Seminar Speaker: Dr. Siqian Shen, University of Michigan at Ann Arbor
Industrial Engineering Distinguished Researcher Seminar Series

Time and Location: Friday 9/23/16 from 1:25 to 2:15, Freeman Hall Auditorium

Title: Optimizing the Profitability and Quality of Service in Carshare Systems

Abstract:

We apply stochastic integer programming to optimizing allocation of a carshare fleet to service zones under the uncertainty of one-way and round-trip rental demand. We minimize the cost of purchasing parking lots/parking permits, in reservation-/free-float-based systems, in addition to the cost of allocating vehicles. We employ the Sample Average Approximation (SAA) method, where we construct a spatial-temporal network for each sample to capture the total profit, vehicle relocation cost, and penalties from unsatisfied demand. We minimize the expected cost minus profit, and also consider a risk-averse model variant that penalizes the conditional value-at-risk (CVaR) of unsatisfied demand. For each model, we develop a branch-and-cut algorithm with mixed-integer rounding-enhanced Benders cuts. We test instances generated from Zipcar data in Boston to demonstrate the insights of stochastic carshare system management. We will discuss several extensions of our models in various applications, including vehicle-to-grid integration and building shared service networks for underserved communities.

Bio:

Siqian Shen is an Assistant Professor of Industrial and Operations Engineering at the University of Michigan. She obtained a B.S. degree from Tsinghua University in 2007 and Ph.D. from the University of Florida in 2011. Her research interests are in mathematical optimization, particularly in stochastic programming, network optimization, and integer programming. Applications of her work include healthcare operations management, energy, and smart transportation. She was named one of the two runners-up of the 2010 INFORMS Computing Society Best Student Paper award, was awarded the 1st Place of the 2012 IIE Pritsker Doctoral Dissertation Award, and was a recipient of 2012 IBM Smarter Planet Innovation Faculty Award. She currently serves as an Associate Director in the Michigan Institute for Computational Discovery & Engineering (MICDE).