ENCE361: Helicopter Rig Controller Project: Milestone 1

Milestone 1 involves generating a TIVA program to respond reliably and in real-time to button pushes and a single analogue input. The analogue input is from the helicopter altitude sensor; the voltage (which is always in the approximate range of 1 V to 2 V) reduces by 1.0 V as the helicopter rises from landed (0%) to fully up (100%).

In weeks 4 and 5 you will have access in the Electronics lab (during lab sessions) or in the Embedded Systems Lab (at all times) to helicopter test mounts, which each incorporate the same altitude sensor as the remote lab rigs. However, you should design your program so that you can first test it using the potentiometer on the Orbit board, which is connected to `AIN0` and is used in the Week 4 lab. Milestone 1 will be assessed using one of the helicopter test mounts. The specification for Milestone 1 is as follows:

- **M1.1** The input on `AIN9`, `PE4` (J1-05), namely the helicopter altitude sensor signal, should be sampled at regular intervals.
- **M1.2** The samples (i.e. ADC outputs) should be stored continually in a circular buffer. At regular intervals the mean value of the samples in the buffer should be computed.
- **M1.3** At the initiation of the program the mean sample value should be recorded as the number corresponding to the "helicopter landed" altitude (0%). This is required for the calculation of the helicopter altitude.
- **M1.4** From the time of initiation onwards (cf. M1.3) the helicopter altitude should be displayed on the Orbit OLED display as a percentage, except as indicated in M1.6.
- **M1.5** From the time of initiation onwards, operating the "LEFT" button, SW1 on the TIVA board, should repeat the action detailed in M1.3.
- **M1.6** A single push of the "UP" button, BTN2 on the Orbit board, changes the display of altitude from percentage altitude to the mean ADC value computed as in M1.2; a second push turns the display blank; thereafter subsequent pushes make the display cycle through the same three states: percentage altitude -> mean ADC value -> off.
- **M1.7** The source code used to achieve Milestone 1 should be pushed to the group's repository on the same day that Milestone 1 is assessed.

NB: Your group's program will only be tested on the specification above. Adding more features or exceeding the specification is risky because it introduces greater potential for error. If you want to progress towards Milestone 2, it is recommended that you branch your git repository to ensure that your Milestone 1 code is maintained. Be sure to record information about your design and how you have tried to meet the specification, as you will need this information for the report due at the end of the project. Examples of the information you should record include how you decided what sampling rate to use and the size of the buffer to use. Groups will receive feedback on the quality of the Milestone 1 source code they have pushed to their repository.

Note also that the helicopter test mounts should not be removed from their locations in the Electronics Lab and Embedded Systems Lab.