



- 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

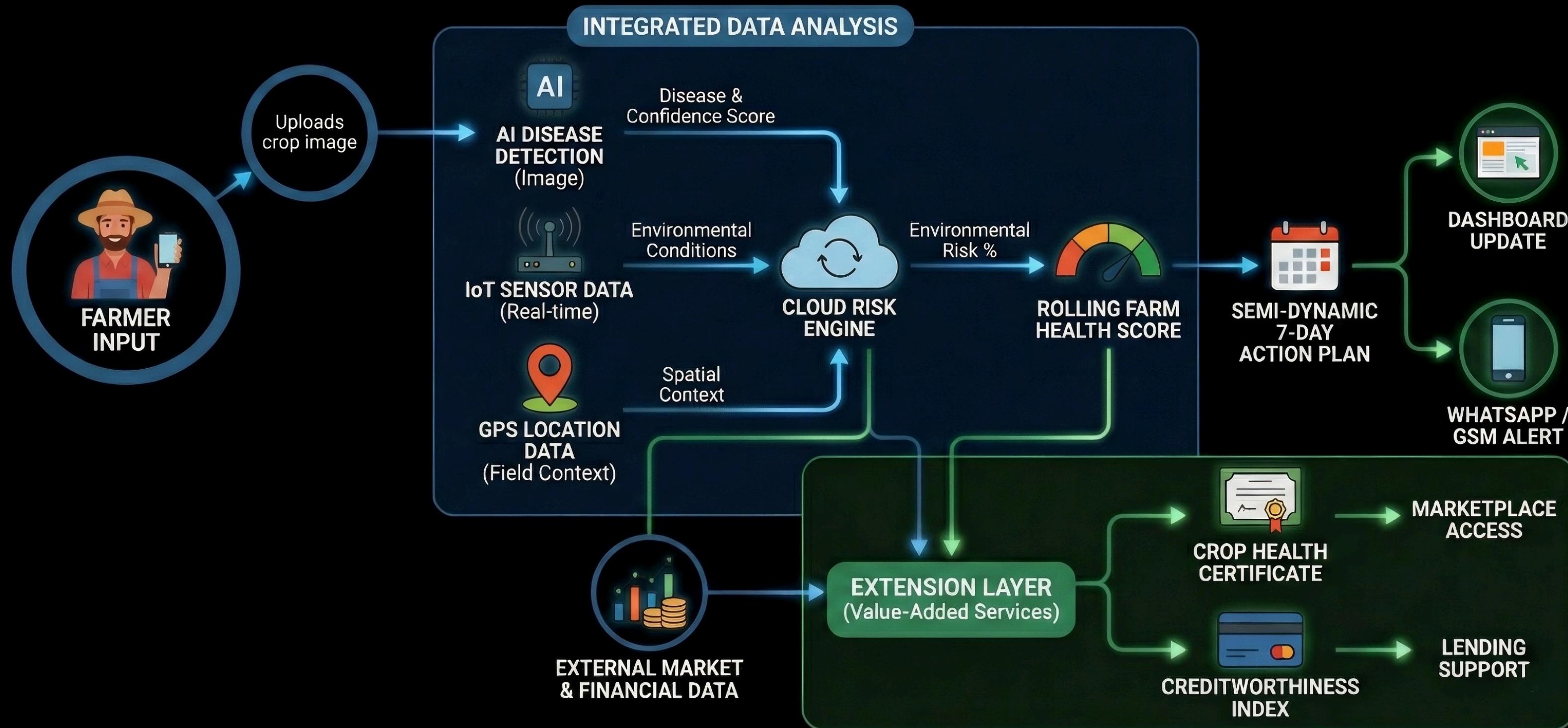
DrFarm integrates real-time environmental sensing with AI-based crop disease detection to deliver actionable farm decisions. Our system includes:

- 🧠 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





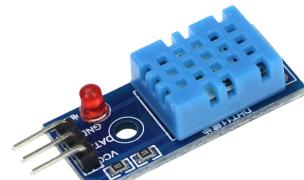
## TECH STACK & APPROACH



### Hardware Components



esp32



Humidity Sensor



Gas Sensors



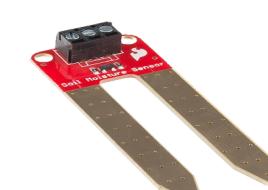
SIM900A GSM Alert Module



Power Source



GPS Module



Moisture Sensor



### Backend & Cloud Layer



OpenAI

NGINX



### AI & ML



OpenAI



Gemini



### Frontend / Application



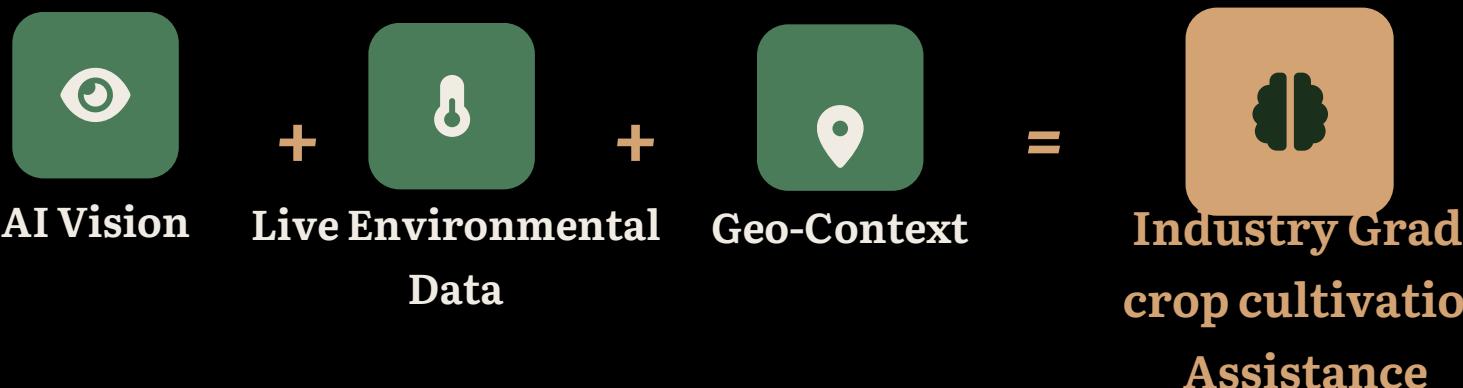
Bootstrap



JavaScript



## 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.