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AUTOMATIC RAIN ALERT AND PROTECTION SYSTEM FOR HARVESTED CROPS USING IOT

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Abstract - Agriculture is a backbone of India and high percent of income is mainly generated through agriculture. So by providing modern technologies enabled by Internet Of Things. This paper presents the working of an Automatic Rain Alert and Protection System for Harvested crops using IOT , which protect crops from Unexpected Rain and send Alert E-mail notification to farmers and also display Temperature and Humidity(DHT22). And this project has applications such as Agricultural fields, Open equipment setups. This uses a rain Sensor with Microcontroller (Arduino Uno) to monitor rain intensity. When rainfall is detected it automatically covers the harvested crops by closing a roof and it simultaneously sends an instant Email alert to user through ESP8266 Wi-Fi Microcontroller .By using this Technology ensures early awareness and prevent the damage by unexpected rainfall. This model provides a low-cost reliable and automated solution for rain detection and protects crops. screen for immediate awareness. The collected data is analyzed using predefined medical thresholds to detect abnormal BP conditions. When an abnormal condition is detected, the system automatically sends an email alert to the concerned doctor through the Blynk IoT platform. This proactive alert mechanism enables early medical intervention, reduces emergency response time, and enhances patient safety. The proposed system offers a low-cost, reliable, and scalable solution for real-time stroke risk monitoring in both home-based and clinical environments.

The adoption of modern technologies enabled by the Internet of Things plays role in improving agricultural efficiency and reducing losses. This paper presents the design and working of an Automatic Rain Alert and Protection System for harvested crops using IoT technology. The proposed system protects crops from unexpected rainfall by automatically covering them and sending instant email alert notifications to farmers. It also monitors and displays environmental parameters as temperature and humidity using a DHT22 sensor. The system employs a rain sensor integrated with a microcontroller (Arduino Uno) to detect rainfall intensity. When rain is detected, the system automatically closes a protective roof over the harvested crops and simultaneously sends an email alert to the user through the ESP8266 Wi-Fi module. By enabling early awareness and automatic protection, this technology helps prevent crop damage caused by sudden rainfall. The proposed model offers a low-cost, and automated solution suitable for applications such as agricultural fields and open equipment storage areas.

Keywords: Abnormal, Pulse value, Blynk IOT, email notification, Stroke detection.

1. INTRODUCTION

Agriculture is process that involves planting and harvesting the crops. Due to some natural calamities and also in the absence of farmers the harvested crop not covered, and also a unseasonal rain leads to financial losses for the farmer. This technology is important because people needs smarter ways to check the weather in homes, forms, and industries. Traditional manual methods of checking for rain and protecting valuables are inefficient during sudden weather changes. With Internet of Things, we can use sensors and automatic devices to develop a model to solve this problem by enabling real-time sensing, automated control. This approach detection of unexpected rain.

The Automatic Rain Alert and Protection systems uses low-cost sensors and IOT connectivity to detect rainfall and notify farmers instantly. If the farmer is not present at the place Email notification helps to know the sudden rainfall . This prototype is developed in such way that The sheet is opened automatically when the rain starts Even with small drops of rain and send Email alert notification to the users. In addition to that If the Weather updates or alerts are not reached farmers in absence of Wi-Fi and all in that situation this system protects the crops by automatic sheet covering.

1.1 RESEARCH OBJECTIVES

The main objective of this project is to design and implement an IoT-based automatic rain alert and crop

protection system to safeguard agricultural fields from unexpected rainfall. The system continuously monitors environmental conditions such as rainfall and humidity using sensors and processes the data in real time. When rain is detected, the system sends instant alert notifications to farmers through email using an IoT platform, enabling remote monitoring of field conditions. In situations where the farmer is not present in the field, the system automatically activates a protective covering mechanism to prevent crop damage. By reducing manual intervention and ensuring timely response to weather changes, the system helps minimize crop loss and financial risk. The proposed solution aims to provide a cost-effective, reliable, and user-friendly smart farming approach that enhances agricultural productivity and supports sustainable farming practices.

2. METHODOLOGY

This model mainly focuses on crop Protection from rain fall and alerting the farmer. System uses IOT Components to build the model. First requirenment is rain sensor to detect the rainfall. As soon as it starts to rain, the rain sensor activates and alerts the controller. The controller covers the crop as soon as rain is detected by the rain sensor, once rain stops, the controller automatically uncover the sheet. and also In this model we are using ESP8266 Wi-Fi Microcontroller use send the email notification to farmers. This System also monitor temperature and Humidity using DHT22 Sensor.

The system is designed using a three-tier architecture to provide efficient rain detection and automatic protection. The first tier, the Sensing Layer, involves rain sensors that detect precipitation and acquire corresponding signals. The second tier, the Processing Layer, utilizes an ESP8266 or Arduino-based module to process the sensor data and make real-time decisions. The third tier, the Action Layer, executes the protective mechanisms automatically and communicates alerts via email. The ESP8266's built-in Wi-Fi capability ensures seamless connectivity with the cloud for remote monitoring and notifications. The motor mechanism responsible for activating the protective measures is carefully analyzed in terms of response time, torque requirements, and load capacity to ensure reliable operation. The overall system performance is evaluated based on the speed of reaction, the delay in sending email alerts, and the effectiveness of the protection mechanism in safeguarding against rain-related damage.

2.1 WORKFLOW DIAGRAM

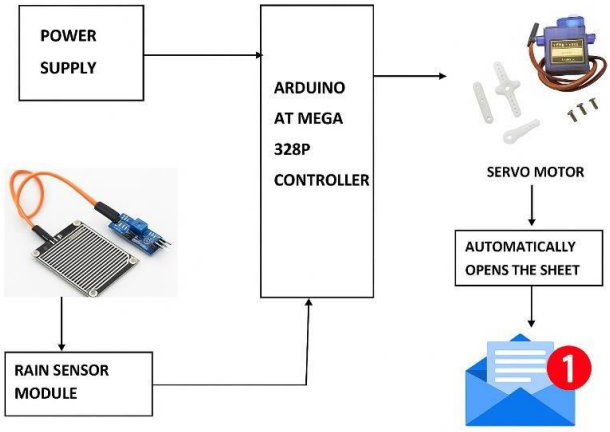

Figure 1: Automatic rain alert and protection system for harvested crops.

3. RESULTS AND DISCUSSION

The implementation of the Automatic Rain Alert and Protection System proved to be effective, reliable, and efficient in safeguarding harvested crops from unexpected rainfall. The integrated rain sensor accurately detected rain intensity and triggered the automated protective roof mechanism without delay. Simultaneously, the ESP8266 module successfully delivered real-time email notifications to the user, ensuring timely awareness. The inclusion of the DHT22 sensor provided continuous monitoring of temperature and humidity, adding additional environmental insights for farmers. Overall, the system demonstrated smooth operation, rapid response time, and consistent performance during testing. This low-cost IoT-based solution shows significant potential for agricultural applications by reducing crop damage, minimizing manual intervention, and improving farm productivity through automation and early-warning capabilities.

The system remained stable during prolonged operation, indicating good reliability for real-world field conditions. Automated actuation of the protective roof reduced the dependency on human supervision and ensured consistent crop protection even during sudden weather changes. The IoT-based architecture allowed seamless data transmission with minimal latency, improving the effectiveness of the alert mechanism. Testing results confirmed that the system can be easily monitor crop types and farm sizes. Overall, the experimental outcomes validate the practicality of the proposed system as a smart agricultural solution that enhances decision-making, reduces economic losses, and supports sustainable farming practices.

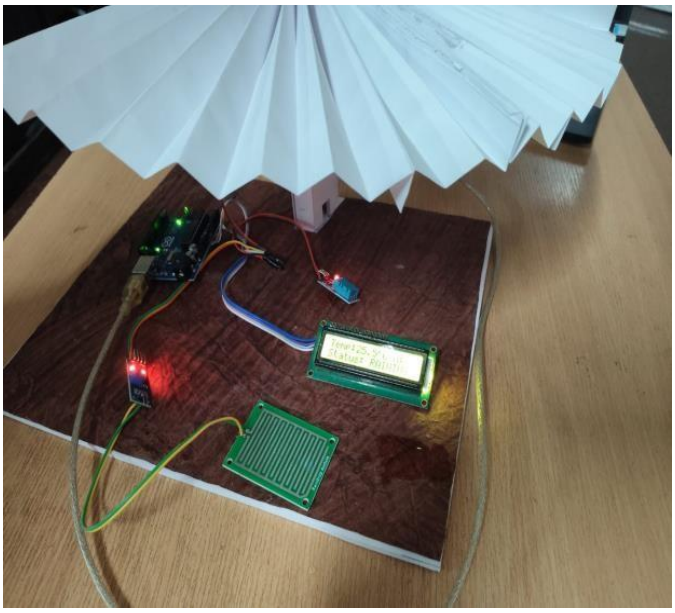

Figure 2 : Automatic sheet covering

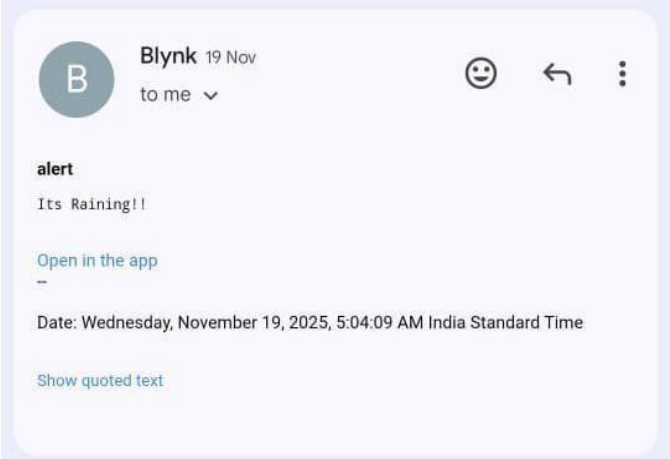

Figure 3: Email notification received to farmer.

4. CONCLUSIONS

The system's modular design also makes it adaptable for various applications such as agriculture, household use, crop protection, and industrial storage areas. Its real-time response capability ensures minimal human intervention, reducing manual effort and improving overall efficiency. Additionally, the combination of sensors, microcontroller processing, and servo-based automation demonstrates how IoT can be effectively used for environmental protection tasks. this system can evolve into a fully intelligent weather-responsive solution. Overall, the Automatic Rain Alert and Protection System gives a reliable, scalable, and user-friendly methods.

The system's modular design makes it adaptable for various applications such as agriculture, household use, crop protection, and industrial storage areas. Its real-time response capability ensures minimal human intervention, thereby reducing manual effort and improving overall operational efficiency. The integration of multiple sensors, microcontroller-based processing, and servo-driven automation clearly demonstrates the effective use of IoT technology for environmental protection tasks. With further enhancements such as cloud data analytics and weather forecasting integration, the system can evolve into a fully intelligent and weather-responsive solution. Additionally, remote accessibility allows users to monitor and control the system from any location, increasing convenience and reliability. Overall, the Automatic Rain Alert and Protection System provides a dependable, scalable, and user friendly approach that supports smart automation for future agricultural and environmental applications.

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