CPE/CS 390: Microprocessor Systems

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Course Description:

This course provides an introduction to microprocessor architecture, assembly language programming and the use of microcontrollers in implementing embedded systems. The internal architecture and operation of stored program microprocessors are examined in detail including arithmetic and logic units, special and general purpose registers, memory addressing modes and interrupts. Assembly programming techniques including data structures, branching, loops and subroutines are presented using simple design examples. Hardware and software techniques for I/O interfaces, both paged and interrupt driven are described. Specialized on-chip microcontroller interfaces for timing, serial communication and A/D conversion are used to implement simple I/O tasks useful in building real-time embedded systems. The course uses the Freescale HCS12 as an example of a 16-bit CISC architecture widely used in automotive applications. It also compares this architecture to the ARM 32-bit RISC architecture.

In the laboratory component of the course, students will gain hands-on experience with assembly programming and interfacing of the HCS12 to external peripherals using a commercial evaluation board. Each group will then design, implement and present a project of their own using the HCS12 board.

Instructor:

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Course Web site:

http://personal.stevens.edu/~backland/Courses/default/Course390_default.htm

Course schedule:

Session: TBD
Times: TBD

Office hours: TBD

You are always welcome to stop by my office if you have any questions regarding this course, or send me an email to set up an appointment for discussion.

Textbook and references:

Textbook:
HCS12/9S12 An Introduction to Software and Hardware Interfacing, 2nd Edition, Han-Way Huang, Publisher: DelMar Cengage Learning, ISBN: 1-4354-2742-4, 2010.

Recommended references:
(1) *Microcontroller Theory and Applications*, 2nd edition, D. Pack & S. Barrett, Pearson Prentice Hall, ISBN 0-13-615205-8, 2008.

(2) *Computers as Components*, W. Wolf, Elsevier, ISBN 0-12-369459-0, 2005.

Laboratory Work:

All students are expected to complete the lab works – they count a significant portion towards the final grade. Teamwork is encouraged and students will be grouped (maximum 3 students/group) to finish the lab works. Students will use the Axiom CML-12SDP512 Development Board for their assigned labs and final project.

Examinations: TBD

Students will be able to use lecture notes and Huang textbook during exams.

Grading:

Grades will be based on the following:

- Attendance (5%)
- Midterm examination (20%)
- Homework (20%)
- Laboratory Work (25%)
- Final examination (30%)

Academic conduct:

It is important that each student read and fully understand the information in the Honor System at Stevens (http://www.stevens-tech.edu/honor_board/) regarding academic conducts. Teamwork and discussions are encouraged during this course, however, "all academic work submitted by a student must be the result of his own thought and research." - *Statement from The responsibilities of students in the Honor System at Stevens.*

Definition of **plagiarism**: (from the *Statement from The responsibilities of students in the Honor System at Stevens.*)
The dictionary defines plagiarism as the act of "...stealing and using the ideas, writings, or inventions of another as one's own" or ".... taking passages, plots, or ideas from another and using them as one's own".