

# IOT BASED WEATHER FORECASTING SYSTEM

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**Abstract** -The proposed framework is one of the arrangements that have been planned for observing the weather conditions at a specific spot and makes the data noticeable anyplace in the world. The innovation behind this will be the Internet of Things (IoT). This framework will manage to observe atmosphere natural conditions like temperature and Humidity. These qualities are to be recorded utilizing a microcontroller unit interfaced with sensors. In this IoT enabled weather forecasting system, Node MCU measures two weather parameters using two sensors. These two sensors are first is temperature sensors and second is humidity sensors. The two sensors are legitimately associated with Node MCU since it has worked in a simple to the advanced converter. Node MCU computes and shows these weather boundaries on an LCD. Then it sends the value of these parameters to the Internet using the IoT techniques.

**Keywords:** Weather Forecasting System, NodeMCU, Temperature & Humidity Sensor, Internet of Thing (IoT)

## 1. Introduction

Recent technological advancements have allowed humans to keep a check on the environmental and climatological settings of the earth. In the ancient times such real time monitoring was not possible due to lack of technological developments. With the recent advancements in science, humans have become compatible enough to understand the different parameters of weather and access its current status using a number of advance platforms and monitoring systems. There are a number of weather parameters like temperature, humidity, cloudiness, wind speed, direction, rainfall and others which can all have real time access from different locations using respective sensors. In an IoT enabled weather monitoring system project, one can program the system in such a way that whenever there will be changes in temperature, humidity or other parameters, the system lets you know through its access. Here, Node

MCU measures two weather boundaries utilizing the separate two sensors. These two sensors are: first is temperature sensor and second is humidity sensor. These two sensors are straightforwardly associated with Node MCU since it has inbuilt analog to the digital converter. Node MCU figures and shows these weather boundaries on an LCD. At that point, it sends these boundaries to the Internet utilizing the IoT procedures. The way toward sending information to the web utilizing Wi-Fi is reshaped after steady time stretches. At that point, the client needs to visit a specific site to see this information.

The project connects and stores the data on a web server. Thus, the user gets live reporting of weather conditions. Internet availability with Wi-Fi is necessary for this IoT weather checking project. The project considers the use of two primary apps namely: Blynk app and a self-made app named as Voice weather. Blynk app is designed for internet of things. It can store, display and manage data and also respond to both incoming and outgoing commands. On the other hand, Voice weather was created for handling of voice commands which was not accessible in the Blynk app.

In the weather Forecasting system, we can collect the information about humidity and temperature and according to current and previous data, we can graphically deliver the outcomes in the framework. We survey numerous articles, directly, there are no papers that notice checking the mix of temperature, humidity, and Air pressure in one joined framework and have actuators to change these settings. What's more, there is one examination paper that has talked about checking these three natural conditions; notwithstanding, there has been no notice of having actuators to change. So our fundamental thought was to coin a framework that can detect the primary segments that detail the weather and can have the option to forecast the weather without human error.

## 2. Literature Review

Ferdin Joe John Joseph [1] The frameworks utilizing Raspberry Pi is done according to the particulars above and the information bits of knowledge are produced in the electronic entrance. Access to this information is accessible in the intranet with the current degree of execution and it could be made open when the information is made to store in cloud servers or different sources on the web. This proposed framework is the smaller unit for estimating climate boundaries in districts experiencing the PM 2.5 contamination.

K. P. Rane et al. [2] Atmosphere perception impacts humanity. The social occasion of the different information of temporary components of the atmosphere varieties is incredibly critical. The basic purpose of this paper is to develop an introduced structure to plot an atmosphere watching system which enables the checking of atmosphere boundaries. This kind of system incorporates different sensors including temperature, humidity, wind speed, wind bearing data that can be marked into the cloud so anybody from any place can watch the specific data.

R Suresh Babu et al. [3] The framework proposed in this paper is a propelled answer for checking the climate conditions at a specific spot and make the data noticeable anyplace on the planet. The innovation behind this is the Internet of Things (IoT), which is a progressed and productive answer for associating the things to the web and to associate the whole universe of things in a system.

Girija C et al. [4] The framework proposed in this paper is a progressed answer for checking the climate conditions at a specific spot and make the data obvious anyplace on the planet. The innovation behind this is Internet of Things (IoT), which is a progressed and productive answer for associating the things to the web and to associate the whole universe of things in a arrange. The framework bargains with observing and controlling the ecological conditions like temperature, humidity and others.

Chaw Myat Nwe1 et al. [5] The proposed framework is a propelled answer for observing the climate conditions at a specific spot and makes the data obvious anyplace on the planet. The innovation behind this is the Internet of Things (IoT). The framework manages to check the natural conditions like temperature; humidity concerning its deliberate time with a microcontroller interfaced with sensors and GSM module to sends the data remotely to remote servers.

BulipeSrinivasRao et al. [6] The framework proposed in this paper is a propelled answer for checking the climate conditions at a specific spot and make the data obvious anyplace on the planet. The innovation behind this is the Internet of Things (IoT), which is a progressed and effective answer for associating the things to the web and to interface the whole universe of things in a system. Here things may be whatever like electronic devices, sensors, and car electronic gear. The framework manages to check and control the natural conditions like temperature, relative humidity and others.

K.N.V. Satyanarayana et al. [7] The proposed framework utilizes Raspberry-pi installed with climate sensors to gather climate conditions. Thus, it offers better help for the climate checking and control focuses, and meteorological forecasts for TV and radio broadcasts.

Shifeng Fang et al [8] Environmental change and ecological checking and the board have gotten a lot of consideration as of late, and a coordinated data framework (IIS) is viewed as exceptionally significant. This paper presents a novel IIS that consolidates Internet of Things (IoT), Cloud Computing, Geo-informatics and e-Science for natural checking and the board, with a contextual investigation on provincial environmental change and its biological impacts.

P. Susmitha et al. [9] Climate observation assumes a significant job in human life, so the assortment of data about the transient elements of climate change is significant. In any industry, during certain perils, it is imperative to screen climate. The crucial point of this paper is to build up an installed framework to plan a climate observing framework which empowers the checking of climate boundaries in an industry.

AtulKulkarni et al. [10] Climate determining is a critical capacity in meteorology and has been one of the most methodically testing inconveniences around the world. This plot manages the structure of a climate show technique utilizing little cost segments with the goal that any hardware specialist can develop it. Serious climate wonders challenge the difficult climate gauge approach with the halfway clarification. Climate occasions have various boundaries that are impractical to detail and figure. Developing specialized techniques empowers climate predictsspecialist frameworks to consolidate and share assets and along these lines cross breed frameworks have risen.

### 3. Methodology

The implemented framework comprises of the principal square Node MCU and sensors are associated with the node MCU. Node MCU gathers the data from the various sensors; at that point they send information to voice weather. (App)

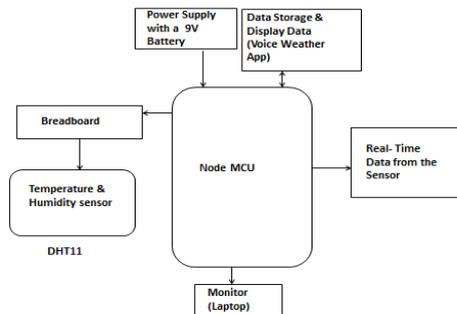


Figure 1: Logical System Block Diagram

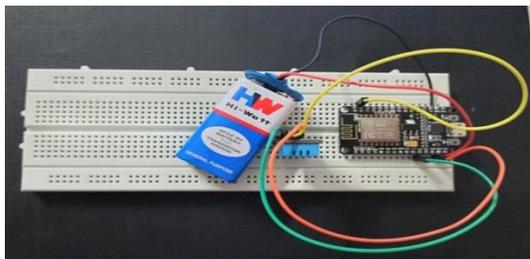


Figure 2: Physical System Block Diagram

#### 3.1. Connection of the system

The sensors associated with get the information of the current room atmosphere and the electronic parts utilized in the model are listed below.

##### Hardware Components

**i) Node MCU:** Node MCU is the core of the gadget. it is an open-source firmware and created a pack that causes you to manufacture IoT stuff. It comprises of an ESP8266 Wi-Fi chip. The ESP8266 is an ease Wi-Fi chip created by Espressif Systems with TCP-IP convention. The various sensors are associated with this microcontroller. They send the deliberate qualities to it and it transfers all the qualities to the cloud where the qualities are examined. The engineer of this board is the ESP8266 Open-source Community. It has a working framework called XTOS. The CPU is ESP8266 (LX106). It has an in-manufactured memory of 128 KBytes and a capacity limit of 4MBytes.

**ii) Sensor DHT11:** Node MCU is utilized to interface DHT11 for humidity (in %) and temperature (in °C)

estimation utilizing a single-wire serial interface (SPI). DHT11 is regularly used as a temperature and humidity sensor. The sensor can measure temperature from 0°C to 50°C with a blunder of  $\pm 2$  °C and humidity from 20% to 90% with a precision of  $\pm 1$ °C and  $\pm 1\%$  with RH  $\pm 5\%$  RH mistake. DHT11 chips away at a 3-5.5V voltage gracefully and 0.5-2.5mA current flexibly. The sensor accompanies a committed Negative Temperature Coefficient (NTC) part to evaluate temperature and an 8-bit microcontroller to yield the estimations of temperature and humidity estimation resistive sort section is used by this sensor. The sensor is similarly creation line balanced and in this manner easy to interface with various microcontrollers with a digital interface.

**iii) Jumper Cable:** Jumpers resemble on/off switches they might be evacuated or added to interchange segment execution choices. A jumper is made of materials that lead power and is sheathed in a non-conductive plastic covering to forestall unplanned short circuits. The jumper's fundamental favorable position is its one-time setup, which makes it less defenseless against debasement or force disappointment than firmware.

**iv) Bread Board:** A breadboard is an extensively used gadget to structure and test circuits. You don't need to tie wires and portions to make a circuit while using a breadboard. It is easier to mount sections and reuse them. Since parts are not bound you can change your circuit plan whenever with no issue. It involves an assortment of conductive metal catches encased for a situation made of white ABS plastic, where each fasten is ensured with various catches. There are a couple of holes on the plastic box, planned in a particular structure.

##### Software Components

**i) Arduino IDE:** The Arduino coordinated improvement condition (IDE) is a cross-stage application (for Windows, macOS, Linux) that is written in the programming language Java. It started from the IDE for the dialects Processing and Wiring. The Arduino IDE underpins the dialects C and C++ utilizing exceptional standards of code organizing. The Arduino IDE supplies a product library from the Wiring venture, which gives numerous regular info and yield techniques. User-written code just requires two fundamental capacities, for beginning the sketch and the fundamental program circle, that are assembled and connected with a program stub main ( ) into an executable cyclic official program with the GNU device chain, additionally included with the IDE dissemination.

**ii) Android Studio:** Android Studio gives a brought together condition where you can construct applications for Android telephones, tablets, Android Wear, Android TV, and

Android Auto. Organized code modules permit you to partition your undertaking into units of usefulness that you can autonomously assemble, test, and troubleshoot.

**iii) Voice Weather App:** This Voice Weather android app that recognizes user voice. The android gives a form in framework that can perceive the client words. The application UI is very straightforward. There is just one button that we use to begin sending commands.

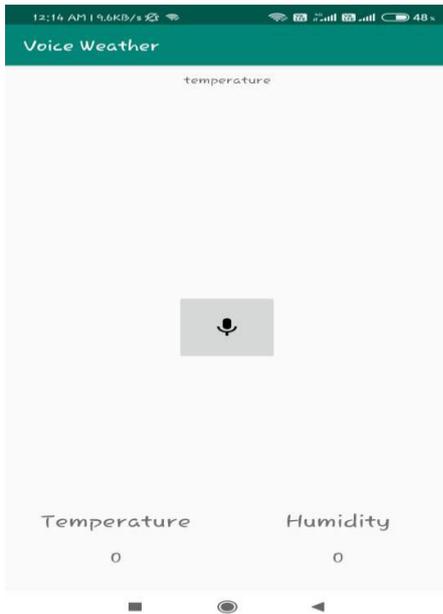


Figure 3: Voice Weather App

#### 4. Result

The arrangements made using Node MCU and the primary sensor gives way to the real time weather data which is accessible without any physical contact from a distance. After the data is sensed from the sensor devices, located anywhere. It will send to the voice weather app accurately and swiftly when a good internet connection with the device is obtainable. Thus, the output will be precisely displayed on the screen given in hand good connectivity.

#### 5. Conclusions

The model in the making has been completed as per the objectives taken in frame. Both the humidity and temperature sensors and their real time access have been made possible by the completion of this work. It fulfills the need of being remotely accessible requiring less human contact. It operates anywhere irrespective of time and place where a good connectivity makes the process much more steady and faster. It operates through voice recognition which makes it more comfortable and easy to use feature. The results are free from faults and gives precise output using IoT technique.

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