“User-Friendly Agriculture system control using mobile application from anywhere in world”

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INTRODUCTION

Irrigation is important in agriculture because it ensures crops receive an adequate and consistent water supply, essential for their growth and development. It helps farmers mitigate the risks associated with droughts and unpredictable rainfall, leading to increased crop yields, improved quality of produce, and overall food security.

Irrigation using embedded systems is important in agriculture because it allows for precise control and management of water resources. Using embedded system we are able to provide water to the field from any part of the globe with the help of SMS.

This technology helps in reducing water wastage, minimizing labour, and ultimately improving the overall productivity and sustainability of agricultural operations.

LITERATURE REVIEW

Sr no.	Paper Name	Year and Publisher	Summary
1	An IoT Based Smart Irrigation System	2021 IEEE	The primary goal was to develop a smart irrigation system. A mobile application was developed to offer a user-friendly experience, reducing system complexity. A website providing rich content for farmers was also developed, aiding in user education and system understanding. The prototype has significant potential for improvement, but it is currently functional and effective on a smaller scale.

2	IoT Based Low-cost Weather Station and Monitoring System for Smart Agriculture	2021 IEEE	The system monitors crucial environmental parameters such as temperature, humidity, and rainfall quantity. The system aims to conserve natural resources and save energy. It is designed to be low-cost and user-friendly, making it accessible for widespread agricultural use.
3	Smart Irrigation based on Crop using IOT	2021 IEEE	The system uses water level sensors to ensure water reaches every corner of the land, addressing existing irrigation problems effectively. It enables the irrigation of multiple crops simultaneously without fixing the quantity of water; instead, it relies on maintaining the appropriate water level for each crop. This approach results in substantial water savings, contributing to more sustainable agricultural practices.

Existing System

Manual Irrigation

Traditional method relying on human observation and judgment to determine when and how much water to apply.

Timer-Based Systems

Utilize timers to automate irrigation schedules, reducing reliance on manual intervention..

WiFi-Enabled Systems

Employ wireless technology to connect sensors, controllers, and other devices, enabling remote monitoring and control of irrigation systems.

PROBLEM STATEMENT

Design and implement an embedded system for agricultural irrigation that optimizes water usage through precise, SMS-enabled remote monitoring and control.

Feasibility study & Scope of the Project

Operational Feasibility:

The system is user-friendly, as it allows control via both SMS and a mobile application. Farmers with basic mobile phones can use SMS functionality, while those with smartphones can take advantage of WiFi-based control for real-time updates and more intuitive operation.

Technical Feasibility:

The availability of low-cost microcontrollers, Wi-Fi modules, and mobile app development tools makes the project technically viable.

Economic Feasibility:

The project requires inexpensive components, most of which are easily sourced. For development, you may incur low costs if you use open-source software and development tools. • The potential for cost savings for end users by reducing water usage and improving crop yields adds economic value to the system, which may justify the initial investment.

Scope of the project

Automation of Irrigation:

The core function of the project is to automate the irrigation process, allowing remote control of water flow using SMS or a mobile application.

Dual Communication System:

The integration of both SMS and WiFi-based control ensures that the system can be accessed both remotely and locally, providing flexibility for users.

Real-time Monitoring and Control:

Through the mobile application, users will have access to real-time status updates on the system, allowing them to monitor whether the motor and solenoid valves are active.

Scalability:

The system can be expanded to include additional sensors for soil moisture, weather data, and more to further enhance decision-making.

Application in Different Agricultural Environments:

This system is highly adaptable and can be used in a variety of farming setups—from small farms to larger agricultural enterprises.

Proposed System

The system allows users to remotely manage water flow to crops via two primary modes of communication:

1. **SMS Control :**

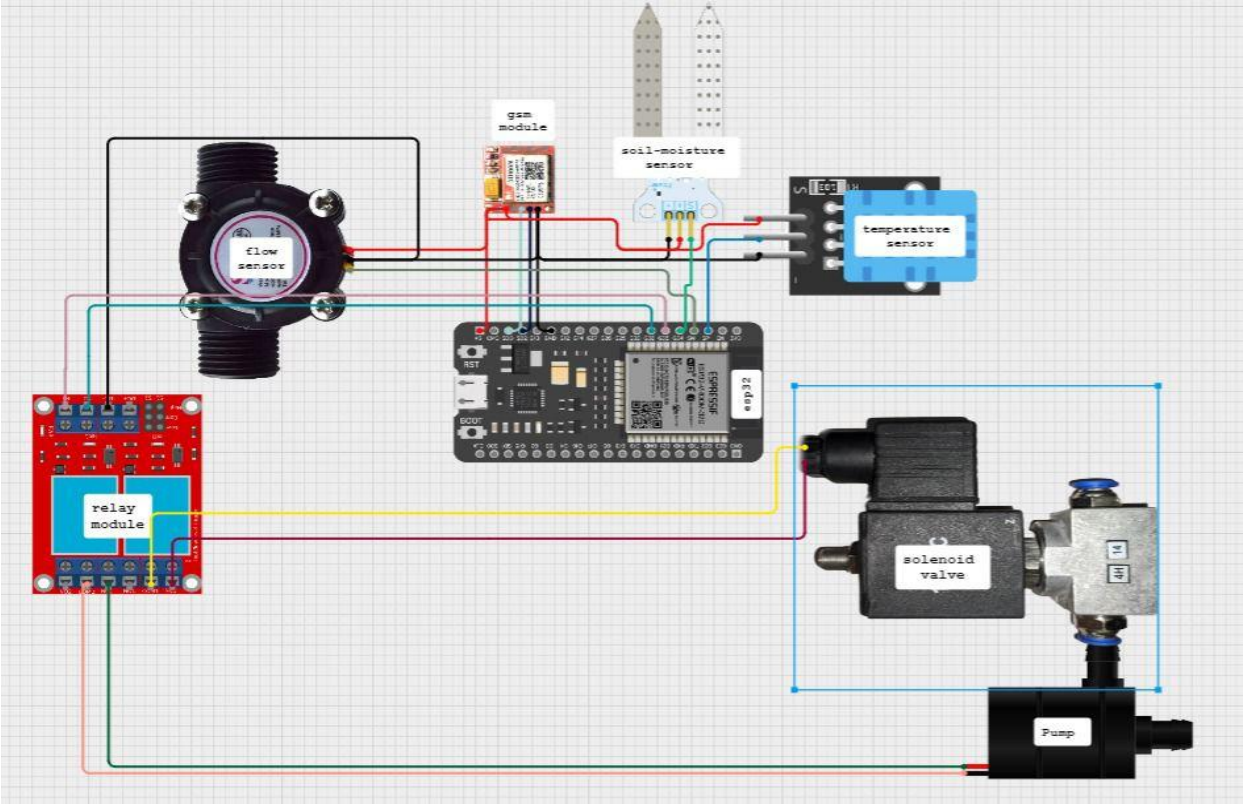
   When the user is offline, they can send predefined SMS commands to control the irrigation system. The GSM module receives these commands and transmits them to the microcontroller, which then checks the command against preset conditions. Based on the command, the microcontroller sends signals to the relay, which controls the motor and solenoid valves for water flow.

2. **Mobile Application :**

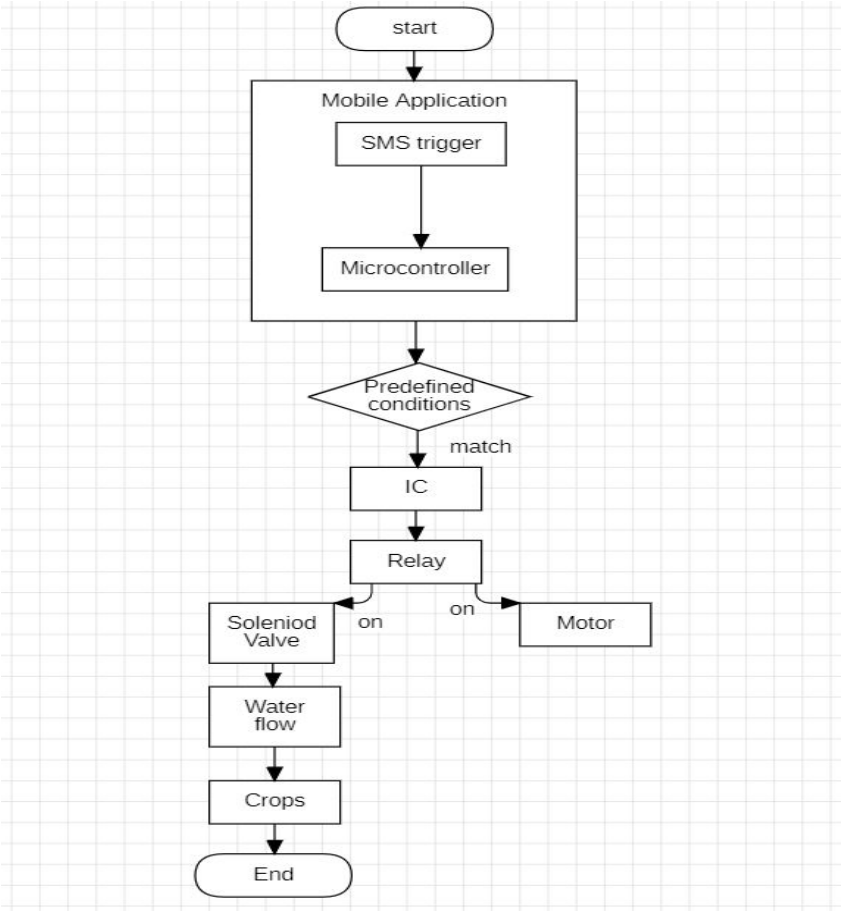
   To further modernize the system, a mobile application will be developed, allowing users to control the irrigation system via Internet. The system will now include a WiFi module connected to the microcontroller. The users can send commands through the mobile application, which the microcontroller will process to manage water flow. The application will also provide real-time status updates on the system, including the operational state of the motor and valves, ensuring transparency and ease of management.

Methodology

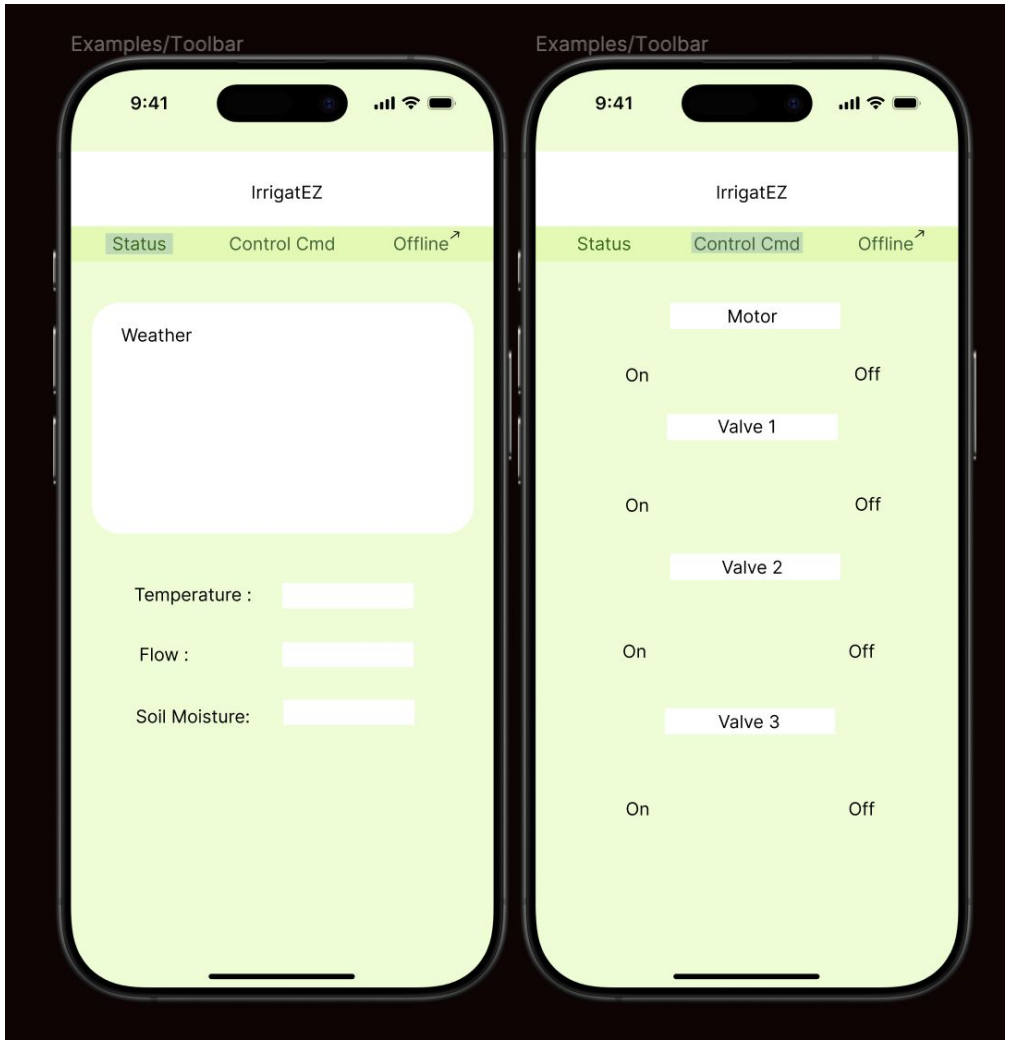
- Circuit Diagram



- Flow Chart


start
Mobile Application
SMS trigger
Microcontroller
Predefined conditions
match
IC
Relay
on
on
Soleniod Valve
Motor
Water flow
Crops
End

- Implementation



Conclusion

The smart irrigation system utilizing SMS and mobile application control offers a cost-effective, reliable, and user-friendly solution for automating water management in agriculture.

By integrating both GSM and WiFi modules, the system provides flexibility to operate in remote areas via SMS and locally through a mobile application.

This dual approach ensures that farmers can efficiently manage irrigation, optimizing water usage and improving crop yield, regardless of their location or internet connectivity.

The system's ability to display real-time status updates enhances user control and monitoring, reducing labor and minimizing water wastage.

Overall, it addresses both technical and environmental challenges, making it a valuable tool in sustainable agriculture practices.

References

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