Software Requirements Specification

for

CropCare: A Platform for Sustainable Farming in Bangladesh

Version 1.1 approved

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Revision History

Name	Date	Reason for Changes	Version
Shuvo	20/03/2023	Initial draft	1.0
Shuvo	30/04/2023	Added UI/UX design specification	1.1

1. Introduction

1.1 Purpose

This document specifies the software requirements for CropCare, a mobile platform for sustainable farming in Bangladesh. This is version 1.0 of the SRS.

The scope of this product includes the development of a mobile application that will provide farmers with access to information and resources to promote sustainable farming practices. The application will be designed to run on both Android and iOS platforms.

The purpose of this software is to provide a platform for farmers to learn about and implement sustainable farming practices, such as crop rotation, soil conservation, and pest management. The software will also provide a marketplace for farmers to buy and sell agricultural products and connect with other farmers.

1.2 Document Conventions

This document adheres to the IEEE standard template for software requirements specification. The requirements are presented in a structured format with numbered sections and subsections. Each requirement is classified as either functional or non-functional, and is assigned a priority level. The priority levels are used to indicate the importance of each requirement in relation to the overall project goals. Additionally, standard formatting conventions have been followed to ensure consistency throughout the document.

1.3 Intended Audience and Reading Suggestions

This software requirements specification is intended for developers and project managers who are involved in the development of the CropCare mobile platform. Developers should carefully review the functional and non-functional requirements outlined in this document. Project managers can use this document as a reference for project planning and scheduling. Additionally, potential users of the CropCare platform, such as farmers or agricultural businesses, may also find this document helpful to understand the scope and purpose of the software.

1.4 References

This Software Requirements Specification (SRS) document is based on the IEEE Standard for Software Requirements Specifications (IEEE Std 830-1998).

Template for System Requirement Specification Documents. Retrieved from https://goo.gl/nsUFwy.

2. Overall Description

2.1 Product Perspective

CropCare is a mobile platform that aims to provide sustainable farming practices and crop management tools to farmers in Bangladesh. The platform will consist of a mobile application for farmers and a web-based dashboard for agricultural experts and administrators. CropCare will be a new, self-contained product. The software will interface with existing agricultural databases and resources to provide farmers with the most up-to-date information on crop management practices.

The CropCare mobile platform needs to meet specific performance and quality standards within a set budget and timeline. Investors require features such as real-time crop tracking, inventory management, and payment processing. The platform must have a user-friendly interface on both mobile and desktop devices, be scalable, and use cost-effective technologies. Ultimately, the platform needs to meet investors' expectations for high-quality crop management and payment processing.

2.2 Product Functions

The CropCare platform will provide the following major functions:

- Farmers can access information on crop management practices, such as planting schedules, fertilizer recommendations, and pest management strategies. The mobile application will also provide personalized recommendations based on the farmer's location, soil type, and crop type.
- Farmers can receive weather alerts and pest and disease management advisories based on real-time data from weather and pest monitoring systems.
- Farmers can access a marketplace to buy and sell agricultural inputs and products, such as seeds, fertilizers, and pesticides.
- Farmers can connect with agricultural experts and peers to share knowledge and best practices through community forums and direct messaging.
- Agricultural experts and administrators can access real-time data on crop yields, soil health, and weather patterns to make informed decisions and provide personalized recommendations to farmers. The web-based dashboard will also allow experts to manage and update the platform's content and features.

2.3 User Classes and Characteristics

The following user classes are anticipated to use CropCare:

- **Farmers:** users of the mobile application who are engaged in farming activities.
- **Agricultural experts:** users of the web-based dashboard who provide guidance and support to farmers.

- **Administrators:** users of the web-based dashboard who manage the platform and its content. Users of the mobile application will vary in technical expertise and experience, but all will have a basic understanding of how to use a smartphone.

2.4 Operating Environment

CropCare will operate on smartphones running Android and iOS operating systems. The web-based dashboard will require a web browser and an internet connection. The software will interface with existing agricultural databases and resources to provide farmers with the most up-to-date information on crop management practices.

2.5 Design and Implementation Constraints

The following constraints will limit the options available to developers:

- The platform must be able to operate on low-end smartphones and slow internet connections.
- The platform must be scalable to accommodate a large number of users.
- The platform must interface with existing agricultural databases and resources.
- The platform must adhere to industry standards and regulations.

2.6 User Documentation

The following user documentation components will be delivered along with the software:

- User manuals for the mobile application and web-based dashboard.
- Online help and tutorials for the mobile application and web-based dashboard.

3. System Requirements

3.1 System Features

Functional Requirements (FRs)

1. **System Login:**
   1.1. The system shall provide a login screen for users to enter their username and password.
   1.2. The system shall validate the user's credentials against the user database.
   1.3. The system shall allow access to authorized users only.
   1.4. The system shall provide a way for users to reset their password if forgotten.
   1.5. The system shall display an error message if an incorrect username or password is entered.

Priority Level: High

Precondition: User account information is available in the system

Cross-references: N/A

2. **Crop Identification**
   2.1. The system shall use image recognition technology to identify different types of crops planted in a farm.
   2.2. The identified crops shall be categorized and displayed on the user interface.
   2.3. The system shall have a high accuracy rate of at least 90% in identifying crops.
   2.4. The system shall provide additional information on each identified crop, such as growth stage, estimated time of maturity, and recommended harvesting time.

   Priority Level: High

   Precondition: Images of the crops are available in the system

   Cross-references: N/A

3. **Soil Analysis**
   3.1. The system shall analyze soil samples taken from the farm to determine the type and number of fertilizers and other soil additives needed.
   3.2. The analysis shall provide recommendations based on the type of crop to be planted, soil pH, nutrient content, and other relevant factors.
   3.3. The system shall display the soil analysis results and recommendations on the user interface.
   3.4. The system shall update the soil analysis data regularly to ensure accurate recommendations.

   Priority Level: High

   Precondition: Soil samples are taken and uploaded to the system

   Cross-references: 2.1, 4.1, 7.2

4. **Pest and Disease Management**
   4.1. The system shall provide recommendations on the most effective pest and disease management strategies based on crop type, location, and weather conditions.
   4.2. The recommendations shall be based on data collected from sensors, satellite imagery, and other sources.
   4.3. The system shall display the recommendations on the user interface.
   4.4. The system shall provide alerts to the user when pest and disease outbreaks are detected.

   Priority Level: High

   Precondition: Data collected from sensors and other sources are available in the system

   Cross-references: 2.1, 3.1, 5.1

5. **Irrigation Management**
   5.1. The system shall monitor soil moisture levels and provide recommendations on the appropriate time and amount of irrigation needed for optimal crop growth.

5.2. The recommendations shall be based on crop type, soil type, weather conditions, and other relevant factors.
5.3. The system shall display the irrigation recommendations on the user interface.
5.4. The system shall provide alerts to the user when soil moisture levels are too low or too high.

Priority Level: High

Precondition: Data collected from soil moisture sensors are available in the system

Cross-references: 2.1, 4.1

6. Harvest Planning

6.1. The system shall provide recommendations on the most optimal time to harvest crops based on weather, soil, and crop conditions.
6.2. The recommendations shall be based on crop maturity, market demand, and other relevant factors.
6.3. The system shall display the harvest recommendations on the user interface.
6.4. The system shall provide alerts to the user when the recommended harvest time approaches.

Priority Level: Medium

Precondition: Crop data and market demand data are available in the system

Cross-references: 2.1, 5.1, 7.2

7. Inventory Management

7.1. The system shall track the amount and type of seeds, fertilizers, pesticides, and other supplies used in the farm.
7.2. The system shall provide alerts when inventory levels fall below specified thresholds.
7.3. The system shall display the inventory data on the user interface.
7.4. The system shall allow the user to order supplies through the system.

Priority Level: Medium

Precondition: Inventory data is available in the system

Cross-references: 3.1, 4.1

8. System Logout:

8.1. The system shall provide a logout button or link for users to log out of the system.
8.2. The system shall clear the user's session and remove any saved login credentials.
8.3. The system shall redirect the user to the login screen after logout.

Priority Level: Medium

Precondition: User is currently logged into the system

Cross-references: N/A

9. Manage Content

9.1. The system shall provide access to administrators to view, edit, and delete content available in the system, such as articles, videos, and images.
9.2. The system shall allow administrators to add new content to the system.
9.3. The system shall provide version control for content, allowing administrators to revert to previous versions if necessary.

Priority Level: Medium

Precondition: Administrator account information is available in the system

Cross-references: N/A

10. Manage Users

10.1 The system shall provide access to administrators to manage user accounts in the system, such as creating new user accounts, editing existing ones, and deleting user accounts.
10.2. The system shall allow administrators to assign roles and permissions to users.
10.3. The system shall provide a way for administrators to reset user passwords if requested.

Priority Level: Medium

Precondition: Administrator account information is available in the system

Cross-references: 1.1, 8.1

3.2 Non-Functional/Quality Requirements

QA1: Performance: The system shall be able to process at least 1000 requests per second with an average response time of 500 milliseconds or less, and shall provide real-time recommendations to farmers.

Priority Level: High

Precondition: N/A

Cross-references: QA2

QA2: Security: The system shall use encryption and secure authentication methods to protect sensitive data and prevent unauthorized access.

Priority Level: High

Precondition: N/A

Cross-references: QA1, QA3

QA3: Scalability: The system shall be designed to handle future growth of the farm and its operations, with the ability to add new features and functionalities as needed.

Priority Level: Medium

Precondition: N/A

Cross-references: QA1, QA2

QA4: **Accessibility:** The system shall be accessible from different devices and operating systems with a user-friendly interface.

Priority Level: Medium

Precondition: N/A

Cross-references: QA5

QA5: **Availability:** The system shall be available for use 24/7 with a guaranteed uptime of at least 99%.

Priority Level: High

Precondition: N/A

Cross-references: QA1, QA4

QA6: **Maintenance:** The system shall have a minimum uptime of 99% and shall be designed with modularity and extensibility in mind, to facilitate regular updates and bug fixes without disrupting the overall functionality of the system.

Priority Level: Medium

Precondition: N/A

Cross-references: QA7

QA7: **Interoperability:** The system shall be able to integrate with other software tools used by farmers, such as accounting and finance software.

Priority Level: Low

Precondition: N/A

Cross-references: QA3, QA6

3.3 Project Requirements

1. **Technology Stack:** The software shall be developed using Python programming language and Django framework.
2. **Data Storage:** The system shall store user data in a secure and scalable cloud-based database.
3. **Testing and Deployment:** The system shall be thoroughly tested before deployment to ensure that it meets all functional and non-functional requirements.
4. **Effort Estimation:**

4.1. Total Human Resource Needed: 5 developers, 1 tester, 1 project manager.

4.2. Total Required Time: 6 months.

4.3. Total Budget: $500,000.

5. COCOMO Model:

5.1. Mode: Organic
5.2. Estimated lines of code: 50,000
5.3. Development Effort: 8 person-months
5.4. Development Time: 9 months
5.5. People Required: 4 developers, 1 tester, 1 project manager
5.6. Total Cost: $350,000.

4. Design and Interface Requirements

4.1 UML Diagrams

4.1.1 Use case diagram

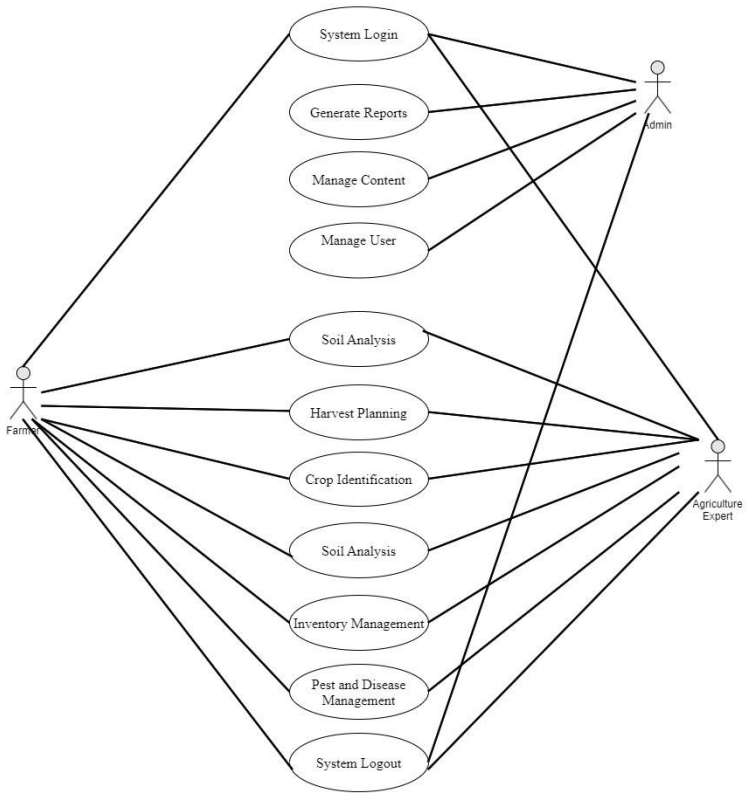

Figure 1: Use case diagram

4.1.2 Class diagram

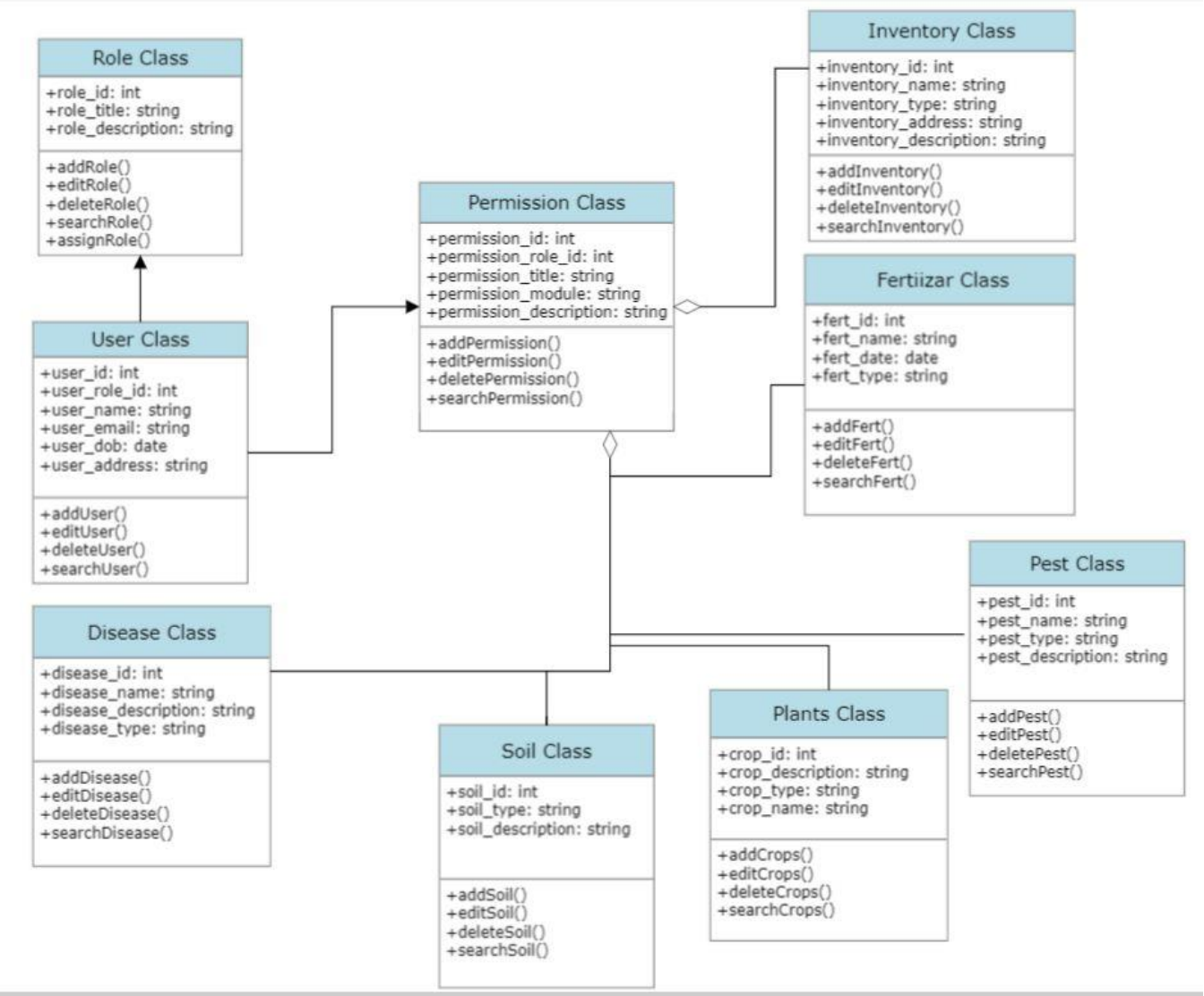

Figure 2: Class Diagram

4.1.3 Activity diagram

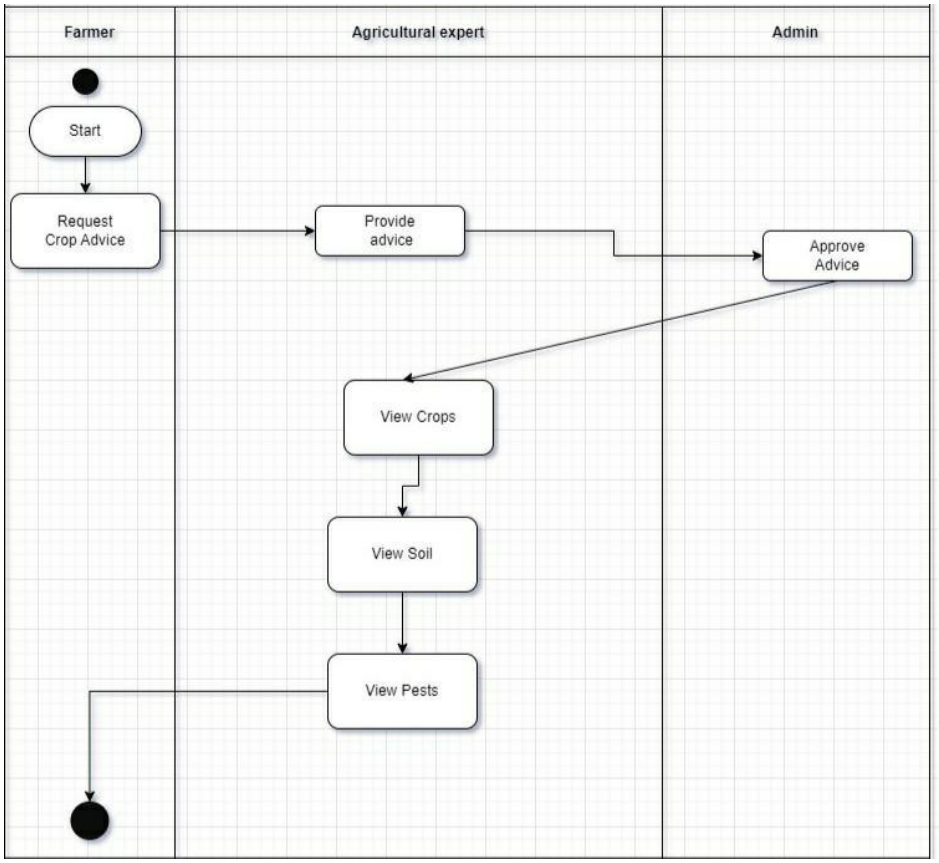

Figure 3: Activity Diagram

4.1.4 E-R diagram

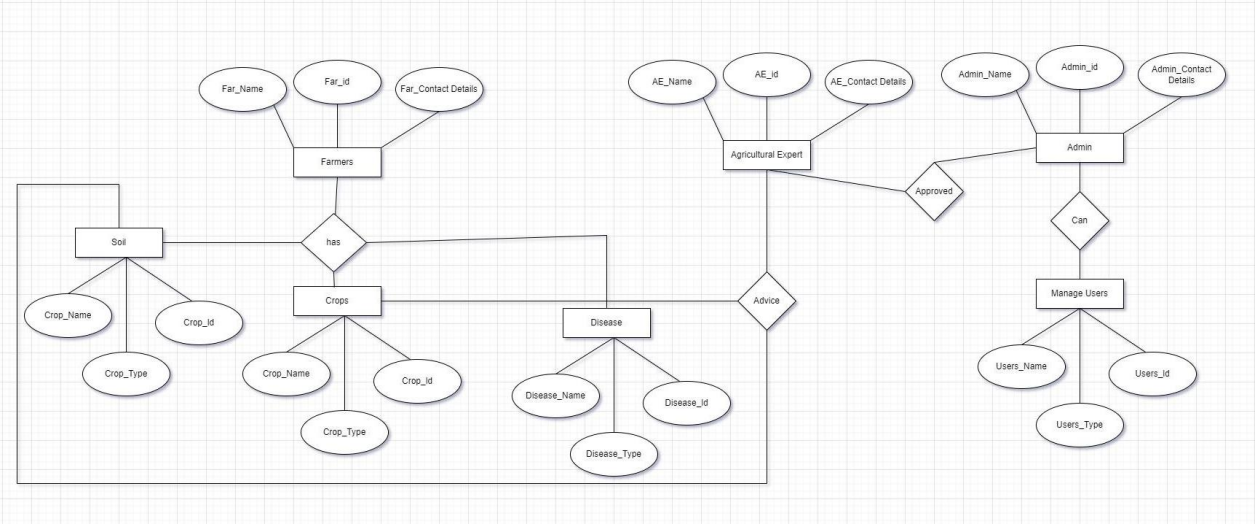

Figure 4: E-R Diagram

4.2 Data Dictionary

Entity	Attribute	Type/Size	Validation	Key
Farmers	Far_name	string(50)	Required	
Farmers	Far_id	int(10)	Required, Unique	Primary
Farmers	Far_Contact_Details	string(100)	Required	
Agricultural Expert	AE_Name	string(50)	Required	
Agricultural Expert	AE_id	int(10)	Required, Unique	Primary
Agricultural Expert	AE_Contact_Details	string(100)	Required	
Admin	Admin_Name	string(50)	Required	
Admin	Admin_id	int(10)	Required, Unique	Primary
Admin	Admin_Contact_Details	string(100)	Required	
Soil	Soil_Name	string(50)	Required	
Soil	Soil_Type	string(50)	Required	
Soil	Soil_id	int(10)	Required, Unique	Primary
Crops	Corp_Name	string(50)	Required	
Crops	Corp_Type	string(50)	Required	
Crops	Corp_id	int(10)	Required, Unique	Primary
Disease	Disease_Name	string(50)	Required	
Disease	Disease_id	int(10)	Required, Unique	Primary
Disease	Disease_type	string(50)	Required	
Manage Users	Users_Name	string(50)	Required	
Manage Users	Users_Type	string(50)	Required	
Manage Users	Users_id	int(10)	Required, Unique	Primary

4.3 UI/UX Design Specification

ABOUT CROPCARE

A PLATFORM FOR SUSTAINABLE FARMING IN BANGLADESH

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Figure 5: Home Page

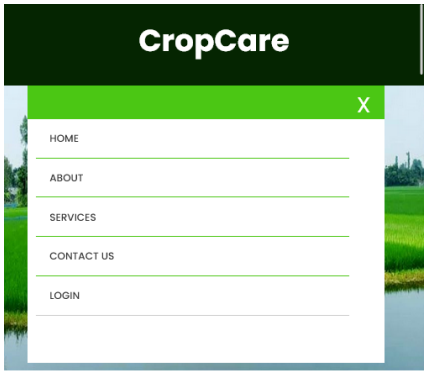

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Figure 6: Homepage with Menu

Figure 7: Application Status

Figure 8: CropCare Features

Figure 9: CropCare Features

GET IN TOUCGH

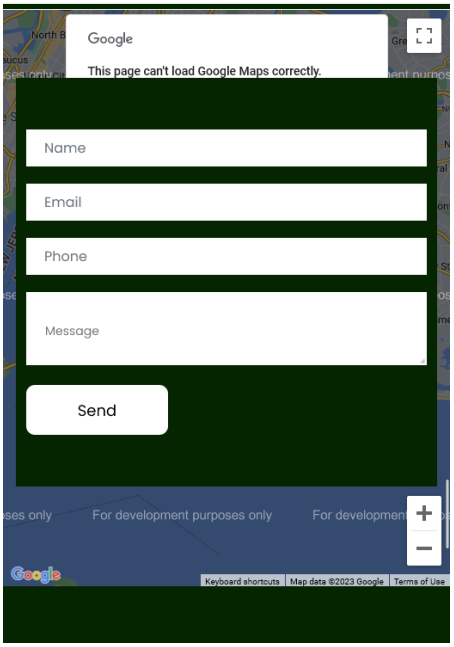

Figure 10: Contact Form