**Project Description:**

This hackathon project is aimed at leveraging technology to improve crop health, increase agricultural productivity, and promote sustainable farming practices. The project integrates IoT, machine learning, and data analytics to create a smart agriculture system that provides real-time insights and actionable recommendations to farmers.

**Key Features:**

1. Smart Crop Monitoring:

Implement an IoT-based crop monitoring system with sensors to measure soil moisture, temperature, humidity, and light levels. The data collected will be sent to a centralized platform for analysis.

2. Disease Detection with AI:

Develop a machine learning model that can analyze images of crops and detect diseases early. Farmers can capture images using their smartphones or a dedicated camera, and the model will identify potential diseases and provide recommendations for treatment.

3. Predictive Analytics for Yield Optimization:

Use historical data, weather forecasts, and crop health information to build predictive models. These models will help farmers optimize planting schedules, irrigation timings, and fertilization practices for maximum crop yield.

4. Smart Irrigation Management:

Integrate the soil moisture data from the crop monitoring system with weather forecasts to create a smart irrigation system. The system will automatically adjust irrigation schedules based on real-time data, conserving water and preventing overwatering.

5. Sustainable Pest Control:

Implement a pest monitoring system that uses traps and sensors to detect pest infestations. The data will be analyzed to provide farmers with early warnings and recommendations for environmentally friendly pest control methods.

6. Mobile Application for Farmers:

Develop a user-friendly mobile application that allows farmers to access real-time data, receive alerts, and interact with the smart agriculture system. The app will provide insights and recommendations for informed decision-making.

7. Farm-to-Market Traceability:

Implement blockchain technology to create a transparent and secure supply chain. Consumers can trace the origin and journey of agricultural products from the farm to the market, promoting food safety and authenticity.

**Impact:**

- Improved crop health and reduced losses due to early disease detection and smart pest control.

- Increased agricultural productivity and optimized resource usage through data-driven decision-making.

- Enhanced sustainability by promoting efficient water usage and eco-friendly practices.

- Strengthened trust between farmers and consumers through transparent supply chain traceability.

**CODE**

simulate a basic crop monitoring system using random data generation-----

import random

import time

class Crop:

def \_\_init\_\_(self, name):

self.name = name

self.soil\_moisture = 0

self.temperature = 0

self.humidity = 0

self.light = 0

class CropMonitoringSystem:’

def \_\_init\_\_(self):

self.crops = []

def add\_crop(self, crop):

self.crops.append(crop)

def read\_sensor\_data(self, crop):

# Simulate reading sensor data for soil moisture, temperature, humidity, and light

crop.soil\_moisture = random.randint(20, 80)

crop.temperature = random.uniform(20, 35)

crop.humidity = random.uniform(50, 80)

crop.light = random.uniform(0, 100)

def monitor\_crops(self):

while True:

for crop in self.crops:

self.read\_sensor\_data(crop)

print(f"{crop.name}: Soil Moisture: {crop.soil\_moisture}%, Temperature: {crop.temperature}°C, Humidity: {crop.humidity}%, Light: {crop.light}%")

print("-------------------------------------------------------")

time.sleep(5) # Read data every 5 seconds

def main():

crop\_monitoring\_system = CropMonitoringSystem()

# Simulate crops in the field

crop1 = Crop("Wheat")

crop2 = Crop("Rice")

crop3 = Crop("Corn")

crop\_monitoring\_system.add\_crop(crop1)

crop\_monitoring\_system.add\_crop(crop2)

crop\_monitoring\_system.add\_crop(crop3)

# Monitor the crops and display sensor data

crop\_monitoring\_system.monitor\_crops()

if \_\_name\_\_ == "\_\_main\_\_":

main()