

IOT based Vehicle Pollution Monitoring System

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Guide

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Abstract: Internet of things is a system where we can connect smart devices with surrounding, now a day's one of major problem is global air pollution and major cause of global air pollution is harmful pollutant emitted by vehicles. Problem arises when the vehicle's emission exceeds standard limit. The actual cause for the violation of emission level is incomplete combustion of fuel. To overcome this problem a system is made which continuously monitors the emission level of individual vehicles. An IOT kit is made using gas sensors, controller and a wifi module. This kit can be physically mounted in exhaust system of every vehicle. Gas sensors connects data about vehicle emission and send it to the controller which transmit the data to cloud through wifi module. Web server is designed which keeps the data of each vehicle emission and only vehicle authority can access the data from website. So authorities can check the data to informed the vehicle owner. Hence this proposed system helps in reducing air pollution level.

Keywords: - Arduino uno, cloud, global air pollution, microcontroller, wifi module, sensors, emmission.

I INTRODUCTION

In The 21st century air pollution has become in india most major issue, and number one health concern. Around 90 percent of population are exposed to harmful level of air pollution. The major source of pollution from the past decade are from transport truck, diesel vehicle large number of two tire vehicles and cars causing maximum amount of pollution.

Hence and idea suggested in this paper will be helpful for minimize the amout the pollution in air which is caused by vehicles.

II LITERATURE REVIEW

In Area where most number of vehicles, air pollution has a very harmful for humans and environment too. Issues relating to environment are growing quickly in India. Kolkata, Delhi and Mumbai are few cities where the air quality reducing day by day. Extensive number of projects in the literature that utilizes very low cost air pollution sensing devices. We have

studied,

Zheng et al [9] it presents the system for cloud. This is helpful for calculating real time air quality data. At different geo locations stations from there data can be collected to monitor. For predicting the pollution level of whole route and to alert if vehicle crosses the limit.

Reshiet et al. [10] To design wireless sensor network platform, known as Veh node it helps automobiles and have capacity for monitoring pollutant level in smoke which is emitted by vehicles.

The first emission norms for petrol and diesel were introduced in 1991 and 1992 respectively. From October 2010 Bharat Stage 3 norms are enforced in country. Since April 2010 in 13 cities where making of catalytic converter for petrol and diesel vehicle.

A. WSN

It is a wireless technology where sensor nodes are organized for gathering data. WSN's have limited memory and computation power. At remote location, these are used to monitor minimum frequency data. In location which is given the sensor network layout is placed to recognize all the gases which are combined to produce pollution. In this paper carbon dioxide, carbon monoxide and methane gases are considered as main parameters for air quality which are most harmful. WSN would be minimal for its expenses, unlike the general wired framework.

B. IOT

The Internet of Things is a system where interrelated computing devices, mechanical and digital machines, objects or people are provided with unique identifiers and allows data transfer over a network. In this paper we have used four kinds of things:

1. Arduino UNO Controller
- 2.ESP8266-01S 'Wifi module'
- 3.Cloud Service 'Thingspeak'
- 4.Gas sensors

IOT model is composed of three layers which are application, network and sensor layers. The data can be attained from the real world in the sensor layer. The sensor layer continuously sends the data to the network layer. Application layer provide service to the investigate the data which is received the both of previous layers.

C. ThingSpeaks-cloud service

In this paper, ThingSpeaks is cloud service which is used for capturing and processing sensor data. Two things are needed, to publish sensor data on the internet: 1.A place to access and store data. 2.Way of communication with it.

D. Wi-Fi

Wi-Fi stands for wireless fidelity. It belongs to family of wireless

networking technologies. It is used to create local area network (LAN) for internet access. It has high data transfer speed of about 1 GegaByte p/s. Its network connection range is about 150 meters. There are many versions of Wi-Fi as per IEEE 802.11 protocol standards, having different radio technologies. In this paper we are using ESP 8266-01S for creating LAN Wi-Fi for sending the data from controller to the cloud for data interpretation.

III PROBLEM STATEMENT

AIM: To Create a compact vehicle pollutant detection device that could be mounted on the vehicle itself.

To Track vehicles that cause emissions above a given threshold by connecting the global system of mobile communications network to the cloud.

OBJECTIVES - To Monitor air pollution on roads.

To Track vehicles which causes a pollution over a specified limit

IV PROPOSED SYSTEM

A. Architecture

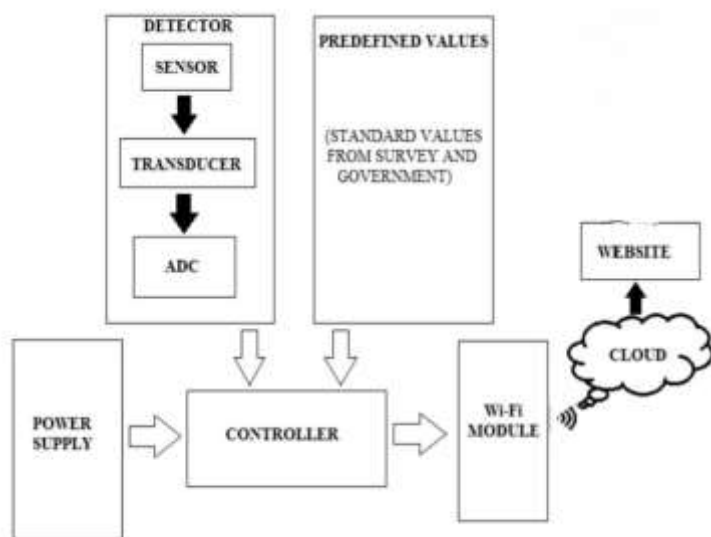


Fig.1 Block diagram of the system.

IOT- Kit is designed and used to monitor the air pollutant emission of individual vehicles. The system design of the air pollution monitoring system consist two main phases:

Phase 1- To detect the concentration of major air pollutants of vehicle emission through sensors. Detector detects the smoke sensor, transducer and ADC are three sub-blocks in the detector block. Main component is smoke sensor block of the detector block which is embedded on to the exhaust of the vehicle. The ADC converts the digital signal into analog electrical signal. In this paper smoke sensor MQ-2 which measure CO, CO₂, SO₂, NO_x, and lead concentration is considered. Gas sensor MQ7 which measure carbon monoxide. To measure NH₃, Benzene, Alcohol, CO₂, NO_x sensor MQ135 is used.

PHASE 2 Storing the data on cloud with help of internet. The following approach is used to store and process data in ThingSpeak cloud service platform.

1. Create a new account and login on the site “ThingSpeak.com”.

2. Add a variable to a data source it will hold the value collected and published by ESP8266-01S wifi module.

3. Copy the variable id value so that latter it can be substituted in Arduino code.

4. Generate an authentication token for a security which prevents former user from posting data to the users’ variable.

V. IMPLEMENTATION AND RESULT

An IOT kit is designed which contains number of gas sensors like MQ-2, MQ-7, MQ-135 and a controller ESP 8266-01S. The IOT kit is designed by following steps:

1. Kit is placed in exhaust system all sensors are interfaced with controller to measure pollutant gases emitted by the vehicle. The idea is to place the kit inside the exhaust system of the vehicle at the time of vehicle manufacture.

2. To measure value of pollutant gases emitted by the exhaust system of the vehicle recorded by the controller.

3. Value recorded by the controller is then uploaded to the cloud using HTTP protocol.

4. The value is recorded on the cloud and the recorded value is then converted into graph and threshold value is set. If the pollutant emitted by the vehicle exhaust is above the set threshold the then the graph crosses the threshold limit and indicates that vehicle emission has exceeded the standard threshold level.

VI CONCLUSION

Global air pollution in earlier era was considered to be negligible. Currently air pollution has become a major concern. Main causes of air pollution are industries and vehicles used in transportation. Hence it is need to be reduced to protect the environment from harmful effects of air pollution. Hence an IoT-Kit is designed which helps to detect, monitor and test air pollutant emitted by individual vehicles. The IoT-Kit is integrated with exhaust system of all vehicles. The kit is integrated with different gas sensors which detect harmful pollutant emitted by vehicles. Data generated about vehicles pollutant emission is stored on the cloud. Graph plotting of vehicle emission is also done using the collected data and if the vehicles emission crosses the standard threshold set value a notification is generated. This system is helpful for the transportation authority i.e. RTO to detect and take legal action against the defaulter vehicle. Thereby helps to reduce the air pollution by controlling the harmful air pollutant emission emitted by the vehicles.

VII FUTURE SCOPE

System will display the efficiency of the vehicle in terms of fuel consumption. Alert message can be sent to the user of the vehicle. This system can be connected to the ignition system, which will prevent the vehicle from starting after the certain time period of expired PUC.

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