DANIEL J. EPSTEIN DEPARTMENT OF INDUSTRIAL AND SYSTEMS ENGINEERING

EPSTEIN INSTITUTE SEMINAR • ISE 651 SEMINAR

Statistics Methods Driven by Engineering Model for System Performance Improvements

Jianjun (Jan) Shi

The Carolyn J. Stewart Chair and Professor
H. Milton Stewart School of Industrial and Systems Engineering
Georgia Institute of Technology, Atlanta, Georgia

ABSTRACT

The rapid advances in cyber-infrastructure ranging from sensor technology and communication networks to high-powered computing have resulted in temporally and spatially dense data-rich environments. With massive data readily available, there is a pressing need to develop advanced methodologies and associated tools that will enable and assist (i) the handling of the rich data streams communicated by the contemporary complex engineering systems, (ii) the extraction of pertinent knowledge about the environmental and operational dynamics driving these systems, and (ii) the exploitation of the acquired knowledge for more enhanced design, analysis, and control of them.

Addressing this need is considered very challenging because of a collection of factors, which include the inherent complexity of the physical system itself and its associated hardware, the uncertainty associated with the system's operation and its environment, the heterogeneity and the high dimensionality of the data communicated by the system, and the increasing expectations and requirements posed by real-time decision-making. It is also recognized that these significant research challenges, combined with the extensive breadth of the target application domains, will require multidisciplinary research and educational efforts.

This presentation will discuss some research challenges, advancements, and opportunities in "statistical methods-driven by engineering models" for system performance improvement. Specific examples will be provided on research activities related to the integration of statistics, engineering knowledge, and control theory in various applications. Real case studies will be provided to illustrate the key steps of system research and problem solving, including (1) the identification of the real need and potential in problem formulation; (2) acquisition of a system perspective of the research; (3) development of new methodologies through interdisciplinary methods; and (4) implementation in practice for significant economical and social impacts.

TUESDAY, APRIL 17, 2012
ANDRUS GERONTOLOGY BLDG (GER) ROOM 309
3:30 – 4:50 PM

Bio

Dr. Jianjun Shi is the Carolyn J. Stewart Chair Professor at H. Milton Stewart School of Industrial and Systems Engineering, Georgia Institute of Technology. Prior to joining the Georgia Tech in 2008 he was the G. Lawton and Louise G. Johnson Chair Professor of Engineering, Professor of Department of Industrial and Operations Engineering, and Professor Department of Mechanical Engineering at the University of Michigan. He got his B.S. and M.S. in Electrical Engineering at the Beijing Institute of Technology in 1984 and 1987 respectively, and his Ph.D. in Mechanical Engineering at the University of Michigan in 1992.

Professor Shi's research interests focus on system informatics and control for the design and operational improvements of manufacturing and service systems. He is one of the early pioneers in the field. He has produced 24 Ph.D. graduates (17 of them joined IE department as faculty members, 6 received NSF CAREER Awards, and one received PECASE award; 3 serves as executive/directors in industrial companies). He has published one book and more than 140 papers (80+Journal papers, and collectively received about 2000+ paper citations). He has also been closely worked with industrial companies and served as PI and co-PI of more than 17 millions dollars research grants. He has led various research projects funded by National Science Foundation, NIST Advanced Technology Program, Department of Energy, General Motors, Daimler-Chrysler, Ford, Lockheed-Martin, Honeywell, Pfizer, and various other industrial companies and funding agencies. The technologies developed in his research group have been implemented in various production systems with significant economic impacts.

Professor Shi is the founding chairperson of the Quality, Statistics and Reliability (QSR) Subdivision at the Institute for Operations Research and Management Science (INFORMS). He currently leads the System Informatics and Control Group of ISyE at Georgia Institute of Technology. He also served as the Director of Program in Manufacturing, co-Director of Global Automotive and Manufacturing Engineering, and Director of Laboratory for In-Process Quality Improvement Research (IPQI) at the University of Michigan. He also served as an Associate Director of a NSF Industrial/University Corporative Research Center (IUCRC) and a thrust leader at NSF Engineering Research Center at UM. He is the founding Director of the Quality Science Center at the Chinese Academy of Science in China. He is currently serving as the Focus Issue Editor of *IIE Transactions on Quality and Reliability Engineering*, Editor, *Journal of Systems Science and Complexity*, Senior Editor of *Chinese Journal of Institute of Industrial Engineering*, and associate editor for the *International Journal of Flexible Manufacturing Systems*. He is a Fellow of the Institute of Industrial Engineering (IIE), a Fellow of American Society of Mechanical Engineering (ASME), a Fellow of Institute of Operations Research and the Management Science (INFORMS), and also a member of ASA.

Dr. Shi has received the IIE Albert G. Holzman Distinguished Educator Award (2011), Forging Achievement Award from Forging Industry Educational and Research Foundation (2007), Monroe-Brown Foundation Research Excellence Award at The University of Michigan (2007), Excellence in Service Awards from IIE Transactions (2002, 2003), Robert M. Caddell Memorial Award 2001), and Best Paper Awards from Industrial Engineering Research Conference (2006), ASME International Mechanical Engineering Congress (2000), and North America Manufacturing Research Conference (2000). He has also received the NUTN Distance Education Innovation Team Award (2007) and the Sloan-C Program Profile Team Award (2006) as the co-Director of the GAME. He was the recipients of NSF CAREER Award (1996), the 1938E Award at the COE (1998) and Faculty Achievement Awards at UM (2003).