IOT based air pollution monitoring system

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***Abstract*- The issue of air pollution has reached a critical point, by the increasing number of pollutants present in our atmosphere. The presence of poisonous gases such as carbon monoxide, sulfur dioxide, and the utilization of hazardous chemicals within industries together are responsible for the contamination of the air we breathe. The results of such profound pollution are tremendous, which cause a huge environmental damage. As a result of this horrifying pollution, diseases like asthma, bronchitis, tuberculosis, lung cancer are increasing day by day. To tackle this serious situation arising out of air pollution, We are trying to develop a sophisticated system capable of monitoring pollution levels and the concentration of toxic gases in the air. There are two objectives behind the design of the system: to make create awareness of the environmental challenges and to provide a smart system for public to ensure their good health. By scrutinizing the invisible threats that plague our air, we aspire to not only raise awareness but also empower communities and policymakers to take decisive actions to combat air pollution and its dire consequences. In this endeavor, we hope to steer towards a future where clean, breathable air is a reality, not a rarity.**

***Keywords*- Environment security, Rise of diseases, Real Time Service.**

I. INTRODUCTION

Air pollution is a big problem because of harmful stuff in the air. Gases like carbon monoxide, sulfur dioxide, and chemicals from factories make pollution worse, causing problems for the environment and people's health. To deal with this, we made a system to watch and control it. Our system is a helpful solution. It shows the amounts of gases in the air on an easy screen. This not only tells people about pollution but also helps to quickly do things to make the bad effects of air pollution less. We use GSM technology to easily share this important information with mobile phones. This helps people and leaders make good choices, so the environment and public health stay safe. Our system deals with the main reasons for air pollution and helps to watch it all the time. This is part of a big plan to protect the environment and public health. To face today's problems with the environment, it's important to do things now for a better and healthier way of living. Air pollution is bad for both the environment and people's health. More pollutants in the air can make it hard to breathe and cause diseases like asthma. It also hurts ecosystems and the balance of nature.

Our system's real-time monitoring is a strong tool to fight air pollution. It shows accurate and timely information, so people and leaders can make good choices based on data. This is especially important in emergencies when quick actions can make a big difference in protecting public health. Adding GSM technology to our system makes it easy for more people to get important information on their mobile phones. This sharing of information is important for everyone to work together in solving the problem of air pollution.

To fight air pollution, we need a big plan that works well together. Our monitoring system is part of this plan. It looks at the main causes of pollution and gives a practical tool to keep watching it. The data it collects can help make good policies and actions to handle air quality issues. As we deal with problems in the environment, it's clear we need to do things now.

The monitoring system not only finds and tells about pollution levels but also starts important conversations about living in a way that's good for the Earth. It encourages a change to cleaner practices, both for individuals and industries, so we can all work together for a healthier and more sustainable future. In the end, fighting air pollution needs many different strategies, and our monitoring system is an important part of that. By giving real-time data, spreading awareness, and helping people make good choices, it becomes a hopeful tool in the effort to have cleaner air and a healthier planet.

II. SYSTEM OVERVIEW

The main point is that we really need to work hard to control pollution, especially dirty air. The talk wants people to understand how serious the pollution problem is and asks everyone to join forces in reducing the harmful effects of pollutants like SO2, CO, and other dangerous gases like smoke, benzene, and alcohol.

It's crucial to realize how bad the pollution problem is and that we urgently need to work together. The talk suggests working together is the key, highlighting the responsibility each person has in reducing pollution. It's not just about knowing; the talk urges everyone to actively do things to reduce harmful pollutants. Focusing on dirty air, the talk encourages looking closely at where air pollution comes from. It suggests taking action, like reducing emissions and using cleaner technologies, to deal with the main causes of this big problem. The ultimate goal is to protect public health by working together to face the many challenges posed by pollution.

To sum up, this discussion is a call for everyone to come together against pollution, especially dealing with the widespread issue of dirty air. By raising awareness, encouraging personal responsibility, and suggesting practical steps, the talk hopes to lead a joint effort toward a healthier and pollution-free environment.

III. PROBLEM STATEMENT

Recently, pollution has been really bad for people's health, especially in India. The World Health Organization (WHO) says India has the most deaths from pollution. In 2015, a huge number, 2.51 million people in India, died because of sickness from different types of pollution, like dirty air, water, and other things. The WHO report says that dirty air is the main problem, causing a shocking 6.5 million deaths in 2015. This is more than deaths from dirty water (1.8 million) and pollution at workplaces (0.8 million). The report lists many things in the air that make people sick, like sulfur dioxide (SO2), carbon monoxide (CO), carbon dioxide (CO2), smelly organic compounds (VOCs), tiny particles, and harmful chemicals like chlorofluorocarbons (CFCs). All these things in the air are really dangerous for public health, so we need to do something to control pollution. The big numbers in the report show how important it is to focus on fixing the problem of dirty air. It's crucial for everyone to know about these problems and join efforts to reduce the bad effects of these pollutants. This way, we can work towards a future where the air is healthier and people are better off.

IV. PROPOSED SYSTEM MODEL

When there are bad gases like carbon monoxide (CO), hydrogen sulfide (H2S), and other checking gases like Alcohol and Benzene, a special sensor quickly finds them. This sensor sends the information to a small computer-like device called Arduino. Arduino looks at this information and changes the gas amounts into easy-to-understand percentages. These percentages are then shown on a small, efficient screen called OLED.This screen tells us right away about the air quality, showing how much of these gases are there. At the same time, the system uses a special technology called GSM to send this important information to a specific device in the health department. This technology makes sure the information goes quickly. If there is a lot of dangerous gas, the health department gets a quick message. This quick and smooth communication is important because it helps the health department to act fast if there's too much harmful gas. Getting fast information helps them do what's needed to keep people and the environment safe. This whole system, with the sensor, Arduino, OLED screen, and GSM technology, works together to keep an eye on the air quality. It helps the health department react quickly to any possible danger. The main goal is to make a system that gives correct and fast information about the air, making sure people and the environment stay healthy.

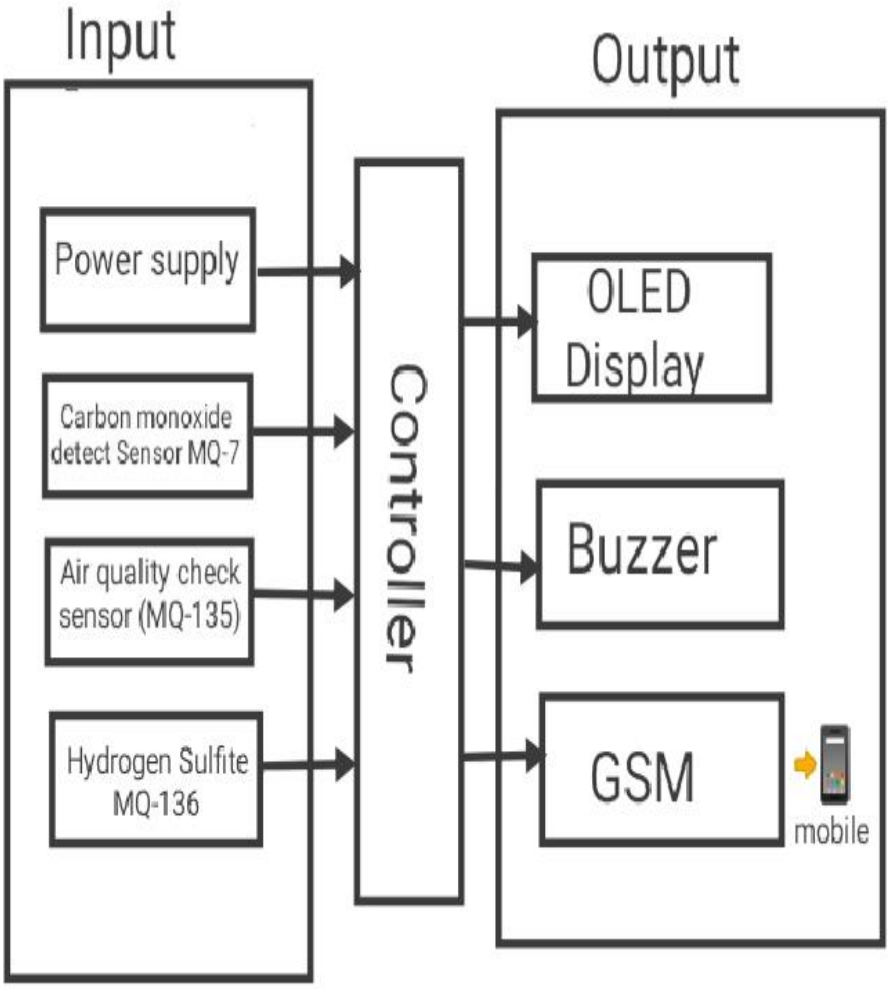

Fig:- Block diagram

V.FLOWCHART

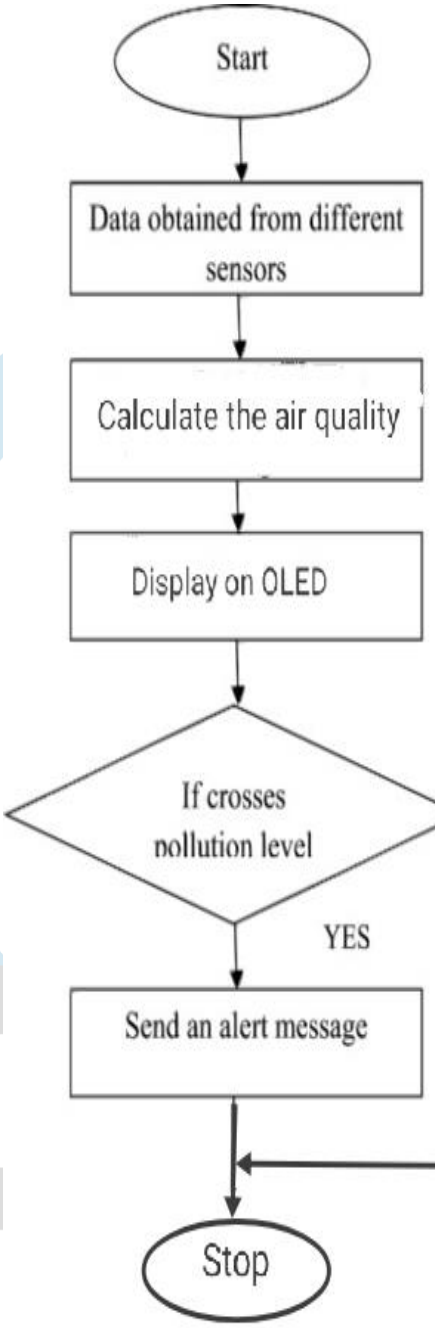

Fig. 2.1 Flowchart for Air quality checking

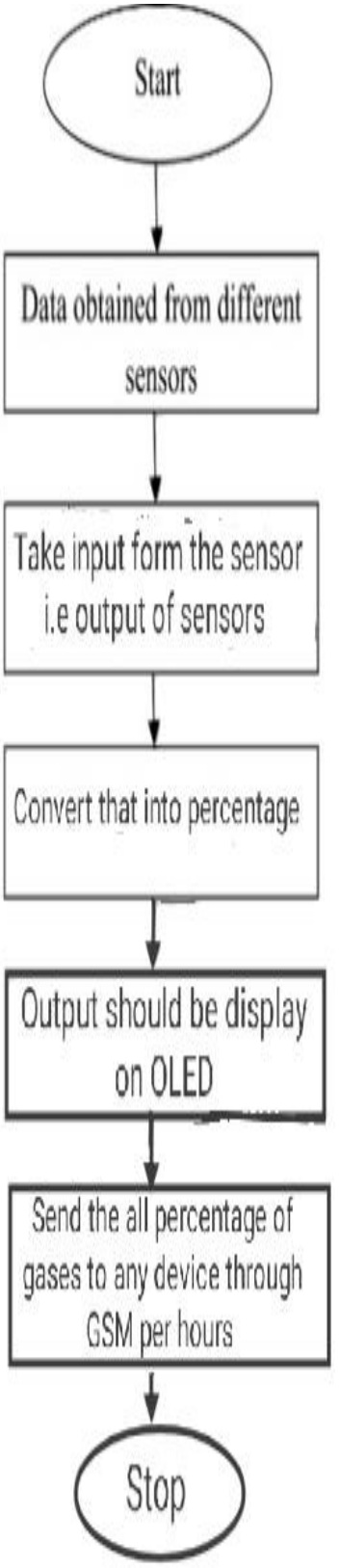

Fig:-2.2 Flowchart for gase detecting

VI. SYSTEM REQUIREMENTS

1) Arduino:-

Arduino is an Italian open-source company that designs and manufactures single-board microcontrollers and kits. The Arduino ATmega328 has an operating voltage of 5V, recommended input voltage of 7-12V, limits of 6-20V, 6 analog input pins, 40mA DC current per I/O pin, 50mA DC current for the 3.3V pin, 2KB SRAM, and 14 digital I/O pins (6 providing PWM output).

2) MQ Sensors:-

MQ gas sensors detect various gases like alcohol, smoke, methane, LPG, hydrogen, NH3, benzene, propane, etc. Three sensors (MQ-7, MQ-136, MQ-135) are used to monitor carbon monoxide, hydrogen sulfide, and air quality respectively.

3) OLED Display:-

OLED (organic light-emitting diode) is an emissive technology using pixels that emit their own light. It's used in our project to display the percentage of gases and air quality.

4) Buzzer:-

A buzzer emits a buzzing sound when an electrical current passes through it. In our project, it alerts when air quality surpasses the threshold level.

5) GSM Module:-

The GSM module, based on the GSM standard, facilitates communication in our project. It supports international roaming, offers clear voice clarity, can support multiple handheld devices, is suitable for low-powered devices, and is compatible with International ISDN. It is used to send the gas and air quality percentages to a specified device.

VII. ADVANTAGES

1) Operating in real-time, the system is consistently monitoring the environment, ensuring a continuous check on its conditions.

2) With the capability to detect a diverse range of gases, the system proves adept at identifying various types of air-related issues and pollutants.

3) The system goes beyond detection, actively identifying and flagging areas with pollution. This feature contributes significantly to a thorough evaluation of environmental quality, allowing us to gauge the overall health of the surroundings.

4) Demonstrating precision, the system provides accurate and reliable values for the concentration of each gas present in the air. This accuracy enhances its dependability for assessing air quality.

5) Combining effectiveness with cost-efficiency, the monitoring system emerges as a practical choice for a wide array of applications, providing reliable performance without imposing excessive financial burdens.

6) By delivering precise information about gas concentrations, the system plays a pivotal role in keeping both individuals and authorities well-informed about potential environmental risks. This proactive approach contributes to promoting enhanced health and safety measures within the community.

VIII.CONCLUSION

An Internet of Things (IoT)-based air pollution monitoring system stands as a groundbreaking solution, offering precise and instant information on the air quality in a specific region. This innovative technology plays a vital role in pinpointing different sources of pollution, enabling prompt and targeted actions to mitigate environmental harm and safeguard human health..This system operates by collecting and analyzing data in real-time, allowing for a comprehensive understanding of the air quality dynamics. By doing so, it becomes a powerful tool in the fight against pollution, aiding in the identification of pollution origins. With this knowledge at hand, necessary steps can be taken to minimize and control pollution, contributing to the overall protection of the environment and the well-being of individuals .The significance of this IoT-based monitoring system lies in its proactive approach. It not only provides information about current air quality but also empowers decision-makers and communities to take preventive measures. This, in turn, supports the reduction of pollution levels and fosters a healthier living environment for everyone.In essence, the implementation of an IoT-based air pollution monitoring system represents a transformative step towards sustainable and healthier living. Through its ability to offer real-time, accurate data and facilitate targeted interventions, it emerges as a crucial ally in the ongoing efforts to combat pollution, thereby ensuring a cleaner, safer, and healthier future for both the environment and the people inhabiting it.

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