EEE212 Spring 23-24 Lab 1

Due Date: 26 February 2024, 13:30

Assignment Requirements

- Your submission will be checked using the MCU 8051 IDE simulator for Part 1 and Proteus simulation software for Part 2 during lab hours. **For part 2, you must show your demos on Proteus**. Otherwise, you will not receive any partial credit. Thus, ensure your code works before the lab session.

- Lab assignment has two parts. **Therefore, you must upload two different files, respectively**. Please upload your files in ".txt" of ".pdf" format.

- The deadline is strict. Submit your code before the deadline. **You cannot change your uploaded codes during lab hours. You will show your demos based on your uploaded codes**.

- This is an individual assignment. You can cooperate but must submit your **OWN** code. Plagiarism will **NOT** be tolerated. After the lab sessions, codes will be compared manually by assistants and by Turnitin software.

1   Part 1 (30 pts)

For this part, you do not need to show your result on the LCD of the Proteus or take inputs from the keypad of the Proteus. You will show your results ONLY on the MCU 8051 IDE simulator. In this part of the assignment, you write a program to sum the digits of a hexadecimal number in its decimal

representation. Given a hexadecimal number in the range [00h, FFh], you need to do the hexadecimal to decimal conversion and then calculate the summation of its digits in the decimal representation. Note that both the input and the output are 8 bits, therefore, they can be stored within a single register.

Initially, put the input number to the program into the R0 register. Include the following line at the beginning of your code (during the demo, TAs will change the input and check if your program works).

MOV R0, #...h; Specify the Input here.

Then, calculate the result in your program and store the output result in the R1 register as a hexadecimal value. **You do not need to convert the result of the sum of the digits of the input to decimal again.** Show your results on the MCU 8051 IDE Simulator.

1.1 An Example

- Input (R0) = 55h

- Decimal Conversion (of hexadecimal input) = 85

- Result (summation of digits in its decimal conversion) = 13d = 0Dh

- R1 = 0Dh

1.2 Grading of Part 1

- Show the correct sum of digits (30 pts)

2 Part 2 (70 pts)

For this part, you need to show your result on the LCD of the Proteus and take inputs from the keypad of the Proteus. In this part of the assignment, you're tasked with determining the month and corresponding day given an input number in the range [1,366], which represents the index of the day in the year 2024. The goal is to display the month's first three letters along with the day of the month on the second line of the LCD. In addition, you should also identify the weekday and display its name

on the second line. For instance, if the input number is 35, the LCD should show "FEB 4 SUN" on the second line of the LCD. This indicates that the 35th day of the year is February 4th, which falls on a Sunday in 2024.

The string 'INPUT=' be displayed on the first line on an LCD before taking your input. Take a decimal number with at most three digits in the desired range as an input, and print it on the first line, following the string as mentioned earlier. Then, when the A button on the keypad is pressed, you should go to the next line and the output needs to be displayed on the second line of the LCD while the first line still shows the given input.

2.1   An Example

- INPUT = 302

- R0 = 01, high part of the input

- R1 = 2E, low part of the input

- Find the day October 28th, Monday.

- Display on the LCD as:

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INPUT = 302
OCT 28 MON
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2.2   Details

- You need to show your results on Proteus for this part. Otherwise, you will get NO PARTIAL GRADE.

- While taking input, each digit must be displayed immediately when the corresponding digit is pressed on the keypad.

- You are not required to display any result for inputs that are not between 1 and 366.

- You may need to create a lookup table to store the number of days each month in 2024. Remember that February has 29 days in 2024. Additionally, you have to store the names of the months and days in a lookup table for an easy implementation.

- Since the number of days in a year is 366, which is larger than 255, you need to use two registers to store the high part and the low part of the input value.

- You can go to https://asd.gsfc.nasa.gov/Craig.Markwardt/doy2024.html which shows the corresponding number of a day in a year. You can verify your results using that link.

- Your code does not need to run indefinitely without reset. In other words, while the LCD is displaying the result of a previous query, the MCU does not need to be able to accept new input from the keypad.

2.3   Grading of Part 2

- Find the month and the day of the month correctly. (30 pts)

- Find the name of the day of the week correctly. (20 pts)

- Display the results correctly. (20 pts)