AI-Driven Smart Agriculture System

Overview

This solution leverages IoT sensors and AI algorithms to optimize crop monitoring, predict yields, and improve farm efficiency. Real-time data collection feeds into predictive models, supporting smarter decision-making for farmers.

Required Sensors

Sensor Type	Purpose
Soil Moisture Sensor	Tracks irrigation needs
Ambient Temperature	Monitors climate variations
Humidity Sensor	Measures moisture in the air
Light Sensor (PAR)	Captures photosynthetically active radiation
pH Sensor	Checks soil acidity for nutrient uptake
Rainfall Sensor	Assesses natural irrigation
CO_2 Sensor	Evaluates air quality and plant respiration
GPS Module	Enables geolocation-based insights

AI Model for Crop Yield Prediction

- **Model**: Ensemble Learning (e.g., Random Forest + Gradient Boosting)
- **Inputs**: Sensor data (soil, climate, light), historical yield, crop type
- **Output**: Predicted yield per hectare
- **Optimization**: Hyperparameter tuning + SHAP values for explainability
- **Deployment**: Azure ML with RESTful API for seamless integration

Value Proposition

- Enables **data-driven irrigation**, **fertilization schedules**, and **yield forecasting**
- Scalable architecture for small to commercial farms
- Compatible with **NutriTrack** and farmer chatbot integrations

If you'd like, I can turn this into a Copilot Page for editing or sketch a visual diagram. Just say the word and I'll whip it up!