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IOT BASED AUTOMATIC EXHAUST GAS EMISSION MONITORING SYSTEM FOR COMMERCIAL VEHICLES

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Abstract - The increasing number of commercial vehicles on the roads has led to a significant increase in exhaust gas emissions, which contribute to air pollution and environmental degradation. The proposed IoT -based automatic exhaust gas emission monitoring system offers a solution to this problem by providing a cost-effective, efficient, and accurate way of monitoring the emissions of commercial vehicles. The system is designed using a PIC16F877A microcontroller, which is responsible for controlling the overall functionality of the system. It communicates with an ESP8266 Wi-Fi module to collect data on the emission levels of the commercial vehicle. The collected data is displayed on an LCD screen, allowing the driver and passengers to see real-time emission levels. The system also uses a GPS module to track the location of the commercial vehicle. The GPS data is transmitted to the central server, along with the emission data, through a GSM module. This allows for real-time monitoring and analysis of the emissions data, providing a more accurate and reliable way of assessing the impact of commercial vehicles on the environment. The system is capable of measuring various gases, including carbon monoxide (CO), carbon dioxide (CO2), nitrogen oxide (NOx), and other harmful gases. The system provides an early warning system, alerting the driver when the emission levels exceed the permissible limit. The driver can then take appropriate action, such as reducing the speed or stopping the vehicle.

***Key Words*:** Internet of Things (IOT), GPS, GSM, SENSOR MODULES.

1.INTRODUCTION

The main objective of IoT based automatic exhaust gas emission monitoring system for commercial vehicles is that the air pollution is a growing issue these days. In begun distinct period of history air pollution is consequential problem in society which anguish to the human health & environment. This is the great problem faced in the urban area. Vehicle emits hazard gases like CO which are very damaging to the environment, which has an immediate impact on people chronic obstructive pulmonary disease in human beings. both the risk of cancer and the condition (COPD) contribute significantly to global pollution.

Even when they are stopped in traffic, people don't turn off their vehicles. they add to pollution by the traffic. It is necessary to monitor emission and keep it under control for a better future and healthy living for all. As a human we need fresh air to survive. Air is most important factor in human life. So here we propose an air pollution monitoring system that allows us to monitor and check live gas emission in vehicles through IOT.

Project uses air sensors to sense presence of harmful gases/compounds in the air and constantly show the data. the sensors interact with PIC IC which processes this data and transmits it over the application and LCD. This allows authorities to monitor emission rate and act against it. Owners will get a alert message, so problems can be rectified. Network Devices and the Internet of Things All kinds of ordinary household gadgets can be modified to work on IOT system.

IJSREM sample template format, Define abbreviations and acronyms the first time they are used in the text, even after they have been defined in the abstract. Abbreviations such as IEEE, SI, MKS, CGS, sc, dc, and rms do not have to be defined. Do not use abbreviations in the title or heads unless they are unavoidable.

2.LITERATURE SURVEY

In this paper, [1] Air pollution from vehicle emissions can cause health, economic, and aesthetic problems when they exceed PCB limits. Incomplete combustion of fuel due to improper vehicle maintenance is a common cause. To control this, the proposed system measures emitted gas levels and alerts the user when pollution levels exceed the threshold value. The system also detects nearby obstacles and alerts the user by displaying their direction. While the system can help prevent accidents, it has limitations.

In this paper [2] The proposed IOT Air & Sound Monitoring System aims to monitor air and sound pollution in an area through the use of air sensors and sound level measurements. The system is designed to constantly transmit data and interact with Arduino to process and transmit the data over an application. This allows authorities to monitor and act against air pollution in different areas and noise pollution near schools, hospitals, and no honking areas. The system alerts authorities if air or noise quality issues are detected, enabling measures to control the problem. The system has potential future applications such as self-parking automobiles, automatic ordering of groceries, and wireless monitoring of health parameters like blood pressure.

In this paper [3] proposed an IOT-based air and sound pollution monitoring system using Raspberry Pi. The system uses CO2 and methane sensors along with a microphone to measure the level of pollutants in the environment. The data collected from the sensors is transmitted to a remote web server through a Wi-Fi connection. The system can analyze the data and terminate the output protocol if toxic gases are present in the surroundings. The data can be accessed by the users through a prescribed device.

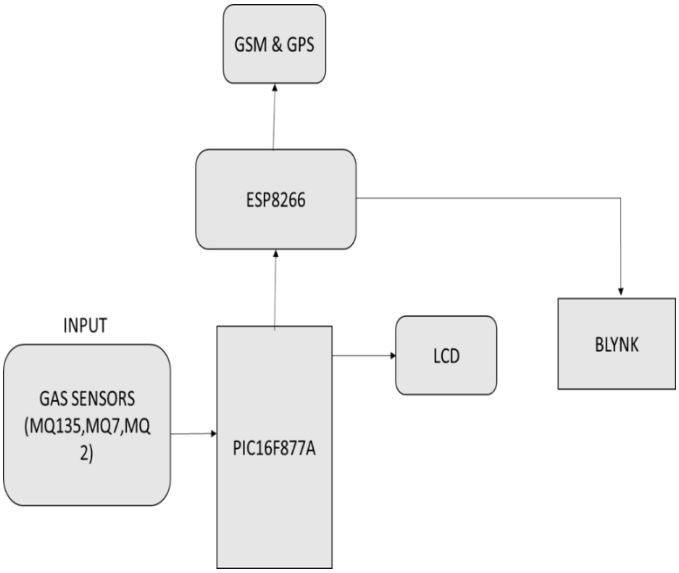
In this paper [4] The authors propose the use of an Internet of Things (IoT) system to monitor the emission levels of individual vehicles in order to address the problem of global air pollution. The system consists of a gas sensor, a controller, and a Wi-Fi module, which are physically mounted in the exhaust system of each vehicle. The gas sensor collects data on the vehicle's emission levels and sends it to the controller, which transmits the data to the cloud through the Wi-Fi module. A web server is designed to store the data on each vehicle's emission levels, which can only be accessed by vehicle authorities. This system can help reduce air pollution by providing a means for vehicle owners to be informed about their emission levels and take steps to reduce them.

3. PROPOSED WORK

This system designed to monitor the emissions of individual vehicles and to take action if the emissions exceed acceptable levels. The system includes gas sensors, including the MQ7, MQ2, and MQ135 sensors, which are used to monitor the exhaust gases emitted by the vehicle. The MQ7 sensor is used to detect Carbon Monoxide (CO) gas, which is harmful to human health. The MQ2 sensor is used to detect white smoke, which is often an indicator of incomplete combustion. The MQ135 sensor is used to monitor the air quality of the exhaust gas.

The sensors send data to a PIC16F877A microcontroller, which has two threshold levels programmed into it. When the sensed values cross the first threshold, the microcontroller sends a message to the driver of the vehicle using an LCD display and sends an SMS with the current location of the vehicle to the vehicle owner using a GSM and GPS module. The aim of this is to alert the driver and owner of the vehicle to the problem so that they can take corrective action

Fig-1: Block Diagram of the proposed work



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If the problem is not resolved and the sensed values reach the second threshold level, then the system will send the number plate of the vehicle to an RTO (Road Transport Office) application using an ESP8266 module. The RTO will use this information to issue a fine to the owner of the vehicle, and a message will also be sent to the owner to inform them of the fine.

Overall, the system is designed to monitor and control emissions from individual vehicles, and to ensure that vehicles do not exceed acceptable emission levels. This is important for reducing air pollution and improving the health of the population.

4. RESULTS

This window shows the basic circuit diagram where PIC is connected with sensors, LCD display and driver circuit. The left side window shows the devices which are used. Figure 3 represents flame sensor output, figure 4 represent gas sensor output and figure 5 represent ultrasonic sensor output.

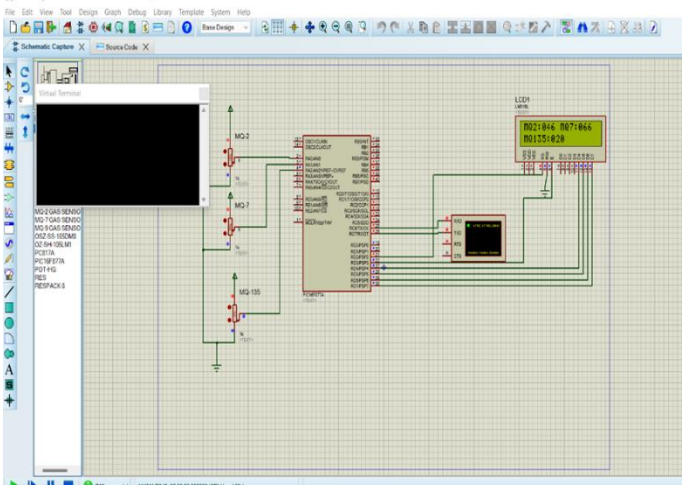

Fig-2: Simulator window indicating Gas emission (Normal)

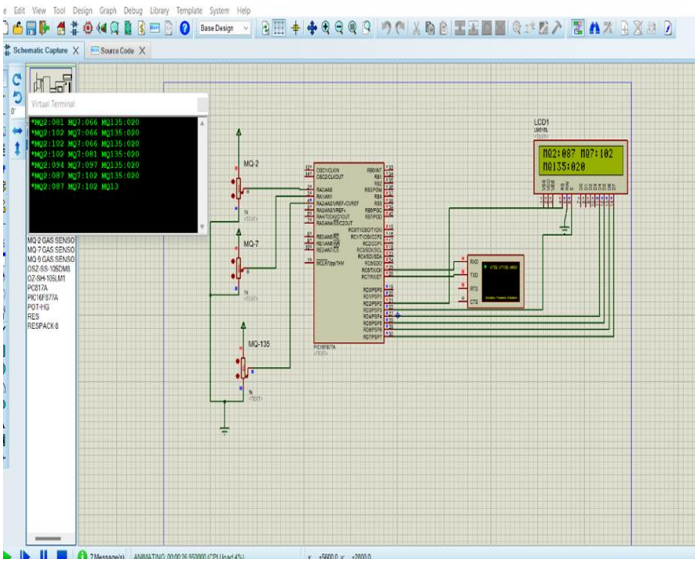

Fig-3: Simulator window indicating Gas emission (After Threshold)

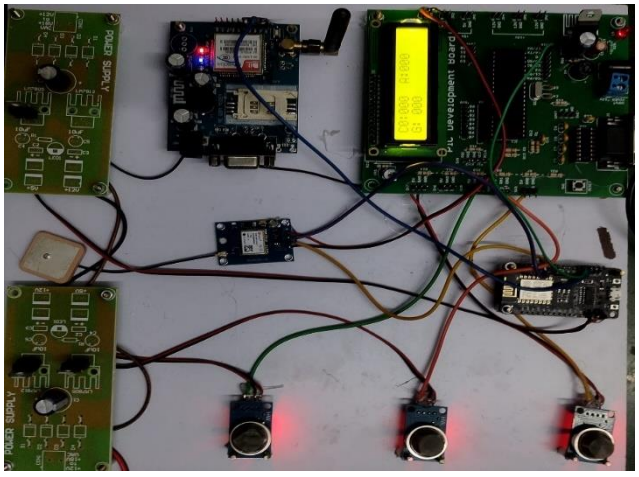

Fig-5: Output of Ultrasonic sensor

5. CONCLUSION

In conclusion, the proposed system for monitoring vehicle emissions using gas sensors and microcontroller technology offers a promising solution to the problem of air pollution caused by vehicular emissions. By continuously monitoring the exhaust gas and sending alerts to the driver and vehicle owner in case of high pollutant levels, the system provides a way for individuals to take action and reduce their impact on the environment. Moreover, the use of GPS and GSM technologies enables authorities to track and identify vehicles that consistently violate emission standards, making it possible to enforce penalties and improve overall air quality. Overall, this system has the potential to contribute significantly to efforts aimed at reducing air pollution and protecting public health.

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