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An IoT based Weather Monitor System for Drying Clothes

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Abstract: ***A growing demand for integrated smarter and faster techniques to make work easier and productive leads to the advancement of technologies. This paper entitled "AN IOT BASED WEATHER MONITOR SYSTEM FOR DRYING CLOTHES" proposes a smart way of monitoring the area where we dry out our clothes and upload the data over IoT.***
This proposed module consists of an IoT based framework that effectively observes the change in weather using sensors, Application that displays weather parameters such as temperature, humidity and clothes moisture obtained from the sensors to cloud by implementing message queuing telemetry transport protocol. The proposed system is portable, affordable and the data can be accessed at any instant. The Internet of Things is implemented to make informed decisions and to optimize the experience of the residents by providing them with real time data and sending customized alert notifications via software application to the right person. The clients can subscribe to the application and get the updates from the implemented system in their smartphone.
Keywords: IoT, Arduino uno, sensors, Message Queuing Telemetry Transport Protocol (MQTT), Blynk

I. INTRODUCTION

Nowadays the unforeseeable climate can be troublesome to some individuals who dry out their clothes. So, people often find it difficult to continuously monitor the sudden change in weather and take out clothes from outside if an unexpected rain occurs. There are a lot of cloth dryer rack products available in the market these days. However, most of the products are large in size and also occupy a lot of space. Some houses have a very small space. So, it is difficult to buy the clothes dryer rack by the conditions of their home and bring in their clothes while raining. A product that consumes small space saves time and worry-free to users about hanging clothes outdoors is needed.

Here, this system will be more helpful to the people who are busy with other works. Also this system will help them to find the preferred climate for clothes drying. Thus, there is no human intervention required to continuously monitor the climatic changes

This project uses Temperature sensor, Humidity sensor and wet sensors act as observation unit with considerate power supply using power supply unit, these sensor will continuously monitor the environment conditions and update in IoT. The system is designed using Node MCU, where node mcu was programmed to upload the sensor data continuously to the cloud server using internet. A mobile application was developed with user interface were user can see the stored data from the database.

So in-case of any changes in the climatic conditions such as sudden increase in precipitation or if the clothes are dried up this system will notify via the application or alert the user through a buzzer which is a part of the system. In IoT we store and analyse the data continuously to predict the environment changes which can be used to decide whether it is reliable for cloth wash or not. This project helps the users for drying the cloth at the time of rainy seasons.

II. LITERATURE SURVEY

Yung-Chung Tsao et. al. [1] focuses on developing the weather monitoring system. The main goal of the research is to use the technology of message queuing telemetry transport (MQTT) as roles of the communication layer instead of direct-connecting database, which can isolate the system migration complexity from heterogeneous relational database management system (RDBMS) and construct a distributed information system easily. Finally the contributions are demonstrated as implementation of the IoT-based weather monitoring system. The prototyping of the weather monitoring system is implemented and deployed at Wu-Tso elementary school for the students' learning of nature science and activity environment. In addition, the system is implemented using open sources and is easy to be deployed and scalable.

Vladimir N. Khmelev et. al.[2] published a paper devoted to the application of ultrasonic technologies for agriculture needs. Application of high intensity ultrasonic oscillations for presowing treatment of seeds with the purpose to increase its germination and productivity is described. The ultrasonic dryer for drying grain, vegetables and fruit with high technical and operational performances is presented.

Mosfiqun Nahid Hassan et. al. [3] proposed an environmental air quality monitoring system also has industrial application. In mining or in heavy industry, there is a possibility of air contamination by different harmful gases. In such hazardous situations, an environmental monitoring system can potentially save the life of the workers. In such largescale sensor deployment, there are data collection, data management, connection, and power consumption issues. IoT technology is specifically suited for this sort of need. This paper presents an IoT based framework that effectively monitors the change in an environment using sensors, microcontroller, and IoT based technology. Users can monitor temperature, humidity, detect the presence of harmful gases both in the indoor and outdoor environment using the proposed module.

Jaromír Murčinko et. al. [4] presented a paper on printing machines for plastic packaging foil production are the objects of monitoring, mainly the drying technological part. The paper is focused to usage of vibration diagnostics of rotational equipment, i.e. ventilators in drier. The selection of appropriate on-line system control by way of intelligent components implementation is a critical problem of mass production with dangerous operation. The project of applied monitoring system is described. The newly system of automatic monitoring regime with use of artificial intelligence elements was projected and tested.

G. Mahalakshmi et al. [5] published a paper where in they described the different prospects of applying automation in different smart ways. With this in mind the Smart Home project allows the user to build and maintain a house that is smart enough to keep energy levels down while providing more automated applications. A smart home will take advantage of its environment and allow seamless control whether the user is present or away. With a home that has this advantage, you can know that your home is performing at its best in energy performance. By implementing this system, it is possible to explore a variety of different engineering challenges, including software programming, PCB design, Wi-Fi, TCP/IP protocols, Web Server logic design, and other aspects. This automation system provides great insights to the challenges of software and hardware design.

K. Sai Nikhilesh et. al. [6] attempted to a real-time weather monitoring system designed for a smart home that displays weather parameters such as the intensity of rainfall, temperature, wind speed and light intensity obtained from the sensors to the cloud by implementing message queuing telemetry transport protocol. The proposed system is portable, affordable and the data can be accessed at any instant. The Internet of Things is implemented to make informed decisions and to optimize the experience of the residents by providing them with real time data and sending customized alert notifications via email to the right person. The clients can subscribe to the channel from anywhere in the world and get the updates from the implemented system in their smartphone and PC.

III. METHODOLOGY

A. System Architecture

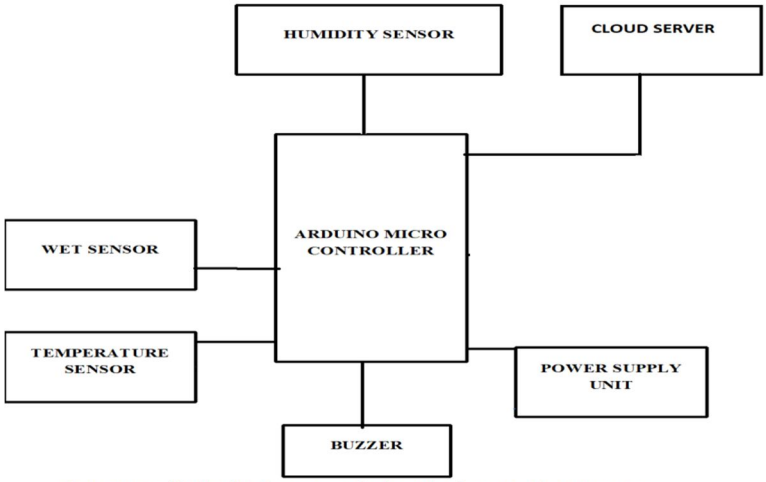

Fig1.Overall Block Diagram Of The Clothes Drying System

The block diagram shown in fig1. is a representation of the proposed Clothes Drying System. Here, the ESP8266-NodeMCU is regulated by 5v of power for its operation, regulated 5v should be provided to the microcontroller which is done by the power unit. The sensors which are interfaced with the NodeMCU are rain sensor, temperature sensor and humidity sensor connected to a moisture sensor module and the overall system is connected to a buzzer to intimate the user.

B. Node MCU (ESP8266 ESP-12E)

The ESP8266-12E, integrates 802.11b/g/n HT40 wi-fi transceiver which enables it to interact with the internet. It has SPI, I2C interface which allows connectivity to the sensors. The operating voltage is 3.0V to 3.5V. The Node MCU has 30 pins that can be integrated into the outside world.

C. Sensors

1) *Humidity and Temperature Sensor:* DHT11 is used as temperature and humidity sensor. It will sense the atmospheric temperature and humidity. According to the threshold value set for sensors, device will work.
2) *Rain Sensor:* The rain sensor was an easy tool that used for sensing rain. The PCB of the raindrops sensor consists of copper tracks which act as a variable resistor. The rain sensor module works on the principle of resistance. Its resistance varied with respect to the wetness on the rain board. When the surface of the rain board was exposed to rainwater, the user will be notified to remove clothes . When the surface of the rain board is not receiving rainwater, the resistance in high condition. It activates the second sensor in this project.
3) *Moisture Sensor:* The Moisture Sensor uses capacitance to measure the water content present in the clothes. Simply insert this rugged sensor onto the clothes which are put to dry, and the volumetric water content of the clothes is reported in percent.
4) *Buzzer:* A buzzer is a signaling device used here to notify the user for a rain alert.

D. Arduino IDE

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code. Here using Embedded C programming language the code is written and uploaded into the microcontroller.

IV. SYSTEM WORKING

The System incorporates of two main divisions : the first division consists of various sensors such as Humidity and Temperature sensor, Rain sensor and Moisture sensor which are interfaced with the Node MCU. The second division consists of the blynk application module where the readings obtained from the sensors are displayed. Additionally a buzzer is added to the system to also notify the user in case of a rain alert which can be fixed inside the house if the user is not in reach of the mobile phone this buzzer sound will automatically alert the user.

As technology is becoming more advance people are also using smartphones is increasing rapidly. This results in the need to create an app through which the weather conditions can be monitored. The app used in this paper is blynk, it is available free of cost and has a customizable user interface. For a first time user should sign up and then login into the application to monitor the weather parameters . The working of blynk app is represented in fig.2. In the app, the moisture, temperature and humidity values are displayed as shown in fig3. Once the wi-fi connection is established, the user is connected to the wi-fi to access the application indicating that Node MCU can communicate with the app.

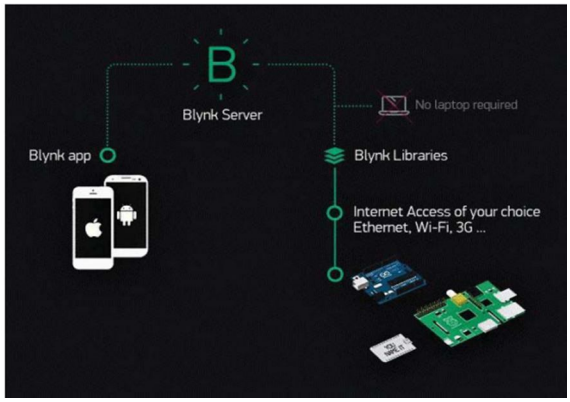

Fig2. Working of Blynk App

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Fig3.Representaion of the application visible to the user

When the system is turned on through the moisture sensor the clothes moisture is available to the user via the application. A threshold value of 100 for moisture is set in percentage form. If the moisture content of the clothes reaches above 90 percent the user is notified that the clothes can be removed as in fig4 if not if the moisture content is below 90 percentage then the clothes will require some more time to dry. A rain sensor is also attached to the system. When this sensor is exposed to rain it immediately notifies the user through notification via the application as shown in fig5. and also it will alert the user by signaling through the buzzer.

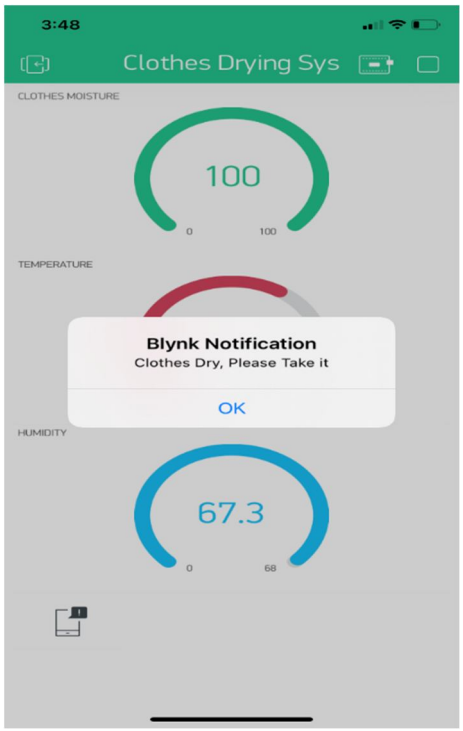

Fig4. Notifying the user to remove clothes

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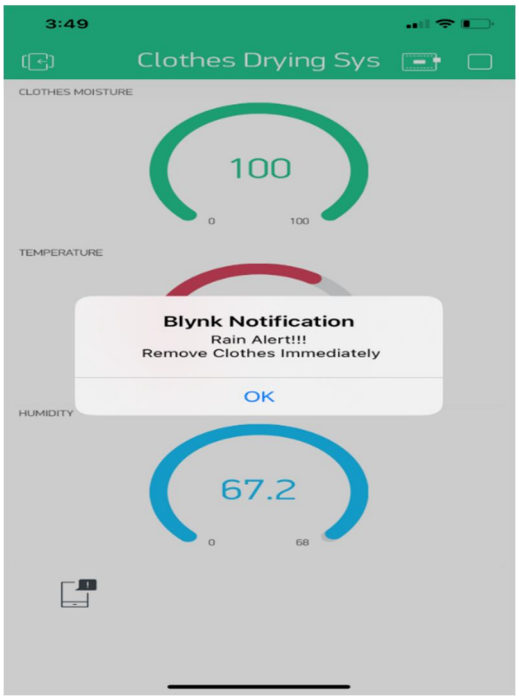

Fig5. Alerting the user regarding the sudden rain

V. RESULTS

The user can easily visualize when the clothes can be put to dry or can also see predict how much more time required for the clothes to get dried up with the help of the values provided from moisture sensor and temperature/humidity sensor respectively. The Blynk application interface screenshot in fig5. clearly depicts that the data gets instantaneously updated and provides an immediate notification to the user if any sudden change in the climatic conditions. The results from all the modules depict the smooth working of the clothes drying system for a smart community.

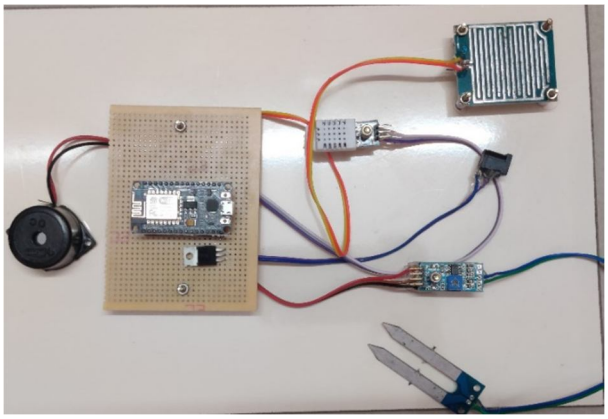
Fig6.Implementation of the system

VI. CONCLUSION

At the end of this project we were able to design and implement a system, the resolves the problem for working people and who doesn't have much time to keep track of the sudden changes in the weather.

This paper is mainly focused on creating a weather monitoring system to dry clothes with low-cost for people who are busy. The overall cost is minimized by using Node MCU which is comparatively cheaper than other devices such as Raspberry-pi etc. This setup can be installed, mounted and is accessible from anywhere, thus making it portable. An automated notification delivery system is developed which alerts the user by sending customized alerts via the smart phone. This setup does not require frequent maintenance thereby saving time and manual labor.

VII. FUTURE SCOPE

The future developments that can be implemented in this project work are we can include a GPS tracking system which involves tracking of in case of displacement of clothes. We can also update this IOT-based system with solar cell can be placed in the system to power up the sensors and Amazon Web Services (AWS) can be used to send daily weather reports via email so the user can decide when to dry out clothes.

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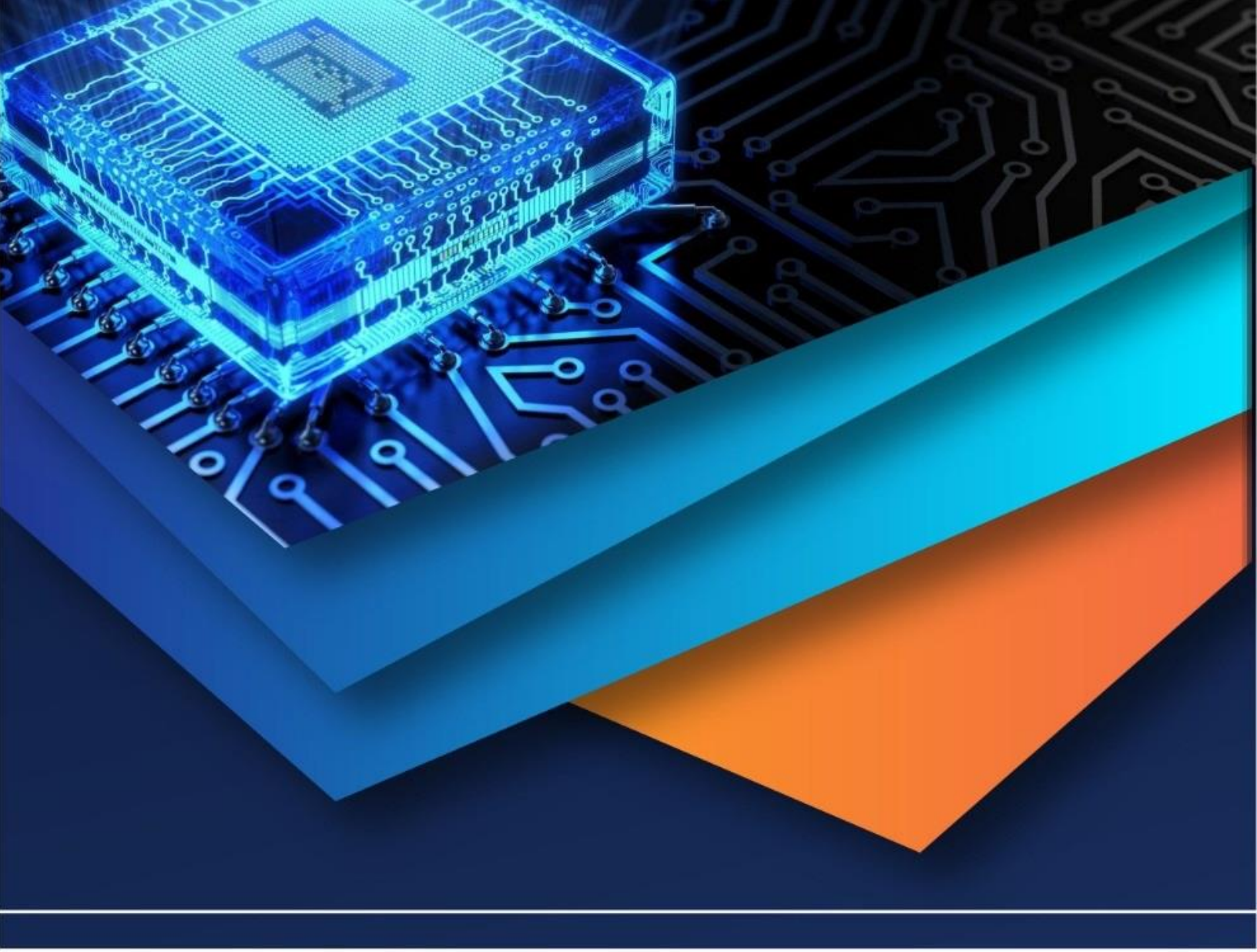

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