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SMART FARMING

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A new field that will help with applications connected to agriculture is the Internet of Things (IoT). IoT can be used to build applications like smart gardening, automated watering systems, automatic equipment installs depending on human activities, etc. This study proposes a wireless sensor based networking system to feed nutrients and handle water pumping to crops. The first challenge is to automate the garden's water pumping system for crops. While soil moisture sensors are used to sense the water level and start the process of pumping water to the garden's crops, temperature and humidity sensors are used to monitor the temperature in order to start the water pumping system. A rain sensor is used to determine whether it is raining.

Keywords: Arduino, Raindrop sensor, Moisture sensor, DTH11 sensor, BMP160 sensor, LCD, Relay, DC pump, Power supply

1.Introduction:

“Smart Farming" represents the fusion of traditional agricultural practices with cutting-edge technologies, particularly those associated with the Internet of Things (IoT), data analytics, and automation. It aims to revolutionize farming operations by leveraging advanced technologies to optimize efficiency, increase productivity, and improve sustainability. The concept of Smart Farming encompasses various aspects of agriculture, including crop cultivation, livestock management, resource utilization, and environmental monitoring.

At its core, Smart Farming relies on interconnected devices, sensors, and actuators embedded throughout the agricultural landscape. These devices collect a vast array of data on factors such as soil moisture levels, temperature, humidity, crop health, livestock behavior, and equipment performance. This data is then transmitted wirelessly to centralized systems for analysis and decision-making.

One of the key components of Smart Farming is precision agriculture, which involves the precise application of inputs such as water, fertilizers, and pesticides based on real-time data and analysis. By utilizing sensors and actuators installed on agricultural machinery and implements, farmers can optimize the use of resources while minimizing waste and environmental impact.

2. Literature Survey:

1. Development of an IoT-based smart irrigation management system for efficient water management in agriculture" (Alam et al., 2020):
This study presents an IoT-based smart irrigation management system that integrates weather forecasting data to optimize water usage in agriculture. The system utilizes sensors to monitor soil moisture levels and weather conditions, allowing for real-time adjustments to irrigation schedules based on forecasted weather patterns.

2. "Smart agriculture: IoT-based smart sensors agriculture stick for live temperature and moisture monitoring using MQTT protocol" (Patel et al., 2020):
The paper discusses the development of a smart agriculture system that incorporates IoT sensors to monitor temperature and moisture levels in soil. Weather forecasting data is integrated into the system to optimize irrigation schedules and conserve water resources.

3. "Smart irrigation management using IoT and weather forecast data for sustainable agriculture" (Jain et al., 2019):
This study proposes a smart irrigation management system that combines IoT technology with weather forecast data to improve water efficiency in agriculture. The system dynamically adjusts irrigation schedules based on predicted weather conditions, resulting in optimized water usage and enhanced crop yields.

4. "An intelligent irrigation control system based on IoT technology and weather forecasting" (Garg et al., 2018):
The paper presents an intelligent irrigation control system that utilizes IoT technology and weather forecasting data to optimize irrigation scheduling. By incorporating weather predictions into the decision-making process, the system reduces water wastage and improves crop water efficiency.

5. "Optimizing agricultural irrigation system using IoT and weather forecasting" (Kamble et al., 2017):
This study explores the optimization of agricultural irrigation systems through the integration of IoT devices and weather forecasting techniques. By leveraging real-time weather data, the system dynamically adjusts irrigation schedules to account for changing environmental conditions, leading to improved water management and crop productivity.

3. Problem Statement:

"In traditional agricultural practices, irrigation scheduling often relies on manual observation or fixed timetables, which may lead to inefficient water usage and suboptimal crop yields. Moreover, unpredictable weather conditions exacerbate the challenge of irrigation management, as excessive or insufficient watering can negatively impact crop health and productivity. To address these issues, there is a need for an innovative irrigation system that integrates advanced technologies such as Internet of Things (IoT) and weather forecasting. The objective is to develop a smart irrigation solution that dynamically adjusts watering schedules based on real-time weather predictions, soil moisture levels, and crop water requirements. This system should enable farmers to optimize water usage, improve crop yields, and enhance overall agricultural sustainability. However, the design and implementation of such a system entail various technical and practical challenges, including sensor deployment, data integration, algorithm development, and user interface design. Therefore, this research aims to design, develop, and evaluate an E-Agriculture irrigation system based on weather forecasting to address these challenges and provide a practical solution for efficient and sustainable agricultural water management."

4. Proposed System:

In the proposed system of E-Agriculture: Irrigation System Based On Weather Forecasting , The farmer can utilize the resources sufficiently without wasting them. Here we are using sensors in order to find the necessities for the crops / fields. Sensors like soil moisture sensor to detect the water level in soil and pump the water whenever crop wants, water sensor is used to switch ON / OFF the motor according to the crop necessity. Temperature & Humidity sensor is used to detect / identify the temperature in order to pump the water if the land is dry due to heavy temperature. The data of these sensors can be displayed / shown on the LCD to the farmers in order to get the good crop yield & they can protect the fields / crops according to the weather conditions.

5. Design of Proposed System:

The user of the proposed system has utilized technology in the agriculture sector to a sufficient degree. In this system, the DHT11 sensor is used to track the humidity and temperature levels in the fields, while the moisture sensor determines the moisture content of the soil. The user may readily view the moisture and climate conditions in the field shown directly on the LCD display of the data from these sensors.

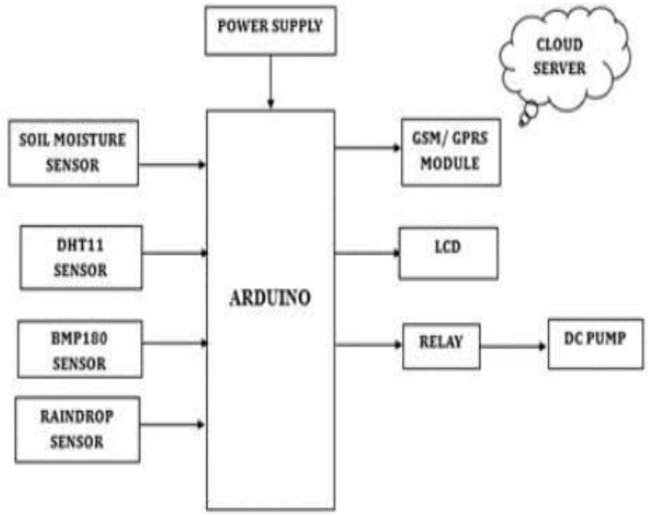
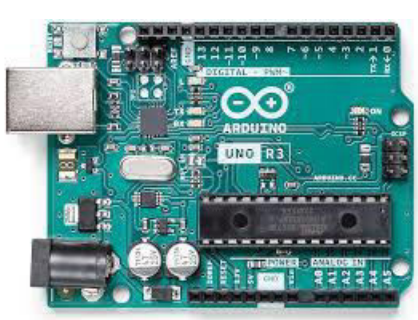
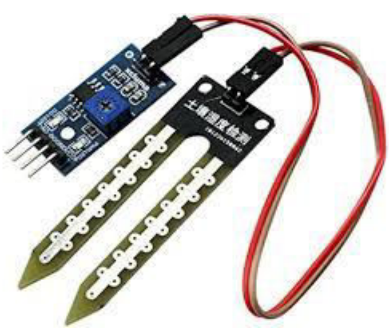


Fig. E-Agriculture: Irrigation System Based On Weather Forecasting.

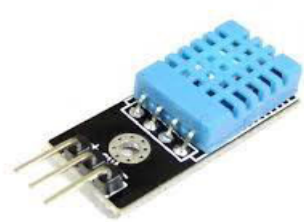
6. Hardware and Software Tools Used:



Arduino UNO



Soil Moisture Sensor



Temperature & Humidity Sensor

Rain / Water Sensor 16x2 LCD Relay

7. Advantages and Applications:

7.1 Advantages:

Water conservation: The irrigation system can improve water usage by modifying irrigation schedules based on anticipated weather patterns by utilizing weather forecasting data. This aids in the preservation of water supplies, particularly in areas vulnerable to drought or water scarcity.

Increased Crop harvests: By supplying crops with the appropriate amount of water at the appropriate time, the system promotes optimal growth and maximizes harvests. It reduces the possibility of crop stress and raises total yield by avoiding overwatering or under watering.

Resource Efficiency: Farmers may use resources like water, electricity, and fertilizers more efficiently, resulting in financial savings and a less environmental impact, by precisely managing irrigation under the guidance of weather forecasts and sensor data.

Weather Risk Mitigation: By anticipating and modifying irrigation schedules in response to weather forecasts

7.2 Applications:

Water management in farming can be done quickly and effectively by putting in place an e-agriculture irrigation system that is based on weather forecasts. By adjusting irrigation schedules in accordance with weather forecasts, farmers may conserve water and increase crop yields.

Smart farming: This technique gives farmers access to data and insights into their farming operations in real-time. Making educated decisions regarding inputs, planting dates, and other elements that may affect crop yields is possible with the use of this data.

Remote Monitoring and Control: Irrigation process control and monitoring are made possible by e-agriculture technologies. Farmers may provide flexibility and convenience by modifying irrigation settings in response to real-time weather data.

Crop planning and rotation: Crop rotation is the process of planting a variety of crops in the same space over time.

8.Results

To sum up, the E-Agriculture project—which uses an irrigation system based on weather forecasting—is essential to the agricultural industry. Wastewater and plant health are often harmed by traditional approaches. On the other hand, it promotes sustainable farming, increases agricultural productivity, and improves water management. This project's benefits include lower labor costs, less water waste, and higher crop yields. In agriculture, we can regulate crop production by employing this technique. The formers will benefit greatly from this project in terms of water, labour and crop related works .

This project model takes low cost, automatic control, dependability, and an alternative electric power source into account. The automatic nature of the device will assist the operator in appropriately irrigating their land.

9.Conclusion

Developing an E-Agriculture Irrigation System Through Weather Forecasting offers a novel strategy with bright future possibilities. Future concerns and scopes that could be of interest are as follows:

1.Improved Crop productivity: By supplying water in accordance with the needs and timing of the crop, we can use this technology to boost agricultural productivity. The engine will automatically switch on to feed the crop when the land is dry. In order to protect crops from injury, the motor switches off when the field becomes dry.

2. Reduce Manpower: The technology allows for the reduction of labor costs because it sends out alerts whenever the crops require watering, allowing us to turn on the motor manually or automatically. Farmers are thus able to lower the

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