IoT Based Air Pollution 6Monitoring System using Arduino

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Abstract: *In today's scenario we are facing a big problem which is pollution. Not India or only Indian people facing this problem. Our whole world faces this problem of pollution. Pollution is of many types like air pollution, water pollution, noise pollution, nuclear pollution, etc. But here we are discussing the harmful effects of air pollution and the solution to air pollution. The level of pollution increasing day by day. The level of pollution is increasing day by day due to factors like industries, urbanization, increasing in population, increasing in use of a vehicle which can affect human health. In the Internet Of Things based Air Pollution Monitoring, system monitors Air quality from the above web server using the internet. When air quality goes down it triggers an alarm. Air quality goes down when enough amount of harmful gases present in the air like carbon dioxide, smoke, alcohol, benzene, NH3, and NOx. The air quality will be shown in Parts per million on the LCD and as well as on webpage so that air pollution can be monitored very easily. The system uses MQ135 and MQ6 sensor for monitoring Air Quality. It measures their amount exactly and finds out harmful gases.*

*Key Words***:** Air Pollution, MQ135 Sensor, IoT, Arduino Uno

1.INTRODUCTION

This is all about Air pollution. How we can minimize the pollution rate we will discuss in this paper.

1.1 Air pollution Problem

The main problem of every nation or country is pollution, the country is of any type developed or developing. Urban areas of developing countries have a growing rate of health problems. Health problems are increased due to an increase in industrialization and vehicles which releases lots of gaseous pollutants. Pollution has many harmful effects which are an allergy, reactions, irritation in the throat, eyes, and nose. It has some serious problems also like pulmonary catarrh, diseases of heart, congestion of lung, lung and provoke asthma. In pursuance of a survey, due to air or humidity pollution 50,000 to 100,000 precocious deaths per year occur in the U.S. deaths per year occur whereas in European Union number reaches to 300,000 and over 3,000,000 worldwide [1]. In the atmosphere, primary pollutants are also called as Various kinds of anthropogenic emissions are pumped which experience reaction of chemical and afore leads to the fabrication of new pollutants which are called as a secondary type of pollutants. These pollutants are responsible for problems of health[2]. Nowadays approximately every citizen spends 90 percent of their time in indoor air or environment. Quality of air of indoor is also get reduced because of the use of various types of machine in indoor.[3]. The air quality of cities of developed countries needs improvement in recent time [4]. In today's era, the buildings are designed which have low power consumption and the number of ventilation is also decreases which decrease the air quality inside the building [5].

1.2 Air Quality Monitoring Systems

The meters available in the market which is called a commercial meter detects the pollution. In this field, the researchers have introduced various types of monitoring systems which measures air quality.[6] [1] [7]. In pursuance of intended function each technology has limited uses, Bluetooth is a lesser range type of system of communication, through Global System for Mobile we notify by using a message only. Any type of system which is present and monitors various types of gases which exist in the environment like carbon monoxide, carbon dioxide, smoke, Liquified Petroleum Gas, iso-Propane, iso-Butane. It also monitors the hotness of temperature and humidity in the environment or the air at that time and monitors these parameters at a distal location,or the most crucial parameter it provides extra precaution and protection and provides some parameters which are important to all users such as temperature and humidity to every person in the between limit of the monitoring system. This paper proposes such a system which detects pollution.

1.3. Research Contribution of this Paper

The outcomes which is possible that can be gained by using this analysis are given as follows:

- For some extent, we can reduce pollution when we see harmful gases in the air.

- We minimize the use of harmful fuel in our vehicles. We use CNG which is not enough harmful like other fuel.
- We have to reduce industrialization and urbanization.

2. RELATED WORK

Here we monitor the pollution in the air by using sensors, Arduino, LCD, buzzer, etc. Air Pollution Monitoring System on the basis of Internet of Things monitors the Air Quality over a webserver using internet and will trigger an alarm when the air quality goes down beyond a certain level when there are amount of harmful gases present in the air like CO_2, smoke, alcohol, benzene, NH_3, NO_x, and LPG. The system will show the air quality in parts per million on the LCD and as well as on webpages so that it can be monitored very easily. Temperature and Humidity are detected and monitored in the system. There is some disadvantage of the traditional monitoring instruments like their large size, heavyweight and extraordinary expensiveness. These lead to sparse deployment of the monitoring stations. In order to be effective, the locations of the monitoring stations need careful placement because the situation of air pollution in urban areas is very related to human activities and the traffic dilemma have much worse air quality than average.
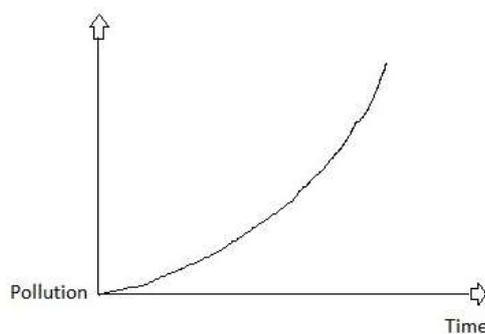
Fig-1: Relation between Pollution and Time

2.1 Motivation

LPG gas is detected using the MQ6 sensor and MQ135 sensor is used to monitor the Air Quality as it diagnoses most dangerous gases and it can also measure their amount accurately. In this project which is based on the Internet of Things, you can monitor the level of pollution from everywhere by using your computer or mobile. This system can be installed everywhere and it can also trigger some device when pollution goes beyond some level and we can send an alert message to the user.]

Table -1: Analysis Table

S.No	IoT Software Platform	Integration	Security
1.	IOT Analysis platform	Thing Worx APIs	Encryption of Link
2.	Amazon Web Services IoT platform	Representational state transfer Application program interface	Encryption of Link
3.	Bosch IoT Suite - MDM IoT Platform	Representational state transfer Application program interface	Unknown
4.	Ericsson Device Connection Platform	Representational state transfer Application program interface	Encryption of Link
5.	Appcelerator	Representational state transfer Application program interface	Encryption of Link

3. REQUIREMENTS

3.1 Hardware Requirements

3.1.1 Gas sensor MQ135

3.1.2 Arduino Uno

3.1.3 ESP8266 Wi-Fi module

3.1.4 LCD 16x2

3.1.5 Breadboard

3.1.6 Potentiometer 10K

3.1.7 Ohm resistors 1K

3.1.8 Ohm resistor 220

3.1.9 Buzzer

3.1.10 MQ 6 LPG gas sensor

3.1.11 Temperature sensor LM35

3.1.12 Humidity sensor SY-H5220

3.2 Software Requirements
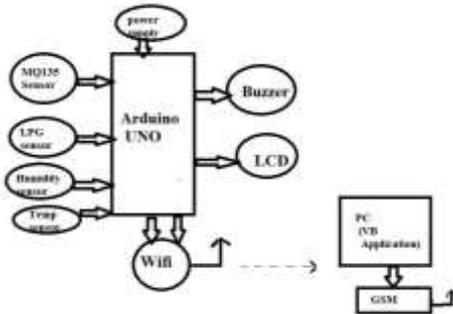
3.2.1 Arduino IDE

3. WORKING

Fig -1: Flow Diagram

We have introduced the Air Pollution Monitoring System which is on the basis of the block diagram which is shown in Fig.1.We recognized the data of air is by MQ135 gas sensor and MQ6 LPG gas sensor. The MQ135 sensor can sense NH3, NOx, alcohol, Benzene, smoke, carbon dioxide. That's why it is a dynamic gas sensor for IOT based Air pollution Monitoring system. When we connect Arduino and IOT based Air pollution Monitoring system then it senses all gases which are present in the air, and it gives the level of Pollution in ppm(parts per million). MQ135 gas sensor will give the output in the form of voltage levels and we have to convert it into PPM. So we have to convert the output in parts per million, we use a library for MQ135 gas sensor and MQ6 sensor. If Sensor will give the value of 90 then there is no gas present near it and the quality of air is safe which have safe level is 350 part per million and it should not above from 1000 part per million. When the limit goes above from 1000 part per million, it will cause Headaches, sleepiness and stagnant, stuffy air. If it goes above from 2000 part per million then it will cause an increment in heart rate and many types of various diseases. The LCD and webpage will display "Fresh Air" When the value will be less than 1000 part per million. If the value is going to be increased from 1000 part per million, then the buzzer will start beeping and the LCD and webpage will display "Poor Air, Open Windows". And when it will increase 2000, the buzzer will keep beeping and give an alert message on a smartphone through GSM. The Liquid crystal display (LCD) and the webpage will display "Terrific! Move to Fresh Air". It will contain temperature and humidity so it will possibly show the current temperature and humidity of the air. For temperature, we have used the LM35 sensor and for

humidity SY-HS-220. According to the model the 4 sensors work as input data, they transmit data for knowing which gas it is, what is the temperature and humidity. LCD and Buzzer are the output devices. LCD shows the data of the gases in ppm (parts per million) and Buzzer is used when ppm crosses above a threshold limit.

4. APPLICATIONS

4.1 Industrial perimeter monitoring.

It measures or monitors the air which is released by industry. The areas which are near to industries are in under highly polluted areas. So we have to fix a system which measures the pollution in the air and alert the people.

4.2 Indoor air quality monitoring.

In today's day outdoor is polluted too much we all know about it but our indoor is also polluted because we use different types of electronic gadgets which pollute our indoor too much. So we have to use this system indoor also and measures air humidity.

4.3 Site selection for reference monitoring stations.

We have to select some locations where we place our system and make a small office which gives alert messages to the people.

4.4 Making data available to users.

We have to do something through which we show data of pollution all the time to the users. If data is always available to people, so they can understand the danger of pollution.

5. CONCLUSIONS

The air of the environment is a monitor with the help of the system by using Arduino microcontroller, IoT Technology has introduced a system which improves the quality of air. Internet of Things is the technology which amplifies the monitoring process and various side of the environment such as air quality monitoring issue introduced in this paper. Here, we use two types of sensor which are MQ135 and MQ6 gas sensor gives the senses of different type of dangerous gas and harmful gas. Arduino is the main component of this project and the entire process is controlled by Arduino. Wi-Fi module is the hardware which connects the whole process to the internet and LCD is used for the visual Output. But there are some problems which we can't rectify in our paper, Firstly it requires high-speed internet connectivity and continuous power supply. That's why it works on those areas

where internet speed is good and power connectivity is also always present. But nowadays we are working on internet speed too much so we can overcome this problem easily. It is good to attempt because when we use this system everywhere because life is very important than luxurious life like we use costly cars and harmful electronic gadgets. We have to do something by which data is always available to users and then people feel how much air is polluted. Then they avoid such polluted things which are very necessary for today's era.

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