Smart Agriculture System Using AI and IoT

Objective:

Develop a smart agriculture monitoring system that integrates IoT sensors and AI to optimize crop yields, resource usage, and timely interventions for sustainable farming.

Sensors Needed

To continuously monitor critical environmental and soil conditions, the system will deploy:

Soil moisture sensors: Measure water content in the soil for irrigation optimization.

Temperature sensors: Track ambient temperature affecting crop growth rates.

Humidity sensors: Monitor air moisture, reducing plant stress and disease risk

Light intensity sensors: Understand sunlight exposure to optimize photosynthesis conditions.

pH sensors: Test soil acidity/alkalinity affecting nutrient availability.

Nutrient sensors: Detect soil nutrient levels to guide fertilization schedules.

Water tank level sensors: Manage irrigation resource availability.

Optional: Pest detection sensors (cameras, optical sensors) for monitoring and early warning.

Proposed AI Model

Use a Deep Neural Network (DNN) or Convolutional Neural Network (CNN) model trained on historical sensor data, climate data, and yield records to predict crop yields accurately.

The model can integrate weather forecasts, soil health metrics, and irrigation patterns for robust yield forecasting.

Deploy AI inference on a centralized cloud or edge gateway with real-time sensor data streaming for continuous crop health estimation and adaptive management.

IoT Sensors

- Soll moisture sensor
- Temperature sensor
- Humidity sensor
- Light intensity sensor
- pH sensor
- Nutrient sensor
- Water tank level sensor
- Pest detection sensor

Real-time data →

Local IoT Gateway / Edge Device

Farmer's Dashboard & Mobile App

Feedback control

AI Prediction Engine

Automatic Actuators

Irrigation valve

Fertilizer dispenser