



## Large-Scale Discrete Event Simulation Modeling and Machine Emulator for Pharmacy Automation Systems

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**Online (via zoom - <https://binghamton.zoom.us/j/96176546486>)**

### **Abstract**

In this talk, advanced 3D simulation modeling frameworks and techniques will be introduced for the design validation and system improvement of large-scale mail order (MOP) central fill pharmacy (CFP) systems. Prescription demand and the complexity of patients' pharmaceutical protocols have drastically increased during the last decades. In this regard, the development of modern automated prescription filling systems has drawn significant attention. Automated pharmaceutical systems provide greater effectiveness in the overall prescription fulfillment process by realizing advancements in system flexibility, consistency, and patients' drug adherence while augmenting patient safety. Typically, the CFP is a make-to-order manufacturing system that fulfills tens of thousands of customized prescriptions every day by utilizing robotic dispensing systems, which integrate auto-dispensers and facilitate the simultaneous dispensing of medications. Such advanced systems can also minimize drug counting errors and inventory holding costs. In this research, therefore, simulation modeling and optimization has been utilized to study and evaluate the performance of existing and proposed pharmacy automation systems through performing capacity planning analysis, analyzing material flow and facility layout, and evaluating resources allocations. In addition, the prototype of virtual reality, emulators, and "digital twins" will be presented to show how they can be utilized in MOP and CFP system developments and operations.

### **Bio**

Yu (Chelsea) Jin received her BS degree in 2014 from the Department of Information Science and Technology at Jinan University in Guangzhou, China. In 2015, she received her master's degree in manufacturing engineering from the University of Michigan at Ann Arbor. She earned her Ph.D. degree in industrial engineering at the University of Arkansas - Fayetteville in May 2020, and she joined Binghamton University as an assistant professor of Systems Science & Industrial Engineering in Fall 2020. Her research focuses on sensing and analytics, optimization, and simulation for advanced manufacturing and service applications. Her research has been sponsored by the Transdisciplinary Area of Excellence Seed Grant, Integrated Electronics Engineering Center Technical Advisory Board, and Watson Institute for Systems Excellence. She received the IISE Gilbreth Memorial Fellowship in both 2018 and 2019; the Kuroda Graduate Fellowship in Engineering, the Graduate Research Award in 2019, and the Outstanding Graduate Student Award in 2020 from the University of Arkansas. Her work has been published in IISE Transactions and ASME Journal of Manufacturing Science and Engineering. She has been a board member of IISE DAIS Division since May 2022 and an officer of INFORMS QSR International Committee since September 2020. She also served as a reviewer for IISE Transaction, ASME Journal of Manufacturing Science and Engineering, IEEE Transaction, Journal of Intelligent Manufacturing, etc.