UTC INSTITUTE FOR ADVANCED SYSTEMS ENGINEERING

SEMINAR SERIES

From models and data to proofs for cyber-physical systems using discrepancy

Traditional approaches for testing and certification are beginning to be stretched at the seams for systems that involve complex software implementation of controllers. Although verification and validation (V&V) makes up for a major part of product design effort, design bugs are often found too late in the process and cost millions. In the most recent standard for airborne software certification (DO-178C), model-based design and formal methods are put forward as alternatives to testing as a way for building high assurance systems; automotive and other industries are following this lead. In this context, I will present our work on developing a verification tool (C2E2) for simulation-driven formal verification of cyberphysical systems. Exact verification is undecidable, but access to numerical simulation data together with static analysis for discrepancy of the system can make bounded time verification decidable. Our tool C2E2 shows that the approach can be used to solve realistic verification problems. I will discuss several recently developed connections between this central notion of discrepancy which quantifies sensitivity of the system, with notions of compositional reachability analysis, optimal state estimation, and privacy.

Sayan Mitra

Sayan Mitra is an Associate Professor of Electrical and Computer Engineering at the University of Illinois at Urbana-Champaign. His research interests are in formal verification, distributed computing and cyberphysical systems. He holds a PhD from MIT (2007) and MSc from the Indiana Institute of Science, Bangalore. He was a postdoctoral fellow at the Center for Mathematic of Information of CalTech, and held visiting faculty positions at TU Vienna, Oxford University and Kirtland Air Force Research Program Award in 2012, IEEE-HKN C. Homes MacDonald Outstanding Teaching Award (2013), and several best paper awards.

Monday September 19th, 2016
1:00pm - 2:00pm

UConn, Storrs Campus – ITEB 336
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Upcoming Distinguished Lectures

10/06/16 – Olivier de Weck
When is complex too complex? Graph energy, proactive complexity management and the first laws of system engineering

10/17/16 – Wei Chen
Design under uncertainty; multidisciplinary design optimization; simulation-based design

Upcoming Seminars

10/03/16 – Amit Surana
Koopman Operator Theoretic Framework for Nonlinear System and Control Applications

11/07/16 – Meaghan O'Neil
Applying Systems Engineering to the Development of Healthcare Capabilities

11/28/16 – Masayoshi Tomizuka
Recent Advances in Robot Controls for Factory Automation

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