Course Announcement FALL 2008

EECS 661 DISCRETE EVENT SYSTEMS

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Time: Monday - Wednesday: 10:30 am to 12:00 pm
Room 3433 EECS

Prerequisite: Graduate standing

Description:
This course is intended for engineering and computer science graduate students (Master's or Ph.D. level) who want to learn about dynamic systems with discrete state spaces and event-driven transitions. Discrete Event Systems, as they are called, arise in the modeling of technological systems such as automated manufacturing systems, communication networks, software systems, process control systems, and transportation systems. In embedded and networked systems, discrete event dynamics are coupled with continuous dynamics, giving rise to what are called Hybrid Systems. This course will introduce students to the modeling, analysis, and control of discrete event systems. The modeling of hybrid systems will also be introduced. Examples from the above areas will be used throughout the course to illustrate the main concepts.

661 is offered in the fall semesters of even years. There are no specific course prerequisites.

Textbook: "Introduction to Discrete Event Systems - Second Edition" by C. Cassandras and S. Lafortune, Springer, 2007

Grading: Homework assignments, two exams, and a short project.

(See over for Syllabus)

Syllabus:

- Finite-state automata models of discrete event systems: notions of deadlock and livelock, product and parallel composition, observers, diagnosers.
- Petri net models of discrete event systems: reachability analysis with coverability tree, structural analysis with invariants.
- Supervisory control of discrete event systems: controllability and observability, nonblocking, modular control, decentralized control.
- Control of Petri nets by place invariants.
- Timed automata models of discrete event systems: parallel composition, reachability analysis by untiming.
- Hybrid automata models of hybrid systems: basic notions.
- Introduction to stochastic models of discrete event systems and to discrete event simulation (if time permits).

Several software tools will be used in the course: UMDES, DESUMA, and Matlab with Stateflow.