Smart Agriculture System

Group 2

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a. Introduction

The Smart Agriculture System is an IoT-based platform designed for real-time monitoring of plant and soil conditions. This system leverages sensors and microcontrollers to gather crucial data such as soil moisture, temperature, and humidity, enabling farmers or gardeners to make informed decisions about irrigation and plant care. The project aims to automate and optimize agricultural processes, thereby increasing crop yield and resource efficiency.

b. Motivation

The motivation behind this project stems from the need to address inefficiencies in traditional farming practices. Manual monitoring of plant health and soil conditions is labor-intensive and often inaccurate, leading to suboptimal irrigation and resource wastage. By integrating IoT technology, the system empowers users to remotely track essential parameters and automate responses, ultimately promoting sustainable agriculture and reducing human effort.

c. Innovation/Uniqueness

What sets this project apart is its integration of multiple sensors and wireless communication modules to deliver a comprehensive plant monitoring solution. The system not only collects real-time data but also enables remote control of irrigation systems, which can be managed via a user-friendly interface. The modular design allows for scalability and customization based on specific crop or field requirements, making it adaptable for various agricultural scenarios.

d. Hardware Requirements

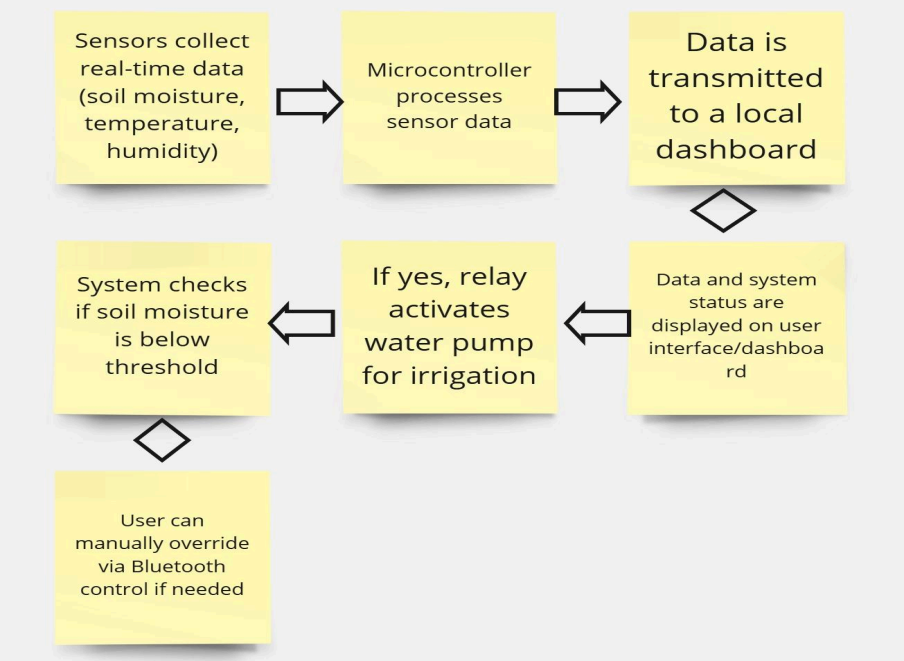
The following hardware components are used:

- Microcontroller (Arduino Mega)
- Soil moisture sensor
- Temperature and humidity sensor (e.g., DHT11)
- Relay module (for pump control)
- Water pump or solenoid valve
- Jumper wires and breadboard
- Power supply (battery or adapter)
- Bluetooth
- Rain Sensor

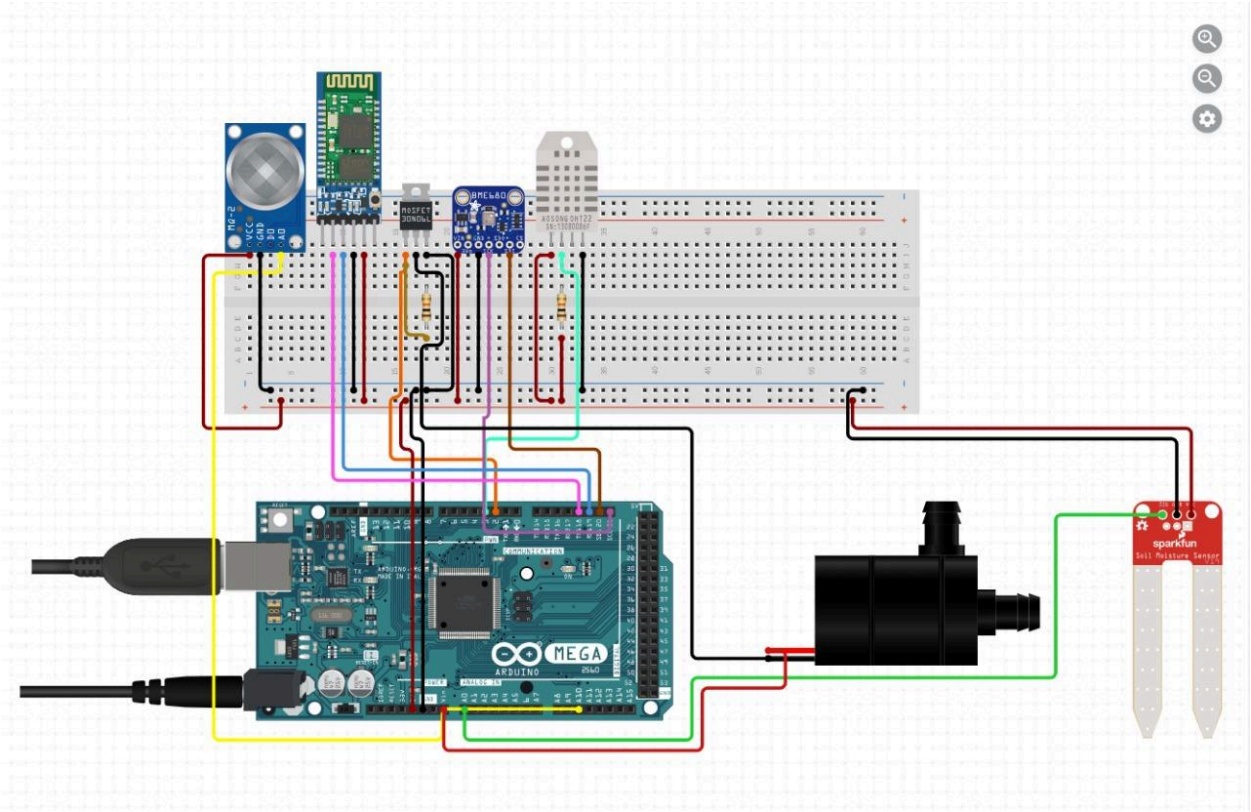
e. Flowchart

Project Workflow Flowchart:

1. Sensors collect real-time data (soil moisture, temperature, humidity).
2. Microcontroller processes sensor data.
3. Data is transmitted to a local dashboard.
4. System checks if soil moisture is below threshold.
5. If yes, relay activates water pump for irrigation.
6. Data and system status are displayed on user interface/dashboard.
7. User can manually override via bluetooth control if needed.



f. Circuit Diagram



g. Code Details

The code is structured to:

- Initialize and read values from sensors.
- Compare soil moisture value to a predefined threshold.
- Activate relay to turn on water pump if moisture is low.
- Send data to cloud/dashboard via Wi-Fi.
- Allow manual override commands from user interface.

Detail codes of the project are available on github :
https://github.com/SuvrayanBandyopadhyay/Smart_Agriculture_System

h. Project Outcome

The Smart Agriculture System successfully automates the monitoring and irrigation process, providing real-time data and remote control capabilities. The system reduces water wastage, ensures optimal soil conditions for plant growth, and minimizes manual intervention. The project demonstrates the effectiveness of IoT in modernizing agriculture and can be scaled for larger applications.

i. Individual Contributions

- Suvrayan Bandyopadhyay:Circuit Making, Arduino
- Chirag Ashish Agrawal:Dashboard Creation, Hardware Integration, Report Making
- Siddharth Anand:CnD, Circuit Making
- Om Ronte: Circuit Making
- Aditya Prakash:Dashboard Creation, Hardware Integration, Report Making