Computing Science Course Outlines  2021 Spring

CMPT 433 - D100 Embedded Systems

Instructor(s):  Brian Fraser

Calendar Objective/Description:
Embedded Systems

Instructor's Objectives:
You will gain hands-on experience developing exciting embedded applications on your own 32-bit single board computer (BeagleBone Green) and our custom "Zen" cape (input/output board). Not only will you flash LEDs, but also you will read buttons, read an accelerometer, and play music! You will purchase the hardware kit 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.

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

The required hardware for the course is only available through the school (or 2nd-hand from a previous student). You must either pickup the board in person from SFU, or pay for shipping and handling. We hope to have an in-person pickup day (possibly on both Surrey and Burnaby campuses).

Shipping will be done via Purolator in a "Express Pack"; shipping can cost over $100. The student would be responsibly for import duties (kit value <$200CAN) and import restrictions on electronics. By early December we will contact students registered in the course to offer shipping and handling quotes. Shipping must begin in early December so hardware can arrive for early January.

Please contact me (Dr. Brian) if you have any doubts about purchasing or receiving the hardware so we can work it out!

Prerequisites:
see go.sfu.ca

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 ).