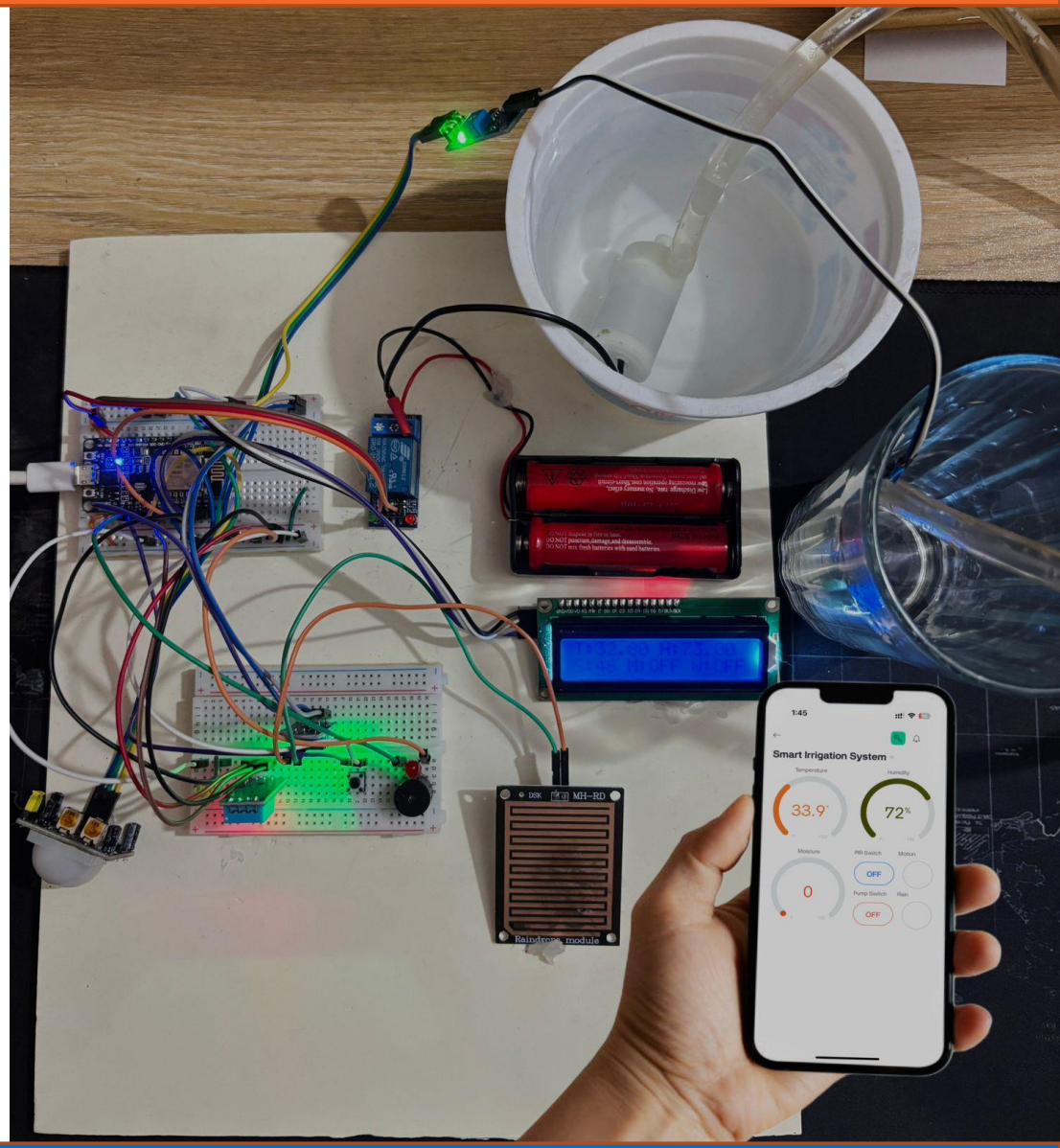
Smart IoT Plant Monitoring System



PRESENTED BY - GROUP 4

SECTION – M

SUPERVISED BY – NILOY GOSWAMI

CONTENTS

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INTRODUCTION

- **Irrigation** is the **artificial application** of water to the land or soil to assist in the growing of crops.
- Soil Moisture, Humidity, temperature, and PIR sensor are wirelessly transmitted using wireless technology for better production.
- Interfacing of a microcontroller through a moisture sensor through **NodeMCU Esp8266.**

PROJECT OBJECTIVES

- Reduce the man power and conserve the water
- Real time sensing the control
- To get the output of the soil moisture sensor and provide water to crop.
- To observe other parameters to better yield.

LITERATURE REVIEW

❑Existing Solutions:

- Previous smart watering systems focus on moisture but lack comprehensive monitoring.
- Some systems use basic sensors but lack environmental adaptability (rain, temperature, etc.).

❑Innovation:

- Integrated **DHT11** sensor for temperature & humidity monitoring.
- Added **PIR sensor** to detect animal movement.
- Used a **Rain sensor** to prevent unnecessary watering.
- Combined with the Blynk IoT app for real-time monitoring and remote control.

METHODOLOY AND MODELING

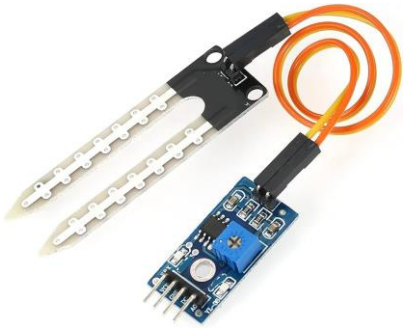
❖ **Approach:** IoT-based system for monitoring environmental factors and controlling irrigation.

❖ **Tools Used:**

- NodeMCU ESP8266 for Wi-Fi connectivity.
- Sensors for soil moisture, humidity, rain, and motion.
- Blynk app for remote control and notifications.

COMPONENTS USED

NodeMcu Esp8266



Soil Moisture

Rain Drop sensor

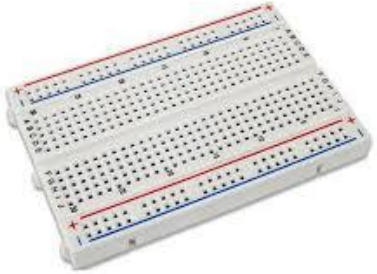
PIR Sensor

DHT11 Humidity Sensor

1 channel 5v Relay

Water pump

Jumper Wire



Breadboard

16*2 Lcd display

3.7v Battery

DESCRIPTION OF COMPONENTS

- **NodeMCU ESP8266:** Wi-Fi module for communication.
- **Soil Moisture Sensor:** Detects soil water levels.
- **DHT11 Sensor:** Measures humidity and temperature.
- **PIR Motion Sensor:** Detects animal activity.
- **Rain Sensor:** Detects rainfall and prevents watering.
- **Water Pump:** Activates irrigation.
- **Relay:** Controls the water pump.
- **Blynk App:** Provides remote control and notifications.

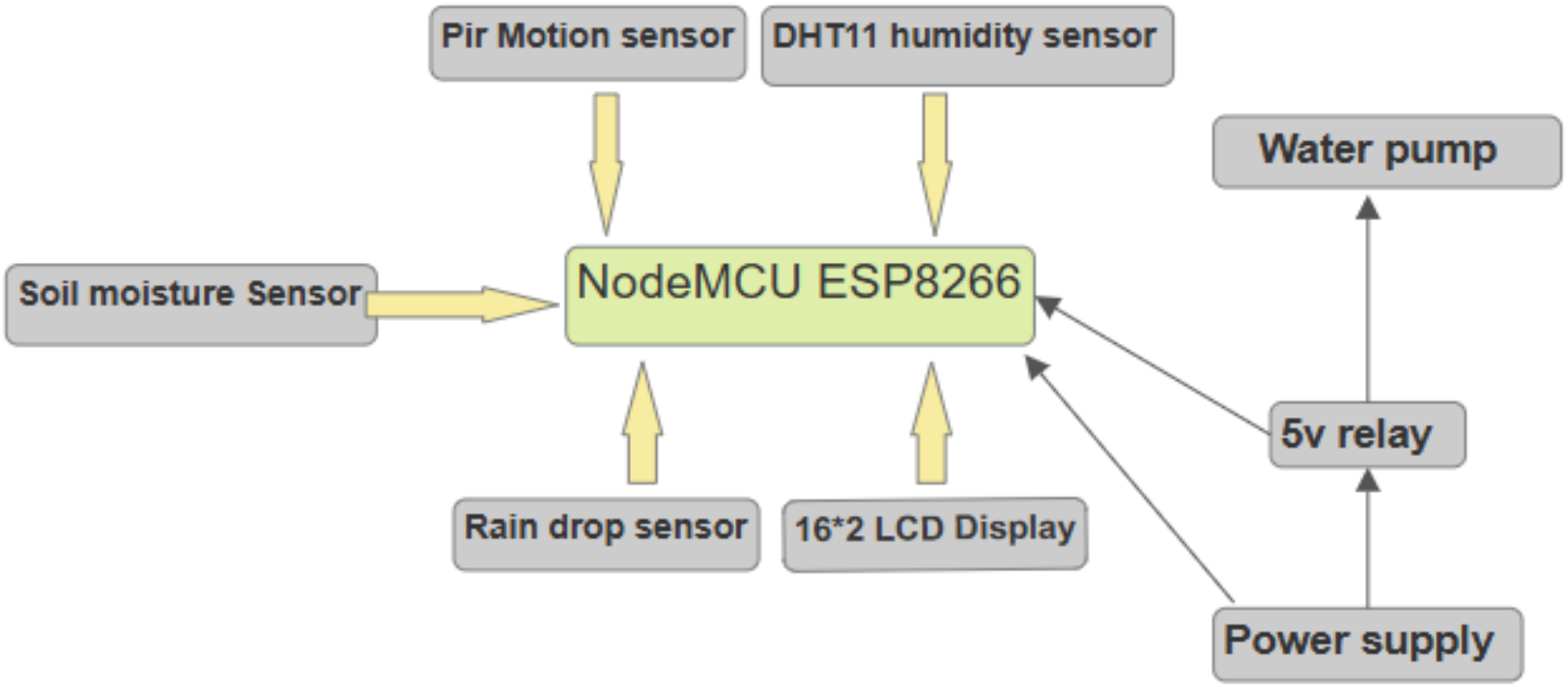
COST ANALYSIS

- **NodeMcu** – 340 BDT
- **Rain drop sensor** – 80 BDT
- **Soil Moisture sensor** – 80 BDT
- **DHT11 humidity sensor** –120 BDT
- **3.7v lithium battery** – 78 BDT * 2
- **1 channel 5v relay** – 85 BDT
- **Water pump** – 120 BD
- **16*2 LCD display I2C interface** – 220 BDT
- **Half Size Breadboard** – 75 BDT * 2
- **Jumper wire male to male** –20 pics (60 BDT)
- **Jumper wire male to Female**–20 pics(60 BDT)
- **Buzzer** – 20 BDT
- **LED** – 5 BDT * 2
- **Push button** – 5 BDT

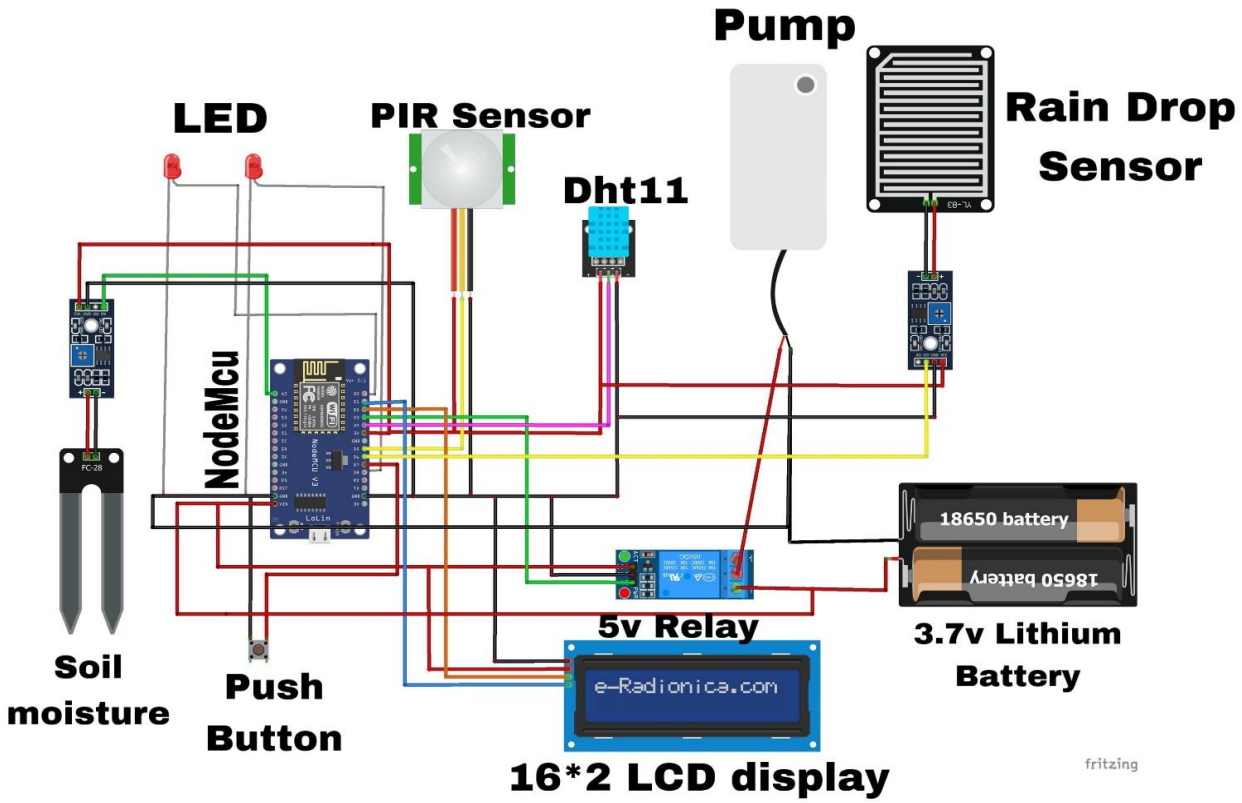
•**Total Project Cost**: Approx. **1800 BDT**

•**Conclusion**: This is a **cost-effective** solution for small gardens and farms.

BLOCK DIAGRAM



CIRCUIT DIAGRAM



The **NodeMCU ESP8266** is the system's core, linking all components and enabling control via the Blynk app. It collects data from sensors like the **Soil Moisture Sensor,** which activates the water pump when the soil is dry. The **DHT11** sensor monitors temperature and humidity, while the **Rain Drop Sensor** prevents watering during rain and alerts you via the app. The **PIR Motion Sensor** detects animals and triggers an alert with a buzzer. The **1-channel Relay** controls the water pump, and the **LCD Display** shows real-time data. Jumper wires connect the components, and the **7.4V battery** powers the water pump. **A Push Button** lets you manually control the pump.

SIMULATION

- **Proteus** was used to simulate the system's performance.
- Due to the limitations of simulating the entire system together, I tested each sensor separately using **Proteus.**

SIMULATION

Cont...

SIMULATION :

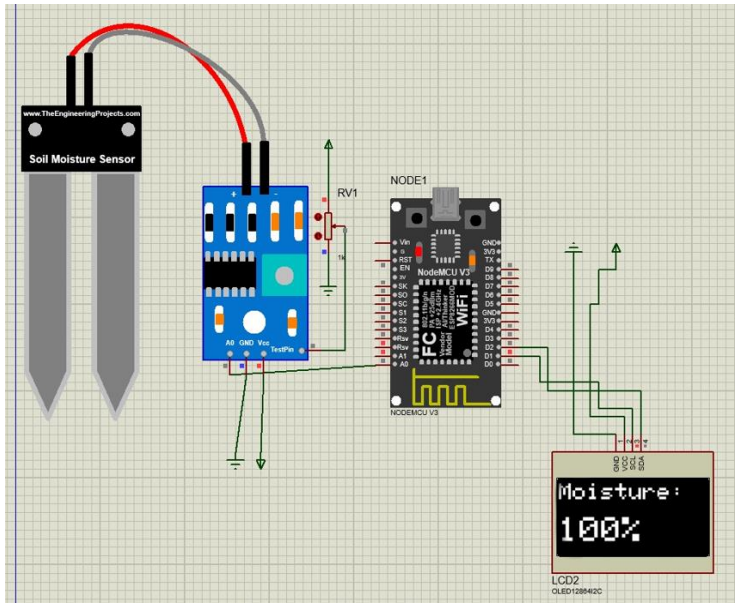


Fig.2.: Simulation for the soil moisture sensor

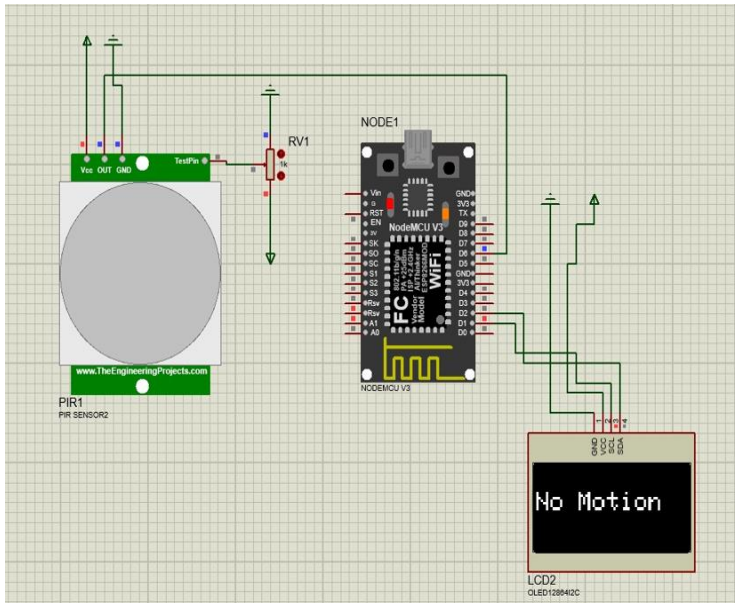


Fig.3 : Simulation for PIR sensor(when System response no motion detected !).

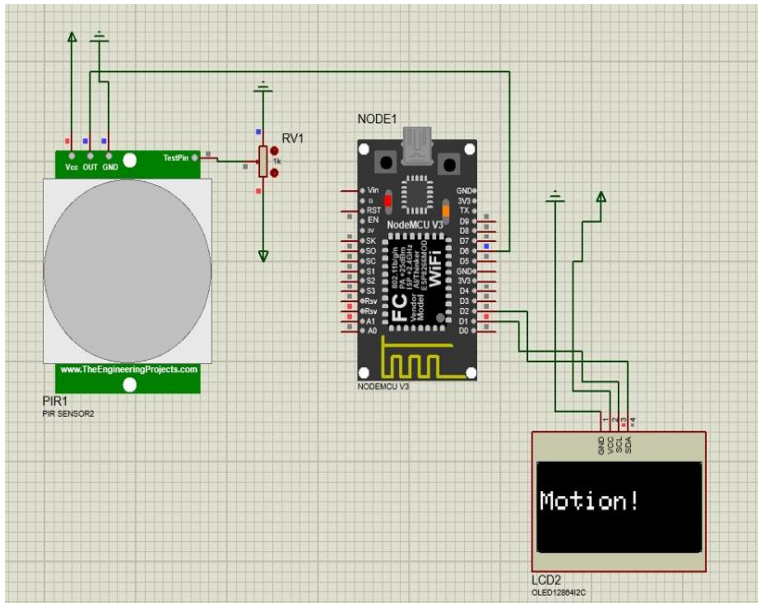


Fig.4 : Simulation for PIR sensor(when System response motion detected !).

SIMULATION

Cont...

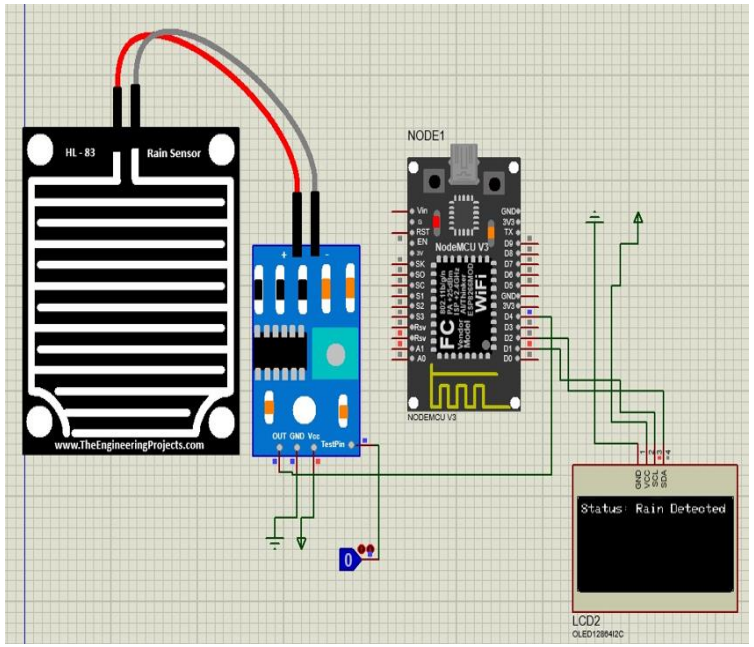


Fig.4 : Simulation for Rain drop sensor(when System response Rain detected !)

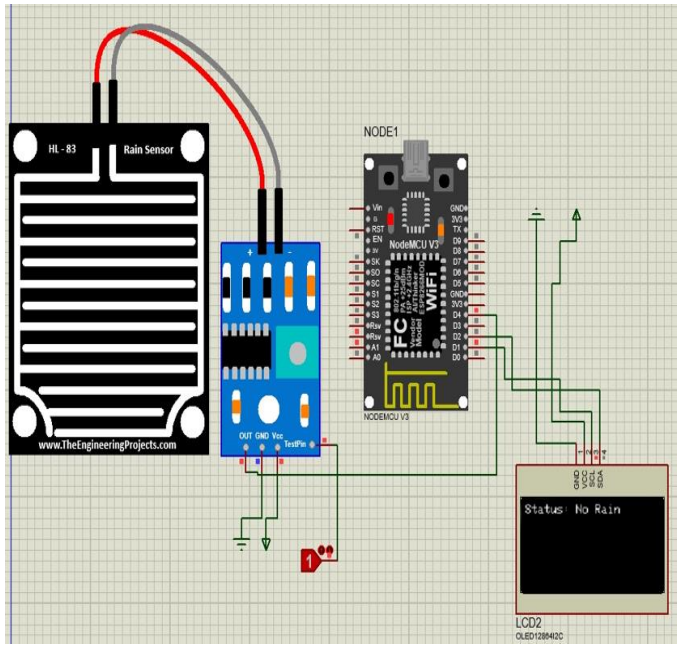


Fig.5 : Simulation for Rain drop sensor(when System response No Rain detected !)

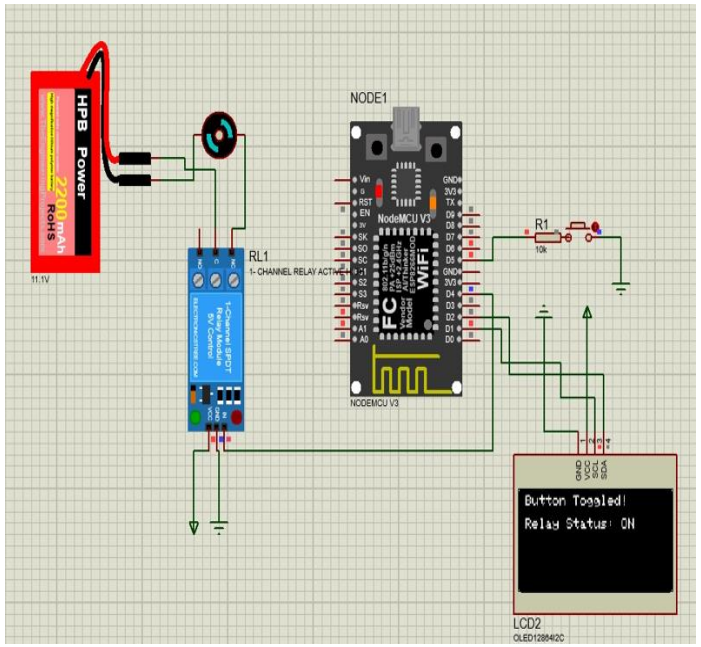


Fig. 6: Simulation for Motor (When toggling the switch ON)

SIMULATION

Cont...

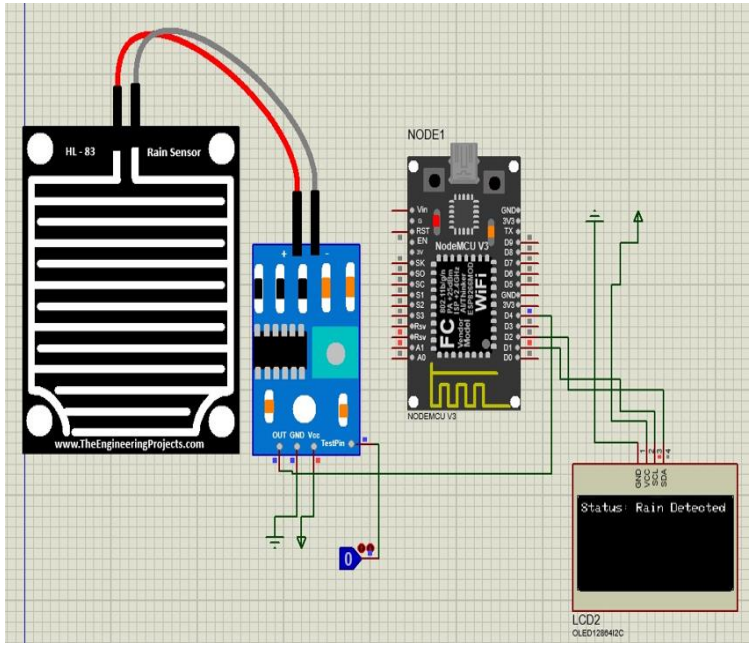


Fig.4 : Simulation for Rain drop sensor(when System response Rain detected !)

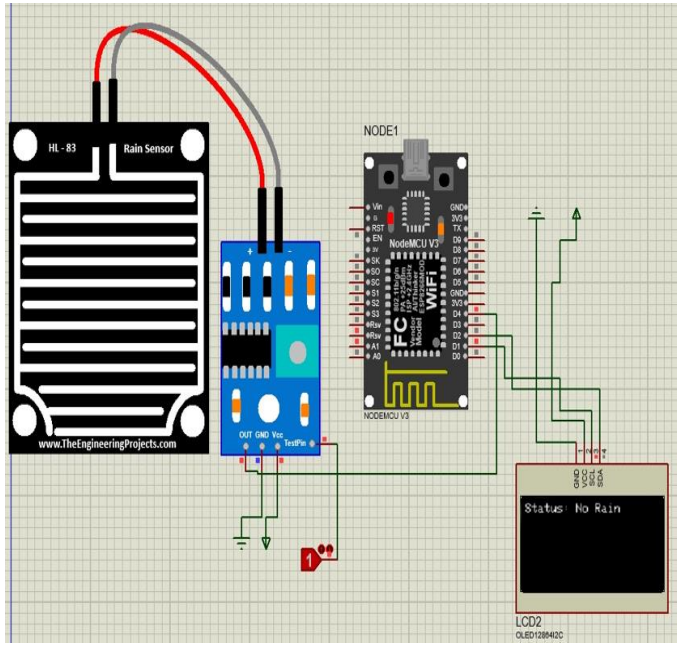


Fig.5 : Simulation for Rain drop sensor(when System response No Rain detected !)

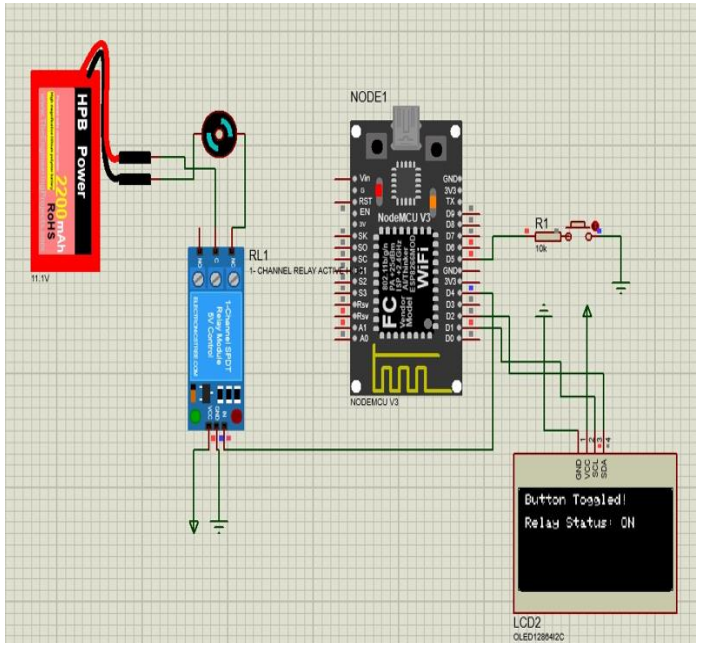


Fig. 6: Simulation for Motor (When toggling the switch ON)

DEMO PICTURES

1.

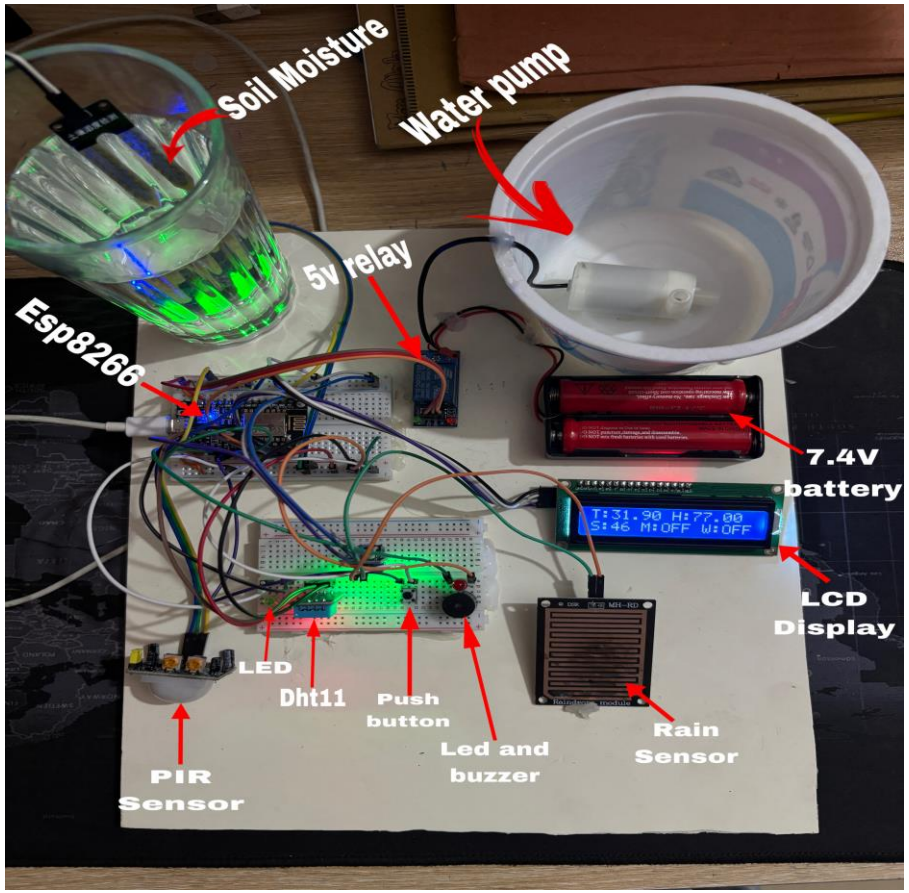


Fig.7: Hardware setup

2.

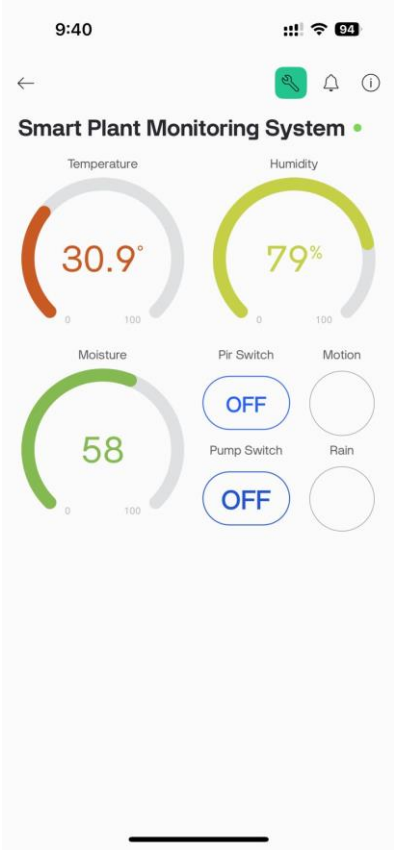


Fig.8: Water switch remains off when moisture value is above 35%

3.

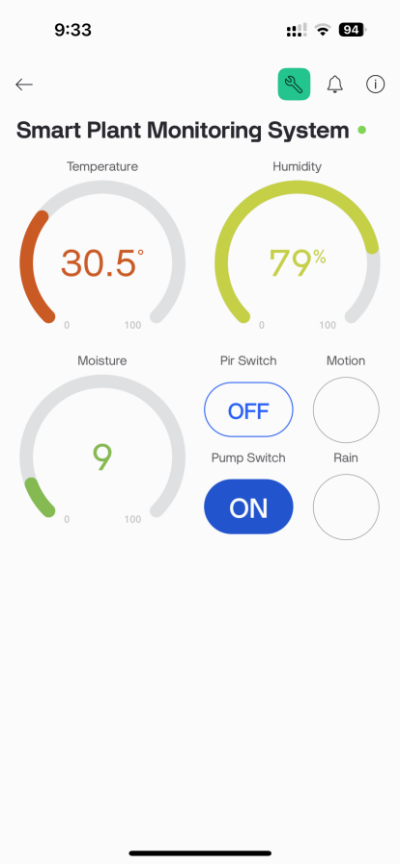


Fig.9: Water switch Turned on when moisture value is below 35%

DEMO PICTURES

Cont...

1.

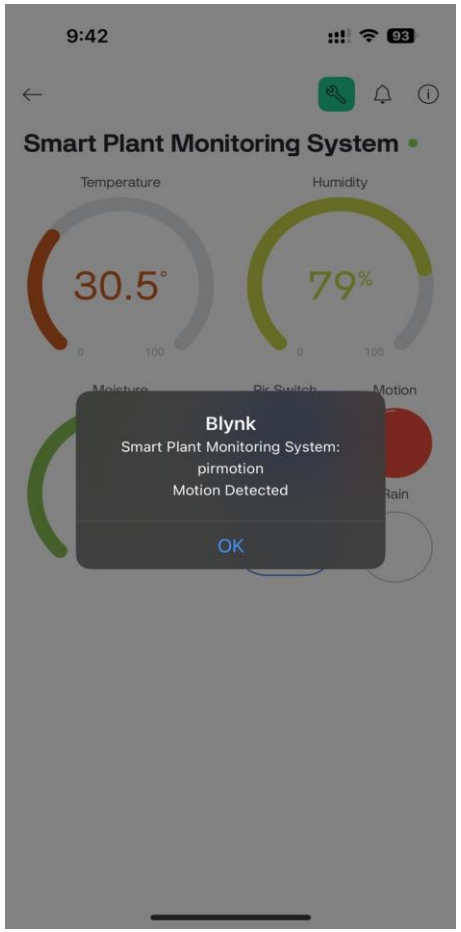


Fig.10: When the motion is detected Notification is send to the device

2.

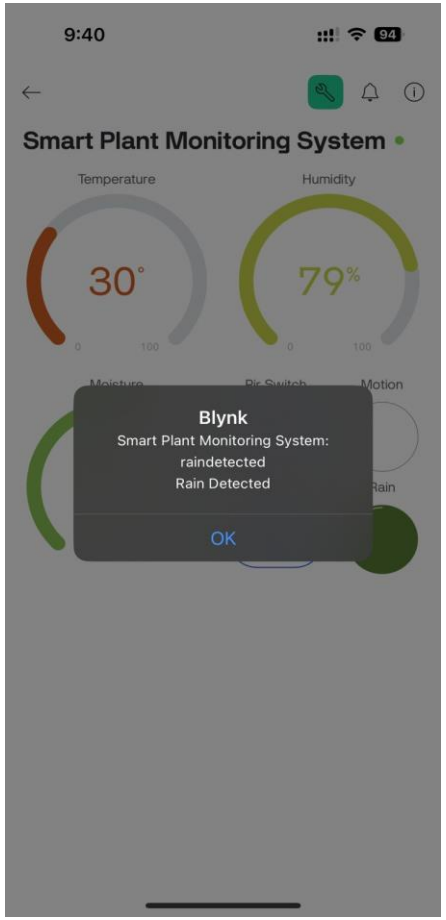


Fig.11: When the motion is detected Notification is send to the device

3.

Fig.12: Lcd displays the value of temp,humidity,moisture, motion and motor on/off status

LIMITATIONS OF THE PROJECT

- **Sensor Accuracy**: Some sensors may be slightly inaccurate, affecting performance.
- **Power Use**: The 7.4V battery needs frequent recharging, especially in larger setups.
- **Limited Adaptability**: Environmental changes like temperature and humidity aren't fully accounted for.
- **Internet Dependency**: Remote monitoring via the Blynk app requires an internet connection.

How Our Project Supports the SDGs

Efficient use of water through automated irrigation reduces wastage and ensures sustainable water management.

Uses IoT technology (sensors, NodeMCU, Blynk) to modernize agriculture with smart and scalable infrastructure.

Supports healthy plant growth and sustainable land use, contributing to ecosystem preservation.

FUTURE IMPROVEMENTS

- Light, pH, and nutrient sensors for better plant health monitoring.
- Smart scheduling based on rainfall and temperature forecasts.
- Use solar power and low-energy components for sustainable operation.
- Machine learning to predict plant water needs and disease control for optimizing irrigation.

CONCLUSION

Thus this project has a handy application for all those people ,Those who have farms and like to contribute to the agriculture of the country but are hampered by a lack of personnel and a lack of time from their daily duties. This project also allows surveillance on the personnel and their crops so as not to incur losses. It is easy to use for anyone with a smartphone and doesn’t require maintenance once set up.

HERE IS A VIDEO HOW IT WORKS


Thank you!