CIS 6930: Embedded Computing Systems (Spring 2007)

Instructor: Prof. Soontae Kim
Classroom and time: ENG 3, TR 09:30am-10:45am
Office hours: T/R 1:00 –2:30 or appointment

Course description

Embedded computing systems are ubiquitous; they are everywhere in our everyday life. They appear in wired and wireless computer networks, automobiles, airplanes, appliances, industrial control systems, wearable computer systems, sensor networks, mission-critical avionics, safety-critical systems, etc; simple computers are embedded in these systems to perform various tasks. This course will study basic principles and techniques of embedded computing systems. We will look at both hardware and software issues in Embedded Computing Systems.

Topics

1. Introduction: embedded systems and design challenges, embedded system design process, formalisms for system design.
2. Instruction set architecture: ARM ISA
3. Embedded system fundamentals: I/O, supervisor mode, exceptions, traps, co-processors, memory systems, and CPU and system performance.
4. The embedded computing platform: CPU bus, memory devices, I/O devices, component interfacing.
5. Program design and analysis: Program models, program modifications to improve the performance, analysis and optimization of execution time.
6. Multitasking and multiprocessing, context switching, operating systems, scheduling policies, inter-process communication, evaluating operating system performance.
7. Hardware accelerators.
8. Distributed embedded systems.
9. Design methodologies and quality assurance.

Prerequisite: undergraduate computer architecture and concepts of software.

Textbook: Computers as Components: Principles of Embedded Computing System Design, by Wayne Wolf, Morgan Kaufmann Publishers, ISBN: 0123694590, 2005.

Grading

Exam1 (Feb. 27, in class):   25%
Exam2 (April 26, in class):   25%
Homework Assignments: 20%
Participation: 10%
Term project: 15%
Final presentation (April 24):   5%

Term project should be about implementing current or proposed architectural or

software techniques, characterizing some interesting behaviors of applications on current architectures, or surveying research papers. You must submit two reports for your project: project proposal and final report.

Project proposal should address goals and motivation, and include at least three references. It should be around 3 pages. This is due on **March 8 (Thursday)**.

Final report should include everything you have done for this project. It is a 10-page single-column paper, similar to a typical conference paper format. This is due on **April 19 (Thursday)**.