

INFO 5440 App Design & Prototyping

# **Final Submission**

Team Hot Pot (H.P.)

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# Table of Contents

## Phase 1: Exploration & Planning

<b>Our User</b>	4
<b>User Research</b>	5
<b>Product Research</b>	6
<b>Our Value Proposition</b>	8
<b>Our Persona</b>	9
<b>User Scenarios</b>	11
<b>Gardening Journal Project Themes</b>	15

## Phase 2: Design

<b>Brainstorming</b>	17
<b>Sketches</b>	20
<b>Final Design Sketch</b>	21
Mobile Version	21
Desktop Version	24
<b>Design Rationale</b>	27
User Goals Achieved	27
Visual Design Rationale	27

## Phase 3: High-Fidelity Prototype

<b>Implementation</b>	32
Data	32
Library	35
Router	38
Features	41
Advanced Feature	52

## Phase 4: Publish

<b>App Icon</b>	54
<b>Install Our App</b>	55
Appendix 1: Product Research Affinity Diagram Details	56

# **Phase 1: Exploration & Planning**

## Our User

**Family:** Our app targets families with children under 15 years old, who have a small garden at home, either indoor or outdoor. They have basic gardening experience, hoping to expand their gardening knowledge and improve their skills. They enjoy gardening since they can grow and eat organic, fresh vegetables. While they sometimes find it challenging to manage the heavy workloads from gardening, given their busy schedules.

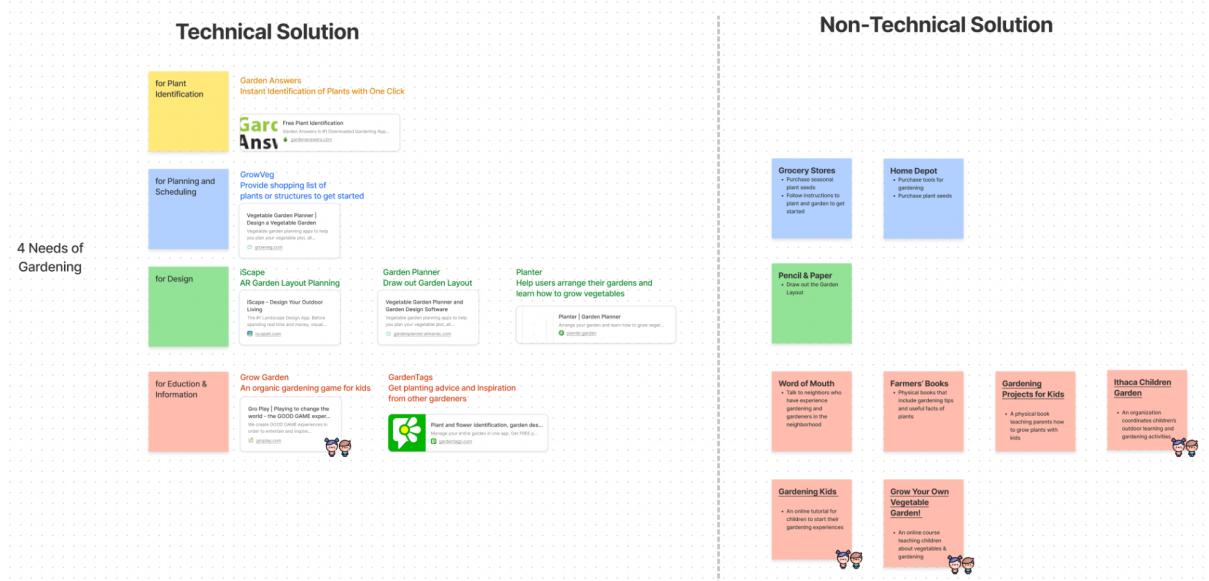
Their kids spend hours on their phones, tablets, and laptops every week. They are concerned that their kids spend too much time on digital devices and don't get enough outdoor activities. They try to engage their kids in the gardening process to enhance family interaction, teach kids how to grow their food, and spark kids' exploratory spirits.

# User Research

In total, we conducted **15 interviews** with **14 different users**. Our user research was done in two rounds: the first-round exploratory and the second-round informative interviews. All of our interview notes and findings can be found in the document, [\*planning-report.pdf\*](#).

# Product Research

After the user research, we did product research based on resources mentioned in interviews, which helped them gain gardening knowledge. We attempted to explore the current gardening market and find out potential market gaps.



We used an affinity diagram to record and organize our research results. To view the detailed version of the diagram, please refer to *Appendix 1*.

## Current Market

Based on our product research, we can divide the current technical solution for gardening into **4 different categories**:

1. Solution for plant identification
2. Solution for planning and scheduling
3. Solution for garden design
4. Solution for education and information

Within these four categories, the solutions for **education and information** have the **most non-technical designs** in the market. The solutions for **garden design** have the **most technical designs** in the market. We learned from the initial product research that current gardening solutions are mostly for adults. As a result, we shifted our research focus to gardening-related

designs for children and found out that most of them are games where children can create their virtual gardens.

## Gap & Potential Area

**The Gap** - We couldn't find any garden solutions to facilitate children's learning in actual gardening. Moreover, we couldn't find any solutions that support interaction between parents and their children in the area of gardening.

**Potential Area** - We learned from the user research that parents want their children to engage in gardening to help their children learn more about nature, gain hands-on experience in gardening, and develop problem-solving skills. Luckily, this is an area where we haven't seen any related solutions. Therefore, we believe that a solution focusing on creating an interactive learning experience for parents and children and facilitating hands-on gardening learning can provide a unique value proposition for our target users.

Moreover, as we're going to design an app for parents and children, and there are abundant technical solutions for the garden design and plan phase, we decided to shift our focus to a gardening journal tracking our target users' entire gardening projects.

# Our Value Proposition

**Product Concept:** Our team attempts to create a **gardening journal** for families with children who have a garden at home with basic gardening knowledge to create interactive family learning experiences that support nature engagement for every family member.

Compared to the existing solutions, our product provides:

1. Free access to the basic information and gardening instructions of various playful plants
2. An online journal to keep track of the family's gardening progress and the growth of plants
3. Interactive family journaling platform to promote parent-child relationship
4. Easy and approachable operations that allow a more organized and streamlined gardening process

# Our Persona

## Background



Emma is a 38-year-old college professor. Her husband, Richard, is a 40-year-old manager at a large finance company, who is often really busy and usually comes home after 8 pm. They have a 9-year-old son, Lucas, and now they live together in a house in a quiet suburb area with an outdoor garden. When they moved into the house around two years ago, it was during the quarantine time, so Emma started to work from home and utilized her leisure time gardening next to their new house.

She was almost new to gardening, so she spent a lot of time gaining gardening knowledge from her grandmother by the phone and some online YouTube videos. In the first year, she started with some easy-to-grow plants her grandmother recommended for beginners, such as tomatoes, spinach, and zucchinis. In the late autumn of the same year, she got a good harvest for a beginner and gave the end products away to her neighbors as gifts. From that moment on, it deeply inspired her further interests and motivations into gardening. Now, the garden is filled with tomatoes, green onions, cucumbers, spinach, and cabbages. Since Emma loves flowers, she recently planted some lilies.

## Goals

Emma's long-term goal is to pursue work and life balance: chasing her career goal in college while spending quality time with her family. Primarily, she wants to raise and educate her son, Lucas, to grow up with health, happiness, and some good qualities, such as a sense of curiosity, responsibility, and hands-on practical ability and capacity. However, since Richard and herself have both been in their career upward rising periods for several years, in the past, Emma often had to send little Lucas to his grandma's place to be watched over. Recently, she has noticed their deficiency as parents in spending quality time with Lucas in his critical years of growth from childhood to teenager. Lucas sometimes started to lose interest in sharing fun stories that

happened in school with them. He spent over 3 hours on electronic products playing video games every day, which Emma believes is very harmful to his health and damages the family bond. Therefore, Emma's short-term goal is to encourage Lucas to leave his video games in the closet, spend more quality time with the family members outdoors to embrace the sunshine and fresh air in nature, and rebuild the family connection and affection to improve his mental health. She believes inviting Lucas to join her in gardening and teaching him some basic skills to help take care of plants could be a good way to achieve her goal.

## Behaviors

This spring, at the garden planning stage, Emma brought Lucas to the local farmer's store and let him look at different seeds in the big displays. She chose a section and allowed Lucas to pick his top 3 favorite vegetables: cucumbers, cabbages, and green onions. She also bought him a set of kids' gardening tools that fit his size, brought home the plants he picked, and told Lucas that he is the house's little gardener and needs to be in charge of the garden with mom's help. Lucas was excited when getting the seeds home and starting to learn. Still, later, he seemed to lose interest in pulling out weeds and digging and became impatient waiting in the plants' growing process without seeing any results in a short time. One day, he surprisingly found the plants growing taller and asked Emma and Richard to look at the plants he helped take care of. They all felt so happy for him to learn that: a little hard work can pay off afterward. They suddenly regretted forgetting to record each of the moments Lucas spent on gardening and track how the plants grow up, starting from a bit of seed because they believe what Lucas learned in the process is way more important than the final result. Also, as Lucas started gaining interest in gardening, he showed excitement for trying some new and uncommon plants. Emma told him that if he could well complete his duty as the little gardener for the first year, he would be allowed to pick some playful plants to grow in the future. Therefore, Emma and Lucas started to look for more knowledge of various plant categories.

# User Scenarios

Emma is a 38-year-old college professor. Her husband, Richard, is a 40-year-old manager at a large finance company, who is often really busy and usually comes home at 8 pm. They have a 9-year-old son, Lucas, and live in a house with an outdoor garden. When they moved into the house two years ago, Emma started gardening to let his son play in the field and have fresh vegetables. The garden is now filled with tomatoes, green onions, cucumbers, spinach, and cabbages. Since Emma loves flowers, she recently planted some lilies. While taking care of those plants, Emma usually asks Lucas to help by teaching him some basic skills, such as watering, digging, etc.

## Scenario 1: Browse and Learn about Plants

*Value proposition: Free access to the basic information about various playful plants*

During the weekends, Emma wants to relax and have quality family time with Lucas by starting to plan for their garden in early March. Emma asks Lucas to browse information about different potential plants they can have in their garden. Inside the app, there is a Plant page specifically about learning and education regarding plants. It includes a list of playful plants for a wide variety of use, such as plants that are edible, visually appealing, nature attracting, colorful, etc. Emma can quickly scroll through the list and see all the plants with images, plant names, and tags of main characteristics.

Emma wants to plant something easier to grow and survive in her backyard garden. She also hopes the plants can be edible for the family because that would benefit everyone's health to eat more greens. To encourage Lucas to participate more actively in the planning and gardening process, Emma asks Lucas to find a plant that is suitable for the family to plant and is edible at the same time.

Lucas uses the filter function and chooses the tag of "edible." After applying the filter, the page automatically refreshes and shows several plants with the tag of "edible." Lucas clicks on the first one that shows up, which is the "autumn brilliance serviceberry," because he thinks the picture of the plant is very appealing. After clicking on the plant's card, it leads to the plant detail

page with more information. He learns that autumn brilliance serviceberry is not only edible but also colorful, nature-attracting, and medicinal. The page includes a brief description of the plant and the gardening instructions. While reading, Lucas shares the knowledge with Emma and moves on to exploring more plants. The free access to numerous plants allows Emma's family to engage in learning about the natural world and better prepare them for the upcoming gardening season.

## Scenario 2: View Previous Journals

*Value proposition: An online journal to keep track of the family's gardening progress and the growth of plants*

To monitor the plant's growth, Emma's family has a habit: they record the planting process every day. Emma would take pictures of the garden and Lucas doing gardening work and upload them on the app. And Lucas would take photos of the plants and enter some texts to describe his observations in the journal. Sometimes Emma and Lucas would also read over their past journal entries to see their progress throughout the journey. This journal is a shared journal that everyone in the family can write and read, and it helps the family share their learnings and experiences during the planting process.

Today, Lucas is bored and wonders how much he has grown in the past year. Thus he wants to check what he wrote last year. He opens the Journal page and scrolls through many journal entries. Then, he uses the date pickers on the top of the page to choose the range of time. Because he wants to reminisce about what happened last March and April, he selects the start date as "March 1st, 2021" and the end date as "April 30th, 2021." After applying the time range, two journals show up. Lucas clicks on the first one, "Ready for the Garden Project," which redirects him to the Journal detail page. He reads through the journal and feels very accomplished by what his family has done throughout the year, and he also realizes how much he has grown from last year.

The journal serves as an excellent tool for the family to document their gardening experience, learning, and growth of plants over time. And it is always really satisfying to reminisce about the past and see how much they have learned along the way.

### **Scenario 3: Create a New Journal of Kid's Gardening Experience**

*Value proposition: Interactive family journaling platform to promote parent-child relationship*

To keep track of Lucas's growth and progress in gardening experience and preserve precious memories, Emma uses the gardening app to keep a journal. After completing daily tasks, Emma walks to the outdoor garden and finds her son watering the flowers and vegetables. Although Lucas is slightly clumsy, he works hard. Emma wants to record the moment she can share with Lucas when he grows up.

She starts a new journal on the app. She writes the journal-title to be "Lucas waters flowers and vegetables today" and selects the creator's name to be herself, Emma. This way, all family members can distinguish the creators of each journal easier. Then, she writes down several sentences of feelings about her son's progress and achievements. Last but not least, Emma wants to capture Lucas by opening the camera and taking a picture of Lucas working in the garden. After Emma completes all the required information for this journal entry, she saves the journal, uploads it to the server, and joins Lucas to have fun in the garden. This journaling activity really makes it an interactive gardening experience for the entire family.

Also, Emma sometimes browses previous journals and recalls those experiences. What significant progress her son made! Emma feels so proud of Lucas. Emma can quickly delete incomplete journal entries by using the trash feature when encountering incomplete journal entries.

### **Scenario 4: Create a Gardening To-Do List for Kids**

*Value proposition: Easy and approachable operations that allow a more organized and streamlined gardening process.*

At 5:00 pm on Monday, Emma just picked up Lucas from school. She has a hectic schedule tonight since her students requested a last-minute online meeting with her at 6:00 pm. After the meeting, she needs to start cooking to make sure that they can have dinner at 8:00 pm. Suddenly, she realizes that she didn't water the garden this morning. It will rain tomorrow, so she needs to cover the plants with plastic wrap. Moreover, she needs to grab some tomatoes and spinach from

the garden for dinner. However, she won't have time to take care of the garden tonight. She really hopes for someone to help.

When Emma and Lucas arrive home at 5:45 pm, Emma suddenly recalls that there may be a to-do list feature on the Playful Plants gardening app. She thinks it is good to ask Lucas to help with gardening since he has finished his schoolwork today. Emma opens the gardening app on her phone, taps the "Journal" button on the bottom navigation bar, and starts a new journal entry. Then, she sees a "to-do list" icon. Emma clicks the icon and finds an empty to-do list appearing on the screen. She quickly enters the tasks of watering the garden, picking tomatoes and spinach, and covering plants with plastic wrap. After saving and posting the journal, she calls on Lucas to check the journal and finish the to-do list.

Lucas opens the app on his phone, finds today's journal posted by Emma, and reads the to-do list. Then, he goes to the garden and starts working. At 6:30 pm, Emma finishes her meeting. She rushes to the garden, sees tomatoes and spinach are on the table, and watches her son trying to cover the plants with plastic wrap. She feels so proud of her son and comes close to helping Lucas finish the last task. After Lucas finishes the task, he reopens the journal and checks all the boxes for the accomplished to-dos, which marks the end of gardening for the day!

# Gardening Journal Project Themes

- ***Adaptability:*** The high-fidelity prototype of the app will be fully responsive on mobile, tablet, and desktop devices.
- ***Usability:*** Design the application with simple interactions and user flow using large, touchable targets. The app will have a playful but simple aesthetic, suitable for children and parents to use. The language used should be easy to understand from children's perspectives.
- ***Content:*** The app will display a list of plants from the Playful Plants database and instructions and tips for growing each plant. The app will allow users to input journal entries with both texts and pictures to document their gardening experience and progress.
- ***Interaction:*** The app will enhance an interactive user experience that connects parents to children, taking full advantage of the wireless capabilities and location awareness.
- ***Visibility:*** The app will display an image-based catalog that provides users with visual understanding of plants and brief textual descriptions.

## **Phase 2: Design**

# Brainstorming

Before our team started designing our product, we held a brainstorming session to explore potential solutions and ideas on **how to enhance the interactive family learning experience via a gardening journal app**. The brainstorming session was divided into 2 phases: the Individual Brainstorming Phase and Group Discussion Phase.

## Phase 1: Individual Brainstorming

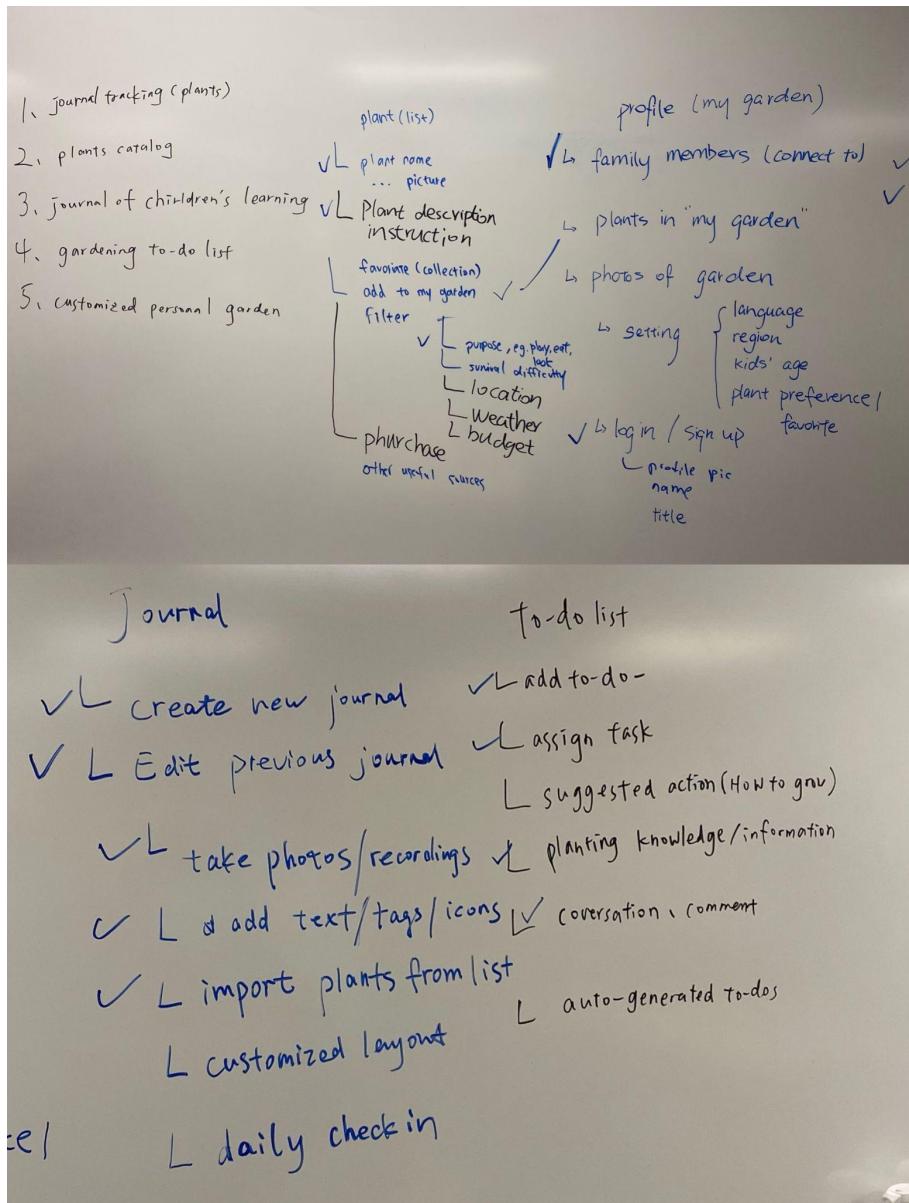


Image 1: Whiteboard Brainstorming

We started by generating a list of **5 potential features** implemented in our design based on **user scenarios** that we created in the planning phase. Then, we moved to the ideation process.

Everyone picked a marker and wrote as many ideas on the whiteboard as possible in 15 minutes. Throughout the process, we followed the “**No-Negative**” principle that no one should judge or criticize any idea, ensuring a thorough exploration of the solution space. We quickly gained a long list of ideas, as shown in *Image 1*.

## Phase 2: Group Discussion

When the individual brainstorming session ended, we gathered to discuss and evaluate each idea on the whiteboard. The following questions guided our evaluation:

- Which user goal(s) does the idea fulfill?
- Is the user goal primary or minor?
- Does the idea fall within the scope of any project themes?
- Is the idea necessary for delivering the MVP?
- Is the idea feasible to be implemented based on available resources, which include time availability, our technical ability, and etc.?

While reviewing each idea, we put a **checkmark** (as shown in Image 1) besides feasible and necessary ideas that would fulfill primary user goals, fall within the scope of our project themes, and help us create an MVP.

We **iterated** the above review and evaluation process twice to **prevent intuitive decisions** and finally came up with our **final design idealist**:

### ➤ Plant Catalog:

- Photo Grid
  - Plant Name
  - Tag
- Plant Detail Page
  - Plant Description
  - Gardening Instruction
- Filter
  - Purpose

**> Journal:**

- Create New Journal
  - Take photos / recordings
  - Text entry
  - Create to-do list
  - Customize layout
  - Import plants from plant catalog
- Edit Previous Journal
- Sort by Date

**> Profile:**

- Family Photo Grid
- Family Member
  - Name
  - Relationship
  - Photo
- Family Location
- Login / Signup

## Sketches

Based on the design idealist from the brainstorming session, we started sketching out user interfaces for our app in both mobile and desktop frames on the whiteboard. We iterated the sketching process at least three times for each interface to generate more ideas. All of our design sketches are available in the file, [design-report.pdf](#).

# Final Design Sketch

Our group's final design sketches for the mobile and desktop version of the Playful Plants App are shown below, which covered three main features of our app: ***Plant Catalog***, ***Journal***, and ***Profile***.

## Mobile Version

### *Plant Catalog*

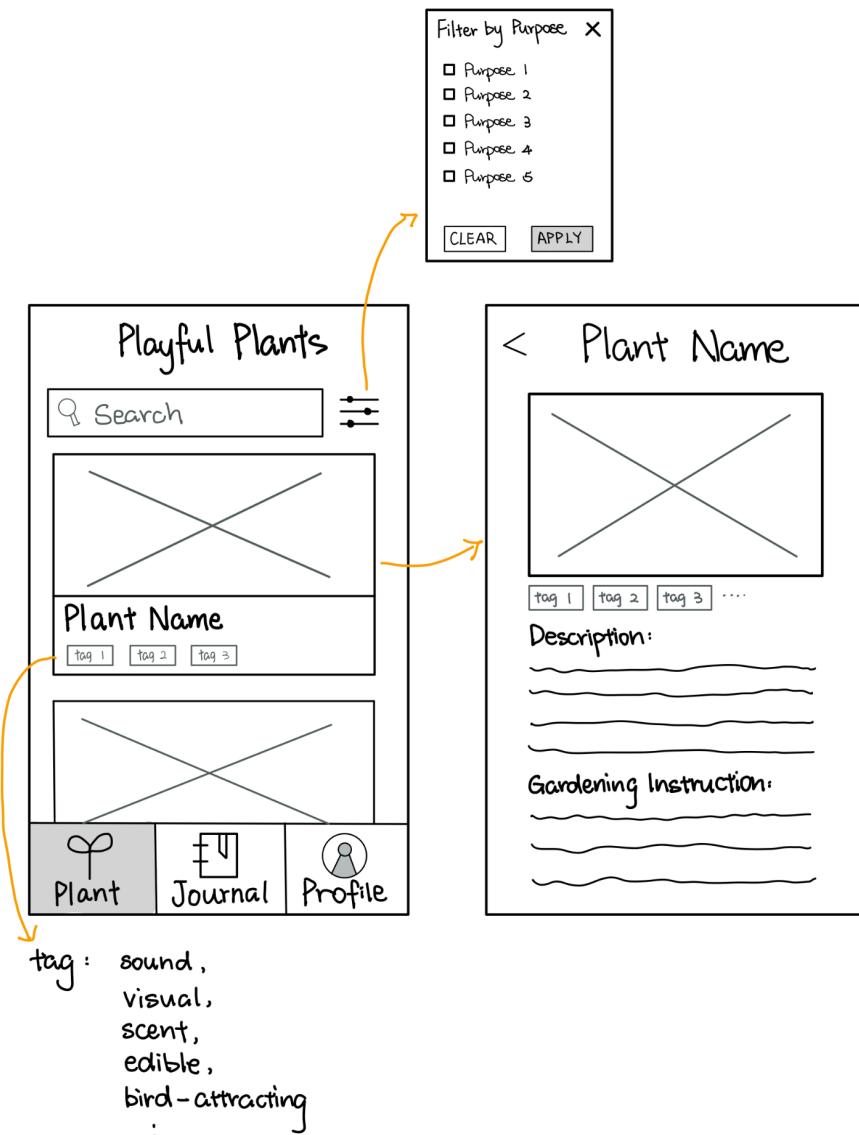


Image 1: *Plant Catalog Page & Plant Detail Page*

## Journal

**Your Journal**

Today is April 10, 2022

**Journal Title**

Created by \_\_\_\_\_ on MM/DD/YYYY

**To-Do List**

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**EDIT**

**POST**

**Journal Title:**

**Creator:**

**Journal Entry:**

**To-Do List:**

\_\_\_\_\_  
 \_\_\_\_\_

**PHOTO**

Image 2: Journal Overview Page, Journal Detail Page, and New Journal Page

## *Profile*

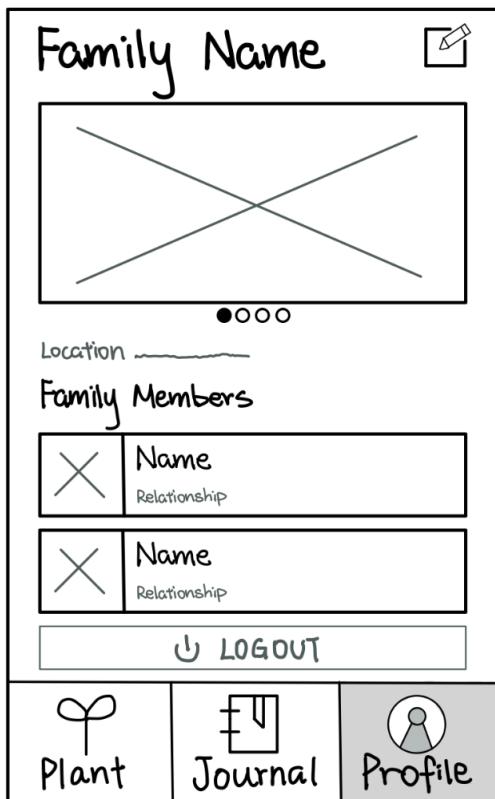
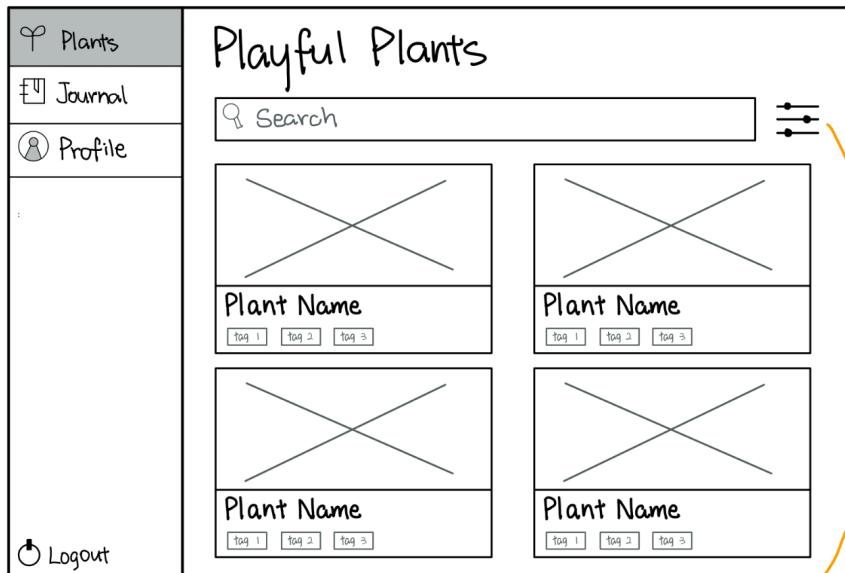


Image 3: *Profile* Page

## Desktop Version

### Plant Catalog



**Filter by Purpose**

<input type="checkbox"/> Purpose 1	<input type="checkbox"/> Purpose 4
<input type="checkbox"/> Purpose 2	<input type="checkbox"/> Purpose 5
<input type="checkbox"/> Purpose 3	<input type="checkbox"/> Purpose 6

**CLEAR** **APPLY**

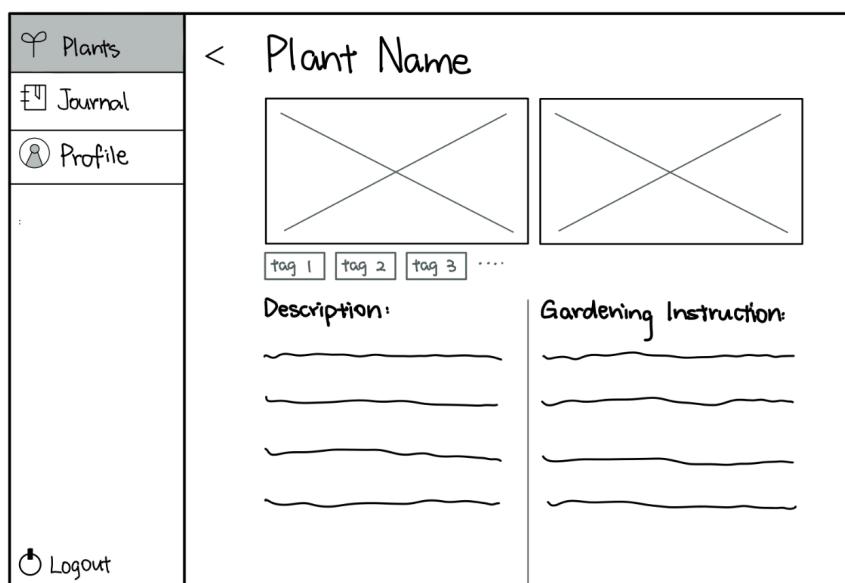
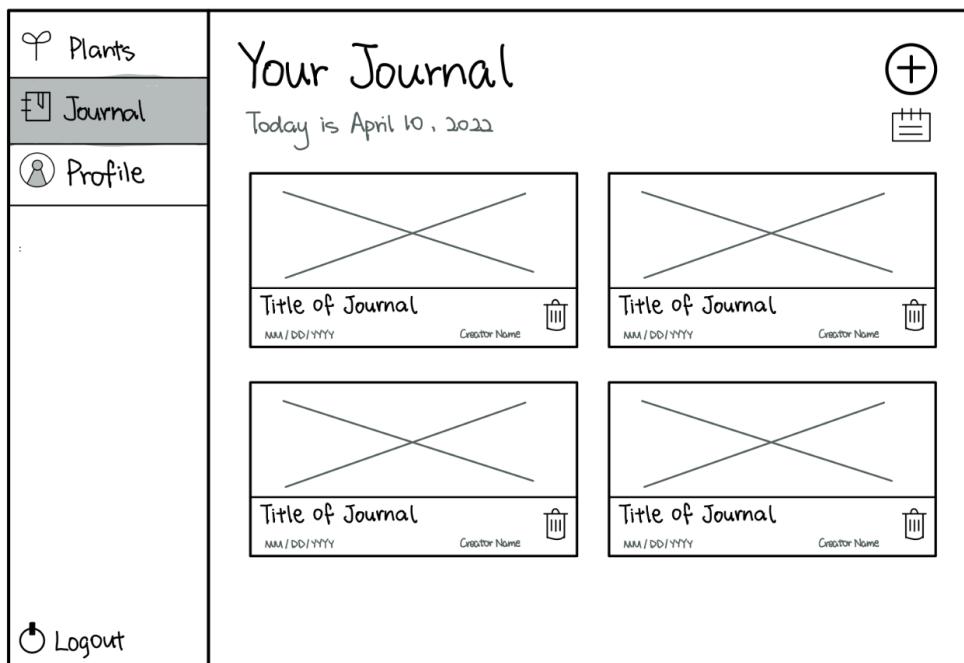
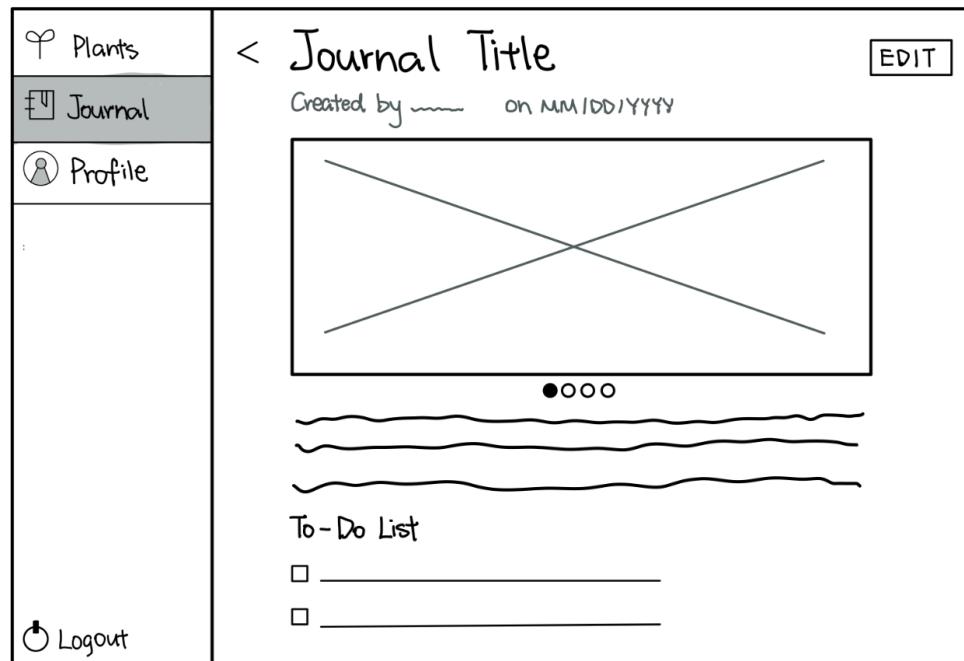


Image 4: *Plant Catalog Page and Plant Detail Page*

## Journal



The wireframe shows the main interface of the 'Journal' application. On the left is a vertical sidebar with three items: 'Plants' (with a leaf icon), 'Journal' (selected, indicated by a grey background), and 'Profile' (with a user icon). Below these are two empty slots followed by a 'Logout' button. The main content area is titled 'Your Journal' and displays the message 'Today is April 10, 2022'. It contains four journal entries, each with a large 'X' over it. Each entry has fields for 'Title of Journal' (with placeholder 'MM/DD/YYYY'), 'Creator Name', and a trash can icon. In the top right corner, there are two icons: a plus sign inside a circle and a calendar.



The wireframe shows the 'Journal Detail Page'. The sidebar remains the same. The main area starts with a back arrow and the title 'Journal Title'. Below the title is a 'Created by \_\_\_\_\_ on MM/DD/YYYY' field. A large rectangular box contains a large 'X'. Below this are three wavy horizontal lines with a small circle at the end of the first line. Underneath is a 'To-Do List' section with two empty input fields. In the top right corner of the main area is an 'EDIT' button.

Image 5: Journal Overview Page and Journal Detail Page

A wireframe of a web page for creating a new journal entry. The left sidebar contains links for Plants, Journal (which is selected and highlighted in grey), and Profile. The main area has a back arrow (<), a date input field (MM/DD/YYYY), and a POST button. It includes fields for Journal Title, Creator (with a dropdown menu), Journal Entry (text area), To-Do List (text area with a plus sign and two empty checkboxes), and a PHOTO button.

<input type="button" value="Plants"/>	MM/DD/YYYY	<input type="button" value="POST"/>
<input type="button" value="Journal"/>	Journal Title:	
<input type="button" value="Profile"/>	Creator:	<input type="button" value="▼"/>
:	Journal Entry:	
<input type="button" value="Logout"/>	To-Do List:	<input type="button" value="+"/>
	<input type="checkbox"/> _____	
	<input type="checkbox"/> _____	
	<input type="button" value="PHOTO"/>	

Image 6: New Journal Page

## Profile

A wireframe of a profile page. The left sidebar contains links for Plants, Journal, and Profile (selected). The main area shows a placeholder for a photo with a large X over it, a location input field (●○○○), and a section for Family Members. Each family member is represented by a row with an icon, name, and relationship status.

<input type="button" value="Plants"/>	Family Name										
<input type="button" value="Journal"/>	<input type="button" value="Edit"/>										
<input type="button" value="Profile"/>											
:											
<input type="button" value="Logout"/>	<input type="checkbox"/> _____ <b>Location:</b> ●○○○ <b>Family Members</b> <table border="1"> <tr> <td>X</td> <td>Name Relationship</td> <td>X</td> <td>Name Relationship</td> </tr> <tr> <td>X</td> <td>Name Relationship</td> <td>X</td> <td>Name Relationship</td> </tr> </table>			X	Name Relationship	X	Name Relationship	X	Name Relationship	X	Name Relationship
X	Name Relationship	X	Name Relationship								
X	Name Relationship	X	Name Relationship								

Image 7: Profile Page

# Design Rationale

## User Goals Achieved

Throughout the designing process, we recall the goals of our persona, Emma, and try to fulfill most of her goals via our design features. Our design has three main functions: (1) displaying plant catalog, (2) recording gardening experience, and (3) showing family profiles. Each of these functions is designed to meet one or more of Emma's goals.

The ***Plant Page*** allows Emma and her son, Lucas, to explore a list of playful plants. They can learn gardening and plant knowledge together. Throughout the process, Emma can achieve her goals of inspiring Lucas' curiosity and rebuilding family connections. The ***Journal Page*** allows Emma and Lucas to track their gardening progress, and the to-do list feature encourages them to share the gardening responsibilities. Emma can achieve her goals of training Lucas' hands-on practical ability, motivating him to engage in more outdoor activities, and enhancing interaction with him. The ***Profile Page*** allows Emma to invite all family members to join the gardening process to reduce her workload and strengthen the whole family relationship.

Overall, our app is designed to build a **family activity** for Emma so that she can find a work-life balance, allocate more time to raise and educate her son through hands-on experience, and enhance family interaction.

## Visual Design Rationale

### *Plant Page*

One of Emma's goals is to let Lucas learn more about the natural environment. Because Lucas already has some experience using electronic devices, we want to encourage him to use technology to learn informative things about plants and the natural world rather than playing computer games all day. The *Plant Page* is an excellent resource for Emma and Lucas to learn about a great variety of plants with different characteristics and uses. Browsing through the *Plant*

*Page* can increase the quality of family time they spend together and encourage an interactive learning environment, rebuilding family connections.

For the **page's layout**, we want to emphasize the learning of various plants. The title of "Playful Plants" is placed on the top of the page to highlight the purpose of this tab intuitively. A search bar and a filter icon are placed underneath, always sticking on the top of the page. This layout can help Lucas and Emma navigate easily on the page without getting lost. They can search for a particular plant or filter plants based on specific criteria. Then, there are the card designs for each plant. On each card, it consists of the plant's picture, name, and tags. We want the picture to be the dominant component because we think images can speak a thousand words and will be more attractive for Lucas to learn and recognize plants in nature. Elements on the cards are aligned vertically to follow the grid structure so Lucas and Emma can quickly scan the pages. However, we decide to have the tags arranged horizontally because a plant can have many characteristics, including scent, edible, bird-attracting, etc.

We plan to use standard **typography** that is simple, legible, and readable, such as Helvetica and Open Sans. These fonts are more suitable for both children and parents to read. We are planning to use **icons** from the Javascript FontAwesome library for the filter icons, so it is easier to implement and consistent with common design patterns. The cards of plants on the main plant page will **afford** the clicking function because users can click on them and be directed to the Plant Detail Page. Therefore, the cards will have a hovering state. The search bar is also clickable, and it will have placeholder texts like "Search Plants" to indicate how Lucas and Emma should interact with controls. After they click on the filter icon, it will show a small popup with checkbox options of different plant characteristics, and the checkbox will afford to click on multiple choices. They can click on the "Apply" command to filter the plant information. In the plant details page, we hope to balance the visual structure of the page by involving plants' pictures as the **graphic** component. Since Lucas is still very young, he prefers looking at colorful images rather than heavy texts. Therefore, we use pictures and colorful tags to convey the most critical information, and Emma can help Lucas understand the textual information.

While our group still hasn't decided on the **colors** of the prototype, we think the colors should convey a playful vibe so it is attractive to Lucas and not too childish for Emma to use. The final sketches for the Plant Page indicate the **animations and transitions** between the main plant page and the plant details page. Clicking on the plant card will lead to the plant details page, and clicking on the return button will take them back to the main plant page. Such interaction follows the common design patterns, which should be relatively easy and intuitive to use and understand. After Emma and Lucas enter the keyword for searching or clicking on the checkboxes inside the filter, the page will be refreshed with sorted plant cards. The refreshed content will give them feedback and draw attention to change.

### *Journal Page*

The Journal Page includes three sub-pages: the *Main Journal Page*, the *Journal Detail Page*, and the *New Journal Page*, which allow users to view previous journals and create new ones. We try to make the entire journaling process smooth and effective through the lens of communication.

The **layout** of all three pages follows users' reading and scanning patterns to ensure that they can find information quickly. For example, the title "Your Journal" is placed on the top center to provide visibility affordance on the Main Journal Page. Each journal entry is grouped on a card and ordered chronologically from top to bottom, so users can scan the page and quickly locate a journal. A date selector is provided in the top right corner so that users can more effectively find a particular journal with a date in mind. The "+" button is placed in a strong fallow area to catch users' attention and ensure the function of starting a new journal is visible to them.

Second, we try to implement appropriate **UI elements** to instruct users on how to interact with our product clearly. For example, on the *New Journal Page*, we use a large edit box with a "Journal Title" placeholder to indicate that the box is editable with an expected title input. Besides the label "creator," a drop-down list instructs users to select their name from the family member list. Checkboxes under the to-do list imply that each element is independently selectable, so users can check it when they complete a task. The "<" icon indicates that the page can be closed, so users can expect to return to the *Main Journal Page*.

Third, we use standard, recognizable **icons** with the supplement of **labels** to ensure that users can easily comprehend them and associate them with desired commands. For instance, we employ a camera icon to present “taking photos” on the *New Journal Page*. We also label it appropriately to avoid confusing users.

### *Profile Page*

Users can quickly scan the page from the upper left and go straight down on the *Profile Page*. The family pictures are in the middle of the page, which users are supposed to **focus on**, at first sight, making the page evident and attractive. Each family member is listed with pictures, names, and relationships. In this part, we emphasize more on the name of a family member. Thus the **font size** of "name" is larger than others. All the labels and controls are **left-aligned**, making the page look clear and concise. The edit icon is designed like paper with a pen. It is common sense that this **icon** represents the 'edit' operation. Users can effectively recognize it without any notice text.

## **Phase 3: High-Fidelity Prototype**

# Implementation

In this milestone, our group implemented the above final sketches to prototype our most viable product (MVP) in Vue.js, which will be used later in usability tests.

## Data

We created **three JSON data files** to store our data fixtures for plant information, fake journal entries, and fake user profiles.

### Plant Information

Considering we need to display a plant catalog in our app, we made up information for **six plants** based on the actual Playful Plants database and stored them in the *plants.json* file. The basic data structure for a plant is shown below:

```
"Autumn Brilliance Serviceberry": {
    "tags": {
        "tag1": "edible",
        "tag2": "colorful",
        "tag3": "nature attracting",
        "tag4": "medicinal"
    },
    "images": {
        "image1": "SH_02",
        "image2": "SH_02_1"
    },
    "description": "The berries are native to North America, northern Europe and Asia. The berries are very nutritious and have long been harvested in the spring to begin the summer berry season. Their shapes vary by seasons. In Spring, the berries have white flowers, which gradually mature into a deep purple color. In summer, they are edible. They taste like a combination of blueberries and apples, and ripen at same time as cherries. In fall, the berries are blue-green foliage, orange-red. As a durable plant, Brilliance Serviceberry is friendly for children to play with.",
    "instruction": {
        "Space": "Plant at least 20-30 ft apart in a loose triangular pattern",
        "Sunshine": "Provide enough sunshine with partial shade",
        "Maintenance Needs": "Prune after flowering",
        "Watering": "Provide a medium level of water"
    }
}
```

Its name, tags, image names, general description, and gardening instructions are stored as a JavaScript Object. To access all plant data, we declared a global variable **\$plant\_fixtures** in the *main.js*.

## Journal Entry

Our app aims to enhance interactive family learning experiences by allowing users to build a family gardening journal. Therefore, the main feature of our app is journaling. Our group created **six fake journal entries** written in the tone of **our persona**, Emma, and her families, including journal titles, entry dates, creators' names, text entries, to-do lists, and gardening photos. These entries are stored in the *journals.json* file, and its basic data structure is shown below:

```
"journal 1": {  
    "title": "Ready for the Garden Project",  
    "date": "03/12/2021",  
    "creator": "Lucas",  
    "image": "journal 1",  
    "text": "The construction of our garden is completely down today! Can't wait for starting the gardening project with my daughter, Emma. This is my first time of taking care of the garden. Hopefully, we can success and Emma can enjoy. By the way, the wether is getting warmer these days. Probably, it's a good sign!",  
    "to-do": {  
        "task 1": "Create a shopping list for gardening tools",  
        "task 2": "Search fo local farms to purchase seeds",  
        "task 3": "Go shopping with Emma"  
    },  
    "checked": []  
},
```

Moreover, we created an empty array, “**checked**,” to store completed to-do items. We also created an empty JavaScript Object, “**update**,” to temporarily catch journal data from users’ new journal entries and display them on our *Main Journal Page*. We declare a global variable **\$journal\_fixtures** in *main.js* to access all journaling data throughout the app.

## User Profile

Last but not least, the one distinct feature of our app is the user account, which all family members share. To help users and later participants of our usability tests understand how they

and their families can use the app to build a journal with each other, we made up a fake user profile for our **persona**, Emma, and stored it in the profiles.json file. She can view her family name, family photos, family location, and all family members' basic information in her user profile. The basic data structure is shown below:

```
{  
  "family name": "Emma's Family",  
  "location": "New York",  
  "family photos": {  
    "photo 1": "family 1",  
    "photo 2": "family 2",  
    "photo 3": "family 3",  
    "photo 4": "family 4",  
    "photo 5": "family 5",  
    "photo 6": "family 6"  
  },  
  "members": {  
    "member 1": {  
      "name": "Emma",  
      "role": "mother",  
      "photo": "Emma"  
    },  
    "member 2": {  
      "name": "Lucas",  
      "role": "son",  
      "photo": "Lucas"  
    },  
    "member 3": {  
      "name": "Richard",  
      "role": "father",  
      "photo": "Richard"  
    }  
  }  
}
```

Similarly, we declare a global variable **\$profile\_fixtures** in *main.js* to access the profile data throughout the app.

## Library

To build our app efficiently, we implemented libraries to support us building the application.

### BootstrapVue

We leveraged the components and icons from the BootstrapVue library. We used the navigation bar and sidebar component to create our app navigation in mobile and desktop versions, card component for journals view and plants view, form component for journal input, checkbox component for the to-do list and filter list, etc. As for the styling, we used standard styling from the components and added additional styling using CSS. All icons are from the BootstrapVue library for styling consistency.

## Navigation

We utilized the sidebar component for the desktop version for the navigation, showing vertical navigation on the left side of the website. As for the mobile app, following the convention for app navigation, we created horizontal navigation that stays at the bottom of the app using the navbar component.

```
<b-sidebar
  width="200px"
  class="side-nav"
  :visible="true"
  no-header-close
  :no-close-on-route-change="true"
  :no-close-on-esc="true"
  :no-close-on-backdrop="true"
  bg-variant="success"
  text-variant="light"
  shadow
>
```

```
<b-navbar class="navBar" type="dark" variant="success" fixed="bottom">
  <!-- <b-navbar-toggle target="nav-collapse"></b-navbar-toggle>
  <b-collapse id="nav-collapse" is-nav> -->
    <b-navbar-nav class="w-100 ml-auto" align="center" justified>
      <!-- to Plant Catalog Page -->
      <b-nav-item class="navItem" to="/" exact>
        <b-icon icon="flower1" class="mt-3"></b-icon>
        <b-nav-text class="hnavarp"> Plant </b-nav-text>
      </b-nav-item>
      <!-- to Journal Page -->
      <b-nav-item class="navItem" to="/journal" exact>
        <b-icon icon="journal-richtext" class="mt-3"></b-icon>
        <b-nav-text class="hnavarp"> Journal </b-nav-text>
      </b-nav-item>
      <!-- to Profile Page -->
      <b-nav-item class="navItem" to="/profile" exact>
        <b-icon icon="person-fill" class="mt-3"></b-icon>
        <b-nav-text class="hnavarp"> Profile </b-nav-text>
      </b-nav-item>
    </b-navbar-nav>
```

Sidebar for Desktop

Navbar for Mobile

## Plant/Journal Cards

Our design wants to show users a list of plants and journals in the main view. We used the card component (b-card) to create cards that include images, descriptions, and tags to achieve the goal.

```
<b-card>
  |   :img-src="getImgUrl()"
  |   img-alt="Journal Image"
  |   img-top
  |   v-on:click.stop="ShowDetail(journal_id)"
>
  <b-card-title v-on:click.stop="ShowDetail(journal_id)"> {{ journal_name }} </b-card-title>
  <b-card-text id="date" v-on:click.stop="ShowDetail(journal_id)"> {{ journal_date }} </b-card-text>
  <b-card-text id="creatorName" v-on:click.stop="ShowDetail(journal_id)"> {{ journal_creator }} </b-card-text>
  <b-button id="delete" variant="outline-dark" size="sm" @click.stop="delClick">
    |   <b-icon icon="trash"></b-icon></b-button>
</b-card>
```

## Filter Pop-Up

```
<b-modal
  id="filter-options"
  class="filter-popup"
  size="sm"
  centered
>
  <template #modal-header="{ close }">
    <h4>Filter by Purpose</h4>
    <b-icon-x-lg size="sm" @click="close()">
  </b-icon-x-lg>
</template>

  <template #default>
    <b-form-group v-slot="{ ariaDescribedby }">
      <b-form-checkbox class="options"
        |   v-for="option in options"
        |   v-model="selected"
        |   :key="option.value"
        |   :value="option.value"
        |   :aria-describedby="ariaDescribedby"
        |   name="filterlist"
      >
        |   <p class="option_text"> {{ option.text }} </p>
      </b-form-checkbox>
    </b-form-group>
  </template>
```

We created a pop-up window for the filter feature using the modal component and listed down all of the filter options using the checkbox components. At the bottom of the filter pop-up, we used button components to show the actions that the users can do within the filter feature.

## Add New Journal Form

On the *New Journal* Page, we utilized the form components to request users' journal inputs and create a new journal.

```
<b-form-input  
  id="title"  
  class="titlebox"  
  v-model="title"  
  v-on:change="changeGlobalTitle(title)"  
  placeholder="Enter Journal Title"  
></b-form-input>
```

```
<b-form-select  
  id="creators"  
  v-model="creator"  
  class="w-100"  
  required  
  v-on:change="changeGlobalCreator(creator)"  
>
```

## Datepicker

```
<b-form-datepicker  
  v-model="startDate"  
  class="startDatePicker"  
  size="sm"  
  :date-format-options="{  
    year: 'numeric',  
    month: '2-digit',  
    day: '2-digit',  
  }"  
  locale="en"  
  :max="setMax()"  
  placeholder="start date"  
  reset-button  
></b-form-datepicker>
```

In our journal view, we supported a date picker feature using the form datepicker component so that users can set the date range and find the journals within that date range quickly.

## Router

Based on the result of our design phase, we decided to divide our prototype into three main parts: **plant** part, **journal** part, and **profile** page. The users can switch three pages by clicking the buttons on the navigation bar. The whole router is shown in the figure below.



### Home (Plant List)

In *index.js*, we define the three routes for the plant part.

```
{  
  path: '/',  
  name: 'plant',  
  component: PlantView  
},  
{  
  path: '/plant/:plant_id',  
  component: () => import('../views/PlantDetail.vue')  
},  
{  
  path: '/plant/catalog/filter',  
  name: 'viewFilter',  
  component: () => import('../views/FilterView.vue')  
},
```

In the Home (*Plant Catalog*) Page, when users click a certain plant card, the *ShowDetail()* function would be called, and the certain plant id would be passed to the plant detail page.

```
v-on:click.native="ShowDetail(value)"
```

```

ShowDetail(plantId) {
  this.$router.push(`/plant/${plantId}`);
},

```

In the *Plant Detail* Page, we get the current plant id through the global variable `$route.params`. Then, we can get all information about the plant from the global variable `$plant_fixtures` by the key `curPlant`.

```
  curPlant: this.$route.params.plant_id,
```

We can return back to the home page by clicking the “←” icon.

```
<router-link class="returnlink" to="/">
```

We also complete the plant tag filter functionality in a plant filter view. The following figures show the implementation detail.

```

v-on:click="ShowFilter"
ShowFilter() {
  this.$router.push("/plant/catalog/filter");
},

```

In the plant filter view, users can return back to the home page by clicking the “close” button.

```
returnback() {
  this.$router.push("/");
}
```

## Journal List

In `index.js`, we define the four routes for the journal part.

```
{
  path: '/journal',
  name: 'journal',
  component: () => import('../views/JournalView.vue')
},
{
  path: '/journal/new',
  name: 'addNewJournal',
  component: () => import('../views/AddNewJournal.vue')
},
{
  path: '/journal/new/camera',
  name: 'openCamera',
  component: () => import('../views/cameraView.vue')
},
{
  path: '/journal/:journal_id',
  component: () => import('../views/JournalDetail.vue')
},
```

The journal list view demonstrates the list of journals created by family members before. In the journal list view, the users can perform two kinds of operations: (1) create a new journal and (2) review old journals.

When users click the “+” button, the page will route to the *addNewJournal* view.

```
<b-button v-on:click="AddJournal" size="sm">+</b-button>

AddJournal() {
  this.$router.push("/journal/new");
},
```

In the *New Journal* Page, users can call the camera on their device by opening the *openCamera* view.

```
<b-button class="cameraBtn" v-on:click="openCamera()">

openCamera() {
  this.$router.push("/journal/new/camera");
},
```

After taking photos, they can click the “*upload*” button and return back to the *addNewJournal* view.

```
v-on:click="returnAndSave()"

returnAndSave() {
  this.stopCameraStream();
  Vue.prototype.$photo = this.items[0].src;
  this.$router.push("/journal/new");
},
```

Users can “*post*” the new journal and then route back to the journal list view.

```
this.$router.push("/journal");
```

When users open the old journals, the *ShowDetail()* function would be called, and the certain journal id would be passed to the *journalDetail* page.

```
ShowDetail(journalId) {
  this.$router.push(`/journal/${journalId}`);
},
```

In *journalDetail* view, users can return back to the home page by clicking the “←” icon.

```
<router-link class="returnlink" to="/journal">
  <b-icon icon="arrow-left"></b-icon>
</router-link>
```

## Features

In our App, we have **7 views** and **5 reusable components**. The navigation bar is consistent throughout the entire App but has two modes for desktop and mobile versions, and it is used in App.vue. The App can be broken up into three main parts: Plant, Journal, and Profile. The App is responsive on mobile, tablet, and desktop to provide accessibility for users like Emma and her family using media queries. We used **BootstrapVue components** for all the buttons, icons, forms, and grid systems.

✓ components
└ FilterList.vue
└ JournalCard.vue
└ NavigationBar.vue
└ PlantCard.vue
└ TodoList.vue

✓ views
└ AddNewJournal.vue
└ cameraView.vue
└ JournalDetail.vue
└ JournalView.vue
└ PlantDetail.vue
└ PlantView.vue
└ ProfileView.vue

Because this is only a high-fidelity prototype, not all functions are implemented. Here is a list of features that are **usable** on this prototype:

- The main *Plant* page (**PlantView.vue**) allows: 1) view all plants with PlantCard.vue, 2) filter plant information based on options on FilterList.vue, 3) click to see details by routing to PlantDetail.vue.
- The *Plant Detail* page (**PlantDetail.vue**) allows: 1) view detailed information about the specific plant, 2) return back to the main Plant page.
- The main *Journal* page (**JournalView.vue**) allows: 1) view all journal entries with JournalCard.vue, 2) filter journal entries based on datepicker, 3) delete existing journal entries, 4) click to see journal details by routing to JournalDetail.vue, 5) click to add a new journal by routing to AddNewJournal.vue.
- The *Journal Detail* page (**JournalDetail.vue**) allows: 1) view detailed content about the specific journal, 2) click on the to-do list with the TodoList.vue by marking a task as completed, 3) return back to the main Journal page.
- The *New Journal* page (**AddNewJournal.vue**) allows: 1) make a new journal entry, 2) add a to-do list, 3) add a photo using cameraApi.vue, 4) return back to the main Journal page.

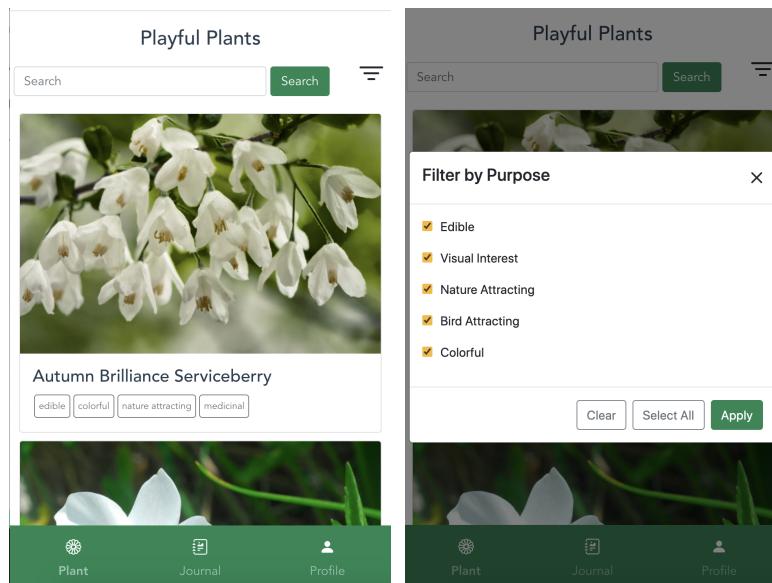
Because of time constraints and priority decisions, here is a list of features that are not functional on this MVP version:

- The search function on the main *Plant* page does not work, but users should be able to filter out plants based on certain criteria.
- Users should be able to edit their family profiles and log out of the account. However, because they are not the key features in the user scenarios and for testing the product goals, the Profile page is only viewable with no actual functionalities.

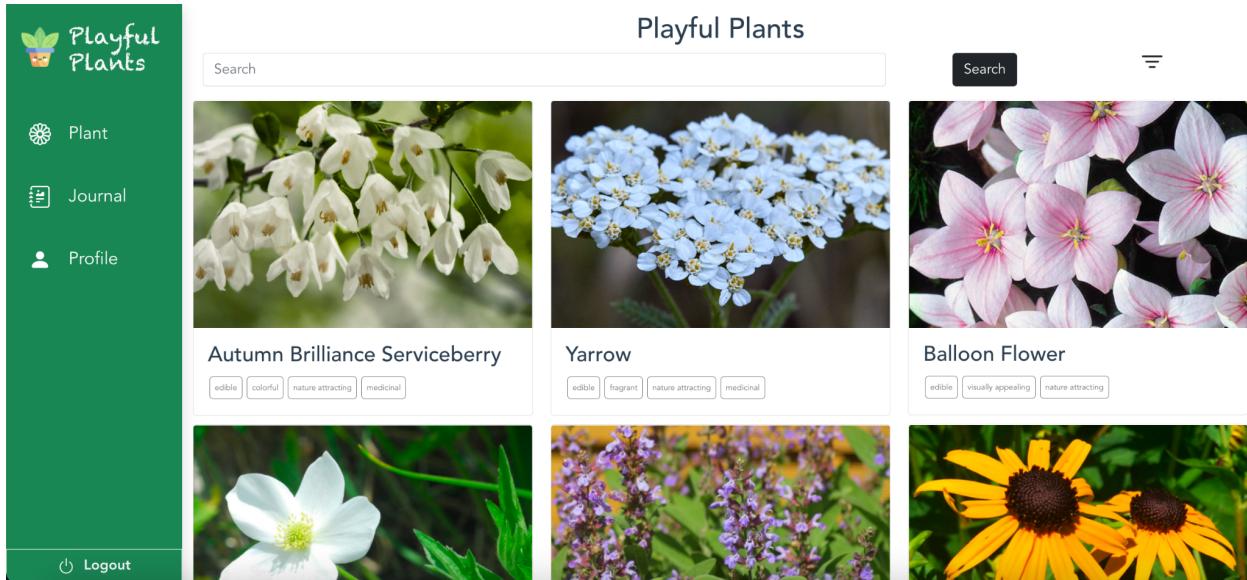
## Plant

### Main *Plant* Page

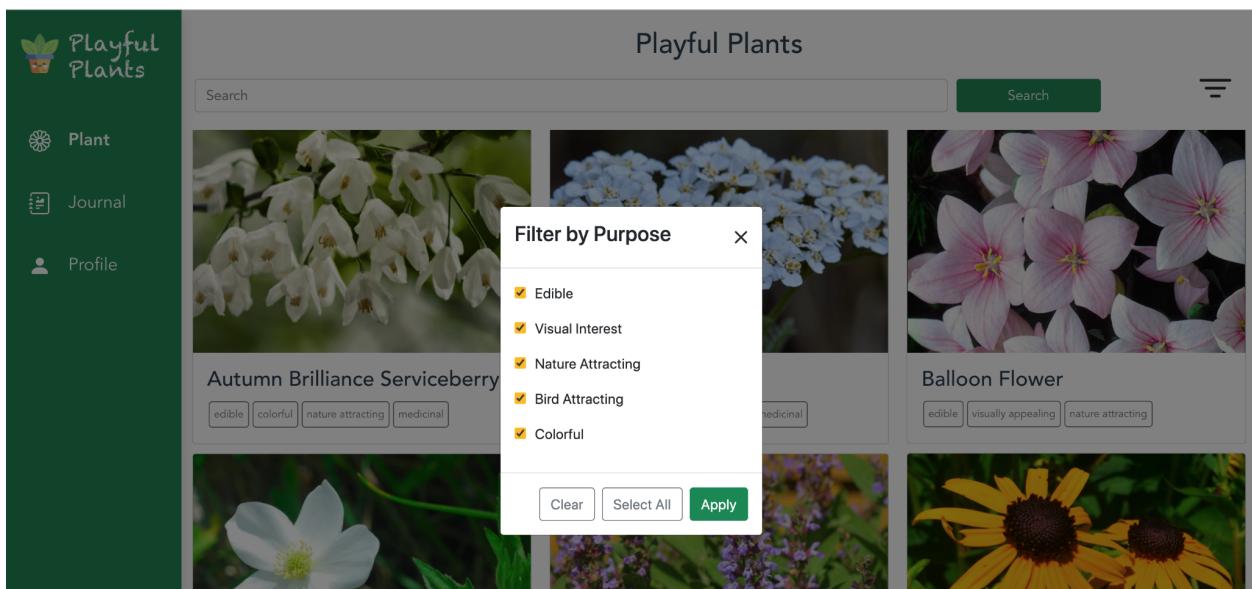
For the Plant part of this App, there are two main pages. The first one is the main Plant page (**PlantView.vue**), where Emma and her family members can browse through the plant catalog and learn more about them. This corresponds to Scenario 1, where Lucas and Emma can learn about plants together with free access to the basic information about various playful plants. Besides browsing through them, users can also use the filter icon to filter out specific plants based on criteria such as edible, bird-attracting and so forth.



Mobile Frame: Main Plant page + Plant Filter



Desktop Frame: Main Plant page



Desktop Frame: Plant Filter

### Plant Detail Page

The second one is the Plant Detail page (**PlantDetail.vue**), where Emma and her family can learn more detailed information about each plant individually. It contains the plant name, picture, tags, description, and gardening instructions.



## Autumn Brilliance Serviceberry



[edible](#) [colorful](#) [nature attracting](#) [medicinal](#)

### Description:

The berries are native to North America, northern Europe and Asia. The berries are very nutritious and have long been harvested in the spring to begin the summer berry season. Their shapes vary by seasons. In Spring, the berries have white flowers, which gradually mature into a deep purple color. In summer, they are edible. They taste like a combination of blueberries and apples, and ripen at same time as cherries. In fall, the berries are blue-green foliage, orange-red. As a durable plant, Brilliance Serviceberry is friendly for children to play with.



[edible](#) [colorful](#) [nature attracting](#) [medicinal](#)

### Description:

The berries are native to North America, northern Europe and Asia. The berries are very nutritious and have long been harvested in the spring to begin the summer berry season. Their shapes vary by seasons. In Spring, the berries have white flowers, which gradually mature into a deep purple color. In summer, they are edible. They taste like a combination of blueberries and apples, and ripen at same time as cherries. In fall, the berries are blue-green foliage, orange-red. As a durable plant, Brilliance Serviceberry is friendly for children to play with.

### Gardening Instruction:

Space: Plant at least 20-30 ft apart in a loose triangular pattern

Sunshine: Provide enough sunshine with partial shade

Maintenance Needs: Prune after flowering

Watering: Provide a medium level of water



Plant



Journal



Profile



Journal



Profile

## Mobile Frame: Plant Detail Page



Plant

Journal

Profile

Logout



## Autumn Brilliance Serviceberry



[edible](#) [colorful](#) [nature attracting](#) [medicinal](#)



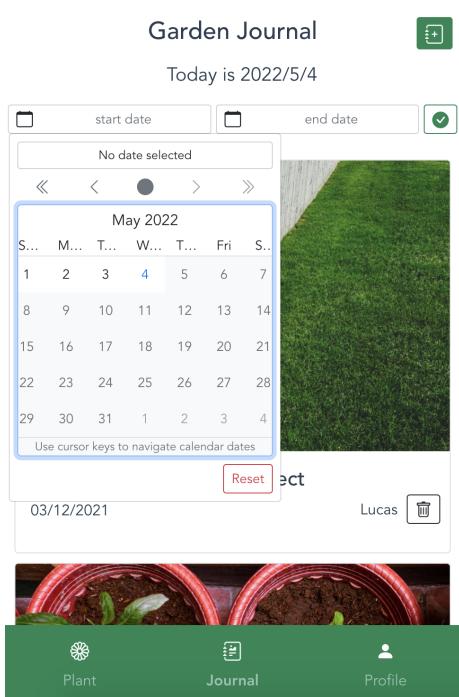
The screenshot shows a mobile application interface for a plant database. On the left is a vertical navigation bar with a green background. At the top is a logo for "Playful Plants" featuring a stylized plant icon. Below the logo are three menu items: "Plant" (with a sun icon), "Journal" (with a clipboard icon), and "Profile" (with a person icon). At the bottom of the bar is a "Logout" button with a power-off icon. The main content area on the right has a white background. It features a large image of a tree covered in white blossoms. Below the image is a horizontal row of four small, rounded rectangular buttons with white text: "edible", "colorful", "nature attracting", and "medicinal". To the left of the image is a section titled "Description:" followed by a paragraph of text about serviceberries. To the right of the image is a section titled "Gardening Instruction:" followed by four lines of text with gardening tips. The overall design is clean and modern, using a mix of green, white, and black colors.

*Desktop Frame: Plant Detail Page*

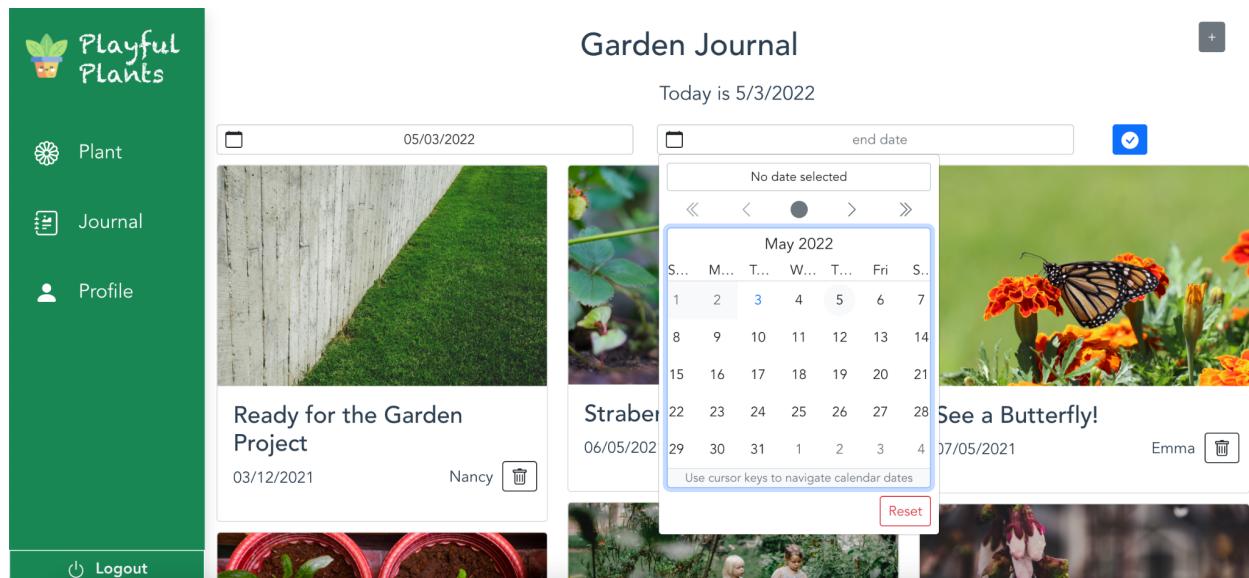
## Journal

### Main Journal Page

For the Journal part of this App, there are three main pages. The first one is the **main Journal page (JournalView.vue)**, where Emma and all her family members can browse through the past journals uploaded by everyone. Emma can also select a specific date or date range to view the journals that fall on those dates. The journal cards use the component of **JournalCard.vue**. We also included a delete button for every journal entry for error recovery. If Lucas accidentally creates a mistaken journal, this function will allow him to delete it. It is helpful for Lucas, who is relatively young, so he does not post a mistaken journal entry accidentally.



*Mobile Frame: Journal Datepicker*



*Desktop Frame: Journal Datepicker*

### **Journal Detail Page**

The second page is the **Journal Detail page (JournalDetail.vue)**, where Emma and Lucas can click on past journal entries and review their gardening experiences. This page includes the journal title, creator, date, picture of that particular gardening experience, description, and a to-do list. For instance, after Nancy creates this journal entry, Lucas can view it and see the to-do list

waiting to be completed. After Lucas finishes the tasks, he can click and check on them, and the progress will be recorded. The to-do list is reusing the component of **TodoList.vue**.

Created by Lucas, on 03/12/2021

**Ready for the Garden Project**

Created by Lucas, on 03/12/2021



The construction of our garden is completely down today! Can't wait for starting the gardening project with my daughter, Emma. This is my first time of taking care of the garden. Hopefully, we can success and Emma can enjoy. By the way, the wether is getting warmer these days. Probably, it's a good sign!

**Todo List**

- Create a shopping list for gardening tools
- Search fo local farms to purchase seeds
- Go shopping with Emma

Plant
Journal
Profile

Plant
Journal
Profile

*Mobile Frame: Journal Details + to-do list*

Playful  
Playful  
Plants
  
  
Plant  
Journal  
Profile
  
  
Logout

**Ready for the Garden Project**

Created by Nancy, on 03/12/2021



*Desktop Frame: Journal Details*

The construction of our garden is completely down today! Can't wait for starting the gardening project with my daughter, Emma. This is my first time of taking care of the garden. Hopefully, we can success and Emma can enjoy. By the way, the wether is getting warmer these days. Probably, it's a good sign!

**Todo List**

- Create a shopping list for gardening tools and plant seeds
- Search fo local farms to purchase seeds
- Go shopping with Emma

*Desktop Frame: Journal Details + to-do list*

## New Journal Page

The third page is the page for adding a **new journal entry (AddNewJournal.vue)**. It allows all family members to create a journal entry, either documenting their gardening progress or their gardening experiences. For instance, in Scenario 2, where Lucas writes a journal tracking plant growth, he can use this page to write down what happened that day and take a picture of the plant. In Scenario 3, Emma can add a new journal entry documenting Luca's gardening progress with photos. It serves as an interactive family learning platform to promote parent-child relationships and regular documentation of gardening experiences. We also included a pop-up modal for error recovery. If Lucas accidentally leaves the page by clicking on the return icon, this modal will show up asking him whether he wants to discard the editing. It is helpful for Lucas, who is relatively young, so he does not delete an entry accidentally.

**Mobile Frame: Add new journal + Discard Confirmation**

**Mobile Frame: New Journal in list + New Journal details**

The screenshots show the 'Playful Plants' mobile application interface. The top screenshot displays the 'Add new journal' screen. It includes a sidebar with icons for Plant, Journal, and Profile, and a Logout button. The main area has fields for 'Journal Title' (placeholder: Enter Journal Title), 'Creators' (placeholder: Please select your name), 'Journal Entry' (placeholder: Write down something about gardening of the day), and a 'To-Do List' field (placeholder: Enter your gardening task). A green 'Post' button is at the top right. The bottom screenshot shows the same screen but with a central modal dialog titled 'Please confirm'. The dialog asks: 'You haven't save your journal entry! Are you sure that you want to discard the editing?'. It contains 'Discard' and 'Save' buttons.

*Desktop Frame: Add new journal + Discard Confirmation*

## Profile

The **Profile Page (ProfileView.vue)** shows the family information, including family photos, family members who are using this App, and their location. Because editing the family profile and logging out of the account are not the key features in the user scenarios and for testing the product goals, the Profile page is only viewable with no actual functionalities.

Emma's Family 



< >

Location: New York

**Family Members**

	Emma mother
	Lucas son

 Plant     Journal     Profile

*Mobile Frame: Profile Page*

Playful Plants

-  Plant
-  Journal
-  Profile

Emma's Family 



< >

Location: New York

**Family Members**

	Emma mother
	Lucas son

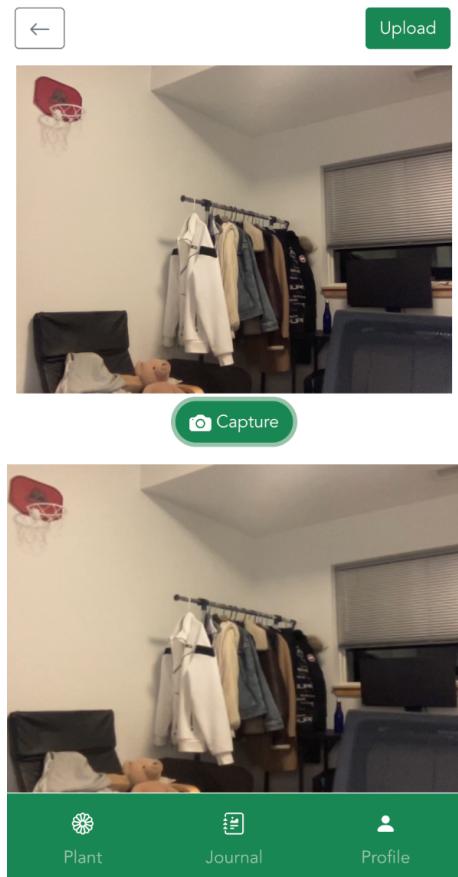
 Logout

*Desktop Frame: Profile Page*

## Advanced Feature

We implement the web camera in our project. Our implementation steps are as follows.

1. Create a video stream which can show the real time camera view.
2. Click the “*Capture*” button to capture one frame of the streaming video
3. Get the image URL from the video canvas, and the captured photo would display under the video screen.
4. Click the “*Upload*” button to return back to the *AddNewJournal* page, and save the image source to local storage.



## **Phase 4: Publish**

## App Icon

We designed and created our Playful Plants app icon in Figma, which is shown below:



## **Install Our App**

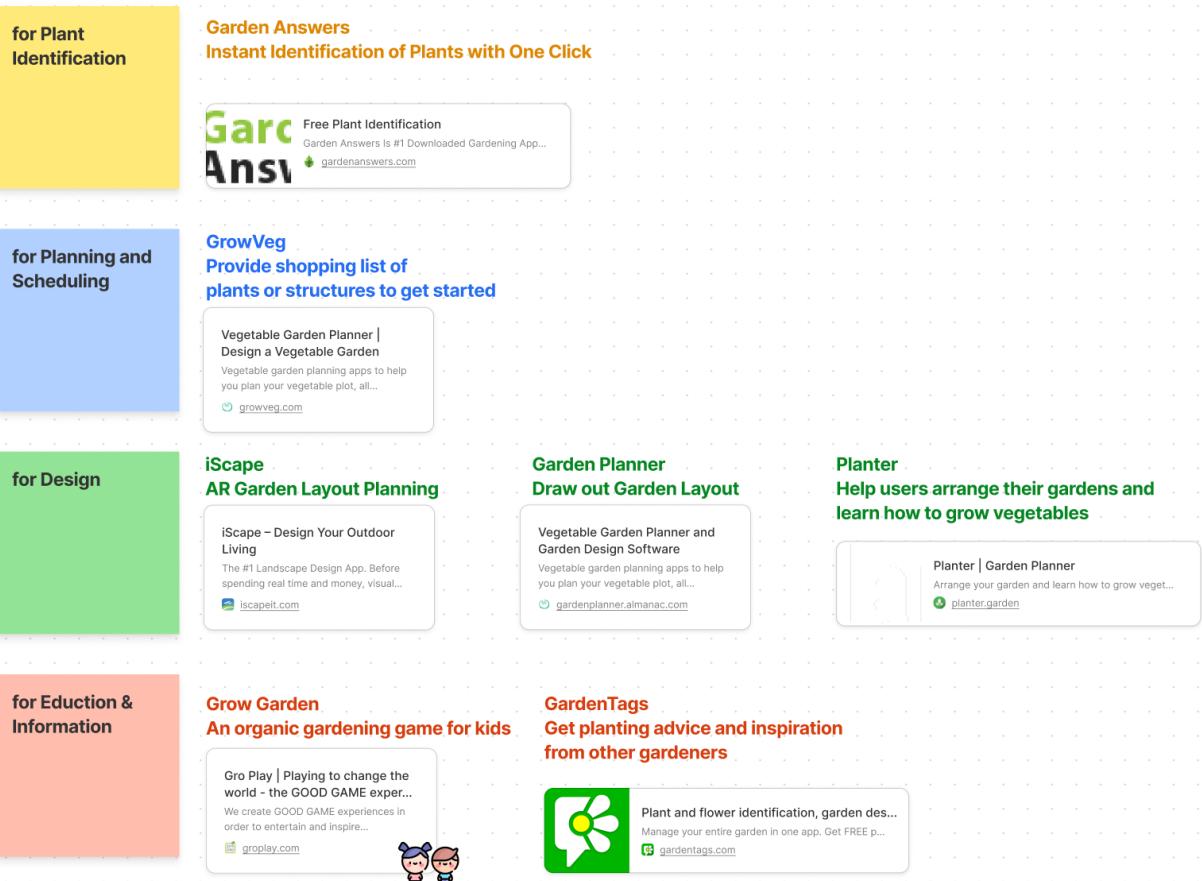
After finishing our high-fidelity prototypes, we published our app on Heroku Deployment Site. Our app is available to download and install via the link: <https://playful-plant.herokuapp.com/>.

# Appendix 1: Product Research Affinity Diagram Details

*Product Research - Technical Solution*

## Technical Solution

### 4 Needs of Gardening



## *Product Research - Non-Technical Solution*

# **Non-Technical Solution**

### **Grocery Stores**

- Purchase seasonal plant seeds
- Follow instructions to plant and garden to get started

### **Home Depot**

- Purchase tools for gardening
- Purchase plant seeds

### **Pencil & Paper**

- Draw out the Garden Layout

### **Word of Mouth**

- Talk to neighbors who have experience gardening and gardeners in the neighborhood

### **Farmers' Books**

- Physical books that include gardening tips and useful facts of plants

### **Gardening Projects for Kids**

- A physical book teaching parents how to grow plants with kids

### **Ithaca Children Garden**

- An organization coordinates children's outdoor learning and gardening activities



### **Gardening Kids**

- An online tutorial for children to start their gardening experiences



### **Grow Your Own Vegetable Garden!**

- An online course teaching children about vegetables & gardening

