

B.TECH 3rd Year, Semester V



Sardar Vallabhbhai National Institute of Technology

Surat-395007, Gujarat, INDIA

Year 2024-25



IOT based Smart Garden

Watering to soil using ESP-32 to
watering garden with smart devices

Introduction



Teammates

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U22EC040

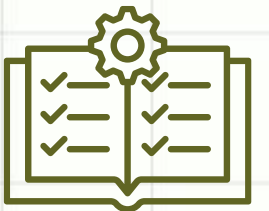
Pratham Bhivsan

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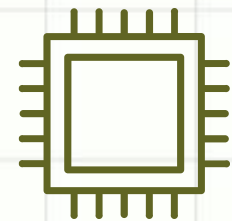
U22EC015

Project Overview



The IoT-based Smart Garden project leverages an ESP32 microcontroller to create an intelligent gardening system.

It monitors soil moisture and humidity levels using respective sensors to ensure optimal conditions for plant growth



Components Required

1 x ESP32

1 x Bread Board

1 x Humidity Sensor

1 x Moisture Sensor

1 x USB cable

1 x Soil container

Wires as required



Project Description

IOT based Smart Garden

This system ensures optimal growing conditions by monitoring soil moisture and environmental humidity and providing real-time feedback for plant management

Components

ESP32 Microcontroller

Central unit for processing sensor data and enabling remote monitoring via Wi-Fi.

Humidity Sensor

Monitors air humidity to assess environmental conditions

Moisture Sensor

Measures soil moisture to ensure proper watering

USB Cable

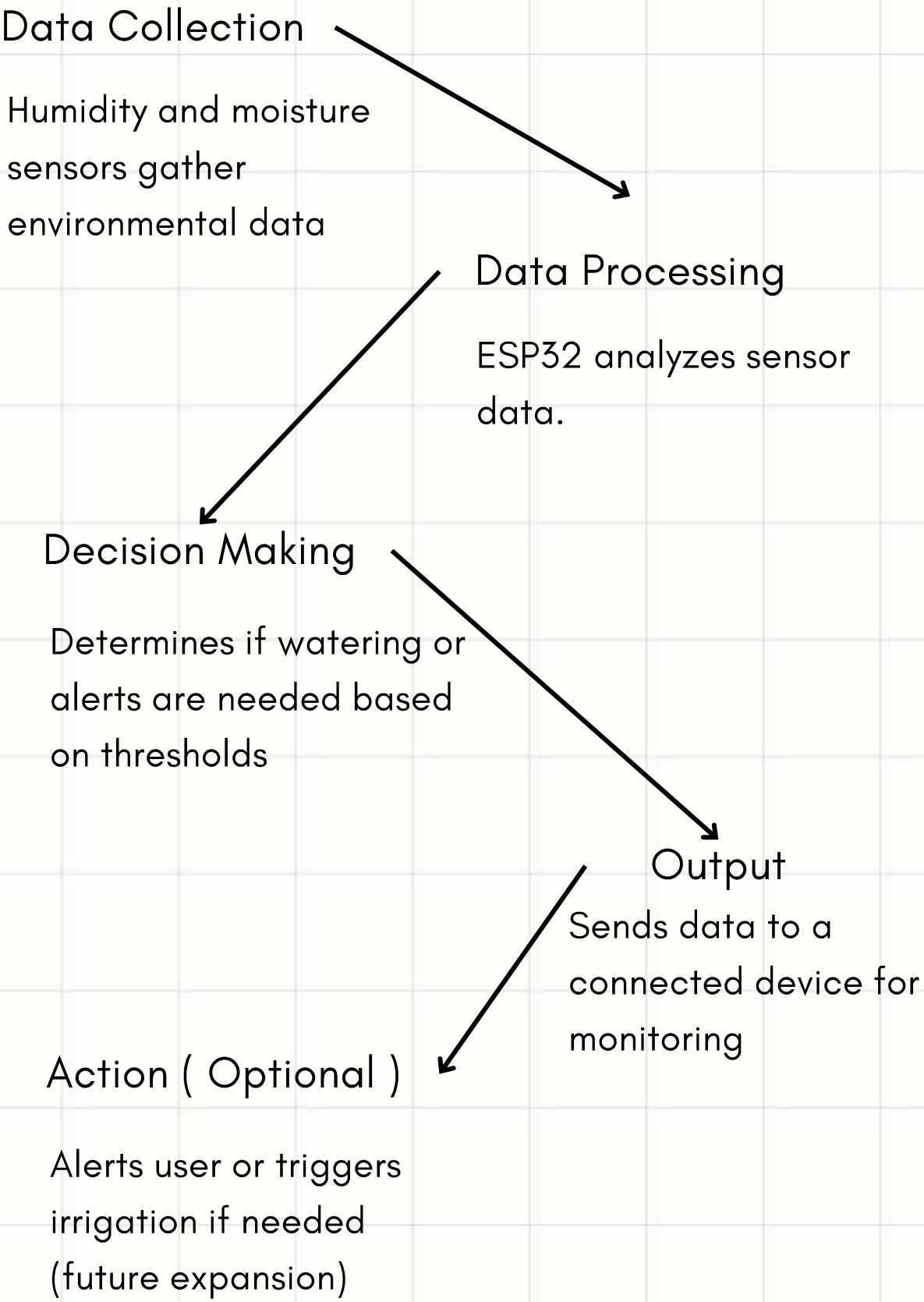
Powers the ESP32 and enables programming

Soil Container

Holds soil for testing sensor functionality

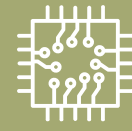
Wires
Connect components for data and power transfer

Working Flow



Objective & Implementation

The objective of this project is to develop an IoT-based Smart Garden system that automates plant care by monitoring environmental humidity and soil moisture levels. The system ensures efficient water usage, promotes healthy plant growth, and enables real-time monitoring and control using IoT technology.



Hardware Setup

Assemble the components on a breadboard, connecting the humidity sensor and moisture sensor to the ESP32 microcontroller.

Place the moisture sensor in the soil container for accurate readings. Power the system using a USB cable.



Testing and Optimization

Test the system in different conditions to ensure accurate sensor readings and efficient operation.

Optimize sensor placement and thresholds for best performance



Programming the ESP32

Write and upload code to the ESP32 using the Arduino IDE or similar platform.



Data Transmission

Utilize the ESP32's Wi-Fi capabilities to send sensor data to a connected device or cloud platform for real-time monitoring



Monitoring and Alerts

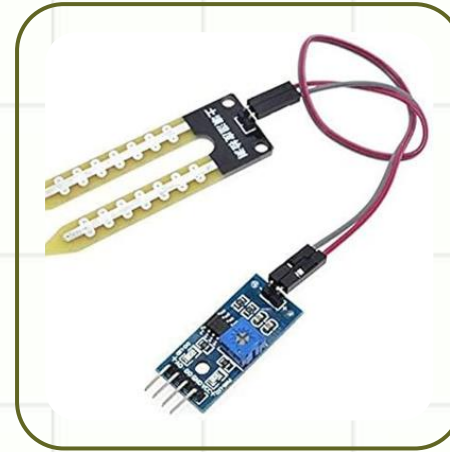
Display sensor data on a dashboard or IoT app.

Implement conditions to alert the user or trigger actions, such as activating irrigation, if thresholds are crossed.



IoT-Based Smart
Garden

The project develops an efficient, automated, and IoT-driven smart garden system to optimize plant care and resource usage.



Humidity and
Moisture Sensors

The system uses sensors to monitor air humidity and soil moisture for precise environmental assessment.



ESP32
Microcontroller

The ESP32 processes sensor data and enables remote monitoring and control through its Wi-Fi capability.



Automated
Monitoring

The system ensures plants thrive by minimizing manual effort and providing real-time data alerts for optimal care.



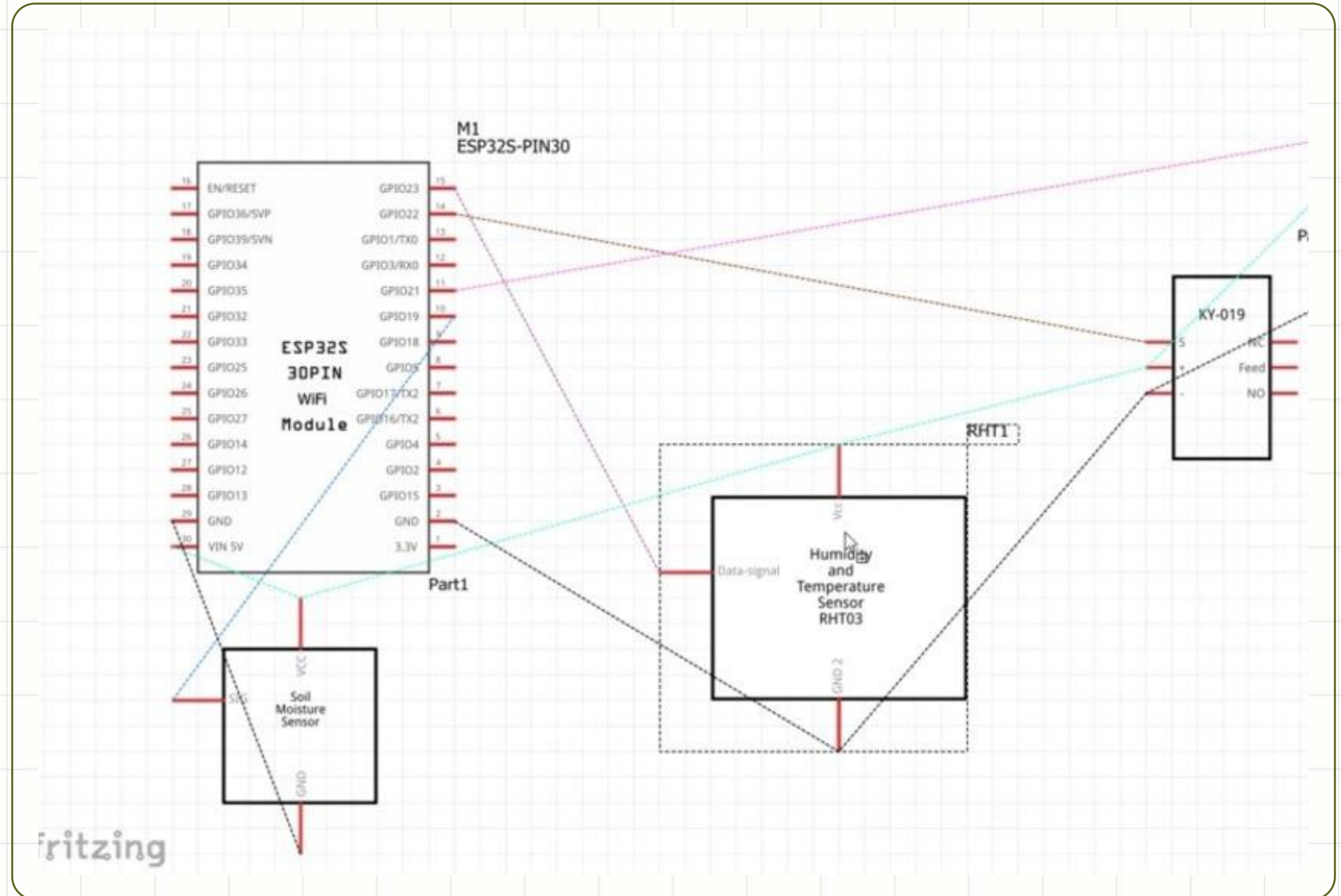
Cost-Effective
Gardening

This solution focuses on affordability and simplicity, making it ideal for smart gardening enthusiasts and small-scale applications.

Electronic Schematic

IOT based Smart Garden

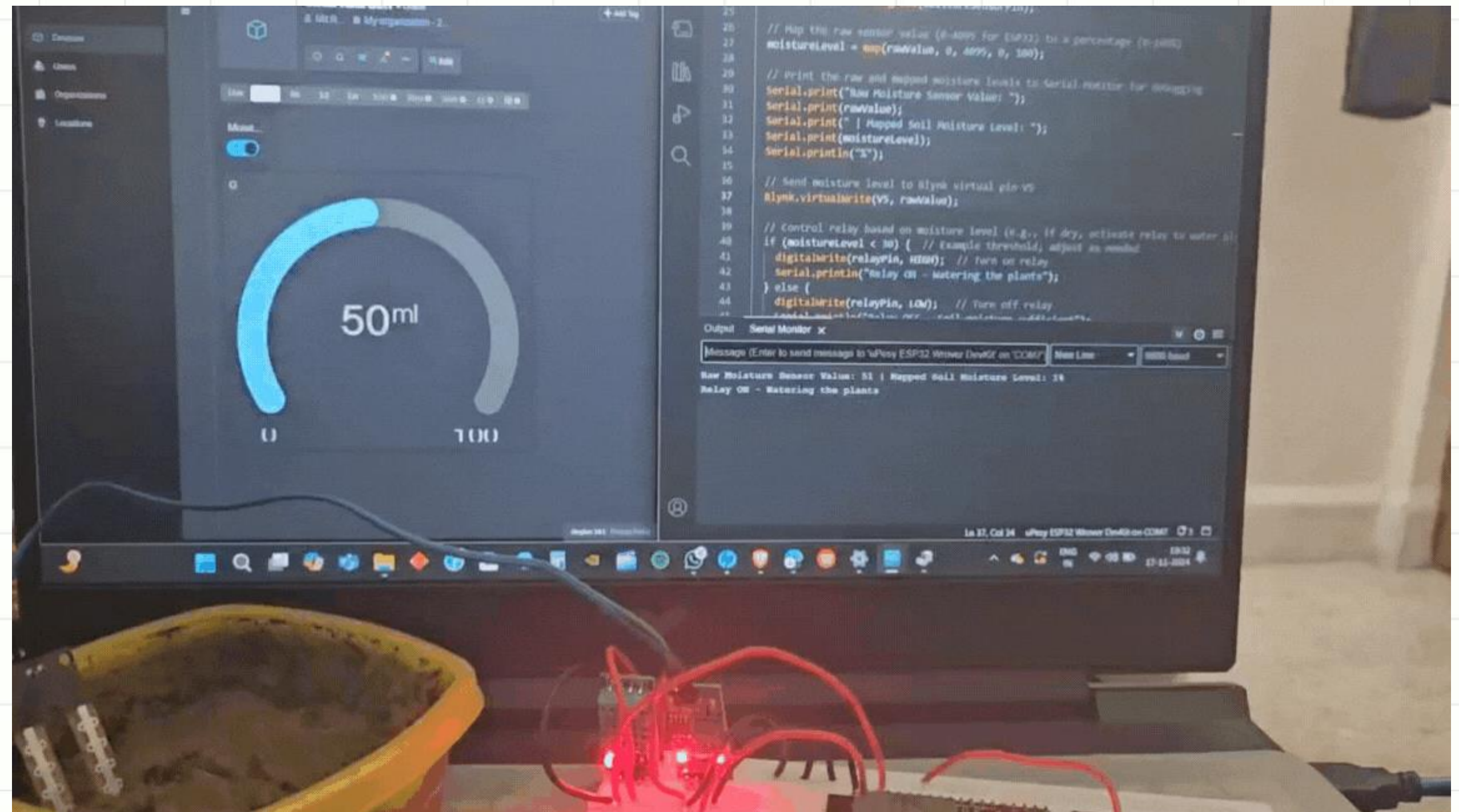
ESP-32 based



Testing Video

IOT based Smart
Garden

ESP-32 based



Future Advancement

Automated Irrigation System

Integrate a water pump to automatically irrigate plants based on soil moisture levels.

Weather Data Integration

Use APIs to fetch weather forecasts and adjust irrigation schedules accordingly.

Mobile App Control

Develop a smartphone app for real-time monitoring, alerts, and manual control of the system.

Solar Power Integration

Add solar panels to make the system energy-efficient and eco-friendly

Multi-Sensor Expansion

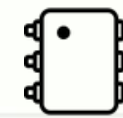
Include additional sensors like temperature, light intensity, and pH for comprehensive plant care.

Summary



Smart and Sustainable Gardening Solution

To create a smart gardening system that automates plant care using IoT and sensor technologies.



ESP32 Microcontroller Integration

The ESP32 serves as the brain of the system, enabling real-time data processing and remote monitoring via Wi-Fi.



Environmental Monitoring

Incorporates a Humidity Sensor for tracking air conditions and a Moisture Sensor to ensure optimal soil water levels.



User-Friendly and Expandable Design

Utilizes a breadboard and USB cable for easy prototyping and upgrades, supporting future expansions like automated irrigation systems.



Promotes Water Conservation

Prevents overwatering through precise moisture level detection, ensuring sustainable gardening practices.

Thank You