

SMART INDIA HACKATHON 2025

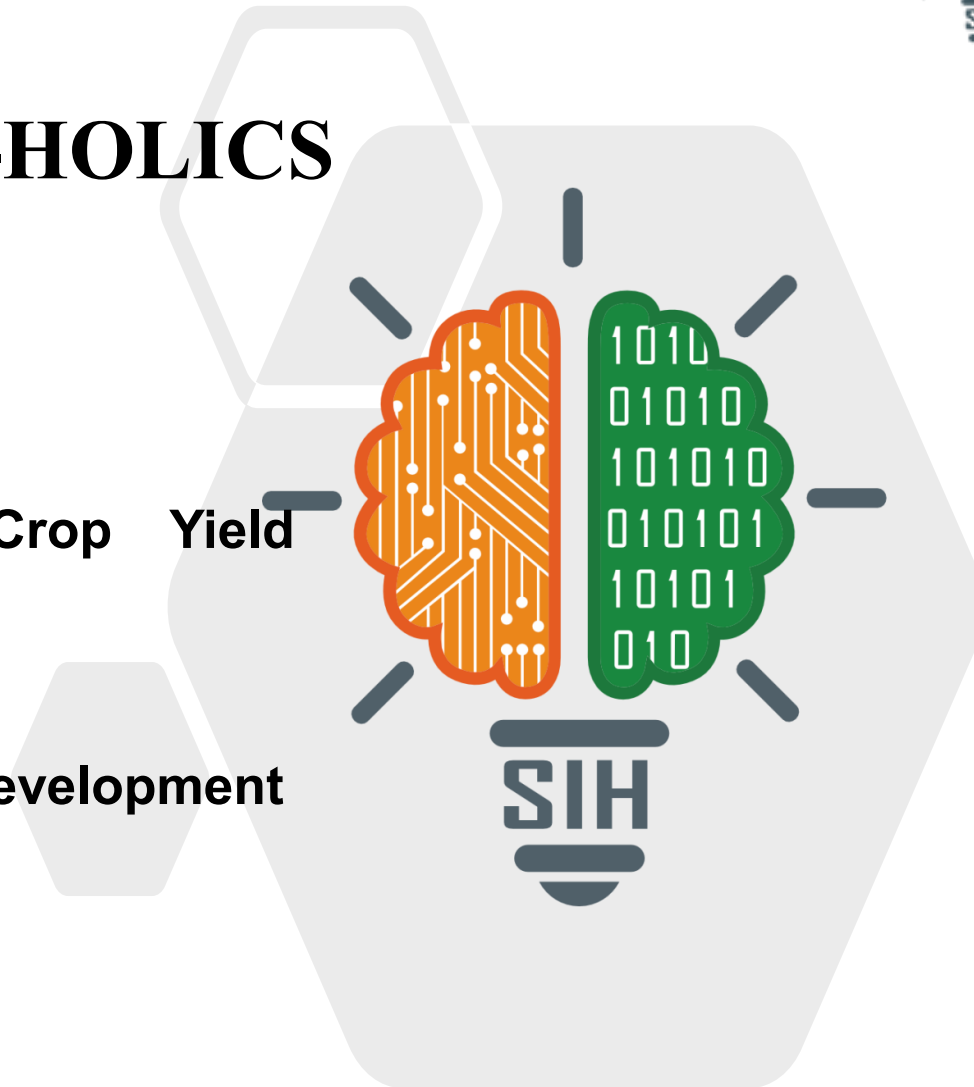


HACK-A-HOLICS

- Problem Statement ID – **SIH25044**
- Problem Statement Title- **AI-Powered Crop Yield**

Prediction and Optimization

- Theme - **Agriculture, FoodTech & Rural Development**
- PS Category- **Software**
- Team ID-
- Team Name : **HACK-A-HOLICS**



IDEA TITLE

Smart Grow is an AI-driven platform that predicts crop yields by analyzing historical agricultural data, real-time weather conditions, and soil health metrics. It delivers tailored, actionable recommendations on irrigation, fertilization, and pest control to optimize crop productivity for small-scale farmers

Detailed Explanation of the Proposed Solution

- **Data-Driven Yield Prediction:** Uses machine learning models trained on historical yield, weather, and soil data to forecast crop outputs accurately.
- **Personalized Farming Guidance:** Provides real-time, crop-specific advice on irrigation, fertilization, and pest control, adapting to local environmental factors.
- **Regional Language Support:** Ensures accessibility and ease of use for farmers by offering multi-language interfaces.
- **Offline Mode:** Enables farmers in low-connectivity areas to access core functionalities without internet.
- **Mobile & Web Platform:** Offers flexibility through a user-friendly app accessible via smartphones and web browsers

Innovation and Uniqueness of the Solution

- **AI-Driven Multi-Source Integration**
Combines **agriculture, weather, and soil data** to generate holistic, hyper-local crop yield predictions.
- **Dynamic, Context-Aware Recommendations**
Continuously updates farming advice based on **real-time conditions** and **farmer feedback** for maximum accuracy.
- **Offline-First Access with Local Language Support**
Runs without internet, supports **Odia voice, SMS, and IVR**—built for rural farmers using feature phones or low-end smartphones.
- **Built for Small-Scale & Marginal Farmers**
Designed to solve the challenges of **low-resource** farmers often ignored by large agri-tech platforms.

How It Addresses the Problem



Precision Farming for Smallholders

- Bridges the gap in data access by offering precise, science-based insights, replacing guesswork in farming decisions.



Optimizes Resource Use

- Helps reduce overuse of water, fertilizers, and pesticides, leading to cost savings and sustainable agriculture.



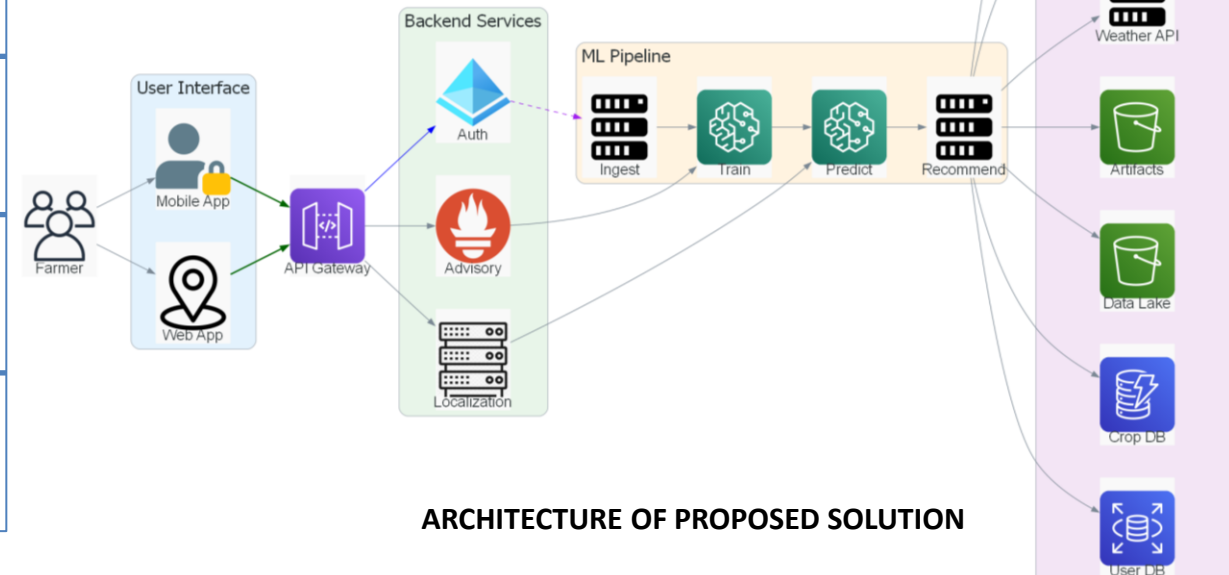
Enhances Crop Yields

- Empowers farmers to increase productivity by 10% or more through actionable, data-backed recommendations.



Local Adaptability

- Adapts to regional conditions and diverse crop types by integrating localized datasets and real-time updates.

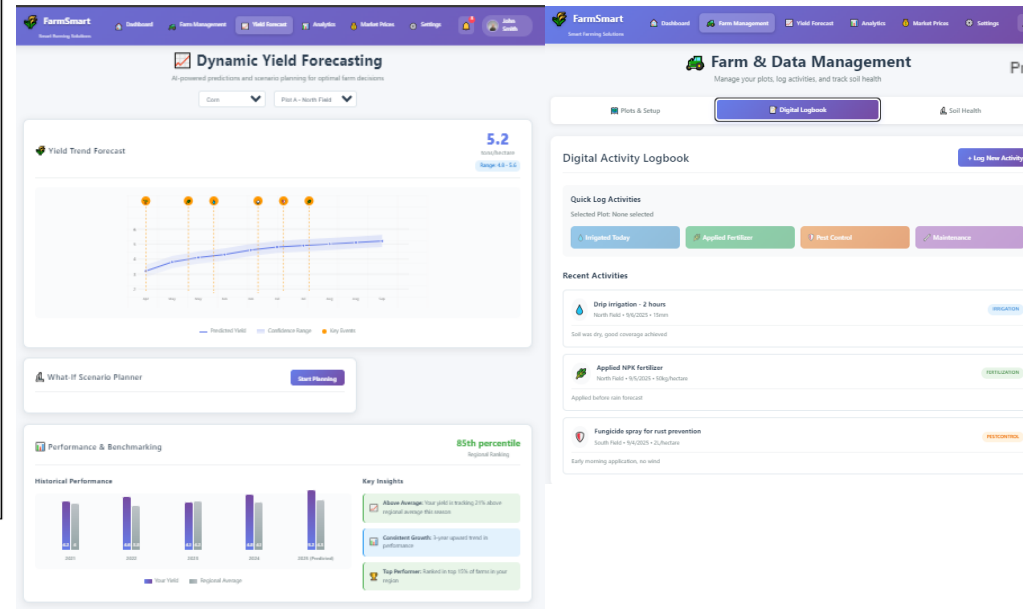
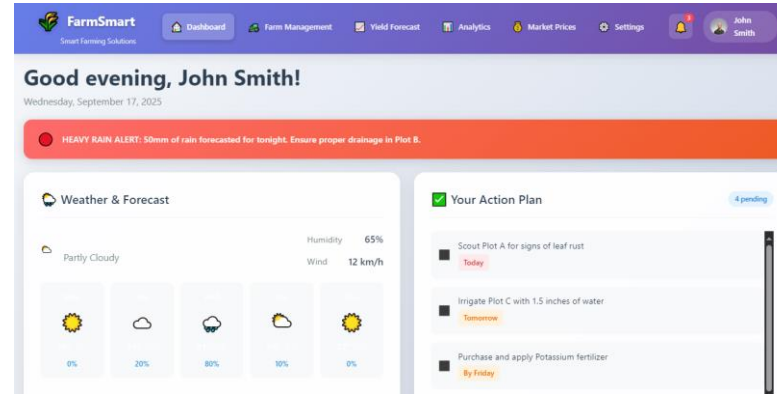
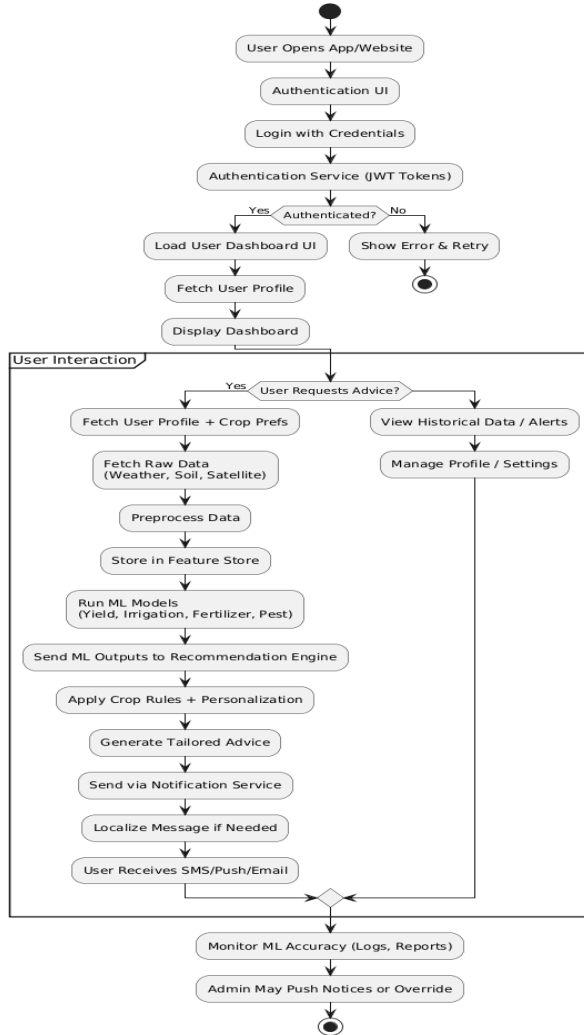


ARCHITECTURE OF PROPOSED SOLUTION

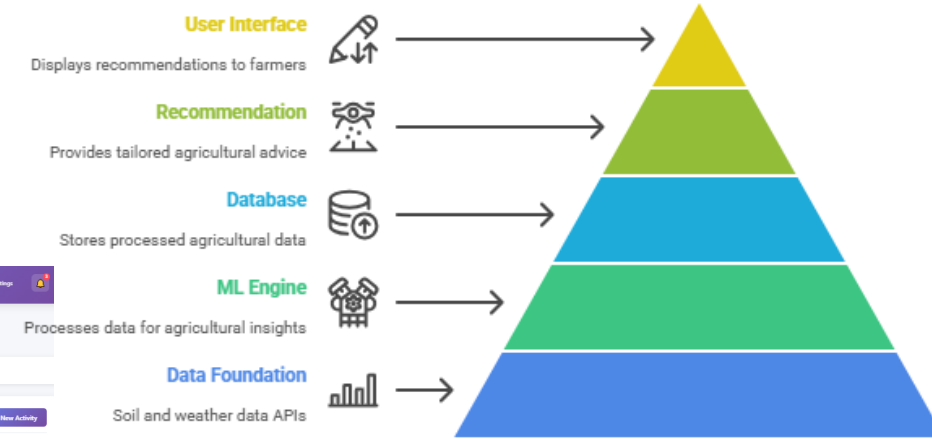
TECHNICAL APPROACH



Smart Agriculture Advisory System - Flowchart



Agri-Tech System Architecture



Made with Napkin

TECH STACK



Product Status: 75% product built completed and further build is on progress. Testing and validation process are next to be undergone

Challenges & Risks

Challenge	Description
Data Quality & Availability	Incomplete or outdated data may reduce model accuracy.
Low Digital Literacy Among Farmers	Difficulty in adoption due to unfamiliarity with tech.
Internet/Network Limitations	Limited connectivity in rural areas could affect real-time sync.
Model Bias / Generalization Issues	ML models may not work equally well for all crop types or regions.

Feasibility Analysis

Technical Feasibility

- Uses widely available technologies (ML frameworks, public APIs, cloud services).
- Lightweight mobile app ensures smooth use even on low-end devices.
- Offline mode and regional language support make it accessible to remote farmers.

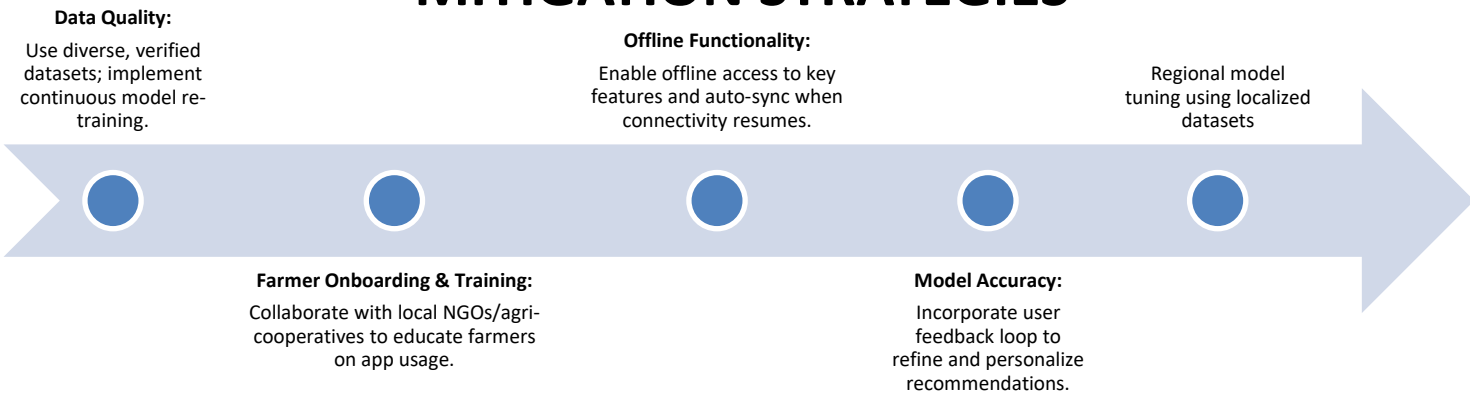
Operational Feasibility

- Easy-to-use interfaces tailored for non-tech-savvy users.
- Modular system allows phased development and testing.

Economic Feasibility

- Leverages open-source tools and APIs to minimize costs.
- Potential for government and agri-tech partnerships for funding and scaling.

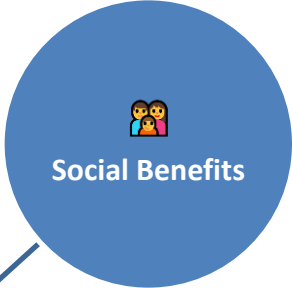
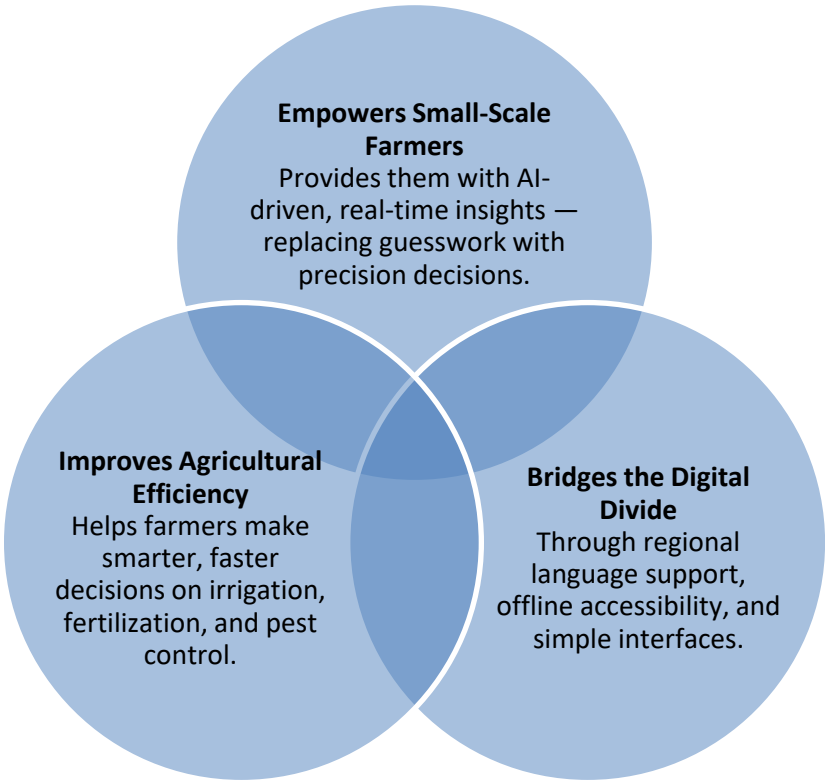
MITIGATION STRATEGIES



SmartGrow is a technically sound, cost-effective, and scalable solution tailored to the needs of small-scale farmers — with robust strategies in place to overcome real-world adoption and implementation challenges.

IMPACT AND BENEFITS

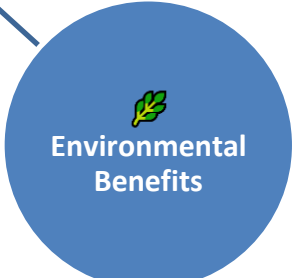
Empowering small-scale farmers with AI to boost yields, increase income, and promote sustainable, data-driven agriculture for long-term social and environmental impact.



- **Improved Livelihoods**
Higher crop yields and better planning lead to increased income for rural farmers.
- **Inclusive Technology**
Designed for users with low literacy or limited tech exposure.
- **Farmer Autonomy**
Empowers farmers with data-backed decisions, reducing dependence on middlemen.



- **Productivity Boost (10% or more)**
Optimized resource use and planning reduce input costs and increase output.
- **Reduced Crop Losses**
Early pest and weather alerts help prevent major losses.
- **Scalable Model**
Potential to expand regionally or nationally with low additional infrastructure.



- **Resource Optimization**
Reduces overuse of water, fertilizers, and pesticides.
- **Sustainable Farming Practices**
Promotes environmentally conscious agriculture through smarter inputs.
- **Climate Adaptation**
Real-time data helps farmers respond quickly to changing weather conditions

SmartGrow contributes to food security, economic upliftment of rural communities, and promotes sustainable agriculture — all while ensuring inclusivity and accessibility for the most underserved farming populations

To ensure accurate prediction and optimization in our AI-based crop yield platform, we have utilized reliable and government-backed agricultural data sources, covering weather, soil health, crop statistics, and market trends.

Primary Data Sources

data.gov.in

Government of India's open data portal – commodity pricing, crop data, weather patterns.

upag.gov.in

UP Agriculture Data API – crop, weather, and yield insights specific to Uttar Pradesh.

data.icristat.org

ICRISAT Crop Database – international and Indian crop research data.

indiastat.com

Comprehensive statistical data on Indian agriculture – area, production, yield by state/district.

desagri.gov.in

Department of Economics & Statistics (Agriculture) – APY reports (Area, Production, Yield).

agri.odisha.gov.in

Odisha Agriculture Department – regional crop and soil health statistics.

[OAS Agriculture Statistical Report \(PDF\)](#)

Detailed regional agri-report for crop planning and forecasting in Odisha.

How These Were Used:

- Model Training:** Historical yield & weather data (ICRISAT, DESAgri, UPAG)
- Real-time Inputs:** API integrations (data.gov.in, UPAG, Weather APIs)
- Localization:** Regional data and reports (Odisha Agriculture Portal, Indiatat)
- Validation & Benchmarking:** Government-published APY data and mandi pricing

Tools & Techniques

- ML Models Used:** Linear Regression, Random Forest, LSTM (for time-series prediction)
- Languages:** Python, JavaScript
- Platform:** Web App (with potential for mobile extension)
- APIs:** REST APIs from data portals + weather APIs (e.g., OpenWeather)



THANK YOU