

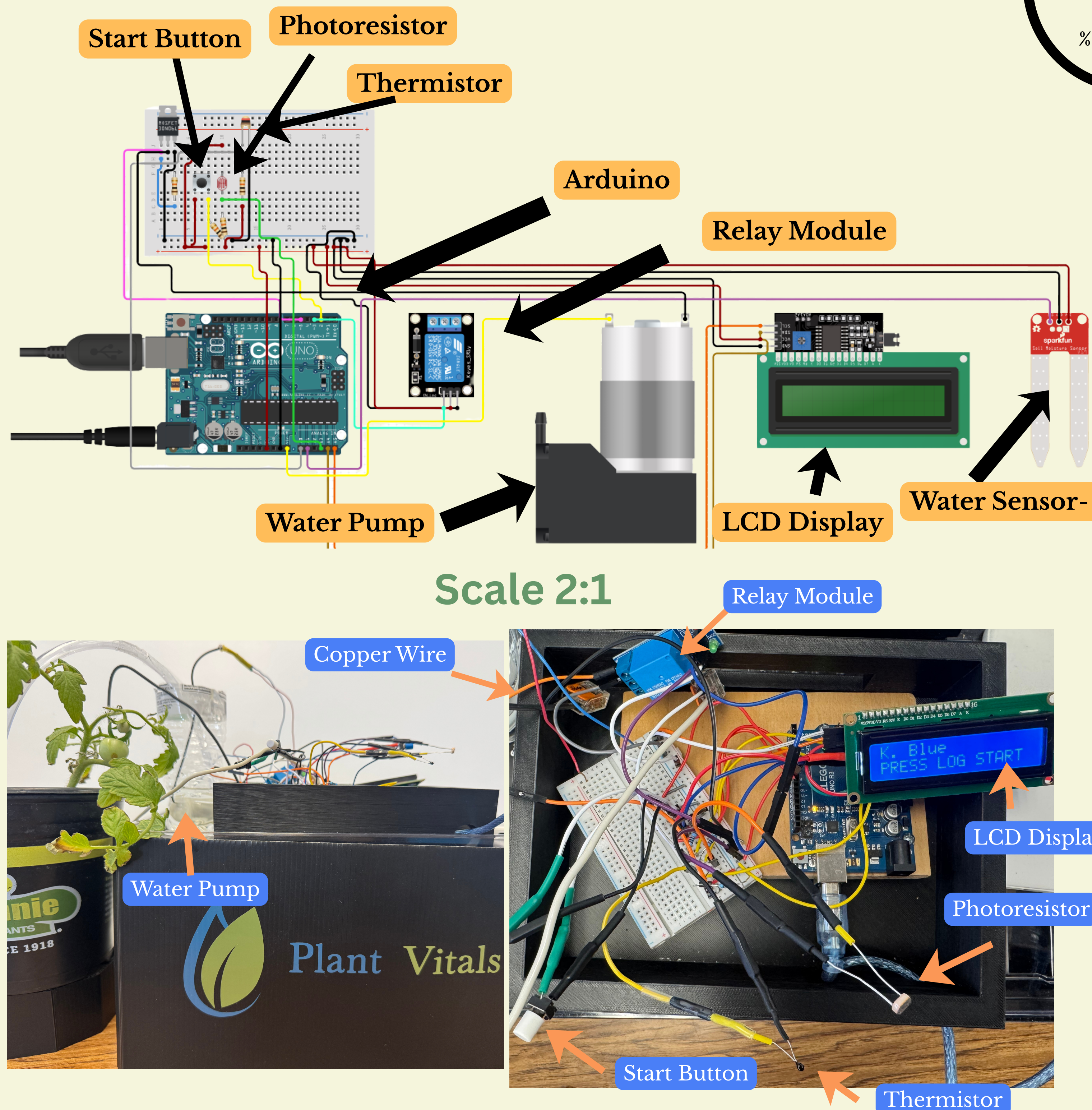
Problem Statement

As the world becomes increasingly urbanized, beginning gardeners experience plant loss due to limited plant-care knowledge, reducing access to fresh food, green spaces, and the benefits of gardening.



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Schematic of Plant-Vitals



Objectives

Primary Objectives

1. Inform users in real-time what the plant needs (water, light, temperature).
2. Provide recommendation of plants based on environmental conditions.

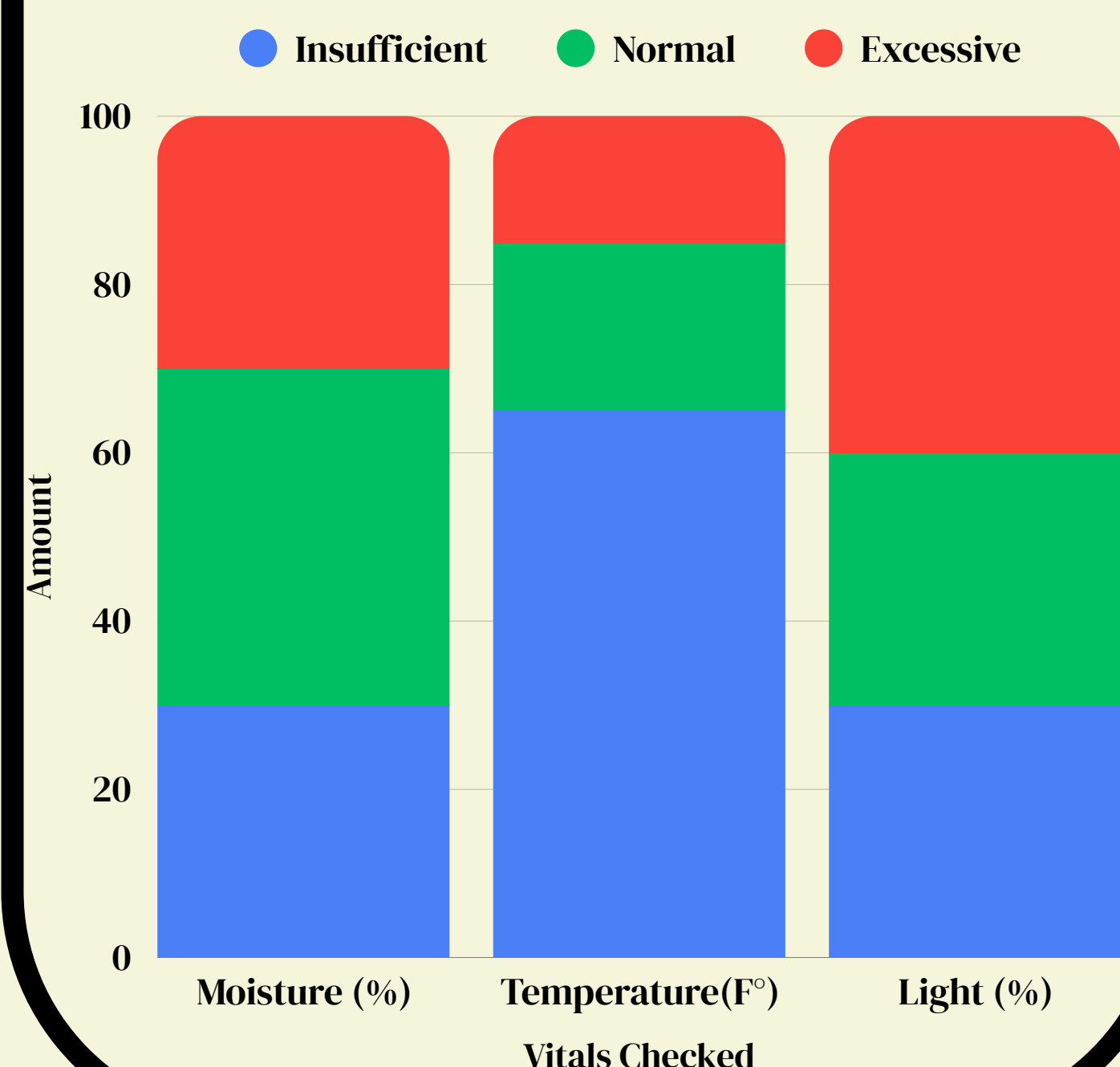
Secondary Objectives

1. Keep plants alive even if user neglects them.
2. Increase likelihood of successful plant growth for beginner gardeners.

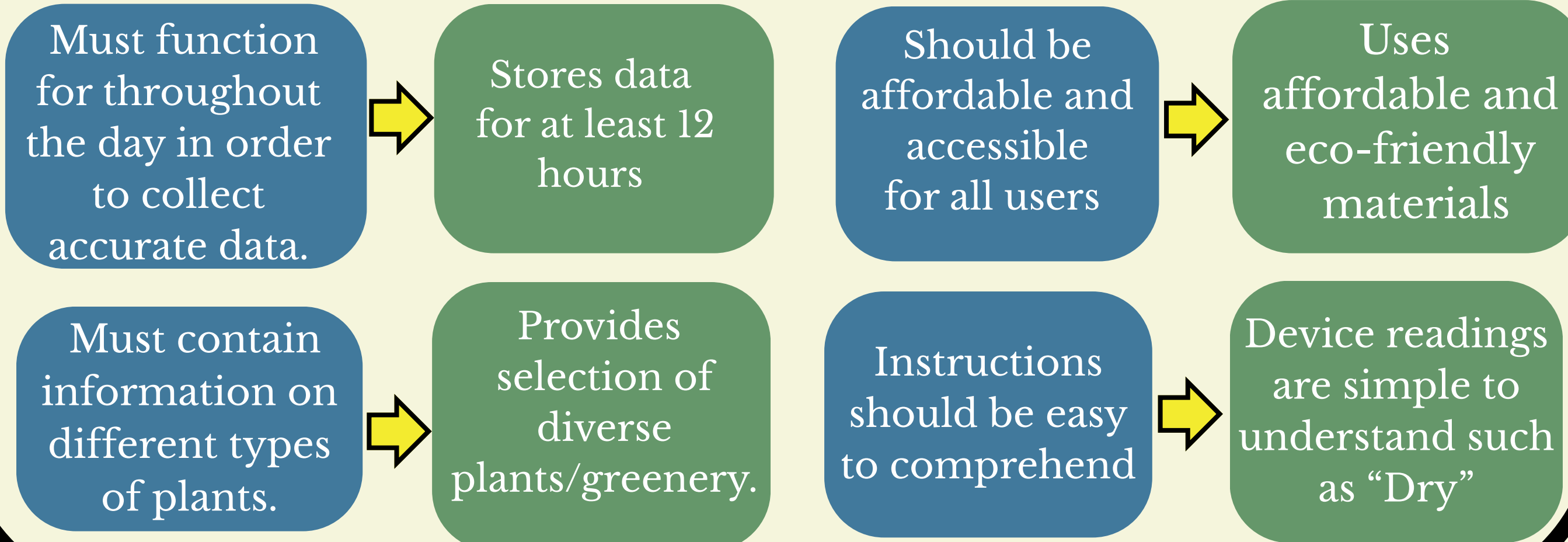
Visual Element

Plant-Vitals Output

The LCD screen displays the plant's vital measurements in real time. When a vital parameter, such as soil moisture, temperature, light level, or humidity, becomes too low or too high, the user is automatically notified of the changes needed to maintain optimal plant health.



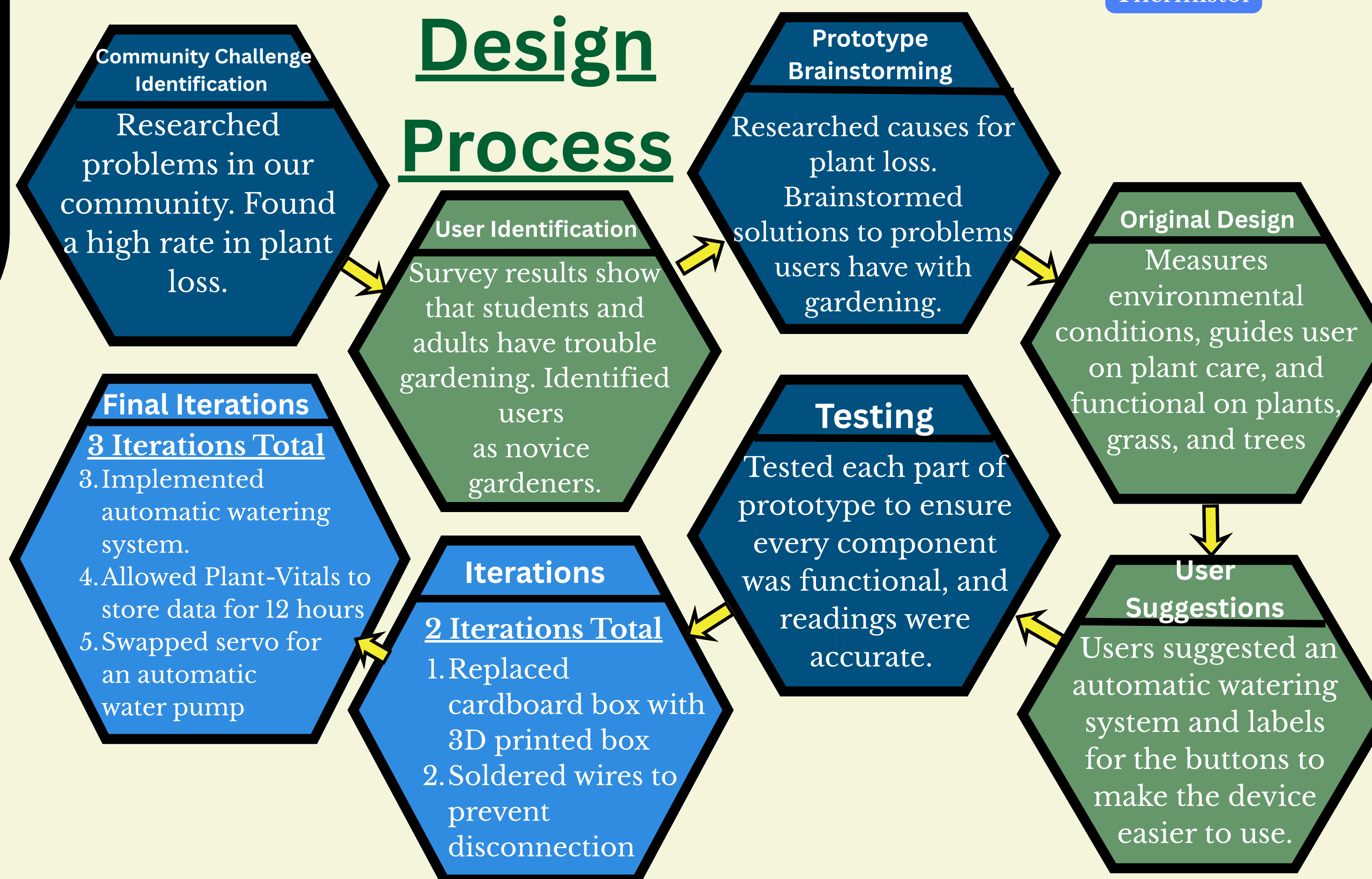
User Requirements



Citations

1. "Benefits of Urban Vegetation.", Cool California, Coolcalifornia.org. 1 Nov. 2025. <https://coolcalifornia.arb.ca.gov/benefits-of-urban-vegetation>.
2. Students and Parents Interviews, Los Nietos Middle School's Open House. Causes of Plant Failure Survey and User Suggestions Interview. 17 Nov. 2025. User Interview.
3. Blank, Eliza. How Much Water to Use When Watering a Houseplant. The Sill, <https://www.thesill.com/blogs/plants-101/drink-up#:~:text=Water%20up%20to%20%E2%85%93%2D%C2%BC,the%20bottom%20of%20the%20planter>.

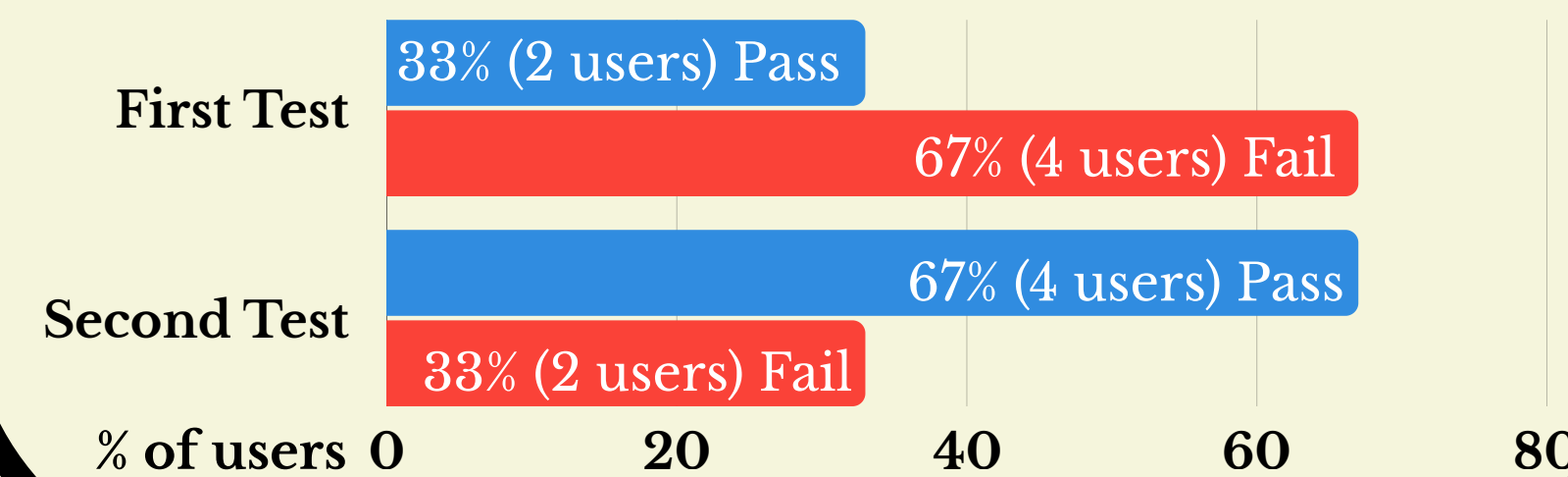
Design Process



Testing Process

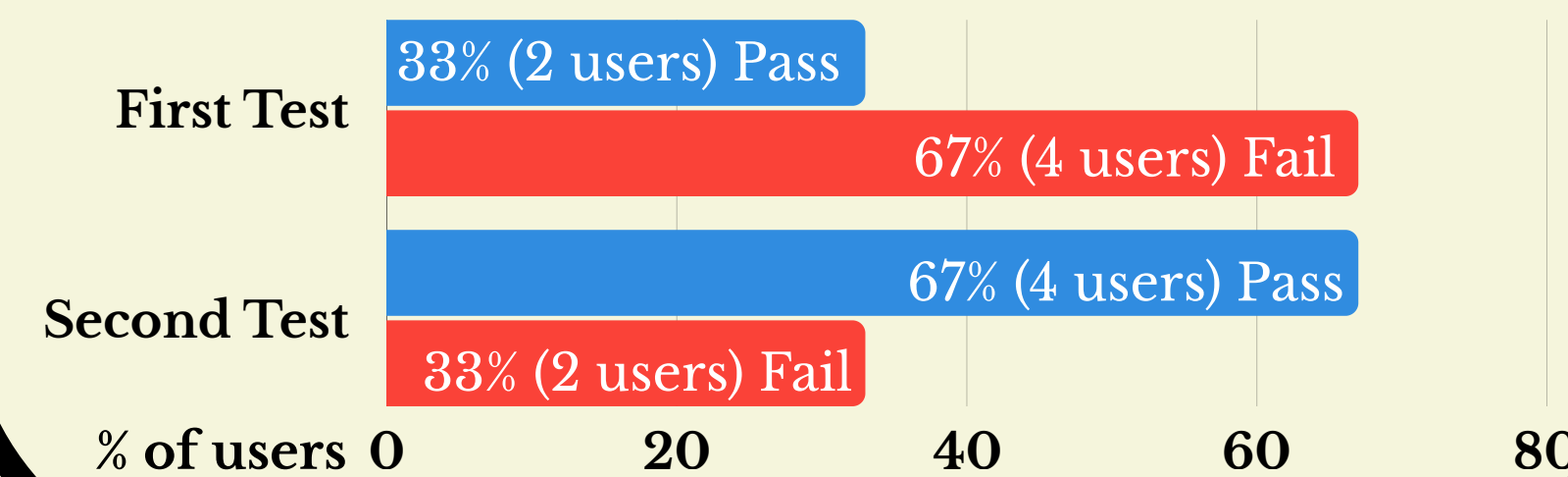
First Test

Tested if 6 users, with no help, could accurately take care of a plant.



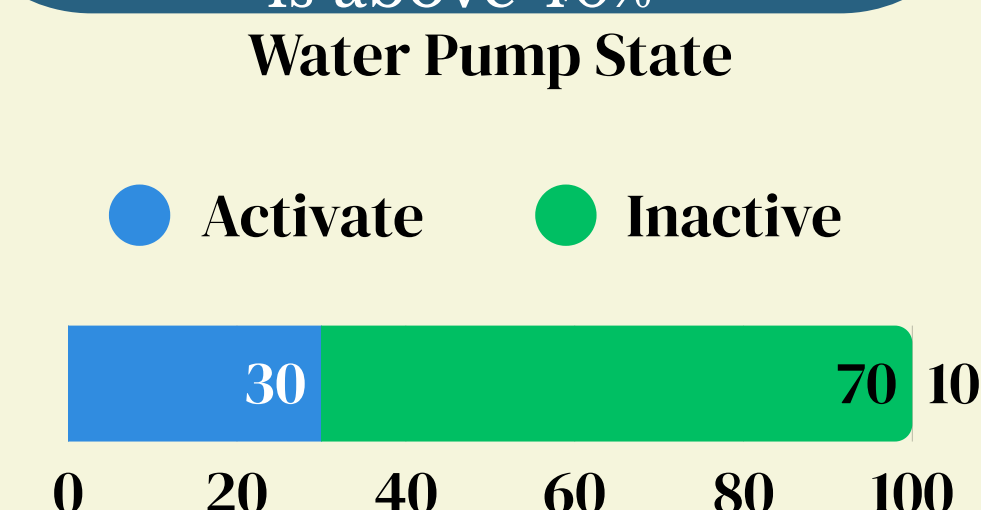
Second Test

Replicated First Test, but the 6 users have Plant-Vitals to assist them and used a new plant.



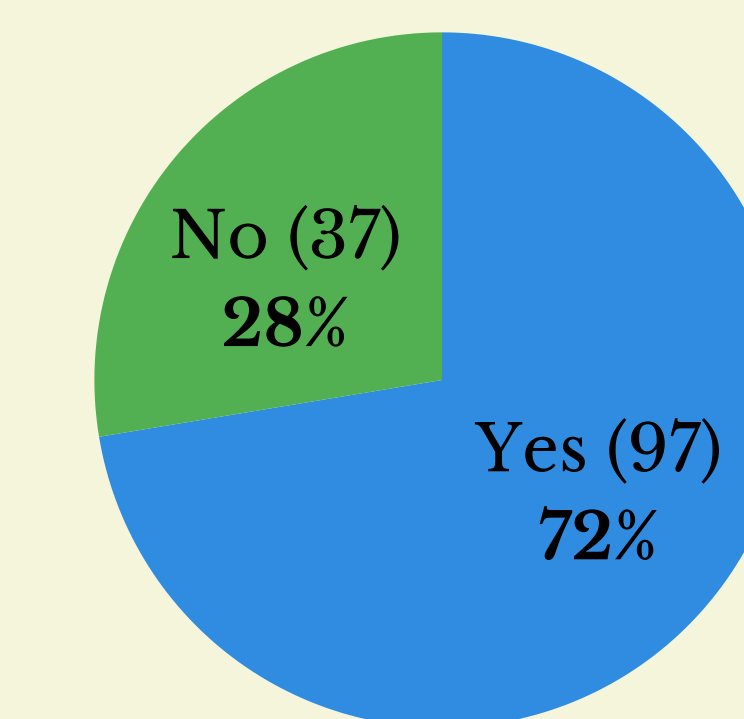
Water Pump Test

Tested 2 times on two plants for accuracy, if pump would activate to release water if soil moisture levels are low. Expected results are activated when moisture is 0-30%; inactive when moisture is above 40%.

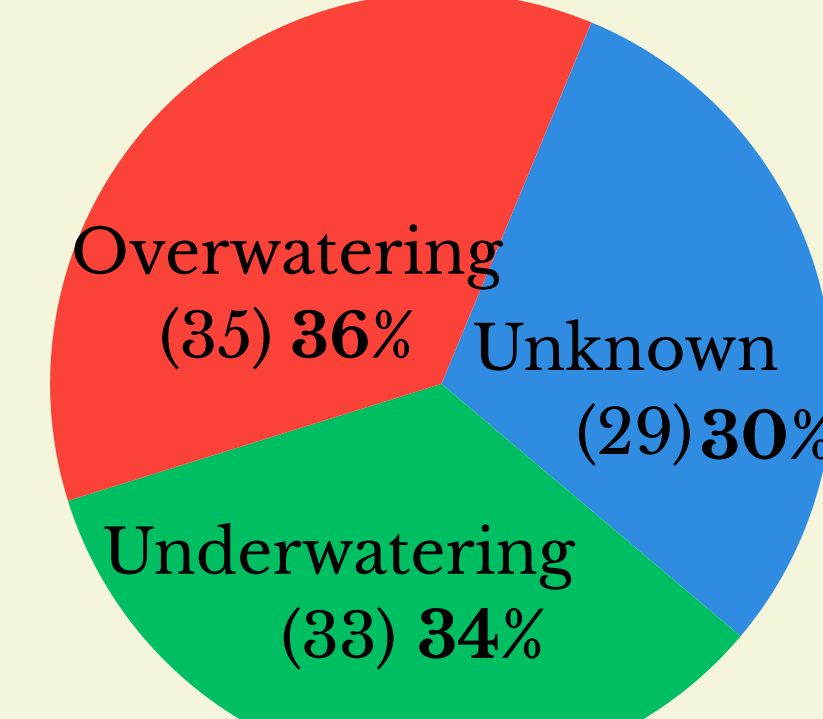


Visual Data 1

Survey Results of 134 participants
"Have you failed at starting a home garden?"



Survey Results of 97 participants who were unsuccessful at gardening, "What do you think caused your plants to stop growing?"

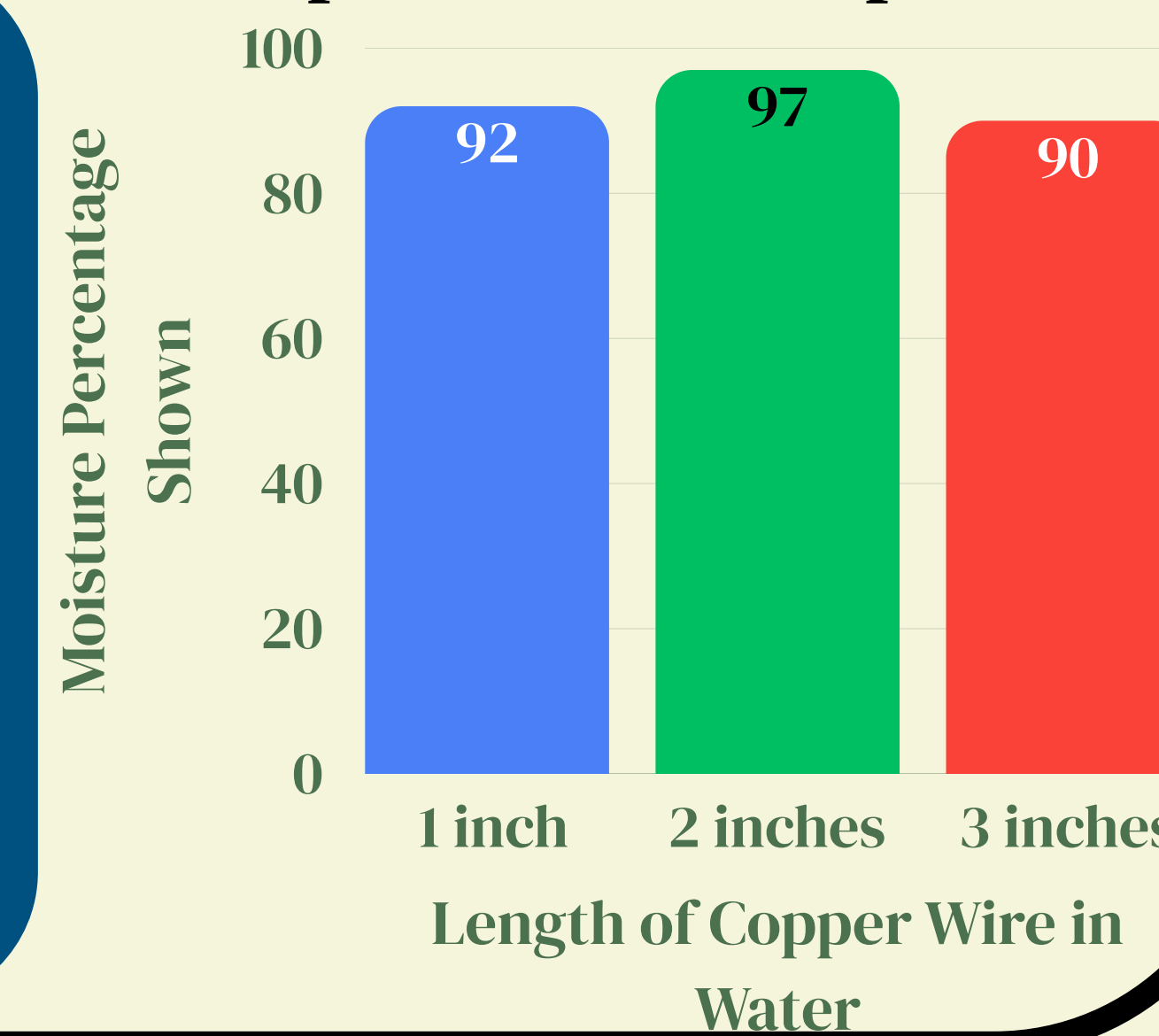


Visual Data 2

Test Taken

1. First, we inserted different lengths of the copper wires to measure the soil moisture.
2. We did this test 3 times to ensure users will never get incorrect readings and warnings.
3. Used full container of water (1 Liter) as a constant.

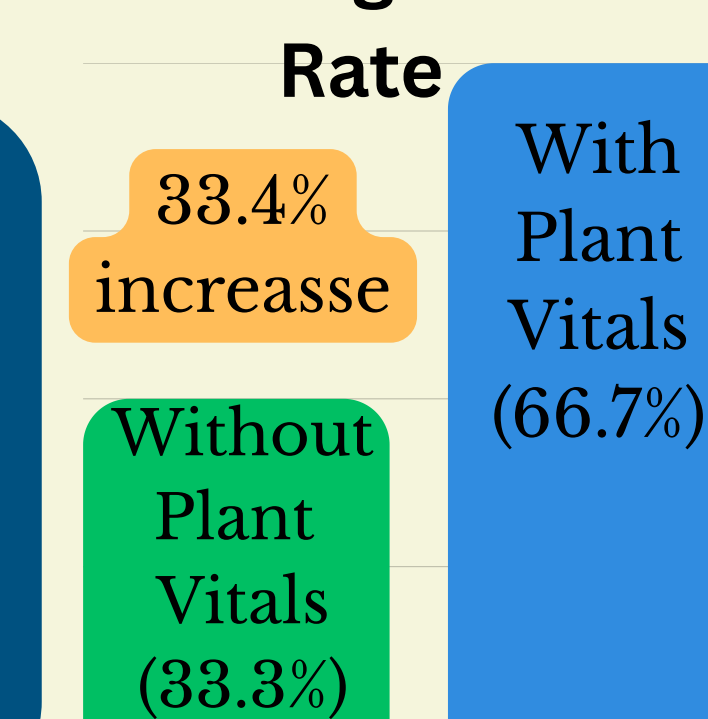
Optimal Sensor Depth Testing



Results

- Successfully monitored plants' nutrients
- Used testing to find improvements/iterations
- Overcame automatic watering system failure by debugging code
- Updates made Plant-Vitals a functional, accessible tool for novice gardeners

Gardening Success Rate



Conclusions

Plant-Vitals proved to be a success. During testing, the device was able to accurately identify the needs of plants. The tests we ran helped us engineer Plant-Vitals into an all-in-one device to meet all user requirements and prevent plant loss for every user regardless of experience.

Future Improvements

- Create system to monitor multiple plants at once
- Create app to track plant's vitals remotely
- Incorporate an artificial light system
- Increase options of different types of plants