|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **21EC7612** | **EMBEDDED AND IOT LABORATORY** | **L** | **T** | **P** | **C** |
| **0** | **0** | **4** | **2** |
| **Preamble** | | | | | |
| 1. To develop skills to work with various modules in embedded processors. 2. To work with various sensors and actuators. 3. To create IoT dashboards using various cloud servers | | | | | |
| **Prerequisites for the lab** | | | | | |
| 21EC5611/ Microprocessor and microcontroller lab | | | | | |
| **Objective** | | | | | |
| 1. To understand about the Embedded Processors 2. To understand the MSP 430 development board 3. To study about CC3200 Launch pad 4. To design various cloud servers. | | | | | |
| **S.No** | **List of Experiments** | **CO** | | | |
| 1 | Embedded System design using MSP 430 Microcontroller.   * Humidity/ Temperature sensor * PIR Sensor & Ultrasonic sensor * DC and Servo motor interfacing | **1** | | | |
| 2 | Embedded System design using Energia IDE with CC3200. | **1** | | | |
| 3 | Exercise of ARM CORTEX M4   * Flashing of LEDS. * Interfacing keyboard and LCD | **2** | | | |
| 4 | 1. Study and Configure Raspberry Pi. 2. WAP for LED blink using Raspberry Pi. | **3** | | | |
| 5 | Creation of own Web Server and Web page for Monitoring and control applications. | **3** | | | |
| 6 | Study and implement MQTT protocol using Arduino and Raspberry pi | **4** | | | |
| 7 | Exercises on cloud application using Thing speak cloud server. | **5** | | | |
| 8 | Exercises on Cloud application using Ad fruit cloud | **5** | | | |
| 9 | Exercises on Cloud application using IBM cloud | **5** | | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 10 | Creating an IoT dashboard using Cayenne project builder | | **5** | |
|  | | | | |
| **S.No.** | **List of Projects** | | **Related Experiment** | **CO** |
| 1. | Embedded System design using MSP 430 Microcontroller - PIR Sensor & Ultrasonic sensor | |  | **1** |
| 2. | Embedded System design using MSP 430 Microcontroller- Humidity/ Temperature sensor using MSP430 | |  | **1** |
| 3. | Embedded System design using MSP 430 Microcontroller - DC and  Servo motor interfacing | |  | **1** |
| 4. | Interfacing Keyboard and LCD | |  | **2** |
| 5. | Design and Implement traffic light controller using Raspberry pi | |  | **3** |
| 6. | Determine the value of analogue input using Raspberry pi | |  | **3** |
| 7. | Motion detection using Raspberry pi | |  | **3** |
| 8. | Distance measurement using Raspberry pi | |  | **3** |
| 9. | RED Dashboard | |  | **4** |
| 10. | ESP01 ESP8266 Projects using Blynk Google Assistant | |  | **5** |
| **Suggestive Assessment Methods** | | | | |
| **Lab Components Assessments (60 Marks)** | | **End Semester Exams (40 Marks)** | | |
| Lab Experiment, Model Exam | | Lab Exam | | |
| **Outcomes** | | | | |
| **Upon completion of the course, the students will be able to:** | | | | |
| **CO1** | Interface Embedded Processors with I/O devices | | | |
| **CO2** | Design an embedded system using MSP 430. | | | |
| **CO3** | Design ARM based wireless Embedded systems. | | | |
| **CO4** | Designing Embedded Systems using CC3200 Launch pad. | | | |
| **CO5** | Design IoT Application using various cloud server. | | | |
| **Laboratory Requirements** | | | | |
| MSP 430 Microcontroller-3 Raspberry pi-3  ARM CORTEX M4-3  Energia IDE with CC3200-3 | | | | |
| **Reference Books** | | | | |
| 1. Iot Based Projects by Dr. Rajesh Singh Dr. Anita Gehlot Dr. Lovi Raj Gupta NavjotRathourMahendra Swain Bhupendra Singh, BPB Publications | | | | |
| **Web Resources** | | | | |
| 1. [96 Projects tagged with "MSP430" | Hackaday.io](https://hackaday.io/projects?tag=MSP430) 2. [Top 10 Raspberry Pi Projects for 2022 - YouTube](https://www.youtube.com/watch?v=rS9CbsohFGk) | | | | |

**CO Vs PO Mapping and CO Vs PSO Mapping**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| **1** | 2 | 3 | 3 | 3 | 3 | 3 | 1 |  | 3 | 2 | 3 | 3 | 3 |  |
| **2** | 2 | 3 | 3 | 3 | 3 | 3 | 1 |  | 3 | 2 | 3 | 3 | 3 |  |
| **3** | 2 | 3 | 3 | 3 | 3 | 3 | 1 |  | 3 | 2 | 3 | 3 | 3 |  |
| **4** | 2 | 3 | 3 | 3 | 3 | 3 | 1 |  | 3 | 2 | 3 | 3 | 3 |  |
| **5** | 2 | 3 | 3 | 3 | 3 | 3 | 1 |  | 3 | 2 | 2 | 3 | 3 |  |