Resúmenes en Inglés
English Abstracts

Comfort Control Techniques in Buildings

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Abstract: Most of the time, people perform their daily activities within buildings, making it necessary to monitor the conditions of comfort (thermal, visual and air quality) within them, trying to minimize energy consumption simultaneously. A review of techniques for comfort control in building is presented in this work. The paper also shows results obtained in the implementation of a hierarchical control system, which provides adequate thermal comfort inside the CDdI-CIESOL-ARFRISOL (Research Container Demonstrator – Centre for Solar Energy Research – Strategic Singular Project ARFRISOL) of the University of Almería. Copyright © 2010 CEA.

Keywords: Hierarchical control; Thermal comfort; Visual comfort; Air quality.

Overtaking with Autonomous Vehicles on Two-Way Roads

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Abstract: Research on cooperation and control among autonomous vehicles is in the vanguard of the Intelligent Transportation Systems (ITS). Some examples are the intersection manoeuvres, Adaptive Cruise Control (ACC), and overtaking, among others. Overtaking requires special attention in dynamic environments, especially when there is a vehicle coming from the other direction on a two-way road. In this paper a decision algorithm, a communication system among three vehicles and a fuzzy logic control, to implement the overtaking manoeuvre are explained. Different use cases has been considered, they evaluate if to finish or to abort in a safe way the overtaking manoeuvre. The results show a good performance of the fuzzy control based in human knowledge for high risk manoeuvres.Copyright © 2010 CEA.

Keywords: Inter-Vehicle Communication, Overtaking, fuzzy control, autonomous vehicle, GPS.

Model of Identification of Sound Source. Application to Noise Engine.

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Abstract: Community noise regulations put stringent requirements on the exterior noise emission of vehicles. Noise from engines and tires are the main contributions to noise pollution caused by traffic. Automobile manufacturers are supervised to certify that their vehicles comply with noise emission standards by measuring noise levels according to procedures defined by international standards, commonly known as Pass-by and Coast-by noise tests. In this respect, it is imperative to establish accurate engine noise prediction models. The purpose of this paper is to develop simple source models for engine noise using a mock-up panel of loudspeakers set up following the substituted monopole technique. The number and quantification of the sub-source factors is established here by the different cases in study. The real-life experience of listening to this sound is assessed by the implementation of DIN 45631/ISO 532B Loudness representation and the evaluation of the related sound quality, together with the annoyance level, is determined in a quick and economical manner, in contrast to other existing techniques. Copyright © 2010 CEA.

Keywords: Identification, Synthesis noise, inverse problem, source modeling, ASQ.

Adaptive Bilateral Control Systems through State Convergence in Teleoperation

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Abstract: This paper presents the design and application of an adaptive control method for a bilateral of teleoperation system. The scheme and control algorithm has been formulated in the space of states following a control technique through State Convergence of master and slave. On this scheme control has been adjusted through the adaptive method the gain the of control loops to obtain a stable bilateral system with the wanted reflection of forces. The validation of the control method designed has been carried out with an experimental system master-slave of one degrade of freedom. Copyright © 2010 CEA.

Keywords: Adaptive control, States Convergence, Modeling, Teleoperation, Bilateral.

Hybrid Controller Design for Virtual Environments in Teleoperation

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Abstract: This article presents the design and implementation of an hybrid controller for a robotic teleoperation system. The low-level control structure is designed to control both, the position of the remote manipulator as well as the interaction force. In the local station the dynamics of the human operator and together with a model of a remote site included the environment. The supervisor controller is designed using the theory of hybrid systems and an automata was used for modeling the discrete event part. The theoretical results are validated through a simulation platform of a commercial robot. Copyright © 2010 CEA.

Keywords: Telerobotic, Robot Control, Event Discrete System, Simulation, Control System Design.

Fuzzy Control Application to a Magnetic Suspension System: Experimental Comparison

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Abstract: In this work, a comparative experimental study of a fuzzy control scheme applied to a magnetic levitation system is presented. In this study, the experimental system responses for the case of position regulation of a sphere in levitation, for several control schemes, are shown. The applied position fuzzy control to the magnetic levitation system of a metallic sphere is of the PD type with current feedforward, equivalent to a gravity compensation. The main contribution of this work is the experimental application, in real time, of a fuzzy control in a magnetic levitation system and its comparison with other linear and non-linear control schemes; namely, PD and PID controllers with feedforward compensation and an Interconnection and Damping Assignment-Passivity Based Control scheme, a recently approach introduced in the control literature Copyright © 2010 CEA.

Keywords: Fuzzy control systems, nonlinear systems, electromechanical systems, magnetic levitation system, PID control, IDA-PBC control.

Implementation of Supervisors in a Reference Architecture Based in Holonics Manufacturing Systems

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Abstract: Integration Architecture for the Automation of a Production Complex is a reference architecture based on holonics manufacturing systems that it divides the processes in production units. Each production unit represents a part of the process (and its control) with autonomy and capacity to negotiate with the other production units. This work presents a method to model and to implement supervisors of discrete events in the production unit. The supervisor is modeled with a Petri net to which is added an interface to be able to read the events and to execute the actions of the process. The method allows to simulate, to prove and to modify the supervisor easily this makes that the production unit is flexible to the changes in the product or in the process. Copyright © 2010 CEA.

Keywords: Holonics manufacturing systems, Supervisor, Discrete events systems, Petri nets.

Contributions to the Theory and Implementation of the LSCR Method

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Abstract: The LSCR method (Leave-out-Sign-dominant-Correlation-Regions) provides confidence regions for the parameters of a system by evaluating a set of correlation functions calculated for the available data. To do the approximation for the whole region, the procedure must be repeated for each value of the parameter vector. The main attributes of LSCR are its validity for a finite set of data and the scarce assumptions on the noise. However, the procedure needs much computational effort, which limits its application to very simple cases. In this work some theoretical aspects of the LSCR method are improved and some implementation alternatives are suggested. It is also compared, in terms of computational effort, with Bootstrap, another way to obtain confidence regions. Copyright © 2010 CEA.

Keywords: Modeling error, Prediction error, Parameter estimation, Uncertainty.

Design Procedure to Minimize Power Consumption and Latency in WSAN

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Abstract: Currently there is great interest in the development of industrial applications using wireless networks, principally to increase flexibility and reliability of these applications and to reduce the implementation cost. However, in control applications, as a consequence of latency and jitter generated by the network, not always a similarity between experimental results and desired performance can be obtained. This is because imprecise models for analyzing and designing these systems have been used, and to use inadequate validation methods and platforms that do not support the models utilized. This paper presents a design method to get a system optimal configuration in order to fulfill with desired performance in control applications and a significant energy saving. Copyright © 2010 CEA.

Keywords: Real-time systems, Wireless sensors and actuators networks, Embedded systems, Real time monitoring and control.

Web-based automatic evaluation system in practical engineering courses

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Abstract: This work introduces a new web tool for education which allows automating the collection and evaluation of practical exercises from different engineering areas. One of the main characteristics of the proposed tool is that allows to customize the exercises for each student. The system makes a functional comparison of the students' proposals with the correct solutions provided by the professors in order to give automatically a grade to the students. The platform allows the professor to implement innovative teaching techniques to promote the self-learning in mass courses. Results of the use of the evaluation system in two engineering courses are presented, one in systems theory and another in basic c-programming. Copyright © 2010 CEA.

Keywords: E-learning, LCMS, Automatic evaluation, Systems engineering, ICT in education.