JEPPIAAR
ENGINEERING COLLEGE

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Faculty Name: Mr. E. Sakthivel

Project Title: IoT-based system for real-time Temperature and Humidity monitoring using ESP32

Academic Year: 2022-23

Semester/Year: VII/IV

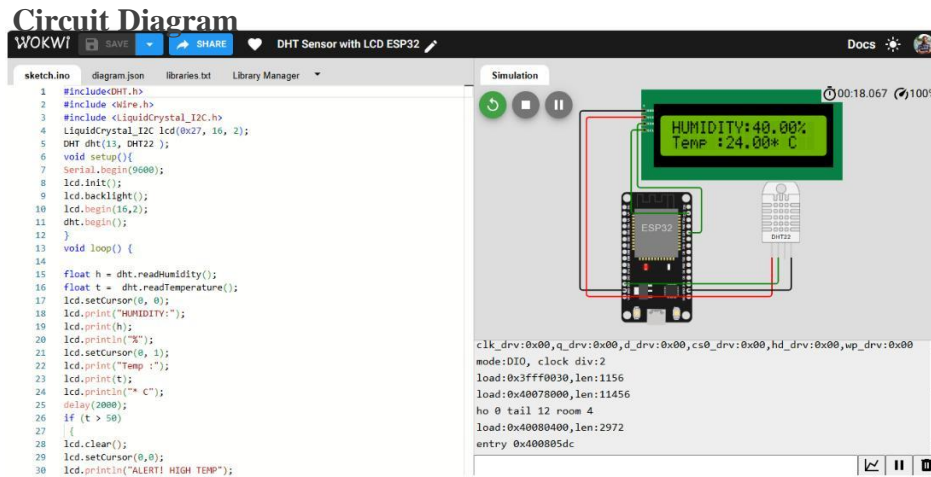**Type**: Hardware Implementation (ESP32(NODEMCU)-based)

Objective

To design an IoT-based system for real-time Temperature and Humidity monitoring for home automation using ESP32

Core Components:

- ESP32 (Wi-Fi/BLE enabled).
- DHT22 or BME280 sensor (higher accuracy than DHT11).
- Power Source: USB/micro-18650 battery for portability.
- Optional: LCD display (local readout)

CO & PO Mapping

CO	PO1 (Engineering Knowledge)	PO2 (Problem Analysis)	PO3 (Design/ Development)	PO4 (Investigation)	PO5 (Modern Tools)	PO6 (Ethics)	PO7 (Environment)	PO9 (Individual/ Teamwork)
CO1	3	2	3	–	2	–	–	2
CO2	3	3	3	2	3	–	–	2
CO3	2	3	2	3	3	1	2	3
CO4	2	3	2	3	2	–	3	–
CO5	–	3	–	3	2	–	–	2
CO6	–	–	–	–	–	3	2	–

Circuit Diagram

Wokwi link for simulation https://wokwi.com/projects/392411702976184321

Technical Outcomes
Functional IoT System:
- Real-time monitoring of temperature/humidity with **ESP32** + **DHT22/BME280**.
- Wireless data transmission via **Wi-Fi/Bluetooth** to cloud platforms (Firebase/MQTT).

Cloud Integration:
- Live data logging and visualization (e.g., Firebase dashboard, Node-RED UI).
- Automated alerts (email/SMS) for threshold breaches (e.g., temp > 30°C).

Power Efficiency:
- Optimized battery life using **deep sleep mode** (10μA vs. 80mA active).

Scalability:
- Design supports adding more sensors (e.g., air quality, motion) or nodes (via ESP-NOW).

Skill Development Outcomes
Hardware Skills:
- Circuit design, sensor interfacing, and PCB troubleshooting.
- Hands-on experience with **oscilloscopes, multimeters, and logic analyzers**.

Software Skills:
- Embedded C/C++ programming for ESP32 (Arduino IDE/ESP-IDF).
- Cloud API integration (Firebase/MQTT) and data parsing.

IoT & Networking:
- Wi-Fi configuration, MQTT protocols, and REST API basics.
- Security practices (e.g., data encryption, secure Wi-Fi credentials).