UTC INSTITUTE FOR ADVANCED SYSTEMS ENGINEERING

SEMINAR SERIES

Formal Methods for Dynamical Systems

In control theory, complex models of physical processes, such as systems of differential equations, are usually checked against simple specifications, such as stability and set invariance. In formal methods, rich specifications, such as languages and formulae of temporal logics, are checked against simple models of software programs and digital circuits, such as finite transition graphs. With the development and integration of cyber physical and safety critical systems, there is an increasing need for computational tools for verification and control of complex systems from rich, temporal logic specifications.

The formal verification and synthesis problems have been shown to be undecidable even for very simple classes of infinite-space continuous and hybrid systems. The focus of this talk is on discrete-time linear systems, for which it is shown that finite abstractions can be constructed through polyhedral operations only. By using techniques from model checking and automata games, this allows for verification and control from specifications given as Linear Temporal Logic (LTL) formulae over linear predicates in the state variables. The usefulness of these computational tools is illustrated with various examples.

Calin Belta

Calin Belta is a Professor in the Department of Mechanical Engineering, Department of Electrical and Computer Engineering, and the Division of Systems Engineering at Boston University, where he is also affiliated with the Center for Information and Systems Engineering (CISE) and the Bioinformatics Program. His research focuses on dynamics and control theory, with particular emphasis on hybrid and cyber-physical systems, formal synthesis and verification, and applications in robotics and systems biology. Calin Belta is a Senior Member of the IEEE and an Associate Editor for the SIAM Journal on Control and Optimization (SICON) and the IEEE Transactions on Automatic Control. He received the Air Force Office of Scientific Research Young Investigator Award and the National Science Foundation CAREER Award.

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12:00pm - 1:00pm

UConn, Storrs Campus – ITE Building 336

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Upcoming Distinguished Lectures

05/19/16 – Krithi Ramamritham
Being Smart: The Role of Timely Analytics

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

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

Upcoming Seminars

09/08/16– Chris Ha
Think Like a Customer, Act like a Startup in Analytics Space

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