

AI-POWERED CROP HEALTH & BLOOM MONITORING

BloomWatch

Team Name: YEDAVAKDA

Team Members: 1) Harshada Dhamne

2) Mayur Khalse

3) Krushna lohakare

4) Samruddhi Kadam

Event: KodeKalesh 2025

Problem Statement

The Core Problem: A Disconnect from the Data

A critical disconnect exists in modern agriculture. Farmers are forced to rely on high-risk traditional guesswork for their **planting, irrigation, and fertilization decisions**, making them highly vulnerable to unpredictable climate shifts.

Meanwhile, terabytes of valuable, **real-time** geospatial data from **ISRO** and **NASA** satellite data that could solve these problems remain completely inaccessible. It is too raw, complex, and un-processed for a farmer on the ground.

Content

This 'last-mile' data gap creates a purely reactive farming model where problems like pest outbreaks and soil moisture loss are only identified after the damage is visible and irreversible. This inefficiency leads directly to systemic resource waste, higher operational costs for farmers, and significant environmental strain, all while limiting potential yield.

We need a 'translator' to bridge this gap between space-age data and on-the-ground decisions.

Our Solution

Continuously processes satellite imagery (MODIS, Sentinel-2) to monitor vegetation indices such as NDVI and EVI, providing up-to-date information on crop health across regions.

Integrates local weather data, including rainfall, temperature, and humidity trends, to understand environmental impacts on crop growth and potential stress factors.

Analyzes historical and current data to detect anomalies such as sudden drops in vegetation health that might signify pest attacks, disease outbreaks, or water stress before visible damage occurs.

Offers a user-friendly AI chatbot that provides personalized agricultural advice, such as fertilization schedules, irrigation recommendations, pest management strategies, and crop rotation tips based on real-time analytics.

Generates detailed reports in PDF and CSV formats that farmers can use for record-keeping, insurance claims, and consultations with agronomists or cooperative societies.

Key Features

Interactive GIS Map: Zoomable, time-slider enabled maps that show farm health changes over weeks, districts, or states using heatmaps of vegetation

Analytical Dashboard: Detailed graphs for rainfall, temperature, crop bloom, and stress tracking, enabling historical comparisons and future forecasts.

Crop Suggestion System: Based on soil type, moisture levels, climate, and historical yields, the system advises on optimal crop selection and rotation to maximize output.

Multilingual AI Chatbot: Supports English, Hindi, Marathi; provides real-time answers, alerts, and practical farming tips, breaking barriers in literacy and technology access.

Collaboration Portal: Enables communication and reporting among farmers, NGOs, and government bodies for more effective support and interventions.

BloomWatch Works

Platform allows monitoring over time, so farmers can compare seasonal or year-on-year health trends to adjust practices accordingly.

Satellite data is processed continuously to track vegetation indices like NDVI and EVI, highlighting crop health dynamics.

Correlates satellite data with weather information to provide a comprehensive picture of conditions affecting crops.

The AI chatbot communicates directly with farmers offering personalized advice on fertilizer use, irrigation timing, and pest control tailored to their region and crop type.

Data Integration

Uses Google Earth Engine APIs to gather and preprocess satellite data from MODIS and Sentinel-2, combined with Open-Meteo weather data for comprehensive environment monitoring.

AI & Analytics

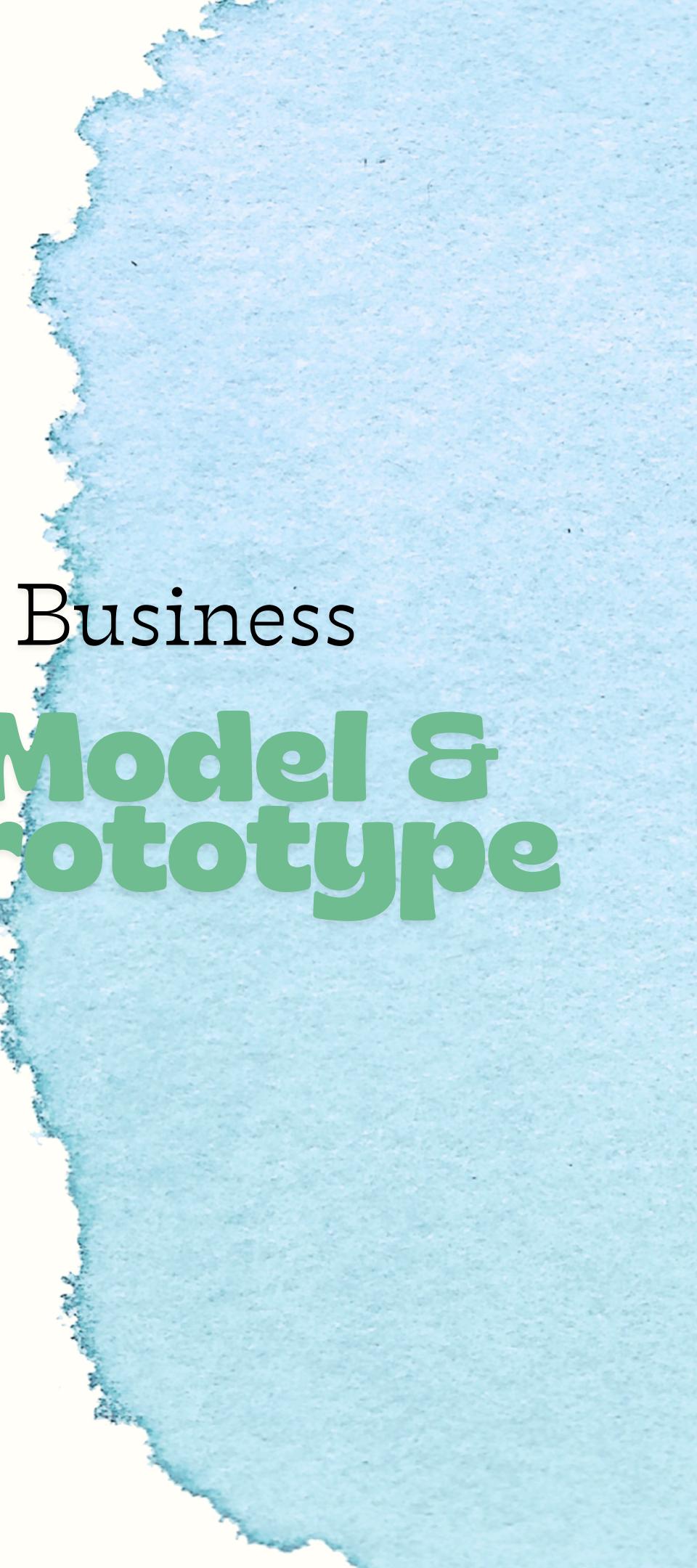
Utilizes Firebase Firestore for secure storage of user, farm geo-data, and prediction results; presents interactive dashboards and maps using React.js, Mapbox, and Plotly for real-time user insights.

Deployment & Accessibility

Implements machine learning models (Random Forest, LSTM in TensorFlow and Scikit-learn) to analyze vegetation patterns and predict crop stress, bloom likelihood, and pest risks.

Storage & Visualization

Containerized with Docker for scalable, cloud-based deployment; optimized for mobile and low-bandwidth rural environments to ensure accessibility to remote farmers.



Business Model & Prototype

Developer API allows seamless integration of BloomWatch data into other agriculture tech solutions.

Provides freemium basic features including chatbot, dashboards, and crop suggestions freely to farmers, promoting widespread adoption.

Subscription-based access unlocks advanced analytics, detailed regional reports, and exportable insights for agribusinesses, governments, and NGOs.

Prototype interfaces demonstrate intuitive interactive maps, Q&A chatbot sessions, and crop recommendation workflows.

IMPACT & ROADMAP

- Anticipated yield improvements of 20-30% through precise, data-driven farming practices based on early warnings and effective resource allocation.
- Significant reduction in losses caused by pests, drought, and nutrient stress, with proactive mitigation alerts.
- Future updates include incorporation of drone imagery for hyperlocal monitoring, expanded mobile applications, and support for more Indian regional languages.
- Developing a community platform where farmers share success stories, receive peer support, and engage with agricultural experts dynamically.
- Strategic partnerships aimed at national-level deployment to support governmental agricultural sustainability programs.