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IOT BASED AIR QUALITY MONITORING SYSTEM

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ABSTRACT

Air plays a major role in our daily life, it is essential for as we know it providing oxygen for respiration in most living organisms including humans. It also plays a role in the water cycle, transporting, moisture and influencing weather conditions. The quality of air directly impacts human health through the breath. The pollution can lead to various health problems such as asthma, lung diseases and cardiovascular diseases and also the planet such as Carbon Monoxide(CO),Methane, Nitrous Oxide, Carbon Dioxide(CO2),Fluorinated Gases (F-gases) which as a whole effect the climatic changes. So to reduce this pollutants and harmful gases in air. This project proposed a IoT Based air quality monitoring system. If pollutants detected by the sensor then buzzer will alert the people and also send alert message to the control board with the help of blynk cloud. In this system, Node MCU plays the main controlling role. It has been programmed in a manner, such that it senses the signals from the sensors and shows the quality level via LED indicators.

Keywords: IoT, wireless cloud system, air pollution environment protection.

I.INTRODUCTION

Air is getting polluted because of the release of toxic gases by industries, vehicle emissions and increased concentration of harmful gases and particulate matter in the atmosphere. The level of pollution is increasing rapidly due to factors like industries, urbanization, increase in population, vehicle use which can affect human health. Particulate matter is one of the most important parameters having a significant contribution to the increase in air pollution. This creates a need for measurement and analysis of real-time air quality monitoring so that appropriate decisions can be taken in a timely period. IoT (Internet of Things) has become an integral part of our lives and it has already made an impact in various sectors, including the environment. Air pollution is a severe problem that has been affecting our planet for years. Therefore, there is a need for a reliable and efficient air pollution

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monitoring system to protect ourselves from its hazardous effects.

An IoT-based air pollution monitoring system is an ideal solution that can provide real-time data and insights about the air quality in a particular area. An IoT based air pollution monitoring system consists of several hardware and software components that work together to collect and process data. The hardware components include sensors, microcontrollers, and communication modules. The software components consist of a cloud platform, a mobile application, and a web-based dashboard. The IoT-based air pollution monitoring system provides several benefits over traditional air pollution monitoring systems. It can collect real-time data from multiple locations, which then analyzed to identify the sources of pollution. It helps to take necessary measures to reduce it. The system can also alert the users if the air quality reaches a dangerous level, allowing them to take precautions to protect themselves. IoT (Internet of Things) plays a crucial role in reducing air pollution through its ability to collect real-time data and enable smart decision-making. IoT devices, such as air quality sensors, can monitor pollutant levels in various environments, including cities, industries, and homes.

This data can be analyzed to identify pollution sources, implement targeted mitigation strategies, and track the effectiveness of pollution control measures. IoT-enabled smart city solutions optimize transportation, waste management, and energy consumption, reducing emissions and improving air quality. Furthermore, IoT-based personal air quality monitors empower individuals to make informed choices and avoid high-pollution areas. By leveraging IoT technology, we can proactively address air pollution, create sustainable solutions, and promote healthier environments for present and future generations.

An IoT-based air pollution monitoring system using Node MCU is a compact and cost-effective solution. NodeMCU, an open-source development board, can be integrated with air quality sensors to collect pollutant data. This data can then be transmitted to a cloud-based platform for real-time monitoring and analysis, enabling proactive pollution control measures. The system offers a scalable and efficient approach to monitor air quality using IoT technology.

II.LITERATURE SURVEY

Bobulski. J et.al [1] described as the impact of air pollution on human health has been studied for

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decades. Unfortunately, each year brings new evidence of the harmfulness of living in a contaminated environment. The smallest particles of pollutants penetrate the entire body and affect a person already at the stage of the formation of reproductive cells. The spectrum of diseases that can develop from breathing polluted air is broad. Therefore, it is necessary to monitor the state of the air and warn of exceeding the standards, which will allow action in a specific place. In the article, we present a pollutant monitoring system that provides for their measurement and the propagation of information about their level among people in a given area. The system uses IoT technologies and the Internet.

Velasco, R.P et.al.[2] described that the article has two main objectives. One is to provide the context to this Special Issue, related to (a) policy context, overall exposure to air pollution, and burden of disease attributable to air pollution, and the other is to describe (b) the WHO guideline development process, with special emphasis on the systematic reviews. In particular, this paper presents the systematic reviews and other supporting evidence that was used and discussed during the process and summarizes important methodological information about the approaches taken to conduct the systematic reviews. These approaches include the definition of population, exposure, comparator, outcomes and study design (PECOS) questions, the assessment of the risk of bias in individual studies and the assessment of the overall certainty of the evidence. In summary, the new WHO global air quality guidelines are informed by the best available scientific evidence covering a vast number of research papers published until September 2018, and appraised by experts and stakeholders in the field of air quality. However, research gaps remain and, therefore, further research is warranted.

Leung, D.Y.C [3] has said bad air quality's most significant environmental health risk significantly impacts Europe's population. Bad air quality is known to cause various health problems, like lower respiratory infections, trachea, bronchus, lung cancers, ischemic heart diseases and strokes. Air pollutants can be divided into two categories: internal (indoor) and external (outdoor) air pollutants.

Rochim, A.F. et.al. [4] has said the first phase must be executed once for each vehicle, but the second phase must be completed after every end of the route in the proposed system. Further, the proposed system uses secure communication channels via WiFi standards for communication between the central server and AV, or LTE/5G standards mention for communication between AV and device. Gubbi.J et.al. [5] described as the air pollution is a critical global issue, creating a system for monitoring and publishing real-time air-grade knowledge seems reasonable. The Internet-of-Things

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(IoT) is an approach that can be a suitable and effective solution to this issue. The IoT is a network that collects vast doses of data from diverse devices connected to more extensive schemes. The data gathered by this network are converted into useful information. More detailed knowledge about IoT can be found in.

Alvarez-Campana, M. et.al.[6] has said the platform proposed here offers individual course monitoring established on Wi-Fi tracking. Environmental monitoring refers to observing and measuring the environment to gather information about its condition and any changes that may occur. It involves using various tools and techniques to collect data on factors such as air quality, water quality, soil conditions, and weather patterns. The data collected through this process is used to identify potential environmental issues and to inform decisions regarding the management and protection of the natural environment. The system allows measuring multiple ecological parameters such as noise level, light, temperature, humidity, CO and $NO2$ concentration. The monitoring system proposed in this paper is built based on the MiCS-4514 Micro ElectroMechanicalSensor (MEMS) and popular hardware—Raspberry Pi and Arduino, which has a shallow level of safety data transmission.

Taştan, M. et.al.[7] has said this research proposes a real-time monitoring procedure for gauging ambient air quality, which is low-cost, portable and based on IoT without transmission protection. The detection unit measures air grade elements such as $CO2$, CO, $PM10$, $NO2$ using the sensors GP2Y1010AU, MH-Z14, MICS-4514 and DHT22.

III. EXISTING & PROPOSED SYSTEM

Existing System:

The commercial meters available in the market are Fluke CO-220 carbon monoxide meter for CO, Am probe CO2 meter for CO2, Forbix Semicon LPG gas leakage sensor alarm for LPG leakage detection. The researchers in this field have proposed various air quality monitoring systems based on WSN, GSM and GIS. Now each technology has limited uses according to the intended function, as Zigbee is meant for users with Zigbee-receiver, Bluetooth.

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Proposed System:

In this project we are going to make IOT based Air Quality Monitoring System in which we will monitor the Air Quality over a web server using internet and will trigger alarm when the air quality goes down beyond a certain level, means when there are sufficient amount of harmful gases are present in the air like CO2, smoke, alcohol, benzene and NH3. It will show the air quality in PPM on the LCD and as well as on webpage so that we can monitor it very easily.

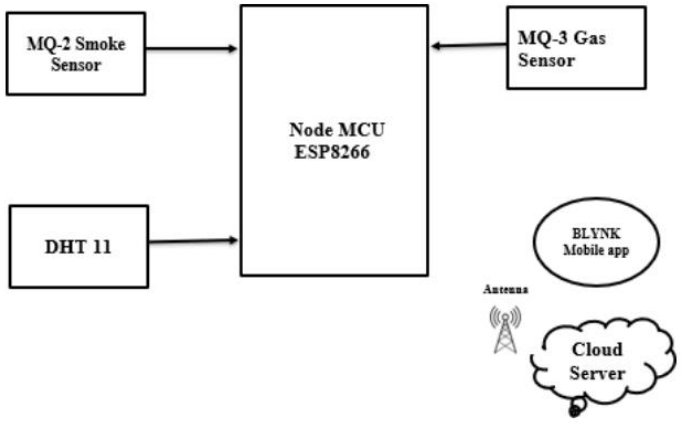

Fig1: Block diagram of proposed system

The Blynk app can be used in the context of an automatic movable platform for crossing railway tracks to provide control and monitoring capabilities. With the Blynk app, users can have a mobile interface to interact with the platform and perform various functions. The Blynk app can allow users to remotely activate or deactivate the platform when they are about to cross the railway tracks. This can be done by tapping on buttons or switches within the app's interface. The app communicates with the platform's control system, sending the necessary commands to initiate the platform's movement.

Additionally, the Blynk app can provide real-time monitoring of the platform's status. Users can view information such as the current position of the platform, any safety alerts or notifications, and other relevant data. This allows users to have a visual representation of the platform's movement and ensures that they are aware of any changes or issues. Overall, the Blynk app acts as a user-friendly interface that enables convenient control and monitoring of the automatic movable platform for crossing railway tracks. It enhances the user experience by providing easy access to platform functions and real-time information.

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IV. RESULTS & DISCUSSION

Additionally, air quality monitoring systems can help raise public awareness about the importance of air quality and encourage individuals to take steps to reduce their contribution to pollution. For example, by providing information on pollution levels in specific areas, these systems can help people make informed decisions about when to avoid outdoor activities or use pollution-reducing measures such as carpooling or using public transportation.

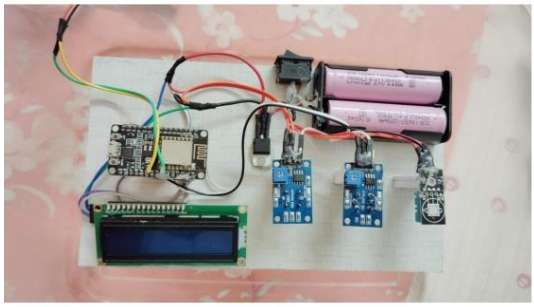

Fig2: Exp. circuit board

Fig3: Exp. Circuit board

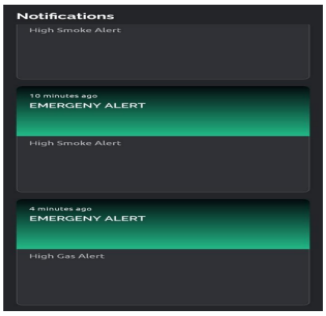

Fig4:

Fig 4: Experimental Results

Overall, an air quality monitoring system is a valuable tool in the fight against air pollution, providing vital information to policymakers, environmental agencies, and the public to improve air quality and protect public health; traffic jam which consumes our precious time and also reduces the theft of vehicles.

V.CONCLUSION & FUTURE SCOPE

Conclusion:

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The system to monitor the air of environment using NODE MCUIOT 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 the using of MQ3 gas sensor, MQ2 smoke sensor, DHT11 gives the sense of different type of dangerous gas and Node MCU is the heart of this project which controls the entire process. Wi-Fi module connects the whole process to internet and LCD is used for the visual Output. The Automatic Air & Sound management system is a step forward to contribute a solution to the biggest threat. The air & sound monitoring system overcomes the problem of the highly- polluted areas which is a major issue. It supports the new technology and effectively supports the healthy life concept.

Future Scope:

This system has features for the people to monitor the amount of pollution on their mobile phones using the application .Our system mainly focused on monitoring the harmful pollutants in air using wireless gas sensors and esp8266 Wi-Fi module which helps in monitoring the results. The proposed system is very much easy to implement. The concept is much new and we detect number of gases. The arduino and sensors are very less expensive so we can implement this system in high pollution areas. In future this type of systems has to be implemented because with help of this system we can actually detect and monitor the pollution of air and sound. In big cities this system is very much useful because implementation cost is very much less these the big systems. So we have to think about future and make world pollution free.

REFERENCES

[1] Bobulski, J.; Szymoniak, S.; Pasternak, K. Air pollution monitoring and information distribution system. In *Pattern Classification, Image Processing and Communications: Proceedings of the CORES and IP&C Conferences*; Burduk, R., Choras, M., Kozik, R., Ksieniewicz, P., Marciniak, T., Trajdos, P., Eds.; Lecture Notes in Networks and Systems, 766; Springer: Cham, Switzerland, 2023; pp. 185–192.

[2] Velasco, R.P.; Jarosińska, D. Update of the WHO global air quality guidelines: Systematic reviews—An introduction. Environ. Int. 2022, 170, 107556.

[3] Leung, D.Y.C. Outdoor-indoor air pollution in urban environment: Challenges and opportunity. Front. Environ. Sci. 2015, 2.

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[4] Rochim, A.F.; Harijadi, B.; Purbanugraha, Y.P.; Fuad, S.; Nugroho, K.A. Performance comparison of wireless protocol IEEE 802.11 ax vs 802.11ac. In Proceedings of the 2020 International Conference on Smart Technology and Applications (ICoSTA), Surabaya, Indonesia, 20 February 2020; pp. 1–5. [Google Scholar]

[5] Gubbi, J.; Buyya, R.; Marusic, S.; Palaniswami, M. Internet of Things (IoT): A vision, architectural elements, and future directions. Future Gener. Comput. Syst. 2013, 29, 1645–1660. [Google Scholar]

[6] Alvarez-Campana, M.; López, G.; Vázquez, E.; Villagrá, V.A.; Berrocal, J. Smart CEI moncloa: An iot-based platform for people flow and environmental monitoring on a Smart University Campus. Sensors 2017, 17, 2856. [Google Scholar] [CrossRef] [PubMed]

[7] Taştan, M.; Gökozan, H. Real-time monitoring of indoor air quality with internet of things-based E-nose. Appl. Sci. 2019, 9, 3435. [Google Scholar] [CrossRef].