

Spring 2016 Seminar Series

EXPLORING NEXT-GENERATION TECHNOLOGIES FOR HIGH-PERFORMANCE COMPUTING AND NEAR-THRESHOLD COMPUTING SYSTEMS

FRIDAY JANUARY 22, 2016

2:00 PM – HEC 356

Low-power embedded computing and high-performance computing are pervasive and important in various scales of applications, ranging from battery-powered embedded systems, handheld smartphones, desktop computers and household appliances, to data centers and grid-level applications. In my talk, I will discuss my work on near-threshold computing for low-power embedded systems with next-generation technologies. We investigate the characteristics of FinFET devices and circuits, and optimize the structure of FinFET circuits and systems under near-threshold computing. We propose a device-circuit-architecture cross-layer design framework, starting from accurate FinFET device modeling, logic and memory cell optimization, to performance and energy efficiency enhancement techniques.

In high-performance data centers, over-provisioning of energy storage devices (ESDs) provides new opportunities for performing power capping and capex/opex reduction without performance degradation. We propose the hierarchical ESD structure for data centers and the corresponding provisioning and control framework for design-time optimization and run-time control. I also work on future data center structure and propose the data-center-on-a-chip (DCoC) paradigm. We solve the virtual machine mapping problem in the DCoC paradigm to minimize the communication cost while satisfying chip power budget and power density constraints.

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Xue Lin is a Ph.D. candidate in the Department of Electrical Engineering at the University of Southern California. Her advisor is Prof. Massoud Pedram. Her research interests are (i) near-threshold computing for low-power embedded systems, (ii) high-performance computing and mobile cloud computing systems, and (iii) machine learning and computing in (embedded) cyber-physical systems. Her research work has resulted in two Best Paper Awards, multiple Best Paper nominations, and one IEEE Trans. on CAD Popular Paper. Most of her conference papers are published in highly selective conference proceedings with 20% - 30% acceptance rate.

