# IOT BASED WEATHER REPORTING SYSTEM

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Weather reporting using IoT

Abstract

Most of the weather reporting applications extracts the data from accurate weather system. Here we are building our own weather reporting system which would give us the information about present temperature, humidity, wind speed, pressure etc. The main aim of this project is to design a smart way of weather monitoring system using cloud storage technology based on wireless Wi-Fi communication. The weather parameters are monitored using sensing devices like wind speed sensor, pressure sensor, temperature and humidity sensors. Then the collected data and analysis results will be available to the user through Wi-Fi along with the current location using GPS module. It also sends the sensed parameters to the cloud storage and provides thing speak. This data will be helpful for future references.

**Keywords:**

AVR Micro controller (ATMEGA328), Barometric pressure sensor BMP180,(Temperature, humidity) DHT11,LCD module, Wi-Fi module,GPS Receiver, Wind Speed sensor, Buzzer

**.1. Introduction:**

Climatic change and environmental monitoring have received much attention recently. Man wants to stay updated about the latest weather conditions of any place like a college campus or any other particular building. Since the world is changing so fast so there should be the weather stations. Here in this paper we present a weather station that is very helpful for any places. This weather station is based on IOT (internet of things). It is equipped with environmental sensors used for measurements at any particular place and report them in real time on cloud. To accomplish this we used AVR Micro controller (ATMEGA328) and different environmental sensors like BMP180 Barometric pressure sensor,DHT11,WIND SPEED sensor. The collected sensor data and analysis results will be available to the user through Wi-Fi along with the current location using GPS module. It also sends the sensed parameters to the cloud storage and provides thing speak web application. This data will be helpful for future references.

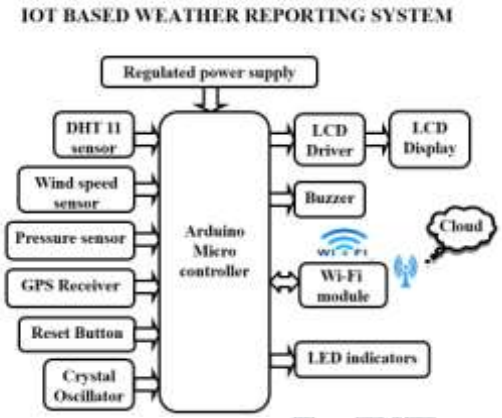
Internet of things, IoT, as an important part of the new generation of information technology, have developed rapidly both in theory and practice since proposed and derived many applications such as smart home, intelligent environmental monitoring. Things not only liberated a lot of manpower, but also achieved a standardized, automated management.

We can even set up this in our home and get alerts for time to time changes in climate which would help us in planning our daily work easily. It would be helpful for a farmer in this agricultural activity by which he can protect his crops according to climatic changes. It would help in transportation giving information of weather conditions.

## 2. LITERATURE SURVEY:

The existing weather monitoring systems generally use weather stations that use multiple instruments such as thermometers, barometers, wind vanes, rain gauge etc. to measure weather and climate changes. Most of these instruments use simple analog technology which is later physically recorded and stored in a data base. This information is later sent to news reporting stations and radio stations where the weather report is given.

## 3. Implementation:




3.1 Block diagram of **IOT BASED WEATHER REPORTING SYSTEM**

The proposed system "**IOT BASED WEATHER REPORTING SYSTEM**" 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 and efficient solution for connecting the things to the internet and to connect the entire world of things in a network. By keeping this proposed weather station at a particular place for monitoring enables self protection to the environment. Micro controller forms the controlling module and it is the heart of the device. The controller performs the functionality of receiving data from the GPS along with different sensors connected to it like temperature, pressure, humidity and wind speed sensors. The received data can be monitored and displayed on LCD. The system also alerts when the weather parameters exceeds beyond threshold limits using buzzer alarming device. The smart way to monitor environment this device is an efficient low cost embedded system.

## 4. Related Work:

The brief introduction of different modules used in this project is discussed below:

### 4.1. Arduino UNO

4.1.1 ARDUINO UNO

The AVR is a modified Harvard architecture 8-bit RISC single chip microcontroller which was developed by Atmel in 1996. The AVR was one of the first microcontroller families to use on-chip flash memory for program storage, as opposed to One-Time Programmable ROM, EPROM, or EEPROM used by other microcontrollers at the time. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

### 4.2. BAROMETRIC PRESSURE Sensor:

This board is 5V compliant - a 3.3V regulator and a i2c level shifter circuit is included so you can use this sensor safely with 5V logic and power.

Using the sensor is easy. For example, if you're using an Arduino, simply connect the VIN pin to the 5V voltage pin, GND to ground, SCL to I2C Clock (Analog 5) and SDA to I2C Data (Analog 4). Then download our BMP085/BMP180 Arduino library and example code for temperature, pressure and altitude calculation. Install the library, and load the example sketch. Immediately you'll have precision temperature, pressure and altitude data.


4.2.1 BMP180 sensor

## 4.3. ESP 8266 WI-FI:

4.3.1 WI-FI MODULE

The ESP8266 Wi-Fi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much Wi-Fi-ability as a Wi-Fi Shield offers (and that's just out of the box)! The ESP8266 module is an extremely cost effective board with a huge, and ever growing, community.

### 4.4. GPS(NEO 6M):

GPS(NEO 6M) has four pins:VCC and GND for power supply of 3v-5v and grounding of the module.TX and RX for transmission and reception of data with respective to GPS NEO 6M and other end connected device.And it's default baud rate is 9600 bps(bits per second).

4.4.1 GPS MODULE

It is mainly used for finding the location using ht latitude and longitude values we obtain from GPS.Not only the latitude and longitude values would be found using GPS, we could also find location, tracking, timing, mapping, tilt, altitude and navigation.

The $GPGGA which is the basic "GPS National Marine Electronic Association" message, that provides 3D location and an accurate data.

**4.5 LCD Display:**
**LCD (LIQUID CRYSTAL DISPLAY) :**


**4.5.1 16*2 LCD Display**

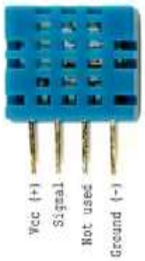
One of the most common devices attached to a micro controller is a 16x2 LCD display. This means 16 characters per line by 2 lines and 20 characters per line by 2 lines, respectively. The project status will display on LCD.

## 4.6 ThingSpeak:

**4.6.1 Thingspeak**

ThingSpeak is a platform providing various services exclusively targeted for building IoT applications. It offers the capabilities of real-time data collection, visualizing the collected data in the form of charts, ability to create plugins and apps for collaborating with web services, social network and other APIs.

**4.7 DHT11:**



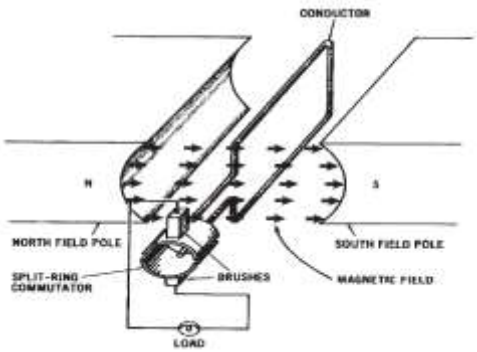

4.7.1 DHT11

DHT11 digital temperature and humidity sensor is a composite Sensor contains a calibrated digital signal output of the temperature and humidity. Application of a dedicated digital modules collection technology and the temperature and humidity sensing technology, to ensure that the product has high reliability and excellent long-term stability. The sensor includes a resistive sense of wet components and NTC temperature measurement devices, and connected with a high-performance 8-bit microcontroller.

**4.8 WIND SPEED SENSOR:**

**D.C GENERATOR**

An electrical generator is a machine which converts mechanical energy (or power) into electrical energy (or power). Induced e.m.f is produced in it according to Faraday's law of electromagnetic induction. This e.m.f cause a current to flow if the conductor circuit is closed.




**4.9 Buzzer:**

A **buzzer** or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). The system also

alerts when the weather parameters exceeds beyond threshold limits using buzzer alarming device.

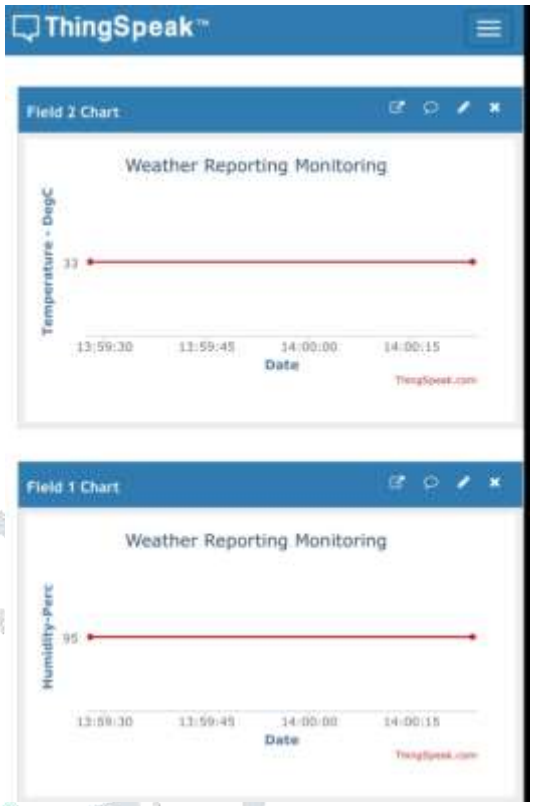
## 5. CONCLUSION:

Now-a-days IOT play a vital role. So, the proposed project which is an IOT based weather reporting system which gives us values to different parameters like BMP180 Barometric pressure sensor, DHT11, WIND SPEED sensor. This can be accessed from anywhere with a laptop, a pc or a smart phone, as we developed an application which displays the streaming information. This project gives a developer a clear idea about both hardware and software knowledge. We need not setup datacenters as we can store the data in cloud itself so the cost of equipment is reduced. Hence, we conclude that we can use an IOT based weather station which would give us the information remotely from any place.

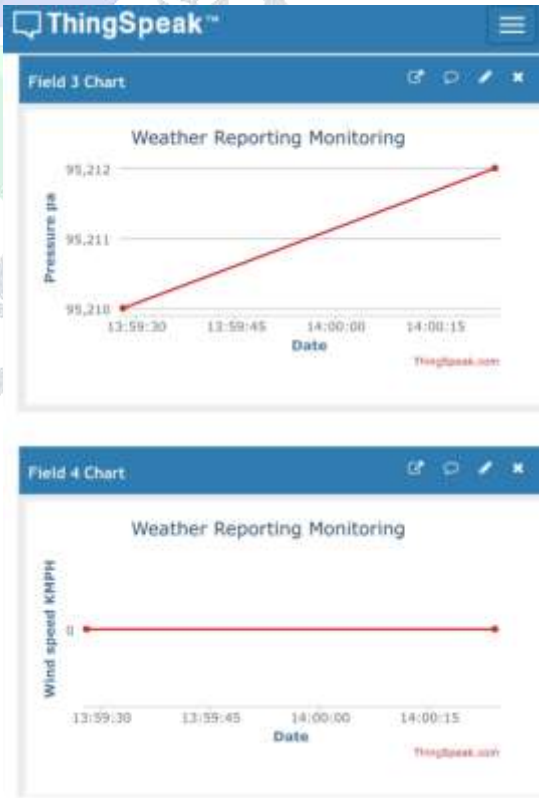
## 6. ACKNOWLEDGEMENT

We would like to thank all the authors of different research papers referred during writing this paper. It was very knowledge gaining and helpful for the further research to be done in future.

## 7. RESULTS:




The fig 7.1 shows the recorded temperature and humidity data.




The fig 7.2 shows the recorded data of wind speed and wind pressure.


The fig 7.3 shows the latitude longitude location of the device.

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