



E-Patha – A Hyperlocal Weather Monitoring Application Using Django framework

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Abstract: The available weather forecasting information is not accurate to every region. Typically, areas are separated into districts or taluks, and the weather conditions of one measured location are used to define the weather for the entire region. It will be different in real life. The proposed low-cost weather monitoring system can be placed in any location, allowing weather data to be sensed and updated to the cloud. Based on the specified location, the weather information will be displayed in plot format in a website developed with the Django framework, and the weather forecasting is done using Open weather API which is displayed through the web application.

Keywords: Weather Forecasting, Django, Framework, Web Application

I. INTRODUCTION

For centuries, climatic and weather changes have been observed. Monitoring changes in meteorological factors is critical for determining environmental changes. Climate change has always had a tremendous impact on human life, which has prompted the establishment of entire scientific fields dedicated to climate and weather observation. Simple and inaccurate equipment were utilised in the beginning, which were insufficient for easy reading and saving of measured parameters. The prototype weather forecasting system created for specific objectives is the subject of this paper. The development of a prototype system for measuring temperature and humidity, light intensity and rainfall is achieved using relatively inexpensive components, which could be an inexpensive module used in local area surrounding for weather monitoring and forecasting data to a server that could be viewed and used for further purposes. The system can be installed in any place where we need to monitor the weather, like agricultural land or industrial area etc. on linking to that device to the cloud the weather information can be accessed through the web page. this will help the people to get the weather of any place not just restricted to the village wise but also their own agriculture land.

II. LITERATURE REVIEW

[1] T. Akilan, Rani Astya, Asish Kumar Singh and others wrote a paper on application of Raspberry Pi named “Raspberry Pi Based Weather Reporting over IoT”, many sensors are connected with raspberry pi to gather weather information. The data sensed by the sensors are sent to raspberry pi which is the base station. Raspberry Pi is an IoT device which is sends the data to SparkFun server with the help of inbuilt WiFi module and the readings are displayed on an LCD screen connected to mobile.

[2] Yogendra Singh Parihar discussed about the IoT application of Nodemcu and the paper is titled as “Internet of Things and Nodemcu”. The author discussed different IoT devices that are already built with the help of Nodemcu. Nodemcu is a low-cost device with built in WiFi module. The paper also discussed about the programmable pins in the Nodemcu and their functions.

[3] Rakesh Kumar Singh, Himanshu Gore, Ashutosh Singh and Arnav Pratap Singh made a paper on Django titled “Django Web Development Easy & Fast” and this research paper talks about Django framework and how to work with Django. The paper discusses setting up the project, managing and other aspects of Django framework. This paper explains everything that is needed to start with Django framework.

[4] Busari O. A., Adebisi O. A., Adeaga I. I. and Oni A. A. wrote a paper named “Development of an Online Shop with Python Web Framework (Django)” that describes the implementation process of shopping website with the help of Django framework. Creating a website is a complex process and very time consuming. With the help of Django like

frameworks a developer can reduce the implementation time. Python, Django, Redis and Ngrok are the requirements from the implementation phase to the deployment.

[5] Nitin Singh, Saurabh Chaturvedi and Shamim Akhter written paper called “Weather Forecasting Using Machine Learning Algorithm” which discusses the weather forecasting system using raspberry pi. The raspberry pi collects the data from temperature, humidity and pressure sensors and predicts the possibility of rain. Random forest algorithm is used to train the model for better prediction. The model reached the accuracy of 87.90% with the availability of current datasets.

[6] Germán H. Flores and Roberto Manduchi explained about an assistant system for blind people in a paper called “A Public Transit Assistant for Blind Bus Passengers”. The proposed system helps the blind and deaf passengers to notify their destination. The PTA (Public Transit Assistant) system was set inside bus and it connects to device with the help of WiFi.

III. COMPONENTS

The Weather monitoring system we are using in our project contains the following components:

- NodeMCU
- DHT11 Temperature and Humidity Sensor
- BH1750 Light intensity Sensor
- Rain Drop Sensor module
- Bread board, Jump wires

Arduino IDE software is used for programming the sensors.



Fig.1 NodeMCU

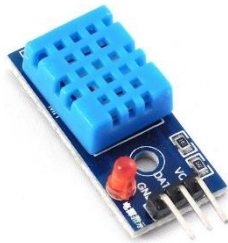


Fig.2 DHT11 Sensor



Fig.3 BH1750 Sensor



Fig.4 Rain Drop Sensor

- A. NodeMCU:** The NodeMCU platform is built on ESP8266 technology which allows objects to be connected with each other through Wi-Fi. Data transfer from various sensors is sent to the server using the inbuilt Wi-Fi in the NodeMCU. It consists of 11 digital input/output pins and one analog input pins.
- B. Temperature and Humidity Sensor (DHT11):** Digital sensors can detect temperature and humidity at a low cost. Interfacing this sensor with the microcontroller devices like Arduino, NodeMCU and others is very easy to measure humidity and temperature values instantly.
- C. BH1750 Light intensity Sensor** This sensor is a Digital Ambient light sensor. It makes use of Inter-Integrated Circuit I2C protocol so it is easy to connect to a microcontroller. This device is very efficient and uses a photodiode to sense light.
- D. Rain Drop Sensor module:** Detection of rain is easy through a rain sensor module. The module comes with a rain board and control board which are separated from each other. A power indicator LED along with potentiometer is also used in the module. The output of the rain sensor module is analog.

IV. TECHNOLOGY USED

- A. HTML:** abbreviated as Hypertext Markup Language is a text-based method of describing the structure of material in an HTML file. This markup tells a web browser on how to render text, images, and other types of files on a web application.



- B. CSS:** Cascading Style Sheets are used to format the layout of the Web application. They can be used to specify text styles, table sizes, and other characteristics of Web pages that were previously solely specified in the HTML of the page.
- C. JavaScript:** JavaScript is a scripting language for generating dynamic website content, such as something that moves, refreshes, or otherwise changes on your screen without requiring users to reload the page explicitly. To make website attractive and dynamic JavaScript is used.

V. METHODOLOGY

Weather monitoring system is comprised of three sensors which gives accurate values regarding the local weather data of corresponding area. Sensors are integrated with each other using an open source IOT platform NodeMCU. For programming the sensors Arduino IDE software is used. The corresponding data from all the sensors is transferred to the ThingSpeak cloud. The channel ID with API key from the ThingSpeak cloud is included in the program to transfers the sensor data values. The graphical representation of the sensor data is displayed along with the OpenWeatherMap API data. The website based on the user’s latitude and longitude gives the seven-day weather forecast information using one call API from OpenWeatherMap API.

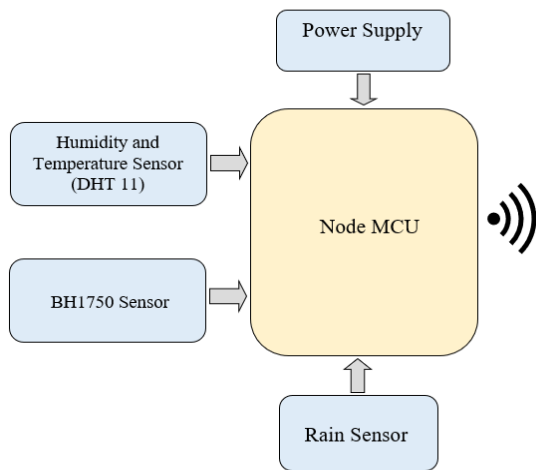


Fig.5 Weather monitoring System

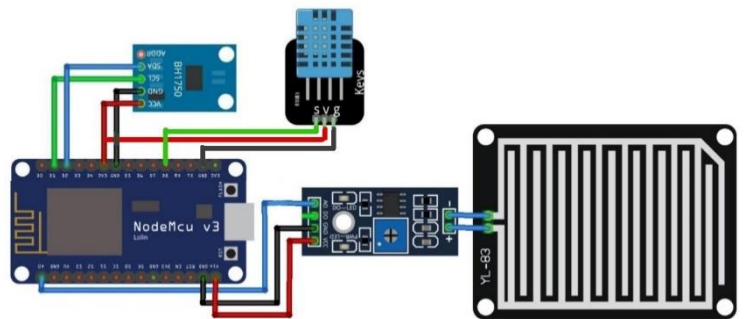


Fig.6 Weather monitoring System circuit diagram

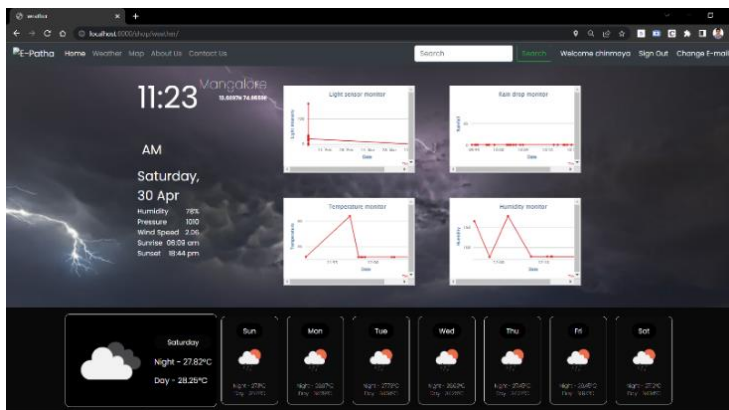


Fig.7 Django based Web application

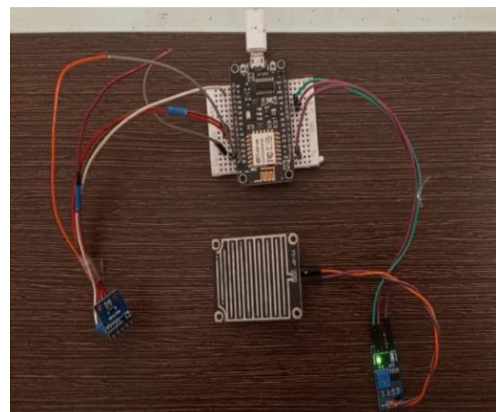


Fig.8 Node Mcu controller with sensors



The web application asks the user to get the location access. Based on that their location weather parameters are fetched from the database and displayed. The user can select the any other region to see that place weather condition. Also 7 days weather prediction is also displayed in the webpage based on the data fetched from the Open Weather API.

VI. CONCLUSION

The presented system can be considered as effective one after analyzing the output obtained. Lot of improvement can be made to this system such as, presented system will use the wired sensors to sense the weather data, instead of that distributed wireless sensors can be used to get the more accurate weather of the place and weather-based Android application can be developed for easy accessing of information through the mobile app.

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