COMPUTER ENGINEERING GROUP

Prof. Louise Moser

CE CURRENT RESEARCH AREAS

• Electronic Design, Automation & Test
• Computer Networks & Distributed Systems
• System Architecture & Bioengineering
ELECTRONIC DESIGN, AUTOMATION & TEST

- Circuit and system design
- Embedded systems
- Methodologies, algorithms and tools for design, verification and test of heterogeneous systems
- Close collaboration with, and sponsorship from, industry (20+ companies) in addition to DARPA, NSF, SRC and MARCO

THE MOTIVATING CHALLENGE

Combination of increasing complexity, nanometer effects and diversity of on-chip components cause...

- Slowdown in design productivity
- Unpredictability in the design cycle
- Inability to verify / correct complex designs
- Substantial increase in the cost of complex designs
MIXED-SIGNAL, MIXED-TECHNOLOGY INTEGRATED SYSTEMS
(System-on-Chip / System-in-Package)

Department of Electrical & Computer Engineering

COMPUTER NETWORKS & DISTRIBUTED SYSTEMS

Michael Melliar-Smith  Louise Moser  Volkan Rodoplu

Moving from the mere ability to communicate to communication that serves the needs of the application
• User-friendly embedded and enterprise distributed applications
• Robust wireless and mobile communication
• Energy-efficient wireless sensor network protocols and architectures
• Real-time architectures and protocols
• Specialized protocols for harsh environments such as underwater acoustic networks

• Human-Computer Interactions
  Move from text I/O using keyboard, stylus and display to natural language speech I/O as part of multimedia human-computer interfaces

• Computer-Computer Interactions
  Move from traditional transaction protocols to novel protocols that reduce the risk of inconsistency by orders of magnitude
Design, realization, and evaluation of novel architectures and algorithms for a variety of application domains, including biomedical applications.

Current projects address:
- Modeling of uncertainty
- Novel arithmetic algorithms and representations
- Parallel and multi-core processor design
- Hardware acceleration
- Large-scale interconnection structures
- Dynamic adaptive systems
- Machine intelligence
BIOENGINEERING

Embedded systems and associated signaling and processing algorithms to augment human capabilities

- Computer / neuron interfaces
- Biosensors
- Neural prosthetics
- Systems biology

Bioengineering requires novel system and computer architectures

COMPUTER ENGINEERING COURSES

- Major / Minor Areas
  - Computer Architecture
  - Very Large Scale Integration & Computer Aided Design
  - Computer Networks & Distributed Systems

- Additional Minor Areas
  - Machine Intelligence
  - Software Systems
  - Computational Models, Algorithms & Analysis
  - Scientific Computation
  - Graphics & Image Processing
## COMPUTER ENGINEERING COURSES

### Computer Architecture
- ECE 251: Mobile Embedded Systems
- ECE 252B: Computer Arithmetic
- ECE 253: Embedded Systems Design
- ECE 254B: Adv. Computer Arch.: Parallel Processing
- ECE 254C: Adv. Computer Arch.: Distributed Systems
- ECE 257: Fault-Tolerant Computing
- CS 240A: Applied Parallel Computing
- CS 254: Advanced Computer Architecture
- CS 271: Advanced Topics in Distributed Systems

### Very Large Scale Integration & Computer Aided Design
- ECE 219: CMOS Radio Frequency Integrated Circuits
- ECE 220A: Semiconductor Device Processing
- ECE 223: High Performance Digital Circuit Design
- ECE 224A: VLSI Project Design
- ECE 224B: VLSI Project Testing
- ECE 225: High-Speed Digital IC Design
- ECE 255A: VLSI Testing Techniques
- ECE 255B: VLSI Design Validation
- ECE 256A: Introduction to Design Automation
- ECE 256B: Logic/Design Automation
- ECE 256C: Advanced VLSI Architecture & Design
- ECE 256D: Algorithmic Logic Synthesis
## COMPUTER ENGINEERING COURSES

### Computer Networks & Distributed Systems

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<td>Fiber Optic Communications</td>
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<tr>
<td>ECE 228C</td>
<td>Optical Networks</td>
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<tr>
<td>ECE 250</td>
<td>Wireless Communication and Networking</td>
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<td>ECE 254C</td>
<td>Advanced Computer Architecture: Distributed Systems</td>
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