Computer Science

Distinguished Seminar

Networked Systems Design in the Interest of Sustainability

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University of California, Berkeley

Over the past decade the computer and network systems design techniques that have brought such incredible advance within the Information Technology sphere – connecting half the world's population, providing instant access to the world's knowledge, and connecting the physical world – are increasingly being directed at the design of distributed systems for our societal infrastructure. This talk explores a series of use-inspired systems research explorations in such Cyber-Physical systems. The central goal is to enable a supply-following grid, where the major consumers of electricity are able to adapt to the availability of fluctuating renewables. We develop an extensible Building Operating System and Services (xBOSS) that allows commercial and residential buildings to become programmable, and thereby responsive to their external environment and internal human-centered needs. We investigate several directions from this point, creating unprecedented visibility into the distribution tier through a novel time-series query processing system for micro-synchrophasor data, creating micro-environment control networks within buildings, developing a wide-area fabric for authentication and delegation of trust, and even a new wave of low-cost wireless sensor networks. Together, these shed light on how classic computer systems design issues arise in development of a more sustainable infrastructure.

Bio: David Culler is the Freisen Professor of Electrical Engineering and Computer Science and Faculty Director of CITRIS Sustainable Infrastructures 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. 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 Sensys, Usenix, NSDI, SIGCOMM, PLDI, HPDC, and ISCA. 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 Corp. 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 NSF and for several companies. He is currently focused on utilizing information technology to address the energy problem and is co-PI on the NSF Cyber-Physical Systems projects LoCal and ActionWebs and PI on Software Defined Buildings.

Date: September 26, 2016

Time: 10:00 am

209 Computer Science Building

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