# Project Title

- Smart Irrigation System.

# Team Members

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# Introduction

- In today's fast-paced world, automating daily tasks has become essential for convenience and efficiency, especially in areas like garden and plant care. This project focuses on creating a Smart Irrigation System using the ESP8266 microcontroller, the Blynk IoT platform, and a soil moisture sensor. The system ensures that plants receive the right amount of water at the right time, automating the watering process based on soil moisture levels.

# Objectives

- 1. Automate Irrigation Process: Develop a system that automatically waters plants based on soil moisture levels to ensure optimal hydration for plant growth.
- 2. Remote Monitoring and Control: Enable users to monitor and control the irrigation system remotely through the Blynk IoT platform on their smartphones.
- 3. Efficient Water Usage: Reduce water wastage by ensuring the system only waters when necessary, promoting sustainable water management.

# Methodology

- Hardware Setup
  ● Objective: Assemble the hardware components based on the designed circuit.
  ● Steps: ○ Set up the ESP8266 microcontroller as the central unit for controlling the system and communicating with the IoT platform. ○ Connect the soil moisture sensor to the ESP8266 to measure the soil's moisture level. ○ Interface the relay module with the ESP8266 to control the water pump for irrigation.

  Software Development
  ● Objective: Program the ESP8266 to automate and control the irrigation system.
  ● Steps: Write the code for the ESP8266 using the Arduino IDE:
  ■ Establish Wi-Fi connectivity using the ESP8266WiFi library.
  ■ Integrate the Blynk library for communication with the Blynk app.

# Methodology

Blynk App Configuration

- Objective: Set up the Blynk app for real-time monitoring and control of the irrigation system.
- Steps:
  - Download and install the Blynk app on a smartphone.
  - Create a new project in the app and select ESP8266 as the hardware model.
  - Add relevant widgets to the app interface:
    - Gauge or display widget to show real-time soil moisture levels.
    - Button widget to manually control the water pump.

# Hardware Components

ESP8266 (NodeMCU V3):

- Function: The ESP8266 is the main microcontroller in the system.

Soil Moisture Sensor (FC-28):

- Function: This sensor measures the moisture level in the soil

Relay Module (5V):

- Function: The relay module acts as a switch to control the water pump.

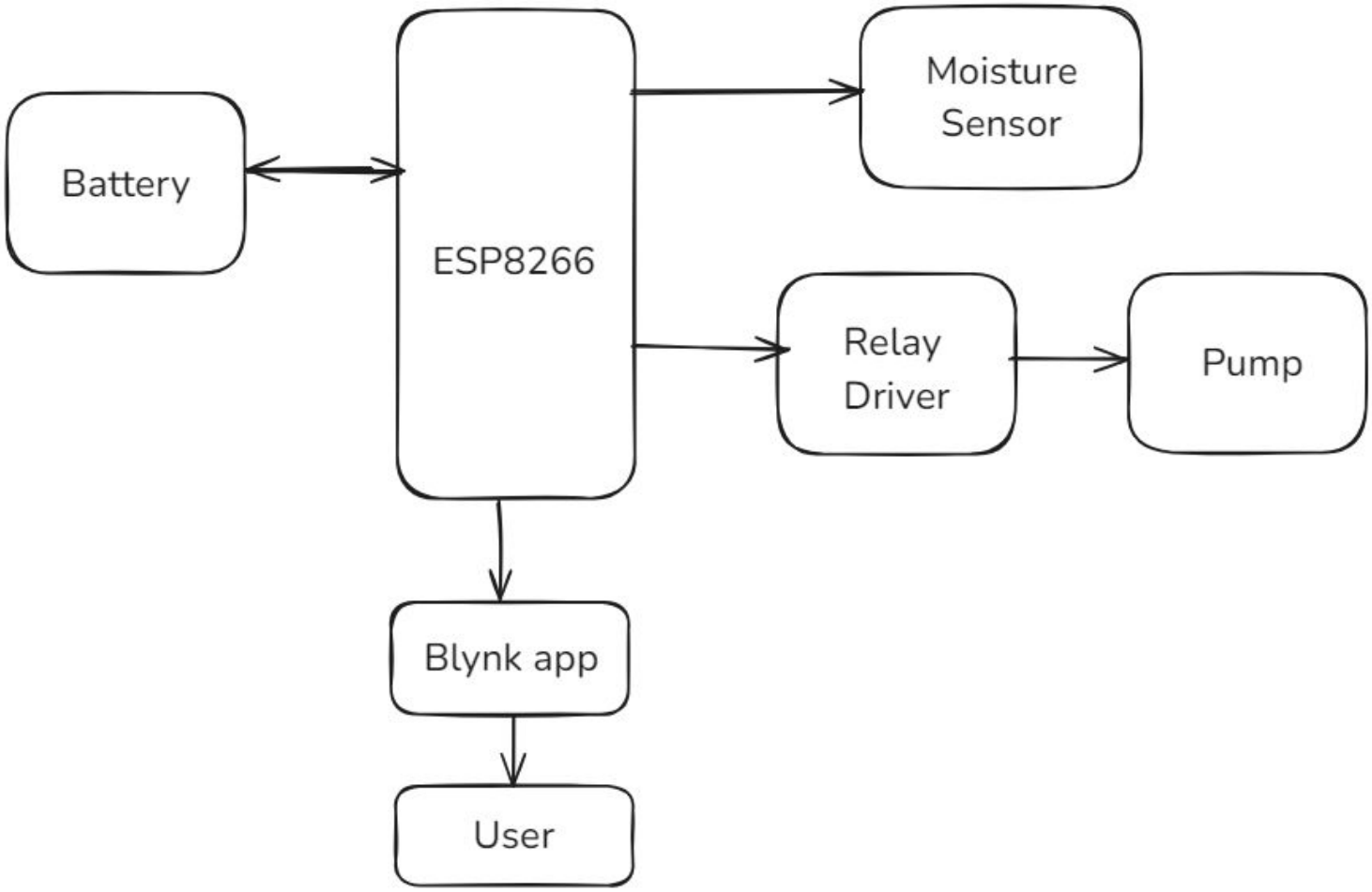
Water Pump:

- Function: The water pump is responsible for delivering water to the plants.

# Software Components

- Blynk IoT Platform:
- ● Function: Blynk is an Internet of Things (IoT) platform that allows for remote monitoring and control of hardware via a mobile app.
- Blynk Library:
- ● Function: The Blynk Library is included in the Arduino code to facilitate communication between the ESP8266 and the Blynk cloud server

# Block Diagram



# Implementation

## 1] Setting Up the Hardware

Use jumper wires to establish connections between the components on the breadboard, ensuring a solid circuit.

## 2] Programming the ESP8266

Write or upload the Arduino sketch to the ESP8266. The sketch should:

- ○ Connect the ESP8266 to your Wi-Fi network.
- ○ Continuously read data from the soil moisture sensor

## 3] Configuring Blynk IoT Platform

Add widgets to the app interface, such as:

Step 1:Gauge or Graph to display the soil moisture level.

Step 2: Button to manually control the water pump.

Step 3: Link the widgets to virtual pins defined in the code, so the app can control the system and receive data.

Step 4: Use the authentication token provided by Blynk in your Arduino code, ensuring the ESP8266 can connect to your project on the Blynk server.

# Testing

- Initial Hardware Test:
  - Objective: Verify that all hardware components are correctly connected and functional.
- Wi-Fi Connectivity Test:
- ● Objective: Ensure the ESP8266 connects to the Wi-Fi network
- Blynk App Connectivity Test:
- ● Objective: Verify communication between the ESP8266 and the Blynk IoT platform.

# Results and Discussion

**Automated Watering**:

- The system successfully automated the watering process based on real-time soil moisture levels.

**Manual Control via Blynk App**:

- The Blynk app provided seamless remote control of the water pump. Users could manually turn the pump on or off from anywhere, providing flexibility for users

**Real-Time Monitoring**:

- Soil moisture data was continuously sent to the Blynk app, allowing for real-time monitoring of soil conditions.

**Water Conservation**:

- The system demonstrated efficient water use, only activating the pump when necessary.

# Conclusion and Future Work

**Conclusion**

- The smart irrigation system successfully automated plant watering based on soil moisture levels, ensuring efficient water use.
- Remote monitoring and control through the Blynk app provided convenience and flexibility for users.
- Overall, the system promoted healthier plant growth and water conservation, making it an effective solution for modern gardening needs.

**Future Work (Slide Content)**

- Integrate additional sensors, such as temperature and humidity, for more comprehensive environmental monitoring.
- Explore solar power options to make the system energy-efficient and suitable for remote locations.
- Implement machine learning to predict optimal watering schedules based on historical data and weather conditions.