UNIVERSITY OF WESTMINSTER

INFORMATICS INSTITUTE OF TECHNOLOGY

Informatics Institute of Technology

School of Computing

5COSC021C.Y Software Development

Group Project

Project Proposal

Group Number: CS 82

Application Name: AgroLanka

Name	UOW ID	IIT ID
S. Promodi Silva	w2082753	20230105
Navinya Dewamiththa	w2082749	20230057
S.K.D. Ravindu Sandumith	w2084389	20230083
S.B. Akila Lochana	w2084726	20232599
S.L.G. Yuneth Samarasinghe	W2083120	20230127
R.M. Pujana Rathnayake	W2053219	20222362

Table of Contents

Declaration

We, the members of SDGP: CS 82, declare that the software requirements and features outlined in this proposal are based on our current understanding and research conducted as part of the Software Development Group Project on an agriculture-based application. This proposal is intended solely for academic purposes and reflects our efforts to design a conceptual application aimed at supporting sustainable agricultural practices. The specifications and features described herein are subject to change based on further research and feedback from our academic advisors.

(SDGP Group: CS 82)

1. Problem

1.1 Introduction to the Problem.

In today's world, many people unknowingly consume harmful chemicals and toxic vegetables. Despite the common advice to grow your own vegetables in small spaces and enjoy their flavors, there is still a lack of understanding regarding the benefits of home gardening. Many individuals often believe that planting just one or two plants in their small space will not yield any significant benefits. If they can look at their land and assess the land and make decisions about the types of plants they can grow, how many plants they can plant, how they can be planted, the potential yield, the amount needed for home consumption, the surplus and the income from selling the surplus, do they still ignore it.

The reliance on commercially grown produce introduces significant health risks due to the harmful chemicals and toxins often present in these foods. Additionally, there is a widespread lack of awareness regarding the numerous benefits of home gardening, which can provide fresh, safe, and sustainable food alternatives. Many people hold misconceptions about the feasibility of small-scale gardening, assuming it to be unproductive, and thus underestimate its potential impact. This mindset leads to the underutilization of available land, with small plots often left unused or minimally cultivated, bypassing opportunities for self-sufficiency and potential income. Moreover, without proper knowledge of suitable crop types, planting techniques, and yield optimization, individuals miss out on income that could be generated from selling surplus produce.

1.1.1 Problem Background and Stats

Problem Background

It is less known that many people consume commercially grown vegetables, which are mostly grown with the use of harmful chemicals and toxins. While there is an encouragement for people to utilize any available land for home gardening, most of them underrate the potential of small

spaces in terms of yields. This little knowledge will lead them to fresh and safe produce and even economic opportunities that come from a surplus harvest.

Benefits and Potential Impact

Among the many advantages of home gardening are:

• Availability of safe and fresh food, which lessens dependency on potentially hazardous commercial produce.

• The possibility to make extra money by selling extra produce, which promotes economic self-sufficiency.

• Support for sustainable living, since home gardens lessen the environmental impact of growing and distributing food.

Even on small plots, people can maximize their yields through effective land management, which has positive economic and health effects on both an individual and group level.

1.1.2 Example in the problem (Example Scenarios)

New Farmer Planning Crop Selection: A first-time farmer inputs their land details, such as size and soil quality, into the app. Based on the insights provided, they select crops that are well-suited for their land type and anticipated yield, ensuring a higher probability of successful farming in their first season.

Maximizing Profit with Market Insights: A farmer checks the app for yield predictions and real-time market prices before planting. They discover that a specific crop has a favorable market price trend, prompting them to adjust their crop selection for better profitability at harvest time.

Disease Prevention and Treatment: While inspecting their crops, a farmer notices unusual spots on some leaves. Using the app's disease identification feature, they take a picture, which diagnoses the disease and suggests effective treatment options, helping to protect the remaining healthy crops.

Efficient Water Management During a Drought: In a low rainfall season, a farmer uses the water requirement planning feature to understand the exact water needs for their chosen crops. The app suggests efficient irrigation techniques that help them save water while still providing adequate hydration for their crops.

Connecting with Local Buyers: After a successful harvest, a farmer lists their surplus produce in the app's marketplace. Local consumers can view and purchase directly from them, reducing food miles, minimizing waste, and providing fresh produce to the community.

Seasonal Planning with Weather Data: A farmer planning for the next season inputs upcoming weather forecasts and soil data into the app. The app recommends alternative crops or sowing dates based on projected rainfall, helping them adapt to changing weather patterns and maintain productivity.

1.1.3Attempted solutions of the competitions (with feature comparison chart)

Feature Category	**Krushi Advisor**	**SL Paddy Fertilizer**	**Crop Forecasting (Boga Purokath)**	**National Pest Surveillance**	**AgroLanka**
AR for measuring land distance	❌	❌	❌	❌	✅
Real-Time Weather Updates	✅	❌	❌	❌	✅
Weather Forecast & Alerts	✅	❌	❌	❌	✅
Watering Plans	✅	❌	❌	❌	✅
Offline Mode	✅	❌	❌	❌	✅
Yield Calculation	✅	✅	✅	❌	✅
Consumption & Sales Tracking	✅	✅	❌	❌	✅
Financial Tools	✅	✅	❌	❌	✅
Crop Placement & Yield Insights	✅	❌	❌	❌	✅
Disease Diagnostics	✅	❌	✅	✅	✅
Market Integration	✅	❌	❌	❌	✅

Pest Control	✅	❌	❌	✅	✅
Soil & Climate Analysis	❌	❌	❌	❌	✅
Plant Buying Suggestions	❌	❌	❌	❌	✅
Pest and Disease Surveillance	✅	❌	❌	✅	✅
Integrated Fertilizer Management	❌	❌	❌	❌	✅
Smart Irrigation Scheduling	❌	❌	❌	❌	✅
Crop Health Monitoring	❌	❌	❌	❌	✅

2.Propsed Solutions

- A mobile application designed as a personal garden planning assistant.

- Utilizes smart technology and data-driven solutions to simplify and enhance home gardening.

- Analyzes environmental conditions to recommend suitable plants and optimal growing techniques.

- The app uses Artificial Intelligence to provide personalized, data-driven recommendations, optimizing plant selection, layout, and resource management for successful home gardening.

3. Target Audience

- Urban Home Gardeners: Farmers interested in maximizing their small plots of land in urban areas to produce safe locally grown greens for their household needs and in some cases for small local markets.

- Sustainable Living Enthusiasts: Those who care about their well being, the well being of the environment and the ability to become more independent by producing their own food.

- Local Communities and Neighborhood Groups: Those families that may have been living in closely related Residential Parks where they may have a common garden area that is practically shared or any other group of people that may require such a company may be well suited to foster this type of gardening.

- Agricultural and Environmental Organizations: Organizations and agencies whose mandate is on environmental conservation and the promotion of sustainable farming practices might support or sponsor programmes on land management for food sufficiency.

- Educational Institutions: Schools, universities, or community centers that wish to implement programs with focus on useful and tangible approaches to teach people about sustainability, environment and farming.

- Small-Scale Entrepreneurs: Specifically, farmers interested in small business opportunities within home-grown fruits and vegetables or value-added products like jams, herbs among others.

- Health-Conscious Consumers: Those who are conscious about eating fresh foods that are not treated with chemicals may be concerned on how to grow their own foods at home.

4. Resource requirements

4.1 Hardware requirements

1. Mobile Device: Compatible Android/iOS device with GPS, camera, and internet access for real-time data, location-based services, and alerts.
2. Processor & RAM: Minimum of 2 GHz CPU and 2 GB RAM recommended for smooth operation, especially for AI processing.
3. Storage: ~500MB for data caching, plant and weather databases, and offline access.

4.2 Software requirements

1. Operating System: Android 9.0+ / iOS 13+.
2. Database: Local SQLite for offline data storage and caching.
3. Internet Connectivity: Necessary for real-time updates, such as weather, disease alerts, and market prices.

4.3 Technology Stack

1. Frontend:
    - Flutter or React Native for cross-platform mobile app development.

- Map APIs for geolocation and mapping (e.g., Google Maps API).
- Notification API for alerts and reminders (Firebase or iOS Push Notifications).

2. Backend:
    - Node.js with Express for API development.
    - Weather and Market APIs to integrate real-time data (e.g., OpenWeatherMap, AgriMarket APIs).
    - Machine Learning Frameworks: TensorFlow Lite or Core ML for AI-driven features like disease identification.
3. Database:
    - Firebase for real-time database support.
    - SQLite for offline storage and user history tracking.
4. Cloud Services:
    - AWS or Google Cloud for data storage, real-time analysis, and secure user data handling.

5. Features of the solution

Personalized Garden Planning Assistant

- Analyzes space using device cameras and user input to recommend plant placement and growing techniques tailored to the user's specific environment.

AI-Driven Recommendations

- Uses artificial intelligence to provide data-driven suggestions for plant selection, layout optimization, and efficient resource management.

Yield Calculator

- Estimates harvest quantities and economic benefits to help users understand the financial value of their home garden.

Seasonal Planting Calendar & Companion Planting Guide

- Provides a planting calendar based on seasonal changes and guides for companion planting to boost plant health and productivity.

Real-Time Monitoring and Resource Management

- Allows users to track plant growth, manage water and soil usage, and monitor harvest timing for optimal yields.

Community Feature

- Connects users to share experiences, trade surplus produce, and engage with local gardeners.

Family Size and Consumption-Based Planning

- Customizes recommendations for plant quantities based on family size and individual consumption needs.

Educational Resources & Troubleshooting Guides

- Offers resources on best gardening practices and step-by-step guides to tackle common gardening issues.

6.Our Research on this problem

During our visit to Govijana Madura, we met with the Agri Technology Director, Anura, who shared insights into the initiatives and technologies being applied to advance agriculture in Sri Lanka. Key takeaways include:

1. **Focus on Sustainable Agriculture**: Govijana Madura, in collaboration with institutes like the Institute of Post-Harvest Technology, emphasizes sustainable methods to maintain soil health and improve yields through environmentally friendly practices.
2. **Adoption of Modern Agri-Tech Solutions**: We learned about the application of new technologies, such as mobile apps for pest control and irrigation, which help farmers monitor crop health more efficiently and reduce losses due to pests and disease.
3. **Support and Training for Farmers**: The Department of Agrarian Development provides resources, workshops, and hands-on training to equip farmers with the knowledge and tools to implement these advanced techniques, helping them manage resources better and achieve higher productivity