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Accident Detection and Pollution Monitoring using Smart Vehicle

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Abstract: *The main aim of this paper is to control pollution monitoring as well as accident detection. The main factor is considered in vehicles to provide safety. Due to day by day increase in traffic and number of vehicles on road it is necessary to have a well-organized safety mechanism that helps to detect the accident in vehicles. From past decade the vision based vehicle detection techniques was main part for road safety. The improvements have gained an increasing amount of attention [1]. These techniques allows toughness due to huge variability in vehicle shape basically for motorcycles, various enlightenment conditions, driving behavior and degradation of air quality in cities. The result of a system is difficult interaction between natural and anthropogenic environmental conditions. Day by day increase in urbanization and industrialization there is increase in more pollution. Also poor control on emissions large number of particulate and toxic gases are produced. In this paper we are introduced a system which solves these main problems. In these methods we use major units like accident detection unit and pollution monitoring unit [2]. In this paper we use three methods to avoid accidents. First unit is accidents pressure measurement mechanism to detect accident using pressure sensors, second accelerometer and last pollution monitoring unit monitors real time pollution factor using different gas sensors. Also updates data and graphs to website all the units by using Wi-Fi to communicate to each other. Collected data from various unit can be transmitted.*

Keywords: *GPS, GSM, ADXL335, Arduino IDE, GSM- SIM900A, MQ-7 sensor, MQ-2 Sensor.*

I. INTRODUCTION

Accident detection and monitoring system is to rescuing people in accidents. This improved systems to get immediate help. In new era GPS systems are highly useful. This system enables the owner to observe and track his vehicle and vehicle movement and its past activities of vehicle. This new technology is called as vehicle detection Systems, which created many wonders in the detection of the vehicle. This hardware is attached on the vehicle in such a way that no one see it either it is inside or outside of the vehicle [1]. Hence it is used as underground unit which continuously or by any interrupt to the system. This system sends the location data to the monitoring unit. When the vehicle is stolen, the location data from tracking system can be used to the location and can be informed to police for further action. This system detects unauthorized movements of the vehicle and then alerts the wholesaler. This gives boundary over other pieces of technology for the same purpose. The accident alert system detects the accident as well as sends the location of the accident occurred using GPS. GPS coordinates to the specied mobile, computer etc. Most important features of Vehicle Tracking are: It is mainly benefit to the companies which are based on transport system. It also shows the position of vehicles in real time. Due to this system can create expected data accordingly. This vehicle Tracking system can store the all data where the vehicle had gone, where did it stop, It gives information about how much time it take at each and every stop and can create complete data analysis. It is also used in buses to estimation how far are they, how much time it takes for them to come to a particular stop? These systems are basically used to data capture, data storage, data psychotherapy and finally data transfer. The Features Accident Alert System is 1. This system is based on new technology 2. Its main purpose of this system is to detect an accident. 3. Also alert to the control room. 4. It can detect accidents as well as their intensity without any visual contact from control room. When we inserted this system in vehicle then it is simple to understand how many vehicles are involved in a particular accident and how intense is it. Due to this it is help from control room will be according to the control room. The propose method is designed for both vehicle tracking and accident alert systems. Due to this system make it more precious and useful. The proposed system board uses to alerts us from theft and on accident detection. This device detects pre-accidents also by placing pre detector in one of the interrupt pins. Vehicles are the main source of pollution in big cities like Delhi, Mumbai, Pune and Bangalore. The improper combustion in the engine of a vehicle leads to emission of different dangerous and harmful gases leading to increase in the pollution and unfavorably affecting the environment.

Identification and control of these gases in the environment is an important area of work. Gases emission from vehicles cannot be completely avoided, but definitely controlled. To overcome these problems we design automated control system to detect and control emission level of vehicle. In this system we use the sensors, data from the sensors is used to make check the pollution level and accordingly the control action is carried out [4].

II. SYSTEM OVERVIEW

Accident avoidance detection of vehicles has always been challenging task. many times Medical help cannot reach to accident spots in time and pollution is big problem of our world most of contribution in air pollution is by the vehicle in this project we are going to target these main three problems, how we can minimize response time to reach at accident spot and pollution monitoring.

A. Safety System for Vehicle

Almost 50 percent of the accidents which involve inattentiveness are due to driver distraction thirteen kinds of possibly distracting activities are drinking or eating, outdoor people, event or object, talking as well as listening on mobile phone and using in vehicle technologies etc.

- 1) Visual distraction (e.g. looking away from the roadway)
- 2) Cognitive distraction (e.g. being lost in thought)
- 3) Auditory distraction (e.g. responding to a ringing cell phone)

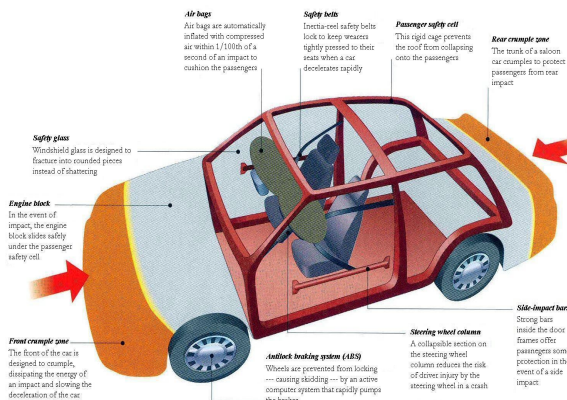


Fig 1: Safety System for Vehicle

- 4) Biomechanical distraction (e.g. manually adjusting the radio volume) region than other countries. An unexpected obstacle
- 5) Lane splitting, i.e., driving between two lanes
- 6) Speed limits Driving on the wrong side of road radio volume
- 7) Vehicle (or motorcycle) faults

B. IOT Based Vehicular Pollution Monitoring

Vehicles are the main source of pollution in cities. Day by day increase use of vehicles in cities results in vital increase in the emission load of various toxins into air. Result is increase in environmental problems which will affect the human health in urban areas. Air pollutants from car, buses, and taxis result in the damage of ground level ozone and other respiratory problem like asthma attacks. Transportation is main source for generating carbon monoxide that contributes 72 percent of total pollution in the metropolitan cities like Calcutta, Mumbai, and Delhi. To control the pollution at present the Indian pollution control board has made the fitness certificate as compulsory for public and commercial vehicles once in a year. Pollution Under Control (PUC) certificate for every three months is mandatory for all group vehicles from the date of registration. In order to control the air pollution, the amount of air pollution needs to be monitored and vehicles responsible for polluting should be indented.

C. Accident Detection Unit

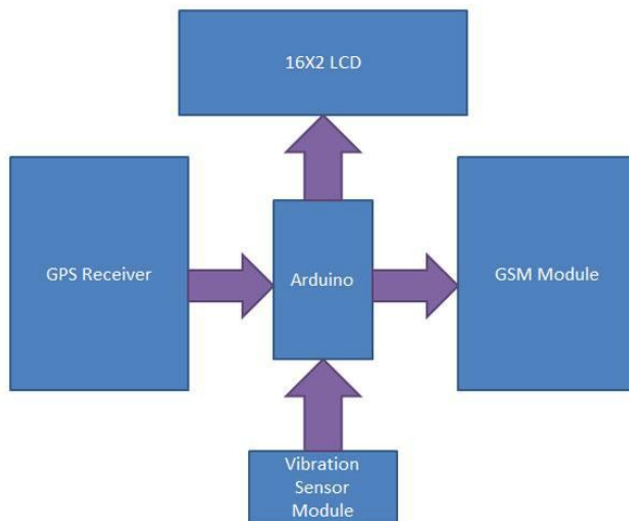


Fig 2: Accident Detection Unit block diagram

Pollution monitoring system using IoT Accident Detection is done in this unit using accelerometer ADXL335, pressure sensor. Threshold values for sensor are set in Arduino Atmega [4].

D. Pollution Monitoring Unit

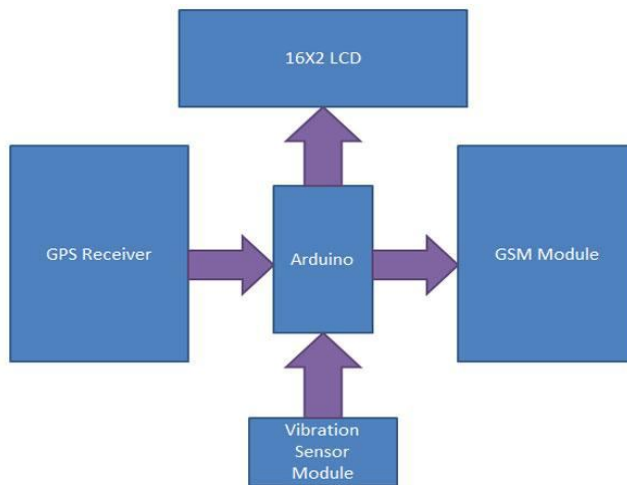


Fig 3: Pollution Monitoring Unit

Pollution Monitoring is done by this unit MQ2 and MQ7 detects the gases carbon monoxide and hydro carbon respectively and sends this data to RTO, vehicle owner.

E. Hardware Requirement

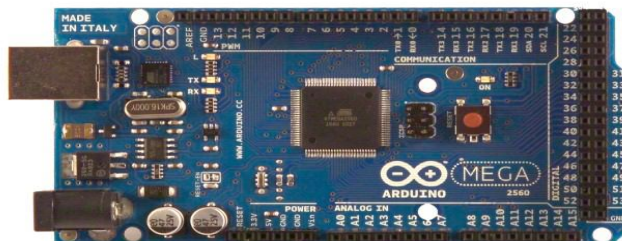


Fig 4: Arduino Board

The microcontroller Arduino Mega is board based on the ATmega2560 .It has 54 digital input/output pins (of which 14 can be used as PWM outputs), total 16 analog inputs, Atmega 2560 also consist of 4 UARTs (hardware serial ports)a 16 MHz crystal oscillator, a power jack, an ICSP header, and a reset button , a USB connection.

ATmega2560 consists of everything which is needed to support the microcontroller simply connect it to a computer with a USB cable or power it with an AC to DC adapter or battery to get started.

III. IMPLEMENTATION OF SYSTEM

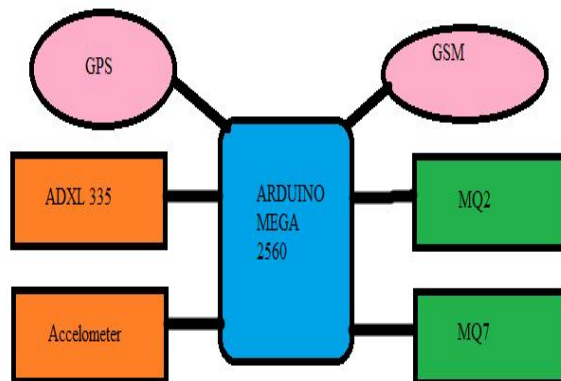


Fig 5: Architecture of System

The figure 5is a block diagram of system which explains the working procedure of the system which can be designed for this project. An Arduino UNO is used here for automation and controlling of the other supporting devices those are GPS, GSM, Accident Detection and pollution monitoring sensor, LCD display, puss switch, buzzer etc. Actually this paper gives a practical model of a vehicle accident detection and rescue information system which can do tracking of moving vehicle as well as detect accident in large area [4].

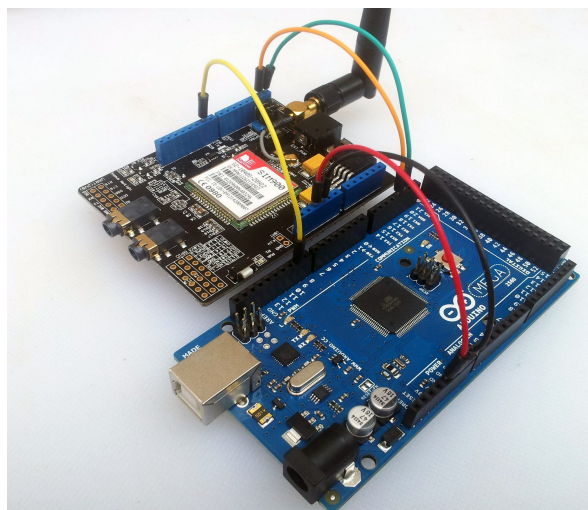


Fig 6: GPS Module Interface with Arduino

Actually this system consists of two sections, the first one is tracking location which is done by GPS in it and as the car moves the location of the car change continuously, the GPS finds the location in terms of two co-ordinates that are longitude and latitude. These two co-ordinates communicate with GSM modem which is shown in the block diagram. The second one is detection of accident through Pressure sensor. To detect accident, a threshold is set to a highest Pressure value. If the pressure value is greater than the threshold value, then it will consider that accident occur and wait 10 second for a confirmation. After detection of an accident the implemented system send the accident location to the web server. The web server then informs the car owner and nearest police station and hospital through web service using mobile SMS.



Fig 7: Messaging Facility In system

A. Hardware Connection

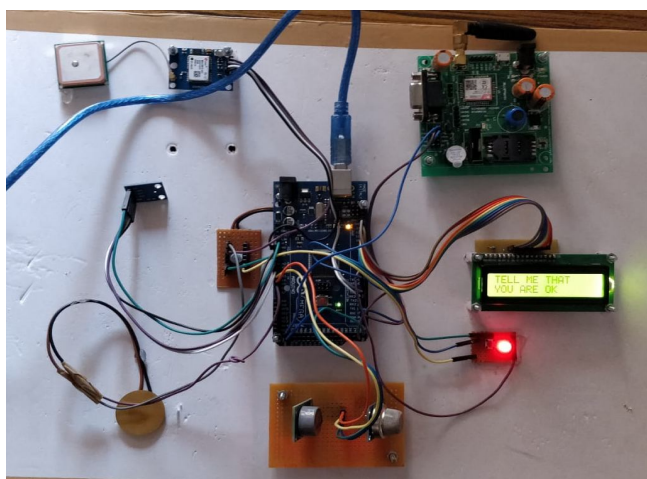


Fig 8: Implemented Hardware circuit Connection

The system is developed by using GSM/GPS/Bluetooth Shield SIM900 directly connected to all the pins of Arduino. Pin 2 of Arduino is used for RX and pin 14 for TX.15. Pressure sensors are connected with Arduino in pin number A5. A LCD display is connected at pin number PWM 8 to 13. A confirmation switch is connected in pin 3.

B. Circuit Connection ADXL335

The ADXL 335 measures acceleration along X, Y and Z axes and gives analog voltage output proportional to the acceleration along these 3 axes. Microcontrollers can process these voltages by converting them to digital signals using ADC. On the earth, 1g means acceleration of 9.8 m/s² is present. On moon, it is 1/6th of earth and on mars it is 1/3rd of earth.

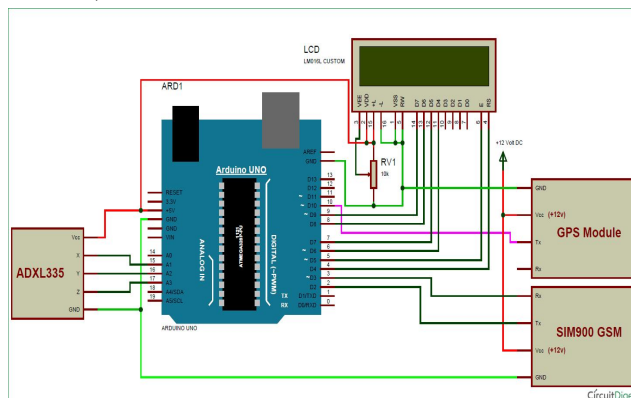


FIG 9: INTERFACING CONNECTION OF ADXL335



IV. CONCLUSION

The Vehicle Accident detection and pollution monitoring system is successfully implemented using database server and fulfil all the requirements. This device is capable of reading and collecting the required data and sends them securely to the database stored in server. Used system can do tracking of a vehicle which has this device. Besides, an accident occur this system can inform Police station and hospitals authority can to reach the accident spot using mobile SMS. Web base concurrent data visualization makes this system more convenient to see all the data in a clean,

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