HACK KRMU 5.0

- PROBLEM STATEMENT ID : PS07
- TEAM NAME : ERROR404
- TEAM ID : HK-039
- TEAM MEMBERS : SAHIL, MEHAK, ANUSHKA, KRISHNA

DR. FARM

PROBLEM & SOLUTION

Problems :

India’s agriculture sector faces increasing crop health instability due to environmental unpredictability and delayed disease detection.

- **Late detection of fungal diseases**
- **Unmonitored humidity & soil conditions**
- **Yield loss impacting MSP-grade quality**
- **No real-time farm intelligence**
- **No structured action planning**
- **Low data transparency for buyers & lenders**

All of which demand predictive, data-driven intervention.
But here’s the problem: Most systems are reactive, not preventive.

Solution :

Smart AI + IoT = Predictive Crop Intelligence

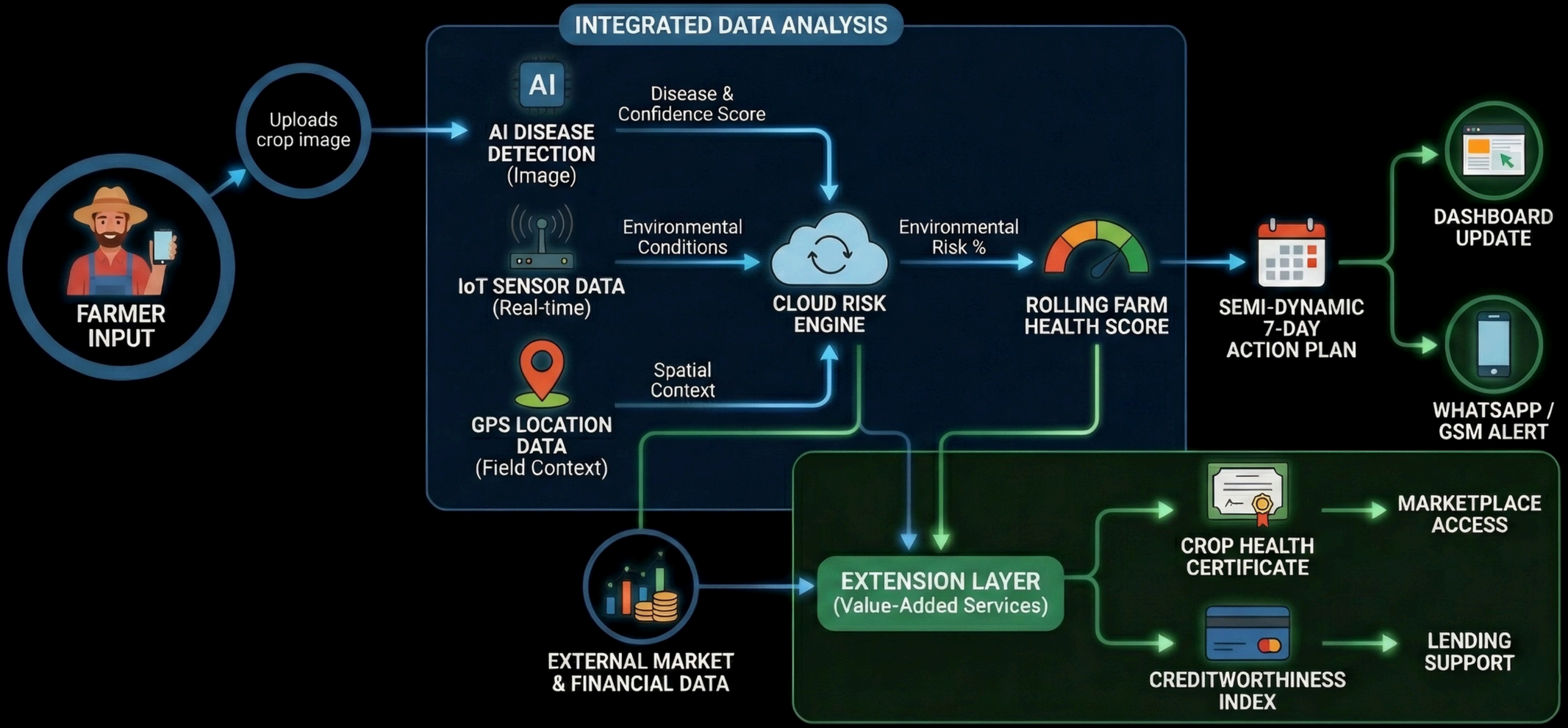
DrFarm integrates real-time environmental sensing with AI-based crop disease detection to deliver actionable farm decisions.
Our system includes:

- 🧠 AI Disease Detection – Image-based crop diagnosis using transfer learning models
- 🌡️ Smart Field Node – Soil moisture, temperature, humidity & anomaly detection
- 📍 GPS Geo-Tagging – Field-level location tracking for scalable farm monitoring
- 📊 Risk Engine – Weighted environmental risk percentage calculation
- 📈 Farm Health Score – Rolling 0–100 crop health index
- 📅 7-Day Action Plan – Semi-dynamic agronomic guidance

📲 GSM / WhatsApp Alerts – Immediate high-risk notifications

DrFarm transforms environmental signals into structured crop decisions aligned with MSP-quality standards.

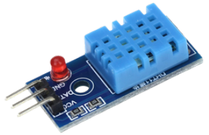
FLOW OF SOLUTION



TECH STACK & APPROACH

Hardware Components


esp32


Humidity Sensor


Gas Sensors

SIM900A GSM Alert Module


Power Source


GPS Module


Moisture Sensor

Backend & Cloud Layer

PHP · {REST} · MySQL · OpenAI · NGINX

AI & ML

TensorFlow · colab · python · OpenAI

Frontend / Application

NEXT.JS · OpenStreetMap · tailwindcss · node.js

UNIQUENESS & INNOVATION FACTOR

AI + Environment Fusion

Combines AI visual diagnosis with environmental risk modeling for crop assessment

Predictive Protection

Predictive (not reactive) crop protection — intervene before disease outbreak occurs

Rolling Health Score

Real-time Farm Health Score (0-100 index) with continuous monitoring updates

Dual-Layer IoT

Dual-layer IoT architecture with separate Sensor + Decision Display systems

Multiple Nodes

Distributed smart field nodes with GPS geo-tagging for location-aware intelligence

Marketplace Alignment

Crop quality monitoring aligned with MSP procurement standards

FEASIBILITY & CHALLENGES

Feasibility of the Idea

- Proven Technology – AI-based crop detection, IoT sensors, GPS, and GSM modules are already used in precision agriculture systems.
- Cost-Effective – Estimated hardware cost ~₹3k–₹5k per Smart Field Node, significantly cheaper than large agri-automation setups.
- Scalable – Modular node-based design allows deployment across multiple farm fields without major infrastructure.

Strategies for Overcoming Challenges

- Sensor Accuracy – Weighted risk modeling reduces dependency on single-sensor spikes.
- AI Reliability – Confidence threshold filtering + structured agronomic knowledge base.
- Connectivity Issues – GSM alert fallback in low-internet zones.
- System Integration – Modular cloud API enables gradual adoption and scaling.

Potential Challenges & Risks

- Internet connectivity in rural zones
- Environmental sensor noise in extreme conditions
- AI misclassification under unusual crop stress
- Farmer adoption & training barriers

RESEARCH & REFERENCE

Links Of The Reference

- "PlantVillage Dataset — A Public Resource for Image-Based Plant Disease Research" — Hughes & Salathé, arXiv / IEEE, 2015.
- "MobileNetV2: Inverted Residuals and Linear Bottlenecks" — Sandler et al., CVPR, 2018.
- "Minimum Support Price (MSP) Policy and Procurement Challenges" — ICRIER Policy Review, 2021.
- "AI could boost agricultural sector's contribution to India's GDP" – Fortune India, Oct 2025.
- "Agriculture continues to employ ~46 % of workforce while contributing ~one-fifth of national income" – Economic Survey 2025-26.
- India's agriculture could contribute $600 billion to GDP by 2030" – McKinsey report, highlighting the sector's future economic potential.