Uploading Weather Data to Weather Underground

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Abstract:- The paper proposes the development of a weather station made up from a Raspberry Pi 3 and the Sense Hat shield. The shield used in this application has sensors for temperature, humidity and pressure. The weather station can connect to the internet wirelessly or with a standard UTP (Unshielded twisted pair) connection, this connection gives us the ability to take part in a scientific community for the sole purpose to monitor the weather all around the world. The program for the weather station is implemented in Python, this programming language is easy to used and very versatile.

On the other hand, the known web application Weather Underground is used to preview the weather conditions at various locations i.e urban or remote. This application will fetch the weather data from the sensors interfaced with the raspberry pi. The real time data accession will be provided by the web application through server connectivity.The whole system is developed at relatively low cost giving higher reliability and it is of comparatively is smaller size with easy to use technology in various applications.
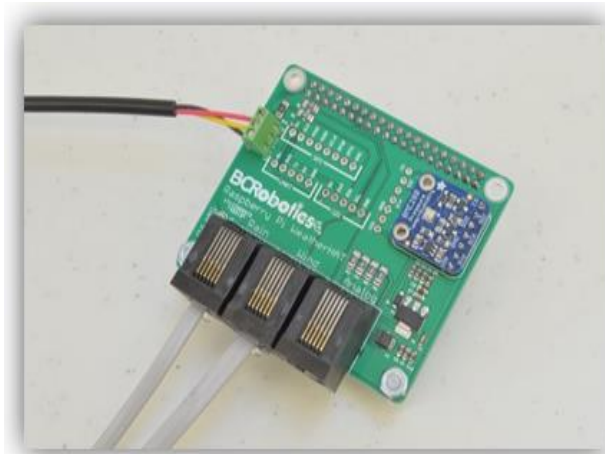
Fig 1:- Raspberry pi Board

I. INTRODUCTION

In this era of technology, determining and tracking of weather conditions plays a vital role in various fields such as agriculture, sports, energy sector, space science. It is a huge factor influencing the human life, hence developed as a motivation of scientific area devoted for weather observations completely. Therefore, A raspberry pi based weather system is proposed to determine the weather conditions. The system depends on interfacing of various sensors with raspberrypi.

Observing the weather parameters variations is essential to determine the environmental changes. So to achieve the goal of weather monitoring, a real-time, faster, portable and low-cost weather system has been proposed. At our proposed weather system we are measuring some environmental parameters like temperature, humidity, pressure.

The accurate results are determined by means of using sensors for measuring the weather parameter .the entire system will be faster and less power consuming. The system will detect the weather conditions and will continuously update the information to the web application. The reason for behind sending the data to the web page is to provide the complete accessibility of the weather conditions of a particular place anywhere in the world.

II. PROPOSED SYSTEM

➢ *Raspberry pi is a Latest Wireless Technology*
The raspberry pi board is a single board integrated with multiple features. It facilitates various solutions for network communication & consumes less power giving faster performance. The raspberry pi board has various features embedded in it like Wi-Fi, Bluetooth, and Ports for networking purposes etc.

➢ *It is integrated with various ports such as USB, HDMI, GPIO, Micro –SD Slot, audio jack for various connectivity purposes.*
The proposed system will determine and store the values of various weather parameters such as temperature, pressure and humidity with the help of sensors connected with Raspberry pi. The SD card is used to stores the collected data like a memory card. The output is displayed on the LCD and on off relays are used for server access.

The system will be integrated with the web application "Weather Underground" and a python code will help in updating the results to the server. The current status of the weather can be seen at remote location by the user only by logging in on web application entering the username and password associated with the particular user. Web application i.e Weather Underground opens after entering password and the output along with graphical representation will be obtained.
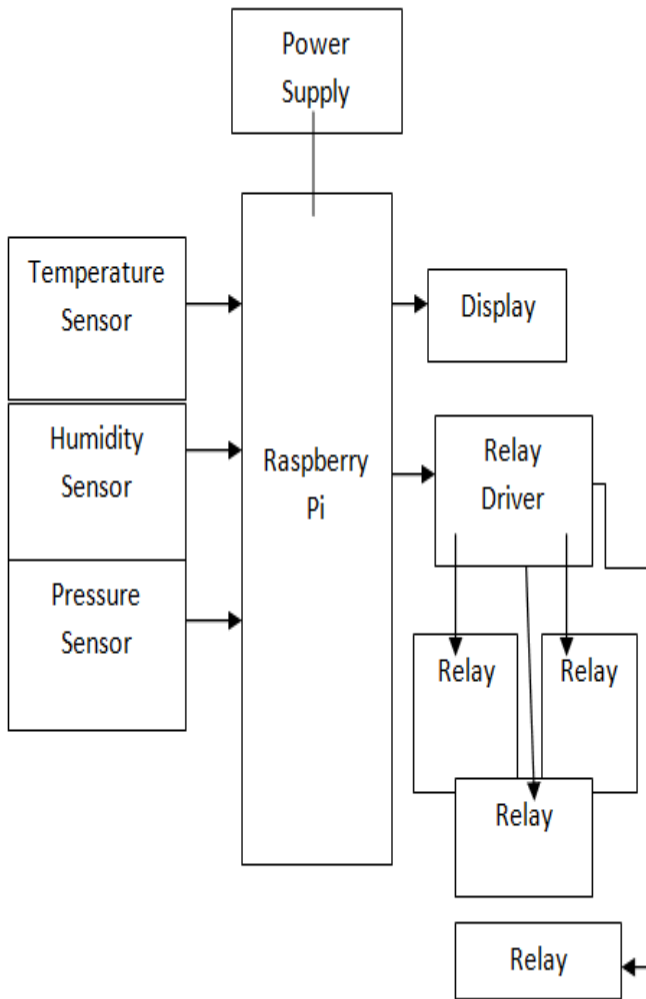
III. SYSTEM ARCHITECTURE

Fig 2:- Block Diagram of System Models

IV. IMPLEMENTATION

A. Hardware Component Description

The proposed system includes following hardware components;

➢ Raspberry Pi
➢ LAN Cable
➢ HDMI Display
➢ Atmospheric pressure sensor
➢ Humidity sensor
➢ Temperature sensor
➢ Keyboard and mouse
➢ Relay

➢ *Raspberry pi*

The Raspberry Pi is a small sized computer device just like ATM card or a Credit card . It uses Linux Operating System such as Raspbian and frequently used for IOT applications, It can be programmed in languages like Scratch & Python and can be connected directly to the Bluetooth, ethernet as well as Wifi .It has several USB ports for various connectivity purposes. For providing direct connectivity with the sensors and many other devices it has 40 GPIO's. It is a light weight device with 64 bit Quad -core processor.This credit-card sized computer can perform various processing operations These are even used for playing games & many more.

Fig 3:- Raspberry Pi B+ Model

➢ *LAN Cable*

LAN Cable (Local Area Network): In our system LAN Cable is useful for provided internet connectivity to the Raspberry pi, by means of which the results are updated at the website & can be accessible at various locations. The devices connected via LAN has much more efficiency and have faster speed than the wireless connection.

➢ *HDMI Display*

HDMI Display: The display is required to view the current status of the weather as well as sensor predicted data such as (humidity, pressure, temperature) values. It will also reflect the error and disfunctionality of the system.

Fig 4:- HDMI Display

➢ *Atmospheric Pressure Sensor*

Atmospheric Pressure Sensor is used for measuring the pressure conditions in the environment .This is a generation of sensor from Bosch. A new generation of digital pressure sensors with higher precision is used in our proposed system. It is an electronic sensor with low power & voltage consuming capacity. BMP180 is optimal sensors for using in mobile phones, PDAs etc. It has a pressure range of 300 ... 1100hPa.
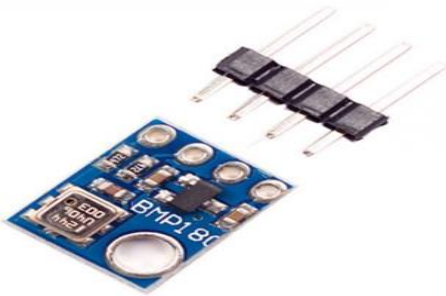
Fig 5:- BMP-180 Barometric Pressure Sensor

➢ Temperature and Humidity Sensor

The Temperature & Humidity sensor is used here for determining the temperature and humidity values in the environment. DHT11 is a Humidity and Temperature Sensor we used in our system generates calibrated digital output. It can be interfaced with many microcontroller like Raspberry Pi, etc. and get instantaneous results. A low cost humidity and temperature sensor which provides high reliability and long term stability DHT11 uses a resistance controlled humidity sensor and a thermoresistor to measure the surrounding air temperature and humidity. It is good for 20-80% of humidity measurement and 0-50°C of temperature measurement.
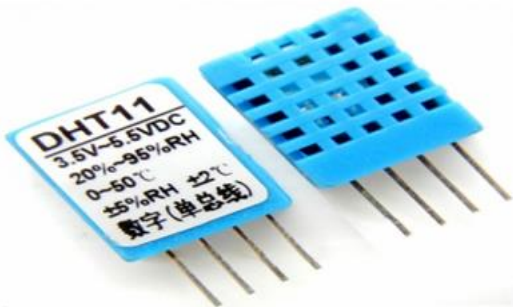

Fig 6:- DHT11 Temperature and Humidity Sensor

➢ Relay Board

Relay Board: Relay is an electromechanical switching device which can be turned on or off ,allowing the current go through it or resisting it. It is used in industries, automobiles and home appliances. These are relatively simple with longer life, and proven as highly reliable. The 8-channel relay is used in our system for switching and controlling the devices.The following Control signals uses +5V logic levels.

B. Software Requirement

Programming on Raspberry pi can be done in multiple ways. Raspberry Pi supports all the programming languages which a Linux computer can run. The GCC compiler suite is preloaded with Raspberry Pis' operating system **Raspbian**. Raspberry pi can directly run C programs without any other installation.

➢ Python

The most recommended language mainly used for Raspberry Pi is Python, as Raspberry works on Linux Operating system. The Interpreter of python allows the language code to run on a wide variety of systems and

Raspberry pi is one of them .Python codes are packed into stand-alone executable programs for some of the most popular operating systems such as Raspbian, so without installing python interpreter these codes can be executed and used easily. Python is designed to be highly readable and understandable and is very simplest and dynamic in nature .It is an object-oriented language with an easy to learn syntax.

V. CONCLUSION

Thus, we concluded that the Raspberry Pi is highly efficient in connectivity to various sensors and   does the work of weather station, reflecting the results on the server connected website.

The website is connected via server to the raspberry pi via raspbian Operating System giving a better performance and accuracy of the results. The website is logged on and the sensors connectivity is in through relay.

Although after the completion of the model we have achieved the desired results as the value of the temperature, pressure and humidity visible on the dashboard of Weather Underground Application Website.

Fig 7:- Output on Weather Underground's Application Dashboard

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