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**Colorado State University's**
**Information Science and Technology Center (ISTeC)**
***presents <u>two</u> lectures by***

# Dr. Trevor Mudge

Bredt Family Professor of Electrical Engineering
and Computer Science
The University of Michigan, Ann Arbor

## ISTeC Distinguished Lecture
## in conjunction with the
## Electrical and Computer Engineering Department and
## Computer Science Department Seminar Series

# "Three Dimensional Integrated Circuits"

**Monday, November 7, 2011**
Reception: 10:30 a.m.
Lecture: 11:00 – 12:00 noon
Location: Lory Student Center Room 222

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## Electrical and Computer Engineering Department Seminar
***sponsored by ISTeC***

# "3D Integrated Circuits & Their Impact on the Design of Computer Systems"

**Monday, November 7, 2011**
Lecture: 3:30 – 4:30 p.m.
Location: Engineering E205

# ABSTRACTS

"**Three Dimensional Integrated Circuits**"

Integrated circuits have employed only 2-dimensions, in the past. Recently this has begun to change and some chip manufactures are starting to take advantage of the third dimension. This talk will discuss why this change is occurring and the opportunities that it opens up to computer system designers. The talk will be aim at a general audience rather than at specialists.

The chips in cell phones, laptops, and the data centers behind the "cloud" are essentially 2-dimensional. The logic circuits and the wires that interconnect them are laid on the surface of a small die of silicon that is from 1 to 2 cm square.

The 2-dimensional nature of chips has been the case since integrated circuits were invented by Robert Noyce and Jack Kirby in the late 1950s. Until recently the restriction to 2-dimensions has not been a limitation because the trend characterized by Moore's Law has meant that chip density doubles every two years—there seemed little reason to venture into the third dimension with its potential for additional cost. In recent years three things have changed: 1) Moore's Law has started to run into difficulties; 2) power consumption in integrated circuits has become a limitation; and 3) the space taken by the chips themselves has become critical. These points will be discussed in more detail in the talk.

**"3D Integrated Circuits & Their Impact on the Design of Computer Systems"**

Integrated circuits have employed only 2-dimensions, in the past. Recently this has begun to change and some chip manufactures are starting to take advantage of the third dimension. This talk will discuss why this change is occurring and the opportunities that it opens up to computer system designers. We will examine this trend in more technical detail using examples from different ends of the computing spectrum: large scale server systems, on the one hand, and mobile platforms, on the other. Many of their requirements are quite different, but they both share a need to be compact and power efficient. We will outline the technical reasons why this is so. Although 3-dimensional integration offers many advantages it also presents a number of technical challenges. We will conclude the talk with a discussion of these challenges and what we can expect for the future.

## SPEAKER BIOGRAPHY

Trevor Mudge (http://www.eecs.umich.edu/~tnm/) received a Ph.D. in Computer Science from the University of Illinois. He is now at The University of Michigan. He was 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 supervised 40 theses in these areas. He is a Fellow of the IEEE, a member of the ACM, the IET, and the British Computer Society.

**To arrange a meeting with the speaker**, please contact MaryAnn Stroub at mstroub.engr.colostate.edu or (970)491-2708.

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