



**ECE - Distinguished Lecturer Series**  
**Thursday, Sept. 10, 2009, Dana Research Center 442, 3-4pm**

## **SmartCell: An Energy Efficient Coarse-Grained Reconfigurable Architecture for Stream Processing**

**Prof. Xinming Huang**

Assistant Professor, Department of Electrical and Computer Engineering, Worcester Polytechnic Institute

Host: Miriam Leiser

### **Abstract:**

Many data streaming applications require an integrated platform that is power efficient and dynamically reconfigurable. However, conventional integrated circuit solutions are unable to provide both features at the same time. For instance, a hardwired Application-Specific Integrated Circuits (ASIC) can provide superior power efficiency but offers little if any flexibility. In contrast, a Field-Programmable Gate Array (FPGA) is the popular reconfigurable platform for high performance signal processing but it consumes about 10~30 times more power than an ASIC implementation. This research is aimed to bridge the gap between FPGA and ASIC on power efficiency. This talk will present the SmartCell coarse-grained reconfigurable architecture (CGRA) targeted for stream processing. A SmartCell prototype device integrates 64 processing elements, configurable interconnections, and dedicated instruction and data memories on the same chip, which is able to provide high performance parallel processing while maintaining post-fabrication flexibility. The chip performance is evaluated using a set of benchmark applications. The results show that SmartCell can improve the energy efficiency by 3.6 and 28.9 times when compared with FPGA and DSP implementations, respectively. Therefore, it is a promising reconfigurable and energy efficient platform for stream processing.

### **Bio:**

Xinming Huang is an Assistant Professor in the Department of Electrical and Computer Engineering at Worcester Polytechnic Institute (WPI). He received his Ph.D. in Electrical Engineering from Virginia Tech on December 2001. After completion of his Ph.D., he joined the Wireless Advanced Technology Laboratory, Bell Labs of Lucent Technologies. In July 2006, he joined the faculty of WPI, where he leads the Embedded Computing Laboratory. He was among the recipients of the Central Bell Labs Annual Excellence Award in 2002, the IBM Faculty Fellowship Award in 2004, and the DARPA Young Faculty Award in 2007. His current research interests are in the areas of circuits and systems design for reconfigurable computing, wireless communications, and cognitive radio networks. He is a senior member of IEEE and a member of ACM.