SYNOPSIS ON IOT Based Air Quality Monitoring System

SUBMITTED BY:ABHISHANK PANDEY **SUBMITTED TO:MR AMIR KHAN**

1.Introduction

As we know the level of the pollution has increased with times by lot of factors like the increase in the population,increased vehicle use,industrialization and urbanization which results in harmful effects on human wellbeing by directly affecting the health of population exposed to it.In order to monitor in this project we are going to make an IOT Based Air Quality Monitoring System in which we will monitor the air quality over a web server using internet and will trigger a alarm when the air quality goes beyond a certain level that means there are sufficient amount of harmful gases which are present in the pure air like C02,smoke,alcohol,benzene and ammonia(NH3).It will show the air quality in ppm(parts per million) on the LCD and as well as on webpage so that we can monitor it very easily.In this IOT project,we can monitor the air pollution level from anywhere using your computer or mobile. So it is necessary to monitor the air quality and keep it under control for a better future and healthy living for all.

2.Existing System

The commercial meters available in the market are Fluke CO220 carbon monoxide meter for CO, Amprobe CO2 meter for CO2, ForbixSemicon LPG gas leakage sensor alarm for LPG leakage detection. The researchers in this field have proposed various air quality monitoring systems based on WSN(Wireless Sensor Networks), GSM(Global System for mobile communications) and GIS(Geographic Information System). Now each technology has limited uses according to the intended function, as Zigbee is meant for users with Zigbee trans-receiver, Bluetooth. GIS based system is designed, implemented and tested to monitor the pinpoints of air pollution of any area. It consists of a microcontroller, gas sensors, mobile unit, a temporary memory buffer and a web server with internet connectivity which collects data from different locations along with coordinate's information at certain time of a day. The Global Positioning System (GPS) module is attached to a system to provide accurate representation of pollution sources in an area. The recorded data is periodically transferred to a computer through a General Packet Radio Service (GPRS) connection and then the data will be displayed on the dedicated website with user acceptance.The IoT based air pollution monitoring system can be produced by using sensors and microcontrollers present in the market.The microcontrollers are programmed to take the sensors as input and transmit the data to the cloud.An algorithm is developed to analyse the data and send it to the smartphones app.

Smartphone app will be developed for the user to access the air quality information in real time.Through this project,the potential impact around the worldwide globe can be improved upto some extent.There are many cities around the world which are facing air quality issues.The contaminated air results in death every year and decline in health conditions as people are exposed to unhealthy air quality.Awareness of the contaminated air enables the community and society to take precautionary steps. This will also enable the relevant authority to take the remedial actions.With this project both the community and society can enjoy cleaner air and improved health conditions.

3.Use of the Project

The use of this project is limited upto some extent only.Some of them are:

1.Industrial perimeter monitoring.

2.Indoor air quality monitoring.

3.Site selection for reference monitoring stations.

4.Making data available to users.

4.Idea of Project

The idea of my project is that to create a wireless distributed mobile air pollution monitoring system using General Packet Radio Service(GPRS) sensors.Since the smart air has been already developed based on the iot technology to efficiently monitor the air quality and transmit the data to a web server via LTE in real time.The device is composed of a microcontroller,pollutant detection sensor and a LTE modem. I am thinking about the new idea that we may display the information and graph levels of the pollutants present in the pure air about temperature ,humidity,various pollutants level such as methane,carbon dioxide ,alcohol level,liquified gases ,carbon monoxide level ,etc on both the cloud server called as thingspeak as well as on the television using hdmi cable,vga adapter.

Thus, Smart-Air was developed to collect accurate and reliable data for indoor air quality monitoring. Because the monitoring area is not constant, the device was designed to be easily customized to an environment by using an expandable interface. Thus, various types of sensors can be installed or adjusted based on the environment. Also, a Long-Term Evolution (LTE) modem is mounted in the device to transmit detected data directly to the web server for classifying and visualizing air quality. For most IoT platforms, gateway or data loggers are installed to gather and transmit data wirelessly to the web server. However, in this study, a microcontroller was installed in the device to gather the data from the sensors and transmit it to the web server using the LTE modem, eliminating the need for a gateway and a data logger.

5.Functional Specification

The functional specification of the project includes how the various IoT devices(components),sensors,bread-board etc. are connected i.e. circuit connection and the working of the project.So,here is the working of the project.

Working:

. The data of air is recognized by MQ135 gas sensor and MQ6 LPG gas sensor. The MQ135 sensor can sense NH3, NOx, alcohol, Benzene, smoke, CO2. So it is dynamic gas sensored for our Air pollution Monitoring system. When it will be connected to Arduino then it will sense all gases, and it will give the Pollution level in PPM (parts per million). MQ135 gas sensor will give the output in form of voltage levels and we have to convert it into PPM. So for converting the output in PPM, we have used a library for MQ135 gas sensor and MQ6 sensor.

Sensor is giving us value of 90 when there is no gas near it and the air quality safe level is 350 PPM and it should not exceed 1000 PPM. When it will exceed the limit of 1000 PPM, it will cause Headaches, sleepiness and stagnant, stuffy air. If it exceeds beyond 2000 PPM then it will cause increased heart rate and many different diseases. When the value will be less than 1000 PPM, then the LCD and webpage will display “Fresh Air”. When the value will increase from 1000 PPM, 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 smartphone through GSM. The LCD and webpage will display “Danger! 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 LM35 sensor and for humidity SY-HS-220 or DHT-11 sensor.For my easy purpose, I am using DHT-11 which is both a temperature as well as humidity sensor.

According to the model the 4 sensors works 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.

6.Hardware(Components) Requirements

1. MQ135 Gas sensor

2.Arduino Uno

3.Wi-Fi module ESP8266

4.16x2 LCD Display

5.Breadboard

6.Buzzer

7. 10K potentiometer

8.1K ohm resistors

9.220 ohm resistor

10.MQ 6 LPG gas sensor

11. Temperature & Humidity Sensor(DHT-11)

7.Software Requirements

1.Arduino UNO 1.6.13 Software

2.Embedded C programming Language

3.ThingSpeak cloud data server for displaying the output of the project.

8.Future Scope

Air pollution monitoring is an important application of Internet of Things. In this project, we propose an air pollution monitoring system using IoT. The main objective of this model is to monitor and analyze the air pollution from any location. The hardware setup of the proposed system is detailed very short briefly in this project. Real time deployment of the proposed model is to be carried out in the future. Maintenance of the equipment in all weather conditions, transmission of data effectively etc. are the challenges that need to be addressed furthermore in future.

In future the project can be upgraded in more ways than one:

1.Interface more number of sensors to know the detail content of all gases present in the air.

2.Design a web page and upload data on it with date and time.

3.Interface SD card to store data.

4.Interface GPS module to monitor the pollution at exact location & upload on the webpage for the netizens.