

# CI Course Course Project Terms

## Project terms:

1. It must be a real-time application (hardware implemented).
2. It must include interfacing between the PC and the implemented hardware system (hardware is attached to the PC through some communication interface and required applications exist on that PC to handle and use the attached hardware).
3. PC applications must have a GUI interface.
4. Interfacing mediums can be wireless.
5. Should include two programs, one at the hardware side (i.e. compiled as a hex file and programmed to an MCU), and the other at the PC side (i.e. a GUI using any programming language that interfaces with the attached hardware).
6. It should be a useful application showing good engineering concepts.

## Attention:

1. The project will be delivered to Dr. Maher in real-time hardware. All students in the team will have oral discussions considering their knowledge about the course and their contribution and knowledge regarding the delivered project.
2. Every team must provide a hard copy of the “CI Course Project Report” at the oral exam.
3. Oral exam dates and times will be announced with time slots for each team based on the team lists we have.

## Project proposal submission:

Each team leader is required to fill out the following form only once.

<https://forms.gle/5LD2gLapc9x8GLrK9>

Notes:

- Please note that a single project idea can be implemented by a maximum of two teams only.
- The due date to fill out the form is the end of Thursday, 7<sup>th</sup> Dec. 2023.

## Project Report Template

Every team is required to prepare a complete report about the project.

The report template can be downloaded from the following URL:

[https://docs.google.com/document/d/1EI5CTVdlg\\_Cjj2IMYXc31Evth5-yAa\\_DVab--IQEI4/edit?usp=sharing](https://docs.google.com/document/d/1EI5CTVdlg_Cjj2IMYXc31Evth5-yAa_DVab--IQEI4/edit?usp=sharing)

## Sample Projects:

### 1. Project-1:

**Title:** Garage system

**Description:**

The project will simulate a garage system with two gates and two sensors each on every gate to detect if a car is entering or leaving, and also two 7 segments to display the number of free slots in the garage (maximum is 99 free slots). GUI is where the user can decide whether a car can enter/leave or not. The GUI will also display the number of free slots in the garage. GUI will also have a button used to approve if the leaving car has paid parking fees or not, when the exit sensor detects a car, it sends the PC a signal indicating a request to open the exit gate, if the user presses the button, the gate will open to let the car exit.

### 2. Project-2:

**Title:** Incubator System

**Description:**

The project simulates a simple incubator, having a DC fan, a heating source (AC lamp), and a temperature sensor, along with a GUI application. The user selects the desired minimum and maximum incubator temperature through the GUI. If the read temperature is in the desired boundaries, the status OK is displayed on the GUI, otherwise, the system must control the DC fan and heat source to reach the desired temperature. There are 2 modes of operation, Automatic, and Manual, that can be selected by the user through GUI. In Automatic mode, the user only selects desired temperature boundaries. In contrast, in Manual mode, the user can override controls to manually control DC ON/OFF and speed and also control heat source ON/OFF. Actual read temperature will be displayed in all modes, also system status (OK/HIGH TEMP/LOW TEMP) will be always displayed. The readings (actual temperature, desired temperature, and system status) are presented on an LCD and transmitted to a computer to display on the GUI.

### 3. Project-3:

**Title:** Autonomous Car

**Description:**

A simple car connected to a PC (wired or wireless [wireless is desired]), having 2 modes of operation, that the user can select through the GUI. The first mode is manual mode, where the user can control car movements through the GUI using buttons. The second mode is autonomous mode, when selected through GUI by the user, in which the car keeps moving while avoiding collisions using its onboard sensors (proximity sensors, e.g. ultrasonic). In all modes, the car will send sensor readings to the PC to display it on the GUI, while showing a status of (Obstacle in range or No Obstacles) and the distance between the car and the available obstacle if it exists.

### 4. Project-4:

**Title:** Full functional multimeter

**Description:**

A Full Voltage/Current/Resistance multimeter. You can provide a detailed description.

### 5. Project-5:

**Title:** Smart Home

**Description:**

You can provide a detailed description.

6. **Project-6:**

**Title:** Wave Generator

**Description:**

As provided in the laboratory Manual, however, you need to provide two-way communication.

7. **Project-7:**

**Title:** Oscilloscope

**Description:**

As provided in the laboratory Manual, however, you need to provide two-way communication.

8. **Project-6:**

**Title:** Logic Analyzer

**Description:**

As provided in the laboratory Manual, however, you need to provide two-way communication.