bUd

Process Book

IACT 330 | Fall 2019

Agenda

1. Introduction

2. Discover

3. Define

4. Design

5. Deliver

Agenda

1. **Introduction**

2. Discover

3. Define

4. Design

5. Deliver

1. Introduction

bUd

executive summary

The Problem
Despite growing trends in houseplants, many people struggle to effectively take care of their plants.

HMW
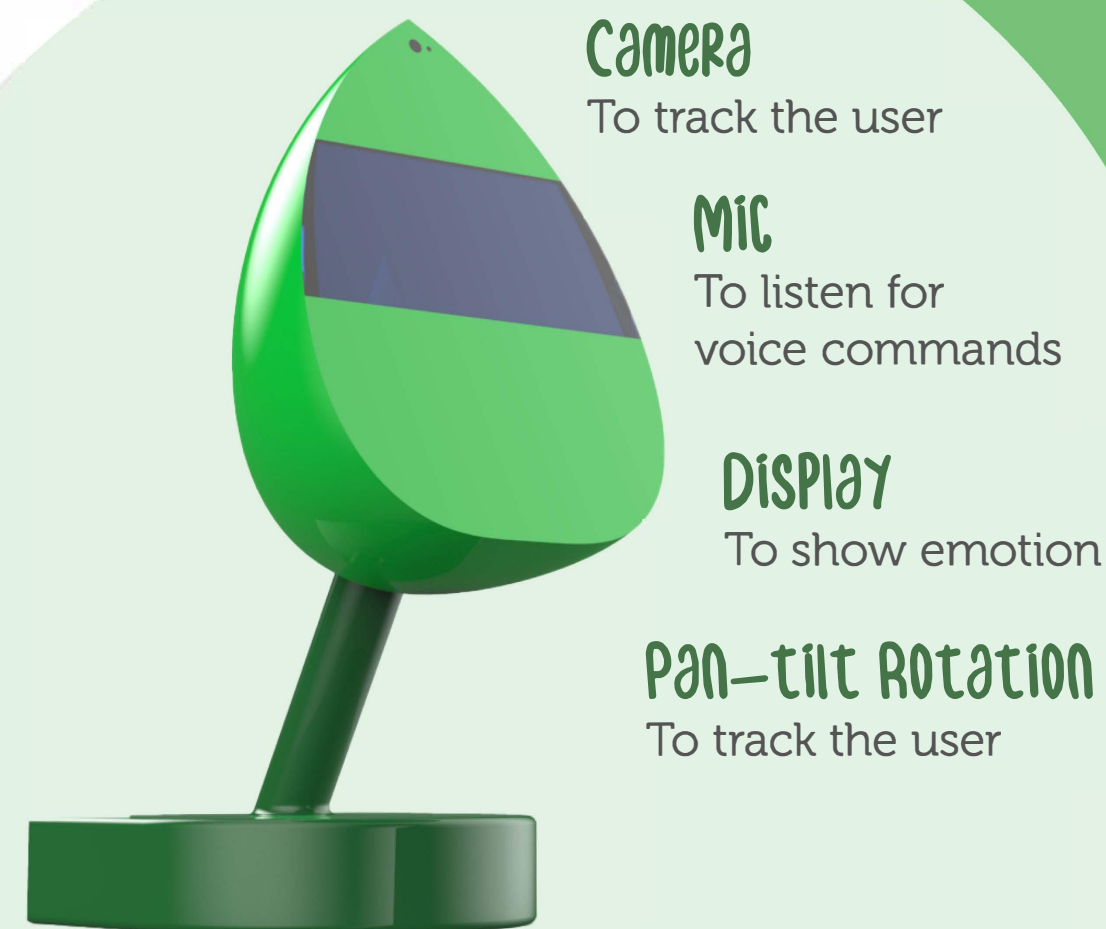How might we aid people who have had little or no success grow thriving houseplants?

The Solution
A two-part system consisting of a face-tracking voice assistant that displays emotions on its screen, and sensors that can gather and record plant health information

Target Users
Ages 18-30
People with no experience or little success growing plants

LED
To show plant health

Light Sensor
To detect sunlight

Soil Sensor
To detect soil moisture

Seed — Sensor

Camera
To track the user

Mic
To listen for voice commands

Display
To show emotion

Pan—tilt Rotation
To track the user

Bud — voice assistant

The Team

Varun Khatri
Project Lead

Aparna Somvanshi
Research Lead

Sheryl Chan
Branding Lead

Madeline Walz
Product Lead

Overview

For IACT 330: Prototyping Electronics for Designers, we were tasked with creating a social robot using Arduino code and devices. The class is one quarter long, lasting ten weeks. The first five weeks are spent in research and concept development, and the second five weeks are focused on building and testing a functional prototype. For some students, this is their first user experience class, where they learn the UX design process. Whether or not it is their first project, by the end of this class students will have a strong project to add to their portfolio.

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2. Discover

Secondary Research

Competitor Analysis

Primary Research

Despite growing trends in houseplants, many people **struggle to effectively take care** with their plants.

The number of households with houseplants has risen, from **31 million in 2014 to 38 million in 2016.**
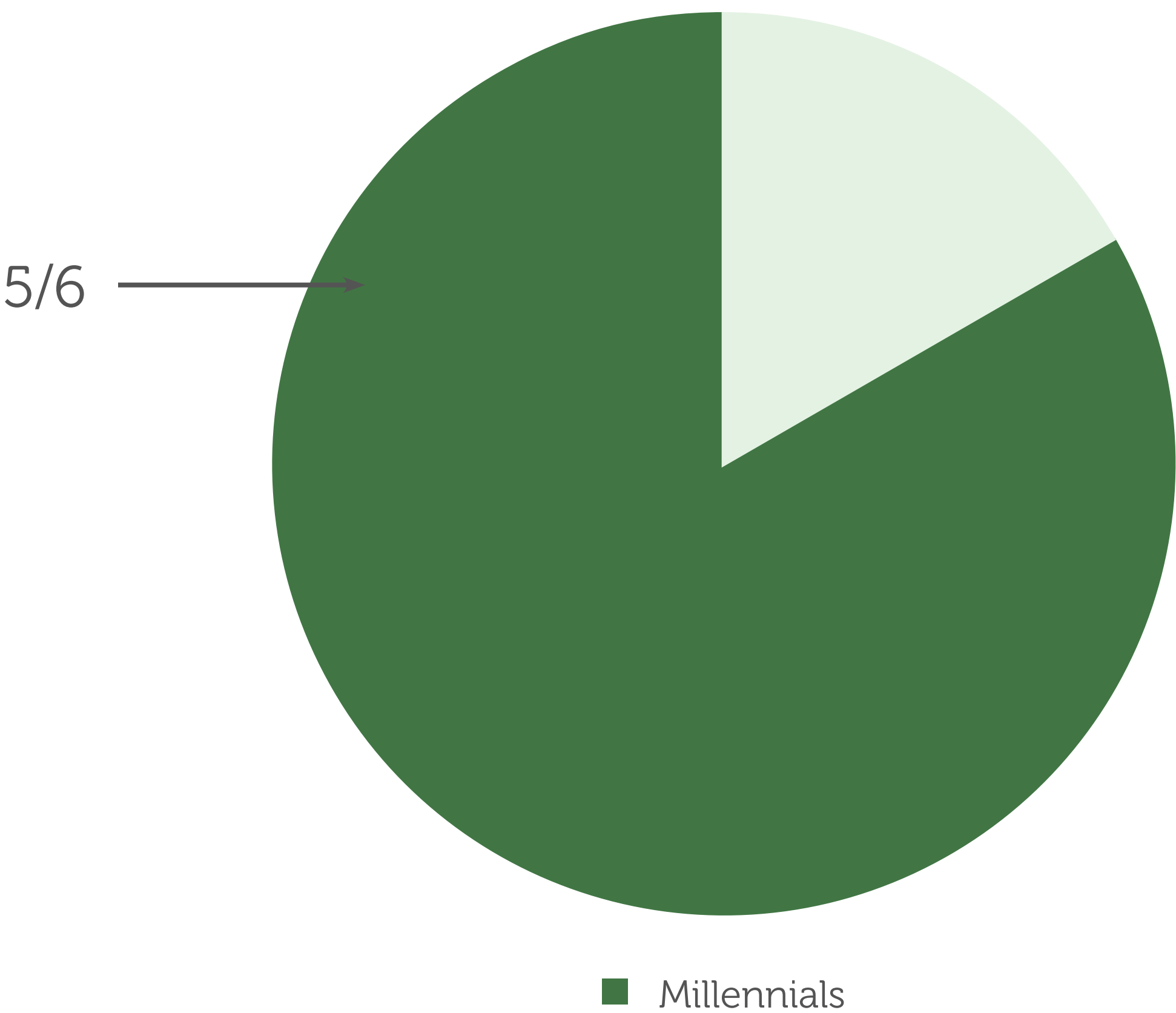
In the US, houseplant sales have **increased 50% in the last three years.**

Bharti, Bianca. "The Houseplant Industry Is Thriving, Thanks to Millennials and Their 'Plant Babies'." National Post, 8 May 2019.
"Instead of Houses, Young People Have Houseplants." The Economist, 6 Aug. 2018.
Long, April. "Why House Plants Are so Crazy Popular Right Now." Well+Good, 25 June 2018.

1/3 ——→

5/6 ——→

■ Millennials
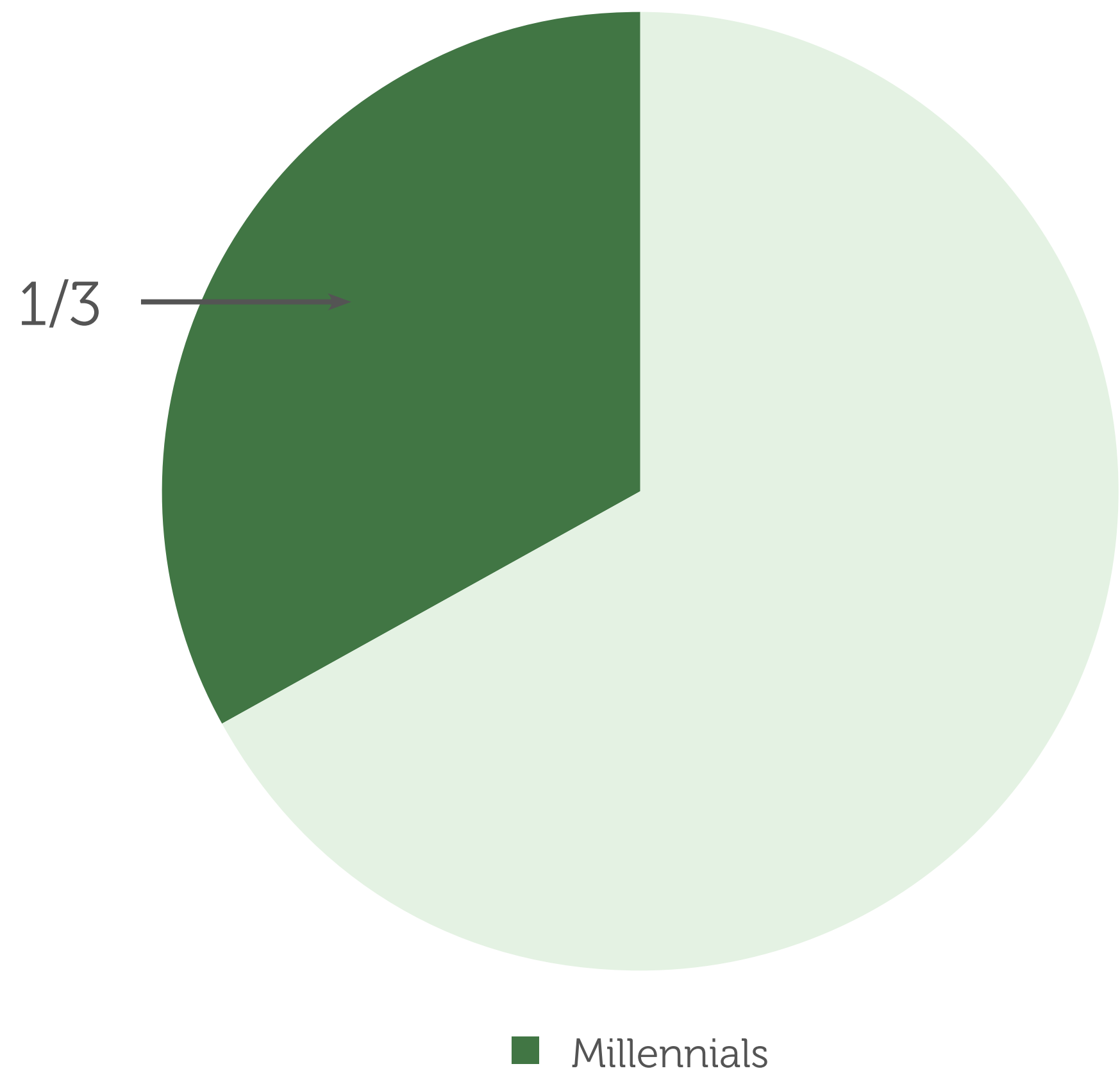
■ Millennials

Houseplant Sales

New Gardeners in 2016

Bharti, Bianca. "The Houseplant Industry Is Thriving, Thanks to Millennials and Their 'Plant Babies'." National Post, 8 May 2019.
"Instead of Houses, Young People Have Houseplants." The Economist, 6 Aug. 2018.
Long, April. "Why House Plants Are so Crazy Popular Right Now." Well+Good, 25 June 2018.

1. Many people treat plants in a relationship **more akin** to the relationship between **humans and pets**.

2. People enjoy the **interaction between themselves and plants**.

Competitor Analysis

	Lua	Edyn	Click and Grow	helloplant	HEXA
Sensors	✔	✔	✔	✔	
Interaction	✔				✔
Movement					✔
App Integration	✔	✔		✔	
Automation		✔	✔	✔	

Primary Research

1. Survey

212 respondants in 4 days

2. Interviews

9 interviewees

3. Cultural Probes

4 participants

1. Survey

212 respondants in 4 days

• People from various demographics

• Used to gather some preliminary information on demographics to target and the people's experiences with plants

2. Interviews

9 interviewees

• People from a more focused demographic

• Used to breakdown people's experiences with plants and to analyze human behaviour with plants

3. Cultural Probes

4 participants

• Even more focused group of participants

• Used to monitor one's relationship with a plant over time and to see how naming and social factors affect one's perspective

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54.1%

stated that their biggest pain point with taking care of plants was the regular care.

12.4%

responsed that they lacked the knowledge needed to care for plants.

47.6%

strongly agreed that houseplants amplified their connection to nature.

64.2%

strongly agreed that nature positively affects their mood.

There was a **perfect 50/50 split** between the people who humanized their interaction with their plants and those who didn't.

9 Total Interviewees

Gender

4 Males

5 Females

Age

1 Under 18

3 18-24

2 25-29

2 30-39

1 40-49

Residence

1 Urban

3 Suburban

2 Rural

- **Information** available on plant care is **vague** and not tailored to **individual plants**
- People give up if **maintaining the plant** becomes too **difficult**
- People like having **more than one** plant
- There is a **sense of responsibility** when it comes to **owning** a plant
- If **communication** with a plant was possible, many people would **want more than basic** care information

The Package

- Plant

- Houseplant journal

- Plant Information Sheet

- Nametag attached within the journal

- Pen

- Lollipops as a treat

- Manilla envelope

The Activities

Journal Documentation

- Water?
- General plant health
- Person's mood
- Notable Interaction

Naming the plant (with nametag)

- Choose name
- Write on nametag and attach to planter
- Reflection

#mybud Instagram Challenge

- Share photo on Instagram using #mybud
- View other's posts
- Reflection

Observations

• People involved their family and loved ones in taking care of the plant.

• People had a postive experience on a whole, whether they would want to keep plants in the future or not.

• The "gamification" of the package incentivized taking care of the plant.

Notable Quote

"I'm not very confident [at taking care of other plants in the future] because you know if an animal is feeling sick that it's going to sneeze or do something, but each plant is unique and has its own needs. The symptoms are also not as obvious. I feel like it's a huge responsibility to take care of a plant" - Siddarth Subhas, 23

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Affinitization

Target Audience

5 Whys

How Might We?

Personas

User Journey Maps
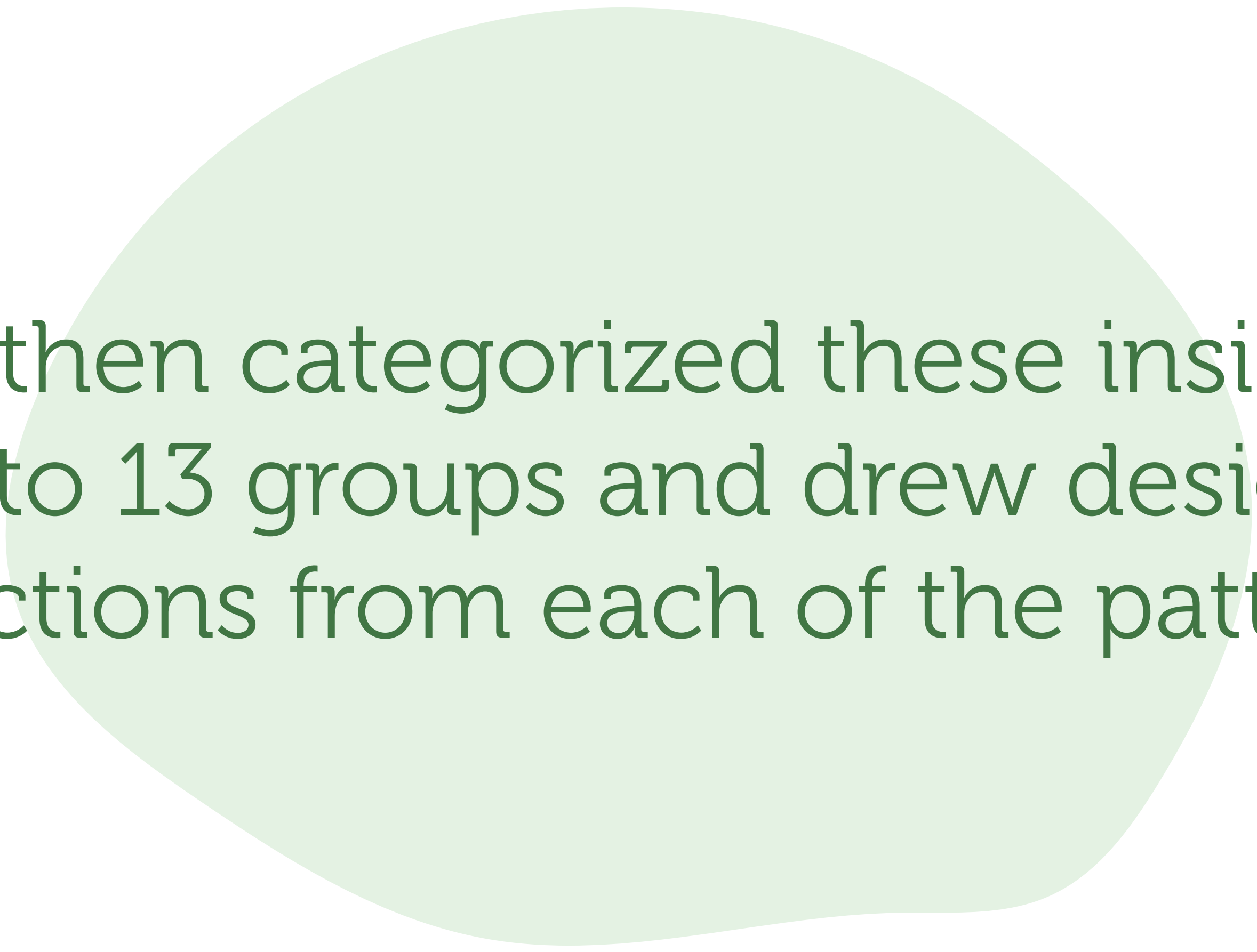
We gathered insights from all of the research and collected around 214 data points

Affinitization

PLANT OWNERSHIP

COMMUNICATION

ENVIRONMENTAL CARE

HUMANIZE

FAKE PLANT VIEWS

HOBBY/ FUN

AIR

DECORATION

FOOD

REMEMBERING TO WATER

KNOWLEDGE GAP

REACTION TO DEATH

SUCCESS
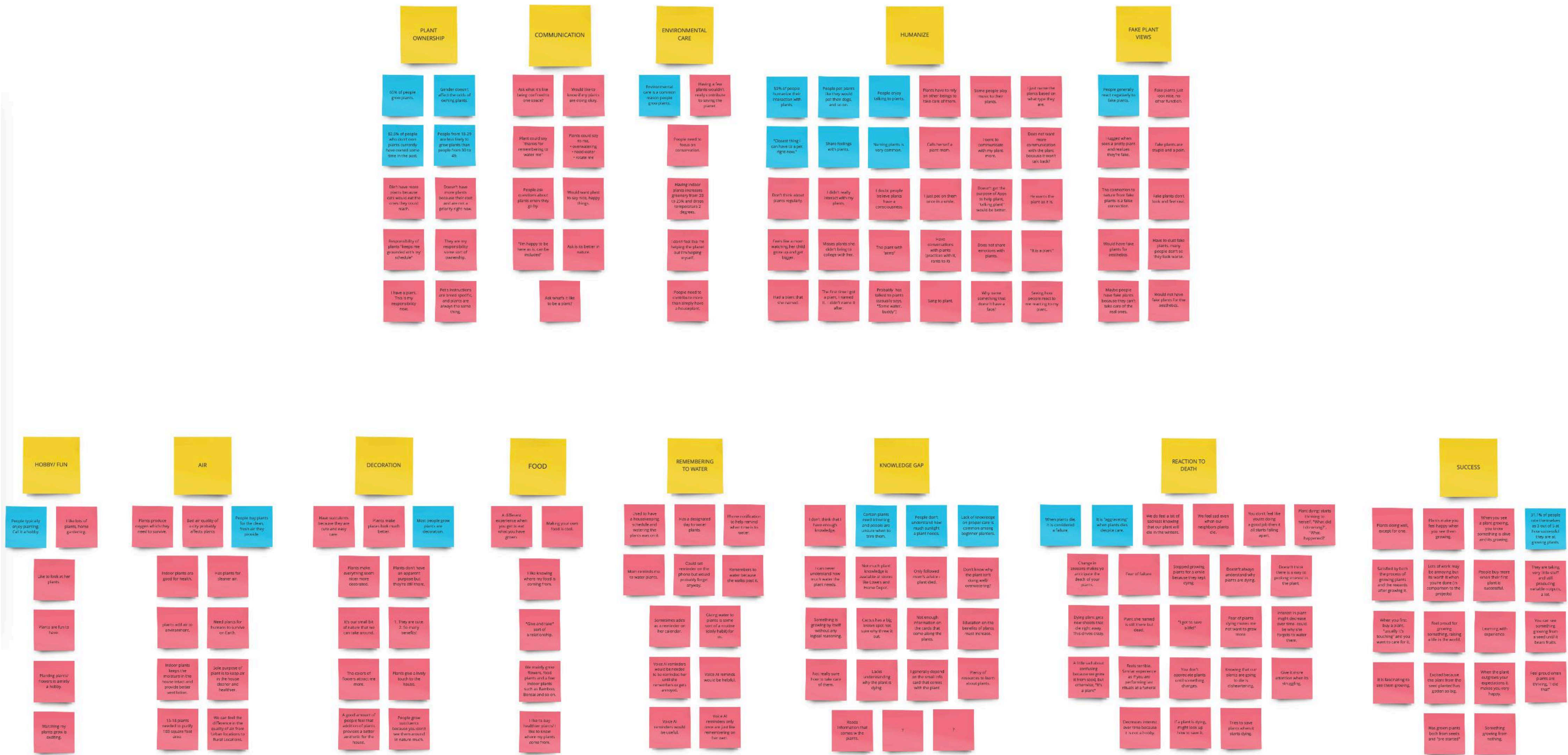
We then categorized these insights into 13 groups and drew design directions from each of the patterns

Affinitization

PLANT OWNERSHIP

COMMUNICATION

ENVIRONMENTAL CARE

HUMANIZE

HOBBY/ FUN

AIR

DECORATION

FOOD

REMEMBERING TO WATER

KNOWLEDGE GAP

FAKE PLANT VIEWS

REACTION TO DEATH

SUCCESS

Basic Demographics

Age: 18-30

Gender: Any

Residence: Urban and Suburban

Key Characteristics

Planting Skill Level: Beginner

Interest in Plants: High

Skill Level

Expert
• Professional

Intermediate
• Understands the needs of plants without any aid
• Can react to dying plant effectively

Beginner
• Completely new OR has owned plants before but without consistent success.
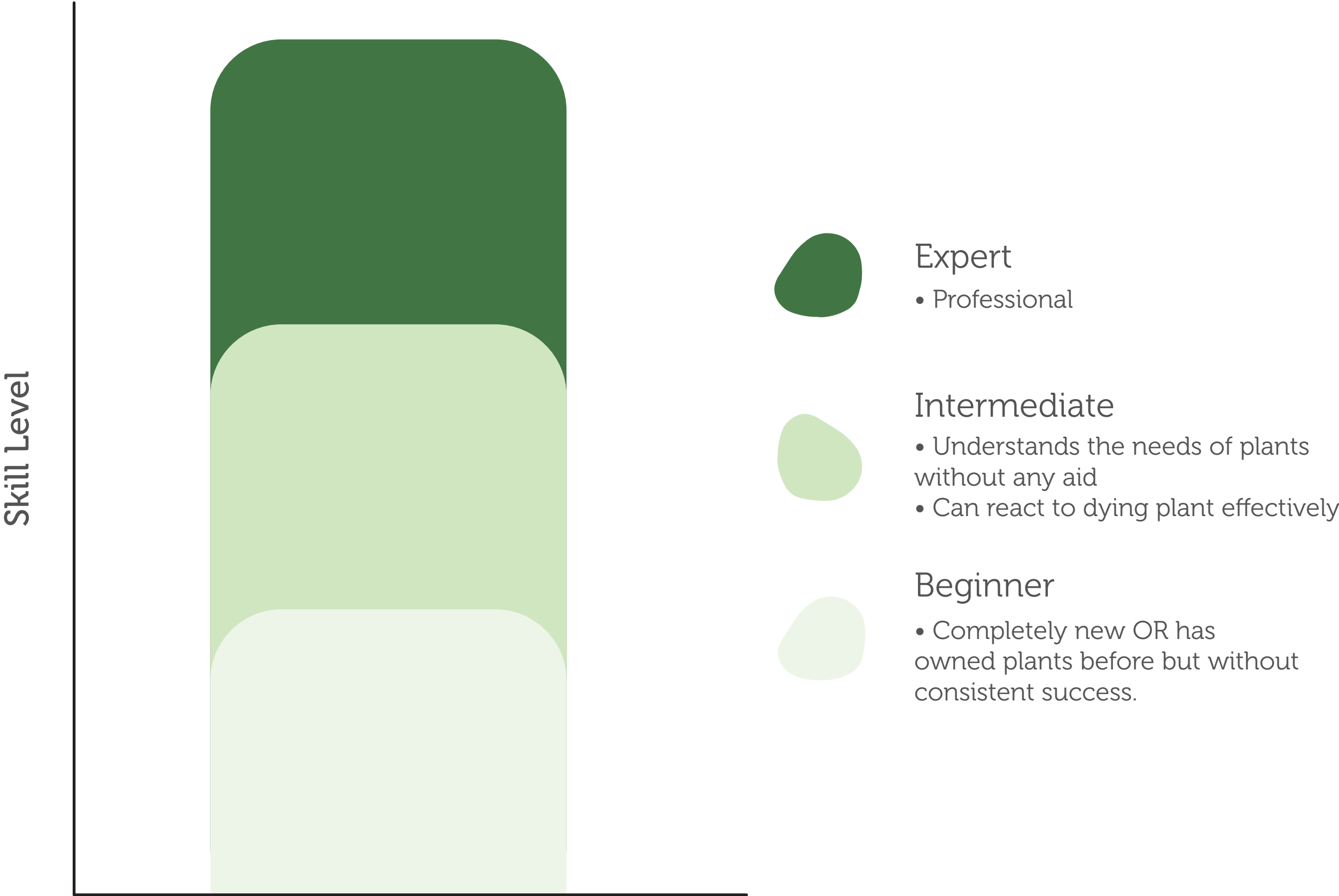
Problem: Beginners struggle at caring for their plants.

Why? There is a knowledge gap in how to effectively care for plants.

Why? The information available on plant care can be vague and difficult to understand.

Why? There are too many variables to account for when taking care of plants.

Why? Plants are living things with individual needs that react to their environment.

Opportunities

1. More interaction = more connection

2. Support for multiple plant systems

How might we **aid** people who have had little or no success grow **thriving houseplants**?

How might we...

help beginners understand each plant's individual needs?

foster a stronger relationship between an individual and his/her plants?

Personas

Olivia Greene
New Grower

Ash Gardner
Beginner Grower

Personas

Olivia Greene
New Grower

Ash Gardner
Beginner Grower

Olivia Greene
New Grower

About
Age: 19
Occupation: Student
Location: New York City, NY

Bio
Olivia is studying at NYU for her first semester. She's seen posts on Instagram about plants and she wants one for her dorm. She's even picked out the one she wants. The problem is, she has no idea what to do with it. Yeah, she knows that plants need water and sun, but everyone knows that. She needs to know the specifics for everything, and she has a lot of questions!

Motivations
• Seen people posting about plants on Instagram
• Wants to improved ambience of dorm room
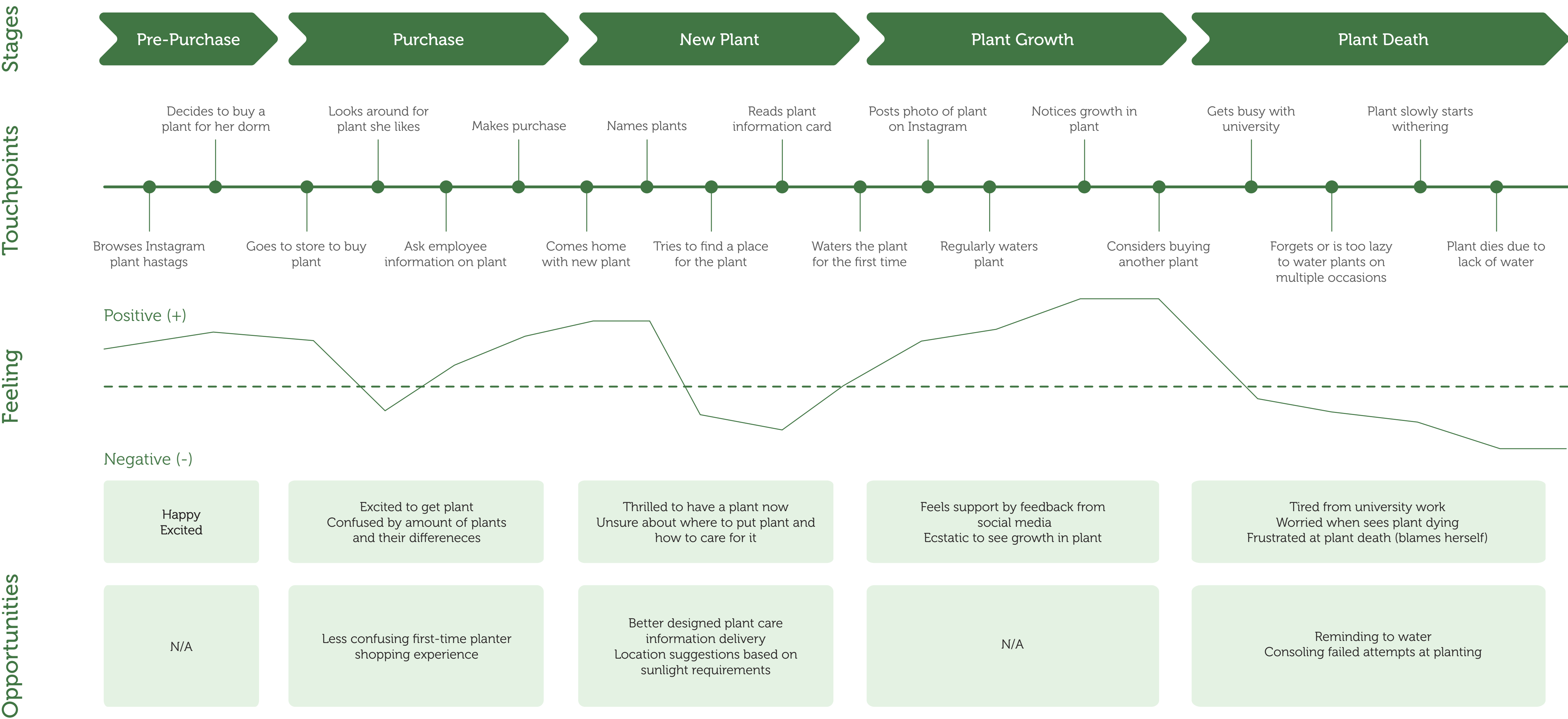• Cares about conservation of the environment

Pain Points
• Busy school schedule
• Doesn't understand basic needs to plants and has nowhere to learn

Core Needs
• Basic plant knowledge
• Resource to answer more specific questions

Olivia's Journey Map

Stages

| Pre-Purchase | Purchase | New Plant | Plant Growth | Plant Death |

Touchpoints

Decides to buy a plant for her dorm

Looks around for plant she likes

Makes purchase

Names plants

Reads plant information card

Posts photo of plant on Instagram

Notices growth in plant

Gets busy with university

Plant slowly starts withering

Browses Instagram plant hastags

Goes to store to buy plant

Ask employee information on plant

Comes home with new plant

Tries to find a place for the plant

Waters the plant for the first time

Regularly waters plant

Considers buying another plant

Forgets or is too lazy to water plants on multiple occasions

Plant dies due to lack of water

Feeling

Positive (+)

Negative (-)

Happy
Excited

Excited to get plant
Confused by amount of plants and their differeneces

Thrilled to have a plant now
Unsure about where to put plant and how to care for it

Feels support by feedback from social media
Ecstatic to see growth in plant

Tired from university work
Worried when sees plant dying
Frustrated at plant death (blames herself)

Opportunities

N/A

Less confusing first-time planter shopping experience

Better designed plant care information delivery
Location suggestions based on sunlight requirements

N/A

Reminding to water
Consoling failed attempts at planting

Personas

Olivia Greene
New Grower

Ash Gardner
Beginner Grower

Ash Gardner
Beginner Grower

About
Age: 27
Occupation: Financial Analyst
Location: Seattle, WA

Bio
He has had a few plants before. One did well, but the rest died quickly. He never knew what he'd done wrong, because honestly he's just winging it most of the time. He knows some basic care, but clearly he's doing something wrong because none of the plants he has had are still alive. He loves caring for the plants himself, but needs some more in-depth assistance to keep his next plant alive.

Motivations
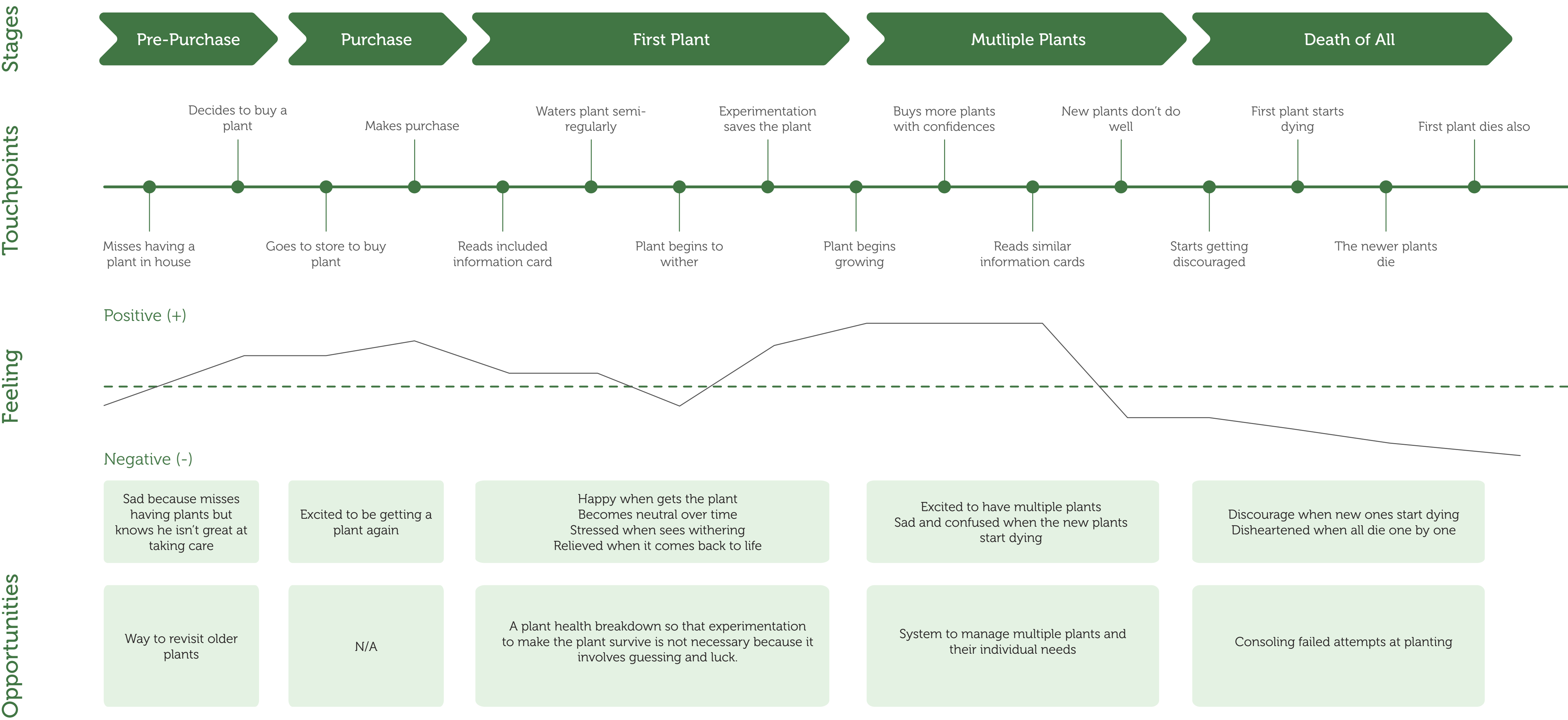• Wants to have success for once when growing a plant
• Enjoys caring for plants

Pain Points
• Doesn't understand why his plants die
• Struggles to understand individual needs of different plants

Core Needs
• A way to understand his shortcomings
• Aid differentiating the needs of each plant

Ash's Journey Map

| Pre-Purchase | Purchase | First Plant | Mutliple Plants | Death of All |

Touchpoints

Decides to buy a plant
Makes purchase
Waters plant semi-regularly
Experimentation saves the plant
Buys more plants with confidences
New plants don't do well
First plant starts dying
First plant dies also

Misses having a plant in house
Goes to store to buy plant
Reads included information card
Plant begins to wither
Plant begins growing
Reads similar information cards
Starts getting discouraged
The newer plants die

Feeling

Positive (+)

Negative (-)

| Sad because misses having plants but knows he isn't great at taking care | Excited to be getting a plant again | Happy when gets the plant Becomes neutral over time Stressed when sees withering Relieved when it comes back to life | Excited to have multiple plants Sad and confused when the new plants start dying | Discourage when new ones start dying Disheartened when all die one by one |

Opportunities

| Way to revisit older plants | N/A | A plant health breakdown so that experimentation to make the plant survive is not necessary because it involves guessing and luck. | System to manage multiple plants and their individual needs | Consoling failed attempts at planting |

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Initial Concepts

Chosen Concept

Concept Sketch

Features

Interaction Model

Storyboards

Concept 1

A stationary voice assistant module with a screen to emulate emotion that connects to separate sensors that can detect plant health
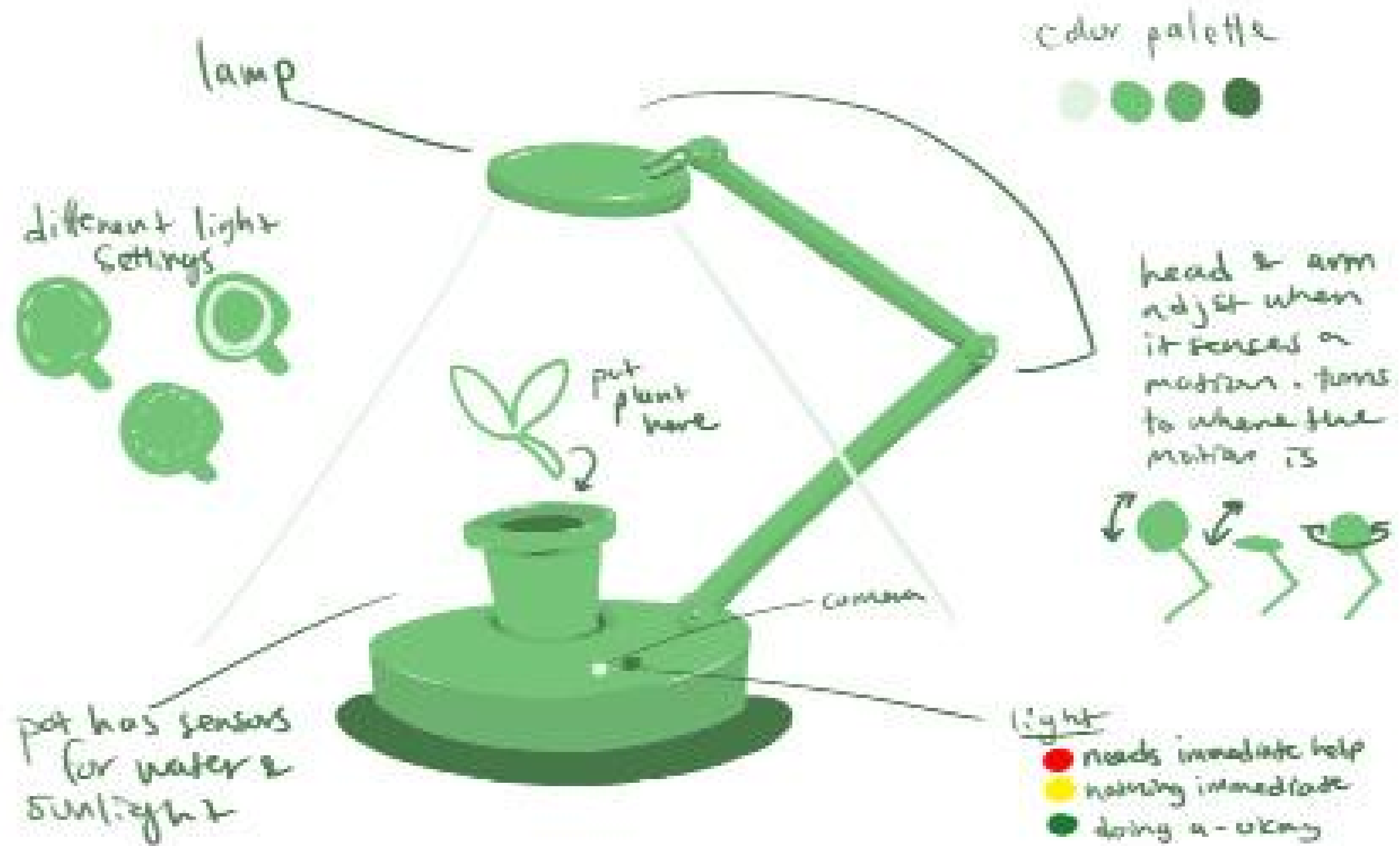
Detailed Sketch

FRONT

SIDE

BACK

engravings

color palette

display

flat bottom

will have different colored lights

sensor (soil, water?)

Concept 2

A planter-lamp combination that moves along its hinges and can voice interface based on the sensors it has to detect plant information.

Detailed Sketch

lamp

colour palette

different light settings

put plant here

head & arm adjust when it senses a motion . turns to where the motion is

pot has sensors for water & sunlight

camera

light
- 🔴 needs immediate help
- 🟡 nothing immediate
- 🟢 doing a-okay

A **two part system** that consists of a face-tracking voice assistant that displays emotions on its screen, and sensors that can gather and record plant health information

Detailed Sketch

color palette

rounded Shape 360° to provide an easier grip

Sensors
• Soil moisture
• air quality
• light detection

different colored lights depending on how urgent the problem is

emoticons on display will change

camera

SIDE

longer & wider front to provide more stability

Section on the back rotates

this section rotates

display (LCD)

camera

mic

speaker

for voice interaction

mic

engravings

rotates display forwards & backwards

FRONT

BACK

rounded edges to provide a sleek & comforting appeal

base hides Arduino & supports display

(may include B or Wifi module/ arduino nano here)

Bud (Assistant Module)

- Voice interaction
- Swivel/movement based on motion sensors
- LCD panel face that changes

Seeds (Sensors)

- Soil moisture detection
- Temperature and humidity detection
- Light detection
- Bluetooth connectivity

Connected App

- Setup function/"Photo AI"
- In-depth information based on sensor
- Management of plants
- Written tips and tricks
- Step-by-step guides
- Plant recommendations
- Ability to order a new sensor (with a plant?)
- Gamification
- Community page

Interaction Model
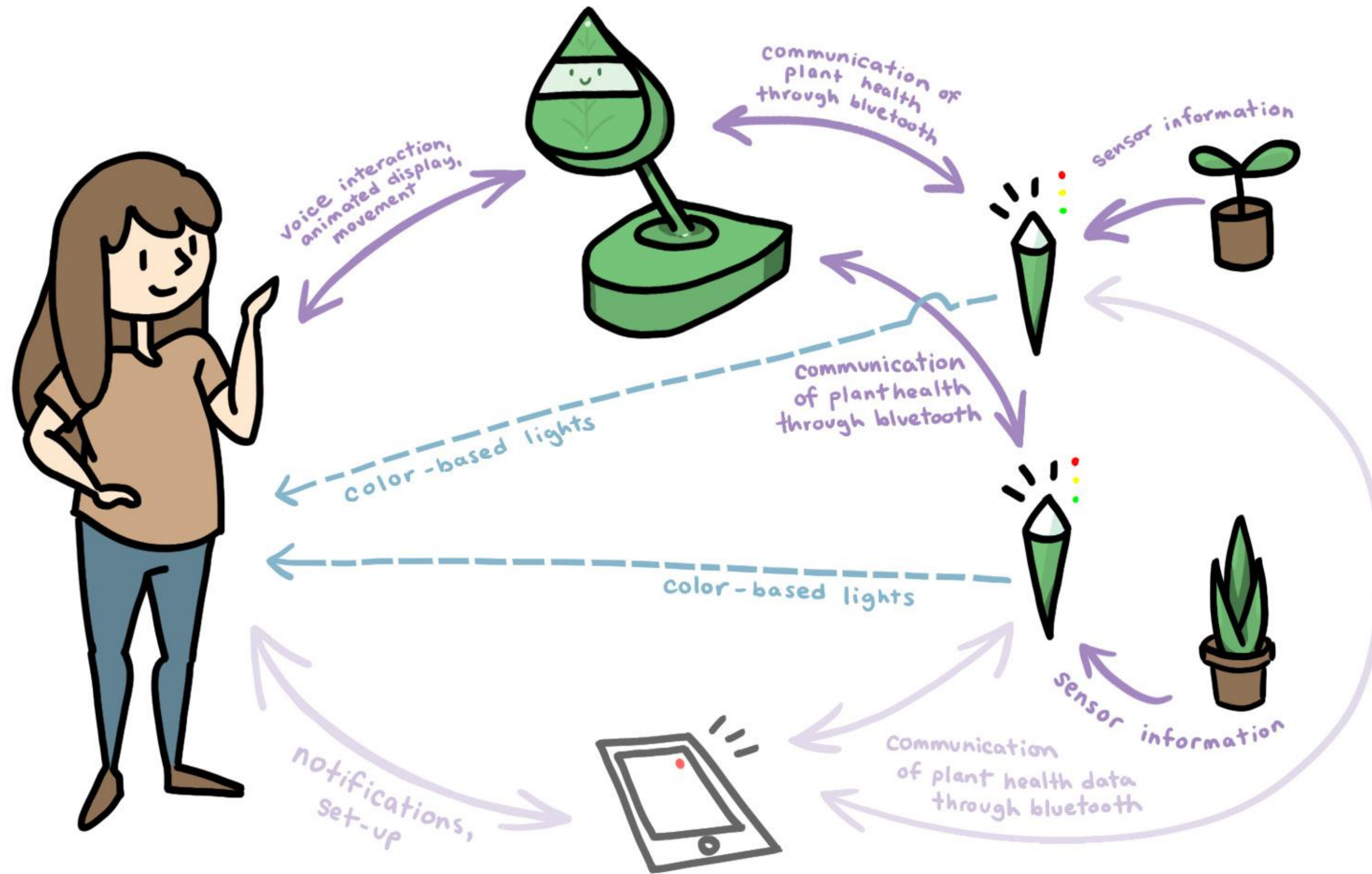
Storyboard

Olivia comes home late studying. She ignores the yellow light on the sensor (indicating that the plant is in a cautionary state) and heads to bed.

The next morning, she gets up early and leaves in a rush, forgetting that her sensor is yellow.
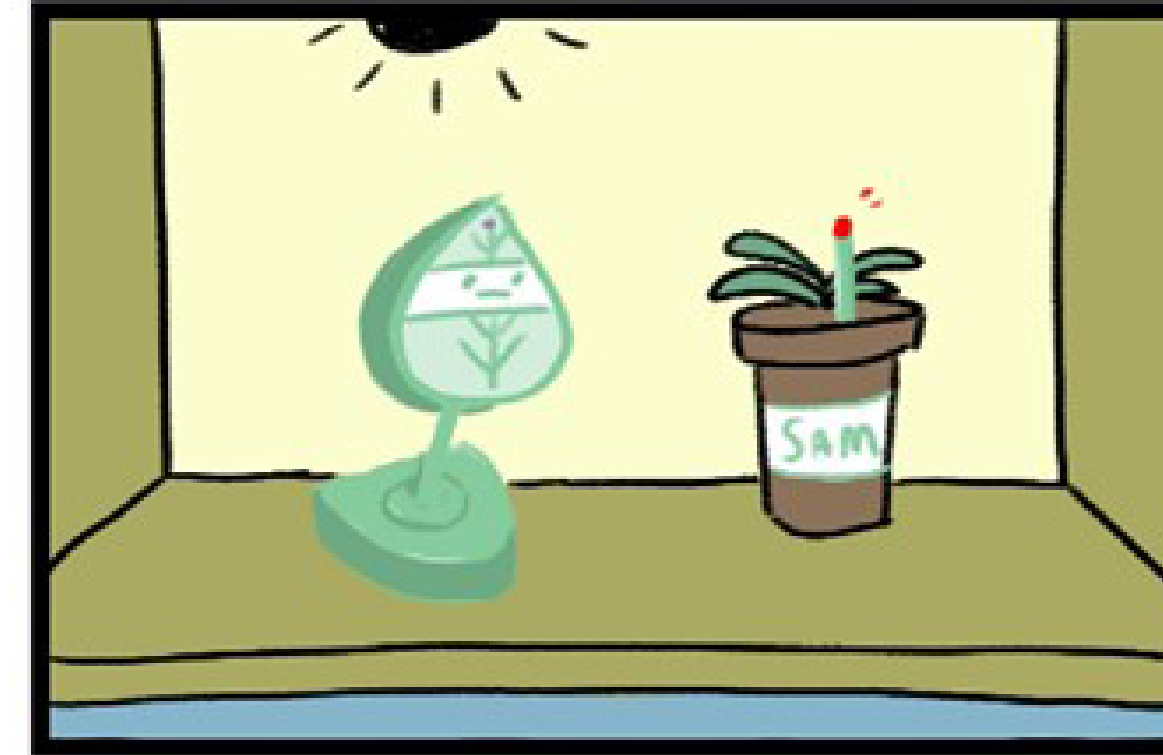
As time passes, the sensor's light turns from yellow to red, indicating that Olivia's plant, Sam, needs immediate attention. Bud responds with a bleak expression.

Olivia comes home after class and notices that the sensor's light is red. She immediately asks Bud what's wrong with Sam. Bud perks up to Olivia moving and talking (physically) and tells Olivia that Sam needs water.

Olivia begins to water Sam. Bud receives information that the sensor has received enough water and tells Olivia to stop watering Sam.

Sam's light slowly turns green and becomes better. Bud tells Olivia that she's done a good job.

Storyboard
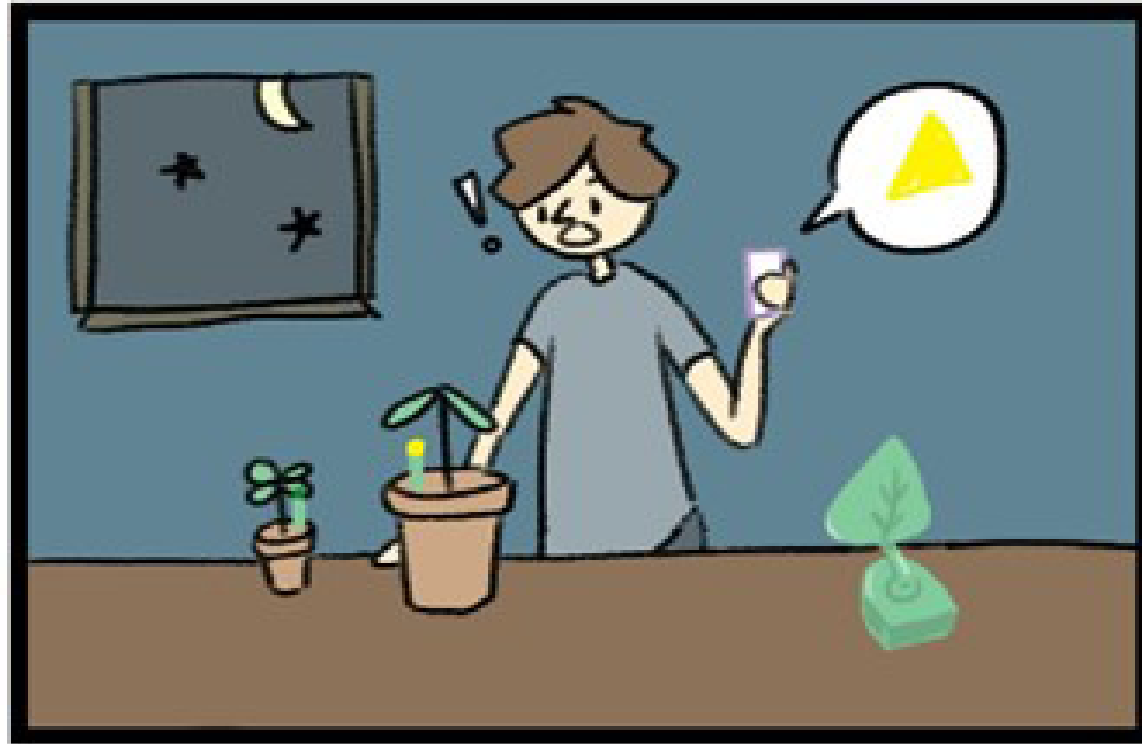
Ash has multiple plants and has previous experience with plants. His phone notifies him that both of his sensors are yellow. He sees that both the sensors are yellow.
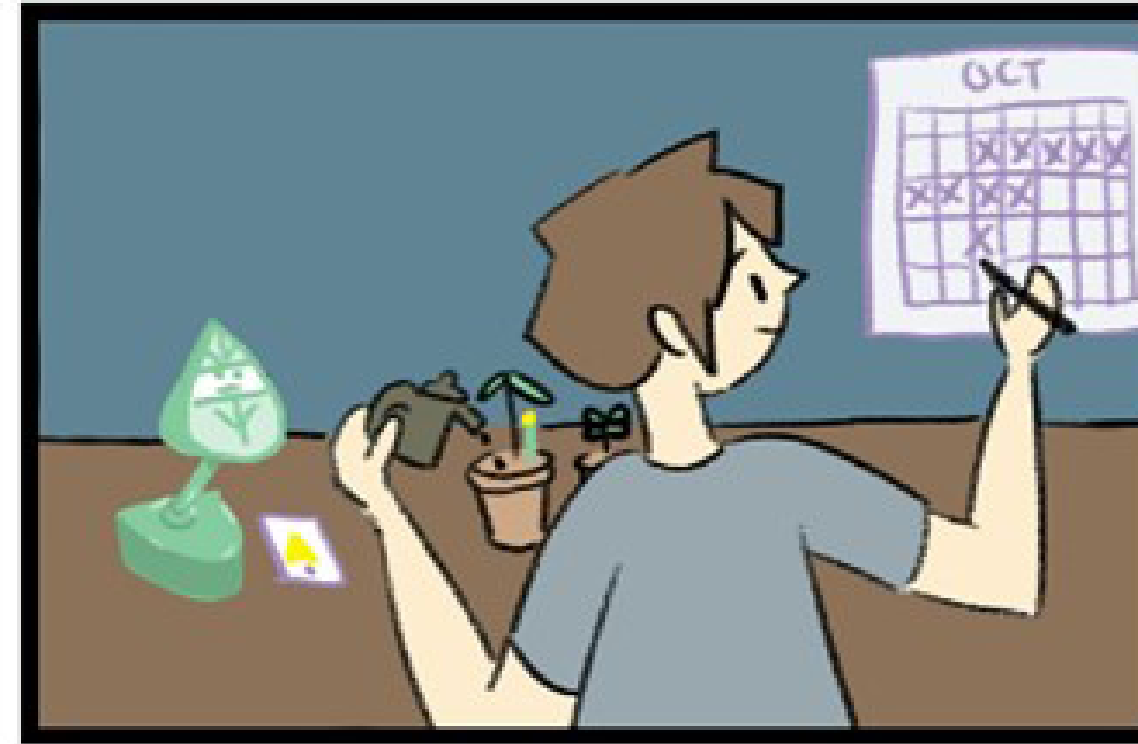
Ash realizes that he hasn't watered his plants in a few days and marks it off on his calendar. He waters his plants.

The next day, while he brushes his teeth, Ash sees on his phone that the lights on his sensor are still yellow.

Ash sees that one of his plants has a green sensor, indicating that it is in a good state, and that one of his plants has a yellow sensor still. Confused, he asks Bud what's wrong with his plant. Bud responds that it needs more sunlight.

Ash immediately moves his plant to his windowsill.

Ash sees that the sensor turns green after receiving sunlight. He thanks Bud, and Bud says, "You're welcome!"

- The support of multiple plants
- Conversational behaviour was important
- Movement brings unparalleled level of interaction.

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5. Deliver

Lo-fi Prototype

User Testing

Evaluation

Voice Persona

Updates and Insights

Gallery

1. How do our interaction systems (voice, display animation, lighting and movement) work and what are each good at achieving?

2. What grammars and prompts are appropriate to use? What sort of characteristics are appropriate for our voice persona?

3. How intuitive is the two-part system to use?

Lo-fi Protoype

- Bud
  - Made from pink foam
  - Pan and tilt movement
  - Swapable faces
  - Voice provided by Sheryl and Aparna
- Sensor Seeds
  - Made from cardboard
  - Programmed Arduino to change LED colors based on a botton click

Evaluation

Quasi-Empirical Method

Questionnaire (SUS)

7 Scheduled participants

4 On-the-stop participants

3 Locations

Locations

1. beeFUEL

Scheduled Test

3 participants

2. The City Market

On-the-spot Test

4 Participants
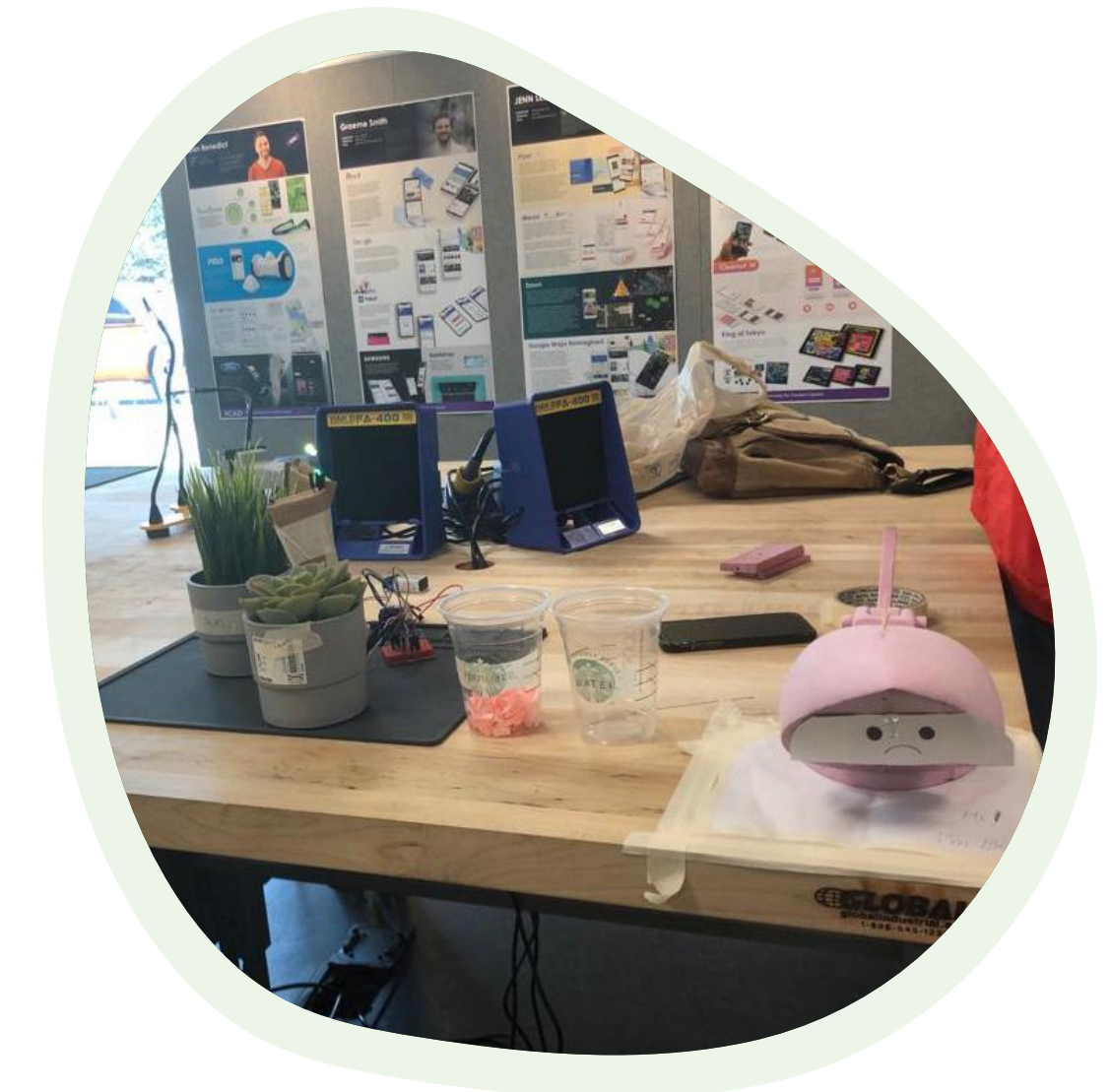
3. The SHED

Scheduled Test

4 Participants

Scheduled

Introduction: Make the users familiar with the product. Explain roleplay method.

Wizard of Oz: 4 roleplay scenarios with think-aloud method

Conclusion: Users answer follow-up questions and fill SUS questionnaire.

On-the-spot

Introduction: Make the users familiar with the product. Explain roleplay method.

Wizard of Oz: 1 quick roleplay scenario with think-aloud method

Conclusion: Ask for reactions.

Observations

- There was a perfect 50/50 split between people who wanted bud to comment about making a habit or not.

- In terms of communication what type is more preferred?
    1. Voice Interaction
    2. Color-based Light on Sensor (seeds)
    3. Movement
    4. Animated Display on Bud.

73.2

score from the System Usability Scale

For all, the system was not unnessarily complex.
For one, the various functions were not well integrated.
For one, learning how to use the system was not the easiest.
For one, enough information wasn't provided
before using the system.

- **Refine grammars and prompts** to match the finalized voice persona created based on results (next slide)
- **Hierachy in voice** based on urgency and number of plants needing care
- **Better integration** of all the different interactions
- Initial instructions need to be **clarified**

Bud
Voice Assistant

About
Age: 18
Gender: Female

Characteristics
Cheerful

Assertive

Friendly

Patience

Persistant

Bio
• Bud is knowledgeable and helpful.
• She is your personal assistant and persistently cares for your plants.
• Cares about conservation of the environment

Voice Tone
• Joyous yet Urgent
• Ringing and fruity
• Appealing
• Modulated
• Confident

Voice Integration- Voice Recording

Voice recording: Experimentation with the prosody by multiple takes of increase in the urgency of the voice.
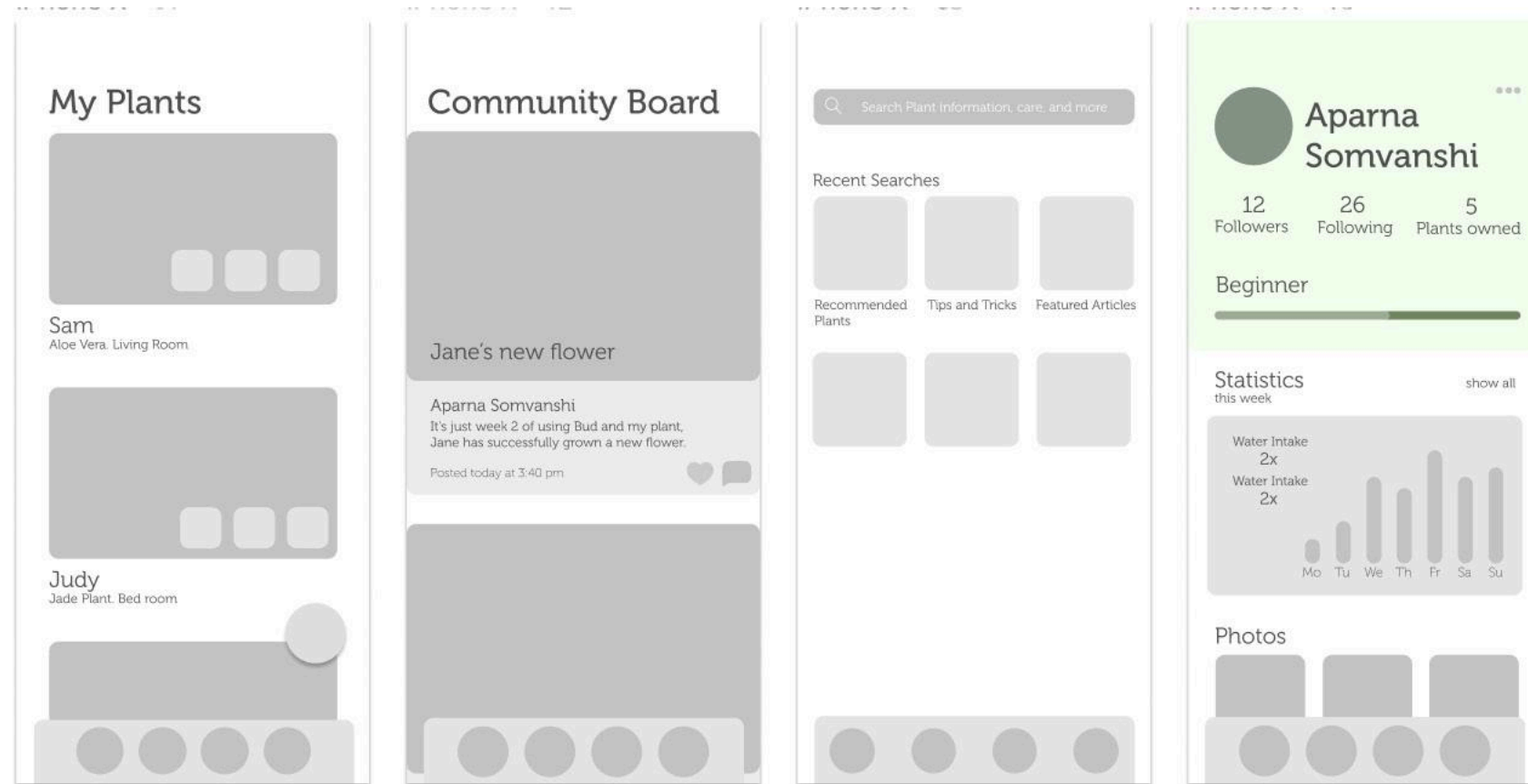
App Integration

App Integration: With step by step guidance, getting started with Bud is easy. Instructions are more precise and clear.
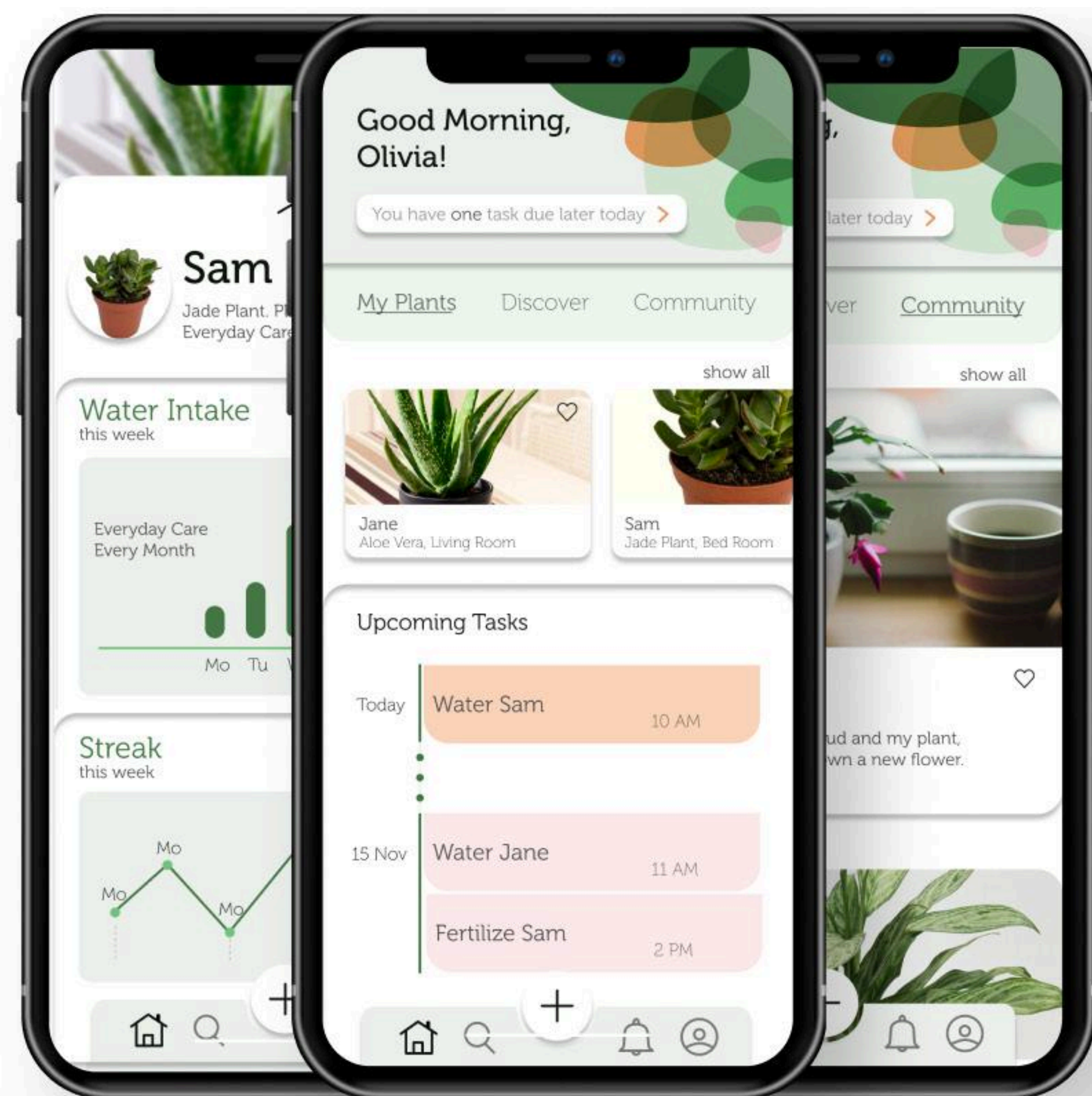
Lo-fi App

- Step by step guidance
- Clear, easy instructions
- Understanding the Information Architecture
- Easier access to detailed information
- Highlighting simpler forms while hiding complex

A **two part system** that consists of a face-tracking voice assistant that displays emotions on its screen, and sensors that can gather and record plant health information

- Voice interaction
- Swivel/movement based on motion sensors
- LCD panel face that changes

- Soil moisture detection

- Temperature and humidity detection

- Light detection

- Bluetooth connectivity

thank you!