Distinguished Lecture Series

Computing Needs Time

Monday, December 7th, 2009   10:00 am
Auditorium 106 at new IIS Building

Edward A. Lee

Robert S. Pepper Distinguished Professor, University of California at Berkeley

Abstract

Cyber-Physical Systems (CPS) are integrations of computation and physical processes. Embedded computers and networks monitor and control the physical processes, usually with feedback loops where physical processes affect computations and vice versa. The prevailing abstractions used in computing, however, do not mesh well with the physical world. Most critically, software systems speak about the passage of time only very indirectly and in non-compositional ways. This talk examines the obstacles in software technologies that are impeding progress, and in particular raises the question of whether today's computing and networking technologies provide an adequate foundation for CPS. It argues that it will not be sufficient to improve design processes, raise the level of abstraction, or verify (formally or otherwise) designs that are built on today's abstractions. To realize the full potential of CPS, we will have to rebuild software abstractions. These abstractions will have to embrace physical dynamics and computation in a unified way. This talk will discuss research challenges and potential solutions.

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