2020 - 2021
Spring Semester

CME 3208
Principles of Embedded Systems

Lab 6
Parking Assistant

In this lab work, your task is to build a simple parking assistant. You are required to create a circuit with an Arduino board, 2x16 LCD Display, Buzzer and Ultrasonic Sensor. When you correctly assembled the circuit, you will need to write a source code to implement parking assistant system using Arduino Software (IDE).

Experiment
You will design a circuit of buzzer and ultrasonic sensor. You will write an Arduino program to monitor distance and indicate the distance by a buzzer. **In the first row of LCD Display**, distance data (in metric units), which is acquired from ultrasonic sensor will be displayed. **In the second row of LCD Display**, one of the following texts will be displayed: "Too Far", "Far", "Close", "Too Close", "Crashed".

Buzzing interval of the buzzer component will be **directly proportional to distance value**. If distance is larger, buzzer will produce tone with **longer silence intervals**, if distance is smaller, buzzer will buzz with **shorter silence intervals**. Moreover for each interval **different tones** should be used.

Also when distance is 5 cm., buzzer will play a melody that resembles **"Game Over" melodies** of old computer games.

Intervals are:

Distance > 1 m → "Too Far"

Distance ∈ [51 cm, 100 cm] → "Far"

Distance ∈ [21 cm, 50 cm] → "Close"

Distance ∈ [5 cm, 20cm] → "Too Close"

Distance <5 cm → "Crashed"

Your program should also display relevant description on the serial monitor window in **an interval of 2 seconds**. The text format should be as follow:

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Date: 17.06.2021 - Hour: 19:17:12 - Distance: 30 cm.

It is close.

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Date: 17.06.2021 - Hour: 19:17:14 - Distance: 15 cm.

It is too close.

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Date: 17.06.2021 - Hour: 19:17:16 - Distance: 2 cm.

It is crashed.

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Upload Requirements

You need to write source code for the experiment on Arduino Software (IDE). You also need to create a video of your project by screen casting, that explains how you created your project, how it works (both hardware and software) and shows its execution for the experiment.

The files you are required to upload are given below:

`(Student_Number)_(Student_Name)_Lab_6_Parking_Assistant_Code.ino`
    (Source code you have written for the experiment)

`(Student_Number)_(Student_Name)_Lab_6_Parking_Assistant_Video.mp4`

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. Also, make sure to show the change of temperature, humidity, light and other variables on the serial monitor during the video.
You must also show your **student identity card** clearly and speak and confirm your identity verbally in this assignment video.

Your codes have to be original.

Good Luck to You All!