Computing Science Course Outlines 2017 Fall

CMPT 433 - D100 Embedded Systems

Instructor(s): Brian Fraser

SFU Surrey

Calendar Objective/Description:
The basics of embedded system organization, hardware-software co-design, and programmable chip technologies are studied. Formal models and specification languages for capturing and analyzing the behavior of embedded systems. The design and use of tools for system partitioning and hardware/software co-design implementation, validation, and verification are also studied.

Instructor’s Objectives:
Students will gain hands-on experience developing embedded applications on their own 32-bit single board computer (likely BeagleBone). Each student will purchase their own single board computer through the school during the first week of class instead of a required textbook (at similar in cost to a textbook). By the end of the course, students will be able to setup and use an embedded Linux build environment to develop embedded Linux applications. Students will also learn bare-metal development (no OS), Linux device driver creation, and be able to read basic hardware circuits. Students will demonstrate a mastery of embedded development on the course project by implementing a stand-alone product or by interfacing with a larger system.

Prerequisites:
(CMPT 250 or CMPT 295) and CMPT 300.

Topics:
- Embedded C and/or C++ programming.
- Embedded Linux cross-platform application development.
- Customizing and/or building the Linux kernel and root file system.
- Embedded application testing and cross-platform debugging.
- Linux device driver development and interfacing to the real-world.
- Bare metal embedded development (no OS) and low-level device control.
- Understand basic hardware circuits.

Grading:
30% assignments, 30% project, 5% Quizzes, 35% final exam. Activities and weighting will be confirmed in the first week of lectures.

Students must attain an overall passing grade on the weighted average of exams in the course in order to obtain a clear pass (C- or better).

Reference Books:
Exploring Beaglebone, Derek Molloy, Wiley, 2015, 9781118935125

Academic Honesty Statement::
Academic honesty plays a key role in our efforts to maintain a high standard of academic excellence and integrity. Students are advised that ALL acts of intellectual dishonesty will be handled in accordance with the SFU Academic Honesty and Student Conduct Policies (http://www.sfu.ca/policies/gazette/student.html).