

IOT Based Air Pollution Monitoring System using Raspberry Pi

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Abstract: IOT which means Internet of Things is a highly distributed network of smart devices. Every smart device is embedded with an electronic sensors, softwares and other technologies. The word "Things" means the one who is able to connect as well as exchange the data with other devices and systems over an internet, which are embedded with sensors, softwares and other technologies. Now a days air pollution is increasing day by day. The factors which produce air pollution are industrialization, increase in population, urbanization and so on. As the air pollution is increasing rapidly, it has become a major concern to work on. So we have tried to design and implement this project to detect the amount of gases present in air to reduce air pollution.

Keywords: IOT, Raspberry Pi, Air Pollution, Smart devices, Sensors, ADC, Monitoring

I. INTRODUCTION

The air pollution is a major concern for every individual in the society. As the air pollution increases, human faces many problems and health issues. The air pollution is also harmful to living things.

The factors which are majorly responsible for air pollution are use of vehicles and industrialization. Vehicles release lots of gaseous pollutants when we use them. These pollutants increase air pollution and these are harmful for human beings. Industries leads to produce harmful gases which affects air pollution which is directly affecting the human health. These harmful gaseous pollutants cause allergic reactions to humans, throat and nose infection, allergies leads to skin diseases. As the title suggests, it is a monitoring system which monitors air pollution with the help of raspberry pi based on Iot. This project deals with monitoring of air pollution as well as air quality. It helps to every individual in the society to determine the air pollution in their surroundings.

II. LITERATURE REVIEW

IOT based Air Pollution Monitoring System

The author proposed IOT based air pollution monitoring system in April 2021. They have used raspberry pi 3 which is connected with gas sensors. They have used MQ 2 and MQ 7 gas sensors which are connected to MCP3008 which is a 10-bit ADC. This ADC is connected to raspberry pi and raspberry pi is connected to wifi module. [1]

Internet of things Mobile – Air Pollution Monitoring System (IOT Mobair)

The authors published Internet of things mobile air pollution monitoring system (IOT mobair) in 2019. The Iot mobair is an application for pollution management. This application provides visibility for users which is specially used in industries into the risk of incidents such as oil spills, toxic substance improper disposal, chemical leaks. This app provides indices of air quality for a specific city with the help of real time computation process view. It mainly focuses on briefing about IOT. [2].

IOT based Air Pollution Monitoring System

In 2018, authors proposed air pollution monitoring system. They have used MQ 135 and MQ 6 gas sensors, LM 35 temperature sensor, SY H5220 humidity sensor. These sensors are connected to Arduino uno which is further connected to wifi module and lcd with a buzzer. The GSM module is used for establishing the communication between computer and gym system. [3].

Air Pollution Monitoring System using IOT

IOT provides the facility to gather as well as transmit the collected data in easy format to phone applications which will make people aware about air pollution in their area.[4]

III. PROPOSED METHADODOLOGY:

We proposed a system for monitoring the air pollution using raspberry pi based on Iot. The objective of this project is to detect the amount of gases present in air.

3.1 Hardware Used

A. MQ 2 Sensor

It is a robust gas sensor. It is used to detect gases like LPG, alcohol, propane, hydrogen, methane and carbon monoxide. It provides analog as well as digital output so it can be used as analog and digital sensor. The working range of this gas sensor is 200 to 10000 PPM.



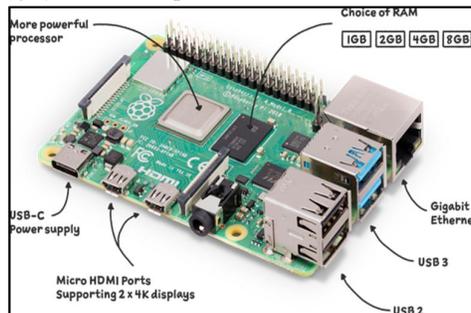
B. MQ 7 Sensor

It is a highly sensitive towards carbon monoxide so it is also known as carbon monoxide sensor. It provides fast response time. It is having low cost. It is stable and long-life sensor. The working range of this gas sensor is 20 to 2000 PPM.



C. Raspberry Pi:

It's like a small independent computer. It is one of the smallest computers popular for its size. It can be used for programming for electronic projects, to play HD videos. We can use languages like c, c++, python, java, ruby for programming. It has its own operating system as Raspbian.



3.2 Software Used

A. Thing Speak

Thing speak is an IoT platform. Which is allowed to monitor live data in the cloud. We can see the data to thing speak from our device. Whenever creating the channel on thing speak, we got the channel id, and AIP keys i.e. Write AIP key and Read AIP key. Write AIP key has a 16-digit code that allows an application to write data to the channel. The read AIP key has a 16-digit code that allows an application to read data stored in the channel. We can see the output on things speak from anywhere.

3.3 Block Diagram

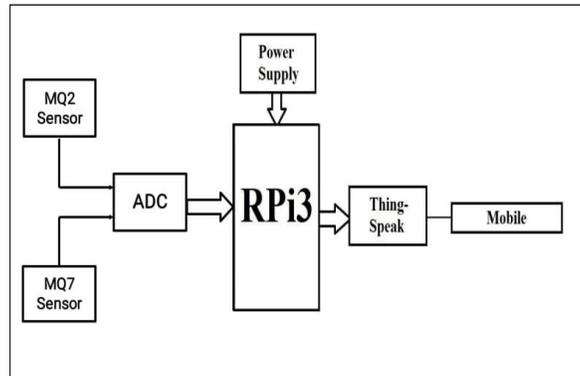


Fig.1. IOT Based Air Pollution Monitoring System Using Raspberry Pi

3.4 Working

The above block diagram shows the working of IOT Based Air Pollution Monitoring System Using Raspberry Pi. The MQ2 and MQ7 gas sensors are used in this project. These sensors are used as an analog sensor which are connected to adc. The adc is further connected to raspberry pi. Raspberry pi is provided with a power supply. The output of raspberry pi is sent to the thing speak IoT platform for monitoring graphically. We can use thing speak in mobile, laptop as well as in computer systems through an internet application that can operate from anywhere.

IV. RESULT

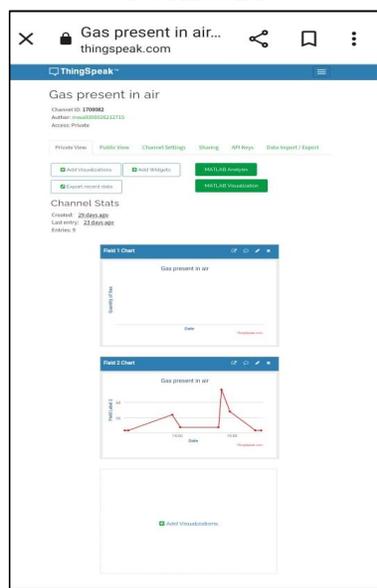


Fig.2.Result

The image shows the output result for this project in the Thing speak application. Thing speak shows output in graphical form in terms of channels that we had created initially. For this project we have created channel named as Gas present in air with quantity of gas and time parameters.

Observation Table:

Date	Time	CO2	Alcohol	Result
15 April,2022	10:00 am	40	149	Air is fresh.
15 April,2022	4:00 pm	41	149	Air is not fresh.
24 April,2022	11:00 am	45	157	Air is not fresh.
24 April,2022	4:00 pm	33	120	Air is fresh.

V. ADVANTAGES

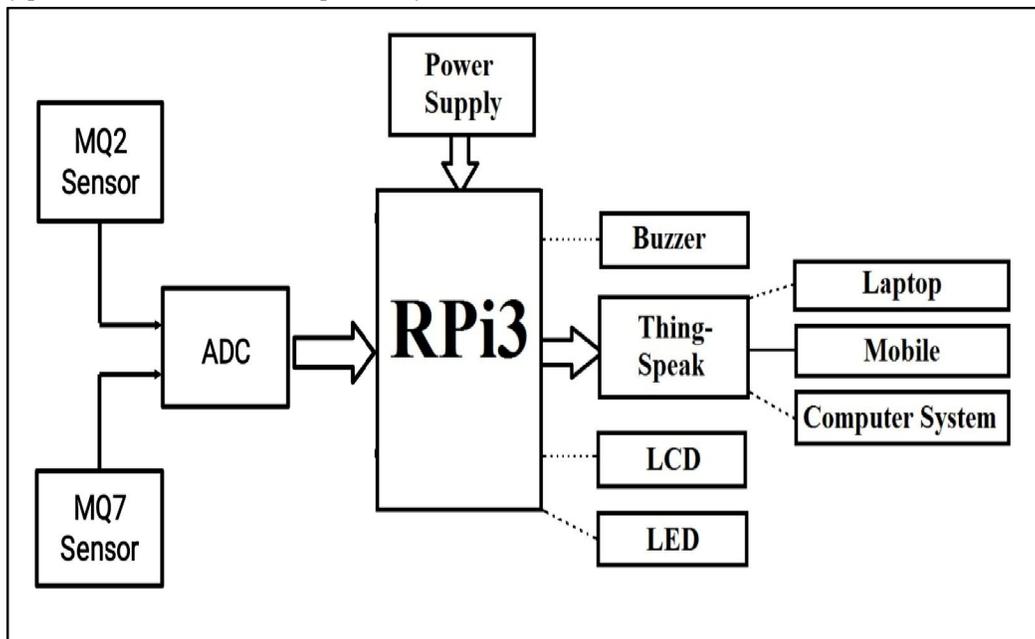
- Easy to install.
- Accurate pollution monitoring.
- Updates on mobile phone directly and connected computer.
- Remote location monitoring.

VI. APPLICATIONS

- Indoor air quality monitoring.
- Majorly used in industrialized areas.
- It can be used near hospitals.
- It can also be used in schools, colleges, crowded areas.

VII. FUTUTRE SCOPE

For the project output alert, we can use buzzer which can tell us our desired output level by beeping. Also, we can use LCD (Liquid Crystal Display) for the purpose of displaying desired output. We can use LED for the purpose of output. At our desired output LED will glow and notified us. We can connect computer system, mobile as well as laptop to raspberry pi board and we can have output on any one of the device.



VIII. CONCLUSION

The project titled as “IOT based air pollution monitoring system using Raspberry Pi” is designed to help an individual in the society to detect and monitor air pollution in the surrounding.

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