DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL – 576104, KARNATAKA, INDIA

Measurement & Instrument Lab

Jan 2025

Mini Project Report

Title: IoT SMART IRRIGATION

Group Details:

S.No	Name	Registration No.	Roll No.	Signature
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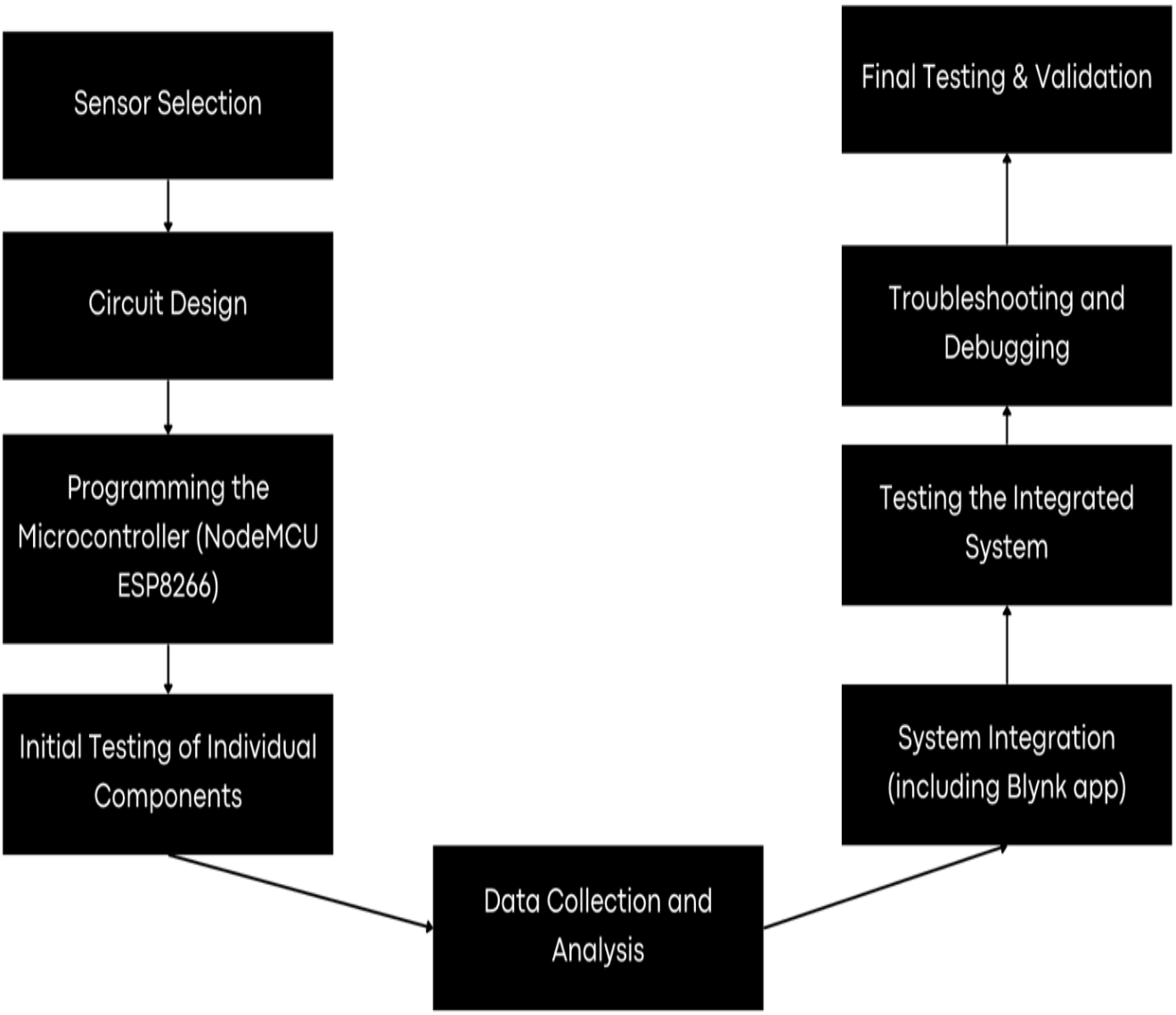
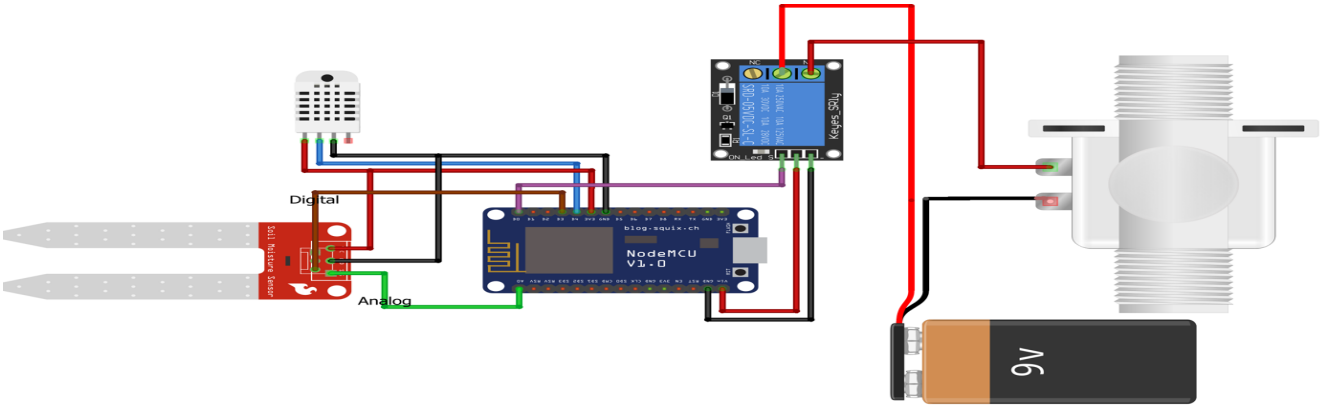
OBJECTIVES:

1) Develop an IoT-based system to monitor real-time soil moisture and environmental conditions (temperature and humidity) of a plant.
2) Implement an irrigation system that triggers on user control monitoring soil moisture.
3) Create a user-friendly mobile application for remote monitoring and control of the system.

Block diagram:



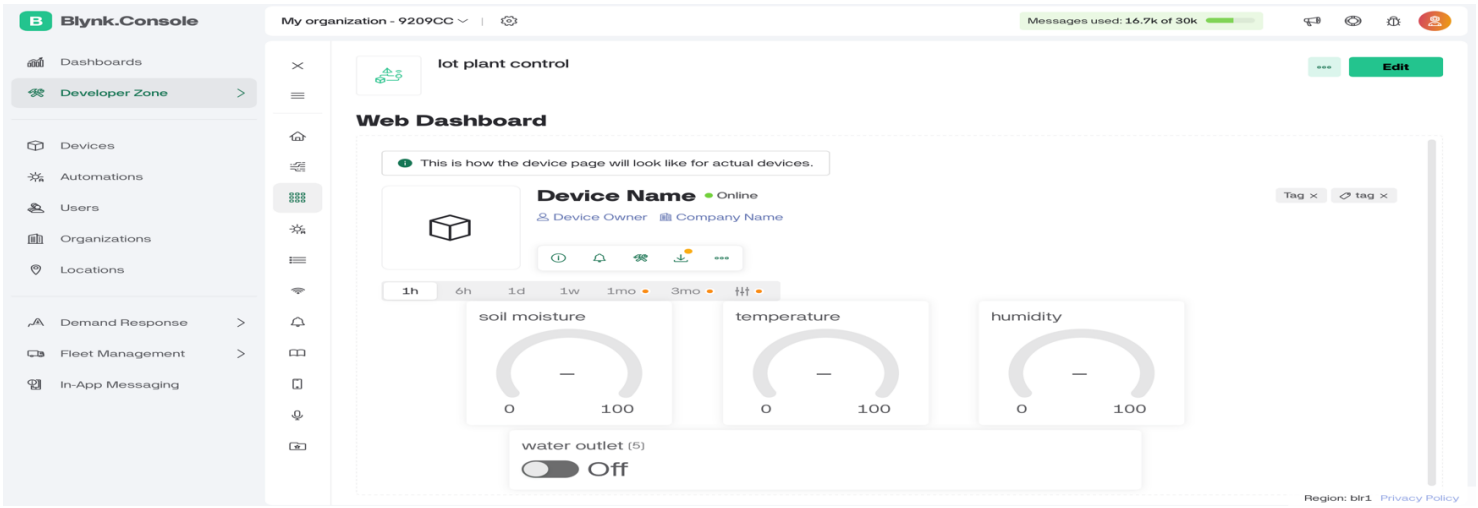
Circuit Diagram:

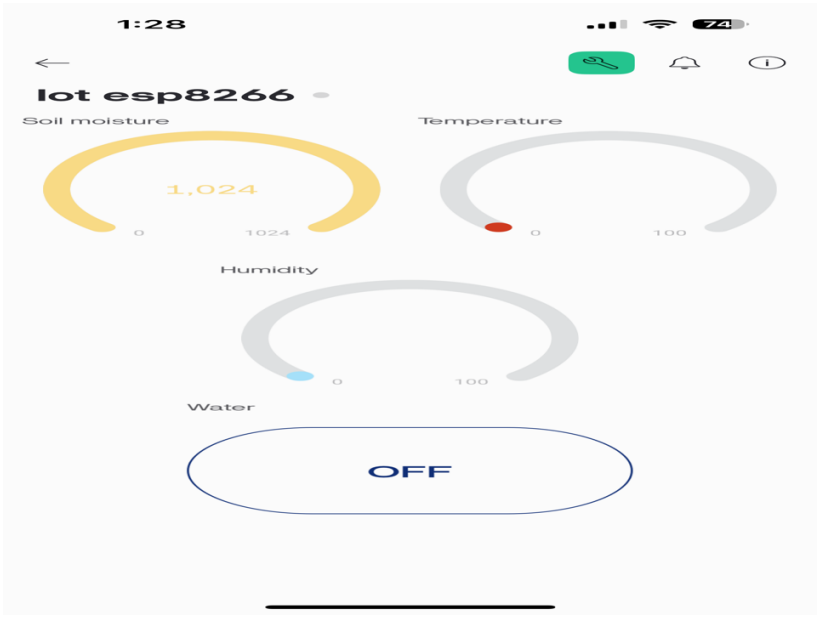


Components: Board- NodeMCU ESP8266 (wifi module)

Sesnors- Soil Moisture, DHT11 (Humidity and Temperature), Relay, 12V DC supply, Solinoid Valve, Connecting Wires.

Blynk console and App control:





Code:

1. Blynk and WiFi Configuration

```
cpp
CopyEdit
#define
BLYNK_TEMPLATE_ID
"TMPL3Spz0Rl_k"
#define
BLYNK_TEMPLATE_NAME
"Iot Plant Control"

#define BLYNK_PRINT
Serial
```

2. Library Inclusions

```
cpp
CopyEdit
#include <SPI.h>
#include <ESP8266WiFi.h>
#include
<BlynkSimpleEsp8266.h>
#include <DHT.h>
#include <OneWire.h>
#include <DallasTemperature.h>
```

3. WiFi and Authentication Credentials

```
cpp
CopyEdit
char auth[] =
"p9vuqBe50yY5uUbvnauIyKdJB1gyCEFA";
char ssid[] = "Airtel_kvai_5077";
char pass[] = "1234567879";
```

4. Pin Definitions

```
cpp
CopyEdit
#define ONE_WIRE_BUS 4
#define sensorPin 0
#define DHTPIN 2
#define DHTTYPE DHT11
#define RELAY_PIN 14
```

5. Object Creation for Sensors and Timer

```
cpp
CopyEdit
int relayState = LOW;

OneWire oneWire(ONE_WIRE_BUS);
DallasTemperature
sensors(&oneWire);
DHT dht(DHTPIN, DHTTYPE);
BlynkTimer timer;
```

6. Relay Control via Blynk

```
cpp
CopyEdit
BLYNK_WRITE(V3) {
    relayState = param.asInt();
    digitalWrite(RELAY_PIN,
relayState);
    Serial.println(relayState ?
"Relay ON via Blynk" : "Relay OFF
via Blynk");
}
```

7. Sending Temperature and Humidity Data

```
cpp
CopyEdit
void sendSensorData()
{
    float humidity =
dht.readHumidity();
    float temperature
=
dht.readTemperature();

    if
(isnan(humidity) ||
isnan(temperature)) {

Serial.println("Failed
to read from DHT
sensor!");
        return;
    }


Blynk.virtualWrite(V5,
humidity);

Blynk.virtualWrite(V6,
temperature);
}
```

8. Sending Soil Moisture and Temperature Data

```
cpp
CopyEdit
void sendTemps() {
    int soilMoisture =
analogRead(A0);

sensors.requestTemperatures();
    float tempC =
sensors.getTempCByIndex(0);

    Serial.print("Temperature:
");
    Serial.print(tempC);
    Serial.print(" °C, Soil
Moisture: ");

Serial.println(soilMoisture);

    Blynk.virtualWrite(V1,
tempC);
    Blynk.virtualWrite(V2,
soilMoisture);
}
```

9. Setup Function

```
cpp
CopyEdit
void setup() {
    Serial.begin(115200);
    Blynk.begin(auth, ssid, pass);

    pinMode(RELAY_PIN, OUTPUT);
    digitalWrite(RELAY_PIN, LOW);

    dht.begin();
    sensors.begin();

    timer.setInterval(1000L,
sendSensorData);
    timer.setInterval(2000L,
sendTemps);
}
```

Results:

The ESP8266 will read analog data and will display on BLYNK console connected via Wi-Fi and allows user to control the water valve relay on the console.

Conclusion:

This Project allows user to observe the environmental conditions of irrigation site and take care of the plant accordingly using sensors for humidity, soil moisture, and temperature. Helps the user to remotely control the water flow to plants using a Relay controlling solenoid valve.

Limitations and Scope of Improvement:

This circuit will only allow user to visualize the data and take required action manually, and the controllable actions are also only water flow.

Scope of improvement could be in integrating the system to automatically send notifications and do the necessary actions without users' involvement.
and could also integrate motion sensor which triggers to ring an alarm, to scare away any threat.

Impact on Public health and Environment:

Improved quality of vegetation with less involvement of manual labor to look after the plants. Irrigation hassle becomes less hazardous as the Iot Smart Irrigation system automates basics required for plant.
Water is saved as we use it only when necessary, reduced use of fertilizers and pesticide as plants get their optimal conditions to grow.

Comments on ability to function effectively as team member for the project:

Adithya Om- Integrating Blynk console was challenging and took a lot of time to figure out how to set up data streams for the UI created. Auth token and template Id was tricky to link to ESP8266 WIFI module.

Arya Singh- Circuit was tricky including many connections and troubleshooting demanded more time as it included 2 sensors, and a relay. Fixing errors in the code was challenging as the WIFI module had different set of libraries to include before we could connect ESP8266 it to PC.

Bill Of Materials:

PRODUCT NAME	PRODUCT IMAGE	MODEL	QUANTITY	PRICE	TOTAL
NodeMcu ESP8266 CH340 WIFI Development Board		FR-01-452	1	₹183	₹183
5V Single Channel RELAY Module		FR-01-500	1	₹31	₹31
Solderless Breadboard 400 Point		FR-01-909	1	₹35	₹35
Combo of 3 type Jumper Cables | 10 F-F |10 F-M | 10 M-M		FRC-01-928	1	₹49	₹49
Soil Moisture Meter, Soil Humidity Sensor, Water Sensor, Soil Hygrometer for Ardunio		FR-01-739	1	₹33	₹33
12V DC 1/2" Normally Closed Electric Solenoid Water Air Valve Switch		FR-05-230	1	₹266	₹266
				Sub-Total	₹597
				Blue Dart	₹79
				Total	₹676

+DHT11(160rs)+Data cable(100rs)

Total=Rs. 936/-

Thank You.