Following are the projects for our course, Embedded System. Choose one with your partner and implement it. The following are the criteria to evaluate your projects. You must register your project with one week.

1. Requirements (20%)
2. Specification (20%)
3. Architecture (10%)
4. Design (10%)
5. Integration (finishing) (20%)
6. Code (20%)

**Project1: CPU FAN Controller based on CPU temperature**

This project is required to control 5 or 12v FAN that cools a CPU. The speed of the fan must be adopted according to the CPU temperature. At least there are 3 speeds.

PIC microcontroller must get an analog signal from a thermostat connected to CPU and convert this signal to digital and then generate PWM signal to control the speed of the fan. In addition to that, The temperature (Celsius) and the speed (round per minute rpm) must be shown on an LCD and must be updated every second.

**Project2: AC devices controller**

This project is required to control the operation of multiple AC devices according to a button code from remote control.

PIC microcontroller must receive an IR signal from remote control (i.e TV remote control) and must recognize the button pressed on that remote control. PIC must switch one of the AC devices on/off based on the code of the pressed button. In addition to that, you have to display the command on an LCD.

**Hint: you can switch AC devices on/off using Relays.**
Project3: Digital multi-meter

The multi-meter should be able to measure voltage, current and resistance. PIC microcontroller must use analog to digital conversion techniques to determine voltage, current or resistance of a circuit. The value of measurement must be displayed on LCD indicating what you are measuring (i.e. 5 volts or 2mA ampere).

The project should have some control keys to change the level of measurement.

Project4: Elevator controller

PIC microcontroller must control a simple model of an elevator. You should have some knowledge of the elevator operations. This simple model should contain a box that represents an elevator and a DC/stepper motor. You should make at least two floors with the requesting buttons. In addition that, the floor number must be shown on each floor and inside the elevator on a 7-segment display.

Project5: Oscilloscope

An oscilloscope is an electronic instrument that depicts patterns on a screen that are graphical illustrations of electrical signals, and measures and analyzes these signals. Oscilloscopes are particularly useful in observing the exact wave shape of an electrical signal. A digital oscilloscope is an oscilloscope that digitally provides its reading. In this project, you have to implement such an oscilloscope that has the following features:

- The device must graph the analog voltage signal on a graphic LCD
- The device must give the ability to change the time levels & voltage levels
  - Use simple voltage and time divisions