IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

WEATHER MONITORING SYSTEM AND DISPLAY READING IN WEB PAGE USING RASPBERRY PI

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ABSTRACT

The significance of environmental monitoring has increased as a result of climate change. Continuous monitoring of the environmental parameter is required to ascertain the environmental quality. Since the IoT is a technology, it is important for gathering information from the sensing unit. A sensing unit often consists of a variety of sensors, including those for temperature, gases, air pressure, and others. The study makes use of a Raspberry Pi to process and transport sensed data to a cloud server and to send message alerts through GSM. Thus, the received parameters are saved in the cloud platform. Through the use of cloud computing, the environment is updated in the form of a database. For immediate access to the measured parameters, a web server is setup.

1. INTRODUCTION

The demand of carriers over the web necessitated record collection and exchange in an environmentally efficient manner. The Internet of Things refers to the unexpectedly created neighbourhood of linked objects that are capable of accumulating and exchanging files through the use of embedded sensors. It is currently finding profound use in every single region and performs a key function in the proposed environmental monitoring.

IoT converging with cloud computing offers a novel method for greater administration of facts coming from precise sensors collected and transmitted with the aid of low power, low priced microcontroller Raspberry Pi. A net server will be created to display screen the parameters. Internet of Things (IoT) refers to the interconnection of devices, vehicles, buildings, and other items via sensors, network connectivity, software, and actuators to collect and share data. IoT is one of the most rapidly evolving technologies. The Internet of Things holds a lot of promise, and it will benefit a wide range of industries by reinventing them. As a result, people have a higher quality of life and live in a safer and healthier environment. The resulting IOT principle plays a critical role in helping to attain the goal. The concept of IoT is somewhat complicated because it encompasses multiple levels of data connections , but the benefit is its simplicity, which allows us to read and obtain information about the city environment via the internet.

2. LITERATURE SURVEY

Pravin Pawar, Sudarshan Lahade, Saurabh Shinde(2015)The temperature, pressure, and relative humidity, as well as the altitude of the atmosphere and rain fall detection, have all been monitored and shown using Raspberry Pi, as reported in this work. Various weather monitoring systems are examined in this research.

Kumar , Jasuja(2017)Using the Rasberry Pi card, created a new system based on internet of things technology. The system was designed to assess air quality Weather by taking measurements of temperature, monoxide and carbon dioxide levels, as well as air pressure and humidity.

Kumari, Kasliwal, and Valakunde(2018)presented an Android-based, internet-of-things-based intelligent environment monitoring system. The developed system is capable of measuring some environmental characteristics such as air, water, and soil. As a result, the system includes a variety of sensors that are connected to the Raspberry Pi card. The card receives the measured parameters and sends their values to a remote database over a wireless network.

Durrani, Khurram, Khan(2019)demonstrated a sophisticated environment monitoring system based on Android and the internet of things. Some environmental properties, such as air, water, and soil, can be measured using the created system. As a result, the system comprises a number of sensors linked to the Raspberry Pi card. The card receives the measured parameters and communicates their values through a wireless network to a remote database.

Puja Sharma and Shiva Prakash(2021)The suggested system will use an IoT-based client-server architecture. Two-tier architecture is used to arrange the system. proposed system includes a number of sensors that will track the temperature sends the data to a serial monitor. An IP address is monitored by the serial. The data on the webserver is viewed using the HTTP protocol. This work uses an environmental parameter or sensor to show data on a website and to monitor real-time weather data. Anyone can check the weather state from anywhere using a webserver, without relying on any programmer.

2.1 ANALYSIS ON LITERATURE SURVEY

S.NO	TITLE	PARAMETERS	DESCRIPTION	KEY IDENTIFIED
1	"Implementation IoT for Environmental Condition Monitoring in Homes "	light, temperature level and humidity	A PIC Microcontroller is used to implement an environmental monitoring system, which is integrated with light,temperature, and humidity sensors, and the data is displayed on a LCD, with message alerts sent via GSM.Fault detection is also implemented in this. The lights can be activated using a mobile phone. If the light does not go out, then an SMS will be sent regarding fault detection.	The interfacing with IOT using PIC is complicated. The Module requires more complex coding to get sensor data and to upload the data. The message sending from GSM to Microcontroller may not get accurate results.
2	"Arduino Based Weather Monitoring System"	Humidity and temperature	This implementation is done for the development done with automated weather with forecasting system using Arduino. In this project the author monitors the values of humidity and temperature in the environment and gives the accurate values of climatic conditions to cloud server.	In this paper are to send cloud data to cloud server an extra module like GSM is used which is costly. Without GSM in this paper data cannot be uploaded to cloud server.
3	smart weather alert system for dwellers different areas	Temperature & humidity,Rainfall, Carbon monoxide	Health concerns will change as a result of environmental factors. They demonstrate that environmental and health data is uploaded	If machine learning used for detecting the parameters which is not necessary and is complex.

			to a cloud server. IoT and Machine Learning are used in this case.	
4	"air quality monitoring system based on IoT using Raspberry Pi"	temperature, monoxide and carbon dioxide	The real time air quality in the environment haven been implemented. The parameters are measured in the form of Carbon Monoxide and dioxide, temperature, Dust in the air. The values are sent to the cloud wirelessly.	This concept was implemented only in one place so that we cannot say weather it will work for all places accurately.

Table 2.2 Analysis on literature survey

3. PROPOSED SYSTEM

In this proposed paper enforcing climate monitoring with multiple environment sensors like CO, CO2, Temperature and Humidity, Pressure, Rain Intensity and Light Intensity. The use of environment monitoring sensors like MQ2, DHT11, BMP180 Pressure sensors to measure gases like CO, temperature and humidity, and atmospheric pressure, raindrop. All these values are updated to net server and GSM used for message alert. The main microcontroller used right here is Raspberry Pi which acts as both Microcontroller and as Microprocessor.

3.1 ARCHITECTURE OF THE PROPOSED SYSTEM

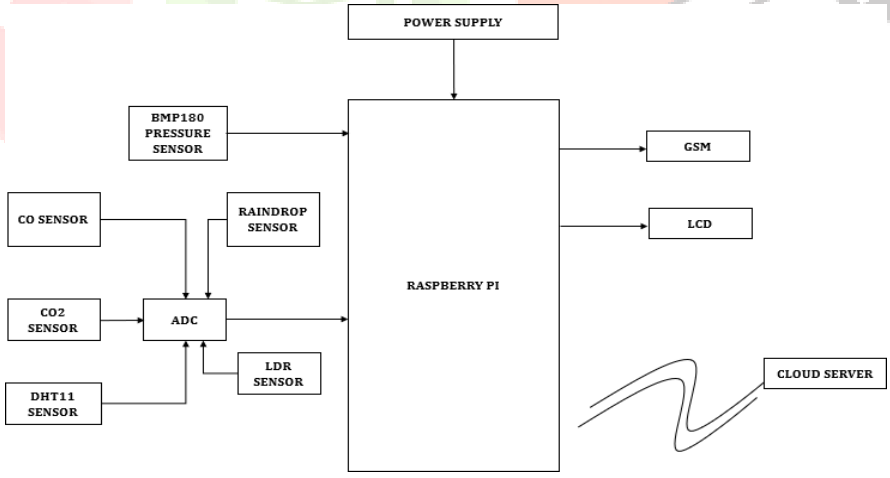

FIG 3.1 ARCHITECTURE

The Main processor is Raspberry Pi and the inputs of the challenge are sensors i.e., MQ2 Sensor which detects CO and CO2, DHT11 Sensor Which Detects each Temperature and Humidity, Pressure Sensor to notice the atmospheric pressure, Raindrop detect the depth of rainfall. As these sensors are Analog sensors the values are fed to ADC which converts Analog to Digital internally and fed to Raspberry Pi. The signals from the sensors acts as input. The GSM here acts as Output if any sensor crosses the threshold value, then GSM will activate and Send SMS to defined number in the coding. The Values are uploaded to Cloud server which is Thingspeak.

3.2 Flow Chart:

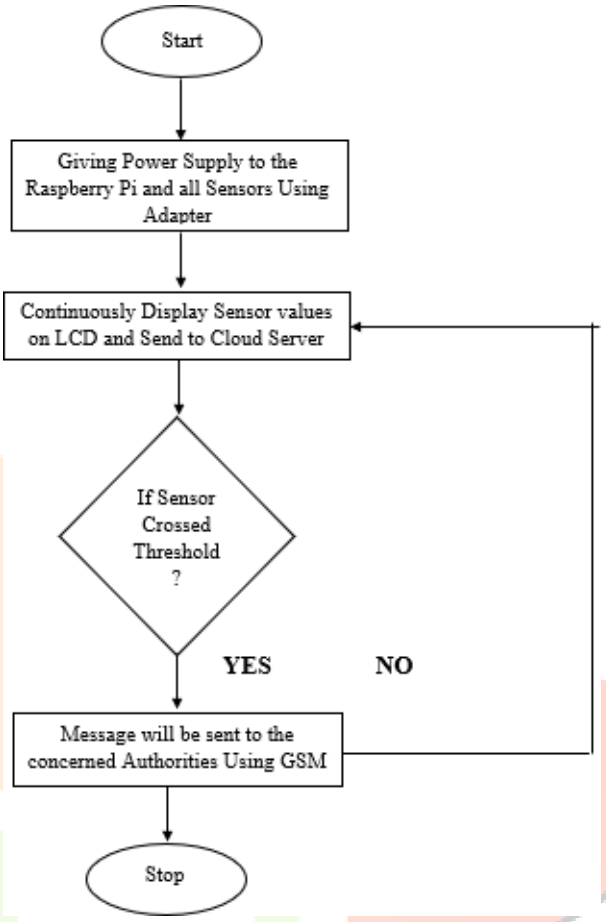

FIG 3.2 FLOW CHART

4.COMPONENTS

4.1 RASPBERRY PI:

It is a competent small gadget that enables users of all ages to explore with computing and discover how to create in languages like Scratch and Python. Everything a desktop computer can do is also possible on a mobile device, including playing games, generating spreadsheets, and word processing in addition to accessing the internet and watching high-definition video. The Raspberry Pi has been utilised in a variety of digital maker applications, such as weather stations, tweeting birdhouses with infrared cameras, music machines, parent detectors, and other projects that interact with the outside environment. It's wonderful to see individuals using the Raspberry Pi all across the world to learn how to code and understand how computers operate.

4.2DHT11 SENSOR (TEMPERATURE/HUMIDITY):

The DHT11 is a low-cost virtual temperature and humidity sensor with a simple design. To degree the surrounding air, it uses a capacitive humidity sensor and a thermistor, and it spits out a virtual sign at the static pin (no analogue enter pins needed). It's simple to use, but it necessitates careful scheduling in order to keep track of information. The best genuine disadvantage of this sensor is that you can only collect new information from it every 2 seconds.

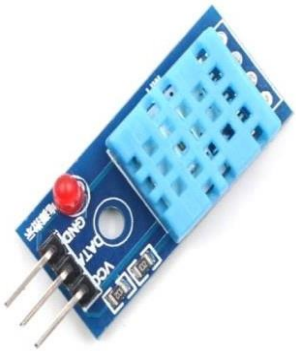

Fig 4.2 DTH11 SENSOR

4.3 MQ2 sensor:

Monitoring of gases produced is critical in today's technological environment. Monitoring of gases is critical in everything from residential appliances like air conditioners to electric chimneys and safety systems in industries. Gas sensors are an essential component of such systems. Gas sensors, which are about the size of a nostril, react spontaneously to the gas present, keeping the system informed of any changes in the concentration of molecules in the gaseous state.

Gas sensors come in a variety of configurations based on sensitivity levels, gas type, physical dimensions, and a variety of other criteria. This Insight is about a methane gas sensor that can detect gases like ammonia produced by methane. When a gas comes into contact with this sensor, it is first ionised and then adsorbed by the sensing element. This adsorption generates a potential difference on the element, which is transmitted to the processing unit in the form of current via output pins.

FIG 4.3 MQ2 SENSOR

4.4 BMP180 Pressure Sensor:

BMP180 is one of the BMP XXX series' sensors. They're all made to measure atmospheric stress or barometric pressure. The BMP180 is a high-precision sensor for client applications. The weight of air carried out on everything is what barometric pressure is. The air has weight, and stress is felt anywhere there is air. The BMP180 sensor detects the stress and transmits the information as a virtual output. Also, because temperature has an effect on stress, we need a temperature compensated stress reading. In order to compensate, the BM180 includes a temperature sensor.

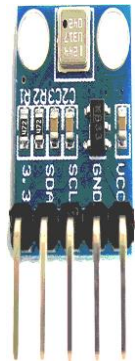

FIG 4.4 BMP180 SENSOR

4.5LDR Sensor:

A light dependent resistor, commonly referred to as a photoresistor or LDR, is a component whose resistance depends on the electromagnetic radiation that strikes it. They are therefore just marginally sensitive gadgets. Other names for them include true photocells, photoconductive cells, and photoconductors. One of the most widely used symbols for a photoresistor or LDR is depicted in the image below. There are numerous precise symbols used to represent this type of device. There is some light falling on it, as the arrow suggests.

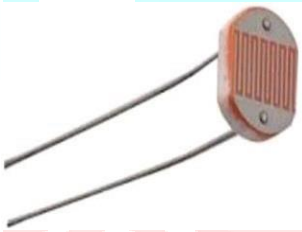

FIG 4.5 LDR SENSOR

4.6 Raindrop Sensor:

A raindrop sensor is a gadget that detects rain. It consists of several modules, including a rain board that detects rain and a manipulator module that compares analogue values and converts them to virtual values. Raindrop sensors can be employed in the automotive zone to automatically regulate the windshield wipers, in the farm zone to experience rain, and in household settings.

5. CONCLUSION

To successfully implemented monitoring system using multiple sensors which will detect the various parameters in the environment. This system is very compatible to use and gives accurate values of the parameters that are calculating. This system completely works on the Internet of things where Raspberry pi is used as the barrier between cloud server and the sensors. This can be implemented in real time so that the authorities can known the weather parameters.

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