



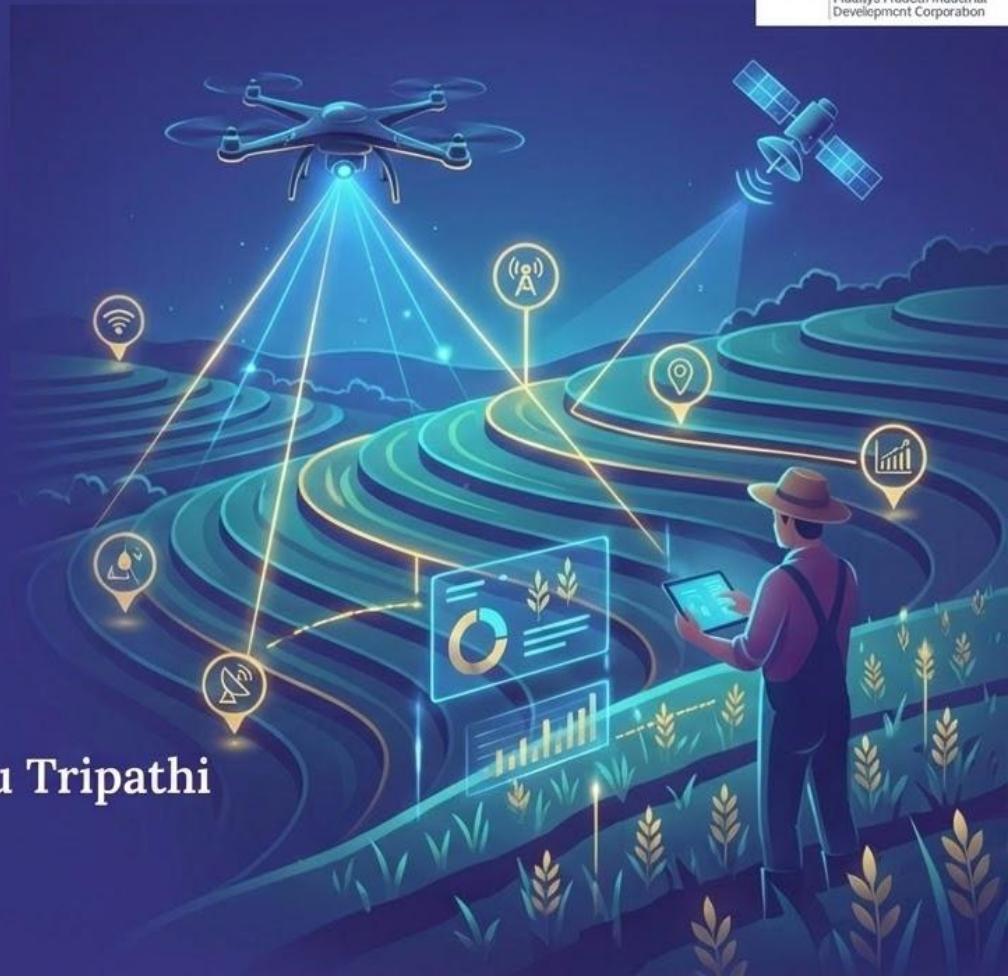
# HACK & MAKE /

**Code it. Build it. Ship it.**

A One-Day Intensive Innovation Sprint  
Hackathon + Makeathon + Export/ODOP Track

## Team Details:

- a. Team name: Phantom Force
- b. Team leader name: Priyanshu Tripathi
- c. Theme: Smart Farmer



## Problem Statement

- Farmers rely heavily on **experience and guesswork**
- Weather forecasts are **generic** and not crop-specific
- No visibility into future mandi prices
- Crop advisory is:
  - Non-personalized
  - Hard to understand
- Results in:
  - Crop losses
  - Poor market timing
  - Low and uncertain income

Farmers lack actionable, data-driven intelligence

## Solution

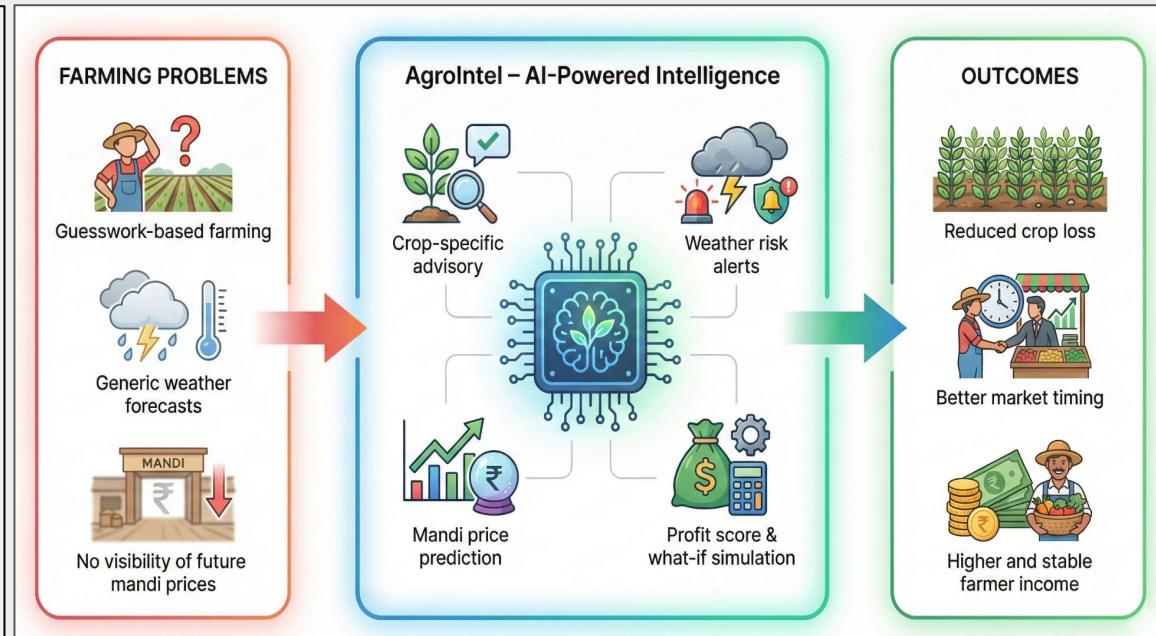
- An **AI-powered smart farming platform** for data-driven decision-making
- Provides **personalized crop advisory** based on crop type, location, and growth stage
- Delivers **crop-specific weather risk alerts** with preventive action suggestions
- Predicts **future mandi prices** to help farmers choose the best time to sell
- Increases **farmer profitability** by reducing uncertainty and improving decision accuracy
- Reduces **dependency on middlemen** through better market intelligence
- **Smart Government Scheme Recommendations** – Helps farmers discover & apply for relevant subsidies and schemes.

## Innovation

- **Crop-Specific Intelligence:** Insights tailored to each farmer's crop and location
- **Profit-First Farming Score:** Single score combining yield, weather risk, and market trends
- **Predictive Insights:** Forecasts future weather risks and mandi prices
- **Explainable AI:** Clear "why" behind every recommendation
- **What-If Simulator:** Test decisions before taking action
- **Farmer Community Platform:** Peer learning and experience sharing among farmers.

# How the Solution addresses the Problem

- **Replaces guesswork with data-driven decisions**  
KrishiBandhu uses AI and real-time data to guide farmers instead of relying only on experience.
- **Transforms generic weather forecasts into crop-specific alerts**  
Weather data is analyzed based on crop type and growth stage, providing actionable risk warnings and preventive steps.
- **Provides visibility into future mandi prices**  
Time-series ML models predict upcoming price trends, helping farmers choose the best time to sell.
- **Delivers personalized and easy-to-understand crop advisory**  
Recommendations are tailored to the farmer's crop, location, and stage, with clear explanations.
- **Simplifies complex analytics into clear decisions**  
The Profit-First Farming Score and What-If Simulator help farmers quickly understand profitability and test options before acting.
- **Reduces losses and increases income**  
By improving planning, risk management, and market timing, the platform directly improves farm outcomes.



**Farming Problems → AI-Powered Intelligence → Clear Actions → Better Outcomes**

# Technology Stack

## 1. USER INTERFACE LAYER

Purpose: Farmer interaction & alerts

- Mobile App: Flutter / React PWA
- Multilingual + Voice Input
- Offline Mode (Low Internet Areas)
- Charts & Alerts Dashboard

## 2. BACKEND & API LAYER

Purpose: Logic, control, communication

- Backend Framework: FastAPI (Python)
- API Style: REST APIs
- Authentication: JWT + OTP
- API Gateway: NGINX

## 3. AI / ML INTELLIGENCE LAYER

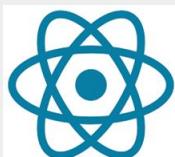
Purpose: Decision-making brain

- Crop Advisory: Random Forest / XGBoost
- Weather Risk Engine: Rule + ML Based
- Price Prediction: LSTM / Prophet
- Explainable AI (Reason-based outputs)

## 4. DATA & STORAGE LAYER

Purpose: Reliable data foundation

- Relational DB: PostgreSQL
- NoSQL DB: MongoDB
- Cache Layer: Redis
- External APIs: Weather & Mandi Data



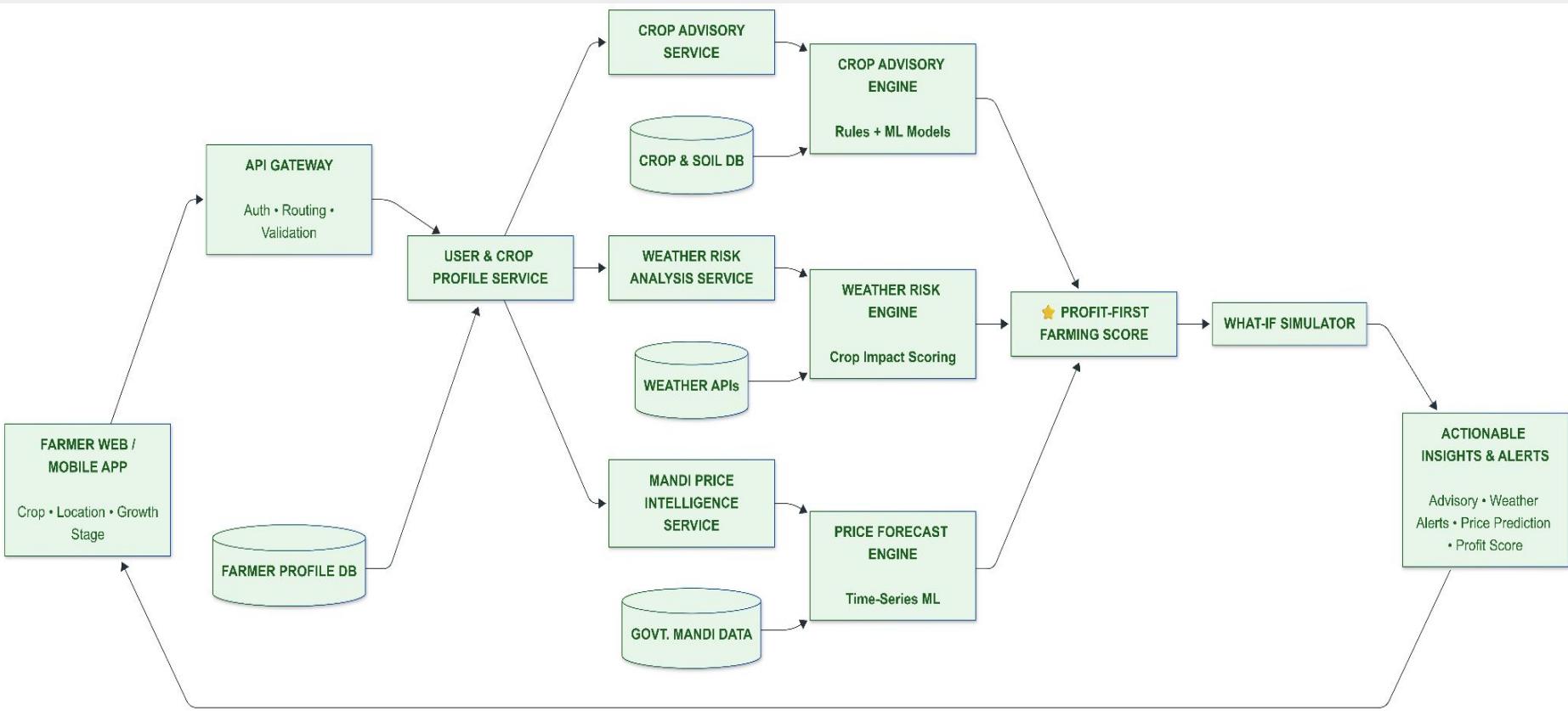
## Security & Compliance

- HTTPS encryption on all data
- JWT auth for safe user identity
- Role-based access control
- Secure storage of price & crop data
- API rate-limiting prevents abuse
- Auditable logs for transparency
- Modular microservices reduce attack impact

## Why this Stack ?

- Designed for low-bandwidth users
- Real AI models, not rule hacks
- Explainable recommendations farmers trust
- Modular services for rapid scaling
- Cloud deployment for national rollout
- Easy integration with govt & private datasets
- Ready for future automation & IoT

# Architecture diagram of the proposed solution



# Business & Feasibility

- Low-cost, scalable digital platform deployable across regions with minimal infrastructure
- Freemium model: Core features free for farmers, premium insights for FPOs and agribusinesses
- Marketplace-based revenue through transaction or service commissions
- Partnership opportunities with government bodies, NGOs, and agri-tech organizations
- High adoption potential due to mobile-first design, local language support, and SMS alerts

## Next Steps:



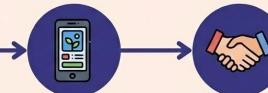
### Pilot Testing

In a selected district of Madhya Pradesh.



### IoT Integration

Incorporate soil moisture & nutrient sensors.



### Mobile App Launch

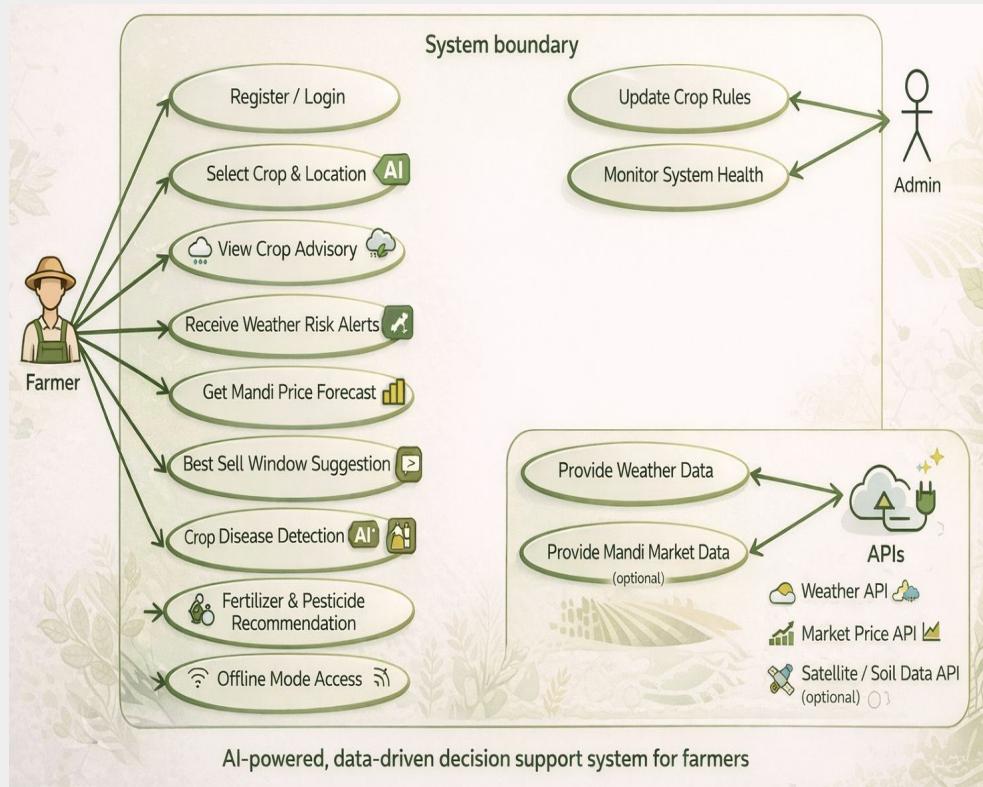
Develop user-friendly app for farmers.



### Partnerships

Collaborate with local agricultural universities.

# Use-Case Diagram



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

| Aspect          | Other Platforms       | Our Platform                            |
|-----------------|-----------------------|---|
| Weather Alerts  | General forecasts     | Crop-specific risk alerts with actions  |
| Market Prices   | Current prices only   | Future mandi price prediction           |
| AI Transparency | Black-box suggestions | Explainable AI ("why this advice")      |
| Community       | Limited or absent     | Farmer-to-farmer knowledge sharing      |
| Govt. Schemes   | Static information    | Personalized, eligibility-based schemes |
| User Experience | Text-heavy            | Simple, voice-enabled, multilingual     |



# Impact & Benefits

| Key Feature                  | Impact & Value Delivered   | Why It Matters / Who Benefits   |
|------------------------------|--|---|
| Personalized Crop Advisory   | Provides crop- and stage-specific guidance instead of generic advice.              | <b>Farmers</b> → Better crop health and improved yield.   |
| Crop-Specific Weather Alerts | Early detection of weather risks with preventive action suggestions.               | <b>Farmers</b> → Reduced crop damage and losses.  |
| Mandi Price Prediction       | Forecasts future prices to help decide the best selling time.                      | <b>Farmers</b> → Higher profit through smart market timing.                                     |
| Profit-First Farming Score   | Combines yield, weather risk, and price trends into one clear score.               | <b>Farmers</b> → Easy, profit-focused decision making.  |
| Community                    | Enables farmers to share experiences, solutions, and local insights.               | <b>Farmers</b> → Peer learning, faster problem solving, reduced isolation.                      |
| Government Schemes           | Provides personalized information about eligible government schemes and subsidies. | <b>Farmers</b> → Better access to benefits, financial support, and policy-driven opportunities. |
| Data-Driven Farming Platform | Enables informed decisions using real-time and historical data.                    | <b>Small &amp; Marginal Farmers</b> → Smarter farming at grassroots level.                      |

# Snapshots

KrishiBandhu

English ⚙️ 🔔 3

Dashboard

Crop Advisory

Weather Alerts

Mandi Prices

Simulator

Community

Marketplace

Schemes

Farm Log

Settings

Welcome back, Ramesh Kumar! 🌱

Bhopal, Madhya Pradesh • Currently growing Wheat on 5.2 acres

### Today's Intelligence

**Weather Risk** LOW  
Next 7 days Clear weather ahead

**Price Trend** RISING  
Wheat prices ₹2,450/quintal +6% this week

**Latest Advisory**  
Fertilizer Application  
Apply 50kg Urea per acre. Nitrogen is critical at tillering stage.  
87% Confidence

**Profit Score**  
Your current profit potential based on crop condition, market prices, and weather  
78% Profit

**Recent Alerts**  
Actionable suggestions for your farm

- Heavy Rainfall Warning  
Expected 50-70mm rainfall in next 48 hours  
Harvest early or provide drainage
- Temperature Drop  
Temperature expected to drop to 8°C  
Cover crops with protective sheets

**Crop Advisory**  
AI-powered personalized recommendations for your farm

Select Crop: Wheat | Growth Stage: Tillering

**Sowing Advice** 95% Confidence  
Optimal sowing window has passed. Focus on irrigation and fertilization.

**Irrigation** 88% Confidence  
Water every 5-7 days. Current soil moisture is adequate.

**Fertilizer** 92% Confidence  
Apply 50kg Urea per acre. Nitrogen is critical at this stage.

Why: Sowing after November 25th reduces yield by 25kg/acre/day due to terminal heat stress.

Why: Tilling stage is critical for crown root initiation. Water stress now leads to poor tillering.

Why: Plants need maximum Nitrogen during tillering for vegetative growth.

**Government Schemes**  
Find and apply for relevant government subsidies and programs

**PM Kisan Samman Nidhi**  
Financial support of ₹6,000 per year to farmer families.  
Benefit: ₹6,000/year | Eligibility: Small and marginal farmers | Deadline: Open all year | Status: Active

**Soil Health Card Scheme**  
Get soil tested and receive a health card with crop-wise nutrient recommendations.  
Benefit: Free Soil Testing | Eligibility: All farmers | Deadline: Open all year | Status: Active

**Best Selling Window**  
Recommended Date Range: 1/12/2024 - 1/14/2024  
Prices are expected to peak during this period. Plan your harvest and transportation accordingly.

**Recommendation**  
Hold  
Wait for better prices

**Price Volatility**  
MEDIUM  
Price range: ₹2,450 - ₹2,680  
Moderate price movements expected.

**Weather Forecast**  
Sun, Jan 11: Clouds, 25°C / 13°C, Low risk  
Mon, Jan 12: Clouds, 25°C / 12°C, Low risk

**O Crop-Specific Risk Indicators**

**Heavy Rainfall Warning**  
Expected 50-70mm rainfall in next 48 hours  
Crop Impact: May damage standing wheat crop  
Suggested Action: Harvest early or provide drainage

**Temperature Drop**  
Temperature expected to drop to 8°C  
Crop Impact: Frost risk for sensitive crops  
Suggested Action: Cover crops with protective sheets

**Alert Preferences**  
Choose how you want to receive weather alerts

**Push Notifications**  
Get instant alerts on your device

**SMS Alerts**  
Receive alerts via text message

Note: Alerts are sent only for medium and high-risk weather conditions to avoid notification fatigue.



# Thank You