



A RASPBERRY PI CONTROLLED CLOUD BASED AIR AND SOUND POLLUTION MONITORING SYSTEM WITH TEMPERATURE AND HUMIDITY SENSING

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Abstract

Air and sound pollution is an increasing problem these days. It is important to screen the air and sound contamination levels to guarantee a solid and safe condition of environment. This proposed system will help the users to monitoring sound and air pollution. The project aim is to design the system which monitor the air and sound pollution based on temperature and humidity sensing with Raspberry pi. In this project, an IOT-based method to monitor the Air Quality Index and the Noise Intensity of a region, have been proposed. The recommended technology comprises of three modules namely, the Air Quality Index Monitoring Module, the Sound Intensity Detection Module, and the Cloud-based Monitoring Module.

Keywords: Adapter power supply, Raspberry pi, Air quality sensor, Sound sensor.

1. Introduction

Air and sound pollution is an increasing problem these days. It is important to screen the air and sound contamination levels to guarantee a solid and safe condition of environment. The environmental problems like the expansion in

modern plants and framework have affected the prerequisite of keen checking framework. In recent times, it is simpler to shape correspondence among people and gadgets. Since Internet of Things has high effectiveness because of its simplicity.

Sensors and interface modules are associated with the web to make the estimating procedure exact and easier than moving to the various locations to collect the data after analyzing. This lengthy process is replaced by this proposed work. It is tougher move to dissect the natural factors and making a stage for the issue if it is done rapidly. In this model a Raspberry pi3 controller, Gas sensor, Sound sensor, Temperature sensor are used for monitoring and interface.

Air and sound contamination is an expanding issue nowadays. It is essential to screen the air and sound pollution levels to ensure a strong and safe state of condition in the environment. The natural issues like the extension in present day plants and structure have influenced the essential of finite and micro level analyzing system.

Wi-Fi (Short for **Wireless Fidelity**) is a wireless technology that uses radio frequency to transmit data through the air. Wi-Fi has initial speeds of 1mbps to 2mbps. Wi-Fi transmits data in the frequency band of 2.4 GHz. It implements the concept of frequency division multiplexing

technology. Range of Wi-Fi technology is 40-300 feet.

The Raspberry Pi is a low cost, credit-card sized computer that can be used in electronics projects. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python. It's capable of doing everything you'd expect a desktop computer to do, from browsing the internet and playing high-definition video, to making spreadsheets, word-processing, and playing games.

2. LITERATURE SURVEY

In paper[2] Arushi Singh et al. have proposed a system which uses sound and air sensors to detect the information continually and afterward transmit the information. The principle goal of undertaking is by utilizing different sensors, GSM/GPRS module and Cloud/server to structure a productive and remote framework to observing the degree of different poisons causing contamination and to limit the impact of these parameters without influencing the common habitat and give live updates to keep away from clashes. A raspberry pi module intervenes with the sensors and procedures the information. The Distributed computing is an efficient answer for the overseeing of sensor information. This paper presents Polluino, a framework for observing the air contamination through Arduino. Also, a Cloud-based stage that oversees information originating from air quality sensors is created.

In paper[3] L.Ezhilarasi et al. have proposed a using a Zigbee wireless sensor network to detect the various parameters in the surroundings. The mechanical air contamination checking framework dependent on the innovation of remote sensor systems (WSNs). This framework is incorporated with the worldwide framework for portable interchanges (GSM).And its correspondence convention utilized is zigbee. The framework comprises of sensor hubs, a control community and information base through which detecting information can be put away for history and tentative arrangements.

In paper[4] Mahantesh B Dalawai et al. have used a GSM module and a web server to monitor the pollution levels. In the parameters of the smoke sensor and noise sensor will upload the data to the cloud storage at every time. Pollutants can cause damages in human health and other living organisms. The available pollutant emission

monitoring systems, such as Opsis, Codel, Urac and TAS-Air metrics are typically expensive. The proposed system which uses sound and air sensors to detect the information continually and afterward transmit the information. . Parking management is also main public issue in most of metropolitan cities and that is also the reason of many problems. In addition, these systems have limitations to be installed on chimney due to their principle of operation.

3. Implementation:

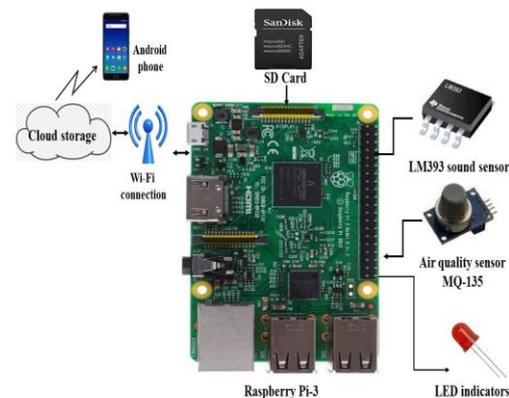


Fig1: Blockdiagram

The controlling device of the whole system is Raspberry Pi. LM393 sound sensor, MQ-135 Air quality sensor. Raspberry pi3 processor continuously read the data from sensors and update this data into the cloud through Wi-Fi. Raspberry pi has inbuilt Wi-Fi to upload the sensor data. The objective of our work is monitoring the air quality of a region and the detection of noise intensity to curb the problem of sound pollution. When there is air pollution or noise pollution it is detected by the Air quality sensor and sound sensor, this is processed by Raspberry pi, as the proposed method involves cloud-based monitoring of the required parameters with the help of internet. The alert system ensures that the user is notified about any unfavorable condition which demands instant action.

4. Related Work:

The short introduction of distinct modules used in this undertaking is mentioned below:

Raspberry Pi (ARM-11) PROCESSOR:



Fig2: Raspberry Pi3

The **Raspberry Pi** can be set up to run like a standard (albeit bare bones) desktop computer, that isn't really the point. Rather, it's intended to be **used** as an educational tool for those who wish to learn to program. It's also intended to be modified and customized for specific tasks. In this version, they've upgraded to a 1.2 GHz 64-bit quad-core ARM processor and added 802.11n Wireless LAN, Bluetooth 4.1 and Bluetooth Low Energy. If you're searching to incorporate the Pi into your next embedded design, the 0.1" spaced 40-pin GPIO header offers you get admission to 27 GPIO, UART, I2C, SPI as nicely as each 3.3V and 5V energy sources.

Raspberry Pi processor is programmed the use of embedded 'Linux'. Linux is the best-known and most-used open source running system. As an running system, Linux is software program that sits under all of the other software on a computer, receiving requests from those applications and relaying these requests to the computer's hardware.

Air quality sensor:



Fig3: Air quality sensor

Air quality sensor for detecting a wide range of gases, including NH₃, NO_x, alcohol, benzene, smoke and CO₂. Ideal for use in office or factory. MQ135 gas sensor has high sensitivity to Ammonia, Sulfide and Benze steam, also sensitive to smoke and other harmful gases. It is with low cost and particularly suitable for Air quality monitoring application.

MQ135 Gas Sensor module for Air Quality having Digital as well as Analog output. Sensitive material of MQ135 gas sensor is SnO₂, which with lower conductivity in clean air. When the target combustible gas exist, the sensors conductivity is higher along with the gas concentration rising. MQ135 gas sensor has high sensitivity to Ammonia, Sulphide and Benze steam, also sensitive to smoke and other harmful gases, tested concentration range: 10 to 1000 ppm.

Sound sensor:



Fig4: sound sensor

Sound detection sensor module detects the intensity of sound where sound is detected via a microphone and fed into an LM393 op-amp. It comprises an onboard potentiometer to adjust the set point for sound level.

LM393 Comparator IC is used as a voltage comparator in this Sound Detection Sensor Module. Pin 2 of LM393 is connected to Preset (10KΩ Pot) while pin 3 is connected to Microphone. The comparator IC will compare the threshold voltage set using the preset (pin2) and the Microphone pin (pin3).

5 RESULTS:

This paper discusses the methodology and results of each of design for the concerned data. All methods used in this paper provides accurate results in classification with high accuracy and widely used cloud storages. Its process are done in inner network so its saves time, reduces the labour work and result is also high. This method is very useful for all consumers.

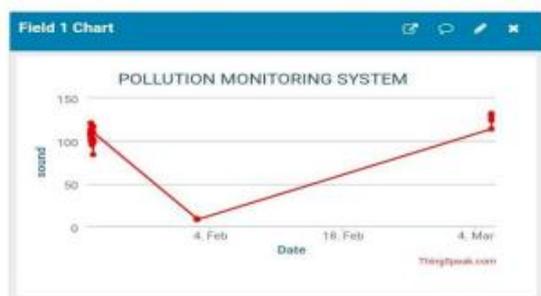


Fig5: sound intensity detection

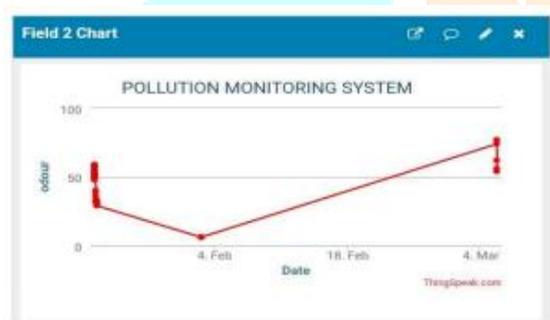


Fig:6

air quality detection

6. CONCLUSION:

The present model gives an Integrating characteristic of all the hardware aspects which has been used and developed in it with Arm-11 Raspberry pi processor. The Presence of every and each and every module has been reasoned out and positioned very carefully. Hence the contributing to the excellent working unit for **A Raspberry Pi Controlled Cloud Based Air and Sound Pollution Monitoring System with Temperature and Humidity Sensing** Using Embedded Linux device has been designed perfectly. A smart way to monitor the environmental parameters using Raspberry Pi module has been discussed in this paper. This concept of IoT helps to develop the quality of air, monitor the noise level and temperature. And also it is a low-cost and efficient method. The monitoring of accumulated data in the cloud storage helps to determine the numerous

patterns in the environment and helpful in making awareness to the public.

5. ACKNOWLEDGEMENT

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