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IOT BASED WEATHER MONITORING SYSTEM FOR SMART AGRICULTURE

Prof. Dilna. U
Prof. School of ECE
Reva University
Bangalore, India

Chandini NS, Bhoomika. GS, Ananya A Rao, Bhagyashree
School of ECE
Reva University
Bangalore, India

Abstract—In this paper, the system proposed is an advanced solution for weather monitoring system that uses internet of things for the real time data to be accessed easily. This system helps to monitor weather and changes in climate like temperature, humidity, moisture, UV radiation and carbon mono-oxide levels present in the air by using sensors. These sensors collect the data and stores it in the cloud. The data which is stored in the cloud can be accessed from anywhere. The collected data can also be used for feature. This project also has an application that sends alerts to warn people and farmers about changes in weather. To predict complex weather we use an API which analyses the collected data and gives accurate results. The design involving API requires very low maintenance as the design is simple and there are few moving parts. The components in this project consumes less power and can also be powered by solar panels. This smart weather monitoring system is cost effective and cheaper compared to other devices in the market. This can also be used in meteorological departments, weather station, marine and agricultural industries.

Keywords: Soil moisture sensor, Blynk application, IoT platform, Reducing cost, Increase productivity

I. INTRODUCTION

In the present day internet is a medium of communication between all the devices. Innovations mainly focuses on controlling and monitoring the devices by using internet (wireless). A good environmental monitoring system is needed to monitor and analyze weather, climate and for collecting data for research. A system is said to be smart when it has sensors, micro controllers, software applications etc. These days climate change and pollution has become a serious issue which intern has increased the importance of weather monitoring. The human activities has a serious influence on the climate, and changes over decades.

The monitoring of weather and environment involves collecting correct information about the eco system and knowing the actions that lead to degradation of bio sphere. In the beginning the sensors are used in the environment to detect the parameters like temperature, humidity, pressure etc. Sensors are used at different locations to collect the sensed data and store the data. The major aim of this paper is to design the weather monitoring system which uses the internet and the data collected and stored in the cloud to predict the weather.

II. RELATEDWORKS

1. The farmers use manual method to check the parameters of soil. This system helps to develop devices which manages and alerts the farmers in the agricultural field by using wireless sensor system (Lakshmisudha, 2011).
2. A method of smart farming is proposed by (chethan, 2015). this involves linking a smart sensing and irrigator system by wireless technology.
3. (Gayatri, 2015) highlights the features of smart GPS which performs weeding, spraying, moisture sensing etc. By using sensors we can create a computing system that observes data and feeds the data including the location.
4. The author (Joaquín Gutiérrez, 2013) gives an idea to conserve water use for agricultural crops by irrigation system.
5. To monitor the diseases on fruits, the variation in colour, texture and morphology image processing is used. (Jhuria, 2013)
6. To monitor soil temperature, soil moisture a real time system is used. A real time system provides a real time analysis in variation of parameters to the owner. In order to save man power, water and increased profit this system is used.

II. OBJECTIVE

To detect, record and display parameters like temperature and humidity weather monitoring system is used. Here sensors are used to detect and monitor the parameters. The information which collected here is stored in the cloud and can be accessed using internet. When correct information is collected every day the farmers can predict the problems which may arise in the future. This data is also useful to increase the sales. In order to get good products of high quality smart agriculture should be used during farming. Smart agriculture helps to avoid challenges and problems during farming so that the efficiency increases.

IV. PROPOSED FRAMEWORK

The system which is proposed here is an advanced system for weather monitoring. It makes use of internet of things so that the real time data can be accessed easily. This system deals with weather monitoring and changes in climate like -

- Sensing the temperature and humidity by DHT11 sensor.
- To measure wind speed by anemometer.
- LDR to measure intensity of light.
- UV radiation measurement by a GY8511 solar sensor.
- To measure carbon mono-oxide using MQ7.
- Hygrometer for soil moisture.
- Measurement of rain water level by ultra sonic sensor.
- To detect rainfall or snow fall by rain drop sensor.

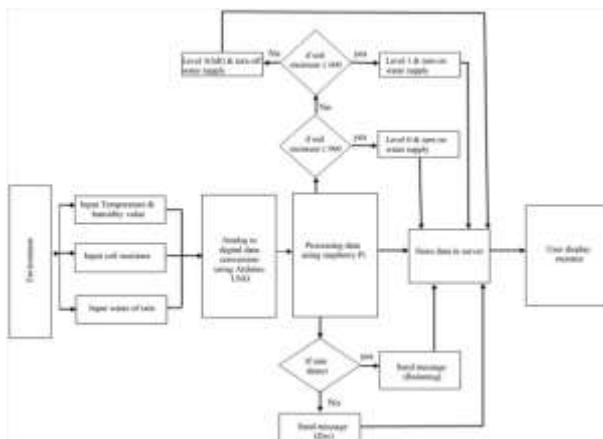


Figure-1: Block Diagram

V. IMPLEMENTATION

This system can be designed in a four step model. The step 1 is environmental sensor devices and step 2 is sensor data collection and decision making in step. Step 4 involves sending warning notification. The information about the parameters is provided in step 1. Step 2 has multiple sensor where each sensor is operated and controlled depending on range of sensing. Fixing the threshold value, periodicity of sensing takes place between

step 2 and step 3. The values of threshold during critical conditions or normal situations are determined based on the analysis done between step2 and step 3. Step 3 helps in decision making and collection of data from sensors. Step 4 is used to identify the changes in collected data and fix the value. Here the collected data will be processed and stored in the cloud. In this model we use node MCU to sense and to store the data in cloud. The sensors are connected to node MCU board to monitor. In built ADC helps in converting the sensor value to digital value and from the digital value environmental parameters will be evaluated.

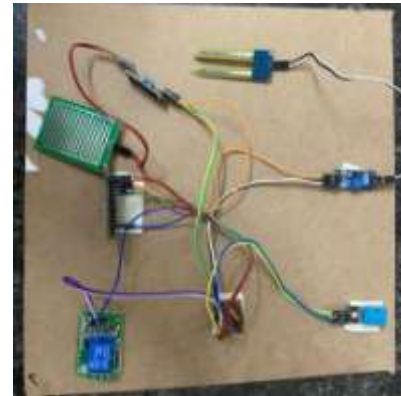


Figure-2: Implemented Circuit (embedded on a band)

VI. HARDWARE AND SOFTWARE

VII. HARDWARE DESCRIPTION

ESP32

It is a device of less-cost. It is a low-power system on a microcontroller chip which has Wi-Fi and Bluetooth.



Figure-3: ESP 32 Board

DHT11-Temperature and Humidity sensor

It is a ultra less-cost temperature and humidity sensor (digital). In order to measure the surrounding air it makes use of a thermistor and capacitive humidity sensor. It does not require analog input pin and gives a digital signal on data pin.



Figure-4:DHT11 temperature and humidity sensor

SOIL MOISTURE SENSOR

It measures soil moisture content. Here the sensor is usually connected to the irrigation system so that the moisture content in soil is measured .If the soil moisture is less than the set value then irrigation takes place, if not irrigation does not takes place.



Figure-5: Soil moisture sensor

RELAY MODULE

It is an electric switch and it is operated by an electro magnet. A low power signal which is generated by a microcontroller activates the electro magnet. When electro magnet is activated it pulls and opens or closes a circuit.



Figure-6: Relay module

REGULATED POWER SUPPLY

RPS is used to provide constant power supply across the circuit.

RAINDROP SENSOR

A switching device which is activated by rainfall is called a rain sensor. It is also called a rain switch.



Figure-7: Raindrop sensor

VII.OFTWARE DESCRIPTION

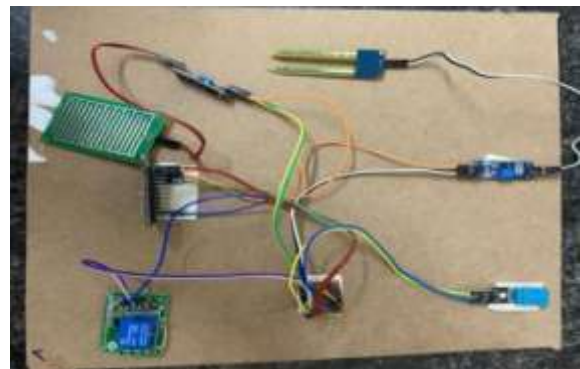
1 .ARDUINO IDE

Arduino is an open-source platform. It can be used to write and upload the software code to the circuit board.

2.OPERATING SYSYTEM-WINDOWS XP/7

3.BLINK APP

VII. RESULT



VIII. CONCLUSION

In order to design the weather monitoring system we make use of sensors in the environment to collect data and to analyze it. We use sensor in the environment to record real time data. Then the collected data results can be accessed by farmers by using wifi. We can also use an network and connect it with other object or devices. An efficient, low cost and a smart way to monitor the environment is given in this paper. Weather station is used to know and predict the weather condition at a particular place. It is used to collect data about the weather of place in order to know the weather conditions in that place.

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