Networked System Distinguished/CS Seminar Series

**Title:** An Operating System Architecture for CyberPhysical Systems in Buildings and Grids – steps toward sustainable energy networks

**Speaker:** David E. Culler, Electrical Engineering and Computer Science, University of California, Berkeley

**Date:** Friday, May 9, 2014 at 11:00 AM – 12:00 PM

**Location:** DBH 6011

**Abstract:** Today's networks allow us to connect almost everybody and, increasingly, to connect almost everything of value. This new tier of the Internet connects directly to the physical world, allowing a real-world web of physical information to stream into and out of the information processing enterprise, driving decision making and action.   Created to understand the ecophysiology of natural systems, this technology is finding many applications in the quest to improve the sustainability of electric grids and the built environment.  In this talk, we explore developments toward an operating system architecture for buildings - where in the US we spend 90% of our time, over 70% of our electrical energy, and nearly 50% of our GHG emissions - in the context of a responsive grid.   We examine how pervasive monitoring, which serves to identify waste and opportunities for energy efficiency, and be integrated into building systems; how diverse sources of physical information can be homogenized to enable an innovative cyber-physical application ecosystem; and how a building operating system and services can provide a foundation for advanced control techniques that operate in concert with external factors, such as energy availability and weather, and for personalized environmental conditioning.  To be quaint, "there's a building app for that."   This work touches several i4energy projects addressing the challenge of creating sustainable energy networks.

**Bio:** David Culler is a Professor and Chair of Electrical Engineering and Computer Sciences, and Faculty Director of i4energy at the University of California, Berkeley.  Professor Culler received his B.A. from U.C. Berkeley in 1980, and M.S. and Ph.D. from MIT in 1985 and 1989.  He has been on the faculty at Berkeley since 1989, where he holds the Howard Friesen Chair.  He is a member of the National Academy of Engineering, an ACM Fellow, an IEEE Fellow and was selected for the 2013 Okawa Prize, ACMs Sigmod Outstanding Achievement Award, Scientific American's 'Top 50 Researchers', and Technology Review's '10 Technologies that Will Change the World'.  He has received Test-of-Time awards from NSDI, SIGCOMM, PLDI, HPDC, and ISCA. He received the NSF Presidential Young Investigators award in 1990 and the NSF Presidential Faculty Fellowship in 1992.  He was the Principal Investigator of the DARPA Network Embedded Systems Technology project that created the open platform for wireless sensor networks based on TinyOS, and was co-founder and CTO of Arch Rock Corporation and the founding Director of Intel Research, Berkeley.  He has done seminal work on networks of small, embedded wireless devices, planetary-scale internet services, parallel computer architecture, parallel programming languages, and high performance communication, and including TinyOS, PlanetLab, Networks of Workstations (NOW), and Active Messages. He has served on Technical Advisory Boards for several companies, including People Power, Inktomi, ExpertCity (now CITRIX on-line), and DoCoMo USA.  He is currently focused on utilizing information technology to address the energy problem and is co-PI on the NSF CyberPhysical Systems projects LoCal and ActionWebs and PI on Software Defined Buildings.

**Host:** Eli Bozorgzadeh, Associate Professor, Computer Science Department