Smart Health System For Plants

ECE 445- Fall 2022
Team 13
Rohan Prasad, Tilak Patel, Yash Parikh
# Table of Contents

<table>
<thead>
<tr>
<th>01</th>
<th>Problem</th>
<th>Initial issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>02</td>
<td>Solution</td>
<td>Our idea to solve this problem</td>
</tr>
<tr>
<td>03</td>
<td>Design</td>
<td>Our subsystems and overall process</td>
</tr>
<tr>
<td>04</td>
<td>Successes/Challenges</td>
<td>Our learnings and rewards</td>
</tr>
<tr>
<td>05</td>
<td>Conclusion</td>
<td>Future work ideas and final thoughts</td>
</tr>
</tbody>
</table>
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
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
Block Diagram

Watering System
- Water Pump

Phone UI System
- Backend Database
- Phone UI

Light System
- Artificial Light

Sensor System
- Temperature Sensor
- Moisture Sensor
- Humidity Sensor
- Light Sensor

All sensors will be connected to power and will send data to the MCU

Power Unit
- Voltage Regulator
- Voltage Boost
- Battery/USB-C

Data
- Power
- Control Signal
- WiFi Connection
- Bluetooth
- Control Signal (USB)
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

Manual Light Signal

Current Data Collection
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 metrics
- User is able to see plant metrics 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!