# IOT Based Air Quality Pollution Monitoring System

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***Abstract-*** *Now a day's, air pollution is a severe problem and it affects every organism. Due to the air pollution many people suffer from various diseases like respiratory diseases, heart diseases etc. In this paper, we develop air quality monitoring system which is based on the Internet of Things (IoT). The system measures concentration of carbon monoxide (CO), carbon dioxide (CO2) and ammonia (NH3) with the help of MQ-7 and MQ-135 sensors respectively. The collected data is display on TFT LCD display and it can be also accessible through Android Application.*

***Keywords***- MQ-7, MQ-135,ThingSpeak, ESP8266

## I. INTRODUCTION

Air pollution is a major concern for several countries. Because of air pollution, humans, plants, animals and also marine life is adversely affected. Also various health problems arises. So it is quite necessary to constantly monitor the concentration of various gases in the atmosphere.

In india, government agencies provided air quality information to aware the public. The National Air Quality Index (AQI) was launched on September 17, 2014 under the Swachh Bharat Abhiyan in New Delhi.

| AQI Category (Range) | $PM_{10}$ 24-hr | $PM_{2.5}$ 24-hr | $NO_2$ 24-hr | $O_3$ 8-hr | CO 8-hr ($mg/m^3$) | $SO_2$ 24-hr | $NH_3$ 24-hr | Pb 24-hr |
|---|---|---|---|---|---|---|---|---|
| Good (0-50) | 0-50 | 0-30 | 0-40 | 0-50 | 0-1.0 | 0-40 | 0-200 | 0-0.5 |
| Satisfactory (51-100) | 51-100 | 31-60 | 41-80 | 51-100 | 1.1-2.0 | 41-80 | 201-400 | 0.6 -1.0 |
| Moderate (101-200) | 101-250 | 61-90 | 81-180 | 101-168 | 2.1- 10 | 81-380 | 401-800 | 1.1-2.0 |
| Poor (201-300) | 251-350 | 91-120 | 181-280 | 169-208 | 10.1-17 | 381-800 | 801-1200 | 2.1-3.0 |
| Very poor (301-400) | 351-430 | 121-250 | 281-400 | 209-748* | 17.1-34 | 801-1600 | 1201-1800 | 3.1-3.5 |
| Severe (401-500) | 430 + | 250+ | 400+ | 748+* | 34+ | 1600+ | 1800+ | 3.5+ |

Fig.1.AirQualityIndex

## II. SYSTEM ARCHEITECTURE

*A. Hardware Description*

The Arduino Uno is an open source microcontroller board which based on the ATmega328P. The software or Integrated Development Environment (IDE Arduino) is used to program. the microcontroller. Arduino Uno is inexpensive, easy to handle and consumes less power. The ESP8266 is a low cost Wi-Fi module and it allow any microcontroller to connect to the Internet through a Wi-Fi connection. MQ-7 gas sensor measure the concentration of carbon monoxide (CO) in the atmosphere and gives both analog and digital output. This sensor can measure the concentration from 10 ppm to 1000 ppm. MQ-7 sensor operates in temperature between -10 to 50 degree celcius. MQ-135 detects the various gases like Benzene (C6H6), Sulphur (S), Ammonia (NH3), Carbon dioxide (CO2) and Smoke. It requires some preheating and it is quite inexpensive.

*B. Software Description*

ThingSpeak is a web platform that enables any user to store and analyze live data in the cloud. The Android Application is created in a such way that it fetches the real time data from the ThingSpeak platform with the help of API. The app display measured readings of parameters in a chart format.

## III. METHODOLOGY

The schematic block diagram of the proposed system is shown in Fig. 2. The Arduino uno is interfaced with the two sensors such as MQ-7 that measures carbon monoxide (CO) in air and MQ-135 that measures the carbon dioxide (CO2) and ammonia (NH3) concentration in the surrounding. It also interfaced with the ESP8266. The Arduino uno has been programmed to simultaneously send the measured sensor values to ThingSpeak through Wi-Fi module.

The ThingSpeak is an open cloud platform on which data stored and it also used to plot graphs, charts, create plugins etc. All the gathered data is then displayed on the TFT LCD display. This information not only shown on LCD display but it can also be accessed through the android application. The app is designed in such a way that it fetches the data in real-time from the ThingSpeak platform with the help of API

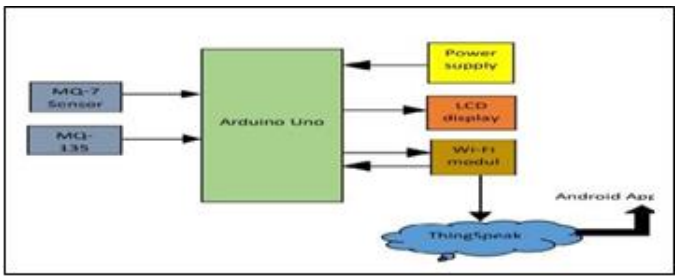


Fig 2. Block Diagram of Proposed System

## IV. FLOWCHART AND ALGORITHM

A. Flowchart

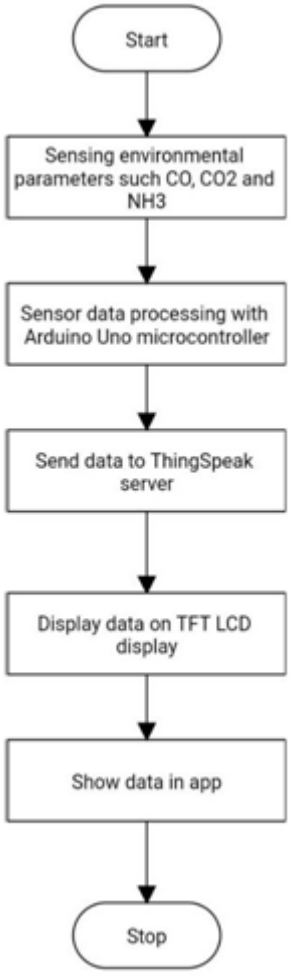


Fig.3.FlowChartof Working Model

*B. Algorithm*

1) Start
2) Sensors senses the environmental parameters
3) Sensor data processing with Arduino Uno Microcontroller
4) Transmit data to ThingSpeak using Wi-Fi module
5) Display data on TFT LCD display
6) User side android application display current status of environmental parameters
7) Stop

## IV.CONCLUSION

The proposed work present air quality pollution monitoring system using Internet of Things (IoT). The system uses two sensors to detect the concentration of gases and transmit this collected data to microcontroller. Then the data send to the ThingSpeak with the help of Wi- Fi module and display on LCD screen and also in app. The present system is small, cost-effective and consumes less power.

## REFERENCES

[1] Temesegan Walelign Ayele, Rutvik Mehta, "Air pollution monitoring and prediction using IoT," IEEE 2018.
[2] Yash Mehta, Manohara Pai M.M., Sanoop Mallissery, Shwtanshu Singh, "Cloud enabled Air Quality Detection, Analysis and Prediction- A Smart City Application for Smart Health," IEEE 2016
[3] Iqra Javid, Sushant Bakshi, Aparna Mishra, Rashmi Priyadarshini, "Air Pollution Monitoring System using IoT," IJEAT Journal Volume-9, Issue-2, December 2019.
[4] Somansh Kumar, Ashish Jasuja, "Air Quality Monitoring System Based on IoT Using Raspberry pi," International Conference on Computing, Communication and Automation, pp.1341-1346, IEEE 2017.
[5] Givovanni B. Fioccola, Raffaele Sommese, Imma Tufano, Roberto Canonico, Giorgio Ventre, "Pollunio: An Efficient Cloud-based Management of IoT Devices for Air Quality Monitoring," 2016 IEEE 2nd International Forum on Research and Technologies for Society and Industry Leveraging a better tomorrow.
[6] Ajitesh Kumar, Mona Kumari, Harsh Gupta, "Design and Analysis of IoT based Air Quality Monitoring System," International Conference on Power Electronics and IoT Applications in Renewable Energy and its Control, IEEE 2020.
[7] Ramik Rawal, "Air Quality Monitoring System," IJCSE, Volume-9, no. 1, pp.1-9, 2019.
[8] Yashvin Munsadwala, Pankti Joshi, Pranav Patel, Keyur Raja, "Identification and Visualization of Hazardous Gases Using IoT," IEEE 2019.
[9] Gagan Parmar, Sagar Lakhani, Manju K. Chattopadhyay, "An IoT Based Low Cost Air Pollution Monitoring System," Proceeding International conference on Recent Innovations in Signal Processing and Embedded System (RISE), pp.524-528, October 2017.
[10] Ajay Chaturvedi, Laxmi Shrivastava, "IoT Based Wireless Sensor Network for Air Pollution Monitoring,"

9th IEEE International Conference on Communication Systems and Network Technologies, pp.78-81, 2020.