

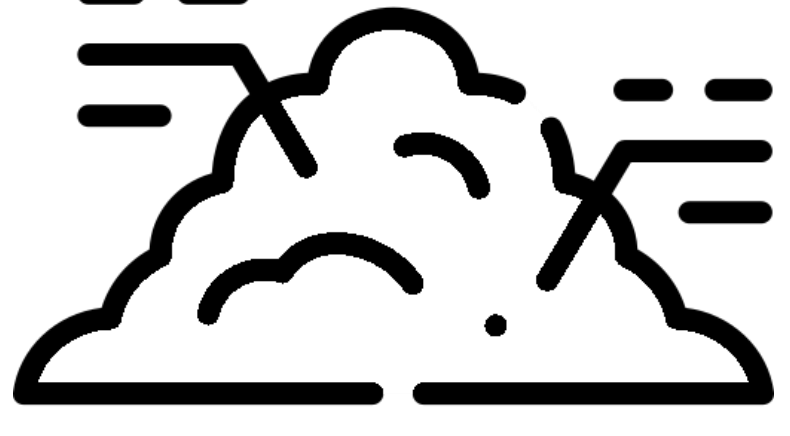
ZenPlant

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A Smart Pot Unlike Any Other

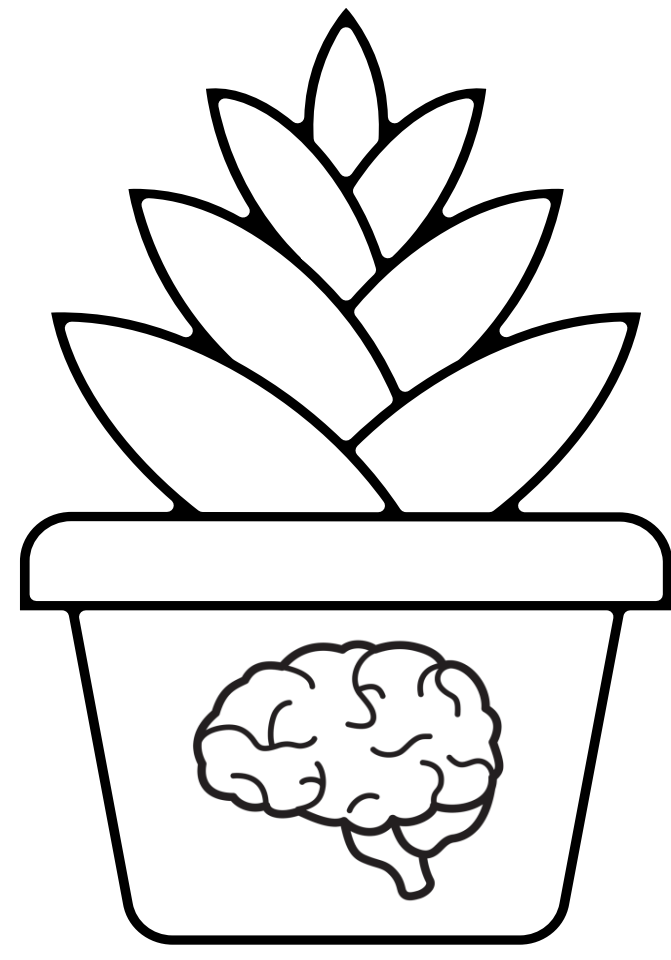
Happy Soil

ZenPlant constantly monitors soil conditions to ensure your plant is cared for



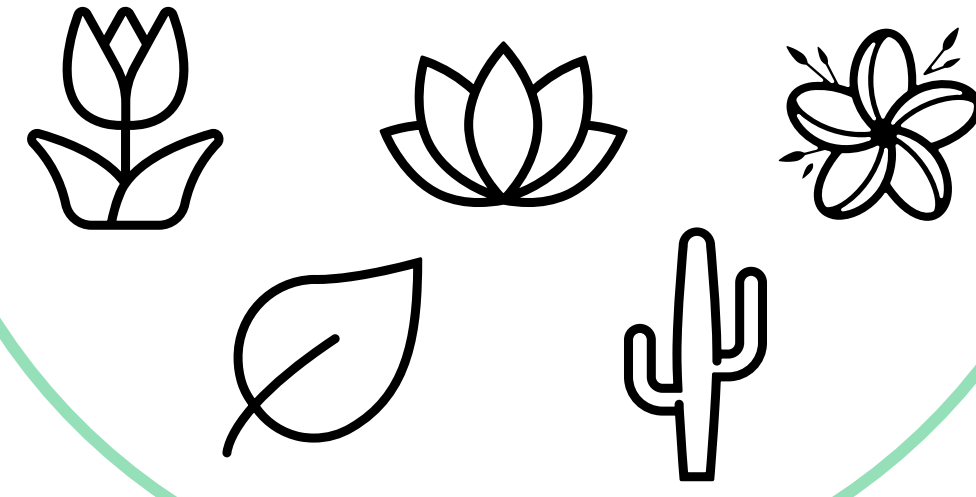
Stress-Free Plant Care

No more watering schedules
No long or confusing setup
No more watering anxiety
No more limiting your plant collection



Mother of Many

Flowers, succulents, tropicals, you name it. ZenPlant can care for them all with built in plant profiles



46% of plant owners struggle with watering their plants.^[1]

This is because plant owners...

- Do not know how to care for their plants
- Do not want to care for their plants
- Do not have time to care for their plants.

This is why we created ZenPlant, to alleviate the stress and planning behind keeping your plants properly watered. There are other 'smart' planters on the market that distinctly lack the smart aspect, either using passive or timed watering, neither of which properly care for your plants needs. By monitoring your plants soil conditions, ZenPlant is able to care for your plant based on it's specific watering needs. A healthy plant starts with good roots and good soil, ZenPlant helps your plant thrive and removes the need to constantly monitor its hydration levels.

CUSTOMER DISCOVERY

We posted to several forums and created a survey to gain more information about consumers. Through searching alternatives and consumer pain points we were able to narrow down our problem statement to watering being the primary issue.

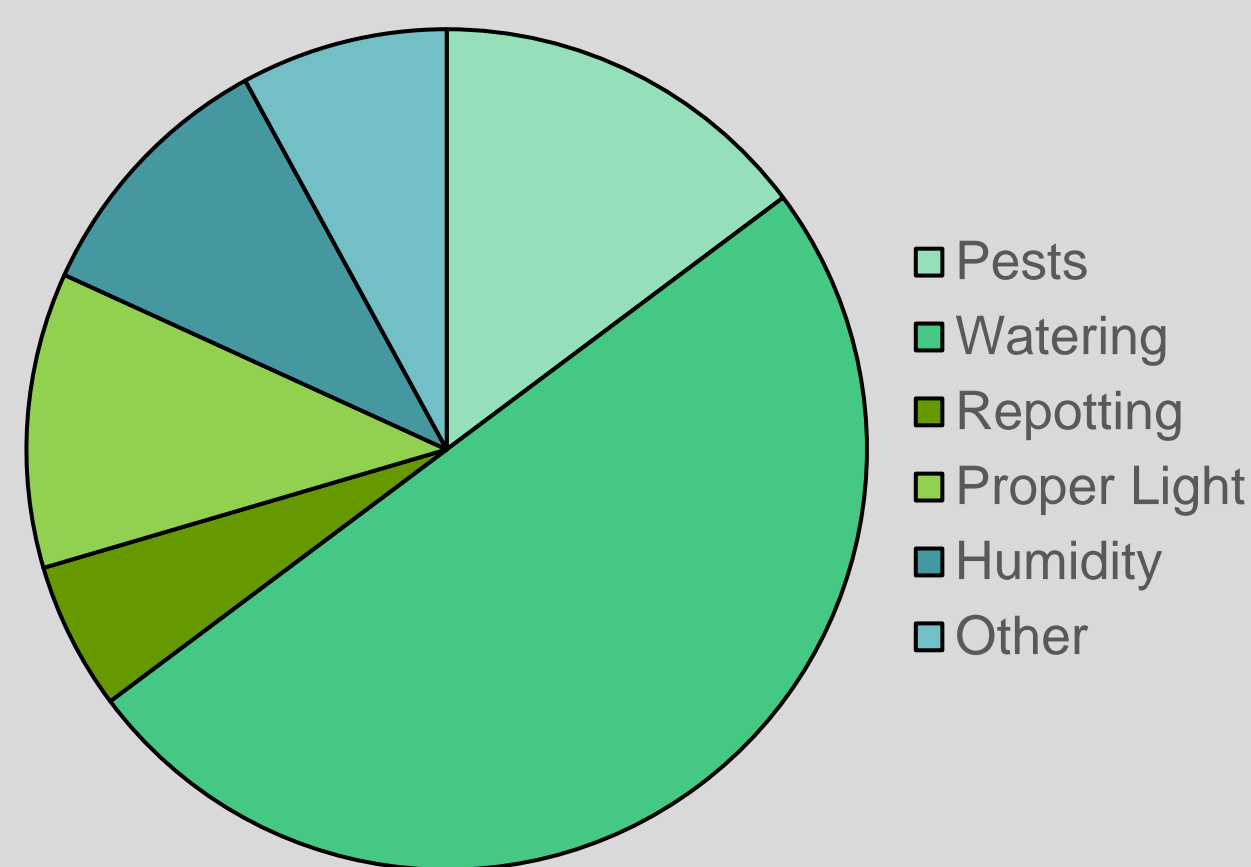


Figure 1. Biggest Plant Care Struggle [1]

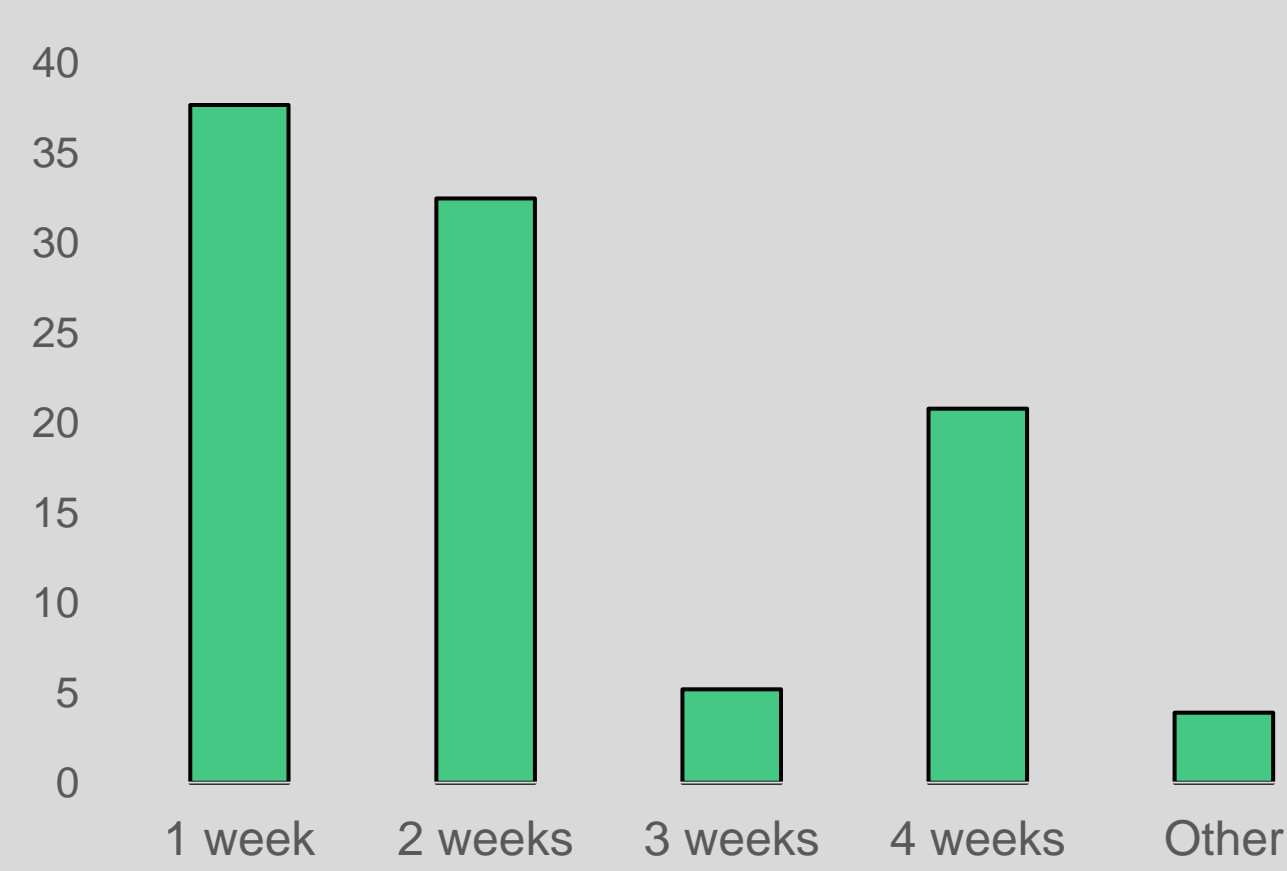


Figure 2. Ideal Water Refill Frequency [1]

DESIGN

Closed-loop Control System

- ZenPlant's smart controller utilizes a closed-loop control system to read the soil moisture level and water accordingly.

Plant Profiles Hold Parameters of Interest Specific to The Type of Plant:

- Maximum soil moisture
- Minimum soil moisture
- Forced low moisture periods

Reduced Water Waste

- The system monitors the moisture level during watering to prevent over-saturation. Excess water is fed back into the reservoir to be re-used.

Fully Integrated Pot Enclosure

- Controller, sensors, pump, and water all-in-one

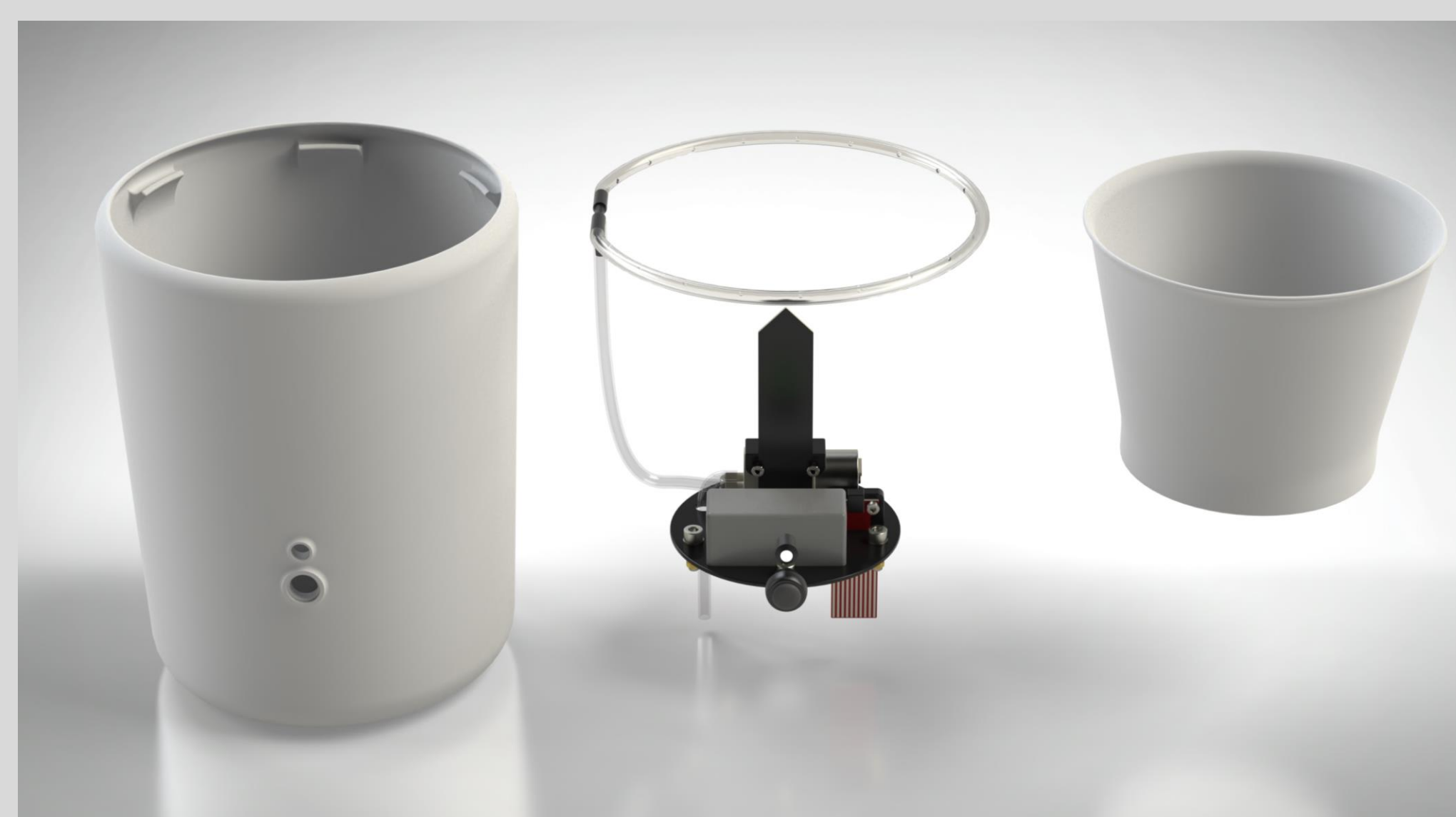


Figure 5. ZenPlant System View



Figure 4. ZenPlant Model

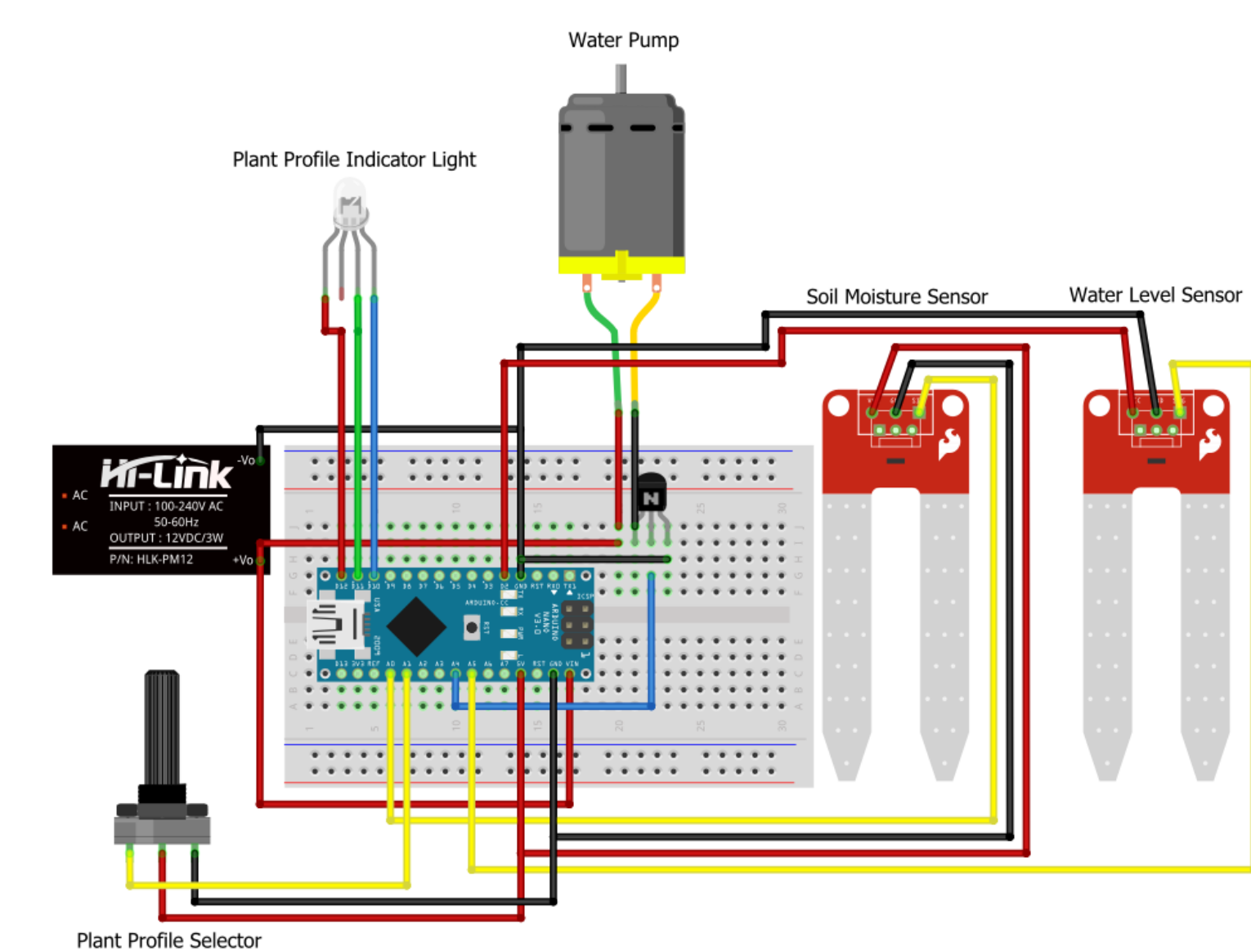


Figure 6. Circuit Diagram

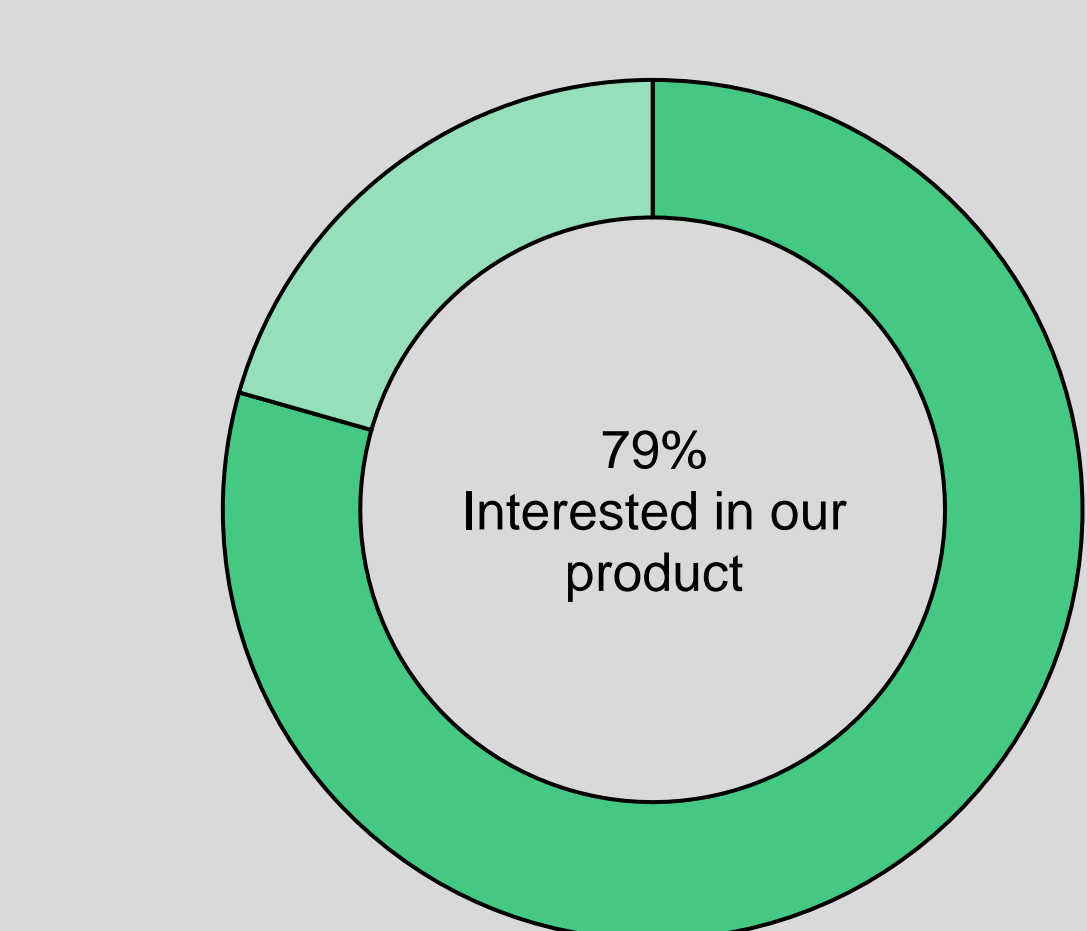


Figure 3. Interest in our product [1]

Watering alternatives offered by competitors:

- Timed watering
 - This doesn't account for the dozens of variables that affect soil hydration.
- Passive watering such as wick- or reverse-watering
 - This does not accommodate many popular types of plants, such as succulents.

BUSINESS METHODOLOGY

Houseplant popularity is on the rise with 22% growth between 2020 and 2021 [2].

- Global plant market compound annual growth rate (CAGR): 4.3% from 2021 to 2023 [3]
- Smart home appliances market CAGR: 8.6% from 2022 to 2030 [4].

With a growing interest in indoor gardening, sustainability, and smart technology, it was concluded that this was a viable market to enter.

CONCLUSIONS

Overall, our prototype successfully accomplished our design goals and alleviates our consumer pain points.

There are a few necessary steps we must take into consideration before bringing our product to the market:

- PCB Design
- Injection Moulding of Housing
- Expanded Plant Profile List
- Assembly optimization
- Mobile app
 - Controlling and monitoring plant
 - Selecting plant profiles

Item	Specifications
Nursery Pot	<ul style="list-style-type: none"> • Inner diameter: 6" • Material: PLA
Housing Pot & Reservoir	<ul style="list-style-type: none"> • Capacity: 2.5 weeks (minimum) to 2 months (maximum) • Material: PLA
Sensor	<ul style="list-style-type: none"> • Input: 3.3-5VDC • Output: 0-3VDC • 98x23mm
Controller	<ul style="list-style-type: none"> • Input: 5VDC • Integrated voltage regulator • 14 Digital pins • 8 Analog pins • Microcontroller: ATmega328
Pump	<ul style="list-style-type: none"> • Input: 3-24VDC • Max pressure: -65kPa
Power	<ul style="list-style-type: none"> • Supply: 120 VAC 50-60Hz
Complete Assembly	<ul style="list-style-type: none"> • Dry weight: < 6 lb • Dimensions: < 8 x 8 x 8 in

Table 1. ZenPlant Specifications