EEE 212 Spring 2022 - Sections 1-4

Lab 1 – Off-Lab Assignment (60% of the overall Lab1 Grade)

1. Install MCU 8051 IDE on your own machines and run the test programs uploaded on Moodle. For your projects, choose Atmel AT89S52 and 12 MHz Clock.

2. Write an 8051 Assembly Language subroutine MAXMIN that will return the maximum and minimum of the unsigned non-zero 8-bit binary numbers located at 1000h in the registers R6 and R7, respectively. The array of numbers is written to the ROM with the DB directive with 00h at the end, and the array will contain at most 256 numbers.

    As an example, consider the following use of the DB directive:

    ORG 1000h
    NUMBERS: DB 12,15,1,25,250,0

    There are five 8-bit non-zero unsigned numbers located at the ROM beginning at ROM location 1000h. The subroutine MAXMIN will return 250 in R6 and 1 in R7. After writing the subroutine, check with MCU 8051 IDE that the subroutine works as desired.

3. Using the virtual hardware capability of MCU 8051 IDE, interface P1 to a seven-segment display. Test the program

    sevensegtest.asm (also use the .vhc configuration file for virtual hardware on MCU 8051 IDE)

    to observe the numbers written to the seven segment display in the order 0, 1, … , 9, 0, 1, continuously.

4. Write a program to display the remaining time in three digits using three seven-segment displays. For example, if the remaining time is currently 20.1 minutes, then we would be displaying 201 on the three seven segment displays. We would then observe 201, 200, 199, … , 001, 000. You need to write the delay subroutine in such a way that when the program is simulated, the time display should be updated at every 0.1 min approximately. Note that the actual 8051 delays and the delays one would get when simulations are performed, may be quite different. Remaining time initialization will be done within the code (largest value 99.9 minutes). When the remaining time hits zero, display blinking characters of your own design.