

**THURSDAY
MAY 4, 2006**

Scaife Hall Auditorium
Room 125

4:00 PM
Refreshments—3:30 PM



TREVOR MUDGE

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Trevor Mudge received his Ph.D. in Computer Science from the University of Illinois. Since then he has been at the University of Michigan. He was recently named the Bredt Professor of Engineering after a ten year term as Director of the Advanced Computer Architecture Laboratory -- a group of a dozen faculty and 80 graduate students. He is the author of numerous papers on computer architecture, programming languages, VLSI design, and computer vision. He has also chaired 33 theses in these areas.

He is a Fellow of the IEEE, a member of the ACM, the IEE, and the British Computer Society.

SOFTWARE DEFINED RADIO: A HIGH PERFORMANCE EMBEDDED CHALLENGE

Wireless communication protocols today have a computationally demanding workload that has to be supported by mobile terminals. In addition, the need for these terminals to be small and portable dictates a limited energy budget. Traditionally these goals were satisfied by an ASIC solution. However, the need to interoperate between a wide range of protocols has led to research into programmable hardware platforms that can support these protocols in software. This talk will examine the computational requirements of the wideband code division multiple access (W-CDMA) protocol, which is one of the dominant third generation wireless standards. We will provide an analysis of the processing requirements of the core algorithms along with the interactions between them. Our goal is to describe computational characteristics for the computer architect and to provide a high-level analysis of the architectural implications. Several of the key features of W-CDMA that can be exploited include high degrees of vector and task parallelism, small memory footprints for both data and instructions, limited need for complex arithmetic functions such as multiplication, and a highly variable processing load that provides the opportunity to dynamically scale voltage and frequency. We will present a programmable architecture that takes advantage of these characteristics. We will then show that it can be efficiently employed on very different wireless protocols that employ orthogonal frequency division multiplexing (OFDM) technology. OFDM is the basis for much of WiFi and is the choice for 4G proposals.

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For more information:
<http://www.ece.cmu.edu/seminar>