Center for Climate and Energy Decision Making
And Carnegie Mellon Electricity Industry Center

Co-Sponsored Seminar

Yuvraj Agarwal

Assistant Professor
Carnegie Mellon University

Presenting on:

"Green Computing: Energy Efficiency at Multiple Scales"

January 27, 2014
12 Noon
(Lunch served at 11:50am)
129 Baker Conference Room
Department of Engineering and Public Policy

Seminar Abstract

Our societal energy consumption is rising at a staggering rate. Part of this problem is due to the rise in energy use, and in turn the carbon footprint, of Information Technology equipment worldwide (devices, servers, networking equipment). Traditional mechanisms to save energy such as duty-cycling by putting computing platforms and their subsystems into power saving sleep modes don't work well in practice due to several application scenarios that require maintaining continuous network presence. I will describe two architectures, Somniloquy and SleepServers, that we have developed that enable IT equipment, such as PCs, to be in a hybrid state of operation where they are able to enter sleep modes while maintaining network connectivity. Additionally, computation can be performed on behalf of the sleeping PCs, allowing for even greater savings. This "sleep-talking" state of operation can save, on average, 70% of the energy consumed by a typical PC.

While computing is indeed part of the problem due to its increasing carbon footprint, in the second part of my talk, I will show that computing is also part of the solution, where it can be used to make other systems much more energy efficient. In particular, I will focus on sensing and control solutions that we have designed and deployed within enterprise buildings to make them more energy efficient and sustainable. I will show that by using fine-grained occupancy information gathered either from battery powered wireless sensors, or from smartphones and WiFi Access Points, the energy consumption of the HVAC system within a building can be reduced dramatically, saving up to 40% in a test deployment. I will also describe our smart energy meter that can measure the energy usage of plug-loads within a building as well as provide a mechanism to control these loads based on a number of policies. Finally, I will describe a new open-source architecture called BuildingDepot to enable development of apps for the "Smart Buildings" of the future

Speaker Bio

Yuvraj Agarwal is an Assistant Professor in the School of Computer Science, within the Institute for Software Research, at Carnegie Mellon University. He completed his PhD from the University of California, San Diego. His research interests are at the intersection of Systems and Networking and Embedded Systems, and he is particularly excited about research problems that benefit from using hardware insights to build scalable and energy efficient systems. In recent years, his work has focused on Green Computing, Mobile Computing and Energy Efficient Buildings. In 2012, he was awarded the "Outstanding Faculty Award for Sustainability" given by the UC San Diego Chancellor. He is a member of the IEEE, ACM and USENIX.

Carnegie Mellon University