Overview

• Members
  – Seven faculty members with expertise in complementary areas of computer engineering
  – 49 graduate students (36 Ph.D. and 13 MS) as of Spring 2012

• Research scope
  – Computer Vision, Cognitive Radio, SHM
  – Secure Networking, Sensor Node Networking
  – Formal approaches to System-level Design
  – Testing and Verification
  – Secure Embedded Systems
  – Low-power circuits

• Annual research expenditures
  – $ 2.5 M for 2011
CESCA – A Fun place to work
CESCA Day 2012

Presentations
CESCA Day 2012

Presentations

Poster Session
CESCA Day 2012

Presentations

In-Depth Analysis

Poster Session
CESCA Day 2012

Presentations

In-Depth Analysis

Top Notch Embedded Research
CESCA Structure

center for embedded systems for critical applications

Critical Applications
Yaling Yang
Lynn Abbott
JungMin Park

Embedded Systems Design
Leyla Nazhandali
Patrick Schaumont

Design Technology
Michael Hsiao
Chao Wang
Networking

• Faculty Member: Yaling yang
• Research Interests
  – Network protocol design
  – Network performance modeling
  – Network security
• Representative current projects
  – Coexistence of cross-layer network protocols (NSF)
  – Compatibility analysis for wireless routing protocols (NSF)
  – Evolutionary design of wireless routing system (NSF)
  – Hardware-software cosimulation of sensor networks (NSF)
  – Attacker localization in wireless networks (NSF)
Computer Vision

- Faculty Member: Lynn Abbott
- Research Interests:
  - Biometrics
  - Stereo vision
  - 3D surface reconstruction
  - Sensing for autonomous vehicles
- Sample of research projects
  - Image quality assessment for latent fingerprints (NIJ)
  - Autonomous landing of aircraft (NASA)
Secure & Cognitive Radio

- Faculty: Jung-Min “Jerry” Park
- Research Interests
  - Countermeasures for DoS/DDoS attacks
  - Network attack traceback
  - Cognitive radio (CR) networks and CR security
    - Security protocols for incumbent- and self-coexistence
    - Jamming-resilient MAC protocols for dynamic spectrum access
    - Tamper resistance for CR software
    - Policy reasoning engine & policy enforcement
- Representative current projects
  - AUSTIN: Assuring Software Radios have Trusted Interactions
  - Cryptographic API and Subsystem Simulator for Software Defined Radios
Secure Embedded Systems

• Faculty Member: Patrick Schaumont

• Research Interests
  – Cryptographic Engineering
  – FPGA
  – Hardware/Software Codesign

• Representative Projects
  – Hardware/Software Codesign for Security (NSF)
  – Side-channel Analysis (NSF)
  – Secure Circuit Identifiers (NSF)
  – Performance Evaluation for Crypto (NIST)
Test, Verification & Diagnosis

• Faculty Member: Michael Hsiao
• Research Interests:
  – Test and verification of HW and SW
  – Diagnosis of faults and defects
  – Design for test/validation
  – Automated reasoning
• Sample of research projects
  – Dynamic validation using swarm intelligence (NSF)
  – Validation of cognitive radio software (NIJ, NSF)
  – Deterioration modeling of latent fingerprint (NIJ)
  – Formal verification of hardware and software (NSF, SRC)
Software Analysis & Verification

- Faculty Member: Chao Wang
- Research Interests:
  - Software performance
  - Software reliability
  - Software security
- Sample of research projects
  - Parallel and concurrent software verification
  - Embedded software verification
Power-Aware Computing

• Faculty Member: L. Nazhandali
• Power Aware Computing
  • Multi-core Subthreshold-voltage processors
  • MEMS-switched design
  • Simulation framework
• Security Aware Computing
  • Hardware evaluation of security algorithms in ASIC
  • Circuit techniques for chip fingerprinting in secure applications
• SCA Resistant Design
• Representative current projects
  – NSF CAREER
  – Physical Unclonable Functions (NSF)
  – Cryptographic Hardware (NIST)
But I want a GRA!

A faculty member will invest on you as a GRA if he/she believes a high return.
Which courses do I take?! 

• The practical approach:
  – Just enough to graduate
  – Minimize the workload to meet the plan of study

• The academic approach:
  – This is the last time you have a chance to attend class
  – Maximize the workload to match your hunger to learn
Some grad courses this fall

- Abbott – ECE 5554 – Computer Vision Systems
- Hsiao - ECE 5505 - Testing and Verification
- Park - ECE 5560 - Network and Computer Security
- Schaumont - ECE 4530* - HW/SW Codesign
- Yang - ECE 5565 - Network Arch and Protocols
Other courses of note

• Abbott – ECE 5524 – Pattern Recognition
• Hsiao - ECE 5506 - Testing and Verification
• Schaumont - ECE 5520 - Secure Hardware Design
• Yang - ECE5566 - Network Arch and Protocols