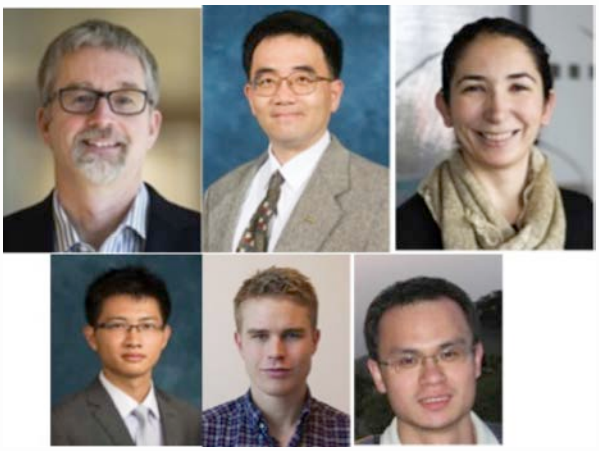
COLLEGE OF ENGINEERING

Control Seminar

Sponsored by: Bosch, Ford, and Toyota

Correct-By-Construction Control Software Synthesis for Highly Dynamic Systems



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Friday December 4 & 11, 2015

3:30 – 4:30 p.m. • 1500 EECS

ABSTRACT: A plethora of driver convenience and safety automation systems, such as electronic stability control, adaptive cruise control and lane keeping are being introduced into production vehicles. The increase in safety-related functions signifies the need for certification of correctness of the corresponding control software. Current practice for certification is through extensive testing, which constitutes a bottleneck in system design and development cycles. This burden can be partially alleviated by adopting correct-by-construction control software synthesis techniques, where correct by construction means that the control software is guaranteed to meet its formal specifications given a set of assumptions on the physical plant and implementation platform.

This two-part seminar will present results from a National Science Foundation Frontiers Grant on "Correct-by-Design Control Software Synthesis for Highly Dynamic Systems." Part 1 on December 4 will give an overview of the grant and then focus on a methodology that allows safety conditions---expressed as control barrier functions---to be unified with performance objectives---expressed as control Lyapunov functions---through a quadratic program.

Part 2 on December 11 will focus on an alternative approach through polyhedral controlled-invariant sets and discuss obstacle avoidance through barrier functions.
This work is done in collaboration with Aaron Ames (Georgia Tech) and Paulo Tabuada (UCLA).