

Keynote Talk

ZebraNet and Beyond: Applications and Systems Support for Mobile, Dynamic Networks

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Abstract

Mobile and wireless computing has the potential to offer the next big revolution in how we relate to and make use of our computing devices. In addition to untethered operation, mobile and distributed systems offer the opportunity to consider new computational models in which dynamic, sparsely-connected confederations of embedded computing devices collaborate across wide areas to gather information and solve problems. These systems, however, face significant energy, form-factor and connectivity constraints that influence how they should be designed. In this talk, I will describe our experiences building the ZebraNet system for wildlife tracking, based on sparse, mobile collections of GPS-based sensing devices. Drawing from ZebraNet and other systems experiences, my most recent work seeks to provide dynamic, optimizable systems layers for expressing mobile node relationships and for allowing distributed confederations of nodes to collaborate. I will discuss both the technical challenges of dynamic networks, as well as the broader opportunities for deploying such networks, particularly in low-infrastructure developing regions.

Categories & Subject Descriptors: Network Architecture and Design; Real-time systems and embedded systems

General Terms: Measurement, Performance, Design, Experimentation.

Bio

Margaret Martonosi is currently Professor of Electrical Engineering at Princeton University, where she has been on the faculty since 1994. Martonosi's research interests are in computer architecture and the hardware/software interface, with particular focus on power-efficient systems and mobile computing. In the field of processor architecture, she has done extensive work on power modeling and management and on memory hierarchy performance and energy. Her group developed the Wattch power modeling tool, the first architecture-level power modeling infrastructure for superscalar processors. In the field of mobile computing and sensor networks, Martonosi led the Princeton ZebraNet project, which included two real-world deployments of tracking collars on Zebras in Central Kenya. She now co-leads the Sarana project, which is building software interfaces for collaborative computing among mobile devices.