CE323/CE860 Advanced Embedded Systems Design Assignment 1

The assignment worth 15% of the total mark for this module. This assignment involves writing two separate C/C++ programs for task 1 and task 2 described below. The mbed simulator or TinkerCAD simulator will be used for this assignment. The purpose of this assignment is for you to be familiar with the mbed/tinkercad and develop a virtual extension board similar to our physical extension board. The physical extension board is presented below.

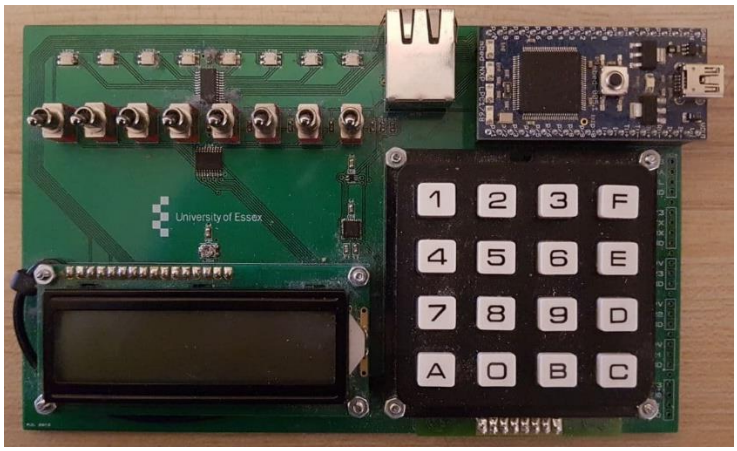

Fig. 1 Physical extension board

The tasks:

- **Task 1** (5%)
  This task is to blink 8 LEDs in the virtual extension board (there are 8 switches in the extension board as you can see in Fig. 1). You can assign one of switches to one of the LEDs. When a switch is on, the corresponding LED blinks. When a switch is off, the corresponding LED is off. The blink rate can be changed. Use four blink rates: 0.2s, 0.5s, 1.0s, and 2.0s.

  In this task, you should find:
  - How to read the status of the switches,
  - how to turn on/off LEDs,
  - and how to communicate with the Serial terminal on the online simulator.

  You can use the wait function for the blinks. But you are encouraged to use the time interrupt (Timeout class) to set up the rates.

- **Task 2** (10%)
  This task is to read a four-digit code from the keypad and show them on the LCD in the extension board. First you need to make a virtual 4*4 touchpad.

  - Initially the second line of the display should show left aligned "Code: _ _ _ _". The first line is empty.
  - When the user enters the first digit of the code, the second line of the display should show left aligned "Code: * _ _ _" with the "_" characters being replaced with each successive digit entered.
  - If the user presses the "C" key, then the last entered character should be

deleted and replaced with "_" unless there are no characters left.

- When all four digits of the code have been entered, the first line of the display should display "Press B to set".
- When the "B" key is entered and the new entered code is matched to the stored code, the program should show "CE323 A1" or "CE860 A1" on the first line of the LCD. The second line of the display should show left aligned "Code: _ _ _ _".
- When a wrong code is entered, the first line of the LCD is empty, and the second line of the display should show left aligned "Code: _ _ _ _".

The programs should contain brief comments explain the main block of the programs, including the addresses used in the programs. The programs should be laid out neatly with consistent indentation.

Assessment criteria:
Correctness of program 50%
Quality of program 25%
Clarity of program and comments 25%

Submission
You are required to submit the source code files. You should copy the code you are developing in the online simulator to a word file.

	File 1 name	File name
Students in CE323	CE323T1main.docs	CE323T2main.docs
Students in CE860	CE860T1main.docs	CE860T2main.docs

All the files should be placed in a single folder which should then be *zipped* for submission to the coursework submission system (FASER), i.e., the submission should be a single file in *zip format* (Studentnumber.Zip).

After you complete your programs, you should demonstrate them to module supervisor or GLA.

Late submission and plagiarism
This assignment is to be done individually, i.e. whatever you submit must be your own individual work. Any software or any other materials that you use in this assignment, whether previously published or not, must be referred to and properly acknowledged. Please be aware that the module supervisor may ask students for an interview to explain their submitted work.

Please refer to the Undergraduate Students' Handbook for details of the School policy regarding late submission and University regulations regarding plagiarism:
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https://0-www-citethemrightonline-com.serlib0.essex.ac.uk/