Eco-Friendly Smart Agriculture System

Description

The Eco-Friendly Smart Agriculture System is a smart agriculture System is designed to optimize crop growth while conserving resources. It integrates various environmental sensors and farming equipment to monitor and respond to changes in soil conditions. Specifically, soil moisture sensors and nutrient sensors detect dry conditions or low nutrient levels, respectively, and automatically trigger irrigation and fertilization systems to address these issues. This automation ensures efficient water and nutrient use, promoting sustainable farming practices.

Design Pattern Used

Observer Pattern

How the Pattern is Used

The Observer Pattern is used to create a system where environmental sensors (subjects) notify the appropriate farming equipment (observers) when changes in soil conditions are detected.

- **Subject Interface (Subject.java)**:
  - Defines methods for attaching, detaching, and notifying observers.
  - Sensors such as SoilMoistureSensor and NutrientSensor implement this interface.
- **Observer Interface (Observer.java)**:
  - Defines the update method that observers implement.
  - Systems such as IrrigationSystem and FertilizerSystem implement this interface.
- **ConcreteSubject Class (ConcreteSubject.java)**:
  - Implements the Subject interface.
  - Manages a list of observers and notifies them of state changes.
- **ConcreteObserver Classes (IrrigationSystem.java, FertilizerSystem.java)**:
  - Implement the Observer interface.
  - Perform specific actions (e.g., start irrigation or release fertilizers) when notified by subjects.
- **FileStorage Class (FileStorage.java)**:
  - Manages saving and loading the state of the system to and from a file.
  - Ensures the current state of sensors and systems is persisted across sessions.

By using the Observer Pattern, the application maintains a loosely coupled system where sensors and farming equipment interact seamlessly, promoting efficient and sustainable agricultural practices.