Spring 2022
EEE212 Microprocessors
Off Lab Assignment 3
(All Sections)

In this lab, you will further your knowledge on the 8051 Assembly language by using **MCU 8051 IDE** for the development and simulations of your code and **Proteus** for setting up the required hardware setup to demonstrate your work.

Important Notes:

- Please prepare your off-lab demonstration before starting the on-lab assignment. TAs will check them during the on-lab.

- After you have completed your lab, you need to get a check from one of the lab assistants (not tutors). The check consists of explanation of the code and a small demonstration.

- This is an individual lab. You can cooperate but you have to write your **OWN** code. Any kind of plagiarism will not be tolerated. Codes will be compared manually by assistants and by Turnitin software after the lab.

- The deadline is strict. Submit your code before the deadline. There will be no extension to the deadline.

Q1: Music Box (100pts)

As your third off-lab assignment, you are going to implement a program that plays the C major scale in a loop <u>continuously</u> and demonstrate it using a speaker setup on Proteus.

Details:

- You are required to use timers in your implementation.

- You will use the A440 pitch standard, i.e. $A_4 = 440Hz$.

- Each note will be played for 1 second.

- The C major scale is: $CDEFGABc$ (the second C note being 1 octave higher than the first).

- You will start from the C_5 note. So, you will play: $C_5\ D_5\ E_5\ F_5\ G_5\ A_5\ B_5\ C_6$

- Frequencies can be generated by picking an arbitrary I/O pin and toggling it according to the current note's frequency (do not use different pins for different notes).

- For more information on the corresponding frequencies, refer to this page [1].

- To learn more on how to use speakers in Proteus, refer to this video.

Note1: The desktop computers in the lab do not have speakers. Therefore, you will have to bring your own speakers/headphones or laptops to be able to demonstrate your work.

Note2: After finishing this off-lab assignment, you should have a small music box to demonstrate. Now, think about how you can add the following features to your implementation using interrupts:

1. Speed up the rhythm of the play (x2, x3, etc.)

2. Shift the octave of the notes (one octave higher or lower)

3. Add play/pause button

4. Reverse the play order (start from the high-pitched note)

5. Restart playing from the beginning when an interrupt is received, etc.

References

[1] "Tuning," Frequencies of Musical Notes. [Online]. Available: `https://pages.mtu.edu/~suits/notefreqs.html`. [Accessed: 09-Mar-2022].