EE 337: Microprocessors Laboratory (Spring 2021)
Section: S2 (Third year UG)
Indian Institute of Technology Bombay

Lab 4: 20 points Date: Feb 10, 2021

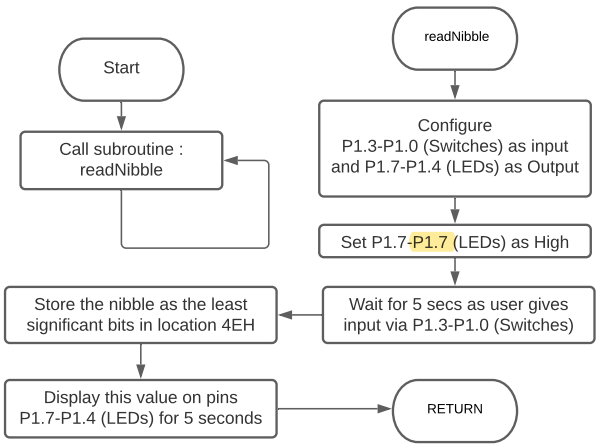
1. [10 points] In this experiment, you will learn to display content on the LCD connected to the Pt-51 kit. Download the `lcd.asm` file and `lcd-control-made-easy.pdf` from Moodle. The latter has general information about LCD operation which is helpful in understanding the code in `lcd.asm`.

   - Compile `lcd.asm` and load the hex file on to the kit. Make sure the output on the LCD screen is as shown below:

     ```
       Pt-51
     IIT Bombay
     ```

   - Modify `lcd.asm` to display "EE337-2021-S2" on the first line and your **first name** on the second line (truncate to 16 characters if you have a longer name). Pad the display lines with spaces such that these are centered on the LCD when displayed. You should load and run this program on the Pt-51 kit.

2. [10 points] Write a subroutine `readNibble` which works as shown in the flowchart below. After configuring the port pins P1.3-P1.0 as inputs and port pins P1.7-P1.4 as outputs, the subroutine turns on the LEDs on port pins P1.7-P1.4 on for 5 seconds. During this time, the user gives a nibble input via the switches connected to port pins P1.3-P1.0. After the 5 seconds elapse, store the nibble as the least significant bits in location `4EH` and display this value on pins P1.7-P1.4 (LEDs) for 5 seconds.



TA Checkpoints

1. For question 1, check that the desired string appears in the LCD (Course section, first name). Also, check that the string is centered in the LCD.

2. For question 2, ask the student to give the nibble input `1010` and check that two of the four LEDs are blinking. Check that the subroutine `readNibble` is running indefinitely by asking the student to change the state of the switches again during the 5 second "all LEDs on" state.