

IoT Based Weather Monitoring System

Mr.Pravin Pawar, Mr.Sudarshan Lahade, Mr.Saurabh Shinde, Prof.Pradeep Khatua

1. Mr.Pravin Pawar, Dept. of E&TC, Dr. D. Y. Patil School of Engineering, SPPU, Pune, Maharashtra, India.
2. Mr.Sudarshan Lahade, Dept. of E&TC, Dr. D. Y. Patil School of Engineering, SPPU, Pune, Maharashtra, India
3. Mr.Saurabh Shinde, Dept. of E&TC, Dr. D. Y. Patil School of Engineering, SPPU, Pune, Maharashtra, India
4. Prof.Pradeep Khatua, Dept. of E&TC, Dr. D. Y. Patil School of Engineering, SPPU, Pune, Maharashtra, India

ABSTRACT

Development in Internet of Things goes rapid increasingly the aim of this project is to design weather monitoring system based on the concept of using the Raspberry Pi as an interfacing device as well as a web server. Weather affects the many fields such as agriculture, industrial area so monitoring station needs and that can take measurements of the temperature, rain, light dependent resistor, humidity, barometric pressure and save them on a server so that this data can be accessed from anywhere via the Internet. This system is useful for every home, school or workplace has its own microclimate, so taking measurements, and local data is generated, stored and can compare with this to previous data.

Keywords- *Raspberry Pi, Raspbian, Temperature & humidity sensor, Rain Fall and Level Sensor, Barometric Pressure Sensor, LDR, Web Server.*

1. INTRODUCTION:

Today, the weather variables has great effect on our modern lifestyle. Weather affects a wide range of man's activities, including agriculture, transportation. Combination of various sensors forms one weather station. Weather Monitoring System can be either wireless or wired one. Raspberry Pi used for many projects because of its small, wide memory capacity features. The primary motivation behind taking up this project is the large utility of the wireless weather monitoring in varied areas ranging from agricultural growth and development to industrial development. Weather variables like temperature, atmospheric pressure, humidity ,rain fall are sensed by sensors and further processed by Raspberry Pi. Sensing the weather has been important to man over the centuries. the winds and other weather variables are of equal concern and can have an even greater impact on our modern, high-tech life style. A weather station is that facility on land or sea, which has instruments and devices for observing and measuring atmospheric parameters to provide the information for weather forecasts Modern weather monitoring systems and networks are designed to make the measurements necessary to track these movements in a cost effective manner. The aim of this project is to design a weather monitoring station that can take measurements of the temperature, air pressure, humidity and save them on a server so that this data may be accessed from anywhere via the Internet. The Raspberry Pi is a low cost, credit card sized single board computer that has the ability to interact with the outside world by interfacing with various types of sensors. The Raspberry Pi has a number of features such as an ARMv7 processor, GPU, RAM, SD card slot, USB port etc. It's cheap, small and rugged, and it needs a small power supply. The data obtained from this system can then be used for various purposes such as automated irrigation systems, automated temperature control for homes, offices, warehouses and factories, green house climate control.The Internet of Things (IoT) can be described as connecting everyday objects like smart-phones, Internet TVs, sensors and actuators to the Internet where the devices are intelligently linked together enabling new forms of

communication between things and people, and between things themselves. Building IoT has advanced significantly in the last couple of years since it has added a new dimension to the world of information and communication technologies.

2. LITERATURE SURVEY:

Meetali Rasal proposed this system is a specially designed for to implement a prototype model for the weather monitoring system. Temperature, relative humidity and many other environmental parameters measurement by using respective sensors, to monitor and display the temperature, pressure and relative humidity using Raspberry pi. [1].

Akash chaudhary et al proposed this system is a specially designed for various weather monitoring techniques have been reviewed. A WMS keeps track of

temperature, humidity, barometric pressure etc. The system displays these readings in real time on a display. It also keeps track of historical information on an hourly and daily basis. Weather can also be monitored by using remote wireless sensors. Zigbee is the latest wireless weather monitoring technique.[2]

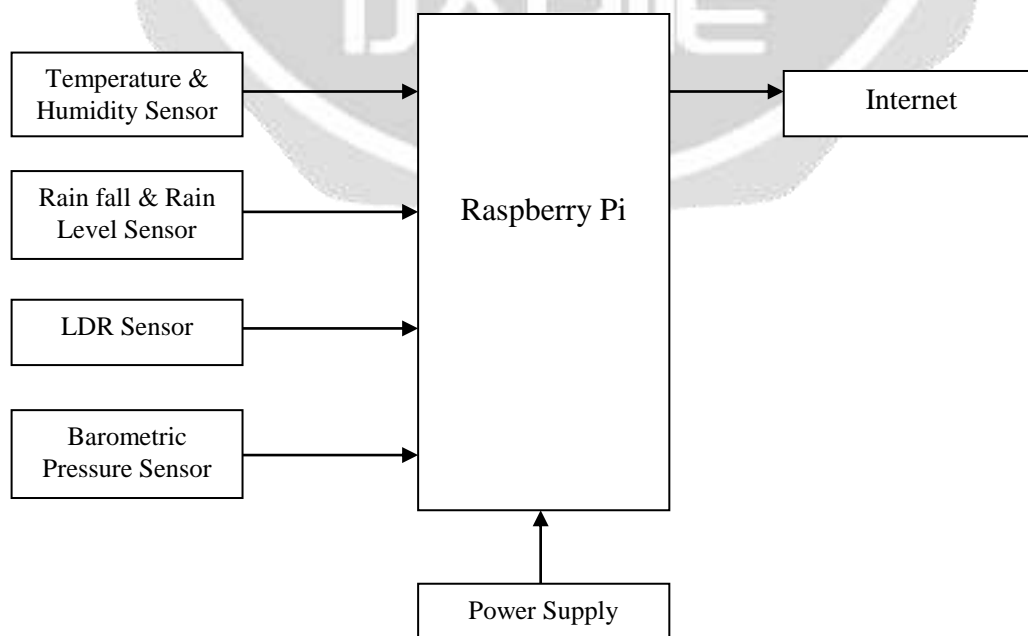
Suraj Thapa et al have described a distribution Through weather monitoring system we can collect the information about humidity and temperature and according to current and previous data we can produce the results in graphical manner in the system. This can be a valid way of forecasting the weather when it is in a steady state, such as during the summer season in the tropics.[3]

G. V. Satyanarayana The advanced development in wireless sensor networks can be used in monitoring various parameters in agriculture. Due to uneven natural distribution of rain water it is very difficult for farmers to monitor and control the distribution of water to agriculture field in the whole farm or as per the requirement of the crop. The age of the Internet of things comes; wireless sensor networks become the core of networking. [4]

Ms. MEETALI VIKAS RASAL et A device for weather monitoring has been developed as described in this paper to monitor and display the temperature, pressure and relative humidity, altitude of the atmosphere ,rain fall detection using Raspberry pi.In this paper, various weather monitoring techniques have been reviewed. [5]

Kavita Nadlamani We will be using raspberry-pi as our main board and sensors will collect all the real time data from environment and this real time data will be fetched by the webserver and display it. User can access this data from anywhere through internet. Due to unnatural and unpredictable weather farmers now a day face large financial losses due to wrong prediction of weather and incorrect irrigation methods and the amount of pesticides and insecticides used for crops [6].

3. PROPOSED SYSTEM:



4. WORKING PROCEDURE:

4.1 Raspberry Pi:-

The Raspberry Pi 2 delivers six times the processing capacity of previous models. The second generation Raspberry Pi has an upgraded Broadcom BCM2836 processor, which is a powerful ARM Cortex-A7 based quad-core processor that runs at 900 MHz. The board also features an increase in memory capacity to 1Gbyte.

4.2 Temperature & Humidity Sensor :-

The sensor used to measure the temperature and humidity is the DHT11 sensor. This sensor features a temperature & humidity sensor complex with a calibrated digital signal output. It makes use of the exclusive digital-signal-acquisition technique and temperature & humidity sensing technology and ensures high reliability and excellent long-term stability. This sensor includes a resistive-type humidity measurement component and an NTC temperature measurement component and provides a calibrated digital signal output.

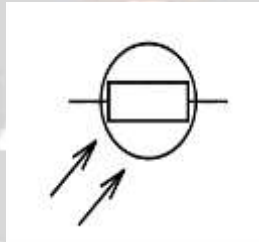
4.3 Rain Fall & Rain Level Sensor :-

The rain sensor module is an easy tool for rain detection. It can be used as a switch when raindrop falls through the raining board and also for measuring rainfall intensity. The module features, a rain board and the control board that is separate for more convenience, power indicator LED and an adjustable sensitivity through a potentiometer. The analog output is used in detection of drops in the amount of rainfall. Connected to 5V power supply, the LED will turn on when induction board has no rain drop, and DO output is high. When dropping a little amount water, DO output is low, the switch indicator will turn on. Brush off the water droplets, and when restored to the initial state, outputs high level.

4.4 Light Dependent Resistor:-

A photoresistor (or light-dependent resistor, LDR, or photoconductive cell) is a light-controlled variable resistor. The resistance of a photoresistor decreases with increasing incident light intensity; in other words, it exhibits photoconductivity. A photoresistor is made of a high resistance semiconductor.

They are made up of Semiconductor materials having high resistance. There are many different symbols used to indicate a LDR, one of the most commonly used symbol is shown in the figure below. The arrow indicates light falling on it. Photo conductivity is an optical phenomenon in which the materials conductivity is increased when light is absorbed by the material. When light falls i.e. when the photons fall on the device, the electrons in the valence band of the semiconductor material are excited to the conduction band. These photons in the

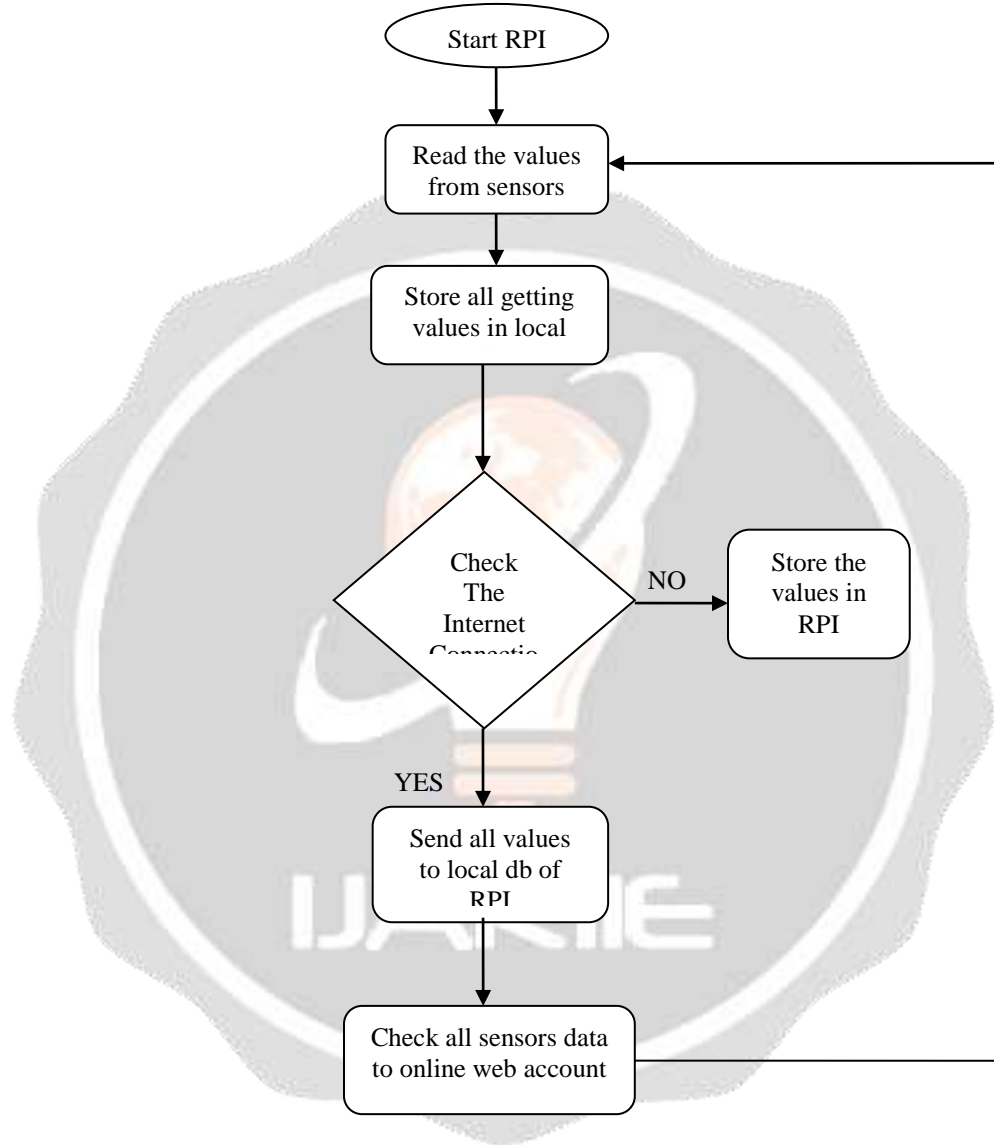


incident light should have energy greater than the band gap of the semiconductor material to make the electrons jump from the valence band to the conduction band. Hence when light having enough energy strikes on the device, more and more electrons are excited to the conduction band which results in large number of charge carriers.

4.5 Barometric Pressure Sensor:-

This is a breakout board for the Bosch BMP180 high-precision, low-power digital barometer. The BMP180 offers a pressure measuring range of 300 to 1100 hPa with an accuracy down to 0.02 hPa in advanced resolution mode. It's based on piezo-resistive technology for high accuracy, ruggedness and long term stability. These come factory-calibrated, with the calibration coefficients already stored in ROM. What makes this sensor great is that it is nearly identical to its former rev, the BMP180. This breadboard-friendly board breaks out every pin to a 5-pin 0.1" pitch header. VCC can be from 1.8V to 3.6V and is I/O lines are 5V tolerant; we typically run it on a clean, regulated 3.3V supply.

4. FLOWCHART:



7.ADVANTAGES & APPLICATIONS:

7.1 Advantages:-

1. Enhanced for monitoring & controlling of atmosphere conditions.
2. Save Power.
3. Automatic message generation & transmission.

7.2 Applications:-

1. High quality, industrial grade sensors for monitoring, alarming and reporting.
2. Agriculture field monitoring.
3. Industrial purpose.
4. Roadside Monitoring.

8. CONCLUSION:

This project aim is to measure the various parameters like Temperature, Humidity, Rain fall & level, Light dependent resistor, barometric pressure and continuously monitor. The data can be stored online, which can be used to forecast weather and eventually analyze climate patterns, as well as for other meteorological purposes. The system uses a good combination of analog and digital sensors in wired and wireless modes of operation. Thus, a proof of concept for an Internet of Things device for a remote weather monitoring system has been established.

9. FUTURE SCOPE:

This will conclude that the real time data successfully helpful because of low agriculture crops and wrong prediction of weather.

The future of this system is very wide. Internet of Things is just opening its arms, Same system can be applicable to the variety of applications like Data monitoring ,sending and controlling of data at remote location.

10. ACKNOELEDGMENT:

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