Smart Health System For Plants

ECE 445- Fall 2022

Team 13

Rohan Prasad, Tilak Patel, Yash Parikh

Table of Contents

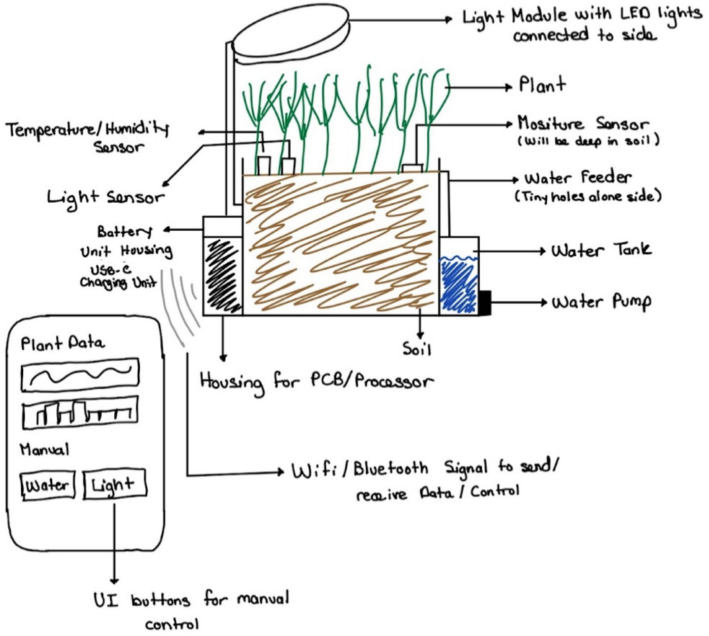
Problem

- There are many families that have plants sitting at home but cannot take care of them due to various commitments
    - Plants wait for water and sunlight to be provided
- Many plants can die out hence owners either purchase a new plant or throw out the old one completely
- This is not only a problem of neglect, but also sustainability on a broader scope

Solution

- Self sufficient plant stand, Smart Health System, and Phone App
- Different sensors used to measure values to determine exactly how much water/sunlight the plant will need
- Water pumped from our water reservoir straight to the roots while the light is above the plant and can provide different intensity when needed

Visual Aid


Light Module with LED lights connected to side
Plant
Mositure Sensor (Will be deep in soil)
Water Feeder (Tiny holes alone side)
Water Tank
Water Pump
Soil
Temperature/Humidity Sensor
Light Sensor
Battery Unit Housing
Use-c Chaging Unit
Housing for PCB/Processor
Plant Data
Manual
Water
Light
Wifi / Bluetooth Signal to send/ receive Data / Control
UI buttons for manual control

High Level Requirements

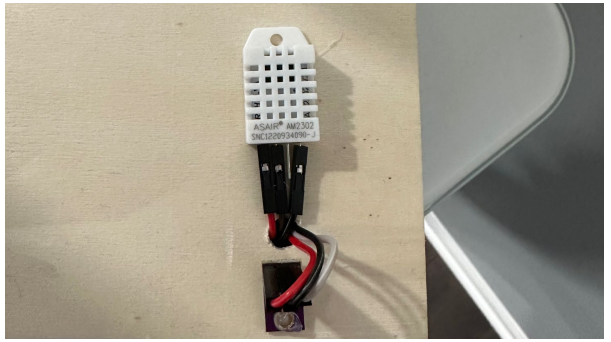
- The system should provide appropriate amount of water when required by the MCU/Microprocessor to do so using our created algorithm
- The system should provide appropriate amount of light when required by the MCU/Microprocessor to do so using our created algorithm
- MCU/Microprocessor is able to communicate with a central system that the phone app can poll from every few minutes and aggregate plant information and metrics to display to the user

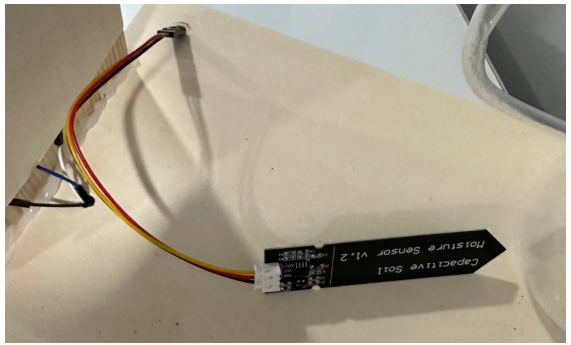
Project Video

Project Images

Full System

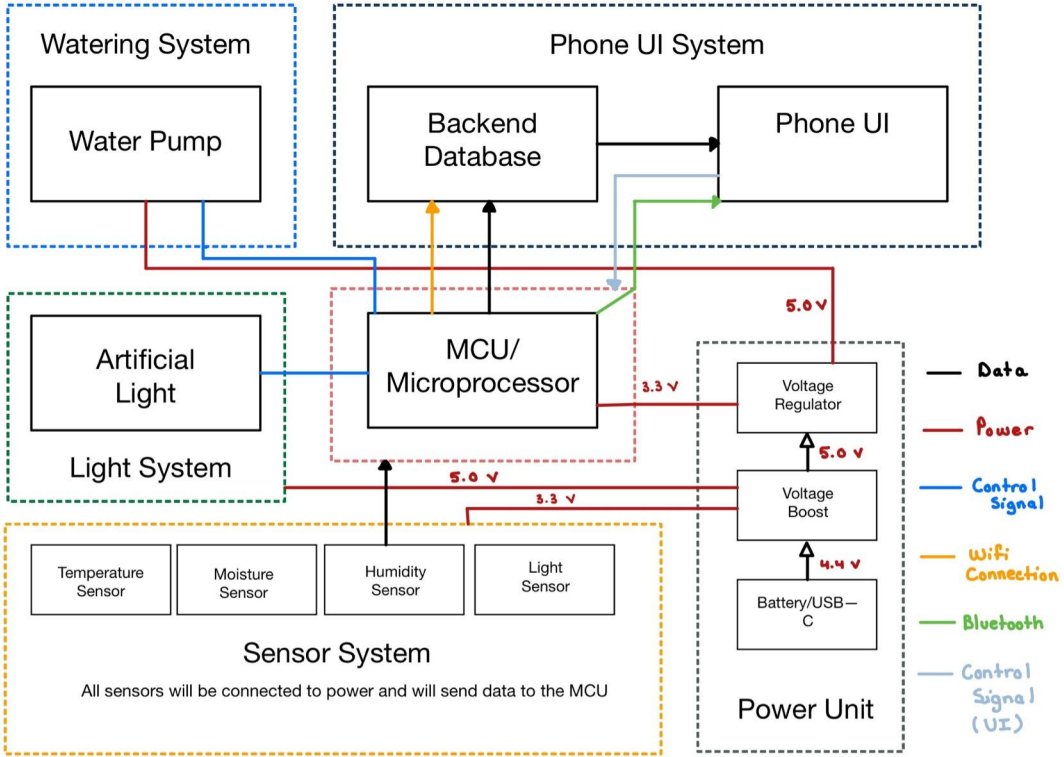
Water System



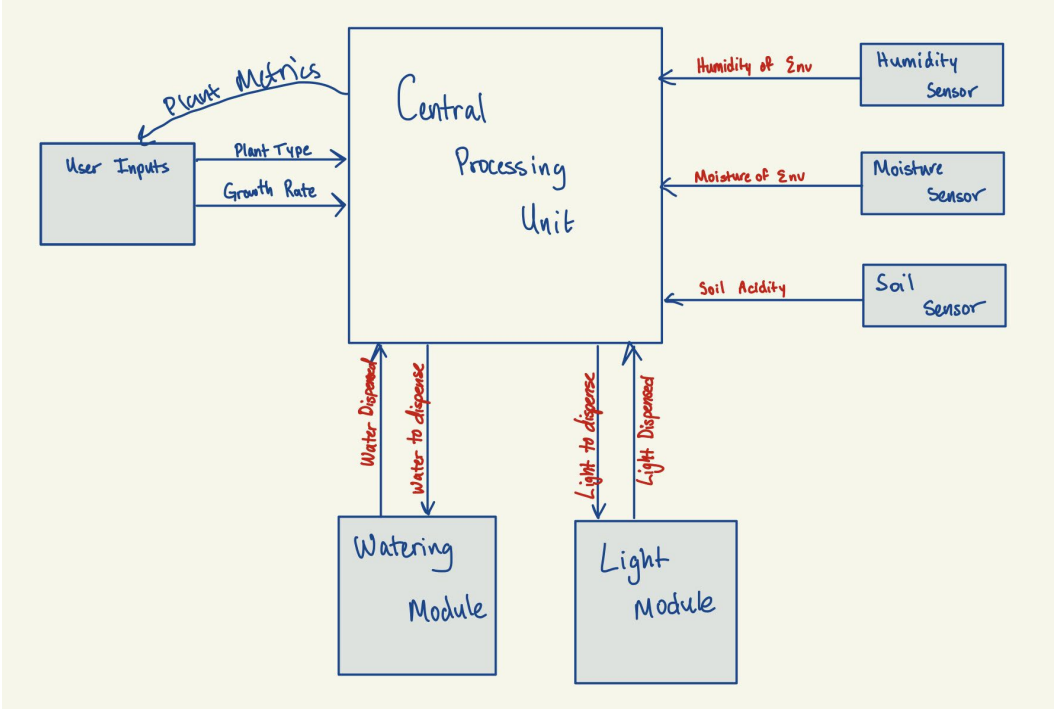


Sensor System

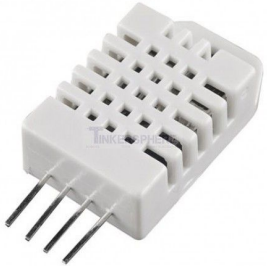
Block Diagram



System Overview

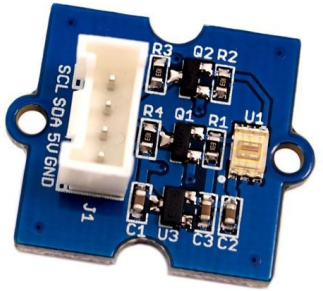


Sensors



Humidity & Temperature

Soil Moisture



Light

Microprocessor Results

- Get sensor readings every 2 minutes
- Send data to remote database every 2 minutes
- Poll for manual signals from the user

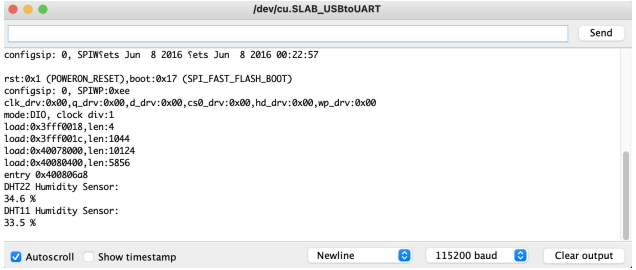
Power System Results

Voltage Regulator

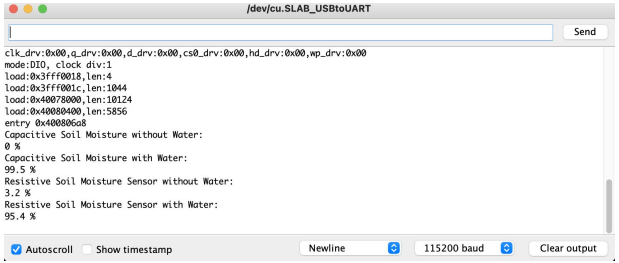
Voltage Boost

Sensor Results

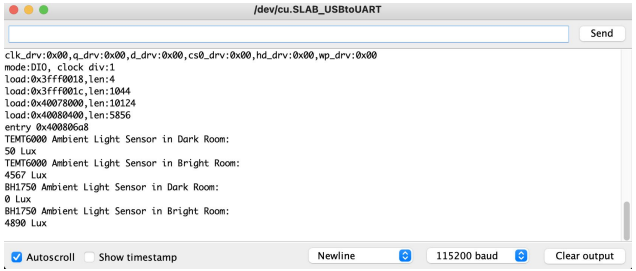
Temperature Reading



Humidity Reading

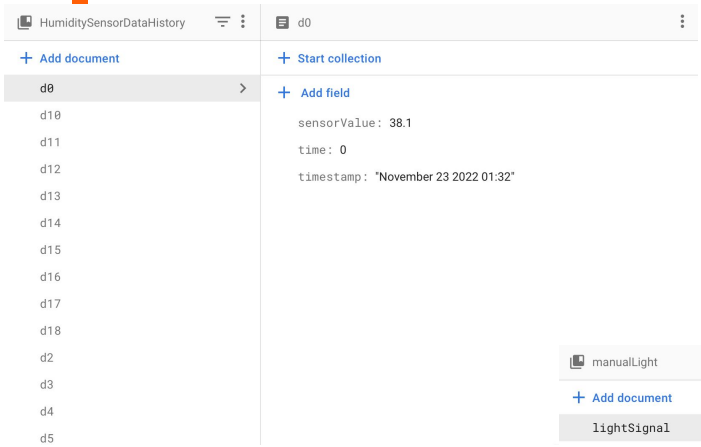


Soil Moisture Reading

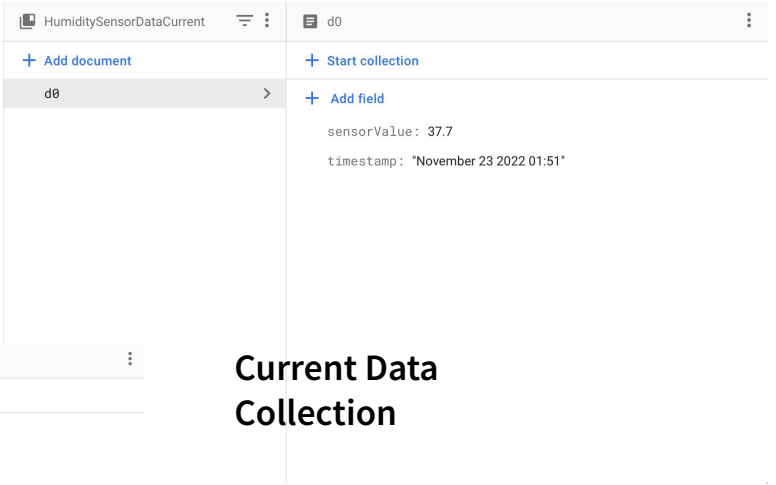


Light Sensor Reading

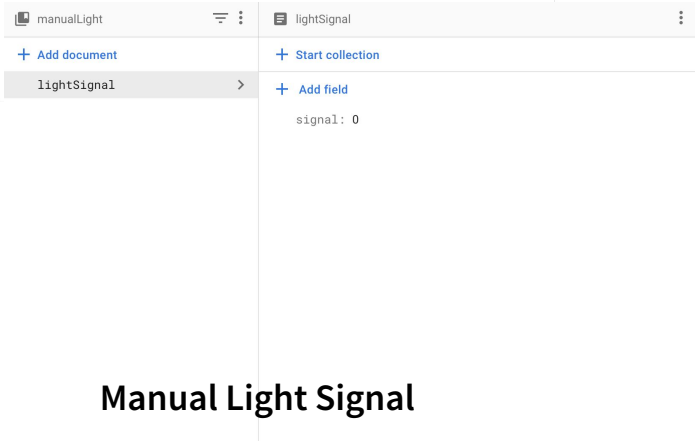
Database Results



Data Collection History



Current Data Collection



Manual Light Signal

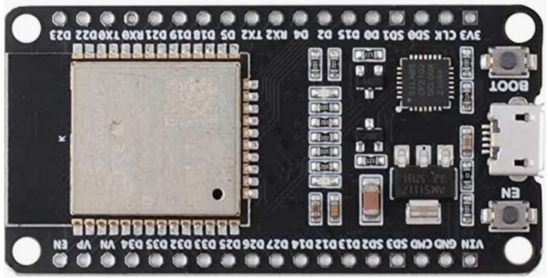
Phone App Results

Home Page

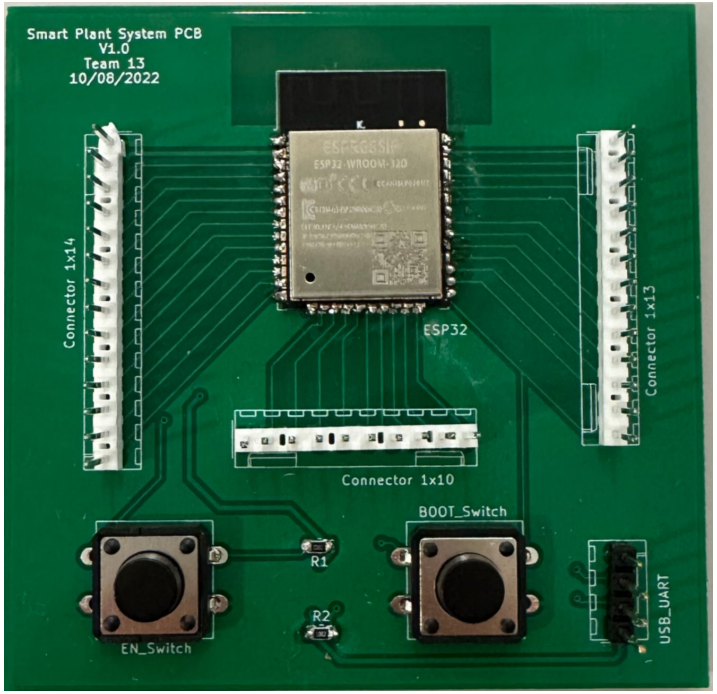
Light Intensity Chart

Challenges-PCB

- Difficulties lied in soldering the ESP32 chip onto the PCB
- Buttons were connected suboptimally
- Used ESP32 DevKit instead for functionality



ESP32 DevKit



PCB after soldering on chip and other parts

Successes

- Full System Integration from Hardware to Software
- System able to make decisions from plant metics
- User is able to see plant metics in phone UI and send signal to system

Plans for Future Work

- **Implement a second light sensor directly under the light source to obtain a more accurate reading**
- **Increase App Functionality for User**
- **Scale up the design to accommodate for multiple plants or a row of plants**
    - Greater number of light sensors to ensure each plant is receiving adequate light
    - Larger water reservoir with multiple pumps for each plant

Thank you!