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الابحاث التي لم تحكم بعد

[1] Modelling and Controlling of Kernel Railroad Crossing Systems (Under Revision)
[2] A Unified Frame Work for Discrete Event Systems (Under Revision)

البحث رقم (1)

Puplished In:

Alexandria Engineering Journal (2011) 50, 305–312

Title

Fault-diagnosis in discrete event systems: Improvements and new results

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Available online 6 October 2011

KEYWORDS

Discrete event systems; IPN; Fault detection and isolation; Industrial processes

Abstract :

The malfunction of sensors, actuators, and erroneous actions of human operators can have some disastrous consequences in high risk systems especially if these systems have multiple faults that can lead to undesirable shutdowns and consequently mass reduction. A reduced interpreted Petri net (IPN) diagnoser has been devised only for safe Petri net models with an output function that associates an output vector to each net marking. The main drawback of this approach is that the Petri net model of the system to be monitored should be diagnosable i.e. all faults can be detected that limits its application on a set of diagnosable models. For non diagnosable Petri net model, the conventional diagnoser incidence matrix has columns with null or similar values that fail to detect a single fault. The conventional diagnoser also cannot detect multiple faults even for diagnosable models. This paper introduces a new local diagnoser to overcome such problems. It decomposes the central IPN-diagnoser into a set of local diagnosers that are linked with multi sessions of the process to be monitored. This decomposition should guarantee that the developed local diagnosers have incidence matrices that

their columns are different from each other. For null values contained in the incidence matrix of a local diagnoser, this paper proposes a set of rules based on the synchronic composition idea to overcome this problem. This proposed scheme allows multiple faults detection and isolation in quick and accurate manner for all Petri net models. Industrial processes are employed for testing the soundness of the proposed scheme.

البحث رقم (2)

Puplished In:

Asian Transactions on Engineering (ATE ISSN: 2221-4267) Volume 01 Issue 05

Title

DEVELOPING A PARALLEL MODEL FOR OIL PRODUCING PROCESS

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Abstract:

This paper introduces a novel Petri net model for an important process in oil industry named oil producing process (OPP) for two reasons. First, the OPP has huge modules. Second it has continuous and discrete modules. In this parallel model, the continuous modules are modeled using intelligent systems while the discrete modules designed using Petri nets. Finally, these continuous and discrete modules are merged in a unified parallel frame work. Two main issues are discussed for developing this unified frame work: First, which graphical tool is appropriate for oil industry modeling and supervision? and second, what methodology is appropriate for modeling and analysis of such industries?. Testing, verifying, and validating the developed parallel model is performed using the Petri net tool software
version 2.1 using real data that are collected from the field of the OPP and its catalogues. Simulation results show that the developed OPP Petri net model has small computational demand due to its compact structure that drastically reduces the scan time limited by the available technologies.

Index Terms:

Automation systems, Hybrid systems, Discrete event systems, intelligent systems, Petri nets.

البحث رقم (3)

Puplished In:

Submitted to A Journal of Discrete Event Dynamic Systems

Title

MODELLING AND CONTROLLING OF KERNEL RAILROAD CROSSING SYSTEMS

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Abstract:

This paper deals with analysis and control of time discrete event systems (TDES) whose behavior is determined by the occurrence of events at moments specified by time intervals. It models and supervises kernel railroad crossing (KRC) systems using time Petri nets and focuses on the control synthesis method, which consists in computing new firing conditions for the timed automaton transitions so that the forbidden locations are no longer reachable. The system to be controlled is modeled by place invariants-based time Petri nets and is analyzed using automata so that the functioning of the system respects given specifications.

Key words:

Automata, Time discrete event systems, Time Petri nets

البحث رقم (4)

Puplished In:

Journal of Engineering Sciences, Assiut University, Vol. 37, No. 4, pp. 969-981, July 2009.

Title

A GENERALIZED PETRI NET-BASED DIAGNOSER FOR FAULT DETECTION AND ISOLATION IN COMPLEX PROCESSES

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(Received May 20, 2009 Accepted June 18, 2009)

Abstract

Recently, an efficient method for obtaining reduced interpreted Petri net, IPN, diagnoser was previously proposed for discrete event systems. This diagnoser consists of a single place and the same number of transitions that the system model has. Although, the current marking of this place (diagnoser) is enough to determine and locate faults occurring in a simple diagnosable discrete event system, it fails to determine and locate faults occurring in a complex non-diagnosable hydride systems that have discrete and continuous variables. Diagnosability means that the PN model is live, strongly-connected, and Transition-invariant (T-invariant); however, most of PN models are not diagnosable. This paper generalizes the IPN-based diagnoser to deals with such complex systems with ease. Chemical batch processes are employed to test the modified IPN-based diagnoser and the simulation results obtained indicate that the proposed diagnoser is promising for industrial processes.

KEYWORDS:

Discrete event systems, Hybrid systems, Fault detection and isolation, Petri nets, Interpreted Petri Nets, Chemical batch processes

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البحث رقم (5)

Title

Design and Implementation of Supervisory Control Schemes in Industrial Automation Systems

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Abstract :

Industrial automation systems have a hybrid nature. Such systems contain continuous activities and discrete event activities, interacting with each other. This paper proposes a control algorithm dealing with the continuous activities, as well as the discrete ones. The discrete event controller performs resource allocation and coordination tasks at the higher level of the hybrid system. The direct implementation of the proposed algorithm to the industrial environment is discussed. Also, a hybrid industrial process, batch one, is handled as an application example to test the proposed algorithm.

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البحث رقم (6)

Puplished In

Journal of Engineering Sciences, Assiut University, Vol. 38, No. 3, pp. 763-781, MAY 2010.

Title

MODELLING OF INDUSTRIAL PRODUCTIVITY PROCESSES

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Abstract

Compared with fault detection and isolation (FDI) issues modeling of an industrial productivity process (IPP) is more important issue due to the fact that FDI schemes usually depend on the developed process models. IPP is always modelled by Grafcet that represents a process model with safe or discrete modules. However, hybrid systems are discrete, continuous, and actually are unsafe. Unlike Grafcet, Petri nets are mathematical approaches that combine a well defined mathematical theory with a graphical representation of the systems' dynamic behaviours. The theoretic aspect of Petri nets allow precise modelling and analysis of the system behaviour, while the graphical representation of Petri nets (PNs) enable visualization of the changes of the system states. According to these reasons, modeling,

analyzing, and verifying of the IPP using Petri nets are valuable issues to be addressed in this paper. Introducing Petrinets as graphical representation tool for modeling and supervision of the IPP instead of Grafcet is the main contribution of this paper. This contribution can be achieved as follows. First, the required information is collected from the expertise and the available catalogues of the IPP to be modeled. Second, the process will be modeled using Petri nets based on the collected information. Third, the PN-modules of the IPP and its net PN-model should be verified and validated using MATLAB-based PN-tool and Pinvariant concepts. Simulation results show that the proposed PN formalism is promising for modelling and validating of the IPP at real time.

KEYWORDS:

Modeling formalism, Hybrid systems, Petri nets, Grafcet, IPP

البحث رقم (7)

Puplished In:

Submission to International Journal of Control, Automation, and Systems

Title

A Unified Frame Work for Discrete Event Systems

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Keywords:

Petri nets, Discrete Event Systems, Fault detection and Isolation, RTP.

Abstract:

Early fault detection and isolation minimize cost and processing time of Rapid Thermal Processing (RTP) systems. This paper develops a unified Petri net-based frame work for fault detection and isolation in such systems. Issues for the RTP systems modeling and supervision are also addressed in this paper. However, event detectability is the corner stone of constructing reliable diagnosers used for constructing the proposed frame work. Accordingly, this paper introduces a modified diagnoser to overcome a detectability problem as well. Simulation results assure the effectiveness of the proposed unified frame work.

البحث رقم (8)

Puplished In:

Minufiya Journal of Electronic Engineering Research (MJEER), Vol. 18, No. 1, January 2008.

Title

Coordination, Resource Allocation, and Deadlock Avoidance of Hybrid Processes Using Discrete Event Supervisors

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Abstract:

The complex man-made systems which have a hybrid nature contain two distinct types of systems, one with continuous dynamics (Continuous Variable Dynamic System; CVDS) and the other with discrete dynamics (Discrete Event Dynamic System; DEDS). Studying such systems is central in designing intelligent hybrid control systems with high degree of autonomy and it is essential in designing discrete event supervisory controllers for continuous local controllers. The main objective of this paper is to design a discrete event supervisory controller for continuous systems. This controller should perform coordination, resource allocation, and deadlock avoidance tasks at the higher level of the hybrid systems. A batch chemical process is employed for testing the proposed scheme in this paper.

Keywords:

Hybrid Systems, DEDS, Supervisory Control, Petri Nets.

البحث رقم (9)

Puplished In:

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Title

Discrete Event Control and Fault Detection and Localization of a Robotic System

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Abstract:

A robotic system at the discrete event level requires a suitable discrete event controller that guarantees coordination and dead lock avoidance. It requires also a robust system of fault detection and localization based on minimum feedback information. This paper proposes a new approach fulfilling the discrete event coordinated control and also achieving the fault detection and localization (FDL) tasks. This approach is based on Petri net model of the robotic system, on Petri net supervisor employing place invariant technique, and based on a Petri net diagnoser on employing g-marking concept. The robotic system under investigation is composed of two autonomous robots to be moved in five rooms according to certain crossing control rules. The application of the proposed approach results in coordinated robots motion and detection and localization of a simulated fault.

Keywords:

Discrete Event Control, Fault Detection and Localization, Robotic Systems, Petri Nets.

البحث رقم (10)

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dx.doi.org/10.1021/ie300072q | Ind. Eng. Chem. Res. 2012, 51, 9812□9824

Title

Recursive Fault Detection and Isolation Approaches of Time-Varying Processes

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ABSTRACT:

Recursive principal component analysis (RPCA) has gained significant attention as a monitoring tool for timevarying systems in recent years. The contribution of this article is the development of numerically efficient and memory-saving recursive fault detection and isolation (FDI) approaches for time-varying processes. The proposed approaches incorporate a recursive PCA based on a first-order perturbation (RPCA-FOP) analysis procedure and two recursive fault isolation methods. The proposed recursive fault isolation methods are the (i) recursive partial decomposition contribution (RPDC) and (ii) recursive diagonal contribution (RDC) methods. Four types of sensor faults, including bias, drifting, precision degradation, and complete failure, are simulated to test the proposed approaches. The utility of the proposed FDI approaches is demonstrated using a nonisothermal continuous stirred tank reactor (CSTR) system.
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البحث رقم (11)

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17th IEEE International Conference on Advanced Thermal Processing of Semiconductors – RTP 2009

Title

Issues in Modeling, Supervision, and Fault Detection for Automated RTP Systems

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Abstract:

Event detectability is the corner stone of constructing reliable diagnosers for Petri net (PN) models. In some PN models, the transition firing sequences are not detectable based on their outputs and structural information only. This paper introduces a modified diagnoser to overcome such problems. The developed diagnoser depends not only on the output and the structural information of the PN models, but also on its associated delta marking vector. The main advantage of the proposed diagnoser is to evaluate the faulty states without checking event detectability and coverability trees of the discrete event

systems. Issues for Rapid Thermal Processing (RTP) modeling and supervision are also addressed in this paper. Early fault detection will minimize cost and processing time of the RTP systems, accordingly, this paper also develops a unified PN-based frame work for fault detection and isolation in these systems.

Keywords:

Petri nets, Discrete Event Systems, Faultf detection and Isolation, +RTP
