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A REVIEW ON AIR QUALITY DETECTING SYSTEM

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Abstract: Measuring air quality is a crucial step in raising public awareness of the need to protect future generations' right to a healthy existence. This study underlines the need of measuring air quality using sensors while concentrating on how to accomplish so. Based on this, the Government of India has already taken some steps to outlaw motorcycles powered by single- and two-stroke engines, which are comparatively releasing significant levels of pollution. Using various gas sensors, we are attempting to create the same system.

Keywords: PPM, VOC, LPG, AQI, MQ

I. INTRODUCTION

Air pollution is a serious concern due to increased levels of hazardous chemicals and particulate matter in the environment as a result of automotive emissions. urbanisation, industrialization, and population the rapid growth in pollution levels, which pose major health issues to individuals, is a result of the release of dangerous gases by businesses, expansion, and increased automobile usage. Particulate matter, a key marker of air pollution, makes a considerable contribution to the deterioration of air quality. which pose major health issues to individuals, is a result of the release of dangerous gases by businesses, expansion, and increased automobile usage. Particulate matter, a key marker of air pollution, makes a considerable contribution to the deterioration of air quality. To meet the need for real-time air quality monitoring and quick decision-making, this study provides a stand-alone air quality monitoring system. With the help of this device, air quality may be measured and shown in parts per million (PPM), a straightforward and understandable unit.

Air pollution, which is brought on by things like industrial chemicals, smoke, dust, and car emissions, has alarmingly increased in recent years. Asthma, coughing, and a number of lung ailments are just a few of the illnesses that air pollution causes to affect health, especially the respiratory system. Unfortunately, air pollution is frequently imperceptible to human senses, making the employment of monitoring tools necessary to locate and classify it. Contaminated air can contain harmful substances like LPG gas, methane, and carbon monoxide. Exposure to these substances may have immediate harmful effects on human health. For instance, carbon monoxide levels above 100 ppm can cause vomiting, nausea, and in extreme cases, even death. The research presented in this paper aims to identify and monitor the specific airborne contaminants in order to provide continuous monitoring of air quality.

Through the use of sensor technologies, this system provides an all-inclusive air quality detection solution. People can monitor the air they are breathing thanks to it, which also addresses the urgent need to combat air pollution. Continuous monitoring and analysis can lead to the implementation of appropriate measures to lower pollution and promote a healthier environment for everyone.

II. LITERATURE REVIEW

Subit Kumar Pradhan A et al.,[1]- The goal of the project is to create a working prototype that can identify LPG gas leaks. The system measures gas concentration levels using a very precise and quick sensing sensor technology. The system sounds an alarm, turns on a GSM modem to warn the user, and turns on the exhaust fan to lower the gas level when the gas level is detected. The system's operation is managed by the relay circuit and microprocessor ATMEGA328p. The main objective of the project is to develop a trustworthy gas leakage detecting system for people's safety and property protection.

D. Dinesh et al.,[2]- For assuring employee safety in risky situations, the IOT-based universal gas detection and health monitoring device is a more affordable option than high-tech robots. It consists of three reconfigurable devices, two of

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which are portable and one of which is worn with a sensor from the Message Queue (MQ) family. Heartbeat sensor devices identify a person's heartbeat, while portable gadgets identify dangerous substances and warn employees. The LORA module shares the location with surrounding medical services and alerts a supportive person in an emergency. This gadget is a preventative measure to guarantee worker security in risky circumstances.

Tarun Kumar et al.,[3]- AIRO is an IoT-based air quality monitoring system that calculates real-time AQI and notifies users of dangerous levels. It can be integrated into everyday items, making it portable and convenient. The physical prototype, using the Intel Edison platform, records air quality indicators, calculates AQI, and sends data to the AWS Cloud Server. A hybrid CNN-Bi-LSTM model is proposed for predicting AQI, and a smartphone app is developed for monitoring air quality and notifying users.

José Ignacio Suárez et al.,[4]- In order to monitor air quality, the study introduces a miniaturised Wireless Sensing Module (WSM) comprising six sensors (humidity, temperature, and four gas sensors). The WSM can send data to a smartphone through Bluetooth and is based on an 8-bit microprocessor. Ten volatile organic compounds were used to test the WSM's discrimination abilities, and the impact of humidity and sensor drift was investigated. Results employing Multilayer Perceptron with Back Propagation Learning algorithm and Radial-Basis based Neural Networks provide good classification success rates.

A. Mirzaei et al.,[5]- It has been demonstrated that metal oxide nanostructures enhance the sensitivity and detection limit of gas sensors for the detection of hazardous gases and VOCs. With a higher surface-to-volume ratio than traditional materials, these structures have a greater contact between the gas-sensing layer and the target gas. In order to detect common VOCs including acetone, acetylene, benzene, cyclohexene, ethanol, formaldehyde, n-butanol, methanol, toluene, and 2-propanol, conductometric solid-state sensors based on nanostructured semiconducting metal oxides have recently seen significant advancements. These sensors could be used for personal safety, chemical process control, and environmental monitoring.

M.I. Mead et al.,[6]- We demonstrate in this study how tiny electrochemical gas sensors, which are typically employed for sensing at parts-per-million (ppm) mixing ratios, can be used for parts-per-billion (ppb) level investigations of gases relevant to urban air quality when configured and operated properly. The deployment of scalable high-density air quality sensor networks at fine spatial and temporal scales, in both static and mobile configurations, is made possible by the low cost and great portability of sensor nodes, in this case made up of several individual electrochemical sensors.

Randall V. Martin [7]- The article describes recent advancements in air quality satellite remote sensing, which can now see a variety of species, including aerosols and different trace gases. The paper reviews the precision and accuracy of existing sensors and examines the many uses for satellite observations, such as case studies and surface concentration estimation. Future studies, according to the authors, should concentrate on better validation procedures, higher-resolution satellite instruments and algorithms, and support for the upcoming satellite instrumentation for applications relating to air quality.

Jun-Ho Yang et al.,[8]- In place of traditional chemical sensors, this study investigated the detection of harmful gases utilising a pair of spark-induced plasma emission spectroscopy (SIPS) modules. This creates a new opportunity for the real-time (3 s) and relatively high sensitivity (5 ppm) detection of hazardous compounds such formaldehyde, acetaldehyde, acetic acid, toluene, and ammonia. The high resolution time-resolved electrical signals from the plasma emissions are handled by an optimised electrical controller (Raspberry Pi), which is produced as a small and affordable 3-channel optical measurement equipment. The results of this study then clarify how the 3-channel SIPS device can be used for quantitative monitoring of dangerous gases.

Hessamaddin Sohrabi et al.,[9]- This article examines the definition, structural traits, numerous types, and synthetic pathways of hazardous compounds, as well as the function of metal-organic framework (MOF)-based sensors and biosensors in their identification. A new advancement in the functional uses of MOFs for the creation of electrochemical and optical sensing assays for the detection of various dangerous gases is also explored in this paper. The limitations of recent developments and potential roadblocks to the effective advancement of sensing methods utilising functionalized MOFs are discussed in the article's conclusion.

Rina So et al.,[10]- In the Danish nationwide administrative cohort, this study demonstrates how to investigate the relationships between long-term exposure to air pollution and mortality from conditions such as diabetes, dementia, psychiatric disorders, chronic kidney disease (CKD), asthma, acute lower respiratory infection (ALRI), as well as mortality from all-natural and cardiorespiratory causes.

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III. SUMMARY

The aforementioned publications addressed various facets of air quality sensing systems. They go over things like detecting gas leaks, keeping an eye on your health, keeping an eye on the air quality, using sensor technology, and detection techniques.The publications discussed above put a lot of effort into creating accurate and effective air quality detection systems. To find dangerous gases and volatile organic compounds (VOCs) in the environment, these systems employ various sensor technologies and approaches. The investigations put forth a number of strategies, such as electrochemical sensors, satellite remote sensing, nanostructured metal oxide sensors, IoT-based devices, precise sensing sensors, wireless sensing modules, and wireless sensing modules.In a number of studies, it is emphasised that to improve the performance and precision of air quality detection systems, advanced technologies such microprocessors, machine learning algorithms, and cloud computing should be included. The inclusion of wireless communication components, smartphone apps, and location-sharing tools facilitates the delivery of timely warnings and emergency alerts.In order to ensure public safety, safeguard the environment, and reduce health risks, the research emphasises the importance of detecting and monitoring air quality. Industries, workplaces, and even private settings can all benefit from these technologies. They offer in-the-moment observation, index prediction for air quality, and hazardous component classification.In addition to discussing power consumption, fault tolerance, and validation procedures, the review papers cover other difficulties and restrictions with air quality detection devices. Researchers provide alternatives, such alternate structures, to address these problems.

IV. CONCLUSION

Overall, the papers provide a comprehensive overview of the design and implementation of sensors with microcontroller. They discuss a number of different challenges and solutions, and they provide valuable insights for engineers who are designing or implementing Air quality detecting System

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