



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B.Tech (CSE)– III-II Sem**

**L T P C**  
**0 0 3 1.5**

**(20A05603P) INTERNET OF THINGS LAB**

**Course Objectives:**

- To introduce components such as WiFi, Bluetooth, Temperature, Moisture sensors
- To know the Micro controller such as Arduino
- To know the System on Chip (SOC) / Single Board Computer such as Raspberry Pi
- To understand HTTP IoT protocols and perform Experiments for data transmission
- To understand UAV/Drones and Internet of Drones Experiments

**Course Outcomes:**

After completion of the course, students will be able to

- Know the various IoT sensors and understand the functionality
- Design and analyze IoT experiments and transfer the data to IoT Clouds
- Design the IoT systems for real time applications
- Understand Drones and Perform Internet of Drones Experiments

**List of Experiments:**

**Experiments using ESP32**

**1. Serial Monitor, LED, Servo Motor - Controlling**

• **Experiment1:**

Controlling actuators through Serial Monitor. Creating different led patterns and controlling them using push button switches. Controlling servo motor with the help of joystick.

**2. Distance Measurement of an object**

• **Experiment 2:**

Calculate the distance to an object with the help of an ultrasonic sensor and display it on an LCD.

**3. LDR Sensor, Alarm and temperature, humidity measurement**

**Experiment 3:**

- Controlling relay state based on ambient light levels using LDR sensor.
- Basic Burglar alarm security system with the help of PIR sensor and buzzer.
- Displaying humidity and temperature values on LCD

**4. Experiments using Raspberry Pi**

**Experiment 4:**

- Controlling relay state based on input from IR sensors
- Interfacing stepper motor with R-Pi
- Advanced burglar alarm security system with the help of PIR sensor, buzzer and keypad. (Alarm gets disabled if correct keypad password is entered)
- 5. Automated LED light control based on input from PIR (to detect if people are present) and LDR(ambient light level)

**5. IOT Framework**

**Experiment 5:**

Upload humidity & temperature data to ThingSpeak, periodically logging ambient light level to ThingSpeak

**Experiment 6:**

Controlling LEDs, relay & buzzer using Blynk app

**6. HTTP Based**

**Experiment 7:**

- Introduction to HTTP. Hosting a basic server from the ESP32 to control various digital based actuators (led, buzzer, relay) from a simple web page.



**Experiment 8:**

- Displaying various sensor readings on a simple web page hosted on the ESP32.

**7. MQTT Based**

**Experiment 9:**

Controlling LEDs/Motors from an Android/Web app, Controlling AC Appliances from an android/web app with the help of relay.

**Experiment 10:**

Displaying humidity and temperature data on a web-based application

**8. UAV/Drone:**

**Experiment 11:**

- Demonstration of UAV elements, Flight Controller
- Mission Planner flight planning design

**Experiment 12:**

- Python program to read GPS coordinates from Flight Controller

**Reference:**

1. Adrian McEwen, Hakim Cassimally - Designing the Internet of Things, Wiley Publications, 2012.
2. Alexander Osterwalder, and Yves Pigneur – Business Model Generation – Wiley, 2011
3. ArshdeepBahga, Vijay Madiseti - Internet of Things: A Hands-On Approach, Universities Press, 2014.
4. The Internet of Things, Enabling technologies and use cases – Pethuru Raj, Anupama C. Raman, CRC Press.

**Online Learning Resources/Virtual Labs:**

<https://www.arduino.cc/>

<https://www.raspberrypi.org/>