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IOT BASED AIR QUALITY MONITORING SYSTEM FOR ANALYSE POLLUTED AREA

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Abstract - Many factors, including population growth, increased vehicle use, industrialization, and urbanisation, have contributed to an increase in pollution levels throughout time, which has a negative impact on human wellbeing by adversely affecting the health of those exposed to it. We will create an IOT-based air pollution monitoring system for this project in order to monitor the air quality. This system will use the internet to monitor the air quality over a web server, and it will sound an alarm when the air quality drops below a certain threshold, which is when there is an adequate amount of pollution in the air. The air contains hazardous gases such CO2, smoking, alcohol, benzene, Methane and Air quality index. It will display the air components in PPM on the LCD and on the website so that we can easily monitor it. With this IOT project, you may use a PC or a mobile device to check the pollution level from anywhere. For monitoring air quality used MQ-135, MQ-7, MQ-2 and MQ-4 sensor.

***Key Words*:** Internet of things, Air Pollution, MQ sensor, Server.

1. INTRODUCTION

Air pollution has become major problem for every nation, whether it is developed country or developing country. Health concerns have been expanding quickly, especially in emerging countries' cities where industrialization and Numerous air pollutants are released as a result of the increased number of cars. Pollution's negative impacts might lead to allergic symptoms like throat, eye, and nasal discomfort as well as potentially significant issues like pneumonia, heart lung, pneumonia, and exacerbated asthma are illnesses.
Air Pollution Monitoring System monitors the Air quality over a web server using Internet and will activate an alarm when the air quality goes down beyond a certain threshold level, means when there is sufficient number of toxic gases present in the air like CO, smoke, alcohol, benzene, Methane, LPG and Air Quality Index. It will show the air quality in PPM (Parts Per Million) on the LCD and as well as on web page so that it can monitor it very easily.

To ensure a better future and a healthier lifestyle for everyone, it is essential to monitor and manage air quality. Internet of things (IoT) is growing in popularity due to its durability and low cost. The atmosphere has been significantly impacted by industrialization and the rise in the number of automobiles on the road. Pollution has a negative impact on health in a number of ways, including mild allergic reactions like throat, eye, and nose irritation as well as more significant issues including bronchitis, heart disease, pneumonia, lung, and worsened asthma. Monitoring provides measurements of the concentrations of air pollutants and noise pollution, which can subsequently be analysed, interpreted, and reported. This information can then be used in a variety of situations. Monitoring data analysis allows us to judge how unhealthy the air is.

2. LITERATURE REVIEW

A system made of Beagle bones was proposed by Nitin Sadashiv Desai and others in 2017. interfaced with air pollution sensors, including noise, carbon dioxide, and carbon monoxide sensors. The Analog pin on the Beagle Bone Black, which receives input signals in the 0 v to 1.8 v range, was used to read the analogue output from the sensor. Python SQL was used to upload sensor data to the Azure Cloud. The beagle bone itself served as the foundation for the reserved data repository. CSV data. The same facts are provided in the at the conclusion of each day. The cloud data base receives an upload of a CSV file.

In August 2019, Monika Singh et al. suggested an Air Pollution Monitoring System. This system senses the many types of gases present in the environment using an Arduino microcontroller linked with MQ135 and MQ6 gas sensors. It was then connected to the Wi-Fi module, which connects to the internet. An LCD is used to show the user the output, and a buzzer sounds a warning when the ppm exceeds a particular threshold. Industrial perimeter monitoring, indoor air quality monitoring, site selection for reference monitoring stations, and data dissemination were some of its applications.

In 2019, Harsh Gupta et al. introduced an IOT-based air pollution monitoring system that is composed of sensors to continuously track the levels of temperature, humidity, carbon monoxide, smoke, LPG, PM2.5, and PM10 in the atmosphere. As a result of their work, a one-way connection between an Android application and the open-source cloud platform Thing Speak has been created. A gateway has been utilised to connect the physical system and Raspberry Pi. Firebase capabilities like Analytics, Authentication, Storage, Messaging, Hosting, Crash reporting, Real-time Database, etc. were used once the firebase API was integrated into an

Android or iOS app. The graphs were created in Thing Speak using the sensor data that was received, and they were tabulated in an Android app for viewing.

In October 2017, Poonam Pal and colleagues created a device for monitoring the air using an Arduino microcontroller. They utilised an Arduino to manage the entire operation and a

MQ135 gas sensor to detect several types of harmful gases. The output from the MQ135 gas sensor is provided in the form of voltage levels, which must be translated into PPM. The entire process was connected to the internet via a Wi-Fi module, and an LCD was utilised to display the results visually. The buzzer starts blaring and the LCD and webpage display "Poor Air, Open Windows" when the PPM exceeds the limit. When the number is less than 1000 PPM, the LCD and webpage display "Fresh Air."

3. PROPOSED SYSTEM

Monitoring air quality is a useful technique for protecting the environment and promoting human health because air pollution has a serious negative impact on people's health and quality of life. To enable their citizens to understand and track the levels of pollution in the area where they live, especially in large urban centres where large industrial centres, commercial vehicles, as well as heavy motor vehicle traffic are concentrated, it is imperative that nations promote the implementation of air quality monitoring networks. This project integrates various MQ family sensor for air pollution monitoring. MQ gas sensors are a family of sensors which are used to detect a wide variety of gases like alcohol, smoke, methane, LPG, hydrogen, NH3, Benzene, Propane etc. These sensors are made up of electrode which is coated with a sensing material, and it is heated to make it more reactive and sensitive.
MQ2 sensor module is used for gas leakage detection (home and industry). It is suitable for detecting H2, LPG, CH4, CO, Alcohol, Smoke or Propane. Due to the high sensitivity and fast response time of it. But, in this design, we used MQ2 sensor for smoke situation. The MQ2 Gas Sensor module is excellent for detecting gas leaks (home and industry). The H2, LPG, CH4, CO, alcohol, smoke, or propane can all be detected using this device. MQ-7 gas sensor has high sensitity to Carbon Monoxide. The sensor could be used to detect different gases contains CO.

The MQ 135 sensor can be implemented to detect smoke, benzene, vapors, and other hazardous gases. It can detect various harmful gases. It can be used for air quality monitoring, noxious gas detection, home air pollution detection, industrial pollution detection, portable air pollution detection.

MQ4 Gas sensor is a Metal Oxide Semiconductor (MOS) type Gas Sensor mainly used to detect the Methane (CNG) gas concentration in the air either at home or in industry. This sensor contains a sensing element, mainly aluminium-oxide based ceramic, coated with Tin dioxide, enclosed in a stainless-steel mesh.

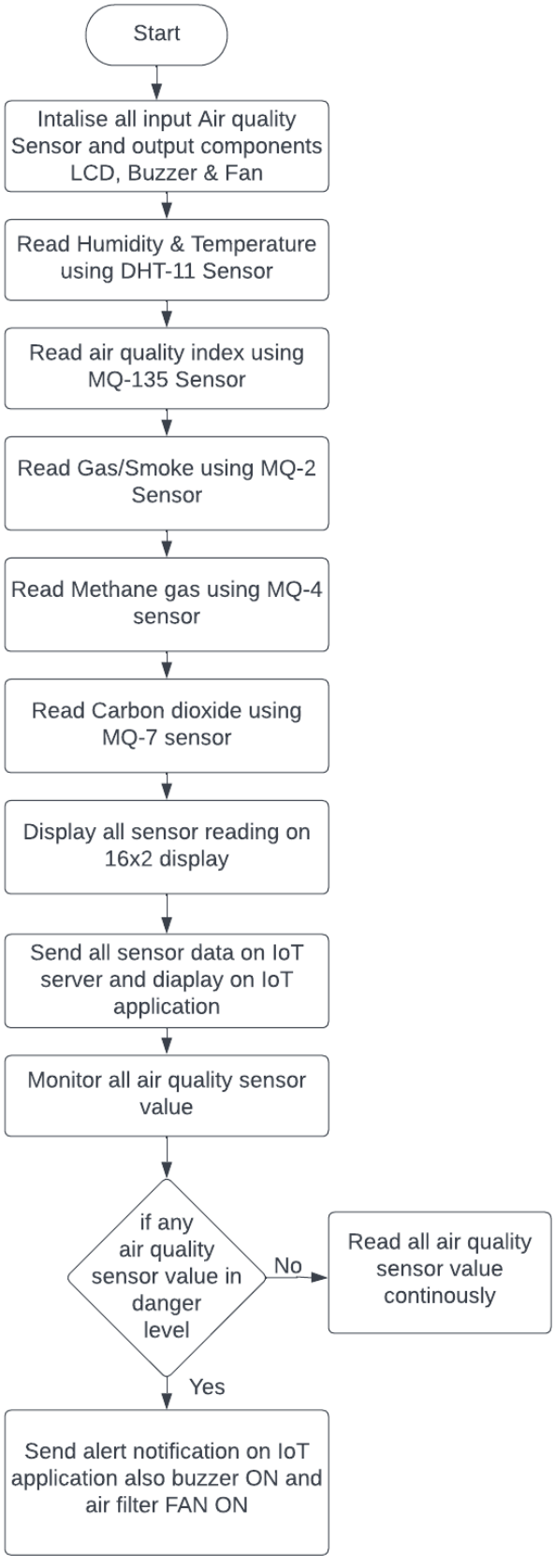


Fig -1: Flow Chart of Air Quality Monitoring System

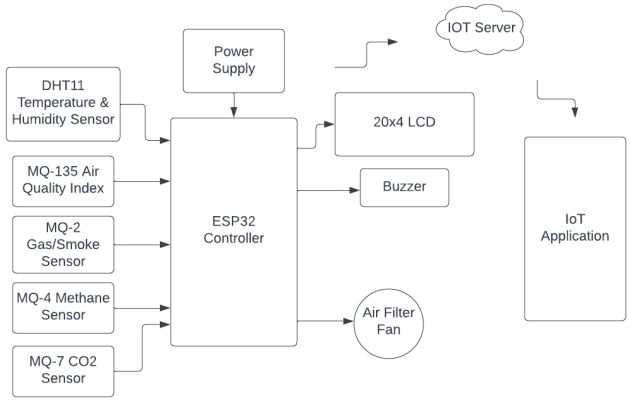
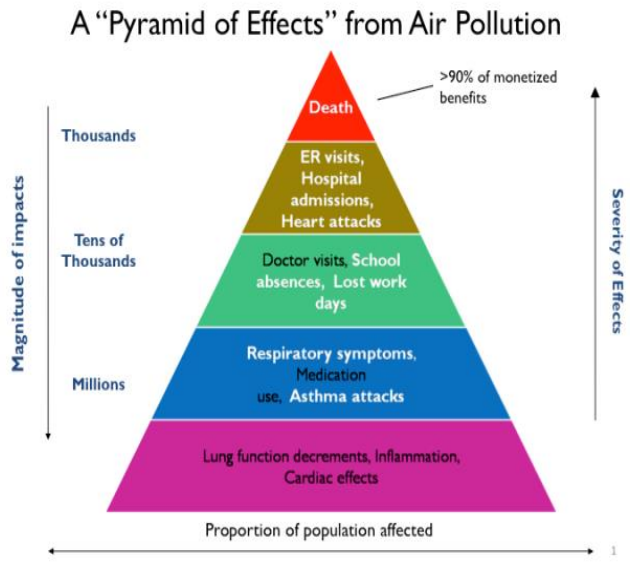


Fig -2: Block Diagram of Air Quality Monitoring System

The monitoring platform was designed for the device to collect sensor data and send to a mobile application (app) that must be installed on the user's smartphone as well as send in web dashboard using IoT technology so user can monitor data from anywhere the world at any time also received alert notification in air quality drops.

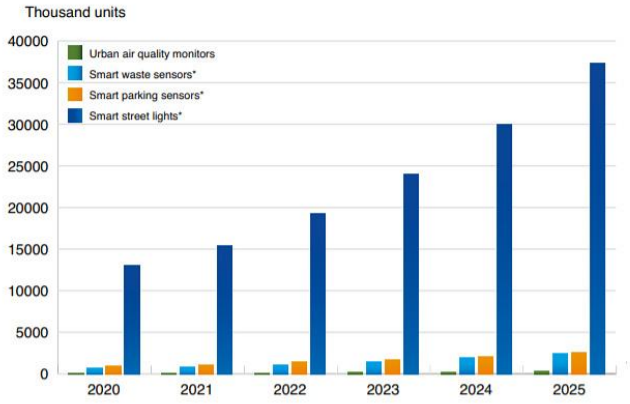
4. RESEARCH QUESTION

The primary goal of this study is to understand and classify the related research in IoT-based air quality monitoring systems. We aim to survey research literature regarding software and hardware architectures in air quality solutions, the most commonly used environmental variables and sensors, communication technologies, data processing analysis, and interaction with other applications (e.g., smart cities).



The prevalence and severity of lung and heart disease, as well as other health issues, are increased by air pollutants including ozone and particle matter (PM), according to decades of studies. More research is required to fully comprehend how poor air quality, particularly among vulnerable communities, contributes to negative health effects and an increase in disease. People who live in places with high levels of air pollution, children, and the elderly are particularly vulnerable.

The increased level of air pollution in big cities has become a major concern for several organizations and authorities because of the risk it represents to human health. In this context, the technology has become a very useful tool in the contamination monitoring and the possible mitigation of its impact. Particularly, there are different proposals using the internet of things (IoT) paradigm that use interconnected sensors in order to measure different pollutants.



Installed base of smart cities applications (World 2020-2025)
**Excludes China*

5. RESULT

Because air pollution is so prevalent today, an air quality detector is essential. For the types of air pollution that are difficult for humans to detect, a device acting as an air quality reader is needed. With the help of this study, we can prevent air pollution by routinely checking the air quality.
Our aim is to evaluate the quality of the exposed level of air pollution as a result. We used IoT based mobile application and web dashboard to monitor air pollution level of real time also we received alert notification if air quality drops of that area. In this application, the pollutant level is tracked in that manner. It keeps tabs on a person's daily exposure to air contaminants as well.

6. CONCLUSIONS

The main factor impacting our environment is air pollution. not just having an impact on the environment, but also having an impact on human health. The smartphone application was created as a monitoring system, tracking the amount of exposure that people have had each day. The detection of leakage gas, carbon monoxide, smoke, and propane were done using gas sensors. The sensor detects gases, converts them to digital data, and presents that data in the application. Calculating the exposure level in PPM (Parts per Million).

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