Modeling and Simulation

Rationale

Systems have become so complex that it is often the case that understanding them cannot be done analytically. Therefore, their behavior can be observed by modeling them and simulating them. This course will introduce the theories and applications of computer modeling and simulation, focusing on discrete event system modeling and simulation.

Course Description

Basic concepts of systems modeling, in-depth discussions of modeling elements, simulation protocols, and their relationships are covered. The modeling and simulation techniques will be illustrated by examples in DEVSJAVA, which is a Java implementation of the systematic and generic DEVS (Discrete Event System Specification) approach to modeling and simulation. Related application domains of this course include communication, manufacturing, social/biological systems, and business. Some advanced concepts and practices will be presented to attract students' interests in a seminar format.

Topic List

Topics may include but are not limited to:

- Computer Modeling
- Simulation Protocols
- Discrete Event Models
- Tools For Simulating Dynamic Models
- Tools For Simulating Complex Systems

Learning Goals

Students are expected to learn concepts of computer modeling and simulation applicable to a wide variety of technological, natural, and social systems, provide hands-on experience with modeling and simulation and specifically object-oriented simulation of discrete event models. After the class, students will establish a sound foundation of computer modeling and simulation and learn a set of computer-based tools for constructing, simulating and analyzing dynamic models of complex systems.

Assessment

The course includes three homework assignments and a term project (report and demonstration). The total grade is broken down as follows (subject to change): homework 1 20%, homework 2 20%, homework 3 25%, term project 35%.