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AUTOMATIC CONTROL and COMPUTER SCIENCE Section

CONTENTS

On Reducing Complexity in LTL-Based Motion Planning

Marius Kloetzer and Narcis Ghiţă

Full text

We propose a computationally feasible method for planning teams of robots based on linear temporal logic specifications. The approach is based on constructing a coarser description for each robot, and then using existing algorithms for solving the problem. Unlike the existing computationally intensive framework dedicated to similar problems, our solution is suboptimal, but it can be applied for large teams of robots evolving in complex environments. The small computation time makes our approach suitable for planning teams of robots even in the case of non-static environments, where the position of regions of interest may change during team deployment.

Key words: linear temporal logic, motion planning, abstraction.

2000 Mathematics Subject Classification: 93C65, 93C85, 68Q45.

top

Dynamic Neighbourhood Pattern-Sensitive Faults in Random-Access Memories. A Fault Coverage Evaluation.

Cristina Huzum and Petru Caşcaval

Full text

The paper presents a study on dynamic faults in random access memories. A new fault model of dynamic neighbourhood pattern-sensitive faults is presented. This model is described by 448 fault primitives and includes dynamic disturb coupling faults, dynamic read destructive coupling faults, dynamic deceptive read destructive faults and dynamic incorrect read coupling faults. A simulation study has been made in order to evaluate the fault coverage of this model by some dedicated memory tests.

Key words: Memory Testing, Functional Fault Model, Dynamic Faults, Neighborhood Pattern-Sensitive Faults.

2000 Mathematics Subject Classification: 94C12.

top

Predictive Control Strategy in Delta Domain for Damping Oscillations in Driveline System

Cristina Budaciu and Corneliu Lazăr

Full text

The paper proposes a predictive control strategy in discrete time δ-representation in order to reduce the oscillations in the driveline. These oscillations appear in modern diesel engines when a high engine torque is generated at low engine speed. The main object of this paper is to present a model based control concept in δ domain which seems to improve both the control performance and control law implementation using fixed point representation in the context of fast sampling. Several simulations were performed in comparison with classical GPC strategy and discrete PID controller. The results obtained with the proposed controller demonstrate better control performances.

Key words: fast sampling, delta operator, predictive control, oscillations.

2000 Mathematics Subject Classification: 34K35, 94A20, 39A21.

top

Fusion of Supervisors in Discrete Event Systems Using Coloured Petri Nets

F.A. de Alencar Menezes and Giovanni C. Barroso

Full text

In this paper it is presented mathematical proof of the method called “Control on Decomposed Colours” for definition of supervisors in the context of discrete event systems modelled by coloured Petri nets as an extension of the theorem proposed by Moody and Antsaklis, using Petri nets. As a result, it is proposed to minimization the number of supervisors by the method “Fusion of Controllers**”.**

Key words: coloured Petri net, supervisory control, discrete event system, fusion of controllers, supervision of coloured Petri nets.

2000 Mathematics Subject Classification: 93C65, 34K35.

top

New Robust Global Asymptotic Stability Criterion for a Class of Nonlinear Discrete Time-Delayed Systems

Maryam Fattahi and Hamid Reza Momeni

Full text

In this paper, the problem of stability will be discussed for a class of nonlinear discrete time-delayed systems with time-varying delay and norm-bounded nonlinearity. The portion of system nonlinearity appears in the states and all delayed states of system. A sufficient condition for checking the stability of system is developed, applying discrete–time Lyapunov–Krasovskii functional. This result is in the linear matrix inequality (LMI) framework, which can be solved easily by using the existing standard numerical software. An illustrative example is presented to confirm the validity of developed approach over the similar cases. In the sequel, the obtained stability condition will be extended to the uncertain discrete time-delayed systems (UDTDS) with norm-bounded parameter uncertainties.

Key words: nonlinear discrete time-delayed systems; Lyapunov Krasovskii functional; linear matrix inequality; norm-bounded parameter uncertainties.

2000 Mathematics Subject Classification: 93D05, 68T37, 65F05.

top

Control Law for Timed Marked Graph Constrained by Marking Exclusion Constraint Or/And

Maen Atli, Zied Achour, Alexandre Sava and Kondo H. Adjallah

Full text

We have already presented a contribution for synthesizing an approach of supervisory control for Discrete Event Systems (DES) modeled by Timed Place Marked Graphs subject to Marking Exclusion Constraint. This paper is a continuation work in this area for building the control law for Discrete Event Systems (DES), where the time is taken in consideration. It solves a forbidden state problems characterized by one of the both types of Marking Exclusion Constraint: MEC-Or and MEC-And. A computationally efficient technique to build the supervisor is proposed, which we take in consideration in the uncontrollable and/or unobservable nature of some events. From the initial state (as known marking), we build time-tables that show us the timeline of tokens distribution over the system. These time-tables help us to build a Control Law Table (CLT), by analyzing this table the supervisor may determine the moment of its intervention.

Key words: component; Discret Event System; control law; Marking Exclusion Constraint; Petri nets; Timed Marked Graph.

2000 Mathematics Subject Classification: 34H05.

top

A Persistent Model for A Class of MIMO Hybrid Dynamical Systems

Lala H. Rajaoarisoa, Nacer K. M'sirdi and Jean F. Balmat

Full text

This paper leads to the identification of a persistent model for a class of a hybrid systems exhibit by a mix of continuous time dynamics, discrete-time and discrete-event dynamics. It is well known that the parameter identification of this kind of system is a difficult problem. In this paper, we address this problem through the study of state estimation of hybrid systems. For the latter, if the operating modes are detectable and observable, we demonstrate the parameters identifiability and the applicability of this property to the system identification procedure. An application is proposed and some results are given.

Key words: Hybrid system, state estimation, modeling, identification, observability, identifiability, detectability, persistently exciting.

2000 Mathematics Subject Classification: 62H12, 93B07, 93H30.

top

Recognition Method for 2d Polygonal Objects

Florin Rotaru, Silviu-Ioan Bejinariu, Mihai Bulea, Cristina Diana Niţă And Ramona Luca

Full text

A 2D polygons recognition method is proposed. Firstly, a polygonal vertex detection is applied and the two strongest guesses are retained. Then a polygonal fitting algorithm using as input the two vertices and the object contour provides a precise object identification and description. The algorithm is suitable for robot vision, quality control or photogrammetry applications when the image objects to be processed have polygonal shapes. A software environment was designed to test and use the proposed method, and to evaluate its speed and accuracy**.**

Key words: vertex detection, polygonal shape approximation, 2D recognition.

2000 Mathematics Subject Classification: 68T10, 17B69.