Intelligent Traffic System for Pollution Monitoring with Auto Detection of Traffic Rules Violation and intimation

Savitha R[1], Aishwarya K[2], B Aishwarya[3], Lakshmi Mache[4]

[1,2,3,4]*Department of Electronics and Communication Engineering, RRIT, Bengaluru, (India)*

ABSTRACT

Every vehicle in India has a standard emission of gases but the difficulty occurs when the emission is more than the standardized values. The key reason for this contravention of emission level being the partial combustion of fuel supplied to the engine which is due to improper prolongation of vehicle. This emission from the vehicle cannot be completely avoided but it can be certainly controlled. The aim of this paper is to monitor and control pollutants in vehicle by using pollution control circuit consists of a series of gas sensor, temperature sensor and GSM. An initial warning is given to the driver regarding the level of CO_2 gas with the help of LCD display and later the same information is transferred to the police control room. This is done with the help of ARM processor that is integrated in the vehicle.

Keywords— MQ-7 sensor, MQ-135, GSM, RFID, LCD display

I.INTRODUCTION:

Air is essential for all humans, flora and fauna and other organisms. Its importance can be estimated by the fact that humans can survive without food and water for few days, but without air it is impossible to survive. Air is a mixture of various gases in which nitrogen content is 78%, 21% is oxygen and 0.03% CO_2 is found and the remaining 0.97% contains hydrogen, helium, argon, neon, krypton, xenon, ozone and water vapour. The above quantities of different gases in the air keep it balanced. It becomes unbalanced when these is an uneven difference in their ratio, posing a grave threat to human health. Whenever CO_2 and nitrogen increase in the air beyond permissible levels, it is called air pollution.

Here are few methods that the government are taking to control the vehicle pollution:

Promoting of vehicle use with CNG fuel (Compressed Natural Gas) instead of Petrol and Diesel fuel. CNG are called green fuel i.e. pollution from CNG vehicle are very less in comparison to Petrol or Diesel. Regularly checkup of pollution from vehicle through registered Authority. Promotion of Electric operated vehicle to reduce pollution. Phasing out of old or high polluted vehicles from the big city. Implementation of Euro-VI fuel in all over India progressively i.e. initially it was implemented in Delhi from April, 2018. In other big cities, it will be implementing till Dec, 2018. Euro-VI fuel will reduce the sulphur by 50 to 75 in Diesel engines.

Government of India are working to introduce LNG (Liquefied Natural Gas) as fuel, it will further reduce the pollution from vehicle. Government has taken initiative to introduce mass transport system i.e. number of buses

increased, Metro in various cities, Infrastructure development, Improvement in Road network. Implementation of Automatic tag system in Toll booth so that vehicle can go easily without waiting in queue for toll.

Creating the bypass across the big cities so that vehicle coming from one end will not need to pass through the city to go to other side. Recently Eastern Peripheral Expressway opened that will bypass the Delhi for trucks or buses, if they are not having any stoppage in Delhi. It will reduce the traffic situation as well as reduce the pollution and save time for the public.

Delhi Government implemented the odd-even car to run based on their registration number on particular day.

Nowadays, it is obvious that the congestion in most countries is on the increase and cities are becoming busier, this problem must be tackled because it is a global issue and most people, especially those who live in big cities, are affected by it.

Traffic congestion is caused by commuters travelling to work. One of the main reasons for traffic jam is that the majority of people prefer using their own cars instead of public transportation means that they tend to travel alone. Because, public transportation is not reliable and efficient for them and with an increasing world population, the cars on the roads are also increased. Another factor is that most people live in the suburbs outside the city center and they tend to travel at the same time of day. Moreover, cars and road space are not used efficiently. As a result, this causes traffic jams during the rush hour.

This modern world, mortality rate due to road side accidents have increased 10 folds than the past. It is argued that limitation of over speeds can play integral role to control road side fatal accidents, while others believe that others immunity measures are essential for improvement of road safeness .This essay will discuss both views, my opinion and followed by reasoned conclusion. On the one hand, over speed is one of the major factor for the road side fatalities and by doing decisive measures we can improve the road safety effectively. The road accidents due high speed vehicles are mortal because there are high chances of intra-abdominal injury due to massive collusion to another vehicles and stab wound due to sharp object. Consequently, mortality of passenger happens due to these massive injuries.

II. LITERATURE SURVEY:

Over the years, there have been several regulations made by the Government to control the emission from vehicles; most of them being unsuccessful at the same. The standards and the timeline for implementation are set by the Central Pollution Control Board under the Ministry of Environment & Forests. Bharat stage emission standards are emission standards instituted by the Government of India to regulate the output of air pollutants from internal combustion engine equipment, including motor vehicles

[1]An Intelligent Traffic Light Control Approach for Reducing Vehicles CO2 Emissions in VANET: Zhende Xiao, Zhu Xiao, Dong Wang, Xiaohong Li

First, an adaptive traffic light control algorithm is proposed with purpose of reducing vehicles waiting time. We model four different phases, and design the demand function to allot the green light for each phases based on multiple traffic factors such as traffic density etc. In order to decrease vehicles stop times, we then

derive recommendatory speed for each individual vehicle. In addition, we introduce a CO_2 emission estimation model to calculate vehicles CO_2 emissions .Present an intelligent traffic light control scheme based on VANET to decrease the vehicle's waiting time and stop times in the intersection, thus can reduce vehicles CO_2 emissions.

[2]TMaaS: Traffic Management as a Service Using Cloud in VANETs Jetendra Joshi, Kritika Jain, Yash Agarwal, ManashJyotiDeka and PravitTutejaTMaaS:

Traffic management as a service in vehicular networks by using the integrated model of VANET and Cloud Computing Services. It has a designed hardware prototype for vehicular speed and location tracking and accident detection on real time basis. In this terminology we have roads with tracks having fixed speed limits and the vehicles moving on these tracks should be adhering to that particular tracks' speed limit lane. If the driver increases or decreases the speed and does not follow the speed limit of the track, the (On Board Navigation System) OBU will display a warning message to the driver and alert him to either change the lane or the speed. The OBU will check the defaulter for three times and if the driver does not respond to it, it will broadcast the information to the vehicular cloud. Even though the messages are intimated the user can ignore and the speed is not controlled.

[3] Automated Control System for Air Pollution Detection in Vehicles Siva Shankar Chandrasekaran, SudharshanMuthukumar and SabeshkumarRajendran

When the pollution/emission level shoots beyond the already set threshold level, there will be a buzz in the vehicle to indicate that the limit has been breached and the vehicle will stop after a certain period of time , a cushion time given for the driver to park his/her vehicle. There is no sufficient time given to the user to get rid of the pollutants and be checked.

Modern vehicles are increasingly equipped with a large amount of sensors, actuators, and communication devices (mobile devices, GPS devices, and embedded computers). In particular, numerous vehicles have possessed power fuel sensing, networking, communication, and data processing capabilities and can communicate with other vehicles or exchange information with the external environments over various protocols.

[4] Developing Vehicular Data Cloud Services in the IoT Environment Wu He, Gongjun Yan, and Li Da Xu

Proposes to use both cloud computing and IoT as an enabling infrastructure for developing a vehicular data cloud platform where transportation-related information, such as traffic control and management, car location tracking and monitoring, road condition, car warranty, and maintenance information, can be intelligently connected and made available to drivers, auto-makers, part-manufacturer, vehicle quality controller, safety authorities, and regional transportation division.

[5] The survey from the starting four reference papers we conclude that the existing system has the following features:

The intelligent traffic system has already been implemented. The existing system contains emission control system which is not regularly followed by the people, even though if it is done the emission control rate is not intimated to the government. The emission testing certificates given by the government are misused; even these certificates are faked by many people. Through these certificates the government will not have a count on the vehicles which are done with emission testing.

The speed controlling system in certain speed zone limit areas is been implemented. The existing system has a working of sending the alert messages to the person if ever the speed of the vehicles is beyond the speed limits. Though the system can send the alert messages there is no measures taken to control the speed of the vehicle automatically. Thus increase in the speed of the vehicle is even the reason for accidents in the speed zone limit areas.

The accidents which are occurred are not been intimated to the nearest hospitals and even to the emergency contacts of the particular person. If ever the correct measures are taken immediately after an accident that may save a life of a person. The alert messages of an accident is not been notified to the nearest hospital. These accidents can even cause highly dense traffic delays in the urban areas which takes too much of time to clear the dense traffic in urban areas.
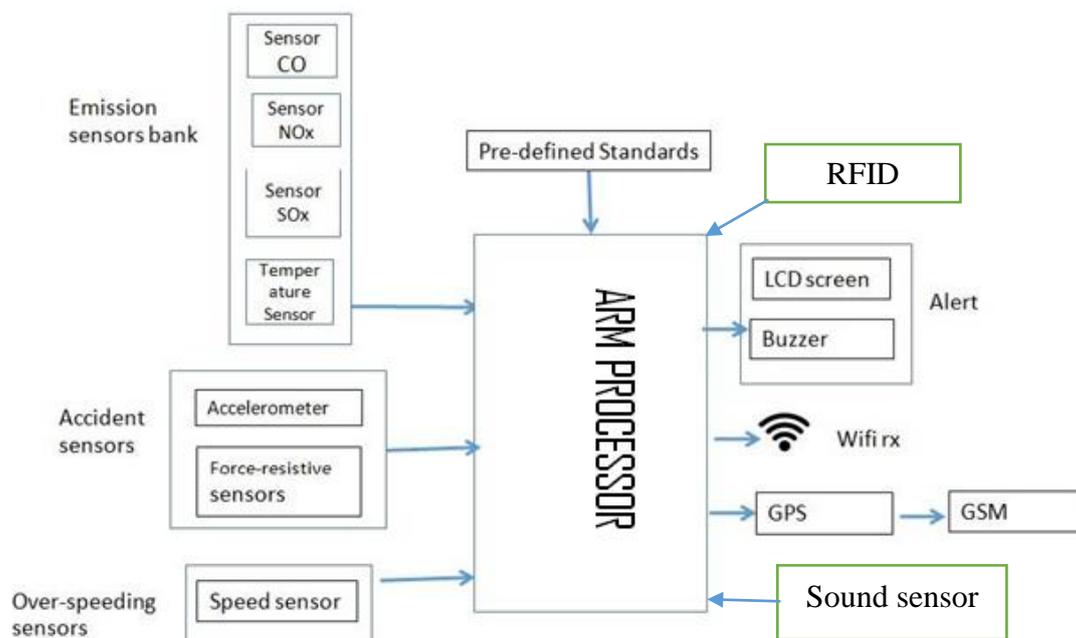
III. BLOCK DIAGRAM:

Fig 1. Block diagram of Intelligent Traffic System for Pollution Monitoring with Auto Detection of Traffic Rules Violation and intimation

The overall block diagram of the proposed system is given in figure 4.1. The proposed system consists of emission sensors bank, the sensors used to detect the emission rate of the vehicles. The accident sensors used to intimate the accidents to the nearest hospitals and to the emergency contacts. The over speeding sensors is used in order to control the speed in the speed zone limit areas.

IV. IMPLEMENTATION:

Module 1: Architecture Overview:

The ARM7TDMI-S is a general purpose 32-bit microprocessor, which offers high performance and very low power consumption. The ARM architecture is based on Reduced Instruction Set Computer (RISC) principles, and the instruction set and related decode mechanism are much simpler than those of micro programmed Complex Instruction Set Computers (CISC).

The ARM7TDMI-S processor has two instruction sets:

• The standard 32-bit ARM set.

• A 16-bit Thumb set.

Pin Control Block:

The pin connect block allows selected pins of the microcontroller to have more than one function. Configuration registers control the multiplexers to allow connection between the pin and the on chip peripherals The Pin Control Module with its pin select registers defines the functionality of the microcontroller in a given hardware environment.

UART:

In addition to standard transmit and receive data lines, the LPC2144/46/48 UART1 also provides a full modem control handshake interface.

Module 2: Pollution Monitoring

The MQ series of gas sensors use as mall heater inside with an electro-chemical sensor. They are sensitive for arrange of gasses. Theoutputis ananalogsignalandcan bereadwithananaloginputofthe ARM7.

MQ-7 CO SENSOR:

MQ-7 is sensitive for carbon monoxide. The heater uses an alternative voltage of 5v and 1.4v.

MQ-135 NO SENSOR:

A nitrogen oxide sensor or no_x sensor is typically a high-temperature device built to detect nitrogen oxides in combustion environments such as an automobile or truck tailpipe or a smokestack.

Temperature Sensor:

A temperature sensor is a thermocouple or a resistance temperature detector (RTD) that gathers the temperature from a specific source and alters the collected information into understandable type for an apparatus or an observer.

Module 3: Accident Monitoring

Accelerometer

The ADXL335 is a small, thin, low power, complete 3-axis accelerometer with signal conditioned voltage outputs. The product measures acceleration with a minimum full-scale range of ±3 g. It can measure the static acceleration of gravity in tilt sensing applications, as well as dynamic acceleration resulting from motion, shock, or vibration.

The ADXL335 is a complete 3-axis acceleration measurement system. The ADXL335 has a measurement range of ±3 g mini-mum. It contains a poly silicon surface-micro machined sensor and signal conditioning circuitry to implement open-loop acceleration measurement architecture.

Module 4: Speed Controlling

DC motor speed control is one of the most useful features of the motor. By controlling the speed of the motor, you can vary the speed of the motor according to the requirements and can get the required operation.

A simple DC motor works on the principle that when a current carrying conductor is placed in a magnetic field, it experiences a mechanical force. In a practical DC motor, the armature is the current carrying the conductor, and the field.

V. RESULT:

The proposed Wireless Air Pollution Monitoring System provides real-time information about the level of air pollution in these regions, as well as provides alerts in cases of drastic change in quality of air. This information can then be used by the authorities to take prompt actions such as evacuating people or sending emergency response team. A wireless distributed mobile air pollution monitoring system was implemented using the GPRS public network along with GPS. The system utilizes city buses to collect pollutant gases such as CO, NO2, and SO2. The pollution data from various mobile sensor arrays is transmitted to a central several that make this data available on the Internet through a Google Maps interface. The data shows the pollutant levels and their conformance to local air quality standards.

The proposed system consist of three main objectives:
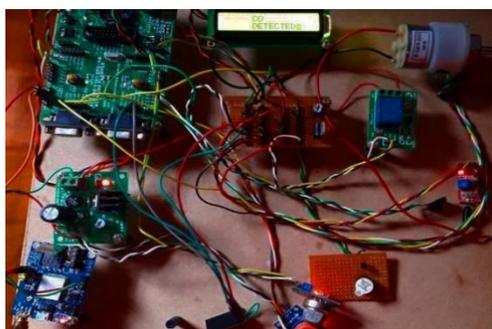
1. **Emission Control and Pollution Monitoring.**

Figure 1. CO &NO Detected.   Figure 2.messages sent through Wi-Fi

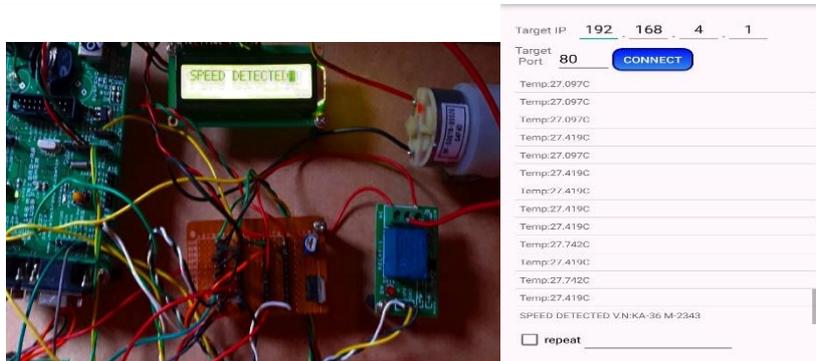**2. Speed Detection and Reduction.**

Figure 3. Speed detectedFigure 4. TCP/UDP client message
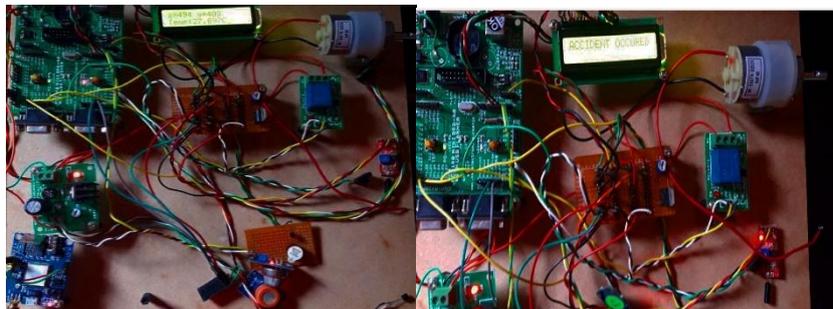
3. Accident Detection and Intimation.

Figure 5. Values of X, Y axis of   the accelerometer   Figure 6. Accident occurred
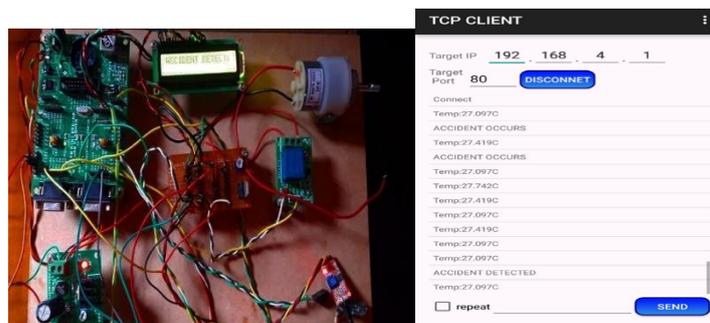

Figure 7. Accident detected   Figure 8.TCP/UDP Client message

VI. ADVANTAGES:

- Traffic violation detection
- Reduction in pollution levels
- Immediate assistance for accident victims
- Automated system Reduces human effort
- Automated Detection of Carbon Monoxide / Nitrogen/ Sulphor
- Automated Detection of Accident Severity

- Engine Temperature Monitoring
- Automatic Intimation Through IOT

VII. APPLICATION:

- It can be used in all transport systems
- System with little modification can be used in Logistics vehicle tracking and safety
- In government agencies
- In industries

VIII. CONCLUSION:

The proposed Wireless Air Pollution Monitoring System provides real-time information about the level of air pollution in these regions, as well as provides alerts in cases of drastic change in quality of air. This information can then be used by the authorities to take prompt actions such as evacuating people or sending emergency response team.

IX. ACKNOWLEDGEMENT:

We would like to thank our Guide **Mrs. Savitha R, Assistant professor, Department of ECE, RRIT** for giving us this opportunity to complete our project in our college, who also helped us in various stages of project and making this project a success.

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