3/8/07 Nanoprobes to Enable Next-Generation Nanotechnology

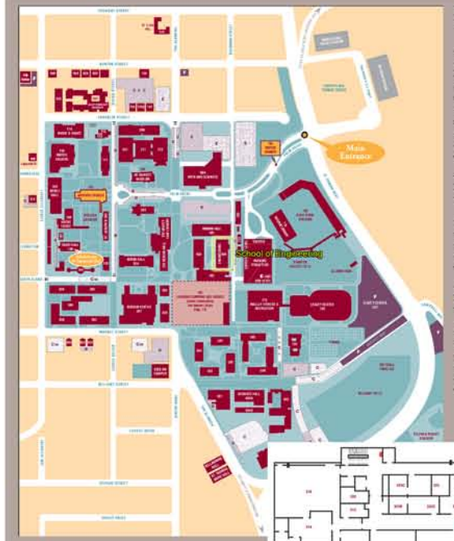
Rapid advancements in the last decade have allowed the visualization and manipulation of matter at an unprecedented scale. The emergent fields of nanotechnology and nanoscale science have developed tools to manipulate structures ranging from individual atoms to particles one hundred thousand times finer than a human hair. What types of nanoprobes are used to visualize and control such tiny objects? How do we measure the properties of matter at this scale? How do these properties change at the interface between the microscopic world and the quantum world? This seminar will give a general description of several nanoprobe tools used to image and control nanoscale objects and phenomena. We will also discuss current nanoprobe research being done at the Stanford-IBM Center for Probing the Nanoscale (CPN).

Kyle Cole, Stanford University

3/15/07 Emerging FPGA Architectures, Software Tools, and Applications

In the highly competitive electronics markets, even an ASIC flawlessly brought to first silicon may not provide the optimal solution for system designers because of their high development cost and long development time. FPGAs, on the other hand, have become a viable alternative challenging ASICs because of the advantages they offer in terms of more flexibility, reduced risk, better time-to-market, and lower overall costs. Additionally, thanks to the recent advancement of FPGA technologies, today's FPGAs have so sig nificant increase in capacity, versatility, performance, and cost effectiveness that more and more system designers are flocking to FPGAs even for volume applications. This talk gives an overview of emerging architectures of FPGAs and various design flows using FPGA. The topics covered includes new FPGA architectures and programming technologies, the growth in FPGAs with new embedded special functional blocks, promising approaches to solve FPGA timing closure issues, recent developments in the area of reconfigurable computing and other applications of hardware acceleration using FPGAs.

Richard Sun, Cswitch Corporation



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1/11/07 Design-For-Manufacturability/Yield (DFM/DFY) in Deep sub-micron processes

Srini Pichumani , Mentor Graphics

1/18/07 A history of early linear predictive coded (LPC) speech

Robert M. Gray, Stanford University

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2/8/07 Overview of Orthogonal Frequency Division Multiplexing

Sarah Kate Wilson, Santa Clara University

2/15/07 Radio Remote Sensing of Atmospheric Tides on Mars and Earth

Kerri Cahoy, Stanford University

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3/1/07 Integrated Digital Control for DC to DC Converters

Brooks Leman, Fyre Storm, Inc.

3/8/07 Nanoprobes to Enable Next-Generation Nanotechnology

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3/15/07 Emerging FPGA Architectures, Software tools, and Applications

Richard Sun, Cswitch Corporation

1/11/07 **Design-For-Manufacturability/Yield (DFM/DFY) in Deep sub-micron processes**

As semiconductor processes scale downwards at a rapid clip, with 65nm in production, and 45/32nm in research and development, the question of product manufacturability and acceptable initial/final yields has takencenter-stage. The industry as a whole, including semiconductor equipment manufacturers, foundries, EDA vendors, is working hard to resolve several issues arising out of these challenges, so that more and more designs can take advantage of the increased integration offered by moving down the deep sub-micron curve. This talk will focus on some of these DFM/DFY challenges and the approaches taken in state-of-the-art tools to addressing these problems successfully and comprehensively.

Srini Pichumani , Mentor Graphics

1/18/07 **A history of early linear predictive coded (LPC) speech**

Voice over IP (VoIP) is popularly considered as a recent technology, but real-time packet speech was demonstrated on the ARPANet over three decades ago --- before the IP protocol existed. This talk sketches the early history of both linear predictive coding (LPC) of speech and of network protocols for realtime low bitrate speech coding for the ARPANet. Beginning with a brief technical survey of the many approaches and developments of LPC, most of the talk is a narrative of the history of LPC and of the first real time successful packet speech demonstration on the ARPANET in1974 and its impact on the development of the Internet protocol (IP). The talk expands on the the article ``Digital Speech and the Internet Protocol: The 1974 Origins of VoIP,'' IEEE Signal Processing Magazine, Vol. 22, July 2005, pp. 87--90.

Robert M. Gray, Stanford University

1/25/07 **An Introduction to Photovoltaics**

Recalling my initiation to photovoltaics at a conference, I shall first give a tutorial on some basics of solar energy and ideas on limiting efficiencies. I shall then talk about my introduction to some practical material and durability issues, and accelerated lifetime testing.

Mei-Ling Shek, Consultant

2/1/07 **The Life of James Clerk Maxwell**

James Clerk Maxwell stands shoulder to shoulder with Newton and Einstein, yet even those of us who have spent decades working with Maxwell's equations are almost totally unfamiliar with his life and times. This presentation, from the viewpoint of a microwave engineer, draws on many sources in providing an understanding of James Maxwell himself. What was Maxwell like as an infant? What was the tragedy at eight years old that profoundly influenced his life? What unique means of transportation did young Maxwell use to escape a cruel tutor? What memorable event occurred on his first day of school? When did he publish his first papers, and what were they about? What did Maxwell have to do with the rings of Saturn? Why did he lose his job as a professor? Why did he have a hard time getting another job? What was his wife like? What is Maxwell's legacy to us? The answers to these questions provide insight into Maxwell the person and add an extra dimension to those four simple equations we have studied ever since. There are no equations in this presentation. The presentation is appropriate for anyone with a general interest in the origins of modern physics. For electronic handouts for the lecture, visit www.sonnetsoftware.com and click on the large Distinguished Microwave Lecture Series" button at the bottom of the "News" section.

James Rautio, IEEE Distinguished lecturer

2/8/07 **Overview of Orthogonal Frequency Division Multiplexing**

Orthogonal Frequency Division Multiplexing (OFDM) is a modulation that is used in many of today's standards including Digital Audio Radio, Wireless Local Area Networks, and Digital Subscriber Lines. This talk will give an overview of OFDM: its history, how it works and its benefits and drawbacks. We will focus on how channel estimation, synchronization and power distribution are applied to OFDM systems. In addition we will discuss both the benefits of OFDM and its drawbacks. The benefits include simplified equalization, immunity to narrow-band interference and bit-loading to the available channel. Drawbacks include high peak-to-average power ratio and sensitivity to synchronization errors.

Sarah Kate Wilson, Santa Clara University

2/15/07 **Radio Remote Sensing of AtmosphericTides on Mars and Earth**

Since the late 1960's, planetary exploration missions have used ultra-stable oscillators onboard spacecraft to transmit simple radio tones through planetary atmospheres. As these electromagnetic waves propagate through the planet's ionosphere and atmosphere, they interact with both neutral and charged particles, and their received signal properties detectably change. The resulting measurement yields vertical profiles of atmospheric refractive index, from which the particle density, temperature, and pressure of the probed atmosphere can be derived. Since 1998, the Mars Global Surveyor spacecraft has collected about 20,000 of these "radio occultation" measurements from its orbit around Mars. We talk about how these measurements can be used to characterize thermal tides (solar-forced, daily-scale waves) in the Martian ionosphere over two consecutive Northern summers. We also discuss how the radio occultation method of remotely sensing atmospheres has recently been employed to study Earth's weather and climate. For Earth, low-earth orbiting satellite constellations are used to receive GPS signals that have passed through the atmosphere and ionosphere. In addition to presenting some results from the CHAMP radio occultation experiments for Earth, we will also touch on the latest Earth radio occultation remote sensing mission, COSMIC, which launched last April and has begun to make its data available to the scientific community.

Kerri Cahoy, Stanford University

2/22/07 **Intellectual Property Overview**

Copyrights, trademarks, trade secrets, and patents are different forms of intellectual property (IP). What are the attributes of these different IP forms, how are each of them used, and why are they likely to be important to you and your future as an electrical engineer.

Jeff Fromm, Hewlett Packard

3/1/07 **Integrated Digital Control for DC to DC Converters**

Power conversion control techniques have been completely analog for decades. Traditional analog techniques have been endlessly refined over the years to continually achieve cost effective implementations for both high and low power converters. While digitally implemented power conversion can already be found in higher power converters in specialized industrial markets, only recently has digital control been proven feasible for lower power, higher volume mainstream consumer applications such as mobile phones, PDAs, and laptop computers. Recent improvements in mixed signal semiconductor processing together with mobile market demand for incessantly increasing complexity in smaller electronics packages have finally created an environment where digital power conversion provides significant advantages and better economy compared with analog techniques.

Brooks Leman, Fyre Storm, Inc.