Automated Plant Watering System with MQTT and ESP32-S3

1. Introduction

Plants require consistent and appropriate watering to grow and remain healthy. However, in daily life, particularly during travel or vacations, it's easy to forget or be unable to water plants. Overwatering and underwatering are common issues that can damage plant health. An automated watering system that responds to soil moisture levels helps ensure optimal plant hydration while minimizing manual intervention.

This project presents a smart plant watering system designed to operate semi-autonomously. It monitors the soil moisture and automatically activates a peristaltic pump via a latching relay to deliver water when needed. The system uses two ESP32-S3 microcontrollers connected over Wi-Fi, communicating through MQTT protocol to exchange sensor data and control messages.

The architecture is split into two subsystems:

Sensor Node: Measures soil moisture and publishes data to an MQTT broker.

Actuator Node: Receives watering commands via MQTT and controls the pump.

Users can integrate remote notifications or dashboards via tools such as Node-RED, Telegram bots, or email alerts.