Software Requirements Specification for

Sustainable Gardening Companion

Prepared by Team AgriGuide

Group Name: Team AgriGuide

V.Satwik	SE22UCSE287	se22ucse287@mahindrauniversity.edu.in
I.Lokesh	SE22UCSE112	se22ucse112@mahindrauniversity.edu.in
P.Prudhvi	SE22UCSE188	se22ucse188@mahindrauniversity.edu.in
B.Sravani	SE22UCSE043	se22ucse043@mahindrauniversity.edu.in
A.Sathvika	SE22UCSE245	se22ucse245@mahindrauniversity.edu.in
B.Aishwarya	SE22UCSE054	se22ucse054@mahindrauniversity.edu.in
N.Senapati	SE22UCSE246	se22ucse246@mahindrauniversity.edu.in
K.Sanjay	SE22UCSE140	se22ucse140@mahindrauniversity.edu.in

Instructor: *Vijay Rao*

Course: Software Engineering

Lab Section: *CSE*

Teaching Assistant: Vijay Rao

Date: 03 / March / 2025

Revisions

Version	Primary Author(s)	Description of Version	Date Completed
Draft Type and Number	Full Name	Information about the revision. This table does not need to be filled in whenever a document is touched, only when the version is being upgraded.	00/00/00

1 Introduction

1.1 Document Purpose

The purpose of this document is to define the software requirements for the Sustainable Gardening Companion. This includes detailed descriptions of system functionalities, user interactions, constraints, and dependencies. The document provides a structured framework for developers, project managers, and stakeholders, ensuring that all aspects of the system are clearly outlined and well-understood.

By specifying these requirements, the document serves as a reference for the development team, guiding them through the implementation and deployment process. It helps in reducing ambiguities and ensures that the project is aligned with the intended goals, resulting in a reliable and efficient gardening companion application.

1.2 Product Scope

The Sustainable Gardening Companion is a web-based and mobile-friendly application designed to assist users in maintaining their gardens efficiently. It provides features such as personalized plant care schedules, automated watering reminders, pest identification, and a community forum for knowledge sharing.

The system integrates weather-based recommendations to optimize plant care, promoting sustainable gardening practices. Whether for beginners or experienced gardeners, the platform offers intelligent recommendations and interactive support, making gardening easier and more eco-friendly.

1.3 Intended Audience and Document Overview

This document is intended for different types of readers, including developers, project managers, testers, and end-users such as gardeners and researchers. Developers will use this document to understand the system's functionalities and architecture. Project managers will refer to it to ensure the project progresses according to requirements. Testers will validate the system based on these requirements, while end-users will benefit from knowing how the system is structured and what features are available.

The document is structured to provide a clear and logical sequence of information. It begins with an overview of the project, followed by a detailed description of functionalities and requirements. Readers are advised to start with the introduction and overall description sections to understand the system at a high level, then move to specific requirements and non-functional requirements for deeper insights into system behavior and constraints.

1.4 Definitions, Acronyms, and Abbreviations

- **SRS** – Software Requirements Specification

- **API** – Application Programming Interface
- **DBMS** – Database Management System
- **UI/UX** – User Interface/User Experience
- **REST** – Representational State Transfer

1.5 Document Conventions

- **Font:** Arial, size 11 for standard text.
- **Spacing:** Single-spaced with 1-inch margins.
- **Titles & Subtitles:** Section headings follow a hierarchical numbering system.
- **Code Elements:** Displayed in a monospaced font.

1.6 References and Acknowledgments

- Sustainable Gardening Practices (Research Papers)
- IEEE Software Engineering Standards
- Expert Input from Agricultural Scientists and Horticulturists

2 Overall Description

2.1 Product Overview

The Sustainable Gardening Companion is a digital assistant designed to help users manage their gardens efficiently through smart recommendations, automation, and community collaboration. The platform will use weather APIs and user input to offer plant care solutions.

2.2 Product Functionality

- **Smart Plant Management** – Users can add, edit, and track plants with care recommendations.
- **Automated Watering Alerts** – Notifications based on real-time weather and soil moisture levels.
- **Pest Identification and Management** – Users can identify pests and receive guidance on sustainable pest control.
- **Community Forum** – A space for users to share gardening experiences and best practices.
- **Weather-Based Gardening Recommendations** – Gardening tips based on local weather conditions.

2.3 Design and Implementation Constraints

- **Platform** – Web and mobile responsive UI.
- **Data Sources** – Integration with third-party APIs for weather monitoring.
- **Compliance** – Adherence to agricultural safety standards and GDPR data privacy regulations.
- **Performance** – The system must handle concurrent users efficiently.

2.4 Assumptions and Dependencies

- Users have internet access and compatible devices.
- Weather data APIs remain accessible and reliable.
- Users input correct plant details for accurate recommendations.

---

3 Specific Requirements

3.1 External Interface Requirements

3.1.1 User Interfaces

The Sustainable Gardening Companion features a user-friendly web-based and mobile-responsive interface. Users will interact with the platform through a dashboard displaying plant information, watering schedules, pest alerts, and community discussions. The primary user interface includes menus, buttons, and interactive elements such as plant selection, health status updates, and weather-driven recommendations.

The dashboard will provide:

- **Plant Management Section:** Users can add, remove, or update plants in their virtual garden.
- **Watering Schedule Panel:** Displays upcoming watering reminders based on weather data.
- **Pest Identification Module:** Users can upload images or select from predefined symptoms to diagnose plant diseases.
- **Community Forum:** Users can post gardening questions and receive expert advice.

3.1.2 Hardware Interfaces

The system will support external hardware components that enhance plant monitoring and automation:

- **Soil Moisture Sensors:** Measures real-time soil moisture levels to provide accurate watering schedules.
- **Weather API Integration:** Fetches temperature, humidity, and rainfall predictions to optimize plant care.
- **Camera Support:** Allows users to upload plant images for disease detection.

All hardware interactions will be facilitated through a standard **read interface**, ensuring compatibility with multiple sensor types.

3.1.3 Software Interfaces

The Sustainable Gardening Companion will integrate with various external and internal software systems:

- **Weather API:** Provides real-time weather updates to influence watering schedules.
- **User Authentication System:** Ensures secure login and data access.
- **Database Management System (DBMS):** Stores user plant data, watering logs, and community discussions.
- **Pest Diagnosis AI Module:** Processes uploaded images and provides disease insights.
- **User Interfaces** – A dashboard for plant management, alerts, and recommendations.
- **Hardware Interfaces** – Optional IoT sensors for soil moisture and environmental monitoring.
- **Software Interfaces** – RESTful APIs for weather data.

3.2 Functional Requirements

Functional requirements define the expected behavior of the system. Below is a list of key functionalities the Sustainable Gardening Companion must provide:

3.2.1 User Management

- **F1:** Users shall be able to register and log in securely.
- **F2:** Users shall be able to update their profile and manage their gardening preferences.

3.2.2 Plant Monitoring and Care

- **F3:** Users shall be able to add plants and receive personalized care recommendations.
- **F4:** The system shall notify users of upcoming watering schedules based on weather and soil moisture levels.
- **F5:** Users shall be able to upload images for pest identification and receive diagnosis results.

3.2.3 Community Interaction

- **F6:** Users shall be able to post questions and share gardening tips on the community forum.
- **F7:** The system shall allow users to comment on and like posts for engagement.

3.2.4 System Management

- **F8:** Administrators shall be able to monitor platform activity and manage user data.
- **F9:** The system shall log user interactions for analytics and future improvements.
- **F1:** Users shall be able to register, log in, and manage accounts.
- **F2:** Users shall receive personalized plant care recommendations.
- **F3:** The system shall notify users of watering schedules based on real-time conditions.
- **F4:** Users shall be able to identify pests and receive recommended actions.
- **F5:** The forum shall enable users to post questions and share insights.

3.3 Use Case Model

The use case model provides a structured representation of user interactions within the system. Below is an example use case:

3.3.1 Use Case #1: Plant Watering Notification

- **Author:** Team Member
- **Purpose:** To notify users about watering schedules based on weather and soil conditions.
- **Requirements Traceability:** Linked to functional requirement F4.
- **Priority:** High
- **Preconditions:** The user has added at least one plant to their profile.
- **Postconditions:** The user receives a notification to water their plants.
- **Actors:** User, Weather API
- **Flow of Events:**
    1. System retrieves real-time weather and soil moisture data.
    2. System determines if the plant requires watering.
    3. If watering is required, the system sends a notification to the user.
    4. User marks the plant as watered or snoozes the reminder.

3.3.2 Use Case #2: Pest Identification

- **Author:** Team Member
- **Purpose:** To allow users to diagnose plant diseases based on image input.
- **Requirements Traceability:** Linked to functional requirement F5.
- **Priority:** High
- **Preconditions:** User has a registered account and has uploaded an image.
- **Postconditions:** The system provides pest identification results and suggested actions.
- **Actors:** User, Pest Diagnosis AI Module
- **Flow of Events:**
    1. User uploads an image of the affected plant.
    2. System processes the image using the AI-based diagnosis module.
    3. System matches the symptoms to known pest or disease patterns.
    4. System provides recommendations for pest control or disease treatment.
    5. User can apply the recommendations and update the plant status.
       Use Case #1: Pest Identification and Management
- **Actor:** User
- **Preconditions:** User is logged in and provides plant condition details.
- **Postconditions:** The system identifies potential pests and suggests solutions.
- **Flow of Events:**
    1. User selects the “Identify Pest” feature.
    2. User inputs plant symptoms or pest details.
    3. The system provides a list of potential pests and treatment options.

4 Other Non-functional Requirements

4.1 Performance Requirements

Performance requirements ensure that the system functions efficiently under different conditions. The Sustainable Gardening Companion must meet the following performance standards:

- **P1:** The system shall load the main dashboard within **2 seconds** under normal internet conditions.
- **P2:** Watering schedule calculations based on weather data shall be processed within **5 seconds** of a request.
- **P3:** The system shall support at least **1,000 concurrent users** without significant performance degradation.
- **P4:** Image-based pest identification shall return results within **10 seconds** after image submission.
- **P5:** The system shall refresh real-time weather data every **15 minutes** to provide accurate gardening recommendations.
- **P1:** Dashboard shall load within 2 seconds under normal conditions.
- **P2:** The system shall support 1,000 concurrent users without degradation.

4.2 Safety and Security Requirements

Security is essential to protect user data, prevent unauthorized access, and ensure system integrity. The following safety and security measures must be implemented:

- **S1:** Users must authenticate using a **secure login system** (email and password with optional two-factor authentication).
- **S2:** All sensitive user data, including plant records and personal details, shall be **encrypted using AES-256** before storage.
- **S3:** Role-based access control (RBAC) shall be enforced to restrict access to administrative features and user data.
- **S4:** The system shall **log all access and modifications** to user data for security audits.
- **S5:** Secure HTTPS communication shall be enforced to prevent **data interception and unauthorized access**.
- **S6:** The platform shall undergo **regular security updates** to mitigate vulnerabilities.
- **S1:** User authentication shall be required for accessing personal data.

- **S2:** All data shall be encrypted using AES-256.
- **S3:** Secure APIs shall be used to protect user information.

4.3 Software Quality Attributes

The Sustainable Gardening Companion must meet high software quality standards to ensure reliability, maintainability, and usability.

4.3.1 Reliability

- **R1:** The system shall maintain **99.9% uptime** to ensure uninterrupted access for users.
- **R2:** Automatic **daily database backups** shall be performed to prevent data loss.
- **R3:** The system shall implement **error-handling mechanisms** to recover from failures with minimal user disruption.

4.3.2 Usability

- **U1:** The platform shall feature a **responsive and intuitive UI**, allowing users to navigate easily on desktop and mobile devices.
- **U2:** The system shall include **tooltips and guided walkthroughs** to help new users understand the features.
- **U3:** Accessibility features such as **text-to-speech and high-contrast mode** shall be available for users with disabilities.

4.3.3 Maintainability

- **M1:** The system shall follow a **modular architecture**, allowing developers to add new features without affecting existing functionality.
- **M2:** The codebase shall be **well-documented**, following industry-standard commenting and formatting conventions.
- **M3:** Regular **performance optimizations and bug fixes** shall be scheduled every three months.

4.3.4 Security

- **SEC1:** All user passwords shall be **hashed and salted** to prevent unauthorized access.
- **SEC2:** Users shall be automatically **logged out after 15 minutes** of inactivity.
- **SEC3:** The system shall be **tested for vulnerabilities** using security assessment tools before each major release.
- **Reliability:** 99.9% uptime, daily backups.

- **Usability:** Intuitive UI with accessibility features.
- **Maintainability:** Modular architecture for easy updates.

---

5 Other Requirements

This section defines additional requirements not covered elsewhere in the document.

5.1 Database Requirements

- The system shall use a relational database to store user and plant-related data.
- Daily backups shall be performed to prevent data loss.

5.2 Internationalization and Localization

- The system shall support multiple languages and allow users to choose their preferred units (e.g., Celsius/Fahrenheit).

5.3 Legal and Compliance Requirements

- The system shall comply with data privacy laws and allow users to delete their data upon request.

5.4 Scalability

- The architecture shall be modular and capable of handling an increasing number of users and features.

5.5 Future Enhancements

- Future updates may include AI-driven plant health analysis and automated irrigation system integration.

Appendix A – Data Dictionary

This data dictionary tracks all the different variables, states, and functional requirements described in this document. It includes a list of constants, state variables (and their possible states), inputs, and outputs, along with their descriptions and any related operations.

Attribute Name	Data Type	Description
UserID	Integer	Unique identifier for each user.
Username	String (50)	The name chosen by the user for login.
Email	String (100)	User's registered email address.

Password	String (Encrypted)	Encrypted user password used for authentication.
PlantID	Integer	Unique identifier for each plant in the user's garden.
PlantName	String (100)	Name of the plant species.
WateringSchedule	Date/Time	Recommended watering schedule for the plant, based on weather and soil data.
PestID	Integer	Unique identifier for detected pests affecting plants.
PestDescription	Text	Detailed description of symptoms and recommended treatments for identified pests.
ForumPostID	Integer	Unique identifier for each forum discussion post.
WeatherCondition	String	Real-time weather conditions affecting the garden (e.g., temperature, humidity, rainfall).

Appendix B - Group Log

This section captures the key meetings and activities undertaken by the team during the development of the Sustainable Gardening Companion SRS. It details the dates, participants, agenda, and outcomes of each meeting, helping to determine the overall effort invested in this project.

Date	Meeting Agenda/Activity	Participants	Key Outcomes
01/03/2025	**Project Kickoff & Brainstorming:** - Introduction to project goals. - Defining the scope and initial roles.	V. Satwik, I. Lokesh, P. Prudhvi, B. Sravani, A. Sathvika, B. Aishwarya, N. Senapati, K. Sanjay	Established project scope and initial SRS draft; assigned team roles; gathered preliminary requirements.
02/03/2025	**Requirements Discussion & UI/UX Review:** - Detailed discussion on functional and non-functional requirements. - Initial review of user interface design concepts.	All team members	Finalized core functionalities and performance criteria; began drafting the data dictionary and interface requirements.
03/03/2025	**System Architecture & Interface Meeting:** - Reviewed external and internal interface requirements. - Discussed integration with hardware and software components.	All team members	Consolidated external interface requirements, clarified integration points, and updated SRS accordingly.
04/03/2025	**Final Review & Compilation:** - Final proofreading of	All team members	Completed the final version of the SRS document; recorded meeting minutes and finalized

	the SRS document. - Ensured consistency and completeness across all sections.		group contributions.

This log demonstrates the collaborative effort and systematic approach taken by the team to produce a comprehensive SRS for the Sustainable Gardening Companion.