ECEG398: Embedded Systems – Fall, 2006

Basics

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Course Description:

The growing popularity of modern embedded systems calls for a new generation of electrical and computer engineers who can easily cross the boundary between hardware and software. The course is designed to help breed such engineers by introducing students to a balanced view of software and hardware in designing electronic systems. The lectures will survey a broad array of subjects including system specification languages, embedded processors, hardware accelerators, memory architecture, communication architecture, real-time operating systems, hardware-software co-design techniques and verification techniques. The concepts will be reinforced with homework and project assignments that involve system design, modeling and validation. The assignments will involve ARM/Linux-based evaluation boards.

Prerequisites:

ECEU324: Computer Architecture/Organization or equivalent
Experience in C/C++ programming and Linux

Textbook (Recommended):

John Catsoulis, Designing Embedded Hardware (Paperback), ISBN: 0596003625
Karim Yaghmour, Building Embedded Linux Systems (Paperback), ISBN: 059600222X

References:

Tammy Noergaard, Embedded Systems Architecture, Elsevier 2005
Wayne Wolf, Computers as Components: Principles of Embedded Computing System Design, Morgan Kaufman, 2001.
Frank Vahid, Tony Givargis, Embedded System Design: A Unified Hardware/Software Introduction, John Wiley & sons, Inc. 2002

Readings:

1. M. Schlett, "Trends in Embedded-Microprocessor Design," IEEE Computer, August 1998
2. Albert Wang, Chris Rowen, Dror Maydan, Earl Killian, Hardware/Software Instruction Set Configurability for Sytem-on-Chip Processors, DAC 2001
3. L. Benini and G. De Micheli, Networks on Chips: A New SOC Paradigm, IEEE Computer, January 2002
4. C.Kulkarni, G.Ghez, etc. Cache Conscious Data Layout Organization For Embedded Multimedia Applications, Date 2001

5. S. Dutta, R. Jensen, and A. Rieckmann, Viper: A multiprocessor SoC for Advanced Set-top Box and Digital TV Systems, IEEE Design and Test of Computers, Sept.-Oct, 2001, pp.21-31
(The list will be adjusted to reflect current progress in the field.)

Course Mechanics

- **Grading:** Exams: 10% + 10%
  Homework Assignments: 30%
  Project: 40%
  Presentation: 5%
  Participation: 5%
- **Exams:** There will be one final exam**.** Exams are open textbook and open notes. Calculators are allowed, but not other electronic devices.
- **Homework:** There will be approximately eight homework assignments. Usually, homework is due at 12:00am Monday nights. They should be submitted electronically. Late homework will be penalized 20% for being one business day late and will not be accepted thereafter.
  You can discuss with others approaches to solving homework problems. However, you must come up with and write-up the solutions on your own.
- **Presentation:** Students are expected to read a list of 5 technical papers. For each paper, one or two students will present its main idea in class. The presentation should be no more than 20 minutes in general and should focus more on the big picture than technical details.
- **Final Project:** A list of project ideas will be provided. Groups of 2 students will select an idea and implement it from the fourth week of the semester. In the end of the semester, all groups will present their approach, results and lessons learned. It is possible to propose your own original project idea with the approval from the instructor.

Additional Info

Website:

Colibri Evaluation Board	http://www.toradex.com/e/index.php
EETimes	http://www.eetimes.com/
Embedded	http://www.embedded.com/