Time: Thurs Feb 14 2.30 PM - 3.30
Come a bit early for coffee and a snack.
Place: 2014 Minto Centre

Prof. Gabriel Wainer

A Model-Based Methodology for Developing Embedded and Hardware-in-the-Loop Simulations
Plus: some ideas on visualization...

Abstract:

Embedded real-time software construction has usually posed interesting challenges due to the complexity of the tasks executed. Most methods are either hard to scale up for large systems, or require a difficult testing effort with no guarantee for bug-free software products. Formal methods have showed promising results; nevertheless, they are difficult to apply when the complexity of the system under development scales up. Instead, systems engineers have often relied on the use of modeling and simulation (M&S) techniques in order to make system development tasks manageable.

M&S let users experiment with "virtual" systems (including advanced visualization engines), allowing them to explore changes, and test dynamic conditions in a risk-free environment. This is a useful approach, moreover considering that testing under actual operating conditions may be impractical and in some cases impossible.

We will present an M&S-driven framework to develop embedded systems based on the DEVS (Discrete Event systems Specification) formalism. CD++ is a software environment that implements DEVS theory with extensions to support real-time model execution in embedded systems. CD++ was used as the base for our development, building on previous research focused on real-time applications with hardware-in-the-loop. The use of DEVS improves reliability (in terms of logical correctness and timing), enables model reuse, and permits reducing development and testing times for the overall process. Consequently, the development cycle is shortened, its cost reduced, and quality and reliability of the final product is improved.

The independence between simulation and models allow the users to create advanced visual environments, integrated seamlessly to the simulation tools. We will discuss how to interface advanced 3D visualization environment (based on Maya, VRML and other standards), showing different applications of the results.