



# VEHICLE POLLUTION MONITORING SYSTEM USING IOT

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**Abstract:** Degradation of air quality in cities is the result of a complex interaction between natural and anthropogenic environmental conditions. With the increase in urbanization and industrialization and due to poor control on emissions and little use of catalytic converters, great amount of particulate and toxic gases are produced. The objective of this paper is to monitor air pollution on roads and track vehicles which cause pollution over a specified limit. Increasing number of automobiles is a serious problem that has been around for a very long time. This paper proposes use of Internet of Things (IoT) to address this problem. Here, combination of Wireless Sensor Network and Electrochemical Toxic Gas Sensors and the use of a Radio Frequency Identification (RFID) tagging system to monitor car pollution records anytime anywhere.

## 1.INTRODUCTION

This project is based on the problem that society is facing nowadays about air pollution. Pollution continues to be a significant issue for our environment. The pollutants from vehicles can impact the atmosphere in a variety of ways. This project suggests a valuable route for sensing engine emissions, particularly CO gas emissions. This involves Gas sensor to identify Motor Vehicle Pollution. This helps to track the data in real time and with low costs. The vehicle owner can identify the emission level easily in advance. We are planning to use the database to store the data and to read the data at any time. The aim of this system is to create a compact vehicle pollutant detection tool that could be mounted on the vehicle itself and to reduce the CO emission in the atmosphere. The smoke ratio emitted from the vehicle is monitored by sensors, and the data can be stored on database.

This project is specially designed to operate the system using a sensor network and gather the information about pollutant levels discharged by the vehicles. We used IoT technology that is rapidly increasing in today's scenario. IoT is used in all sectors nowadays. With the help of this technology, human intervention can be used. The quality of air in all over world degrading using large amount of vehicles [e.g. motor, buses, cars etc.] Due to air pollution from vehicle pollution increases rapidly which causes diseases and trigger, asthma attacks, cancer etc. The main consequence of air pollution are global warming, acid rain, smog, ozone depletion etc. Environmental degradation has increased over the last several decades. Vehicular emissions rapid industrialization and urbanization are the main sources of air pollution. So it is necessary to design pollution monitoring unit.

Monitoring and controlling air quality is most important for healthy life. So we have designed a system which monitors vehicle's pollution. For that we are using IoT technique. IoT (Internet of Things) is an emerging technology in IT and Embedded system. We have used our system in vehicles. When a pollution gets detected by system and if the pollution level is greater than threshold level warns to owner of vehicle. Using IoT Technology, this project aims to monitor and alert air pollution on roads and to track vehicles that cause emissions above a given threshold by connecting the Global System of Mobile Communications Network to the cloud. This also concentrates on avoiding the accidents caused by vehicle generated carbon monoxide gas using MQ7 Gas sensor.

Individual vehicle pollution monitoring in today's practice is not available. Our system collects information about the hardware and software that are used to create this system. We are going to monitor MQ7, MQ2 gas sensors is used to measure the carbon dioxide and carbon monoxide concentration. The sensors send data to microcontroller and microcontroller sends the data onto the Wi-Fi module on the data base that is connected with the internet. Also we are going to use RFID technology for detection purpose. In this proposed system EM-18RFID reader and RFID card is used .RFID card is inserted to vehicles .RFID reader detects RFID card and sends the data to microcontroller. By making use of Arduino that provides controls to the sensors by using HTML & PHP programming language. And the main thing is the user interface is good by providing & giving appropriate information through IOT.

## 2. LITERATURE SURVEY

**G.Arun Francis et.al**<sup>[1]</sup> : An increase in automobile vehicle leads to an increase in air pollution since automobiles are the main source of environmental pollution. The smoke emitted from the vehicle consists of gases like nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), and hydrocarbon (HC). Approximately one-half of the nitrogen oxide gases, carbon monoxide and one-fourth of hydrocarbon gases in our environment are emitted from automobile vehicles, which leads to global warming. Due to poor vehicle maintenance and ignition defect. The gases emitted from the exhaust may increase. In order to reduce environmental pollution and to increase vehicles life, we can use this system. When the rate of gases emitted from the vehicle exceeds the threshold limit set by the government, our system will alert to the user through LCD. Using IOT, the emission level is also displayed and stored in the database of a vehicle owner. When the vehicle owner ignores it, the report will send to the transport office with entire details. The entire system is controlled by Node MCU microcontroller. Keywords: smoke, IoT, gas sensor, LCD, Node MCU.

**Souvik Manna**<sup>[2]</sup> : Degradation of air quality in cities is the result of a complex interaction between natural and anthropogenic environmental conditions. With the increase in urbanization and industrialization and due to poor control on emissions and little use of catalytic converters, a great amount of particulate and toxic gases are produced 111. The objective of this paper is to monitor air pollution on roads and track vehicles which cause pollution over a specified limit. Increasing number of automobiles is a serious problem that has been around for a very long time. This paper proposes use of Internet of Things (IoT) [2] to address this problem. Here, combination of Wireless Sensor Network and Electrochemical Toxic Gas Sensors and the use of a Radio Frequency Identification (RFID) tagging system to monitor car pollution records anytime anywhere. Keywords-Iot; WS; Arduino; RFID; Gas Sensor.

**Joseph Mathew Skaria Maliyekal**<sup>[3]</sup>: pollution is an ever-sustaining environmental issue in today's world. Automobile emission being the major contributor to pollution, this system can be considered as a control measure. This system focusses on developing a vehicular pollution monitoring system based on the Internet of Things (IoT). The amount of pollution emitted by the vehicles can be measured with the help of sensors interfaced to Arduino. If the sensed value goes beyond the threshold value set in the program, then automatically an alert message as a warning will be sent to the vehicle owner two or three times and if they are reluctant to correct it, the message will be forwarded to the authorities. These data are finally stored in a cloud for future analysis. The main objective is to develop an innovative and time-saving system, thereby proposing a solution for environmental pollution.

**Suvitha Vani P**<sup>[4]</sup>: the environmental concerns are on the rise these days. Car, bus, and truck air pollutants can worsen respiratory diseases and cause asthma attacks. Transportation is responsible for airborne carbon monoxide at more than 50 per cent. At present, the emissions of the vehicle is checked with the aid of pollution control stations built in some cities only when the fitness certificate (FC) is obtained from the RTO office. In case of private cars, the health certificates are valid for 15 years and every 5 years thereafter. In case of Transport Vehicles, the fitness certificate is given for a new vehicle for 2 years and then extended each year. Under this process, we cannot detect emissions caused if the vehicle has been repaired until FC. Using IoT Technology, this project aims to monitor and alert air pollution on roads and to track vehicles that cause emissions above a given threshold by connecting the Global System of Mobile Communications Newton to the cloud. This also concentrates on avoiding the accidents caused by vehicle generated carbon monoxide gas using MQ7 Gas sensor. Keywords: CO, GSM, MQ7 Gas Sensor.

## 3. Block Diagram

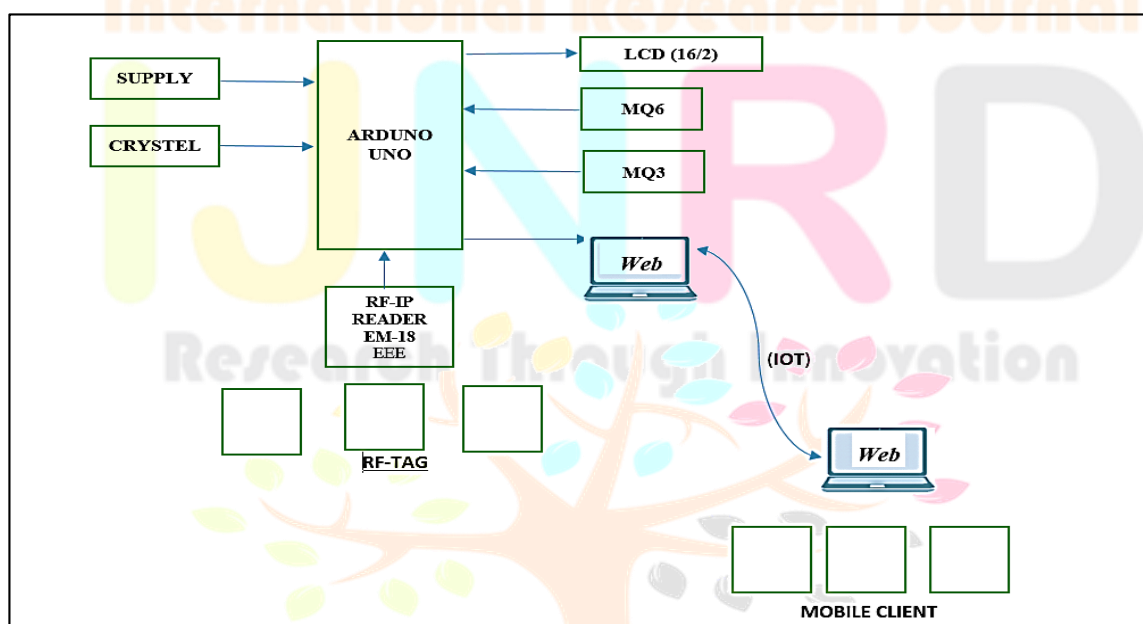


Figure 1: Block Diagram

In most of our electronic products or project we need a power supply for converting mains AC voltage to a regulated DC voltage. For making a power supply designing of each component is essential. He discusses the designing of regulated 5V power supply.



## 5.2: Arduino and LCD interfacing and serial output:

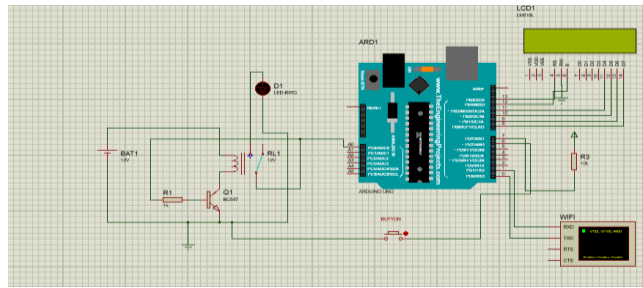


Figure 4: Arduino and LCD Interfacing and Serial Output.

The project operations depend on Arduino UNO i.e., AVR microcontroller. The Arduino UNO is ATmega328P IC of 28 pins have 13 i/o ports and one serial VART for communication. Project simulation have LCD interfacing with four Data lines and two control signals RS and Enable. The 16/2 LCD must be sending some initialization commands that are used to send by header files included to code. Serial communication is established by TXD and RXD lines. The baud rate 9600 is set by serial begin (9600) function in code. Serial communication is used to communicate Wi-Fi (ESP 8266) module.

## 5. 3: Code I/P from compiler:

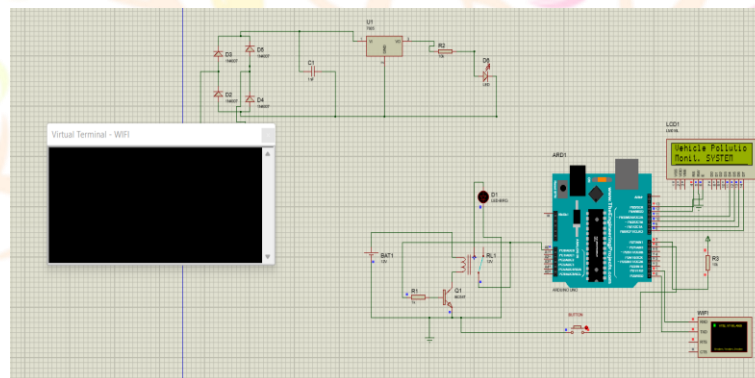


Figure 5: Code I/P from compiler

The code is dumped into IC by header file i.e., by compiled by Arduino UNO compiler. The proteus simulator can have options to run simulation after code insertion. After run option click, we can see display messages and serial data output.

## 5.4: Run option O/p:

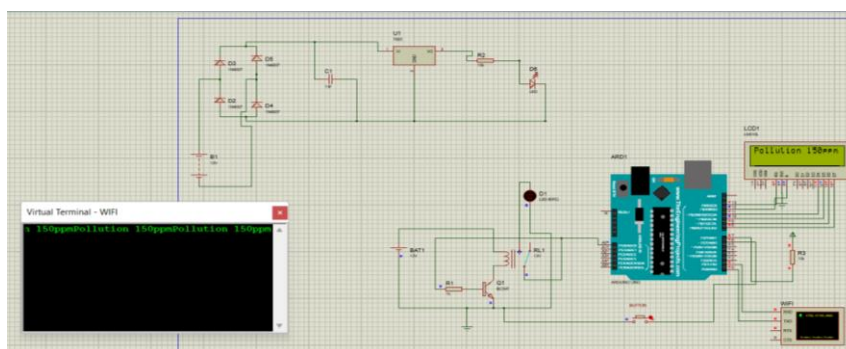


Figure 6: Run option o/p

## 6. Result Table

Sr. No.	CASE	RESULTS
1.	Circuit Design and Serial O/P	5V O/P.
2.	Arduino and LCD interfacing	Program fetch.
3.	Run option from I/P	Project Display.
4.	Run option I/P	Serial (Black window) O/P.

Table No. 1: Case and Results

## 7. CONCLUSION

The system to monitor the air of environment using Arduino microcontroller, IOT Technology is proposed to improve quality of air. With the use of IOT technology enhances the process of monitoring various aspects of environment such as air quality monitoring issue proposed in this paper. Here, using the MQ3 and MQ6 gas sensor gives the sense of different type of dangerous gas and arduino is the heart of this project. Which control the entire process. Wi-Fi module connects the whole process to internet and LCD is used for the visual Output.

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