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:
You will gain hands-on experience developing embedded applications on your own 32-bit single board computer (BeagleBone Green). You will purchase this hardware through the school during the first week of class instead of buying a required textbook (at similar in cost to a textbook).

By the end of the course, you will be able to setup and use a Linux build environment to develop embedded Linux applications. You will have learned bare-metal development (no OS), Linux device driver creation, and be able to read basic hardware circuits. You will have demonstrated a mastery of embedded development on the course group project by implementing a stand-alone product or by interfacing with a larger system.

The assignments and project require a significant amount of time to complete. Expect to spend more time on this course than a less hands-on course.

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

Topics:
- Embedded C and/or C++ programming.
- Embedded Linux cross-platform application development.
- Controlling external hardware via Linux applications.
- Embedded application testing and cross-platform debugging.
- Linux device driver development.
- 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 2nd Ed, Derek Molloy, Wiley, 2019, 978-1119533160
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).