

IOT based Air quality monitoring system

**A Report Submitted In Partial Fulfilment of the Requirements for the Degree
of**

**BACHELOR OF ENGINEERING
in
Information and Communication Technology**

by

191310132076: Samarth Motka

191310132077: Krish Nasit

191310132101: Nirav Patel

191310132118: Yug Raithatha

to

Dr. Mani Shekhar Gupta

Adani Institute of Infrastructure Engineering



to the

Faculty of Information and Communication Technology

**ADANI INSTITUTE OF INFRASTRUCTURE ENGINEERING
AHMEDABAD, GUJARAT**

November 18, 2022

CERTIFICATE

This is to certify that Samarth Motka (191310132076), Krish Nasit (191310132077), Nirav Patel (191310132101), & Yug Raithatha (191310132118) has carried out his project work presented in this report entitled “**IOT based Air quality monitoring system**” for the award of the Bachelor of Engineering from Adani Institute of Infrastructure Engineering, Ahmedabad, Gujarat, under my supervision. The report embodies result of original work and studies are carried out by student himself and the contents of the report do not form the basis for the award of any other degree to the candidate or to anybody else.

Date:

18/11/2022

PROJECT SUPERVISOR

Dr. Mani Shekhar Gupta
Dept. of ICT
AIIE, Ahmedabad, Gujarat

DECLARATION

We hereby declare that this submission is our own work and that to the best of our knowledge and belief. It contains no material publish or written by any other neither person nor material Which to a substantial extent has been accepted for the award of any Degree or diploma of the university or other institute of higher learning, except Where due to acknowledgment has been made in the text.

Signature

Samarth Motka

(191310132076)

Signature

Krish Nasit

(191310132077)

Signature

Nirav Patel

(1913101320101)

Signature

Yug Raithatha

(191310132118)

Introduction

Air pollution is the biggest problem of every nation, whether it is developed or developing. Health problems have been growing at faster rate especially in urban areas of developing countries where industrialization and growing number of vehicles leads to release of lot of gaseous pollutants. Harmful effects of pollution include mild allergic reactions such as irritation of the throat, eyes and nose as well as some serious problems like bronchitis, heart diseases, pneumonia, lung and aggravated asthma. According to a survey, due to air pollution 50,000 to 100,000 premature deaths per year occur in the U.S. alone. Whereas in EU number reaches to 300,000 and over 3,000,000 worldwide. IOT Based Air Pollution Monitoring System monitors the Air quality over a web server(Blynk) using Internet and will give us the reading on a mobile application dashboard, means there are sufficient amount of harmful gases present in the air like CO₂, smoke, alcohol, benzene, NH₃, LPG and NO_x. It will show the air quality in PPM on the LCD and as well as on webpage so that it can monitor it very easily. LPG sensor is added in this system which is used mostly in houses. The system can be installed anywhere but mostly in industries and houses where gases are mostly to be found and gives an alert message when the system crosses threshold limit.

Hardware Requirements :

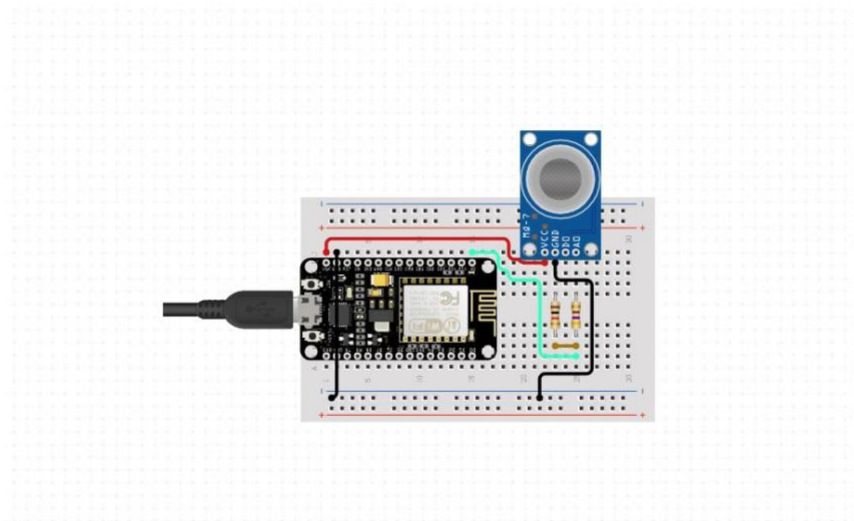
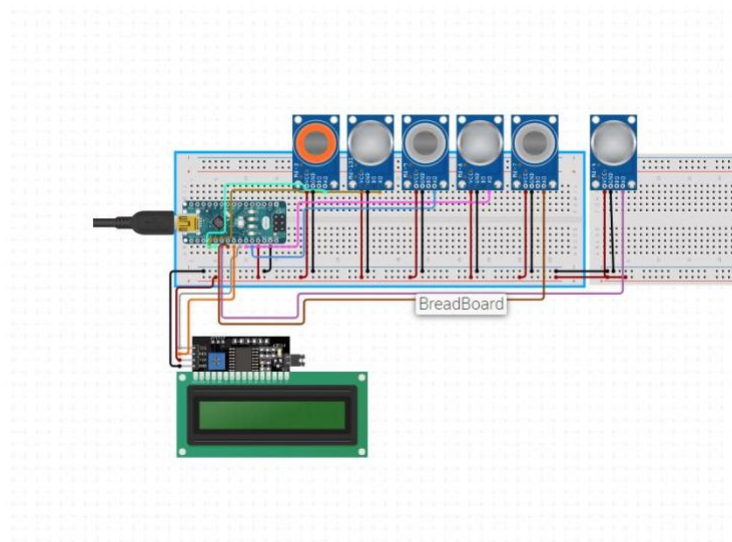
- Arduino Nano
- Node MCU ESP8266
- MQ Gas Sensor
- LCD display (16x2) I2C
- Breadboard

Software Requirements :

- Tinkercad
- Arduino IDE(1.8.0)

Proposed System

The Internet of Things (IoT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers. This model requires microcontroller and gas sensors. The final project model will take a form of portable device for and also gives info over mobile app and offline on an inbuild display. This device need to be mounted over vehicles for monitoring wide area and providing a real time data. The model is using the 16X2 I2C display interfacing with microcontroller for directly displaying the monitored data, also helps to replace bulky and costly displays.



Working

Data from sensors is uploaded in cloud and mobile as well as web dashboards showcases the data visualizations which are easy for users to understand.



Aims And objective

The level of pollution is increasing rapidly due to factors like industries, urbanization, increasing in population, vehicle use which can affect human health. IOT Based Air Pollution Monitoring System is used to monitor the Air Quality over a web server using Internet. It will trigger an alarm when the air quality goes down beyond a certain level, means when there are sufficient amount of harmful gases present in the air like CO₂, smoke, alcohol, benzene, NH₃ and NO_x. It

will show the air quality in PPM on the LCD display and as well as on webpage so that air pollution can be monitored very easily.

Feasibility Study

Applications :

- 1) Industrial perimeter monitoring
- 2) Indoor air quality monitoring.
- 3) Site selection for reference monitoring stations.
- 4) Making data available to users.

Advantages:- 1)

Easy to Install

- 2) Updates On mobile phone directly
- 3) Accurate Pollution monitoring
- 4) Remote location monitoring

Drawbacks of existing systems :

The drawbacks of the conventional monitoring instruments are their large size, heavy weight 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 air pollution situation in urban areas is highly related to human activities (e.g. construction activities) and location-dependent (e.g., the traffic choke-points have much worse air quality than average). IOT Based Air Pollution Monitoring System monitors the Air Quality over a webserver using internet and will trigger an alarm when the air quality goes down beyond a certain level, means when there are amount of harmful gases present in the air like CO₂, smoke, alcohol, benzene, NH₃, NO_x and LPG. The system will show the air quality in PPM on the LCD and as well as on webpage so that it can be monitored very easily.

- 1) Internet: It passes information only one device.
- 2) GSM: When signals drops it passes information slowly.
- 3) Zigbee: We need more than one zigbee as its used in mesh connections. It is not a cost effective solution.

Methodology/ Planning of work

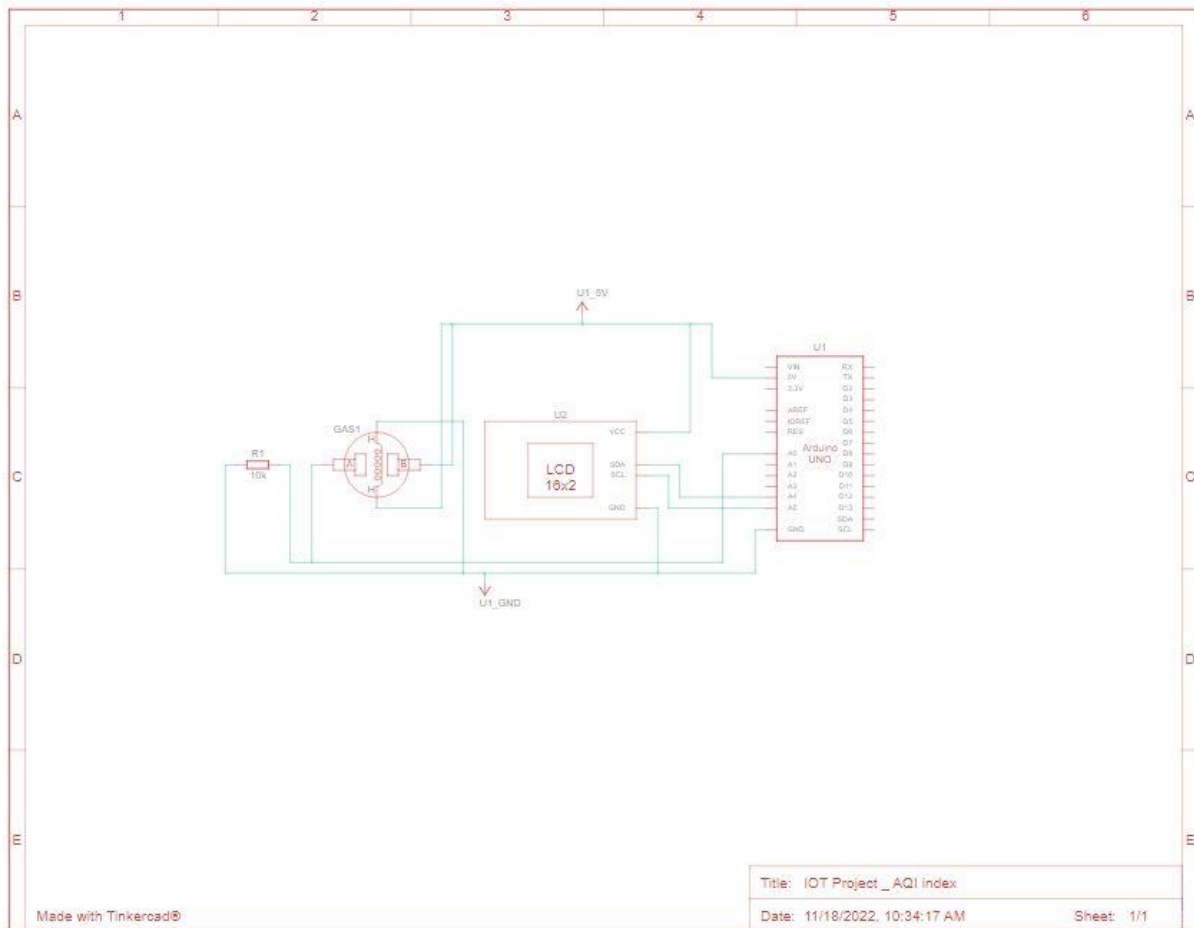
The sensors are used to sense the current status in the air. The sensors are connected to the controller. The controller receives the value and converts into digital form and those values are updated in the web server through WSN (Wireless Sensor Network). The default values are already stored in the web server. The current data will be compared with the default values to analyze the result. The pollution status will be uploaded in the web server. So, the user can view

anywhere through internet. When there is an pollution that occurs this shows the total amount of gases which is present on the particular locality example CFC (chlorofluorocarbon) carbonmonoxide and many toxic gases can identified by the amount of percentage which is present on it. The main working principle behind this is IOT which collects information from the cloud which consists of information about the pollution status which is present in our environment. The microcontroller which is used in this device is that Arduino microcontroller which consists of 6 outputs and 6 inputs so that many sensors can be clubbed together which totally sums up together as an pollution detector and monitoring using an IOT device.

The sensor used for measing the concentration of a gas are:

- MQ-3 - Alcohol, Ethanol, smoke
- MQ-4 - Methane, CNG Gas
- MQ-7 - Carbon Monoxide
- MQ-8 - Hydrogen Gas
- MQ-9 - Carbon Monoxide, flammable gasses
- MQ135 - Air Quality (CO, Ammonia, Benzene, Alcohol, smoke)

System Architecture



Specifications

Applications, drawbacks of the existing system & advantages of this system:-
Yug Raithatha (191310132118) & Krish Nasit (191310132077)

Setup of working model in Tinkercad:-
Samarth Motka (191310132076) & Nirav Patel (191310132101)

References

- [1] https://create.arduino.cc/projecthub/abid_hossain/air-analyzer-using-almost-all-kinds-of-mq-sensors-01c2a4
- [2] <https://www.tinkercad.com/>
- [3] <https://www.arduino.cc/>
- [4] https://www.electronicscomp.com/?gclid=Cj0KCQiA1NebBhDDARIsAANiDD1ulc1bjf8_ZlnNebb78jqUli2by-S-K7iCh78IyXEdaK1C83O6VMaAqLxEALw_wcB