Proposal: AgriSense AI – Smart Agriculture with AI & IoT

Problem Statement

Farmers, especially in rural and resource-limited regions, often lack timely, data-driven insights to guide irrigation, fertilization, and planting decisions. This leads to overwatering, soil degradation, low crop yields, and waste of resources. There is a need for a low-cost, scalable smart farming solution that enables real-time monitoring and predictive insights to increase food security and farm sustainability.

Project Overview

AgriSense AI integrates **IoT sensors**, **edge computing**, and **AI prediction models** to optimize agricultural practices. The system monitors soil and weather conditions in real time, detects anomalies on the field, and uses AI to predict **crop yield**, water needs, and potential risks—delivering timely, actionable feedback to farmers via mobile devices.

Components

Sensor Suite (Deployed in Field)

Sensor Type	Function
Soil Moisture Sensor	Measures water content in soil
Temperature Sensor	Captures air and soil temperature
Humidity Sensor	Tracks air moisture levels
UV/Light Sensor	Measures sunlight exposure (photosynthesis)
Soil pH Sensor	Monitors soil acidity/alkalinity
Rain Gauge	Measures precipitation to adjust irrigation
CO_2 Sensor	Gauges crop respiration and air quality

AI Model – Crop Yield Prediction

Model Type: Random Forest or LSTM (if time-series data available)
Input Features:
Soil moisture, temperature, humidity, rainfall, pH, sunlight, past yields, crop type, fertilizer used
Output:
Yield estimate (kg/hectare), irrigation/fertilizer recommendations, early warnings for low-growth conditions
Training Data: Open-source agricultural datasets (e.g., FAO, CGIAR) + local sensor logs

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Data Flow (From Field to Farmer)

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 [Sensors in Field]
       ↓
[Raspberry Pi / Edge Device]
  (basic alerts + preprocessing)
       ↓
[Cloud AI Engine]
  (yield prediction, recommendations)
       ↓
[Farmer App / Dashboard]
  (alerts, charts, voice/SMS notifications)
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Deployment Plan

Install sensors in the field (LoRa/WiFi connected)
Use **Raspberry Pi** for edge AI + offline alerts
Sync data to cloud periodically
Run predictions and push recommendations to farmers via app/SMS
Support local languages and visual dashboards for accessibility

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Impact & Benefits

📈 Increases yield & farming income
💧 Reduces water and fertilizer use by up to 30%
🌍 Enables smart, sustainable agriculture in rural communities
🔔 Real-time alerts help prevent crop loss