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FACULTY OF ENGINEERING

DEPARTMENT OF COMPUTER ENGINEERING

2021 - 2022
SPRING SEMESTER

CME 3208
PRINCIPLES OF EMBEDDED SYSTEMS

LAB 3 – 15.03.2022
5–BIT LED COUNTER

In this lab, you are required to make a 5–bit LED counter, that takes two integer values from serial monitor (from your Arduino IDE on your computer).

The first value would be used for increment operation. You should check if this value is between 1 and 31 (including both values). If it is not, request it again from the user until a correct input is given.

The second value is for wait time between counting operation (representing milliseconds). You should check if this value is between 1 and 10000 (including both values). If it is not, request it again from the user until a correct input is given.

After taking these inputs from serial monitor, the program should start from 0 and increase the value as first input from serial monitor and output the results on LEDs. The program should wait for second input (in milliseconds) to continue to next increment value in this operation.

In table below, you can see which LEDs should be turned on to represent the corresponding integer value. The empty cell represents an idle LED and light bulb represents an active LED.

DECIMAL VALUE	BINARY VALUE	LED 5	LED 4	LED 3	LED 2	LED 1	DECIMAL VALUE	BINARY VALUE	LED 5	LED 4	LED 3	LED 2	LED 1
0	00000						16	10000	💡				
1	00001					💡	17	10001	💡				💡
2	00010				💡		18	10010	💡			💡	
3	00011				💡	💡	19	10011	💡			💡	💡
4	00100			💡			20	10100	💡		💡		
5	00101			💡		💡	21	10101	💡		💡		💡
6	00110			💡	💡		22	10110	💡		💡	💡	
7	00111			💡	💡	💡	23	10111	💡		💡	💡	💡
8	01000		💡				24	11000	💡	💡			
9	01001		💡			💡	25	11001	💡	💡			💡
10	01010		💡		💡		26	11010	💡	💡		💡	
11	01011		💡		💡	💡	27	11011	💡	💡		💡	💡
12	01100		💡	💡			28	11100	💡	💡	💡		
13	01101		💡	💡		💡	29	11101	💡	💡	💡		💡
14	01110		💡	💡	💡		30	11110	💡	💡	💡	💡	
15	01111		💡	💡	💡	💡	31	11111	💡	💡	💡	💡	💡

An example operation of this lab is given below:

SERIAL MONITOR:

```
Please enter increment value: 7
Please enter wait time: 1000
```

RESULTS:

TIME (MILLISECONDS)	DECIMAL VALUE	BINARY VALUE	LED 5	LED 4	LED 3	LED 2	LED 1
0	0	00000					
1000	7	00111			💡	💡	💡
2000	14	01110		💡	💡	💡	
3000	21	10101	💡		💡		💡
4000	28	11100	💡	💡	💡		
5000	3 (35 mod 32)	00011				💡	💡
6000	10	01010		💡		💡	
7000	17	10001	💡				💡
8000	24	11000	💡	💡			
9000	31	11111	💡	💡	💡	💡	💡
10000	6 (38 mod 32)	00110			💡	💡	
Operation can continue infinite more times…							

Please use Tinkercad online simulator to create and test your design before creating the circuit using your Arduino. This will allow you to design your circuit without experiencing connectivity or similar hardware problems.

If you have any questions, please ask them on Sakai class forums.

GOOD LUCK TO YOU ALL!