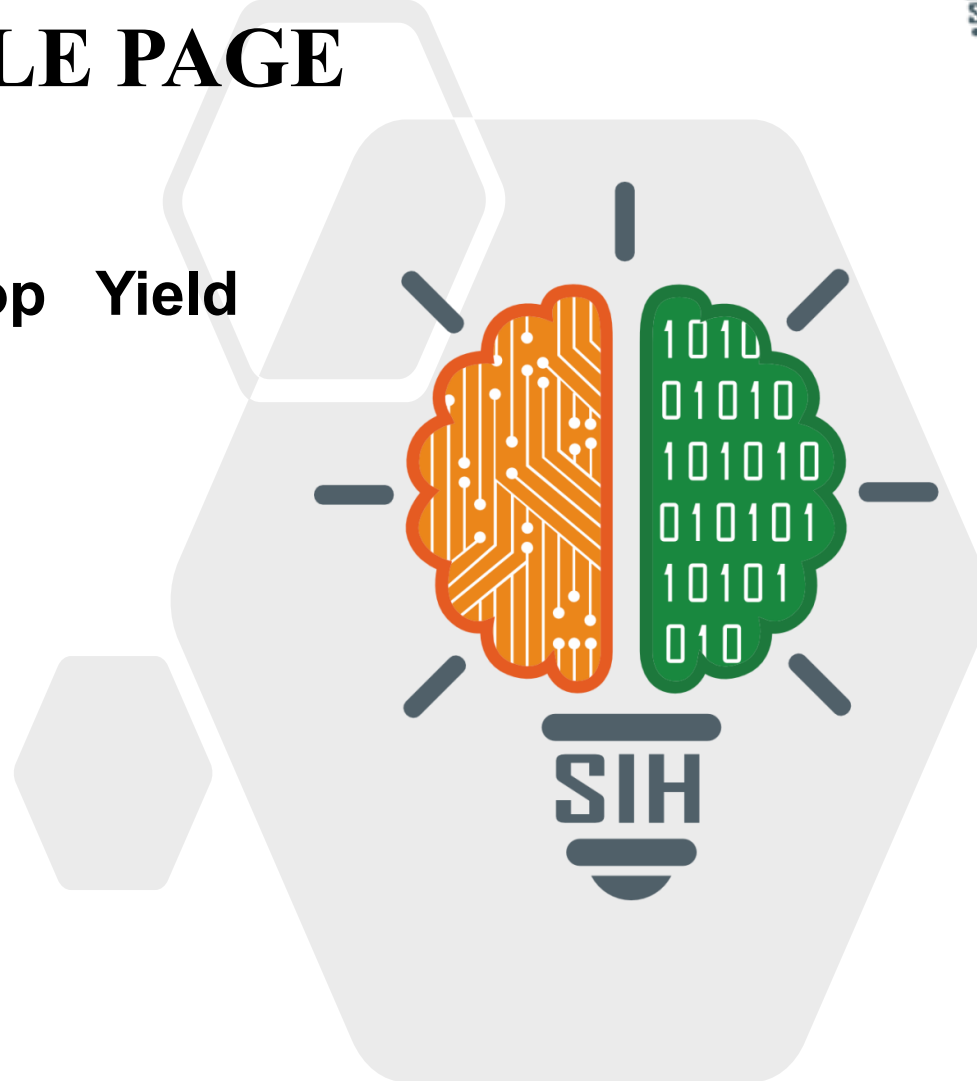# SMART INDIA HACKATHON 2025

TITLE PAGE

- **Problem Statement ID –SIH25044**

- **Problem Statement-AI-Powered Crop Yield Prediction and Optimization**

- **Theme-Agriculture,Foodtech&Rural Devlopement**

- **PS Category- Software**

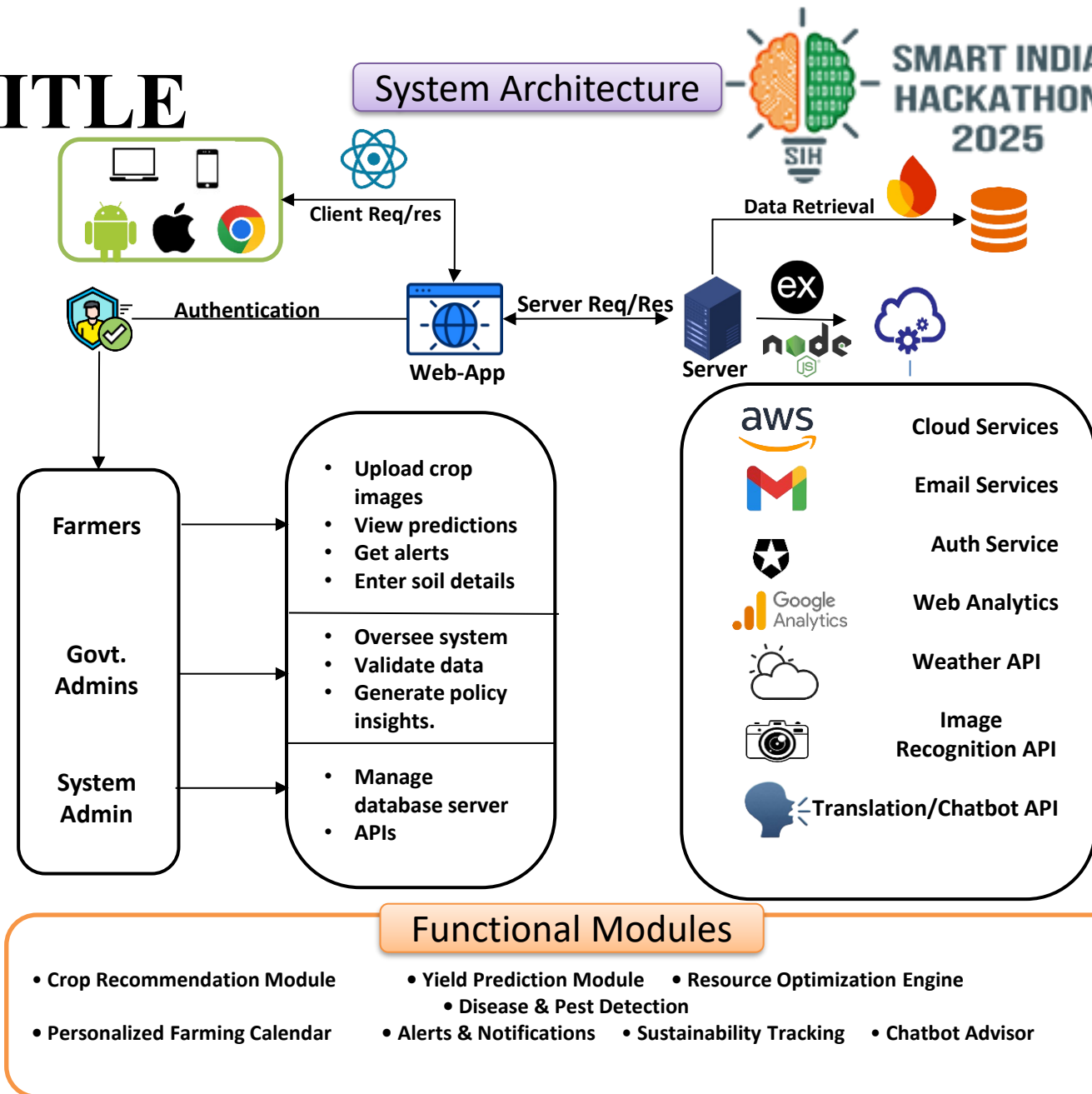- **Team ID-83032**

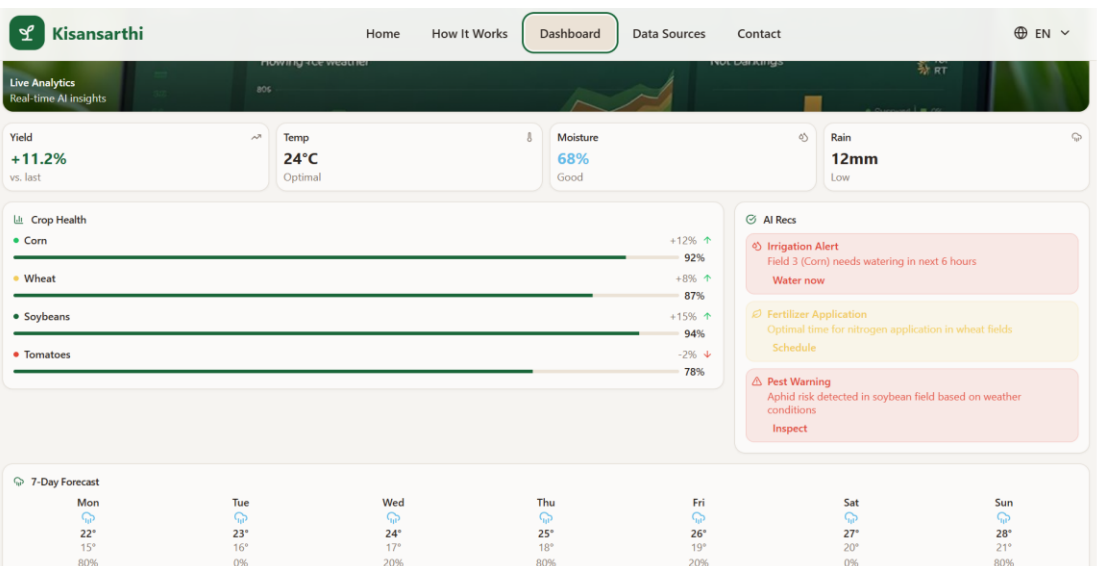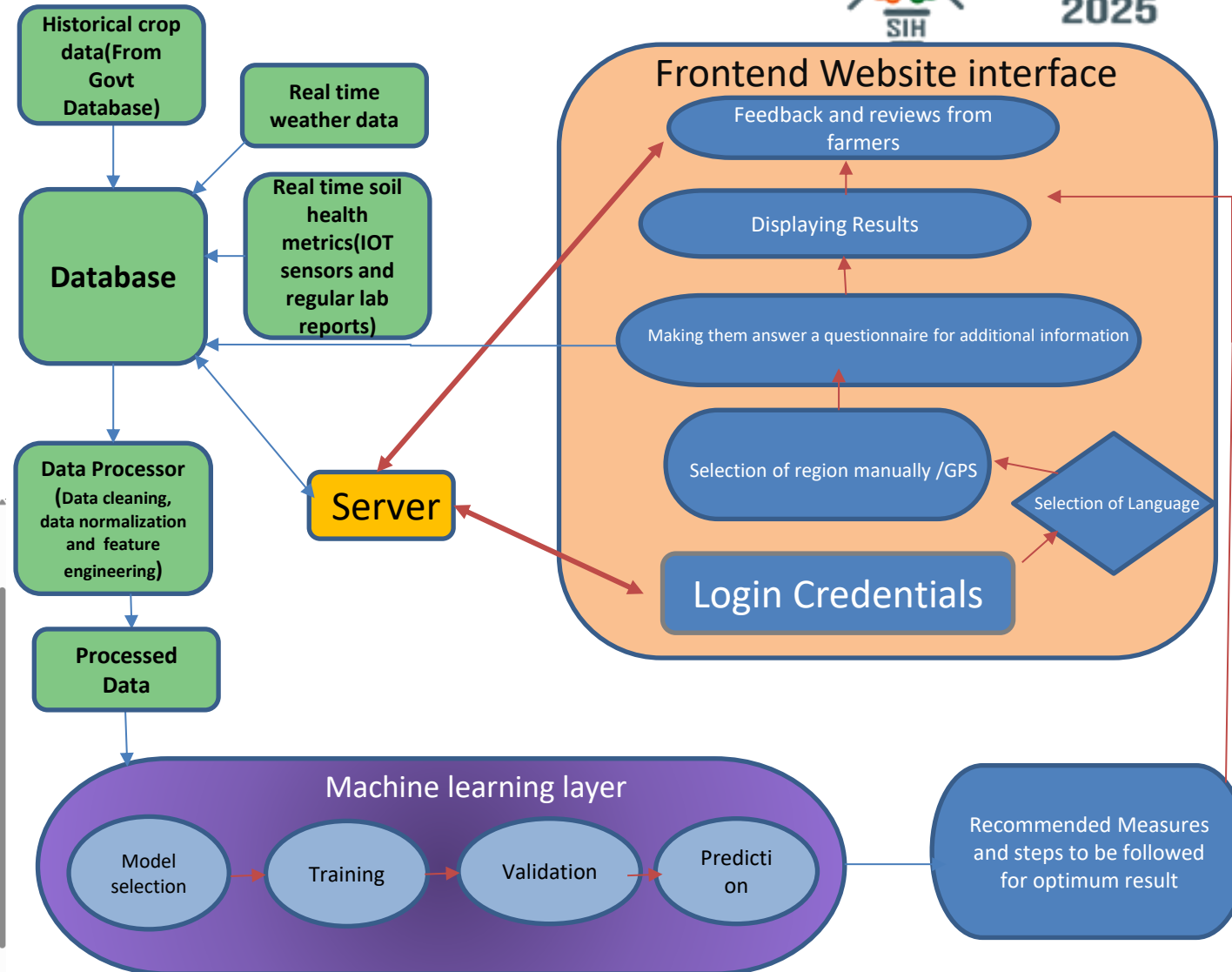- **Team Name- Kisan Sarthi**

IDEA TITLE

❖ Proposed Solution:

- **AI-powered Yield Prediction** – Regression + Neural Net models forecast yield with high accuracy, reducing uncertainty

- **Smart Crop Recommendation** – Suggests the most suitable crops by analyzing soil NPK, soil type, weather, and water resources.

- **Resource Optimization Engine** – Provides personalized irrigation, fertilizer, and pesticide schedules to minimize cost and maximize yield.

- **AI Disease & Pest Detection** – Farmers upload images of affected crops; the system diagnoses problems and suggests remedies instantly.

- **Personalized Farming Calendar** – Auto-updated schedules for irrigation, fertilizers, and pesticides tailored to each farmer's land and crop.

- **Chatbot Advisor** – A 24/7 virtual Krishi assistant providing answers in commonly used languages.

- **Sustainability Insights** – Tracks water saved, fertilizer reduced, and carbon footprint to promote eco-friendly farming practices.

System Architecture

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Client Req/res

Data Retrieval

Authentication

Server Req/Res

Web-App

Server

Farmers
- Upload crop images
- View predictions
- Get alerts
- Enter soil details

Govt. Admins
- Oversee system
- Validate data
- Generate policy insights.

System Admin
- Manage database server
- APIs

- Cloud Services
- Email Services
- Auth Service
- Web Analytics
- Weather API
- Image Recognition API
- Translation/Chatbot API

Functional Modules

- Crop Recommendation Module
- Yield Prediction Module
- Resource Optimization Engine
- Disease & Pest Detection
- Personalized Farming Calendar
- Alerts & Notifications
- Sustainability Tracking
- Chatbot Advisor

FEASIBILITY AND VIABILITY

Technical :

- **Feasibility:** Proven tech—scalable via cloud + edge computing.
- **Risks:** Accuracy in AI detection, scheduling reliability, offline support.
- **Solutions:** Regional AI datasets, weather/soil APIs, lightweight offline modules.

Financial :

- **Feasibility:** Viable—ROI through yield gains + policy support.
- **Risks:** High AI/dev costs
- **Solutions:** Open-source tools, govt. cloud credits, phased rollout.

Operational :

- **Feasibility:** Practical with phased deployment + personalized engagement.
- **Risks:** Low adoption due to digital literacy/connectivity.
- **Solutions:** Multi-language chatbot, simple UI, farmer training, offline access.

Legal / Regulatory :

- **Feasibility:** Legally sound—aligns with govt. digital agriculture goals.
- **Risks:** Data protection, compliance with MSP/market laws.
- **Solutions:** Encryption, DPDP/IT law compliance, MSP-aligned crop advice.

IMPACT AND BENEFITS

Increased Productivity & Profitability

Data-driven recommendations help farmers increase yield by at least 10%, optimize input use, and maximize profitability.

Multi-Language Accessibility

Regional language support + chatbot ensures inclusivity, empowering farmers with limited digital literacy.

AI-Powered Pest & Disease Control

Farmers can upload leaf/stem images for instant diagnosis and remedy suggestions, reducing crop losses.

Smarter Farm Management

Personalized farming calendar + real-time alerts (irrigation, pests, weather) ensure timely, efficient decision-making.

Cost Savings through Efficiency

Cost-benefit calculator helps compare inputs vs. yield; smart scheduling minimizes wastage of water, fertilizer, and pesticides.
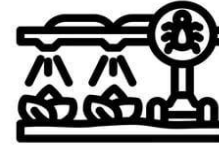
Sustainability & Eco-Friendly Practices

Tracks water saved, reduced fertilizer use, and carbon footprint, promoting climate-smart farming.

Risk-Adjusted Crop Planning

Suggests crops based on soil, weather, market demand, and MSPs, reducing farmer risk and improving income stability.

Farmer Community & Expert Connect (future scope)

Enables knowledge sharing among farmers and direct access to agri-experts for continuous improvement.

RESEARCH AND REFERENCES

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❖ References:

★ **Existing Agri-Tech Platforms:**
  ➢ CropAIQ
  ➢ Kisan Samadhan
  ➢ Kisan AI
  ➢ Hybrid Deep Learning Models in Agriculture: IEEE, Springer (Research Articles)

★ **Research & Best Practices:**
  ➢ AI in Agriculture
  ➢ Machine Learning for Crop Yield Prediction
  ➢ Pest/Disease Detection using Deep Learning
  ➢ Precision Agriculture and IoT

★ **Feasibility Facts:**
  ➢ ICAR (Indian Council of Agricultural Research) Reports
  ➢ FAO (Food and Agriculture Organization) Crop Statistics
  ➢ IMD (India Meteorological Department) Weather API
  ➢ Govt. of Odisha – Department of Electronics & IT

❖ Comparison with existing systems:

Feature	Our Model	CropAIQ	Kisan Samadhan	Kisan AI	Hybrid DL Models
Yield Prediction	✓	✓	✓	✓	✓
AI Pest/Disease Detection	✓	✗	✓	(Partial)	✓
Personalized Scheduling (Calendar)	✓	✗	✗	✗	✗
Real-time Alerts/Notifications	✓	✓	✓	✓	✗
Multi-language Support	✓	✗	✓	✓	✗
Offline / Low-data Mode	✓	✓	✗	✗	✗
Cost-benefit Calculator	✓	✗	✗	✗	✗
Sustainability Insights	✓	✗	✗	✗	✗
Risk-adjusted Crop Suggestions (Market + MSP)	✓	✗	✗	✗	✗
Chatbot Advisor (Voice + Text)	✓	✗	(Text)	(Text)	(Text)
Farmer Community / Expert Connect	✓ (Future Scope)	✗	(Call center support)	✗	✗