



NORTHWEST INSTITUTE FOR CYBERSECURITY EDUCATION AND RESEARCH

CySER Virtual Seminar

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Wayne State University

Cybersecurity and Quantum Computation in Control of Cyberphysical Systems
for Next-Generation Manufacturing

Feb 20, 2023, 3:10 – 4PM PDT

Team Link: [Click here to join the meeting](#)

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Abstract:

Control systems are one of the most critical elements of a next-generation manufacturing system. These systems automate process operation through the computation and communication of actuator actions to final control elements. Physical systems interfaced with computing systems that directly manipulate their behavior in this fashion are termed "cyber-physical systems." In this talk, we will describe our work in developing detection policies for cyberattacks on the controllers of cyber-physical systems. We will also discuss our preliminary work in evaluating the impacts of the imperfections in today's quantum computers on the success of implementing control laws on these devices. Finally, we will discuss the design of strategies for detecting cyberattacks on control systems (on the actuators, sensors, or both at once) tightly integrated with an advanced, optimization-based control algorithm known as model predictive control. In addition, we will discuss our work to date on the investigation of the implementation of controllers on quantum computers. Our vision is that by exploring how control and quantum computing interact, we can provide insights into types of algorithms on quantum computers that may be well-suited for control to seek to guide algorithm development or reveal whether quantum computation should be considered a useful technology for controller implementation or not.

Bio:

Helen Durand is an Assistant Professor in the Department of Chemical Engineering and Materials Science at Wayne State University. She received her B.S. in Chemical Engineering from UCLA and, upon graduation, joined the Materials & Processes Engineering Department as an engineer at Aerojet Rocketdyne for two and a half years. She earned her M.S. in Chemical Engineering from UCLA in 2014 and her Ph.D. in Chemical Engineering from UCLA in 2017 and subsequently started at Wayne State. She received the Air Force Office of Scientific Research Young Investigator award, and her work has also received support from the National Science Foundation, including the CAREER award. She received a Faculty Research Excellence Award and an Excellence in Teaching Award within the College of Engineering at Wayne State University. She was chair of the Next-Gen Manufacturing Topical Conference for the 2021 Annual Meeting of the American Institute of Chemical Engineers.



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