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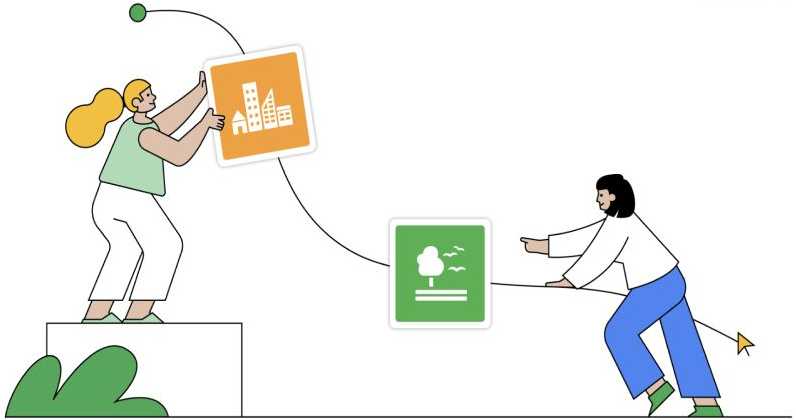
Solution Challenge



Team Details

a. Team name: Algnite
b. Team leader name: Vijai Suria M
c. Problem Statement: Harvesting the Future: AI Solutions for Smallholder Farmers

Brief about your solution - GreenIQ

- AI-powered mobile app for smallholder farmers, built with **Flutter** for cross-platform access.
- Provides **crop & fertilizer recommendations** using TensorFlow models based on soil health, crop rotation, and climate data.
- Detects **plant & pest diseases** through image input using GCP-hosted AI models.
- Delivers **personalized schedules** for fertilizer usage with real-time market pricing.
- Features a **multilingual voice-enabled chatbot** (Gemini + Google Cloud AI) for easy access to insights.
- Real-time **notifications and alerts** via Firebase Cloud Messaging for proactive decision-making.
- Centralized **analytics dashboard** powered by BigQuery for climate, soil, and crop data visualization.
- **Google Auth + Firebase** for secure login and email verification with user data stored.
- Supports **real-time scraping** of fertilizer prices, water levels, and climate data to ensure up-to-date recommendations.

Opportunities

a. How different is it from any of the other existing ideas?

- **End-to-end AI integration**: Combines crop planning, pest detection, fertilizer scheduling, and chatbot support—all in one app.
- **Localized & accessible:** Supports multilingual voice chatbot, real-time data scraping, and personalized insights tailored for smallholder farmers in developing regions.
- **Data-driven & personalized:** Combines user history (from Firestore) with climate, soil, and agricultural trends (from BigQuery) to deliver continuously refined and hyper-personalized recommendations.

b. How will it be able to solve the problem?

- Leverages **real-time climate, soil, and market data** to give hyper-local, actionable recommendations that are relevant and timely.
- Empowers farmers with **accessible AI tools and voice-based interaction**, improving adoption and trust in technology across rural regions.

Opportunities

c. USP of the proposed solution

- **All-in-one AI platform** for crop planning, pest detection, fertilizer advice, and farmer support.
- **Hyper-local insights** powered by real-time climate, soil, and market data from BigQuery.
- **Voice-enabled multilingual chatbot** ensures accessibility for farmers across literacy levels.
- **Smart recommendations** refined through user history and feedback stored in Firestore.
- **Built fully on Google technologies**, ensuring scalability, security, and seamless integration.
- **Real-time alerts and notifications** keep farmers updated on crop health, weather, and market trends.

List of features offered by the solution

- **Crop Recommendation System:** AI-based suggestions from rotation, soil, and climate data.
- **Fertilizer Guidance & Schedule:** Recommends product, quantity, and timing with live pricing.
- **Pest & Disease Detection:** Detects plant issues from images using TensorFlow models.
- **Multilingual Voice Chatbot:** Gemini-powered chatbot with voice/text in local languages.
- **Comprehensive Analytics Dashboard:** Shows irrigation, soil, weather, and crop trends via BigQuery.
- **Live Agri Data Integration:** Scrapes and updates fertilizer, water, and market data.
- **Instant Alerts & Notifications:** Real-time updates on weather, pests, and crop actions via FCM.
- **Secure & Verified Access:** Google Sign-In with email verification ensures safe access.
- **Image & Chat History Storage:** Saves media and chatbot history in GCS and Firestore.

Flow Diagram

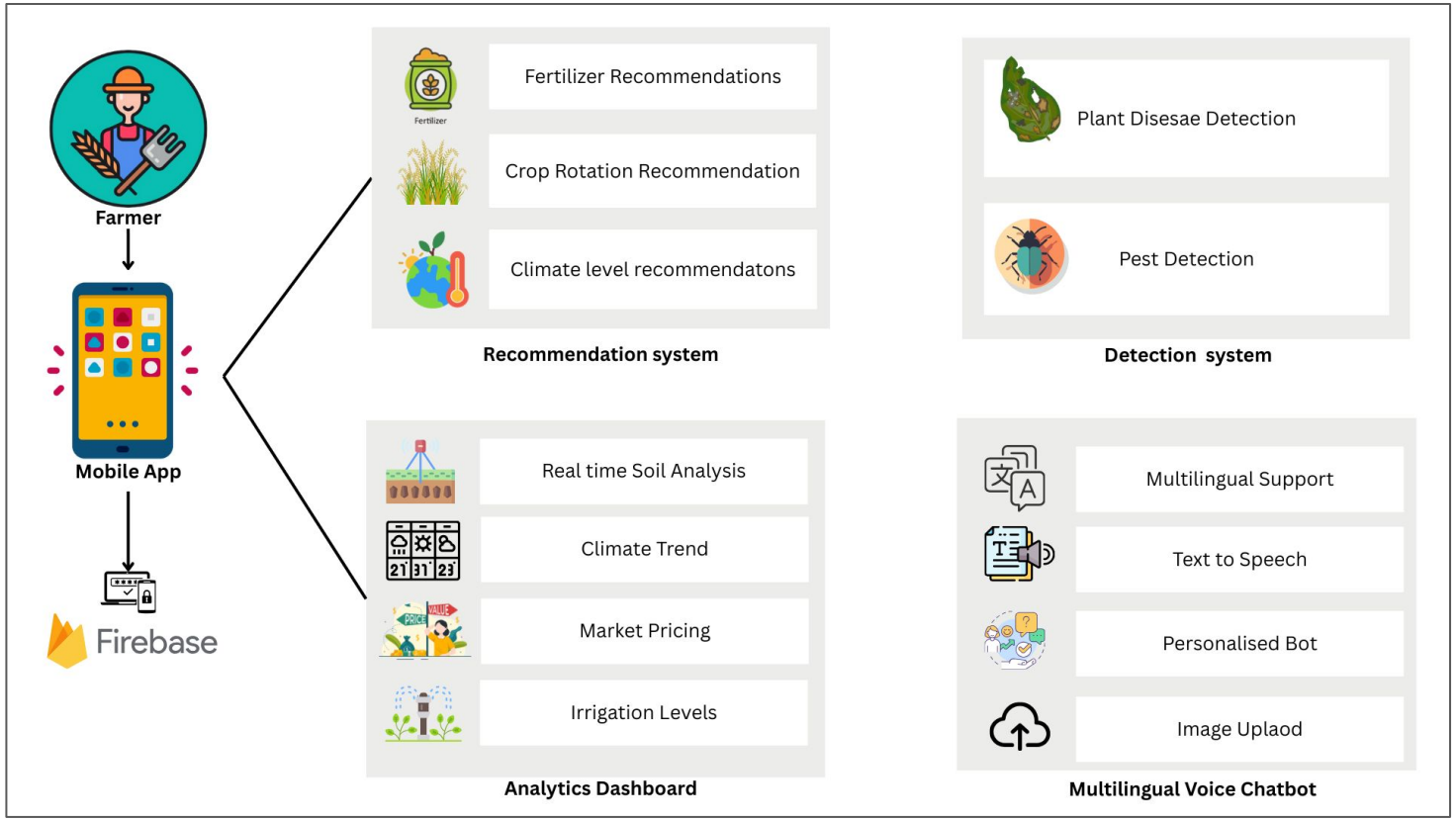


Figure - 1: List of features - GreenIQ

Architecture diagram of the proposed solution

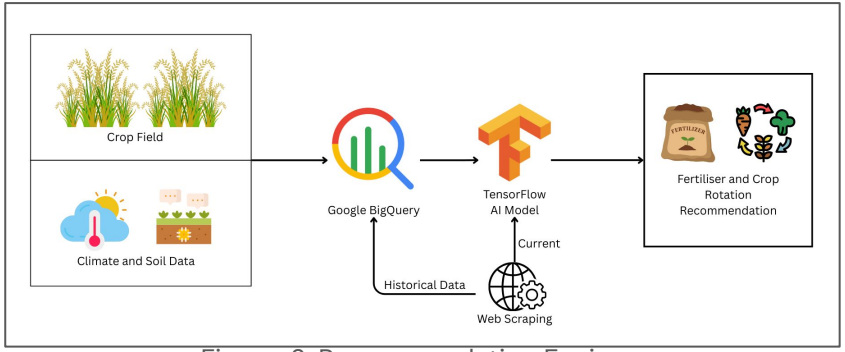


Figure-2: Recommendation Engine

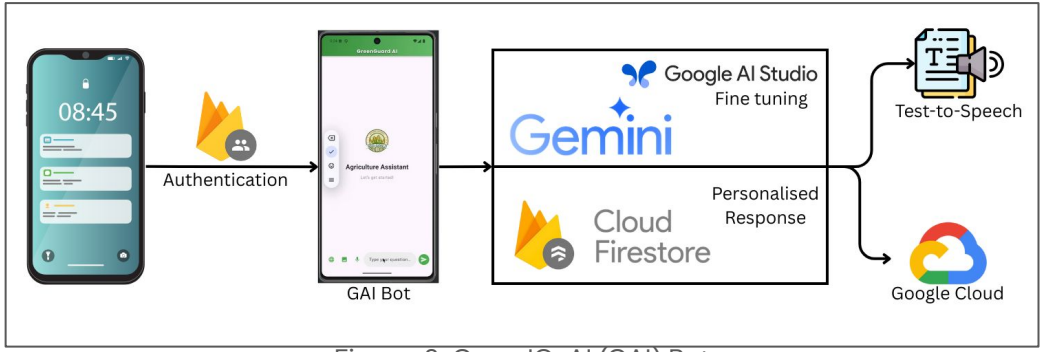
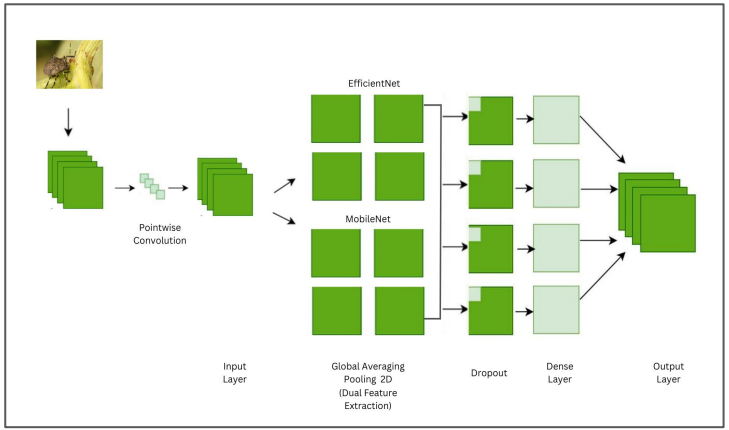


Figure-3: GreenIQ-AI (GAI) Bot



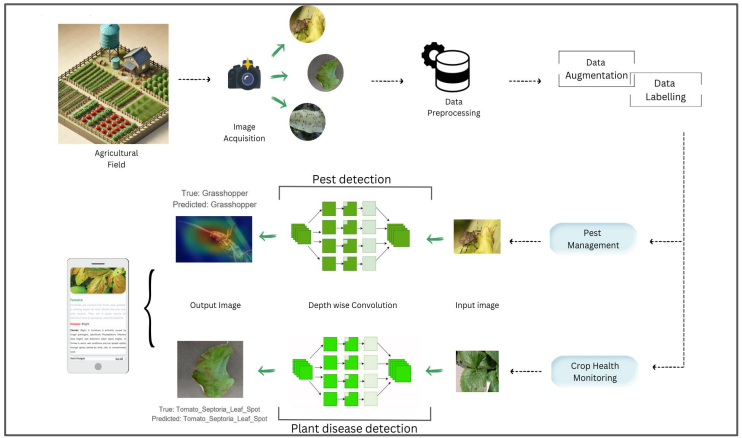


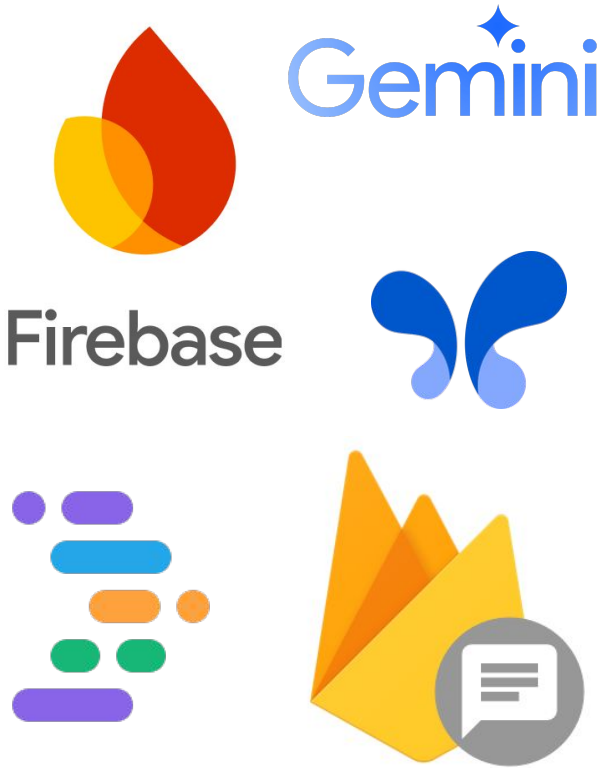
Figure - 3 & 4:
Working of Pest and Plant Disease AI Model

Technologies to be used in the solution

Tech Stack	Use Case
Flutter	Cross-platform mobile app development
Flask (Python)	Backend REST API for AI model integration and data handling
TensorFlow	AI models for crop recommendation and pest/disease detection
Google Cloud Platform	Model deployment, storage, and scalable infrastructure
BigQuery	Stores and analyzes climate, soil, market, and agri-trend data
Firestore (Firebase)	Stores chatbot history, user preferences, and app metadata

Technologies to be used in the solution

Tech Stack	Use Case
Firebase Auth	Handles secure user login, signup, and email verification
Firebase Cloud Messaging	Sends real-time alerts and personalized notifications to users
Google Cloud Storage	Stores user-uploaded images and media files securely
Gemini (Google AI)	Powers the multilingual, voice-enabled conversational chatbot
Google IDX	Cloud-based development environment for faster prototyping and deployment

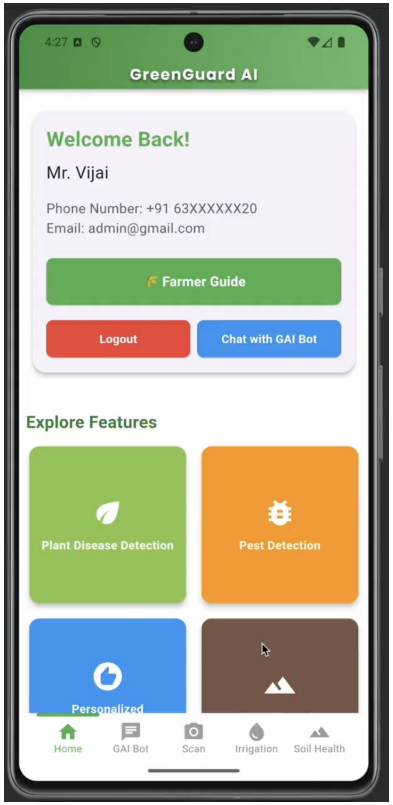


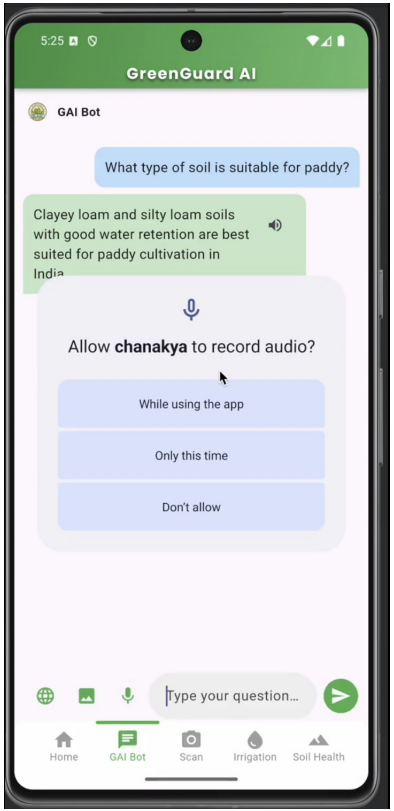
Estimated implementation cost (optional)

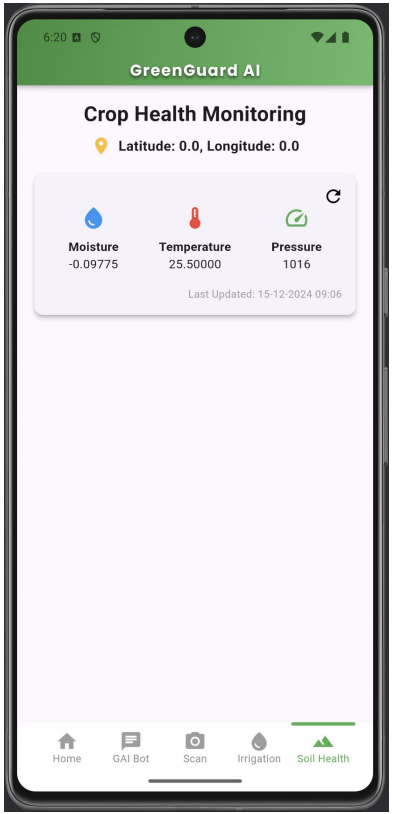
Component	Service	Estimated Cost (Monthly)	Notes
Cloud Infrastructure	GCP (Compute Engine, GCS)	$20–$30 (with Free Tier)	For hosting models, media storage & backend APIs
AI Services	TensorFlow + Gemini API	$10–$20	For model execution and chatbot interaction
Data Services	BigQuery, Firestore, FCM	$5–$10	Minimal cost for queries, notifications & data storage
Firebase Auth + Hosting	Firebase Authentication	Free (within usage limits)	Free tier supports generous number of users

📌 **Note:** Actual cost may vary based on usage, region, and scaling. GCP free credits can significantly reduce early-stage expenses.

Snapshots of the MVP







Additional Details/Future Development

✅ Full prototype design completed with finalized feature set after thorough requirement gathering.

🚧 60% of app UI and core backend functionalities have been implemented and tested.

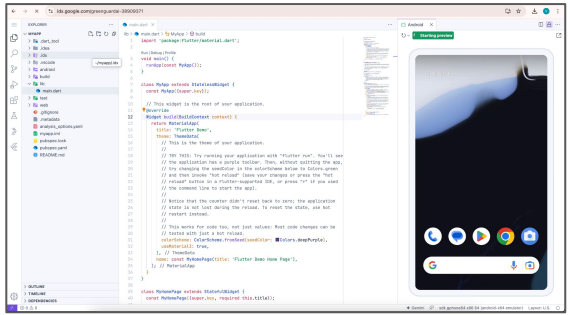
🎨 UI/UX enhancements in progress to improve usability and accessibility for rural users.

🧠 Plan to explore and integrate more AI-powered features like yield prediction and smart irrigation.

🌍 Focus on expanding language support and offline functionality for remote usage.

Project links

Title	Links
Demo Video Link (3 Minutes)	https://drive.google.com/file/d/1wRRMFoNhURYqsxIxwvqrLppy-KRXBimi/view?usp=sharing
GitHub Public Repository	https://github.com/vijaisuria/GreenIQ
MVP Link	https://vijaisuria.github.io/GreenIQ
Project SRS	https://docs.google.com/document/d/1S97G40ZpvbnmGmLkmOM0SmQDgprkqx8ejdwmtvBN3Ho/edit?usp=sharing



🙏 Special Thanks

Thank you to **Google** and **Hack2Skill** for the **$300 GCP credits**—they were a great help during development.

Google IDX made collaboration seamless, and its **GitHub + Gemini integration** even handled heavy tasks like running our Flutter Android app smoothly.

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Solution Challenge

Thank you