T.C.
DOKUZ EYLUL UNIVERSTY

FACULTY OF ENGINEERING

DEPARTMENT OF COMPUTER ENGINEERING

2020 - 2021
SPRING SEMESTER

CLASS CODE   :   CME 3208

CLASS NAME   :   PRINCIPLES OF EMBEDDED SYSTEMS

LAB NUMBER :   LAB – 1

LAB NAME   :   4-BIT LED COUNTER AND SLIDER
**   WITH A PUSH DOWN BUTTON**

DUE DATE   :   23:55 – 06.04.2021

In this lab, you are required to complete one experiment in total.

EXPERIMENT 1:

You are required to create a circuit with an Arduino board, 4 LEDs and a push down button using Arduino Software (IDE).

DO NOT FORGET TO USE RESISTORS TO AVOID BURNING YOUR CIRCUIT COMPONENTS!

After you correctly assemble your circuit using the components mentioned above, you will need to write a source code and use Arduino IDE software to load it into your Arduino Board.

The first operation is counting from 0 to 15 (and returning to 0 to repeat again) using your 4 LEDs. A table showing this operation is given below.

DECIMAL VALUE	BINARY VALUE	LED 4	LED 3	LED 2	LED 1
0	0000				
1	0001				🟥
2	0010			🟥	
3	0011			🟥	🟥
4	0100		🟥		
5	0101		🟥		🟥
6	0110		🟥	🟥	
7	0111		🟥	🟥	🟥
8	1000	🟥			
9	1001	🟥			🟥
10	1010	🟥		🟥	
11	1011	🟥		🟥	🟥
12	1100	🟥	🟥		
13	1101	🟥	🟥		🟥
14	1110	🟥	🟥	🟥	
15	1111	🟥	🟥	🟥	🟥
REPEAT FROM 0					

Your second operation is to create a sliding LED from first to last and back to first again. A table showing this operation is given below.

LED STATE	LED 4	LED 3	LED 2	LED 1
0				■
1			■	
2		■		
3	■			
4		■		
5			■	
REPEAT FROM 0				

You are required to use global variables with following names and values, to make your program more readable and reliable.

TIME_LED_COUNTER = 500
A variable used to store waiting time between steps in LED counter operation given above. It should be 500 milliseconds to denote 0.5 seconds.

TIME_LED_SLIDER = 250
A variable used to store waiting time between steps in LED slider operation given above. It should be 200 milliseconds to denote 0.2 seconds.

A push down button should be used to change currently executed operation (from LED counter to slider and vice versa). Take care that you should only change it once for every press and not repeatedly. For example, you press the button and it changes from counter to slider. However you keep pressing it and it changes back counter at the next sliding step. Try to figure it out yourself how you can make sure this does not happen. In addition, when you press a push down button and change the current running operation, that operation should start from 0 or initial state, disregarding previously counter or slider state, if there was one.

You are free to use functions as you wish. Please take care to use only English language in your code including variables, functions and comments. In addition, make sure your code is understandable, readable and well structured.

You are also required to make a video that will explain and show the circuit and its operation. The video you are going to make should be at most 5 minutes. Videos uploaded longer than this time limit will have their grade reduced. In addition, please make sure the video quality is good and your circuit and computer screen (when it is required) is clearly visible. You can use Turkish or English in this video, you are free to use either of them.

UPLOAD REQUIREMENTS:

You are required to upload two different files. One is the source code you have written in Arduino IDE and the video you have made to show and run your circuit. The extension of your source code file should be "ino" because that is the extension Arduino IDE uses for C source code files. The extension of your video file could be any video extension that is used (e.g. mp4, mkv, etc.), however, make sure you can play this file on your computer and it can be viewed correctly.

The files you are required to upload are given below with explanations and examples.

(STUDENT_NUMBER)_(STUDENT_NAME).ino
(Source code you have written in Arduino IDE)
Example = 2021510123_FATIH_DICLE.ino

(STUDENT_NUMBER)_(STUDENT_NAME).mp4
(Video you have made to show your circuit and operation)
Example = 2021510123_FATIH_DICLE.mp4

Late or no submissions will be graded zero. You can see the basic grading table of this assignment below.

CRITERIA	GRADE
Correct naming of upload files	10
Correct circuit construction	30
Working and good source code (Using English, high readability, Sufficient Comments, etc.)	30
Good Explanation Video (High resolution, showing circuit and its operation, brief and shorter than 5 minutes)	30
TOTAL GRADE	100
CHEATING OR ANY OTHER FORM OF PLAGIARISM	$-\infty$

If you have any questions or problems regarding this lab paper, you can ask about it in lab session at Tuesday, 30.03.2021. If you wish, you can also ask it in class forums or assignment page comments.

GOOD LUCK TO YOU ALL!