COLLEGE OF ENGINEERING, COMPUTER SCIENCE, & TECHNOLOGY

Seminar in Interdisciplinary STEM Research

March 13th – Thursday, 3:05-4:20 PM PST

Location: E&T C-256

HOSTED BY CREST-CATSUS AND SIKAND SITI CENTERS

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Dr. Abdullah Al Maruf is an Assistant Professor in the department of Electrical and Computer Engineering. He earned his Ph.D. from Washington State University and completed his postdoctoral training at the University of Washington. His research interests focus on developing theories and algorithms for the control and resilience of large-scale dynamical networks and cyber-physical systems, particularly in the presence of disturbances, faults, or attacks.

Abstract: Critical infrastructures such as power grids and transportation systems are large dynamical systems with multiple heterogeneous, interconnected nodes. New actuation and sensing technologies, as well as various cyber components, including embedded computation and communication devices, are increasingly being deployed in these systems to provide better functionality and automation. However, these advancements have also introduced significant vulnerabilities, as adversaries can now exploit unauthorized access to actuation and measurement capabilities to compromise systems. Such unauthorized access would allow the adversary to learn sensitive data or manipulate the dynamics of the system to cause damage. In large-scale networked settings, these threats are further exacerbated by the potential for attacks or faults in one subsystem to propagate across interconnections, causing widespread disruptions. In this talk, I will present my research on addressing these critical challenges. Specifically, I will highlight my approaches to developing theories and design algorithms for resilient controls and strategies for dynamical networks and cyber-physical systems. These approaches aim to guarantee the system's stability, safety, privacy, and other performance objectives in the presence of adversarial attacks, faults, and disturbances. I will briefly share results from my recent and ongoing works, focusing on how the underlying network topology can be leveraged to develop distributed controls and resilient solutions that safeguard system functionality against diverse threats.

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