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WEATHER STATION USING WIRELESS INTERNET OF THINGS

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ABSTRACT- The system is an advanced solution for monitoring the weather conditions at a particular place and make the information visible anywhere in the world. The technology behind this is Internet of Things (IoT),which is an advanced solution for connecting the things to the internet and to connect the entire world of things in a network The data revived from the completed system can be accessible in the web from wherever in the world. In cultivating zone it will be really difficult to check and screen the environment limit through wires and straightforward contraptions during a couple of environment gambles. To beat this issue here the distant sensors are used to check and screen the environment limits. We will communicate DHT11 Humidity and Temperature Sensor,FC37 Rain Sensor , barometrical strain sensor and perceivability sensor with Node MCU ESP8266-12E Wi-Fi Module. The framework proposed for observing weather patterns in a specific spot like temperature, moistness, sensors recognize changes in climate and send it to the users for making statistical analysis, data collected by this is uploaded in web, so this can be useful to everyone in the world. In the present project, an attempt is made to develop and explain the use of Internet of Things (IoT) in Monitoring the weather.

Index Terms- IoT(Internet of Things), ESP8266 Wi-Fi module, NodeMCU, Arduino

I. INTRODUCTION

The web of Things (IoT) is viewed as a development and monetary wave in the overall information industry after the Internet. The IoT is an astute framework which relates everything to the Internet with the ultimate objective of exchanging information and passing on through the information identifying devices according to agreed shows. It accomplishes the objective of sharp seeing, finding, following, seeing, and coordinating things . It is an increment and extension of Internet-based structure, which fosters the correspondence from human and human to human and things or things and things. In the IoT viewpoint, many articles integrating us will be connected into structures in some shape . It is an ongoing correspondence perspective that envisions a not really far off future, where the objects of customary ordinary presence will be outfitted with microcontrollers, handsets for computerized correspondence, and reasonable show stacks that will set them up to converse with each other and with the clients, changing into an indispensable piece of the Internet. The IoT idea, consequently, goes for making the Internet considerably more vivid and unavoidable. Moreover, by engaging basic get to and relationship with a wide grouping of contraptions, for instance, for instance, home devices, surveillance cameras, actually looking at sensors, actuators, exhibits, vehicles, and so forth, the IoT will support

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the progression of different applications that make use of the potentially monstrous aggregate and combination of data made by such inquiries give new organizations to subjects, associations, and open associations.
Present advancements in development generally revolve around controlling and checking of different activities. These are dynamically emerging to show up at the human necessities. The majority of this development is revolved around viable noticing and controlling different activities. A capable normal noticing structure is expected to screen and assess the conditions assuming that there ought to be an event of outperforming the suggested level of limits (e.g., commotion, CO and radiation levels). Right when the articles like environment outfitted with sensor devices, microcontroller and different programming applications transforms into a self-getting and self-checking environment and it is moreover called as smart environment. In such environment when some event happens the alert or LED cautions normally. The effects in light of the biological changes on animals, plants and individuals can be noticed and compelled by splendid regular really taking a look at system. By using embedded information into the environment makes the environment clever with various objectives, this is one of the applications that splendid environment targets. Human necessities demands different kinds of checking structures these are depends upon the sort of data amassed by the sensor gadgets. Made to order Detection based and Spatial Process Estimation are the two orders to which applications are requested. At first the sensor contraptions are passed on in environment to perceive the limits (e.g., Temperature, Humidity , Rain and perceivability etc.)while the data getting, estimation and controlling movement (e.g., the assortments in the temperature and Rain and perceivability with respect to the foreordained levels).

Sensor gadgets are put at various areas to gather the information to foresee the conduct of a specific area of interest. The primary point of this paper is to plan and execute a proficient observing framework through which the necessary boundaries are checked remotely utilizing web and the information assembled from the sensors are put away in the cloud and to extend the assessed pattern on the internet browser. An answer for checking the temperature, stickiness and rain visibility and atmospheric pressure levels i.e., any boundary esteem passing its boundary esteem ranges, for instance in air in a specific region surpassing the ordinary levels and so on, in the climate utilizing remote installed figuring framework is proposed in this paper. The arrangement additionally gives an insightful remote checking to a specific area of interest. In this paper we likewise present a moving after effect of gathered or detected information regarding the ordinary or indicated scopes of specific boundaries. The

implanted framework is a joining of sensor gadgets, remote correspondence which empowers the client to remotely get to the different boundaries and store the information in cloud.

II. EXISTING SYSTEM

The current weather conditions checking frameworks by and large utilize weather conditions stations that utilization various instruments, for example, thermometers, indicators, wind vanes, downpour measure and so on to quantify climate and environment changes. The majority of these instruments utilize straightforward simple innovation which is later truly recorded and put away in an information base. This data is subsequently shipped off news detailing stations and radio broadcasts where the climate forecast is given.

2.5 Limitations of the existing System

1. Existing weather monitoring systems that are used in the field generally consist of unconventional and heavy machinery that consists of numerous moving parts that require constant maintenance and need to be manually monitored and changed frequently.
2. Power requirements are one of many major constraints as these instruments are generally sited far from main power supply. This adds to the cost of using such instruments.

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3. The use of thermometers to measure external temperature; however accurate is still outdated and constantly needs to be manually checked for any change in temperature.
4. Data that is collected by the instruments needs to be manually transferred from the logger to a laptop or computer via a cable.
5. Existing systems consist of large and heavy instruments that occupy a lot of space hence making it difficult to install them in remote location and places which have limited space.
6. The instruments used in the existing systems are expensive and add up to the already high cost of installation and maintenance.
7. The current system always faces problems such as delay in warning people about bad weather and sudden changes in the forecast.

III. PROPOSED SYSTEM

The system proposed is an advanced solution for weather monitoring that uses IoT to make its real time data easily accessible over a very wide range. The system deals with monitoring weather and climate changes like 1.

1. Temperature by LM35 sensor,
2. Humidity
3. Light intensity to measure the visibility,
4. Atmospheric pressure
5. Raindrop sensor for detecting rainfall or snow fall.

3.1 Architectural of proposed system

Here heart of our system is Arduino microcontroller, which is connected to different sensor like temperature, humidity, rain sensor, atmospheric pressure sensor and light sensor to check visibility. Once every parameter is get read then it send the information to cloud using Wifi module called esp8266 or nodemcu, here we are using Thinks speaks IoT cloud services. We are sending information in private mode so that that information is only visible to respective authorities. This information can be visible on mobile or laptop.

3.2 Workflow of system:

There are multiple nodes of the system we will install in different locations. All this sensor nodes are connected to one IoT cloud like Thinks Speaks. We are leveraging computing power of cloud service for representing information in graphical manner so that it become very easy to understand the information. Think speaks has in built MATLAB which help in doing calculation on data also MATLAB is very powerful tool for representation of data. It help in presenting data on graphical manner from which we can understand the trends and can also be able to predict about the environment condition based on available data. The work flow diagram is as shown in below fig.

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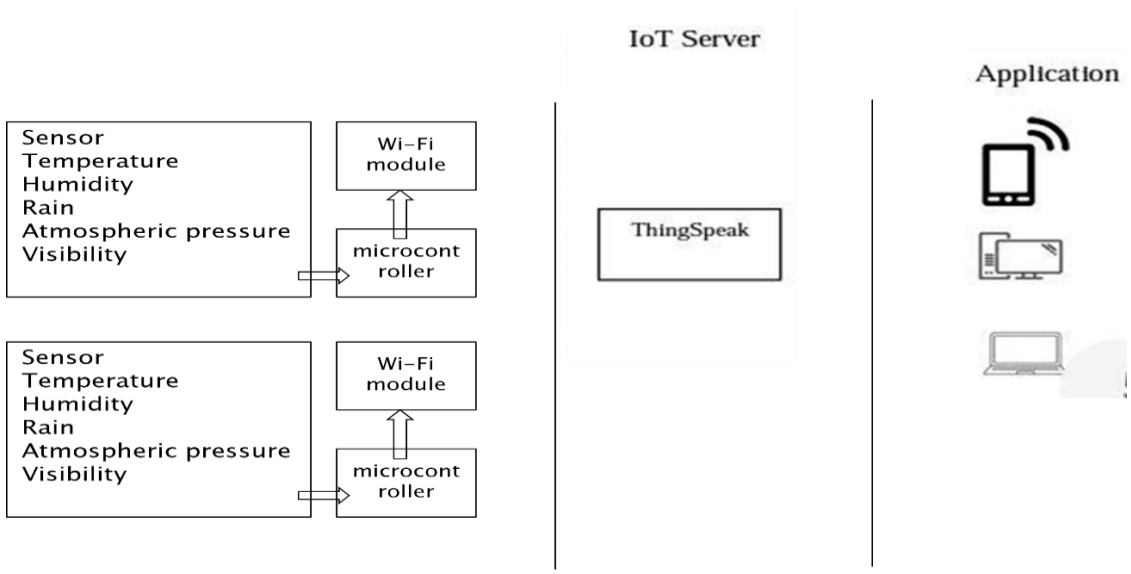

Fig. 1- Work flow

IV. SENSOR INFORMATION AND COMPONENT

a) DHT11 SENSOR:

The DHT11 is a commonly used Temperature and humidity sensor**.** The sensor comes with a dedicated NTC to measure temperature and an 8-bit microcontroller to output the values of temperature and humidity as serial data. The sensor is also factory calibrated and hence easy to interface with other microcontrollers.

The sensor can measure temperature from 0°C to 50°C and humidity from 20% to 90% with an accuracy of ±1°C and ±1%. So if you are looking to measure in this range then this sensor might be the right choice for you.

b) BMP388 ATMOSPHERIC PRESSURE SENSOR MODULE:

the BMP388 is a very small, precise, low power, low noise absolute barometric pressure sensor. It enables accurate altitude tracking and is perfectly suited for drone applications. By making accurate steering significantly easier, the BMP388 enhances the drone flying experience. It is compatible for use with other Bosch sensors such as the BMI088 for better performance, robustness and stability. The BMP388 sensor exciteswith an outstanding design flexibility. Additionally, it provides a single package solution that is easy to integrate into other existing and upcoming devices such as smart homes, industrial products and wearables.

c) BH1750 digital ambient light sensor:

The BH1750 is a light intensity sensor that can be used to adjust the brightness of display in mobiles and

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LCD displays. It can also be used to turn the headlights of cars on/off based on the outdoor lighting. The sensor uses I2C communication protocol so that makes it super easy to use with microcontrollers. The SCL and SDA pins are for I2C. There is no calculation needed to measure the LUX value because the sensor directly gives the lux value. Actually, it measures the intensity according to the amount of light hitting on it. It operates on voltage range of 2.4V-3.6V and consumes really small current of 0.12mA. The results of the sensor does not depends upon the light source used and the influence of IR radiation is very less. There are very less chances of any error because the variation in measurement is as low as +/-20%.

d) Rain drop Sensor Module

Raindrop Sensor is a tool used for sensing rain. It consists of two modules, a rain board that detects the rain and a control module, which compares the analog value, and converts it to a digital value. The raindrop sensors can be used in the automobile sector to control the windshield wipers automatically, in the agriculture sector to sense rain and it is also used in home automation systems.

NodeMCU:

NodeMCU is an open source IoT platform. It includes firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP12 module.

1. Type: single board microcontroller
2. Operating system: XTOS
3. CPU: ESP8266
4. Memory: 128 kbytes
5. Storage: 4Mbytes
6. Power: USB

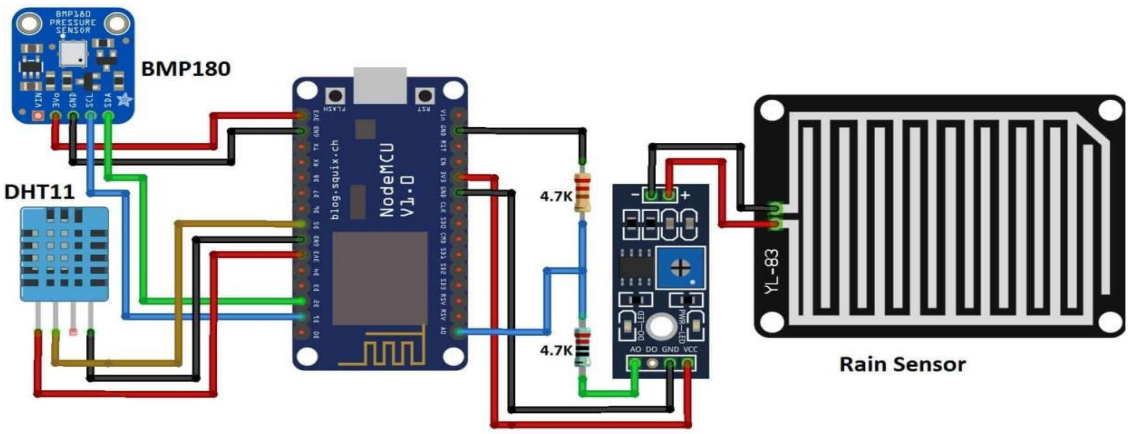

Fig. 2 Project Circuit Daigram

Pressure sensor, temperature sensor, Rain Drop sensor, humidity sensor and ambient light sensor are interfaced with NodeMCU. NodeMCU will measure all the required parameters and it will send the information to thinkSpeaks server or blink server. Via the wifi connected to it.

V. CONCLUSION

The objective of this research is to design and implement a weather station that can provide an accurate weather update and the updated information can be accessed remotely. For its easy design, this WS can be implemented in remote where climate information are difficult to get. Nonstop climate information will be transferred to a server from where anybody from around the world can get to the information. This WS can likewise be useful to meteorologists to track down the property of a specific region for future examination. As we can take information on spot our information precision will be far more prominent than the satellite information. As this WS configuration is basic and anybody can work this so there is no needfor a gifted man to work this. This planned WS can be conveyed effectively to anyplace whenever that will diminish labor and less time consumption. In the future, a mobile app can be developed where users can easily log in and get the weather update.

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