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Title: Coordination of Distributed Federation of Multi-paradigm Simulations and Decision Models for Dynamic Supply Chains
Date: October 20, 2005 (Wed)
Time: 9:30 am
Place: Goldwater Center GWC 510

Abstract:

Supply chains are inherently large-scale dynamic systems (systems of systems). In this talk, we discuss two types of distributed simulations applied for such a dynamic environment. First, applying discrete event simulation to systems of systems leads naturally to federations of distributed simulation models (federates), where federates are executing independently and interacting with each other across a network of multiple processors. In this type of distributed simulations, local simulation clocks must be synchronized so that events in each federate execute in the correct order. To ensure that this happens, we developed a novel time-synchronization approach that allows federates to advance their local clocks at full speed to the minimum estimated next federation time interaction event. This is calculated by a novel look-ahead algorithm at each federate. The first approach lays the foundation for using a multi-scale federation of interwoven hybrid simulations (system dynamic and discrete event) and decision models to support integrated analysis of stability and performance in hierarchical supply chain planning. The proposed methodology entails four stages: plan stability analysis (Stage I), plan optimization (Stages II), schedule optimization (Stage III), and concurrent decision evaluation (Stage IV). We also discuss the infrastructure using HLA 1516 IEEE Standard that we developed to integrate the distributed decision and simulation models. The presentation concludes with a discussion of opportunities for future research.

Bio:

Dr. Young-Jun Son is an Assistant Professor of Systems and Industrial Engineering at The University of Arizona. Dr. Son received his BS degree in Industrial Engineering with honors from POSTECH in Korea in 1996 and his MS and Ph.D. degrees in Industrial and Manufacturing Engineering from Penn State University in 1998 and 2000, respectively. He is an associate editor of the International Journal of Modeling and Simulation and the International Journal of Simulation and Process Modeling. He is a recipient of the SME (Society of Manufacturing Engineers) 2004 M. Eugene Merchant Outstanding Young Manufacturing Engineer Award, the IIE (Institute of Industrial Engineers) 2005 Outstanding Young Industrial Engineer Award, and the IERC 2005 Best Paper Award of the Modeling and simulation Track. He will serve as a co-Program Chair for IERC 2007. Dr. Son has authored or co-authored over 50 publications in refereed journals and conferences, primarily on the theories, models, and methodologies for distributed and hybrid simulation techniques for the analysis and control of automated manufacturing system and integrated supply-chain. He was the faculty advisor for the University of Arizona team that was awarded first place in the eighth IIE/Rockwell Software Student Simulation Contest.