

# Resurrecting Laplace's Demon: The Case for Deterministic Models

*Edward Lee (from UC Berkeley) is one of the pioneers in modeling and building realtime and cyber-physical systems, and he has a vast experience in working with industry.*



**What:** Open lecture

**Who:** People from both academy and industry may be interested in his talk

**When:** Thursday April 20 at 11:00 to 12:00

**Where:** at MDH, Västerås, OMEGA Room

**Title:** Resurrecting Laplace's Demon: The Case for Deterministic Models

## Abstract

In this talk, I will argue that deterministic models have historically proven extremely valuable in engineering, despite fundamental limits. I examine the role that models play in engineering and contrast it with the role that they play in science, and I argue that determinism is an extraordinarily valuable property in engineering, even more than science. I will then show that deterministic models for cyber-physical systems, which combine computation with physical dynamics, remain elusive in practice.

I will argue that the next big advance in engineering methods must include deterministic models for CPS, and I will show that such models are both possible and practical. I will then examine some fundamental limits of determinism, showing that chaos limits its utility for prediction, and that incompleteness means that at least for CPS, nondeterminism is inevitable.

## About the speaker

Edward A. Lee is the Robert S. Pepper Distinguished Professor in the Electrical Engineering and Computer Sciences (EECS) department at U.C. Berkeley. His research interests center on design, modeling, and analysis of embedded, real-time computational systems. He is the director of the nine-university TerraSwarm Research Center (<http://terraswarm.org>), a director of Chess, the Berkeley Center for Hybrid and Embedded Software Systems, and the director of the Berkeley Ptolemy project. From 2005-2008, he served as chair of the EE Division and then chair of the EECS Department at UC Berkeley.

Edward A. Lee is co-author of six books and hundreds of papers. He has led the development of several influential open-source software packages, notably Ptolemy and its various spinoffs. He received his BS degree in 1979 from Yale University, with a double major in Computer Science and Engineering and Applied Science, an SM degree in EECS from MIT in 1981, and a PhD in EECS from UC Berkeley in 1986. From 1979 to 1982 he was a member of technical staff at Bell Labs in Holmdel, New Jersey, in the Advanced Data Communications Laboratory. He is a co-founder of BDTI, Inc., where he is currently a Senior Technical Advisor, and has consulted for a number of other companies.

He is a Fellow of the IEEE, was an NSF Presidential Young Investigator, won the 1997 Frederick Emmons Terman Award for Engineering Education, and received the 2016 Outstanding Technical Achievement and Leadership Award from the IEEE Technical Committee on Real-Time Systems (TCRTS).