

IEEE COM/CS Chapter Presents:

Embedded Systems Customization Platform for Low-Power and Real-Time Applications

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When: Thu Oct 26 at 11:00am

Where: Engineering & Science Research Building, Arthur St. John Hill Auditorium

Abstract:

Embedded systems have become ubiquitous in our daily lives. The widespread wireless connectivity has resulted in increasingly many new applications for which high-performance, responsiveness, and communication are fundamental. Such applications include distributed sensory nodes for data acquisition and control, wireless telephony and personal organizers with multimedia, network, and security functions, various forms of wearable computing, and many others. The majority of these applications, however, are extremely energy constrained, require real-time guarantees, and increasingly often both. These constraints are creating significant challenges to the traditional embedded system design approaches, which are based on general-purpose processor cores and system software infrastructure, and thus, suffer from power inefficiency and poor real-time guarantees.

This talk present a framework for customizable embedded systems platform, in which the hardware, the system software, and the application are fine-tuned in their interaction and functionality to the requirements of the program under execution. The traditional design approach has been to put together a set of general-purpose embedded processor cores, deploy a domain specific or a general operating system and map on it the set of program tasks. In all such systems, the main culprit for the poor energy efficiency and real-time guarantees is the general-purpose nature of the hardware architecture, the system software, and the interaction between them. We address this problem by introducing a new embedded system platform which offers a cross-layer customizability for the major system components at both hardware and system software levels. First, we outline a framework for memory management from system software level down to hardware architecture. Subsequently, we focus on the process execution control and outline a customization framework which offers application-aware low-cost context switch. Application information regarding data and control flow is used to fine-tune the process execution control mechanisms in order to achieve energy-efficiency and real-time responsiveness.

Bio:

Peter Petrov have received his B.S. and M.S. degrees in Computer Science from Sofia University, Bulgaria, in 1996 and 1998. He received his Ph.D. in Computer Engineering from the University of California, San Diego in 2004. Currently, Dr. Petrov is an Assistant Professor in the ECE department of the University of Maryland, College Park. His research interests are in the areas of application-specific processors, energy-efficient and real-time embedded systems, and hardware/software codesign. He was one of the founding members of the Workshop on Application Specific Processors (WASP) and has served as a Program and a General Chair for that workshop.

Registration is not required. Free lunch will be provided.