

Ilia State University
Faculty of Business, Technology, and Education
School of Technology
“Smart Plant Box (SPB)”

Proposal



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Table of Contents

Introduction.....	3
Drawing.....	5
Budget.....	7
Summary	6

Introduction

Smart Plant Box (SPB) Project Overview

The Smart Plant Box (SPB) Project is an innovative solution designed to automate and optimize plant care within a controlled environment. By integrating multiple sensors and a central control unit, the system monitors and adjusts environmental conditions such as soil moisture, temperature, light, and air circulation. The plant box is also accessible remotely via a mobile app, allowing users to monitor and control the system from anywhere. Additionally, the box includes a flower preservation mode for extended freshness.

How the Smart Plant Box Works

1. Central Control Unit (ESP32 WROOM 32 with Wi-Fi)

- Function: Manages overall system operations, processing data from sensors and initiating actions, with the added capability of Wi-Fi connectivity.
- Operation: The ESP32 interprets readings from sensors (e.g., moisture, light, temperature) and activates relevant subsystems like watering, lighting, or the fan as necessary. The integrated Wi-Fi allows for remote monitoring, control, and data logging, enabling features such as receiving alerts, adjusting settings remotely, and collecting data for analysis.

2. Soil Moisture Sensor

- Function: Detects soil moisture levels and triggers watering when needed.
- Operation: When soil moisture falls below a pre-set threshold, the sensor alerts the Arduino, which activates the water pump to maintain adequate moisture.

3. Temperature and Humidity Sensors

- Function: Monitors air temperature and humidity to ensure ideal conditions for plant health and flower preservation.
- Operation: The sensors continuously assess climate conditions within the box, allowing the Arduino to adjust settings as necessary.

4. Light Sensor and Internal Lighting

- Function: Monitors ambient light levels and provides artificial lighting if natural light is insufficient for photosynthesis.
- Operation: When light levels fall below the required threshold, LED lighting activates to support plant growth.

5. LED Lamp for Plant Growth

- Function: Provides artificial lighting to support plant growth, especially when natural light is insufficient for photosynthesis.
- Operation: The LED lamp emits a spectrum of light specifically designed to promote photosynthesis and healthy plant development. It can be set to operate on a timer or controlled by a sensor to adjust light intensity based on the needs of the plants.

6. Camera Module

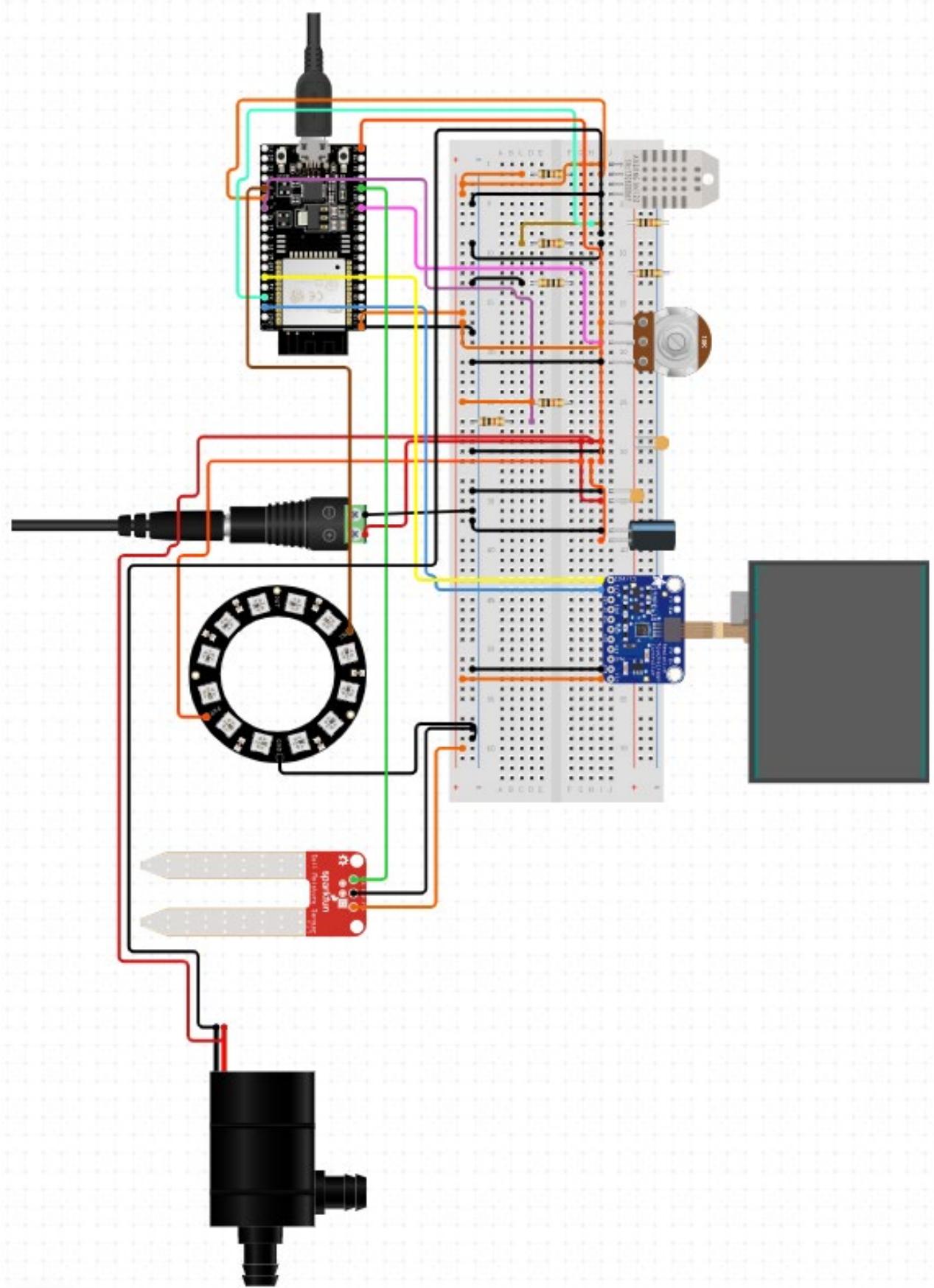
- Function: Provides real-time images for monitoring plant health and growth.
- Operation: The camera captures images and streams visual feedback to the app, allowing users to inspect plants remotely.

7. Water Pump System

- Function: Automates watering based on moisture sensor data.
- Operation: The Arduino activates the water pump when the soil moisture sensor signals the need for hydration, ensuring consistent water availability.

Drawing





Budget

Component	Functionality	Cost
ESP-WROOM-32s	Central control unit	20 GEL
Soil Moisture sensor	Monitors soil moisture	4 Gel
LED Lamp	Light for Plant growth	15 Gel
Camera ESP32-Cam	For plant picture	29 Gel
Power Supply	Power the device	20 Gel
Display TFT LCD	Display plant monitoring	45 Gel
button switch 20A	Power the device	5 Gel
Humidity sensor	Plant environment humidity sensor	9 Gel
Rotating Knob	Controllable knob for light brightness	6 Gel
MOSFET	Brightness control	5 Gel

Project Summary

The Smart Plant Box Project aims to automate and simplify plant care in a controlled environment by integrating various sensors and a remote access mobile app. The system's core components—ESP-WROOM-32 control unit, soil moisture sensor, temperature and humidity sensors and LED Lamp light work together to create optimal conditions for plant health and growth. Unique features, such as flower preservation function, and energy-efficient operations, make this a sustainable, low-maintenance plant care solution for indoor gardening.