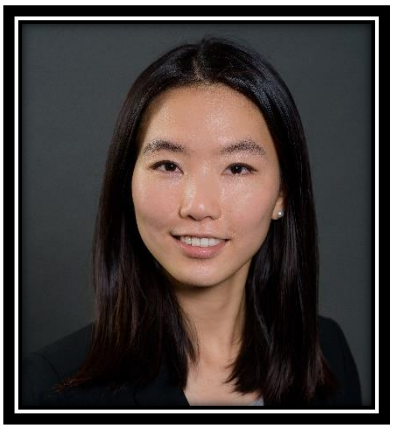
Selection of the Most Probable Best



Abstract: In many business applications, simulation is the primary decision-making tool for a complex stochastic system, where an analytical expression of the problem is unavailable. Often, parameters of these simulators are unknown and must be estimated from data. When plug-in estimates of the parameters are adopted, there is a risk of making a suboptimal decision due to the estimation error in the parameter values. To address this type of *model risk* in the context of simulation optimization, a new concept of robust optimality, *the most probable best* (MPB), is introduced in this talk. The MPB is defined as the solution whose posterior probability of being optimal is the largest given the data when the parameters' estimation error is modeled with a posterior distribution. Some saliant theoretical properties of the MPB will be discussed including its strong consistency to the optimum under the true parameter as the data size increases. In the second half of the talk, efficient sequential sampling algorithms to find the MPB will be introduced and their asymptotic optimality (in efficiency) will be discussed. To demonstrate business insights the MPB formulation provides, a product portfolio optimization problem, where consumer utility parameters are estimated from conjoint survey data will be presented; this is an example inspired by a collaboration with General Motors on their vehicle content optimization program.

Bio: Eunhye Song is Harold and Inge Marcus Early Career Assistant Professor in Industrial and Manufacturing Engineering at the Penn State University and an Associate of the Institute for Computational and Data Sciences. She earned her PhD in Industrial Engineering and Management Sciences at Northwestern University in 2017 and BS and MS degrees in Industrial and Systems Engineering at KAIST in 2010 and 2012, respectively. Her research interests include simulation design of experiments, uncertainty and risk quantification, and simulation optimization. She received the National Science Foundation CAREER award in 2021 and won an honorable mention at the 2020 INFORMS Junior Faculty Interest Group paper competition. She is an active member of the INFORMS Simulation Society and had served on the society's Underrepresented Minorities & Women committee from 2018 to 2020 and organized the 2021 I-Sim Research Workshop.

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TUESDAY, January 18, 2022
3:30pm – 4:30pm
Zoom/Online