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AUTOMATIC CONTROL and COMPUTER SCIENCE Section

CONTENTS

Virtual Instrumentation in the Drive Subsystem Monitoring of A Mobil Robot with Gesture Commands

Cristea Pal, Mihai Horia Zaharia, Iosif Olah, Ştefan Gheorghe Pentiuc, Nicoleta Ştefania Hulea and Florin Tiberiu Pal

Full text

In this paper the use of virtual instrumentation system for academic research and educational purposes is presented. Nowadays Human Computer Interaction (HCI) at the communication level can be used to interact with complex robot systems. A dictionary was created in order to naturally interact with a complex cyberspace system using gestures. The experiments were conducted using a prototype of a mobile robot equipped with a complex computing system. The main functional parameters of the electrical drive subsystem are monitored using virtual instrumentation in order to obtain, by further analysis, an optimal control and high safety.

Key words: robot, gesture commands, virtual instrumentation

2000 Mathematics Subject Classification: *68U07*

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Neural System for Pattern Recognition

Lavinia Ferariu

Full text

The paper addresses the pattern recognition problem by means of neural techniques. The neural classifier is trained in order to identify the type and the position of different objects placed on the conveyor of a manufacturing system. The pattern recognition module has to analyze the images acquired in real-time using a fix camera situated above the conveyor, at a distance that permits to include more than one piece in a single photography. The segmentation is done using an advanced threshold-based procedure, which appropriately crops the photographed objects. The approach applies to the inputs of the neural network a combined set of features, obtained using principal component analysis and histogram analysis. Three different neural networks are considered for classification: multilayer perceptron (MLP), neural networks with radial basis function (RBF) and hybrid neural networks. The last architecture accepts a hybrid hidden layer with sigmoidal and Gaussian neurons. Their design is performed using a constructive genetic procedure. The experiments indicate good overall performances for the designed neural classifiers.

Key words: patter recognition, image segmentation, feature extraction, neural networks, genetic algorithms.

2000 Mathematics Subject Classification: 68T10, 68U10

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Data Storage Method for Systems with 8 Bit Microprocessors or Microcontrollers

Aleodor Daniel Ioan

Full text

This paper presents a method of data storage for micro-systems based on 8-bit microprocessors or microcontrollers that have external buses available, by using an original interface for connecting standard hard disk and CD-ROM drives. Because such devices have 16-bit wide data bus, a special interface is required to split the 16-bit IDE/ATA data transfer in two consecutive 8-bit bus transactions. The interface can be made by software using I/O ports, but in this case all commands and signal strobes to the IDE/ATA device must be implemented by programming, thus slowing down the data transfer rate and increasing the software complexity. A hardware interface can take benefit of the already existent /RD & /WR bus strobes which are wasted by software approach and the block I/O instructions that some microprocessors have. The interface proposed here is a tuned compromise between hardware complexity and efficient use of block I/O instruction: the speed is maximized for read and is less for write, because reads are more frequent than writes. A block schematic is presented, together with a prototype implementation used for testing.

Key words: hard disk drives, embedded systems, bus transactions, hardware strobes, block I/O instructions, sector read/write subroutines, prototype implementation.

2000 Mathematics Subject Classification: 62K10, 68M99

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Volume Visualization Applied in Medical Imaging

Marius Gavrilescu and Vasile Manta

Full text

The paper presents the applications and implementation of GPU-based volume rendering for representing medical data derived from various scanning devices. A brief explanation of the methods more commonly used in direct volume rendering is presented, followed by several examples of more advanced volume visualization, as it is employed in various branches of medicine and medical research, to provide a more detailed and more easily interpretable representation of medical datasets. This modern approach to examining such datasets allows for a closer and more in-depth inspection of the desired anatomical elements, and makes it easier to work with complex data comprising a large quantity of information.

Keywords: volume rendering, raycasting, medical dataset, transfer function, segmentation

2000 Mathematics Subject Classification: 65D18, 68U05

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On Holonic Manufacturing Systems Design and Implementation

Doru Pănescu, Gabriela Varvara and Marius Şutu

Full text

Some results of an on-going research on Holonic Manufacturing Systems are presented. This field refers a collection of methods and techniques seeking to enhance the performance of the manufacturing systems control. The considered approach is derived from a holonic reference model, namely PROSA architecture. Certain additional elements are proposed for the respective method, especially regarding the coordination and implementation issues. Some possibilities to obtain a better management of a distributed manufacturing system are discussed and the appropriate communication mechanism is sketched. A software implementation option that is offered by a specialized agent programming environment is illustrated.

Keywords: Holonic Manufacturing System, PROSA Architecture, Holon Coordination, Service Oriented Operation, Agent Based Programming.

2000 Mathematics Subject Classification: 93C83, 68T27

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Industrial Inspection System Using Triangulation

Cristian Smochină and Vasile Manta

Full text

The 3D shape of the object has become very important for some fields in industry, like reconstruction or inspection of the surfaces of different products. In this paper we focus on using range cameras in the field of product's surfaces inspection and we analyze and determine the position between the elements of the machine vision system: the camera, the laser and the object to inspect, that gives images with the best quality.

Keywords: Triangulation, 3D shape, Inspection system, Resolution.

2000 Mathematics Subject Classification: *68U07, 93C83.*

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Volume Illumination Based on Lit Sphere Maps

Paul Herghelegiu and Vasile Manta

Full text

Non-photorealistic rendering techniques are commonly used for enhancing or suppressing details of a scene. Applying a lighting effect on a specific part of the scene is a common method used for enhancing perception over that part and to draw user's attention in the region of interest. In this paper, we present the concept of realistic illumination of a volume by applying the lighting effects onto the textures used in the volume rendering process. In order

to create a non-photorealistic shading style, we use sphere maps that we convert into textures. Our implementation of these methods permits the interactive creation of lighting models and generation of volumetric illustrations.

Keywords: volume visualization, volume illumination, sphere map, transfer function.

2000 Mathematics Subject Classification: 65D18, 68U05

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In Memoriam Dan GÂLEA

Full text