
Smart Farming Advisory System

Version: 1.0
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High-Level Design (HLD)

1. Problem Statement

Farmers face multiple challenges: - Choosing profitable crops based on soil, weather, and market trends. - Receiving biased fertilizer recommendations. - Detecting crop diseases late. - Optimizing irrigation, fertilizer, and crop management schedules. - Selling crops at the right time for maximum profit.

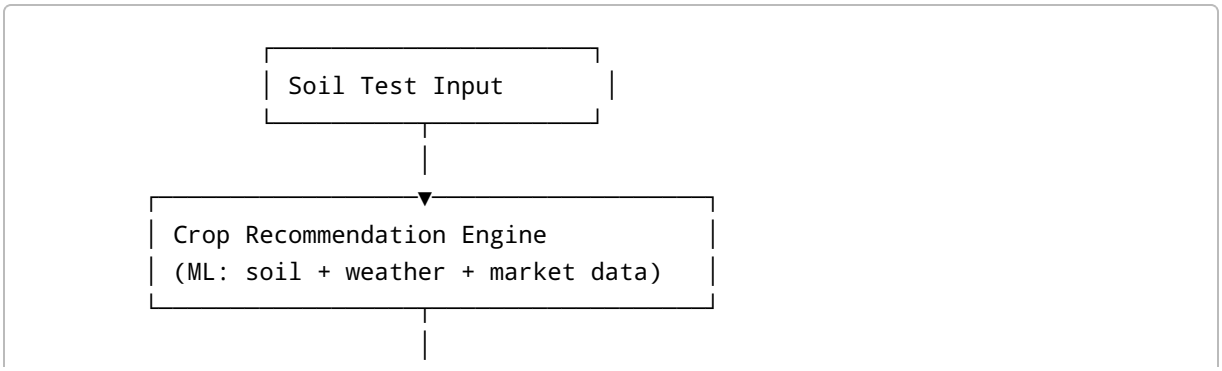
2. Objectives

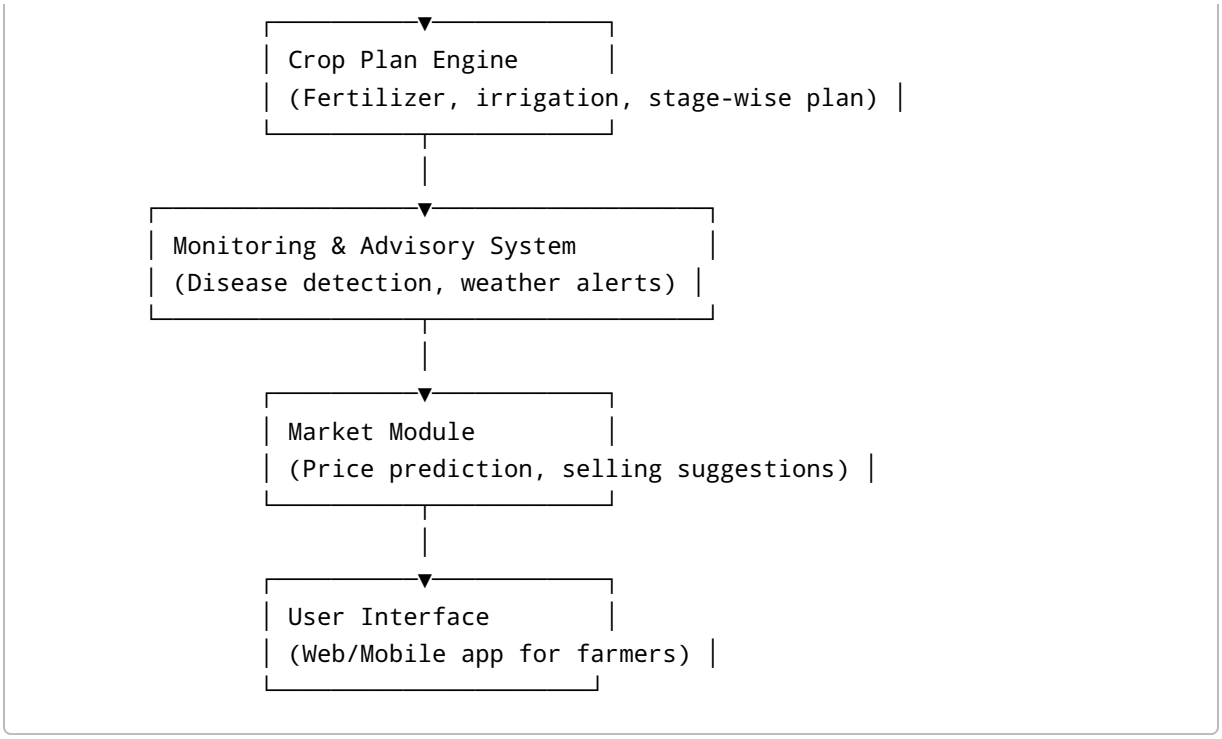
- AI-based crop recommendation using soil, weather, and market data.
- Personalized crop plan including fertilizer and irrigation schedules.
- Disease detection via uploaded crop images.
- Real-time monitoring and risk alerts.
- Market and selling guidance for optimal profit.

3. Core Features

1. Soil Test & Crop Recommendation
2. Detailed Crop Plan & Schedule
3. Fertilizer Advisory
4. Crop Monitoring & Disease Detection
5. Market & Selling Suggestions

4. System Architecture





5. Technology Stack

- Backend: Python (Flask/FastAPI)
- Frontend: React/Streamlit
- Database: PostgreSQL / SQLite
- ML: scikit-learn, TensorFlow/PyTorch for disease detection
- APIs: Weather, Market price, Soil data

Low-Level Design (LLD)

1. Modules & Functionalities

1.1 Soil Test & Crop Recommendation - Input: Soil parameters (N, P, K, pH, organic carbon, texture) - ML Model: Classification/Ranking to suggest top 3 crops - Output: Recommended crops + estimated yield + risk level

1.2 Crop Plan Engine - Input: Selected crop + growth stage - Rule-based system for: - Fertilizer schedule (dose & timing) - Irrigation schedule - Pest/disease preventive measures - Output: Day-wise crop plan

1.3 Monitoring & Disease Detection - Input: Crop images uploaded by farmer - ML Model: CNN-based classifier for common diseases - Alerts for disease/pest outbreak - Recommendation for treatment

1.4 Market & Selling Module - Input: Crop type, market location - Fetch historical prices from Agmarknet/ local mandi - Predict best time & place to sell for maximum profit

1.5 User Interface - Farmer-friendly web/mobile app - Features: - Submit soil test report - View recommended crops - Day-wise crop plan - Upload crop images - Market & selling suggestions

2. Database Schema (Sample)

- **Farmer Table:** id, name, location, farm_size
- **Soil Table:** id, farmer_id, N, P, K, pH, organic_carbon, texture
- **Crop Table:** id, name, ideal_soil, growth_period, fertilizer_requirements
- **Market Table:** id, crop_id, location, historical_price
- **CropPlan Table:** id, farmer_id, crop_id, day, fertilizer, irrigation, notes
- **Disease Table:** id, crop_id, disease_name, symptoms, treatment

3. Data Flow

1. Farmer submits soil data → Crop Recommendation Engine suggests crops
2. Farmer selects crop → Crop Plan Engine generates day-wise plan
3. Farmer uploads crop images → Monitoring Module detects disease and alerts
4. Market Module suggests best selling time and place
5. UI displays all recommendations and notifications

4. Security & Authentication

- Farmer login via mobile/email
- Data encryption for sensitive info
- File upload validation (images, soil reports)

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