

EPSTEIN INSTITUTE SEMINAR ▪ ISE 651

Distributed Federation of Multi-paradigm Simulation and Decision Models for Planning and Control

ABSTRACT – In this talk, we first discuss three major simulation modeling paradigms: 1) discrete event (DE), 2) agent-based (AB), and 3) system dynamics (SD). A product diffusion model is then used to prove that AB and SD models essentially represent the same system state via probability theory and solving differential equations. We then discuss innovative uses of multi-paradigm simulations to support planning and control decisions. First, we will discuss a simulation-based planning and control (SPC) approach, where a fast-running DE simulation is used to evaluate decision alternatives at the planning stage, and the same simulation model (running in real-time) is used as a task generator to drive a real system (e.g. shop floor system; border patrol system) at the control stage. We then discuss extension of the SPC approach to enterprise level activities (e.g. top floor). To handle computational complexity, both an aggregation approach involving SD models as well as federation of multiple DE models using web services technologies are discussed. Finally, we discuss a highly detailed AB model, where human behaviors (e.g. border trafficking behavior) are represented by an extended Belief-Desire-Intention (E-BDI) framework.



Dr. Young-Jun Son

Professor and Department Chair
Department of Systems and
Industrial Engineering
University of Arizona

SPEAKER BIO – **Dr. Young-Jun Son** is a Professor and the Head of Systems and Industrial Engineering Department at The University of Arizona. He is a Department Editor of the Institute of Industrial and Systems Engineers (IISE) Transactions, and serve on the editorial board for six other international journals. He is an IISE Fellow, and has received several research awards such as the Society of Manufacturing Engineers (SME) 2004 Outstanding Young Manufacturing Engineer Award, the IIE 2005 Outstanding Young Industrial Engineer Award, the Industrial and Systems Engineering Research Conference (ISERC) Best Paper Award (in 2005, 2008, 2009, 2016), and the Best Paper of the Year Award (2007) in International Journal of Industrial Engineering. His research works have been sponsored by NSF, AFOSR, USDOT, USDA, USDOE, NIST, among others. He can be reached at son@sie.arizona.edu.

USC Viterbi
School of Engineering
*Daniel J. Epstein Department of
Industrial and Systems Engineering*

TUESDAY, JANUARY 23, 2018

3:30PM – 4:50PM

USC ANDRUS GERONTOLOGY CENTER (GER), Room 206