ONTOLOGY DEVELOPMENT AND AGENT COMMUNICATION IN AGENT-BASED SIMULATION OF AGVS

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Abstract

For effective information exchange in agent-based systems, domain-specific ontology is strongly needed, which is the vocabulary representing facts and relations of objects in the domain. In this paper, a semi-formal domain-specific ontology for shop floor focusing on Automated Guided Vehicle Systems (AGVS) is presented. The domain-specific ontology is developed on Protégé, a leading frame-based ontology editor, and is further converted into JADE™ (Java Agent DEvelopment Framework) compliant java classes. The developed ontology has been used in agent-communication of a simulator known as agent-based shop floor simulator (ABSFSim). Agent communication used in the ABSFSim is discussed. Agent-based simulation model of a sample manufacturing system is built with ABSFSim and the working of the model is verified and validated by comparing the output with an equivalent model developed in ProModel. The ontology development process presented in this paper is useful for developing agent-based models in different sections of manufacturing and also for developing high level agent-based software platforms for manufacturing systems. 21 refs.

REDUCING DELAY IN HEALTHCARE DELIVERY AT OUTPATIENTS CLINICS USING DISCRETE EVENT SIMULATION

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Abstract

Outpatient clinics are demanding more consideration to enhance their performance and quality of care. This paper presents a thorough exploration of the outpatient clinics' environment at a local hospital. The ophthalmology outpatient clinic was selected for a case study. To this end, the total visit time and service times at stations were collected and fed into a Discrete Event Simulation (DES) model. The model was validated through a statistical comparison with the performance of the real system. Various improvement alternatives were then proposed and investigated using the DES model. Key performance indicators of the system, including expected waiting time and expected visit length, were traced. Findings indicated that many improvement scenarios could be applied with significant amounts of reduction in waiting time up to 29 % and visit length up to 19 % without investing in new resources. 23 refs.

ANALYSIS OF A THREE-STAGE SUPPLY CHAIN WITH LEVEL CONSTRAINTS

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Abstract

Many companies have enjoyed a significant success due to the unique ways in which they have organized their supply chains, which are one of the best ways to compete in today's marketplaces. For make-to-stock production systems the production plans and activities are based on demand forecasting. This is one of the key causes of the bullwhip effect. The bullwhip effect (BE) is the inherent increase in demand fluctuation up the supply chain. In the paper we experimented (by simulating) with a special case of a simple three-stage supply chain using seasonal and deseasonalized time series of the market demand data in order to identify, illustrate and discuss the impacts of different level constraints on the BE. The results are presented for different overall equipment effectiveness (*OEE*) and constrained inventory policies. At higher *OEE* level there is less variability in production processes, but at inventory limitations the impact is more complex. 34 refs.

SIMULATION-BASED ENVIRONMENTAL COST ANALYSIS FOR WORK-IN-PROCESS

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Abstract

Under the modern manufacturing environment-oriented, both productivity and green environmental consideration are made in diverse phases of production operations. In this paper, in order to dynamically analyse and control changes of Work-In-Process (WIP) inventory level, a centralized fuzzy control method is proposed. Additionally, a new environmental management accounting method, Material Flow Cost Accounting (MFCA), is adopted to find and calculate environmental waste hiding in the production processes. Moreover, a simulation model integrated with these methods above is constructed. Based on the simulation data, sensitivity analysis between control factors of WIP inventory level and negative product costs ratio is made. To achieve a reasonable productivity as well as green environmental performance for this case, a corresponding optimized solving measure is put forward by means of OptQuest in the Arena simulation system. Through studying, the proposed control approach of WIP can reduce the green environmental cost, and improve production capacity. 15 refs.