Final User Test Report of a Plant Care App

Feb. 2020

Introduction

For most people, plants are good for home decoration and air purifying. Some researchers also suggested that plants can play a key role in the well-being of humans (Mavoa et al., 2019). However, most people lack home gardening skills, which makes growing plants a difficult task at home. This problem is especially true for urban-living people with a lack of time and access to learning how to grow plants. This design aims to offer a solution to the urban-living users who are interested in purchasing and growing plants at home but lack pepper skill to manage the plants. For these people, a tool to help them select and keep their plants alive longer and hence build their confidence in the plant-growing could be useful. This research project aims to develop and test a plant care app for beginners in home gardening that provides gardening tips and is customizable based on the home environment of the user. The key functions include identifying a plant by name or photo, checking if a plant is suitable to grow in the user's home environment, and setting customizable reminders to take care of the plants regularly.

Research Methods

This research project began with the user needs finding study. The interview was conducted with twenty potential users aged from 25 to 48 via face-to-face communication or chat app messaging. The two overarching questions of the user needs-finding study were understanding how the interviewees grow plants and their experience in using plant care apps. And the results were collected and analyzed based on the needs-finding interview. After that, an affinity diagram was drafted to summarize the major expectations of potential users. Besides, personas and storyboards were drafted as well based on the results of user needs finding. The goal of this step was to think about the design of an intervention that helps the potential users find a plant they liked and get guidance to grow plants. Low-fidelity wireframes were also generated to ensure the effort was well-placed and could encourage high-level feedback from users who would participate in the following user test.

In the next step, a micro usability test was conducted with three potential users. The goal of the test was to answer the following questions: Can people who are new to plants use the plant app to grow plants at home? What problems users might encounter when trying to use the plant app to grow plants? Once the test is done, the mid-fidelity prototypes were generated, which followed with a heuristic evaluation to get a troubleshooting list for design optimization. The last step was to do a new round of user tests with three new participants who never appeared in the previous interview and user test. Results were collected and used as a reference to refine the prototype that better suits users' needs.

Design Methods

1. Storyboard:

Storyboard 1 displays a woman who leaves her plants unattended and finds them withered in 2 weeks (Figure 1).

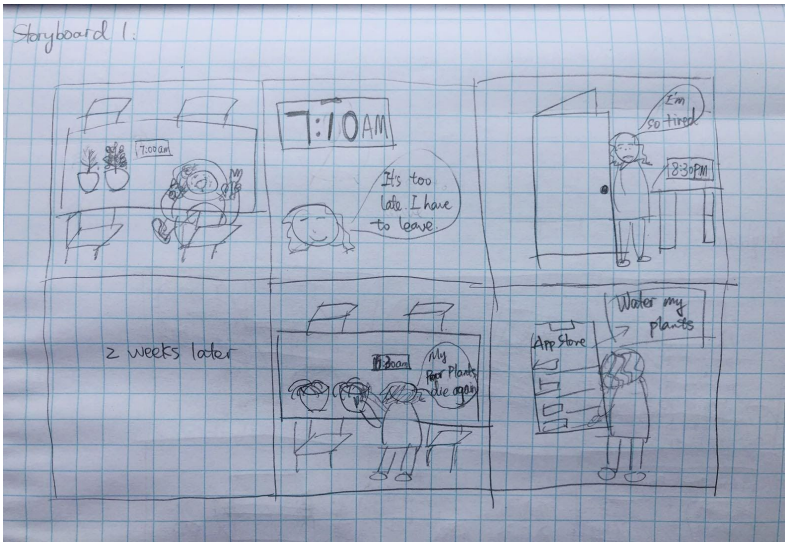


Figure 1: Storyboard 1/3

Storyboard 2 describes a woman who is having lunch at a restaurant and is interested to know the name of a plant placed near her table. She asked the waiter but he doesn't know the plant. The woman has to take a picture of the plant and go to a nursery to ask what the plant is (Figure 2).

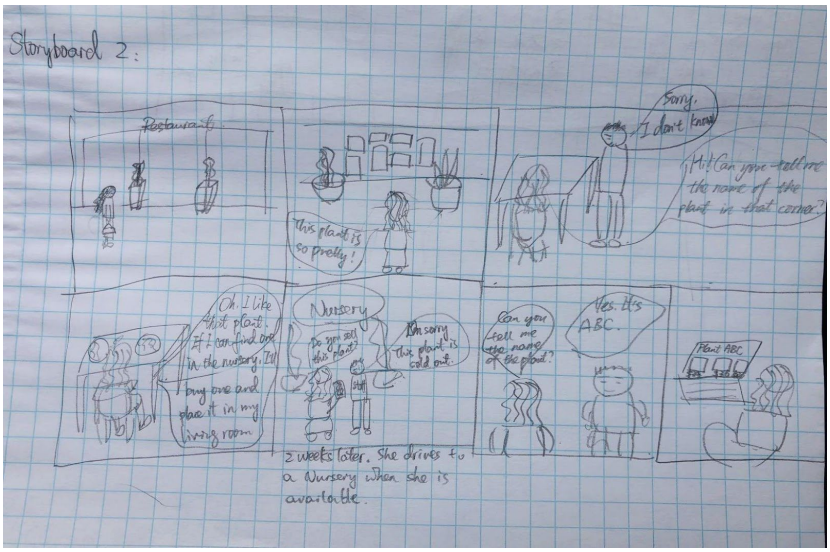


Figure 2: Storyboard 2/3

Storyboard 3 describes a woman who saw a pretty plant in her plant care app. She likes the plant and wants to buy it, so she goes to a nearby Home Depot and purchases the plant (Figure 3).

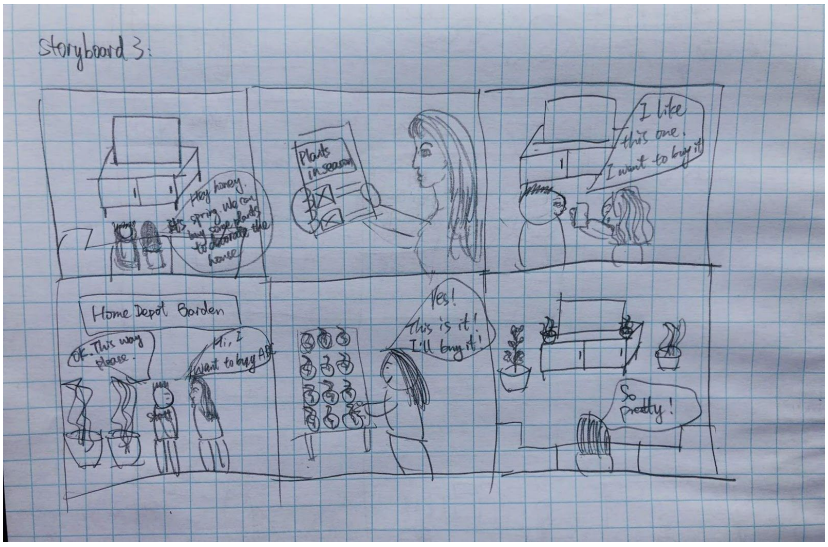


Figure 3: Storyboard 3/3

2. Wireframe:

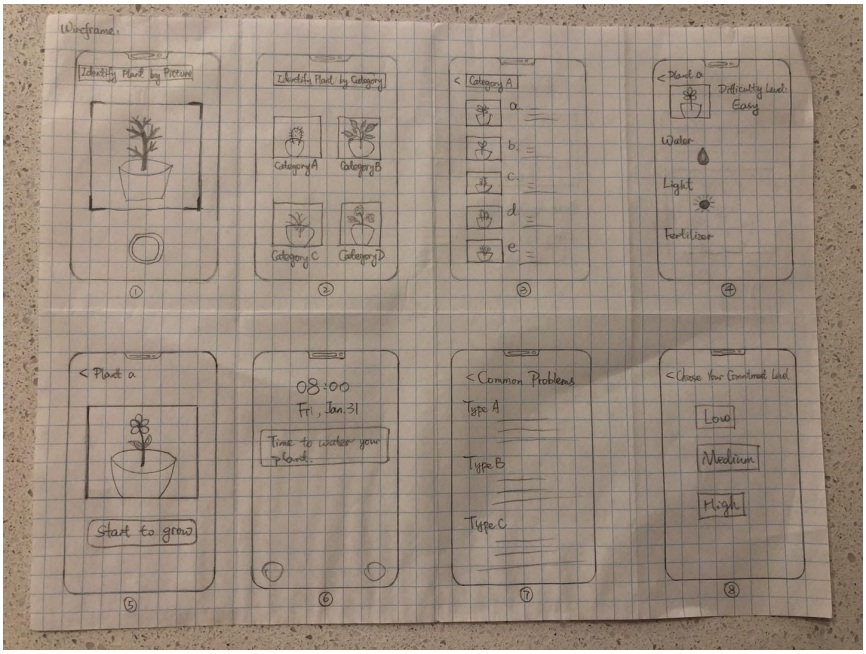


Figure 4: Wireframe ½

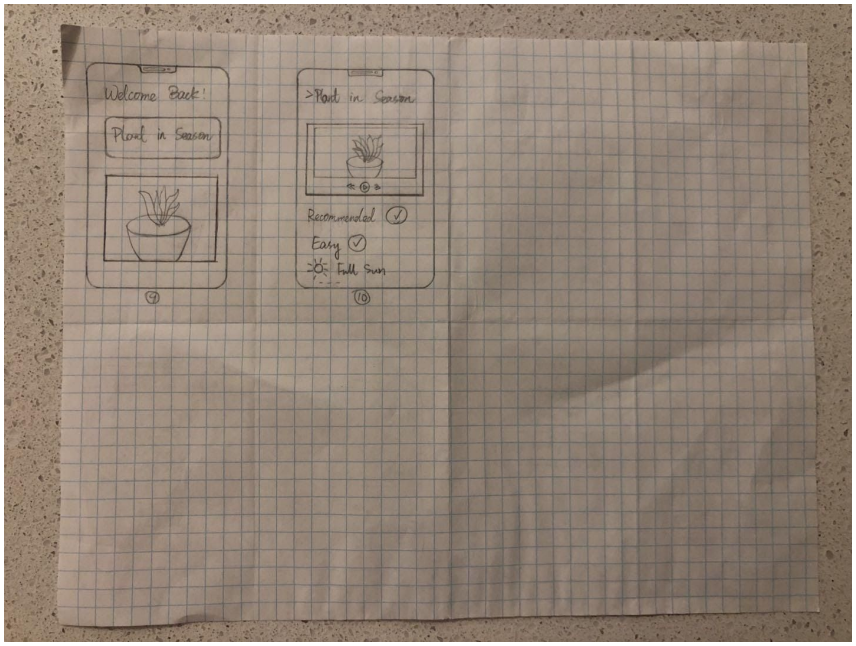


Figure5: Wireframe 2/2

Wireframe Description (Figure 4&5):

1. To identify a plant by taking a picture;
2. To identify a plant by finding its category;
3. To search a plant in a category;
4. This wireframe shows the introduction page of a plant;
5. User can add a plant to grow;
6. Send a notification to remind users to water the plant;
7. This wireframe shows the page of the common problems that users might have during the plant growing;
8. This wireframe shows the page of choosing the commitment level;
9. This wireframe shows “Plant of the day” on the homepage of the app;
10. This wireframe shows users play the introduction video of the plant of the day.

3. Prototype:

Task 1: You found a beautiful plant in a store. But nobody in the store knows the name of it. You want to scan the plant, find the name, and add it to your wishlist (Figure 6).

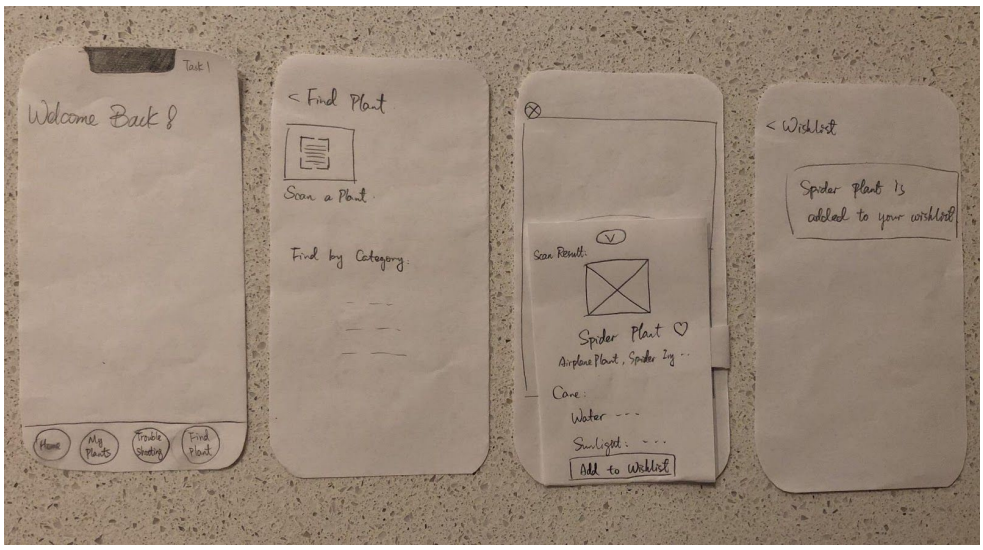


Figure 6: Task 1 of the prototype

Task 2: You plan to add the environmental condition of your living room in the system so that you can start to add a plant to grow. Please select the site's name, temperature, sunlight, and humidity (Figure 7).

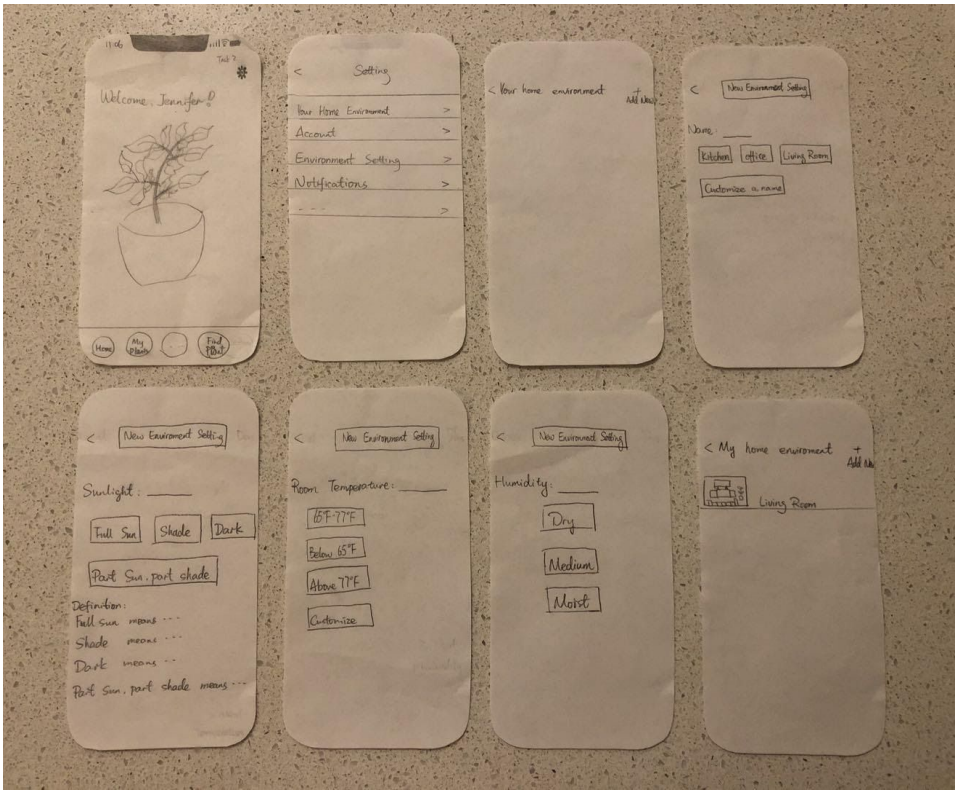


Figure 7: Task 2 of the prototype

Task 3: You just bought a plant Moth Orchid. Please review the care instructions of the plant and add it to "My Plants". You want to place it in your living room, and only want to spend the least time taking care of it (Figure 8).

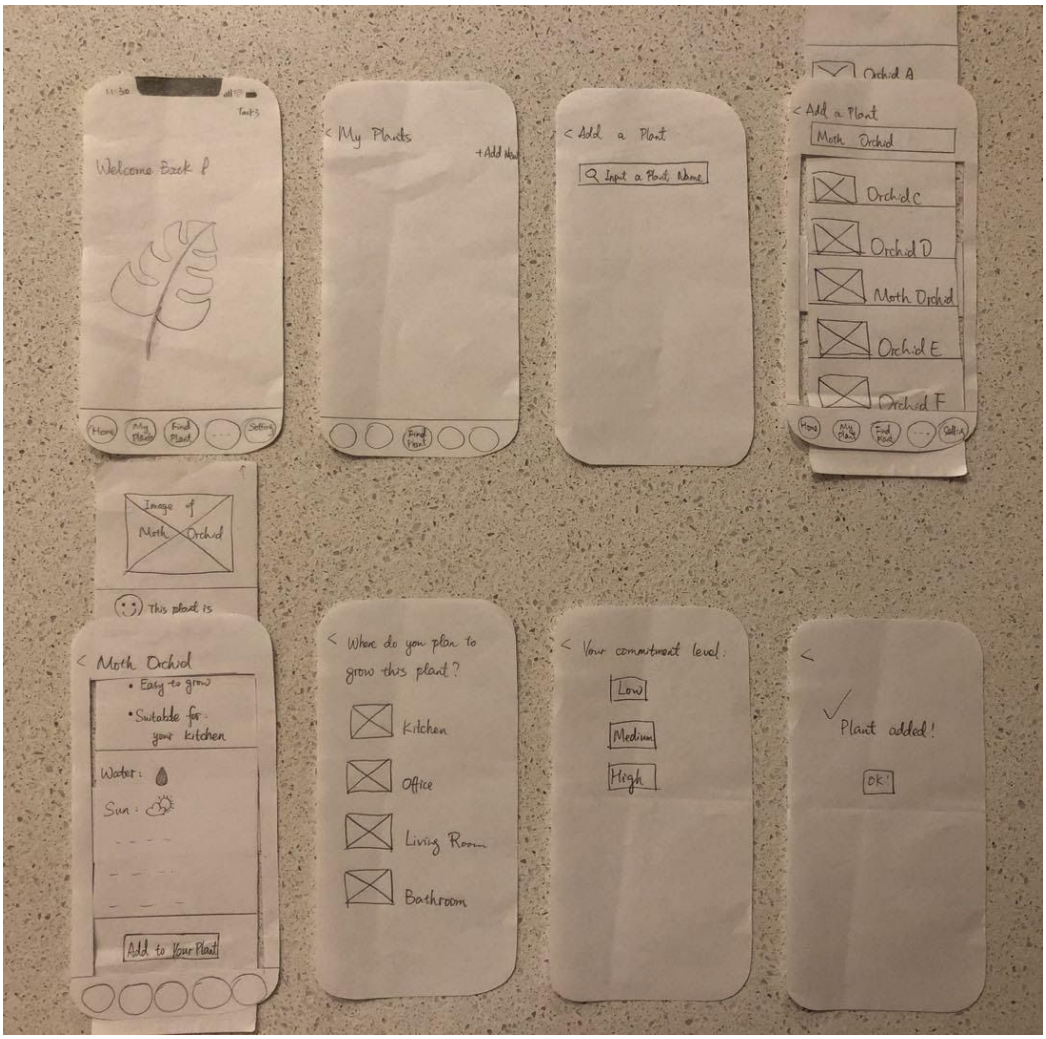


Figure 8: Task 3 of the prototype

Task 4: You have added 1 plant to "Your Plants". You want to set the reminder to 10:00 am every Saturday because you're available at that time (Figure 9).

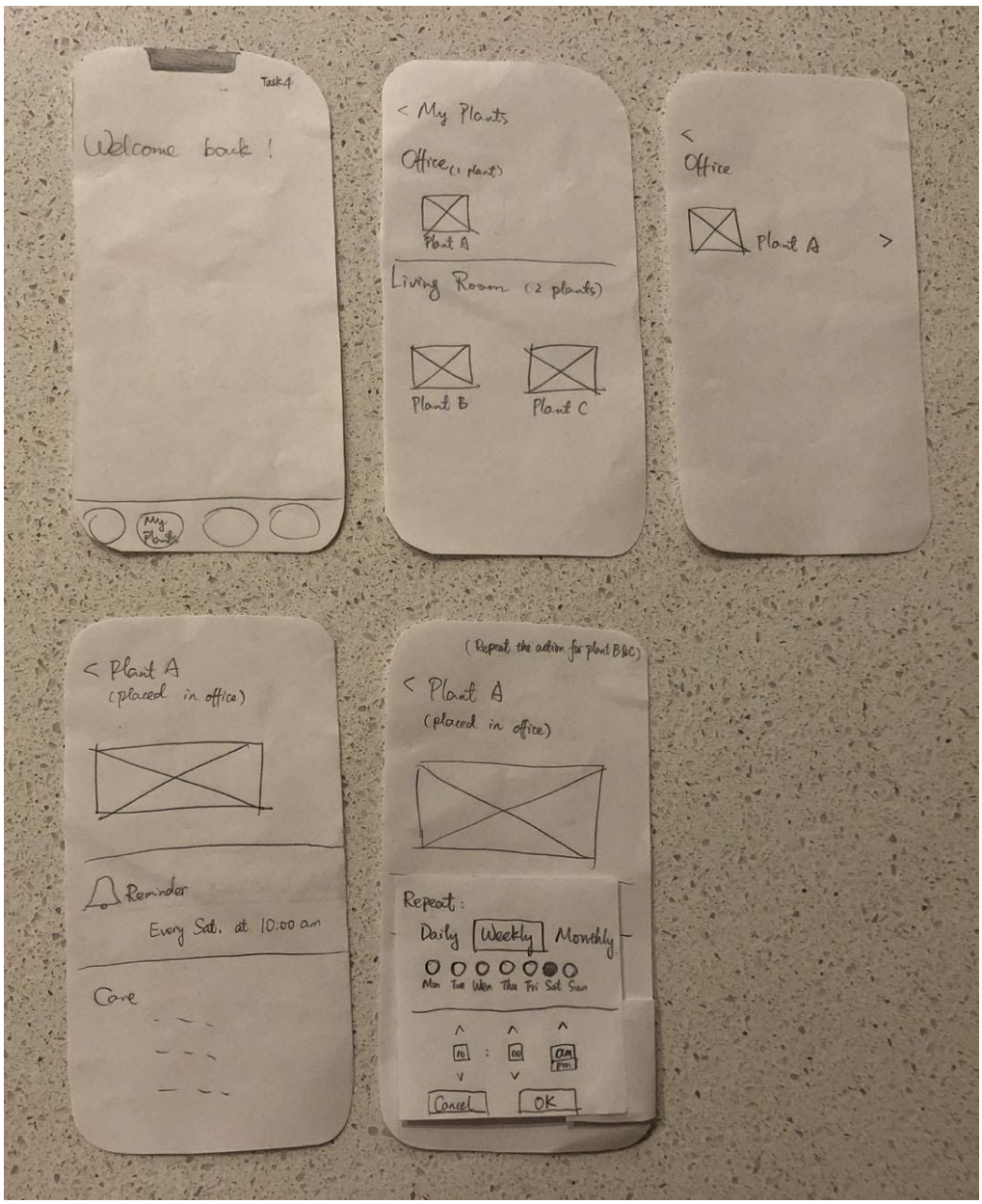


Figure 9: Task 4 of the prototype

Task 5: You found your favorite foliage plant and got brown tips on its leaves. Check what the problem is and get to know how to fix the problem (Figure 10).

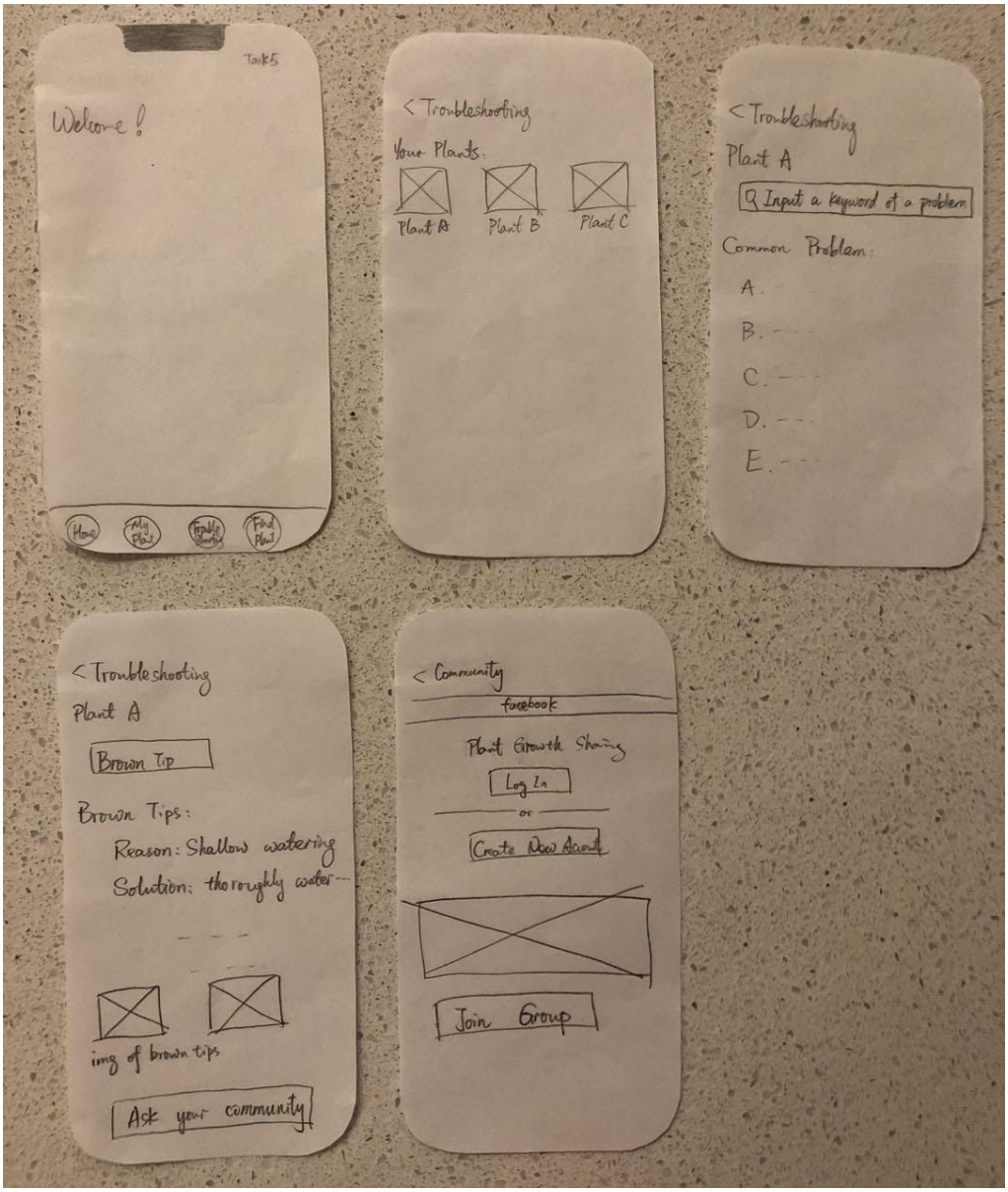


Figure 10: Task 5 of the prototype

User Needs Analysis

The interviews were conducted with five interviewees to learn their current practice and their needs for the design.

Interviewee A bought plants according to his preference. He said he would check the tag attached to each plant to see if the plant is easy to grow or if it's suitable for his home environment. He only spends around five minutes on the plant care per day. He didn't pay too much attention to the plant because he thought he used

plants to decorate his home so he didn't set any expectations for the plant he bought. Usually, he places plants in the living room and office at home. Last summer, one of his plants died because he forgot to water the plant. Currently, he didn't use any app to help him with the plant growth. He hopes there's a reminder in an app that can remind him to water his plant. As he only wants to spend a very limited time on plant growth, he hopes the app can be convenient to use.

Interviewee B bought plants from Home Depot or Lowe's. She only buys a plant if it's easy to grow. She is willing to spend 5-10 minutes and no more than 3 times a week on plant care. She met a problem recently that one of her plants wilted because the sunlight was not strong enough. She moved the plant to the deck for several days to save it. She uses an app called Planta. She likes the design but she didn't use the app very often. She said she always ignores the reminders because it's too frequent for her, especially when she added 5 plants to the system. She likes how Planta presents the "Discover a plant" section in the app because she can find a plant very quickly and the layout is easy to read. However, according to her, she never reads the guidance when the system prompts her because most of the guidance is long articles and she doesn't have time to read an article when she waters a plant in the morning.

Interviewee C doesn't purchase plants very often. He mentioned that he recently received a plant from his friend, and enjoyed growing the plant, so he is willing to spend a little time on plant care. He also expressed his interest in trying a plant care app if he is interested in a plant.

Interviewee D is an expert on plant growing. She is familiar with the basic plant knowledge and enjoys talking with nursery staff on plant care. She is not using any plant care app right now because she thinks she is capable of taking care of the plants.

Interviewee E is an expert as well. She holds a negative feeling toward the plant care app because she thinks plant problems are complicated due to varied weather conditions. She prefers to talk with local plant experts to seek help.

Once the interviews were completed, a summary was drafted to discuss some key points and possible solutions that could be applied to the design. The summary was then shared with interviewees D and E, who both believed talking to a local expert would be a better way to solve plant caring problems. Interviewee A, B, and C, who are relatively inexperienced in plant-caring, showed their interest in using a plant care app. All of the five interviewees showed a clear plant selection and growing location preference, which suggested that this design should include a plant-finding feature as well as a house environment tracking feature. Moreover, interviewees with less experience in plant caring expressed their willingness to spend time on plant caring but are having trouble finding the proper time and approach to managing plants. The summary also suggested that watering, sunlight care, and plant diseases are the main concerns among interviewees.

Competitive Analysis

Planta is an app for overall plant care. Users can set watering and cleaning reminders, get recommendations for houseplants based on skill level, identify plants, and have plants recommended for different spaces in the home based on available light. The only free features of the app are its plethora of reminders. The design interface of Planta is simple and easy to understand. The functions related to plant care are thoughtful. However, it was noted that this app still has room for improvements: First, the reminder is not changeable. Planta sets a reminder for users according to the lifecycle of a plant and

according to the time when the plant was added to the system; Second, there are lots of long articles that describe how to grow a plant or the key points users need to know about a plant. According to my pre-design interview with the potential users, they are unlikely to spend lots of time reading articles on the plant growing app. Therefore, the current design would only highlight the key points in the message prompt. Lastly, many of the frequently used functions are not for free in Planta. Users even cannot have a free trial to see if they like those functions. A subscription fee is required to get access to those functions.

Gardenia is a gardening app for beginners and experts that provides users with botanic information and gardening tips on thousands of species and facilitates their green tasks with simple and effective digital tools. Gardenia is a gardening organizer for users to grow plants in the garden, apartment, or balcony, including vegetable crops. The app is free for anyone. The homepage of Gardenia is simple and clean and function-oriented but the design is not contemporary enough to attract users like Planta. Although Gardenia is for both beginners and experts, the design of a plant instructions page is not very suitable for people who are new to plants because it only contains a minimum description of a plant's needs, which is hard for beginners to understand. The interface design for the reminder is flexible for users to set a time according to their needs. However, there are eight types of reminders including harvesting, pruning, repotting, sowing, which are overly complicated for inexperienced users. Besides, Gardenia uses graphics to replace almost all the texts. It's clean but it's effective when users know what the images stand for. The biggest takeaway from Gardenia was that necessary text explanation is important for beginning users to know the meaning behind an image or an icon.

Design Goals

The initial design goal is to help people who are interested in growing plants at home but are not familiar with a plant growing to take care of their plants. A common situation for these people is that their plants died in several weeks because the plants are out of water or sunlight. Thus, this app is designed to help these beginning learners to build their confidence and try to nurture their interests in plant growing. After the interviews with potential users, many app design features were changed. First off, any potential users are unwilling to spend too much time on plant growth. They either don't have a strong willingness to devote their private time to plant growing or don't know what to do except water the plant and provide some sunlight care. Besides, two of the interviewees mentioned that they ignored the frequent reminders when they used other apps. In this spirit, the design goal had shifted to focus on simplicity and effectiveness. For example, the care instruction of the app would focus more on the water and sunlight condition of a plant. This app would also design a customizable reminder that could fit into users' available time.

Final Prototype

In the final design prototype, there are several major tasks that users could perform. Firstly, users could search the plant by name via a picture. Secondly, users could update their home environment before adding a plant to the app. The possible environment includes the living room, office, kitchen, etc. Thirdly, a dedicated view of "my plant" in a given environment would be displayed. The system will let the users know if the plant is suitable to grow in that environment.

As suggested in the early findings, the app was designed to include a customizable reminder for individual plants. Plus users could find simple and easy to understand answers to common problems they may meet during plant care. Users can also enter the setting part to set up an account and add their location, commitment level, and skill level in the system.

The following screenshots show the general layout of the system (Figure 11, 12, and 13).

Figure 11: Homepage of the design

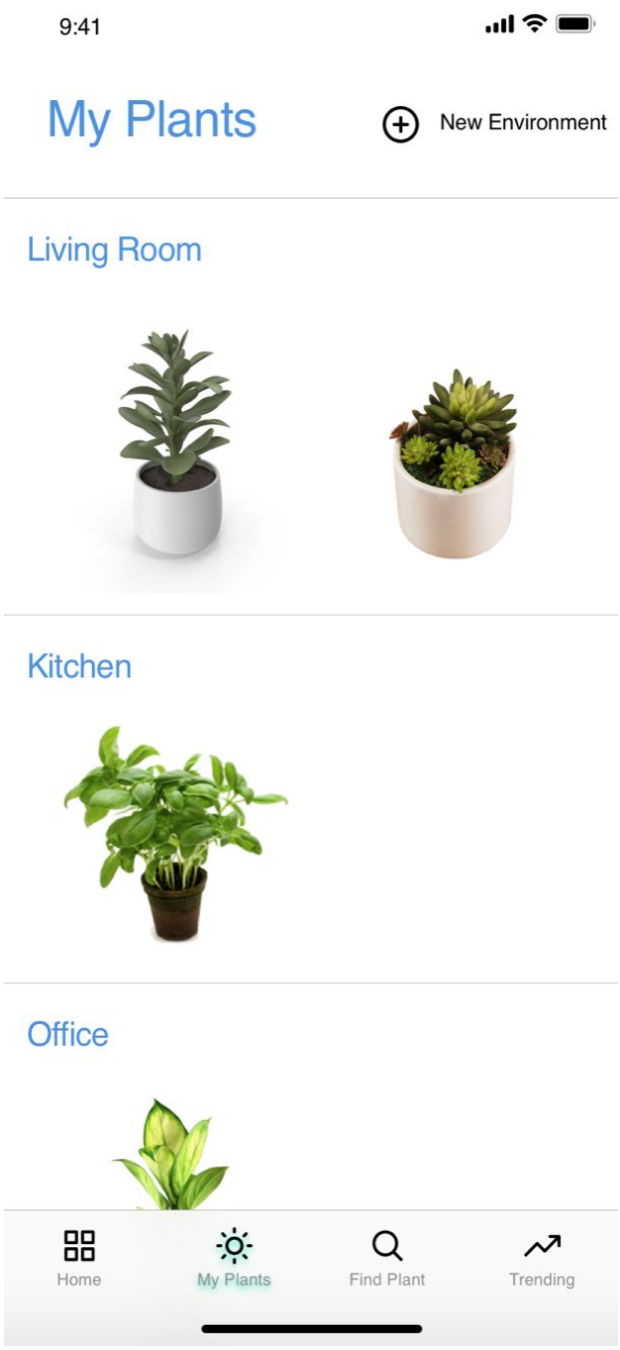


Figure 12: Homepage of the “My Plants” Section

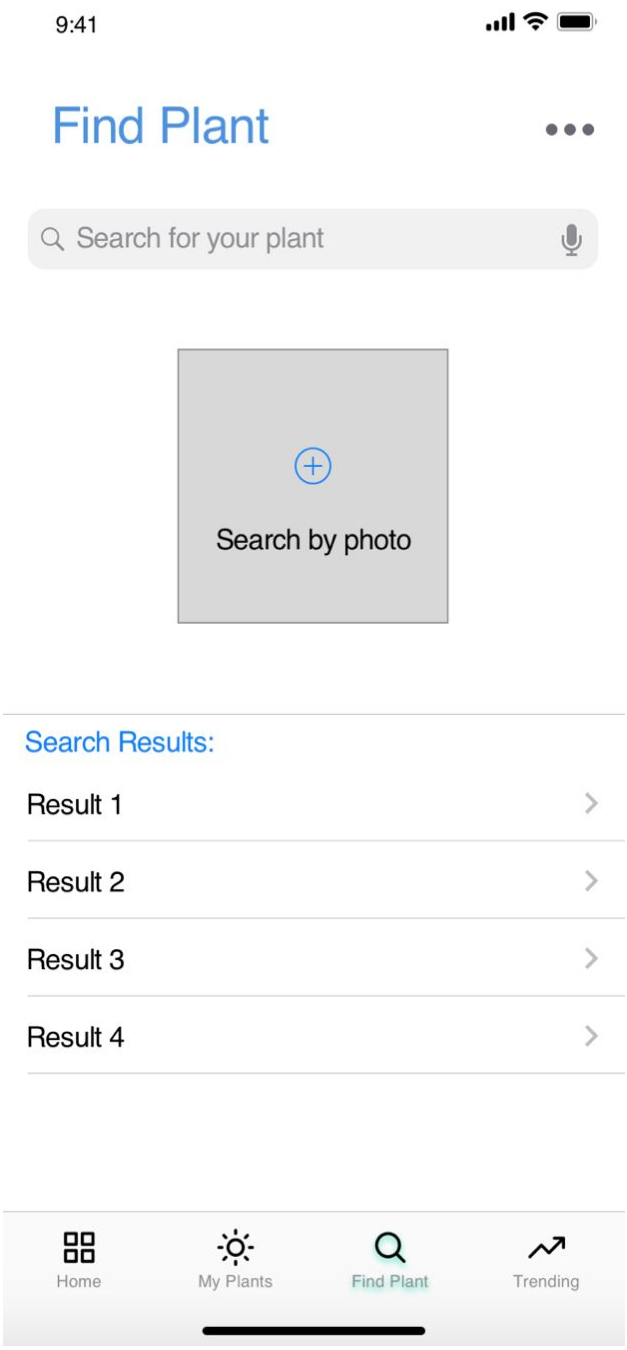


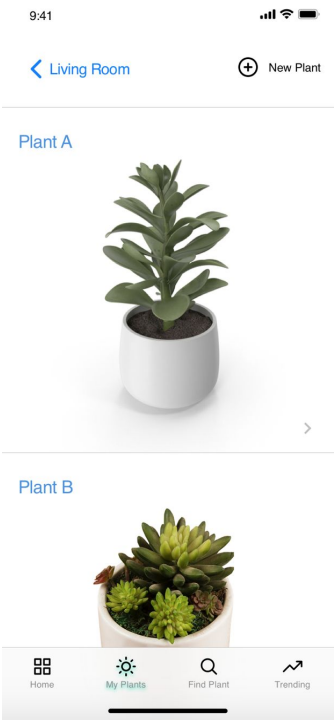
Figure 13: Homepage of the "Find Plants" Section

Task Flow Illustrations:

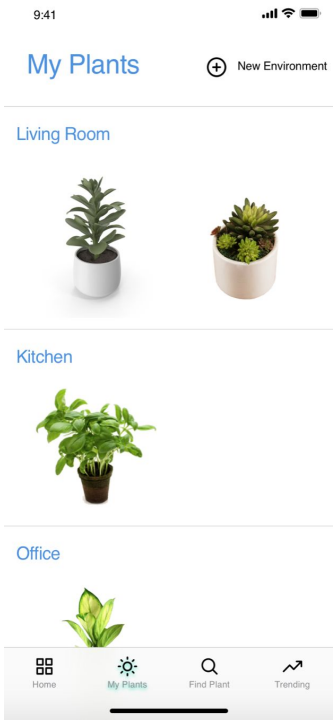
Task Flow 1: The following 7 screenshots show the steps of searching a plant by photo and adding it to the office.

Screenshots Description:

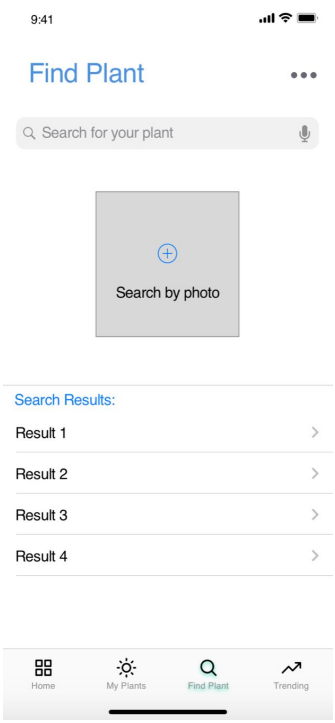
1. Click the “Find Plant” navigation button on the bottom of the home page;
2. Enter the plant finding page;
3. Upload a photo for plant identification;
4. Search results page;
5. Click to enter the detailed plant page with the “Add to your plant” button;
6. Click the button to enter the site selection page;
7. Confirmation page of an added plant



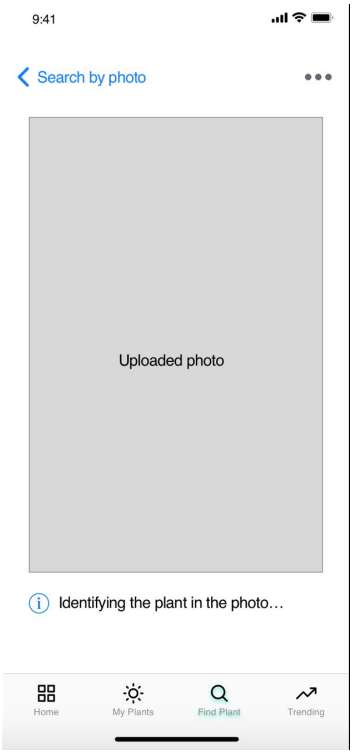
Step1



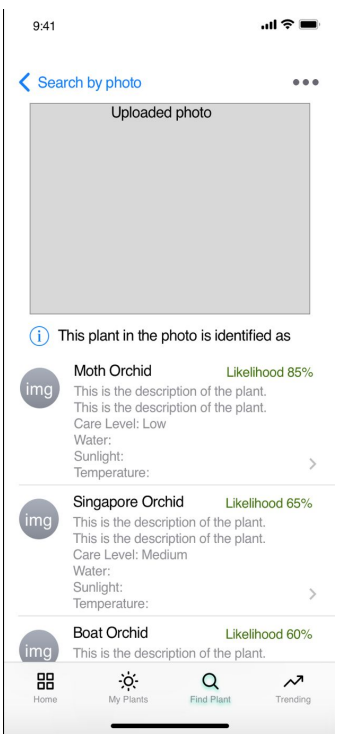
Step2



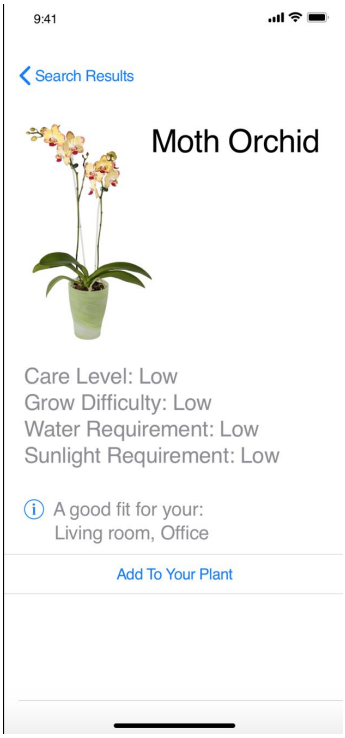
Step3



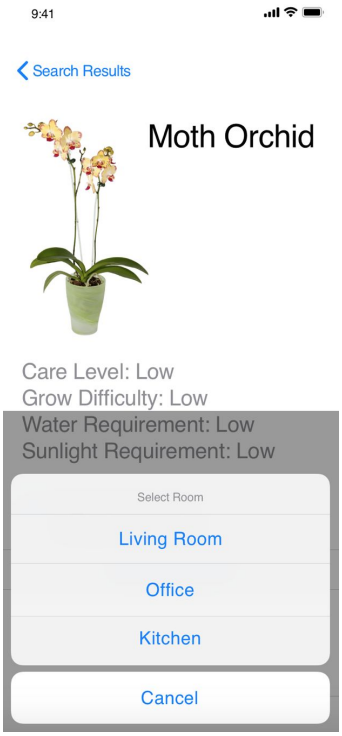
Step4



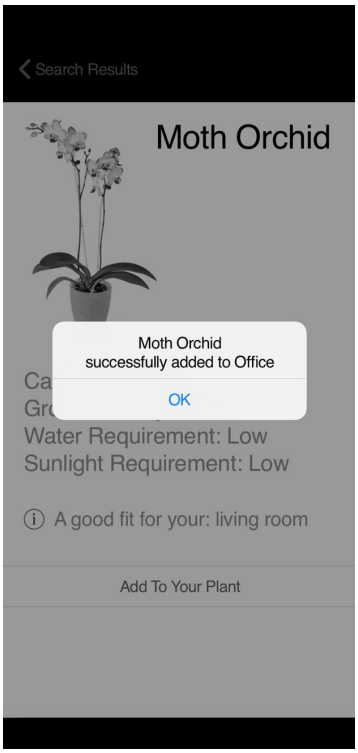
Step5



Step6



Step7



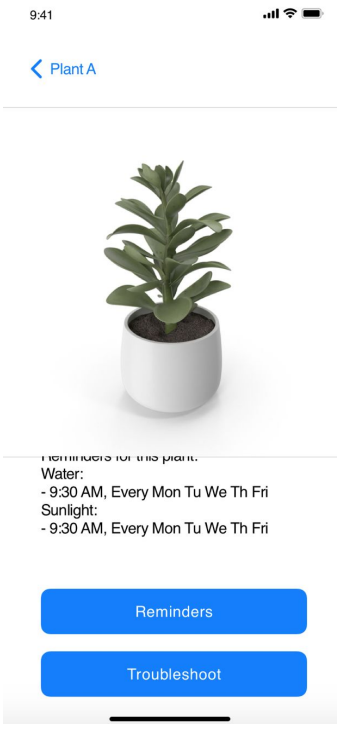
Step8

Task Flow 2: The following 5 screenshots show the steps of adding a new reminder.

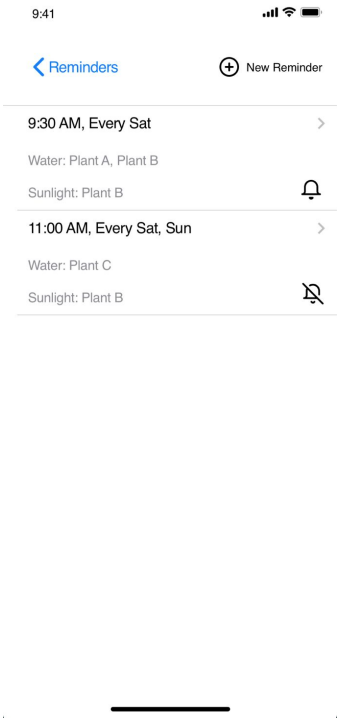
Screenshots Description:

1. Click the image of plant A on the homepage;
2. Click the “Reminders” button;
3. Click the “+ New Reminder” on the top right corner of the page;
4. Users can set a reminder on this page;
5. A new reminder is displayed on the page of reminders.

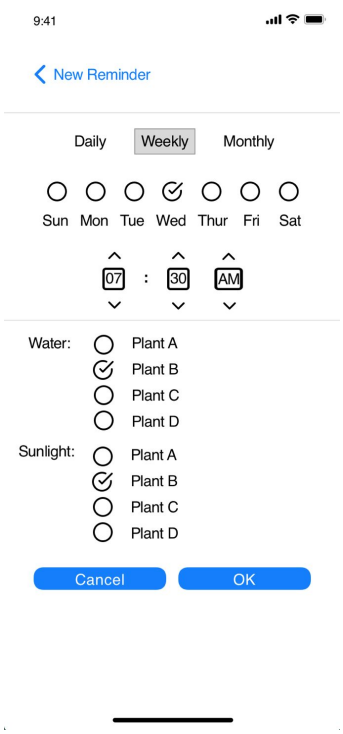
Step 1



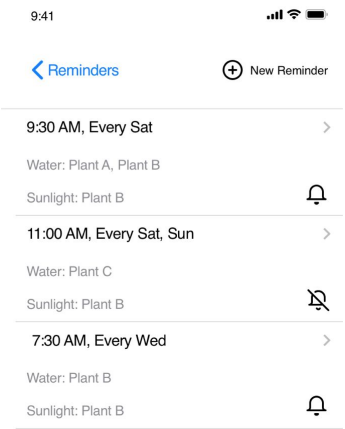
Step 2



Step 3



Step 4



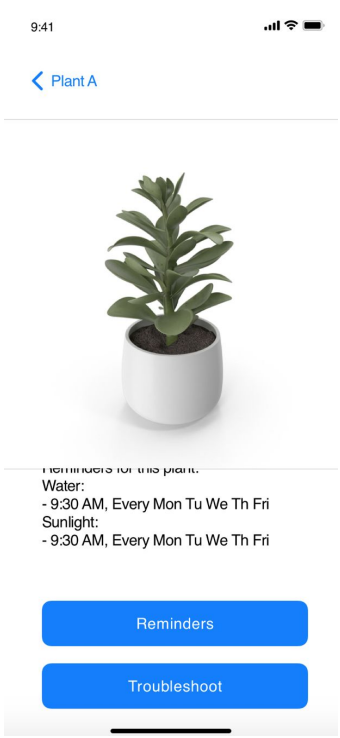
Step 5

Task Flow 3: The following 5 screenshots show the steps of troubleshooting.

Screenshots Description:

1. Click the image of plant A on the homepage;
2. Click the “Troubleshooting” button;
3. Enter symptoms in the search bar or choose from the common problems;
4. Check the possible reasons for the symptom.

Step 1



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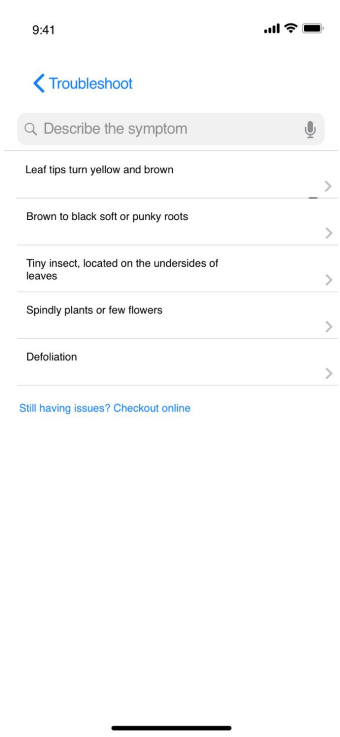
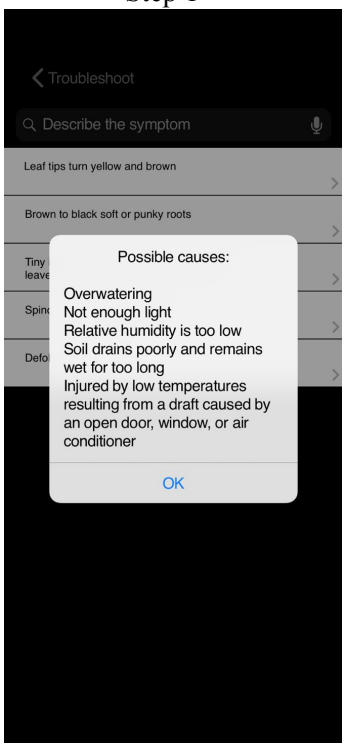


Step 3



Step 4

Final Usability Test

1. Goal of the Test:

The goals for the final usability test are: Understand if users who are new to plants could use the plant app to grow plants at home; Collect feedback from users on the user interface and user experience for further improvement of the design. Test takers from the previous user testing made similar mistakes on two tasks, so the design was revised to allow test-takers to do the same tasks and see if the problems are solved. For example, in the environment setting section. Other than showing new pages for each action, the app switched to use a dropdown menu or a popup window for view promoting.

2. Participants of the Test:

Three participants were invited to the final user test.

The first tester is a single female. She is in her mid-20s and has worked in a company for three years. She lives in an apartment with her boyfriend and is interested in buying plants to decorate her home although she doesn't have any experience in this field.

The second participant is a married female. She is in her early 30s and is self-employed right now. She likes plants and sometimes visits the nursery when she is available. She has some experience in plant growing. She grows around five plants in her home right now. She tried to download a plant app but she deleted it shortly after since she didn't like the app.

The third participant is a married male who has seven years of working experience. He is busy during his daily life but he sometimes purchases plants when he goes to Home Depot. However, he only has limited time on plant care. This participant is the potential user of my design who may have a higher requirement on efficiency.

3. Process of the Final User Test:

The final user test is divided into three parts: pre-test interview, task completion, and post-task questionnaire. The prototype is presented to users in person. Each session is recorded by the designer's phone and analyzed right after the test.

Part I: Pre-test Interview
The goal of the pre-test interview is to characterize the participants' previous experience of growing plants and to characterize the participants' experience with any plant app. Sample questions:

1. Have you grown any plants at home?

2. How often do you buy a new plant?

3. Can you tell me your latest experience of growing a plant?
    a. How much time do you spend on plant growing?
    b. What do you usually use to grow a plant?
    c. How do you solve plant growing problems?
    d. What do you think is most important when you are growing a plant?

3. Have you used any plant app to support your plant growth?

a. Reason why you like or dislike?
b. What are the most frequently used functions in the app?

Part II: Task instructions and success criteria

Note: For success criteria marked with **, the success criteria could change and should be verified/re-established on the day of each test session.

Task 1: This is the first time you open the app. Please share your location with the app and add your commitment level and your skill level.

Success Criteria**: Users find the right place to allow the app to use their locations and share their plant-growing related information with the app.

Task 2: Please create your account including your email and password in the app.

Success Criteria**: a new account has been created.

Task 3: You already have 3 sites in the app: living room, kitchen, and office. You want to create a new site named "Bedroom" in the app. Please select the site's name, temperature, sunlight, and humidity.

Success Criteria**: a new site "Bedroom" is created in the profile.

Task 4: You saw a plant Moth Orchid in a nursery. You want to check if this plant is suitable for your home environment. Please find the Moth Orchid by name and check if it's recommended to you. If yes, please add to your wishlist.

Success Criteria**: Moth Orchid is found in the app and added to "My wishlist".

Task 5: You have added 3 plants to "Your Plants". You only want to water the plants once a week every Saturday morning, so you want to set the reminder to the same date and time so that you can water all the plants at a time.

Success Criteria**: Users add a reminder for one plant and apply it to all of the other plants they're growing.

Part III: Post-questionnaires

For the post-test questionnaire, **a standard SUS questionnaire** is administered in this research. The form should be printed out before each session.

SUS questions:

1. I think that I would like to use this system frequently.
2. I found the system unnecessarily complex.
3. I thought the system was easy to use.
4. I think that I would need the support of a technical person to be able to use this system.
5. I found the various functions in this system were well integrated.
6. I thought there was too much inconsistency in this system.
7. I would imagine that most people would learn to use this system very quickly.
8. I found the system very cumbersome to use.
9. I felt very confident using the system.
10. I needed to learn a lot of things before I could get going with this system.

Debriefing guidelines

The focus of the debrief is to walk through any problems that were encountered during the tasks (question #1). If any time remains afterward, ask higher-level questions 2-5.

1. Review parts of the test where the user struggled: What difficulties did you have on ____? I noticed you struggled with____, can you tell me what happened? You paused here, tell me more about that.

2. Preferences: What did you think of the app? What did you like/dislike? Which parts of this app are most/least important to you?

3. Changes: If you had 3 wishes to make this better for you, what would they be? Why?

4. Understanding: How would you describe this to a friend?

5. Use Cases: Under what circumstances would you use this? Why?

4. Test results:

Participant 1 finished task 1 and task 2 without any problem. But she met a problem when she was doing task 3 which requires her to choose temperature and humidity for the new environment. She thought for a while and chose a temperature range from 65°F-78°F but hesitated for a relatively long time when it came to humidity. She finally chose "Normal" but she said that she didn't know if "Normal" was the right answer. She completed the other 2 tasks quickly and said she loved the reminder setting. Her SUS score is 76.

Participant 2 completed the first two tasks without any problem. When she was doing task 3, she found out it was a little bit strange because the system led her to the home page instead of a page that shows all of the added sites after she finished adding a new site. She has another question in task 4. When she searched results for "Moth Orchid", the page listed several orchids, which is confusing for her. She thought if she searched for "Orchid", the result would show a list of all kinds of orchids but as she searched for a specific orchid type, the result should only show the moth orchid in the list. In the post-test interview part, she suggested canceling the commitment level and skill level option for task 1 because she was told the app was designed for people who are new to plant growth and only have limited time in

taking care of plants. Her SUS score is 78, which means she holds a relatively positive impression of the design.

Participant 3 was the one who used the shortest time to complete all of the tasks. When he finished task 3, he said that there's no place to see all of the environments added. Although users can find the list of the added environments together with plants added to the environment on the home page, he thought it's necessary to let users check all of the added environments. In the post-test interview, he said that he likes the design of the reminder function because it's convenient for him to save time while not forgetting to water his plants regularly. In addition, he mentioned that if it's possible to not ask users to log into an account when they start to use the app because that adds a burden for someone like him. He dislikes apps that ask him to sign in when he is not sure if he really likes or wants to use the app. His SUS score is 80, which is the highest score among the three participants.

Key findings:

Finding 1: Revise the design of the homepage and makes it more useful to access frequently used functions.

Unlike the previous prototype, users can click the image on the homepage to access the plant details in the latest prototype. However, one of the participants mentioned that the homepage looks like the main page of the "My Plant" section.

Recommendation: To make use of the homepage, more functions could be added to it, such as the upcoming task or the next reminder time. Besides, as one participant mentioned the homepage looks similar to the "My Plant" section, I'm thinking about the possibility of using the "My Plant" to replace the homepage, thus making the app more streamlined.

Finding 2: It's difficult for some of the users to fill the room temperature and humidity condition of their homes. Two of the user test-takers hesitated when they were doing the task that requires them to choose temperature and humidity. One participant said that she was trying to recall the AC temperature she set in her home and trying to guess the humidity level.

Recommendation: There might be several ways to solve this problem. For the temperature, A survey can be used to find out the widely used home temperature range people may set in their homes and preset it in in the app. Besides, the app can generate an estimation according to the weather of the location where the user lives. Users only need to share location, the app will get the general weather status in that area. For the humidity, preset the humidity to normal or add instructions to help users to know the humidity condition at their homes.

Finding 3: Users have to repeatedly set reminders for every plant. In the previous design, users need to go to the page of each plant to set a reminder. If they want to set the same reminders for several plants, they need to repeat the action for every plant.

Recommendation: Add a multi-choice plant selection under the previous reminder setting for users to set reminders for more than one plant at a time. This might be a good way to solve the problem mentioned by users. By doing so, users only need to choose which plants to add the same reminder without going to

different plant pages to finish the setting. The new design of the selection has been added in the previous illustration of the task flow 2.

Finding 4: The system didn't include a deletion button for the reminders. The reminder setting is customizable but one test-takers mentioned that there's no delete button if a user wants to delete a reminder.

Recommendation: First, add a "Delete the reminder" button for each reminder. Users can press the reminder bar and drag to the left and the deletion option will be displayed. Second, as mentioned in finding 3 that a multi-choice plant selection can be added to the reminder setting. A reminder will be automatically deleted if all of the plant options are removed in the multi-choice reminder setting.

Next steps

1. Add more pictures to explain the care instructions for plants. In the user needs finding phase, some interviewees who have tried other plant apps mentioned that they didn't want to read long articles in a plant app. More graphics can be used to help users understand how to take care of a plant. However, this part was ignored in previous prototypes. In the next iteration, More photos will be used with brief text explanations to improve simplicity and usability.

2. Add prompt to reminder setting. Although some of the test takers like the present reminder function for its customizability, it remains necessary to remind users when they're trying to set one reminder for all plants that some of them may have different water requirements.

3. Find a way to help users choose the temperature and humidity. These two factors are very crucial for the app to do recommendations or measure if the indoor environment is suitable for an added plant. However, not everyone knows the temperature and humidity in their homes and don't know how to guess a general range. So, it's important to find a way to help those people out. It can be an instruction to ask users to check the display screen of their air conditioner, or an explanation to help them understand the humidity condition.

Appendix:

1. Personas:

Persona 1

Georgina
Age: 23
Occupation: Marketing Executive
Location: Charlotte, NC
Life stage: single

Motivators:

- Like to decorate her home with plants.
- Dislike faux plants.

Constraints:

- She lives far away from her company so she spends most of her day outside. Thus, she doesn't have too much energy to take care of her plants.
- She is pretty busy so she will only spend very limited time on plant growth.

Persona 2

Maggie
Age: 32
Occupation: Assistant Project Manager
Location: Houston, TX
Life stage: married, no kids

Motivators:

- Just moved to a new house with her husband. So, she needs air-purifying green plants to bring vitality to her home.
- Doesn't have too much plant knowledge but willing to learn.
- Used to grow some plants but they all ended up wilted.

Constraints:

- Likes to buy different types of plants but doesn't want to spend too much time on a single type of plant.
- May be easily giving up because she may probably buy a new plant to replace the dead one.

2. Scenarios:

Scenario 1: Georgina bought her first foliage plant last week. She checked the tag attached to the plant and found out this plant needs to be watered regularly and needs moderate sunshine. She didn't know if she could take good care of this plant but she really loves it. So, she still bought it and placed it at the entrance of her apartment. In the evening of that day, she browsed the app store on her phone and found an app claimed to help people grow potted plants. She installed that app to give it a try. She input some required information and set a plant-growing reminder on the app. Three days later, she got her first push notification from the app before she went to work. She watered the plant and placed it on the balcony to make sure the plant could get some sunlight. Then, she left her apartment after that.

Scenario 2: It's a sunny Sunday morning. Maggie and her husband just finished their brunch in a nearby restaurant. They sat in the backyard of the restaurant which connects to the nursery next door. Some guests were choosing plants in that green world and some kids were playing around. Maggie asked her husband to take a look in the nursery because she wants to buy some plants to purify the air in the new house. They went over there and Maggie decided to buy several plants including succulent and foliage plants. But her husband reminded her that she was really bad at growing plants according to her previous experience. He was not sure how long these lovely plants could live this time. Maggie hesitated. She was hoping to have an expert on her side to teach her some basic plant knowledge and remind her to water plants regularly.

[Reference]

1. Mavoa, S., Davern, M., Breed, M., & Hahs, A. (2019). *Higher levels of greenness and biodiversity associate with greater subjective wellbeing in adults living in Melbourne, Australia.* Health & Place, 57, 321–329. https://doi.org/10.1016/j.healthplace.2019.05.006