ELEC 335 - Lab #2

Objective

In this lab we will work with **assembly language**, practice connecting basic components such as LEDs and buttons to the board, read from / write to them.

Submission

You should submit the following items organized in a folder:

- **Lab report** - Written in English. Proper cover page, intro, problems, flow charts, block diagrams, schematic diagrams, comments, and theoretical, mathematical work, simulation vs.
- **Source files** - should have proper comments and pin connections if there are any external components.
- **Elf files** - generated elf file with debug information.

Compress the folder to a **zip** file, and submit that way. Each problem should be in a separate folder. Example folder structure is given below.

```
name_lastname_number_lab2/
name_lastname_report_lab2.pdf
problem1/
  problem1.s
  problem1.elf
  ..
problem2/
  problem2.s
  problem2.elf
  ..
```

Problems

Problem 1. Write assembly code that will toggle the on-board LED at a rate of 1 second.
Problem 2. Connect a button to the board, and turn on the on-board LED when the button is pressed. When the button is released, the LED should turn off.
Problem 3. Connect 8 external LEDs to the board, and toggle all the LEDs at the same time at a rate of 1 second.

Problem 4. Connect 8 LEDs and 1 button to the board, and implement a shift pattern.
Requirements:

- The pattern should light 3 LEDs at the same time
- These 3 LEDs should shift right or left indefinitely.
- The button should toggle the shift direction when pressed. You can think of this as having two modes (right shift and left shift). The button is used to change modes.
- There should be around `100 ms` delay between transitions. (i.e. `t3-t2 ~= 100 ms`)
- First 12 patterns are given in Table 1 for one mode.

Expectations:

- Add your connection diagram (schematic). (This diagram should have a box for the microcontroller, and any LEDs, resistors for connection.)
    - Someone looking at your design could reproduce your circuit.

	LED1	LED2	LED3	LED4	LED5	LED6	LED7	LED8
t0	■							
t1	■	■						
t2	■	■	■					
t3		■	■	■				
t4			■	■	■			
t5				■	■	■		
t6					■	■	■	
t7						■	■	■
t8	■						■	■
t9	■	■						■
t10	■	■	■					
t11		■	■	■				
t12			■	■	■			

Table 1. Pattern on LEDs. Rows represent time steps, and columns represent each LED for right shift mode operation.