ECE 561: HW/SW Design of Embedded Systems

IN

Logic Design

- Understands combinatorial and sequential logic design

Programming Language

- Has experience with programming in C/C++/Java and/or VHDL/Verilog

Computer System

- Has basic knowledge of microprocessors and memory systems

Pre-requisites:

- ECE 251 or equivalent

Concepts:

- Introduction to embedded systems on chip (SoC) design
- Embedded system specification formalisms (petri nets, UML, MSC, state charts, SDL)
- Modeling abstractions and simulation techniques
- SystemC programming
- Hardware components
  - Computation cores (microcontrollers, superscalar/ VLIW processors, DSPs, FPGAs)
  - Memory (SRAM/DRAM, caches, scratchpads)
  - Communication (buses, networks on chip)
  - Analog sensors, actuators, A2D converters
- Software components
  - Real time operating systems (VxWorks)
  - Middleware (CORBA)
- Hardware/software partitioning and co-design
- Real time scheduling and timing concepts
- Design space exploration
- Validation and verification
- Fault tolerant design
- Low power and thermal-aware design

Applications:

Tools:

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OUT

Embedded system design

- Understands challenges and trade-offs between various design decisions

Hardware components

- Understands trade-offs between different hardware configurations and component choices

Software Components

- Understands real-time constraint challenges during software design

Design with SystemC

- Can design and simulate hardware and software components using SystemC

Design Space Exploration

- Can analyze the system level impact of design decisions; be able to use optimization techniques to explore and create (near) optimal configurations

Low Power, Thermal Aware and Fault Tolerant Design

- Understands the design techniques and trade-offs involved for low power, thermal-aware and fault tolerant design

As of 12/9/08