

IoT Laboratory Report

Course: Internet of Things Laboratory

Course Code: CSE-426

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Department of Computer Science & Engineering

Task 1: DHT11 Temperature & Humidity Monitoring

Objective

To measure temperature and humidity using DHT11 sensor and display the readings on OLED display.

Apparatus

- 1 NodeMCU ESP8266
- 2 OLED Display (SSD1306)
- 3 DHT11 Sensor
- 4 Rain Sensor
- 5 Soil Moisture Sensor
- 6 Water Level Sensor
- 7 LM35 Temperature Sensor
- 8 DS3231 RTC Module
- 9 Buzzer
- 10 Breadboard & Jumper Wires

Working Principle

DHT11 sensor provides digital temperature and humidity data which is processed by NodeMCU and displayed on OLED.

Block Diagram

Sensor → NodeMCU (ESP8266) → OLED Display / Buzzer

Flowchart

Start → Initialize Modules → Read Sensor Data → Process Data → Display / Alert → Delay → Repeat

Source Code (Excerpt)

```
#include <DHT.h> float temp = dht.readTemperature(); float hum = dht.readHumidity();
```

Task 3: Rain Sensor Monitoring

Objective

To detect rainfall using a rain sensor and show status on OLED.

Apparatus

- 1 NodeMCU ESP8266
- 2 OLED Display (SSD1306)
- 3 DHT11 Sensor
- 4 Rain Sensor
- 5 Soil Moisture Sensor
- 6 Water Level Sensor
- 7 LM35 Temperature Sensor
- 8 DS3231 RTC Module
- 9 Buzzer
- 10 Breadboard & Jumper Wires

Working Principle

Rain sensor output varies with presence of water which is read as analog input.

Block Diagram

Sensor → NodeMCU (ESP8266) → OLED Display / Buzzer

Flowchart

Start → Initialize Modules → Read Sensor Data → Process Data → Display / Alert → Delay → Repeat

Source Code (Excerpt)

```
int rainValue = analogRead(A0);
```

Task 4: Soil Moisture Monitoring with Buzzer

Objective

To monitor soil moisture and generate alert using buzzer.

Apparatus

- 1 NodeMCU ESP8266
- 2 OLED Display (SSD1306)
- 3 DHT11 Sensor
- 4 Rain Sensor
- 5 Soil Moisture Sensor
- 6 Water Level Sensor
- 7 LM35 Temperature Sensor
- 8 DS3231 RTC Module
- 9 Buzzer
- 10 Breadboard & Jumper Wires

Working Principle

Soil moisture sensor outputs analog voltage based on water content in soil.

Block Diagram

Sensor → NodeMCU (ESP8266) → OLED Display / Buzzer

Flowchart

Start → Initialize Modules → Read Sensor Data → Process Data → Display / Alert → Delay → Repeat

Source Code (Excerpt)

```
if(soilValue >= dryValue) digitalWrite(BUZZER, HIGH);
```

Task 5: Water Level Monitoring

Objective

To measure water level and classify as LOW, MEDIUM or HIGH.

Apparatus

- 1 NodeMCU ESP8266
- 2 OLED Display (SSD1306)
- 3 DHT11 Sensor
- 4 Rain Sensor
- 5 Soil Moisture Sensor
- 6 Water Level Sensor
- 7 LM35 Temperature Sensor
- 8 DS3231 RTC Module
- 9 Buzzer
- 10 Breadboard & Jumper Wires

Working Principle

Water level sensor outputs analog voltage proportional to water height.

Block Diagram

Sensor → NodeMCU (ESP8266) → OLED Display / Buzzer

Flowchart

Start → Initialize Modules → Read Sensor Data → Process Data → Display / Alert → Delay → Repeat

Source Code (Excerpt)

```
int percent = map(analogRead(A0), 0, 1023, 0, 100);
```

Task 6: Temperature Measurement using LM35 & DHT11

Objective

To compare temperature readings from LM35 and DHT11 sensors.

Apparatus

- 1 NodeMCU ESP8266
- 2 OLED Display (SSD1306)
- 3 DHT11 Sensor
- 4 Rain Sensor
- 5 Soil Moisture Sensor
- 6 Water Level Sensor
- 7 LM35 Temperature Sensor
- 8 DS3231 RTC Module
- 9 Buzzer
- 10 Breadboard & Jumper Wires

Working Principle

LM35 provides analog voltage proportional to temperature while DHT11 provides digital data.

Block Diagram

Sensor → NodeMCU (ESP8266) → OLED Display / Buzzer

Flowchart

Start → Initialize Modules → Read Sensor Data → Process Data → Display / Alert → Delay → Repeat

Source Code (Excerpt)

```
float tempLM35 = voltage * 100;
```

Task 7: Environment Monitoring using RTC

Objective

To display temperature, humidity, date and time using RTC module.

Apparatus

- 1 NodeMCU ESP8266
- 2 OLED Display (SSD1306)
- 3 DHT11 Sensor
- 4 Rain Sensor
- 5 Soil Moisture Sensor
- 6 Water Level Sensor
- 7 LM35 Temperature Sensor
- 8 DS3231 RTC Module
- 9 Buzzer
- 10 Breadboard & Jumper Wires

Working Principle

RTC module keeps real-time clock while DHT11 senses environmental data.

Block Diagram

Sensor → NodeMCU (ESP8266) → OLED Display / Buzzer

Flowchart

Start → Initialize Modules → Read Sensor Data → Process Data → Display / Alert → Delay → Repeat

Source Code (Excerpt)

```
DateTime now = rtc.now();
```