**Computer Organization Extra Programming Lab**

**(20% of your final score)**

**Requirement:**

In this lab, you are required to display the following information on the 7-segment LEDs:

1. Display the current date. E.g. April 28th as 0428 on the LEDs.
   1. There should be no obvious displays on the 4 digits but minor glitches are allowed
2. Display the current time. E.g.,14:15 as 1415 on the LEDs.
   1. You can assume any initial time value but the number should change for every one minute (here the minute is in the simulation time and we will not use the wall clock to test your program).
3. Count down from 1000 with decrementing the count every 1 s.
4. The BT2 should be used to change the above display mode.

**Programming Tips:**

The purpose of this lab is to master the concept of timer-based programming. In the example code, we have used the 8253 to generate an interrupt every 1 ms. We use this timer interrupt to update the LED display every 5ms. The following diagram illustrates the high-level idea for this timer-based programming.



The timer ISR simply increments a global variable DisplayCount. The main function is an endless loop that checks the value of DisplayCount. Since we want to update the display every 5 ms and the value of 5 for DisplayCount means 5 ms, we use it as the checking condition of the if statement. Inside the if statement, the main function updates the display index and display value on the LEDs.

So back in this lab, you are essentially required to update the time every minute, counting down value every second, and check the status of BT2 every certain time period (e.g, 0.1s). Think about how to organize those events in the codes.

You may need to modify the schematics connected to BT2 and port C of 8255.

**What to Turn in:**

A compressed file including your whole project and a brief report stating which file to run (so that the TAs know how to test your program) and the design of your assembly program.

**Honor Code:**

1. You are not allowed to discuss this lab with other students. You can ask the TA/instructor for the high-level ideas for this lab but cannot ask them to debug the code for you.

2. We will run the plagiarism test for the programs. You will get zero point if you share your code with other students or copy another student’s code.

**Grading Policy:**

Each functionality in the **Requirement** will be granted for 25 points out of the total 100 points.