AgriShield

AI, IoT & Satellite-Powered Farming Intelligence

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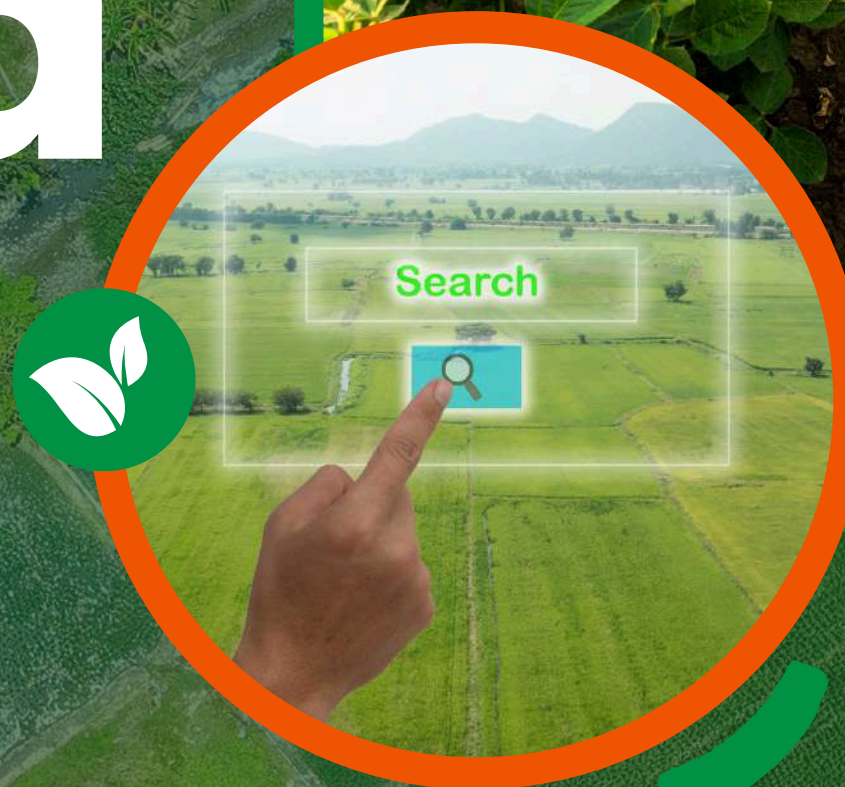
IDEA TITLE

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Problem Statement: AI Driven Crop Disease Prediction and Management System

AgriShield employs AI,IOT & machine learning to integrate NDVI, NDWI, EVI, and GCI technologies with real-time soil sensor data for early detection and prediction of potential disease outbreaks based on emerging patterns, enabling farmers to take preventive measures before diseases spread or occur.

How AgriShield Works

- IoT-Powered: Network of IoT sensors deployed across large fields tracks soil moisture, temperature & humidity in real time.
- AI Disease Detection: Uses NDVI, NDWI, EVI, and GCI technologies, along with historical and satellite data, to analyze plant leaf images & farm to predict diseases early.
- Prevents overuse of water and fertilizers, optimizing resource consumption.
- Cloud Insights & Alerts: Sends real-time, localized recommendations to farmers.

Tech Edge

- Satellite Analysis: Uses NDVI, NDWI, EVI, and GCI to monitor crop health.
- AI + IoT Fusion: Merges sensor data and satellite imagery for predictive farming.
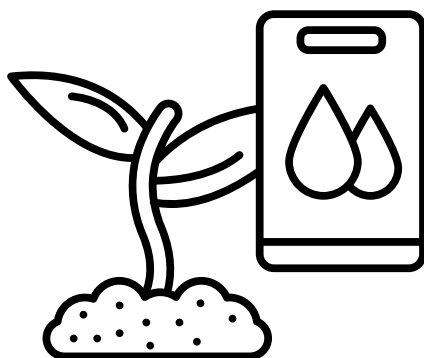
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How it addresses the problem

- Provides farmers with early disease detection, reducing crop loss and enhancing overall farm health.
- Reduces reliance on manual disease detection, increasing productivity.
- Offers localized and actionable recommendations to improve crop yield.
- Combining data sources enhances crop health insights and effective interventions.
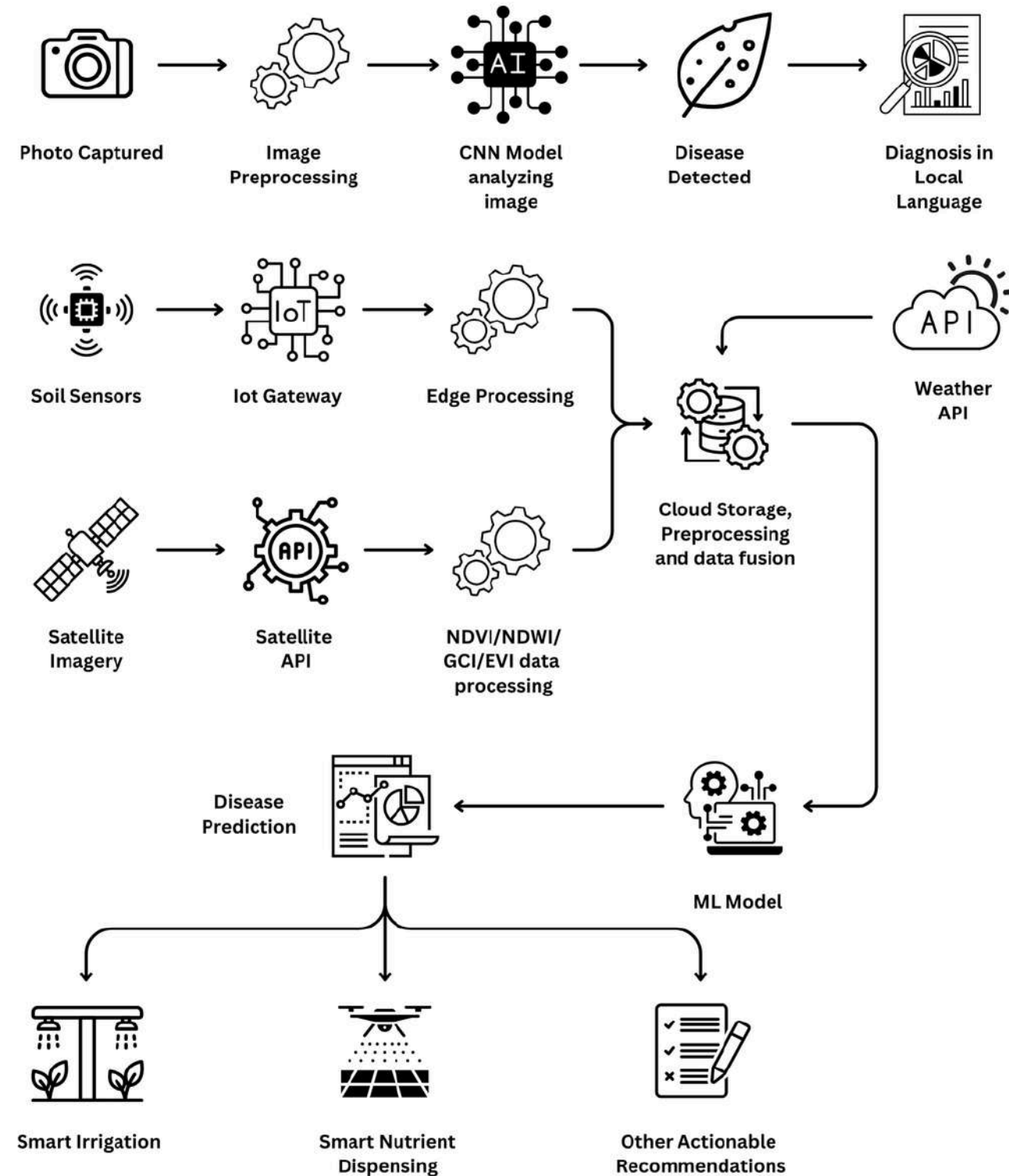
Innovation and uniqueness of the solution

- **Multi-Modal Data Integration:** Combines satellite, soil, weather, and historical data.
- **IoT Sensor Network:** Deploys a dense network of IoT sensors across large fields to continuously monitor environmental conditions.
- **Disease and Pest Prediction:** Anticipates outbreaks and infestations early.
- **AI-Driven Recommendations:** Personalized, multilingual advice based on regional data
- **Tech Integration Potential:** Can Automate irrigation and fertigation processes.
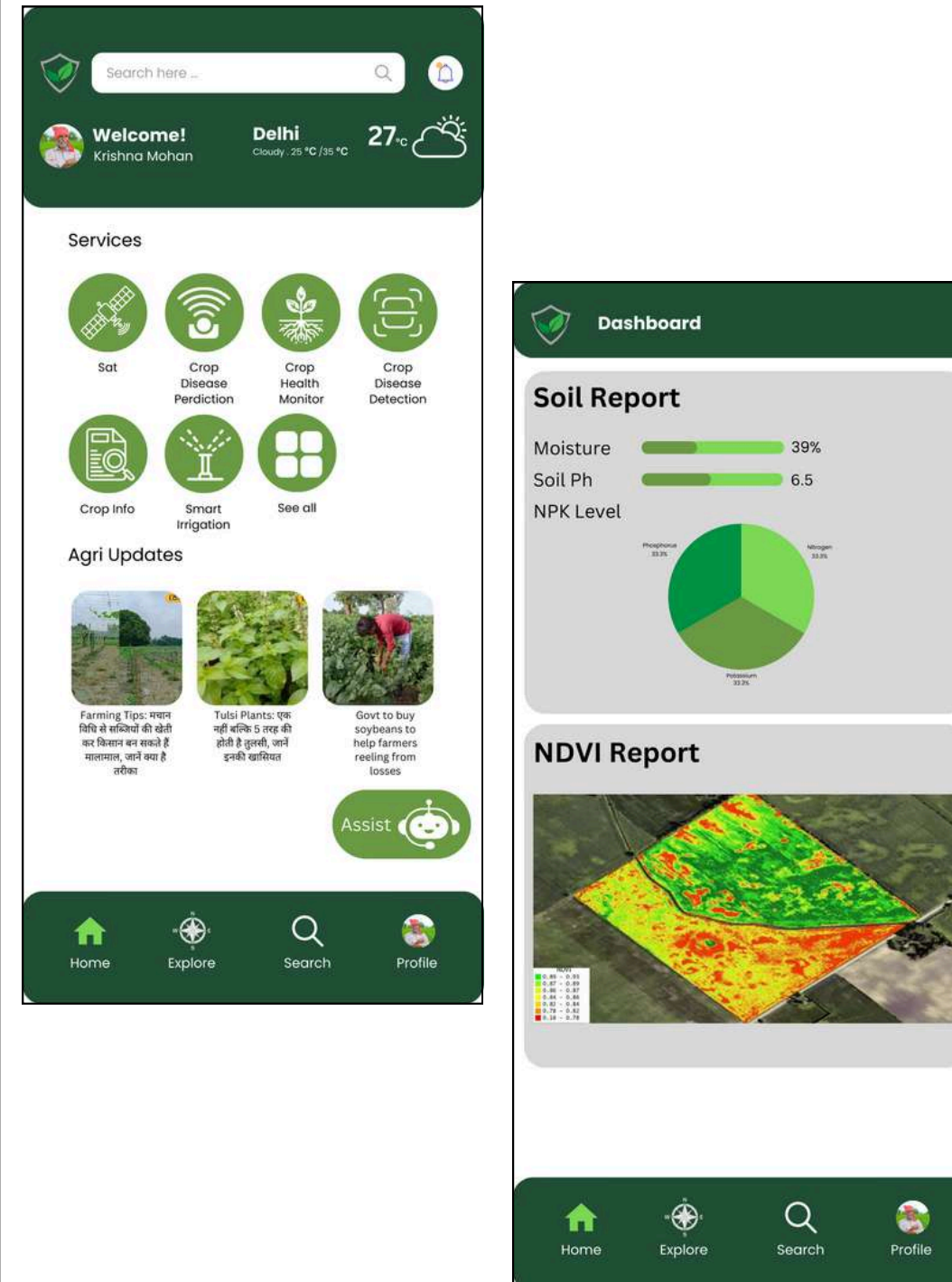- **User-Friendly Interface:** Intuitive and easy diagnostics.

TECHNICAL APPROACH

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Work Flow

Photo Captured → Image Preprocessing → CNN Model analyzing image → Disease Detected → Diagnosis in Local Language

Soil Sensors → Iot Gateway → Edge Processing

Satellite Imagery → Satellite API → NDVI/NDWI/GCI/EVI data processing

Cloud Storage, Preprocessing and data fusion

Weather API

Disease Prediction ← ML Model

Smart Irrigation | Smart Nutrient Dispensing | Other Actionable Recommendations

User Interface

Technologies to be used

IoT & Sensors	ESP32, LoRaWAN, Zigbee
Programming Languages	C, Python, JavaScript
Frameworks & APIs	AWS IoT Core, Node-RED, Google Earth Engine, TensorFlow (LSTM), PyTorch, Dialogflow (Chatbot), Hyperledger, Truffle.
Data Storage	InfluxDB, PostgreSQL, Firebase, Amazon S3, IPFS.
Web & Mobile	Django,Node.js (Backend); Flutter, React Native (Mobile).

Sustainability & SDG Impact

Aligned with UN Sustainable Development Goals (SDGs):

- **SDG 2** – Zero Hunger: Improves agricultural yield & food security.
- **SDG 6** – Clean Water: Reduces water wastage through smart irrigation.
- **SDG 13** – Climate Action: Helps farmers adapt to climate change.

FEASIBILITY AND VIABILITY

- **Technological Readiness:** The combination of AI and machine learning with real-time satellite and sensor data is tested and proven effective.
- **Affordable Implementation**: IoT sensors, satellite data, and machine learning models can be cost-effective for large-scale implementation, with open-source software.
- **Scalability**: The system can be scaled across regions with varying crops and environmental conditions. The data-driven approach allows for customization based on local farming needs.

Potential impact on the target audience

- By detecting diseases early, farmer can take immediate action, preventing the spread of disease and minimizing crop loss helping to increase crop yields.
- Enhances overall crop health and productivity, contributing to food security and economic stability of farmers.

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Market Potential & Scalability

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Agritech Market: $15 Billion+ industry (growing at 12% CAGR).

Target Users

- Small-scale farmers (direct adoption).
- Agri-tech companies (B2B partnerships).
- Government & NGOs (for large-scale deployment).

Future plans

- Offline Functionality.
- Expanded Sensor Network.
- Making it more cost effective.
- Blockchain for Supply Chain.
- Enhance soil health tracking with real-time nutrient analysis.
- Integrate drone-based remote sensing for large-scale monitoring.
- Can be adapted to different crops & geographies.
- Collaborate with government & AgriTech firms for scalability

THANK YOU!