The Virtual Garden App

CMPT 276 Final Project - Milestone 0

Course: CMPT 276 Spring 2023
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Virtual Garden GitHub Repository
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1. Project Overview and Problem Statement

How We Came Up With the Idea

The idea for *Virtual Garden* was inspired by a shared challenge that many plant owners face—keeping their plants healthy and thriving. Whether you're a beginner trying to figure out why your new plant's leaves are turning yellow or an experienced gardener managing a diverse collection, plant care often involves a lot of uncertainty. Many people struggle with identifying their plants, diagnosing health issues, and finding the right care routine. The frustration of conflicting advice online can make plant care feel overwhelming, leading many to give up entirely.

We saw this as an opportunity to create something practical and impactful—a web app that takes the guesswork out of plant care. By integrating AI and real-time environmental data, Virtual Garden helps users accurately identify plants, detect health issues early, and receive personalized care recommendations. The goal isn't just to build a tool but to empower placement, managing indoor conditions, and preventing common pests.

At its core, Virtual Garden is about helping people succeed at something meaningful—nurturing life. By making plant care easier, more enjoyable, and less stressful, we hope to encourage more people to develop a deeper connection with nature and experience the joy of watching their plants thrive.er people to care for their plants with confidence and ease.

Why This Matters

Plants do more than decorate spaces—they improve air quality, boost mental well-being, and create a sense of tranquility. Many people abandon plant care because they feel they lack the necessary knowledge. Virtual Garden bridges this gap by making plant care intuitive and accessible for all user groups:

- **Beginners:** Eliminates uncertainty with easy-to-follow, plant-specific care instructions.
- **Experienced Gardeners:** Offers advanced diagnostics, weather-based insights, and a plant health tracking system.
- **Indoor Plant Enthusiasts:** Provides tailored advice for optimizing plant placement and preventing common pests.

Overview and Problem Statement

Virtual Garden is a web application designed to assist plant enthusiasts and gardeners in managing and nurturing their plant collections. Users can effortlessly add plants to their virtual "garden" by taking and uploading photos. Leveraging advanced AI technologies, the application analyzes each photo to recognize the plant species, assess its health, and generate personalized care advice tailored to the plant's specific conditions.

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Problem it aims to solve

Maintaining plant health can be challenging, especially for individuals managing diverse plant species or those new to gardening. Common issues include:

- **Species Misidentification:** Users often struggle to accurately identify plant species, leading to improper care.
- **Health Monitoring:** Detecting early signs of diseases, pests, or nutrient deficiencies is difficult without specialized knowledge.
- **Personalized Care Guidance:** Generic care advice may not address the unique needs of each plant, resulting in suboptimal growth or plant decline.

Virtual Garden addresses these challenges by providing an intuitive platform that combines image recognition and intelligent analysis to deliver accurate identification, comprehensive health assessments, and customized care recommendations.

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2. User Groups and Their Needs

1. Novice Gardeners

- **Needs:**
    - Accurate plant species identification.
    - Basic guidance on plant care.
    - Easy-to-understand advice without requiring extensive botanical knowledge.

2. Experienced Gardeners and Horticulturists

- **Needs:**
    - Advanced diagnostics for plant health issues.
    - Detailed, tailored care recommendations.
    - Tools for tracking plant growth and health over time.

3. Indoor Plant Enthusiasts

- **Needs:**
    - Specific advice for indoor plant care based on lighting and space constraints.
    - Identification of pests and diseases common to indoor plants.
    - Recommendations for optimizing plant placement and maintenance.

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3. User Personas

Persona 1: Emma (Novice Gardener)

- **Age:** 28
- **Occupation:** Marketing Specialist
- **Background:** Emma recently moved into her first apartment and decided to take up indoor gardening to add some greenery to her living space. She has minimal experience with plant care and often feels overwhelmed by conflicting advice.
- **Goals:** Successfully grow and maintain a variety of indoor plants. As well as, learning the basics of plant care without feeling intimidated.
- **Challenges:** Struggles with plant identification, watering schedules, and lighting needs. She fears inadvertently harming her plants due to lack of knowledge.
- **How Virtual Garden Helps:** Allows easy plant identification by uploading pictures.. It provides straightforward and personalized care instructions. It offers a supportive platform to track plant health and progress.

Persona 2: Liam (Experienced Gardener)

- **Age:** 45
- **Occupation:** Landscape Architect

- **Challenges:** Managing and diagnosing health issues across a large variety of plants.Keeping detailed records of plant conditions and care routines.
- **Background:** Liam has been gardening for over 20 years and manages a diverse garden with various plant species. He seeks advanced tools to optimize plant health and streamline his gardening practices.
- **Goals:** Maintain optimal health for all plants in his garden. Quickly diagnose and address plant health issues. Track long-term growth and health trends.
- **How Virtual Garden Helps:** Utilizes AI for precise species identification and health assessments. Generates detailed, condition-specific care recommendations. Provides tracking features to monitor plant health over time.

Persona 3: Sophia (Indoor Plant Enthusiast)

- **Age:** 34
- **Occupation:** Interior Designer
- **Challenges:** Struggles with maintaining ideal indoor conditions for plants.
- **Background:** Sophia has been an indoor plant enthusiast for several years and loves incorporating greenery into her home designs. She enjoys experimenting with different plant types but struggles with maintaining ideal indoor conditions, especially in spaces with limited natural light.
- **Goals:** Maintain a thriving indoor plant collection. Ensure plants stay healthy by preventing pests and diseases. Optimize plant placement to enhance aesthetics and air quality.

- **How Virtual Garden Helps:** Provides tailored care recommendations, pest identification tools, and plant placement suggestions.

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4. Features Planned for Each API

1. Google Gemini API

- **Species Identification:** Analyzes uploaded plant images to determine species.
- **Health Assessment:** Detects diseases, pests, or nutrient deficiencies.
- **Care Recommendation Generation:** Provides personalized advice for watering, fertilization, and plant care.

2. OpenWeatherMap API

- **Real-Time Weather Data Integration:** Fetches current weather conditions for plant care.
- **Weather Forecast Analysis:** Provides forecasts to anticipate plant care needs.
- **Climate-Based Care Adjustments:** Adjusts recommendations based on local weather patterns.

Backup APIs:

3. Plant.id API

- **Species Identification:** Uses AI to accurately identify plant species.
- **Health Diagnostics:** Detects specific plant health issues.
- **AI Chatbot:** Provides real-time plant care assistance.

4. Visual Crossing API

- **Hyper-Local Weather Insights:** Provides location-specific weather data.
- **Historical Weather Analysis:** Helps users understand past weather effects on plants.
- **Frost and Extreme Weather Alerts:** Sends warnings for extreme weather events.

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5. User Stories

Google Gemini API

Feature	User Story
Species Identification	As an enthusiast (Emma), I want to know what the plants in my garden are. I can easily take a picture and upload it to the website to know what is in my garden.
Health Assessment:	As an enthusiast, My roses have some yellow spots on their leaves.I can take the picture and upload it to the website and let the website tell me what happened to my rose.
Care Recommendation Generation	As an enthusiast, Now I know my roses get Melasma. Then what should I do? Add fertilizer? Water? Or spray pesticides? I hope the web page can give me some advice.
(Backup feature) Recommend plants	As an enthusiast, I moved to a new home. I feel the new room is a bit empty. I hope to have some plants to add a little fun to my life. I uploaded pictures of the room and hope to get some good recommendations.

OpenWeatherMap API

Feature	User Story
Real-Time Weather Data Integration	As an enthusiast, I am worried about how the current weather affects my plants. I can check the website to see real-time temperature and humidity in my area, so I can adjust watering and plant care accordingly.

.Weather Forecast Analysis	As an enthusiast, I want to prepare my plants for upcoming weather changes. I can check the website for short-term weather forecasts, so I can take precautions like moving my plants indoors before a storm or adjusting watering schedules during a heatwave.
Climate-Based Care Adjustments	As an enthusiast, I know that changing weather conditions impact my plants' health. I can use the website to get care recommendations that adapt to local climate patterns, helping me keep my plants healthy through different seasons.

plant.id API

Feature	User Story
Species Identification	As a person who loves plants, I want to quickly identify the plants in my garden by uploading a photo, so I can learn their names and gather more information about how to care for them.
Health Diagnostics	As a plant owner (Jess), my indoor plant's leaves are curling. I can snap a photo and upload it to get a diagnosis on whether it's due to pests, overwatering, or another issue, helping me take quick action.
AI Chatbot	As a beginner plant parent (Chris), I want to quickly get plant care advice on the go. I can use the website's chatbot to ask questions about watering schedules, soil types, or how to treat common plant problems.

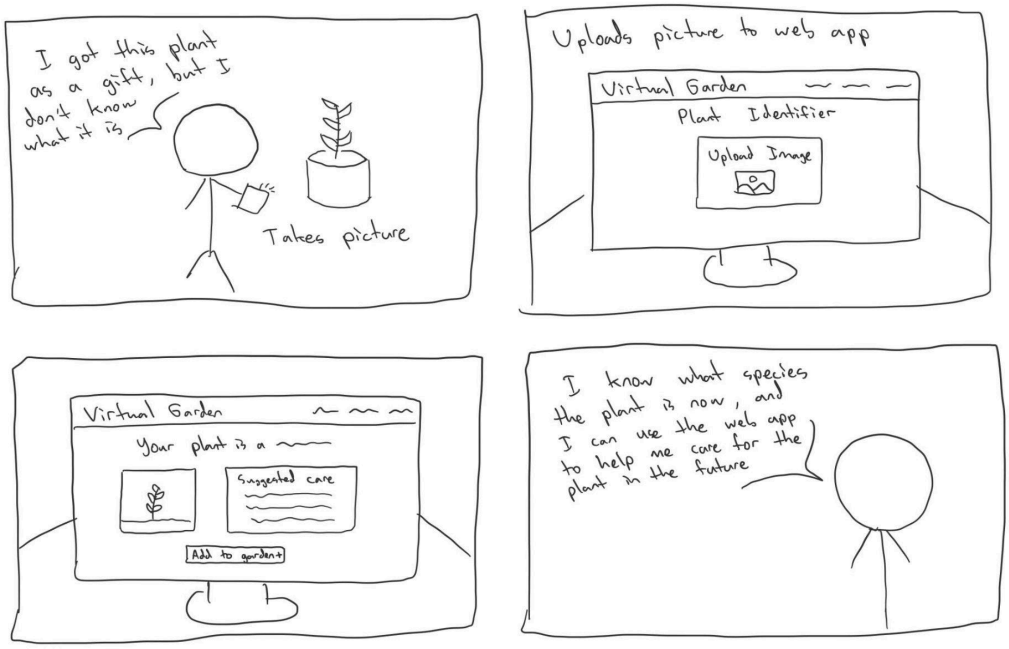
Visual Crossing API

Feature	User Story
Hyper-Local Weather Insights	As a gardener, I want hyper-local, real-time weather data for my exact location. By using this feature, I can optimize my plant care decisions based on precise temperature, humidity, and rain conditions so that it avoids overwatering/underwatering for my plants.
Historical Weather Analysis	As a plant enthusiast (Jake), I want access to past weather data to see how previous seasons' weather might have impacted my plants. This helps me adjust my care routine and make better decisions for the future.
Frost and Extreme Weather Alerts	As a gardener, I want to receive early warnings about frost or extreme weather events. With these alerts, I can protect my plants ahead of time by bringing them indoors or covering them to avoid damage.

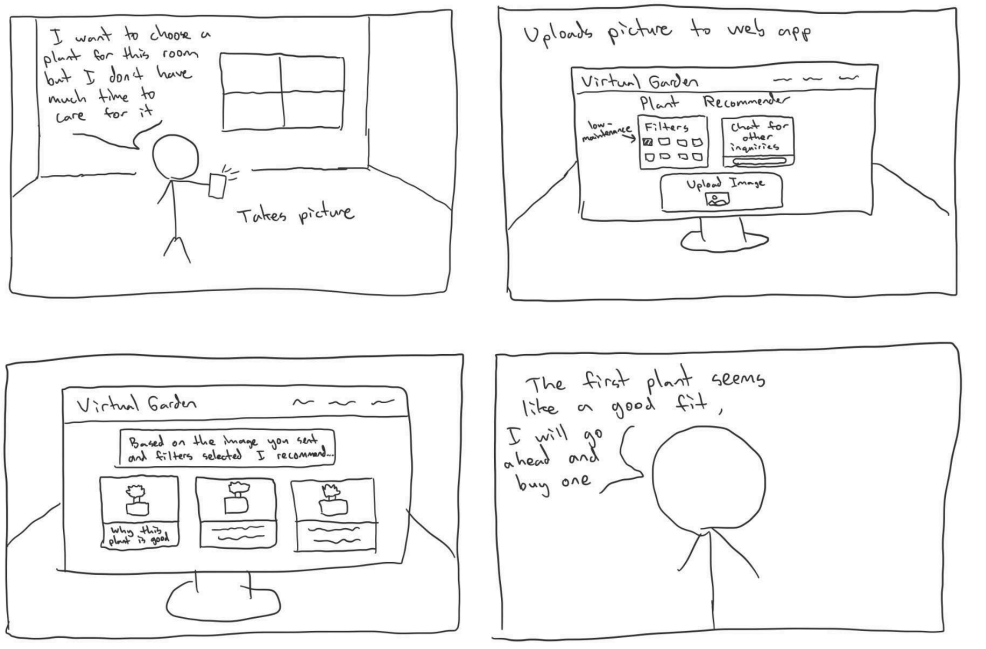
6. Storyboard

A low-fidelity storyboard depicting user interaction and application flow:

Plant Identification



Plant Recommender



7. Technology Stack

We chose **React** for the front-end due to its industry-standard status, along with extensive online tutorials, and large ecosystem of libraries which would be an aid in our development. For styling - CSS Framework - , we opted for **Tailwind CSS** for its ease of use and customizability.