



Air Pollution Monitoring System

Prof. Vaishali R. Surjuse¹, Ms. Achal S. Tidke², Ms. Prachi S. Gedam³, Mr. Harshad R. Choudhari⁴,
Mr. Harshal S. Raut

Third Year Department of Computer Science & Engineering

¹²³⁴⁵ Department of Computer Science & Engineering,

¹²³⁴⁵ KDK College of Engineering Nagpur University in Nagpur, Maharashtra, India.

Abstract : Poor air quality is one of the leading public health concerns in both developed & developing countries. Poor air quality is estimated to be responsible for nearly 2,500,000 premature deaths worldwide every year. We live in a world where technological advancements are constantly being made. We should make the most of these advancements to reap the benefits. Technology has many useful features to keep our environment healthy. This innovation focuses on providing IoT-enabled air pollution meters with a digital dashboard on our smartphones. This allows us to have an up-to-date view of the air quality in our immediate surroundings. According to research, poor air quality could be a major health risk for more than half the world's population. Poor air quality has been linked to industrialisation, and the social health problems caused by poor air pollution disproportionately affect both developed & developing nations. To improve air quality, corrective action is needed. Remedial action to improve air quality is often easy to implement once airborne pollutants have been detected

IndexTerms - IoT, Air Pollution, automated system, Digital Dashboard , NodeMCU, esp8266, microcontroller.

I. INTRODUCTION

Air dirtiness is individual of the grown threats to the-era surroundings. Everyone is being distressed by air pollution continually containing persons, mammals, crops, capitals, forests and floating environments. Besides that, it bear be regulated at a certain level for fear that the growing rate of all-encompassing thawing. This project aims to design an IOT-located air pollution listening whole utilizing the cyberspace from anywhere utilizing a calculating or movable to monitor the air kind of the environment and environment. There are differing patterns and means free for the measurement and listening condition of air.

The IoT-located air dirtiness listening method would not only help us to monitor the air quality but further within financial means transmit alert signals at any time the air value deteriorates and loses further the level. In this system, NodeMCU plays the main ruling act. It has happened prioritize in theory, aforementioned that, it senses the auditory signals from the sensors and shows the character level via experienced signs. Besides the injurious smoke (to a degree CO₂, CO, fume, etc) hotness and moisture can be listened through the hotness and moisture sensor by this plan. Sensor reactions are augment to the NodeMCU that displays the listened data in the ThingSpeak cloud that maybe handled for resolving the air condition of that district. The following natural diagram or graph (as shown in Fig. displays the occupied method of the IoT-located Air Pollution Monitoring System.

To overcome this question, projected work is individual progress towards the atmosphere and pollution levels about the production commerces needs expected listened capably, dependably and correctly. By listening harmful smoke present about manufacturing it likewise checks extreme contamination rate and equate it accompanying standard levels and when kind goes down further the level it sends announcement to human that it's not cautious. Existing System only uses arduino boss, two sensors MQ6 and MQ135. . Due to expeditious incident in science, the incident material for little and low cost sensors enhanced technically and economically possible. Particular consideration is likely to determinants that can influence human strength and the fitness of the natural method. The main objective of IOT Air dirtiness MonitoringSystem search out monitor dirtiness levels, that is to say big issue presently. It's essential to watch air condition and keep it quiet for a far better future and healthful living for all. Due to adaptability and cheap Internet of belongings (IoT) is catching common continually.

II. LITERATURE SURVEY

The literature survey for the Air Pollution Monitoring System reveals a number of related works and technologies.

1] **Monika Singh Et al. in August 2019 projected an Air Pollution Monitoring System.** This whole uses an Arduino microcontroller belonging to MQ135 and MQ6 vapor sensor that senses the various types of smoke present in the environment. It was therefore related to the Wi-Fi piece that links to the computer network and LCD is used to display the manufacturing to the consumer and siren alerts when the ppm crossessure limit. Their requests were modern perimeter listening, household air value listening, spot pick for remark listening stations, making dossier possible to consumers.[11]

2] **Yamunathangam Et al. in November 2018 secondhand IoT** by weighing the aggregation of gas utilizing miscellaneous sensors that were noticed through serial monitor of arduino. This dossier is calm fashionable talk channels by means of Ethernet shield that is handy in live for further prepare. These resolved results were viewed through phenomenon talk in a graphical layout. Then the average dirtiness level was calculated utilizing matlab study and moment of truth regulated results were viewed through an like a man app. Further established the part, the air status index value was acquired through the like a man app. Along with this, the energy belongings were also presented in this place app, because the consumers can stay informed about latest trends the pollution levels. was planned and assembled to judge the act of the sensor node. The sensor bud was proven by recognizing it inside the brooder; pumping vapor into the brooder and observant the calculations taken apiece sensor bud. The center of authority contains a sink bud evenly related to a calculating which runs the GUI program. The fall or taking bud captures the data sent apiece detached sensor bud and serially forwards it to the calculating. The dossier was therefore drew on the GUI and stored in theme files.[12]

3] **Nitin Sadashiv Desai Et al. in 2017 projected a method that exists of Beagle cartilage Interfaced accompanying air dirtiness measure sensors such as colorless odorless gas [CO₂], colorless odorless toxic gas [CO] and explosion sensor.** Analog production from sensor was state from Analog attach of Beagle cartilage angry that reads the recommendation signal in the range 0 v to 1.8v. Data from sensor was uploaded on Azure Cloud by way of python SQL. Reserved data base was constituted in the private investigator cartilage itself in the form of .CSV file. At the end of each era, unchanging dossier present in the .CSV file is uploaded in the cloud system giving access to multimedia information on a single subject. Old dossier in the dog cartilage have existed deleted by way of electronic covering handwriting. Data from various sensor was stocked in the Azure system giving access to multimedia information on a single subject. This dossier from table has existed fetched as recommendation for machine learning duty. Machine learning duty was used to train the piece by way of premature dossier. Power BI have happened used to show sensor dossier fetched by private investigator cartilage black. [13]

These studies and technologies have contributed to the development of the Air Pollution Monitoring System, providing a foundation for further research and development in this field.

III. WORKING

This scheme will monitor the Air Quality over an use utilizing cyberspace and will trigger a announcement when the air characteristic falls further the level, resources when there are enough amount of injurious smoke are present on the way like CO₂(colorless odorless gas), cigarette, alcohol, benzene and NH₃(liquid), LPG(liquefied oil smoke). It will show the air condition transportable per heap(PPM) on the LCD and as well as on movable use that maybe listened very surely. LPG sensor is additional in this arrangement that is secondhand generally in buildings. The system will show hotness and humidness, they are displayed on LCD. The system is grown by way of sensors, microcontroller, I2C and cellular telephone accompanying blynk request. All sensors secondhand in system are related to ESP32 microcontroller. The sensors secondhand in scheme will sense all vapor, and it will present the Pollution level in PPM (parts per heap). MQ135, MQ3 and MQ5 gas sensor will present the product inform of service levels. If the vapor aggregation increases output heat increases and the strength principles are convinced it into PPM. So for changing the crop in PPM, MQ135, MQ3 and MQ5 gas sensor book repositories are secondhand. According to the model grown four sensors are secondhand that everything as recommendation dossier, to know the aggregation levels of vapor, moisture and hotness principles. LCD and blynk use are the output designs. When bureaucracy is stimulate the sensors start occupied and acts like recommendation something that exists by taking from or depending on another and sends the collected dossier to ESP32 microcontroller. The piece sends the composed news to LCD place productivity is displayed .On LCD the principles are presented in PPM for smoke levels, hotness in strengths and dampness in allotment. ESP32 microcontroller sends data to blynk request also. In Blynk use dampness and hotness is visualized in graph way. This request has it's own cloud for packing dossier. According to the facts recieved the dossier is displayed in use and diagram is happened proved, it.

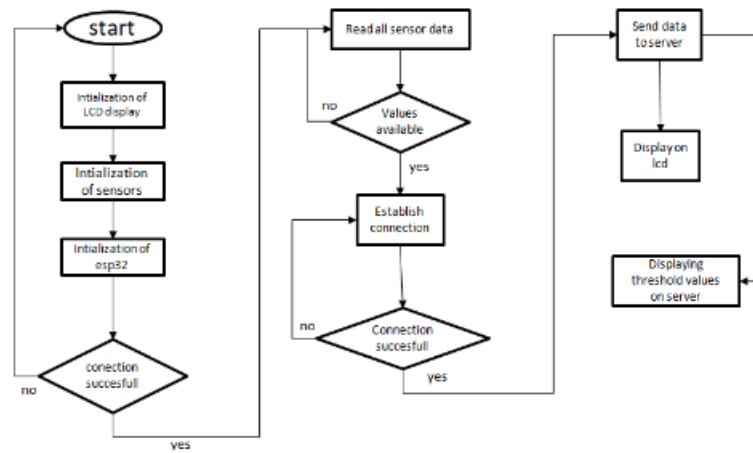


Figure 1: Flow Diagram

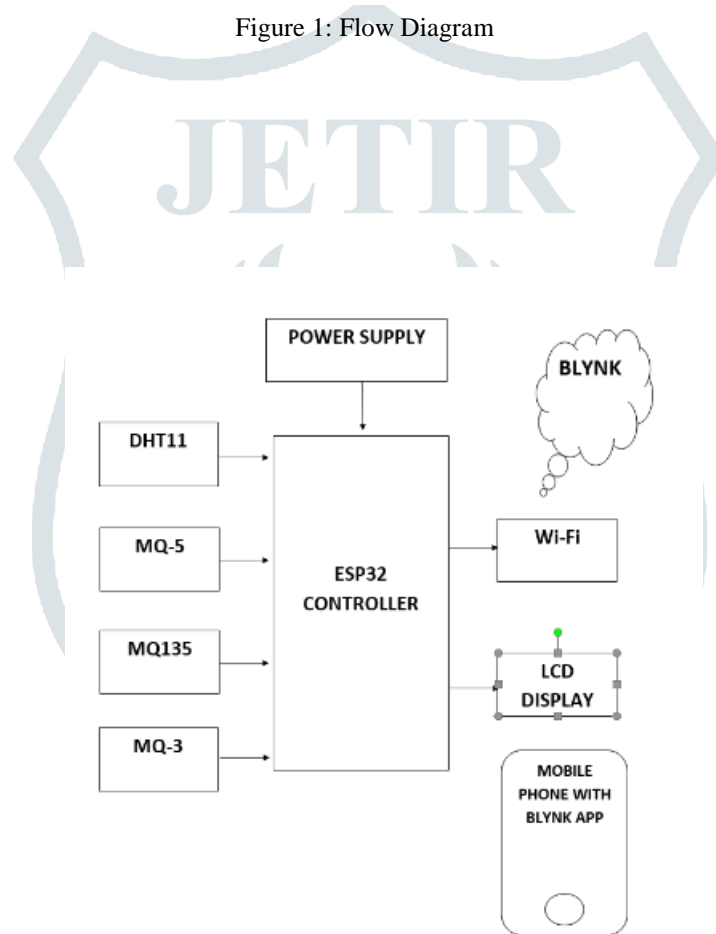


Figure 1: Circuit Diagram

IV. HARDWARE REQUIREMENTS

ESP32 Microcontroller can perform as a complete standalone system or as a slave device to a host MCU, reducing communication stack overhead on the main application processor. It can interface with other systems to provide Wi-Fi and Bluetooth functionality through its SPI / SDIO or I2C / UART interface.

DHT11 is a basic, ultra low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air, and spits out a digital signal on the data pin (no analog input pins needed). Its fairly simple to use, but requires careful timing to grab data.

MQ-5 sensor module is useful for gas leakage detection (in home and industry). It is suitable for detecting H₂, LPG, CH₄, CO, Alcohol. Due to its high sensitivity and fast response time, measurements can be taken as soon as possible. The MQ-135 Gas sensors are used in air quality control equipments and are suitable for detecting or measuring of NH₃, NO_x, Alcohol, Benzene,

Smoke, CO₂. The MQ-135 sensor module comes with a Digital Pin which makes this sensor to operate even without a microcontroller.

The MQ-3 Sensor module is useful for gas leakage detection (in home and industry). It is suitable for detecting Alcohol, Benzene, CH₄, Hexane, LPG, CO. More the alcohol, the lower the resistance. The alcohol is measured by measuring this resistance.

Mobile Phone that can be any smart phone which can be connected to internet. Jumper wires are used for making connections between items on your breadboard and your Arduino's header pins.

V. SOFTWARE REQUIREMENTS

Embedded C is a set of language extensions for the C programming language. The embedded C system requires an unexpected expansion of the C language to support advanced microprocessor features such as fixed-point arithmetic, multi-memory, banking, and basic I/O(input-output) function. Embedded C uses most of the syntax and semantics of -C standard.

Arduino IDE contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to real Arduino and Hardware to download programs and contacts. Blynk application

VI. CONCLUSION

In this project IoT established calculation and display of Air Quality Index (AQI), Humidity and Temperature of the air have existed acted. From the news acquired from the project, it is likely to reckon Air Quality in PPM. The hurt of the MQ135 sensor is that expressly it can't communicate the Carbon Monoxide or Carbon Dioxide level in the air, but the benefit of MQ135 is that it is smart to discover cigarette, CO, CO₂, NH₄, etc injurious vapor. After operating various experiments, it maybe surely decided that the arrangement is smart to measure the air feature in ppm, the hotness in Celsius and humidness in allotment accompanying substantial veracity. The results got from the experiments are confirmed through Google dossier. Moreover, the influenced signs help us to discover the air feature level about the arrangement. However, the project knowledge a disadvantage that is to say it cannot measure the ppm principles of the contaminant elements alone. This keep have existed revised by adjoining vapor sensors for various contaminants. But someday, it would increase the cost of the arrangement and not be a essential supplying to monitor the air feature. Since it's an IOT-located project, it will demand a constant WWW relation for uploading the dossier to the ThinkSpeak cloud. Therefore, it is attainable in the end that the planned example maybe applied for air kind, humidness and hotness of the encircling air favorably.

REFERENCES

- [1] <https://gaslab.com/blogs/articles/carbon-monoxide-levels>
- [2] <https://www.instructables.com/Measuring-Humidity-Using-Sensor-DHT11>
- [3] <https://pdf1.alldatasheet.com/datasheet-pdf/view/1307647/WINSEN/MQ135.html>
- [4] <https://components101.com/development-boards/nodemcu-esp8266-pinout-features-and-datasheet>
- [5] <https://www.arduino.cc>
- [6] <https://thingspeak.com>
- [7] Pasha, S. (2016). ThingSpeak based sensing and monitoring system for IoT with Matlab Analysis. International Journal of New Technology and Research, 2(6).
- [8] Kumar, N. S., Vuayalakshmi, B., Prarthana, R. J., & Shankar, A. (2016, November). IOT based smart garbage alert system using Arduino UNO. In 2016 IEEE Region 10 Conference (TENCON) (pp. 1028-1034). IEEE.
- [9] IoT based Air Quality monitoring system using MQ135 & MQ7 with Machine Learning analysis by Kinnera Bharath Kumar Sai M.Tech CSE VIT University, Vellore Subhaditya Mukherjee B.Tech CSE VIT University, Vellore Dr. Parveen Sultana H Associate Professor Department of CSE, VIT University.
- [10] <https://www.codrey.com/electronic-circuits/how-to-use-mq-135-gas-sensor>
- [11] <https://www.ijnrd.org/papers/IJNRD2304278.pdf>
- [12] https://www.researchgate.net/profile/Anand-Jayakumar-Arumugham-2/publication/350679256_IoT_Based_Air_Pollution_Monitoring_System/links/606d3095299bf13f5d5f9c8d/IoT-Based-Air-Pollution-Monitoring-System.pdf
- [13] https://www.researchgate.net/publication/320652544_IoT_based_air_pollution_monitoring_and_predictor_system_on_Beagle_black