



Automated Monitoring and Control of Vehicles Based Air Pollution Level and Safety

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ABSTRACT:The aim of this paper is to monitor and control the pollutants in the vehicles. The air pollution monitoring system contains smoke sensors to monitor the interested pollution parameter in environment. We simulated the three air pollutants gases including carbon monoxide, carbon dioxide & sulphur dioxide in smoke from the bike. These gases decide the degree of pollution level. When a vehicle reaches beyond certain threshold pollution level then the speed of the system gets automatically slowdown. Then the system gets switched off. Then the owner should service the vehicle for further activation. The RFID reader used to read the information about the owner. The GSM module is used to send the one time password to the owner mobile. By using the keypad a one time password is entered in the system then the vehicle gets started. The IR sensor is used to check whether the person wear the helmet or not. Vibration sensor is used to indicate during the time of an accident where the information is transmitted to the owner.

Keywords: Gassensor, GSM, Microcontroller, Buzzer.

I. INTRODUCTION:

Day by day the number of vehicles is increasing very fast. The increase use of vehicles in cities result in vital increase in the emission load of various toxins into air. As a result increase in environmental problems which will affect the human health in urban places. Detection and control of these gases emission source in the environment is an important area of work. Emission of these gases from vehicles cannot be completely avoided but in definitely can be controlled. As a solution to the above problems we aim to build an automated control system for emission level control if vehicles.

When the pollution/emission level shoots beyond the already set threshold level, there will be a buzzer in the vehicles to indicate that the limit has been breached. After the indication of the buzzer If the vehicle continuously emitting the pollution means the solenoid valve will be blocked then the vehicle gets automatically shut down. Then the owner should service the vehicle for further activation. The RFID reader used to read the information about the owner. The GSM module is used to send the one time password to the receiver (owner mobile). By using the keypad a one time password is entered in the system then the vehicle gets started. [7] discussed about a system, GSM based AMR has low infrastructure cost and it reduces man power. The system is fully automatic, hence the probability of error is reduced. The data is highly secured and it not only solve the problem of traditional meter reading system but also provides additional features such as power disconnection, reconnection and the concept of power management.

II. LITERATURE REVIEW:

Previously, there are many projects related to air pollution monitoring system that controls the pollution in the environment. Following are the previous projects.

A. Air Pollution Monitoring System Using Zigbee and GPS Module:

Air pollution has harmful effects that cause acid rain global warming [12]. To reduce these effects air pollution monitoring system is important. A low power wireless sensor network and control of inter-node data reception for use in the real time acquisition and communication of air pollutants such



as SO₂, CO, NO₂ and NO etc. The main objective is achieved by interfacing various sensors to measure the common air pollutants. The measured data is displayed on the monitor using the graphical user interface (GUI). The data based server is attached to the pollution server for storing the pollutants level. Pollution server is interfaced to Google maps to display real time pollutants, pollutants level and locations in large areas.

B. Automated System For Air Pollution Detection and Control of Speed in Vehicles:

The aim of this paper is to monitor and control the pollutants in the vehicle by using the pollution control circuit [4]. This pollution control circuit consists of various sensors like gas sensors, temperature sensor, GSM, Pulse Width Modulation (PWM) and all of them are integrated and connected to a controller. When a vehicle reaches beyond certain threshold pollution level then the speed of the system gets automatically slow down and if the temperature reaches beyond some threshold value fan is automatically turned on. The DC motor speed control of the system is done using PWM.

C. Automated Control System For Air pollution Detection in Vehicles:

Vehicles and Industries are the major sources of Environmental pollution [4]. We aim to build an automated control system for emission level detection in vehicles and also indicates this level with a meter. 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 this information has been send to traffic control room which includes vehicle number, owner details and location of the vehicle by using GPS. If this information comes to control room more than 3 days, challan has been generated and send directly to the owner.

D. Automated monitoring and control of vehicles based on air pollution level and safety:

The air pollution monitoring system contains smoke sensors to monitor the interested pollution parameter in environment. We simulated the three air pollutants gases including carbon monoxide, carbon dioxide & sulphur dioxide in smoke from the bike.

These gases decide the degree of pollution level. The aim of this paper is to monitor and control the pollutants in the vehicles. When a vehicle reaches beyond certain threshold pollution level then the speed of the system gets automatically slowdown. Then the system gets switched off.

III.METHODOLOGY

In this project we were implemented pollution monitoring system based on the amount pollution released from vehicle. We were done this project using real time operating system, first the pollution level was measured by using WSN. When the pollution/emission level shoots beyond the already set threshold level, There will be a buzzer in the vehicles to indicate that the limit has been breached. After the indication of the buzzer If the vehicle continuously emitting the pollution means the solenoid valve will be blocked then the vehicle gets automatically shut down. Then the owner should service the vehicle for further activation. The RFID reader used to read the information about the owner. The GSM module is used to send the one time pass word to the receiver(owner mobile).Via the keypad. A onetime password is entered in the vehicle then the vehicle gets started.The IR sensor is used to check whether the person wear the helmet or not.

A. System Architecture:

Fig.a shows the architecture of transmitter section. Fig.b shows the architecture of receiver section. Whole System including Micro controller(AT89S52), Smoke sensor, RF ID reader, GSM, LCD display, Buzzer, Relay, Motor, Keypad, Vibration sensor, IR sensor. The AT89S52 chip on the control circuit is the main processor where it control the whole system.

B. Global System for Mobile communication:

GSM is the technology that underpins most of the world's mobile phone networks[5]. It is a second generation cellular standard developed to cater voice services and data delivery using digital modulation. GSM operates in the 900MHZ and 1.8GHZ bands GSM supports data transfer speeds of up to 9.6kbps, allowing the transmission of basic data services such as SMS. The GSM module is used to send the one time password to the receiver (owner mobile).



C. RFID Reader:

Radio frequency identification (RFID) is a generic term that is used to describe a system that transmits the identity of an object or person wirelessly, using radio waves [1]. It's grouped under the broad category of automatic identification technologies. The antenna emits radio signals to activate the tag and to read and write the data to it. The reader emits radio waves in ranges of anywhere from one inch to 100 feet or more, depending upon its power output and radio frequency used. When an RFID tag passes through the electromagnetic zone, it detects the reader's activation signal. The reader decodes the data encoded in the tag's integrated circuit and the data is passed to the microcontroller for processing through the UART. The purpose of an RFID system is to enable data to be transmitted by a portable device, called a tag, which is read by an RFID reader and processed according to the needs of a particular application. The data transmitted by the tag which provide the identification of a person.



Fig1: RFID Reader

D. Smoke sensor:

A gas detector is a device which detects the presence of gases like CO, CO₂ and SO₂ within the system [3]. This type of equipment is used to detect a gas leak and interface with a control system so a process can be automatically shut down.



Fig2: Smoke sensor

E. Microcontroller:

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-

system programmable Flash memory[12]. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional non-volatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications. The AT89S52 provides the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines.



Fig3: AT89S52

F. DC Motor:

The speed control of any vehicle can be demonstrated using simple DC motor [11]. The speed of the motor depends on the voltage supplied to it.

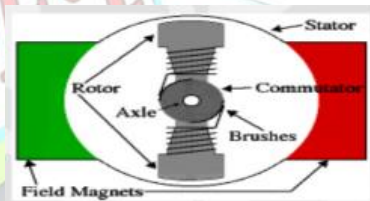


Fig4: DC Motor

G. Buzzer:

A Buzzer or beeper is an audio signaling device [10]. Typical uses of buzzers and beepers include alarm devices, timers and confirmation of user input such as a mouse click or keystroke. When the pollution/emission level shoots beyond the already set threshold level there will be a buzzer in the vehicles to indicate that the limit has been breached.



Fig5: Buzzer



H. IR sensor:

IR sensor is the digital sensor. The IR sensor is used to check whether the person wear the helmet or not. Infrared (IR) light is electromagnetic radiation with a wavelength longer than that of visible light, measured from the nominal edge of visible red light at 0.7 micrometers, and extending conventionally to 300 micrometers. These wavelengths correspond to a frequency range of approximately 430 to 1 THz.

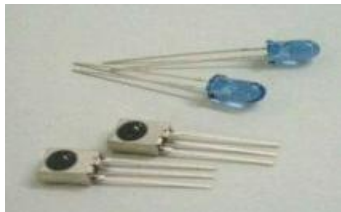


Fig6: IR Sensor

I. Vibration Sensor:

Vibration sensor is used to indicate during the time of an accident where the information is transmitted to the owner. The Point Sensor Vibration sensor is a battery operated digital vibration sensor with a microprocessor controlled 418 MHz.



Fig7: Vibration Sensor

J. LCD Display:

LCD is used to display the character. It can display 16 characters per line. It is used to display the pollution level emitted from the vehicle [5].

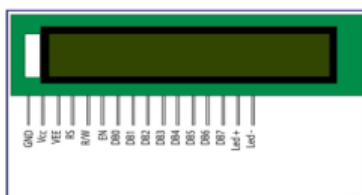


Fig8: LCD Display

K. Keypad:

A keypad is a set of buttons arranged in a block or "pad" which usually bear digits, symbols and usually a complete set of alphabetical letters [6]. If it mostly contains numbers then it can also be called a numeric keypad.



Fig9: Keypad

L. Relay:

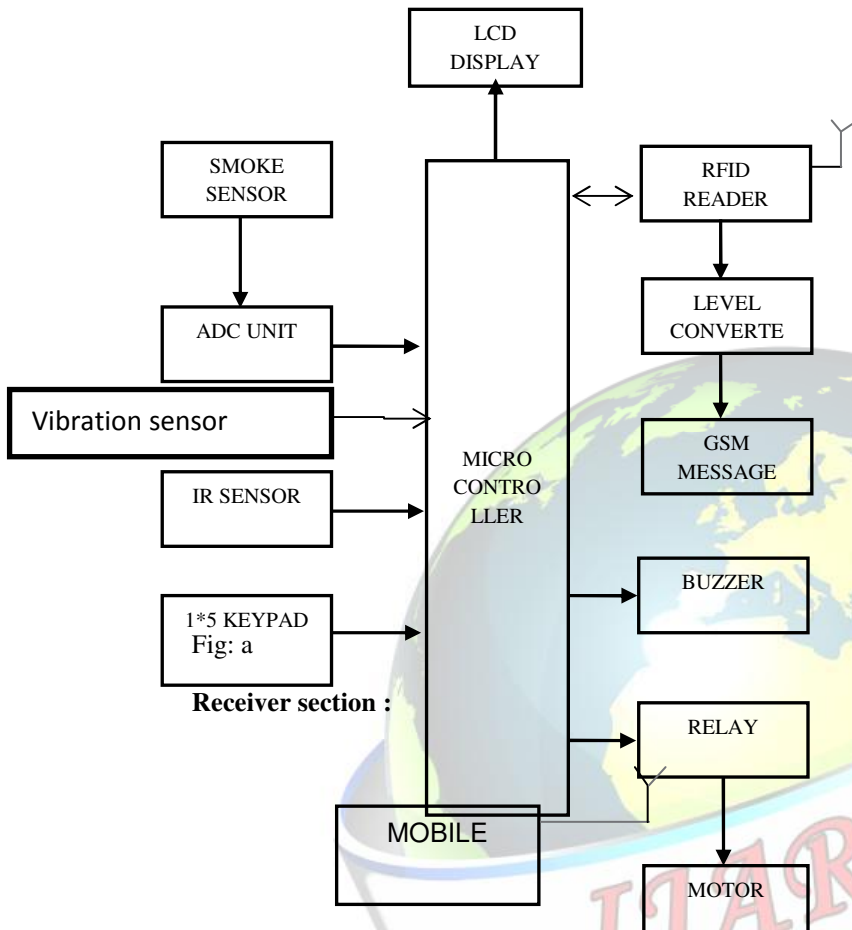
Relay is an electrically operated switch. A relay that can handle the high power required to directly control an electric motor is called a contactor [9].



Fig10: Relay

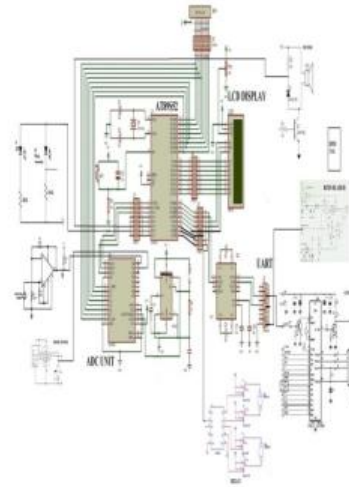


Transmitter section:



Receiver section :

SCHEMATIC DIAGRAM:



RESULT AND ANALYSIS

The Signals acquired from the smoke sensor are compared with the user defined set point crossing the threshold limit the pollution level gets displayed in the LCD and when it exceeds the set point it gives a buzzer indication following the motor gets off.

The table below shows the sample of results obtained from the system Honda bike

Pollution level			Time	Motor condition	Vehicle condition
CO	CO2	SO2			
50 ppm	80 ppm	120 ppm	8am	OFF	ON
90 ppm	40 ppm	20 ppm	9am	OFF	ON
100 ppm	80 ppm	200 ppm	12pm	ON	OFF
60 ppm	220 ppm	70 ppm	4pm	ON	OFF

Table: Monitoring the pollution levels



CONCLUSION

An embedded system for hazardous gas detection has been implemented. Here only three gases (CO, CO₂, SO₂) has been detected for demo purpose. The system will be one of the greatest improvements in technology to keep the environment free from vehicular emission and bring it to a halt if the pollution level is more than the standards. Our system will not change the configuration of the engine by any means, and it is employed in the existing vehicles. As our system is designed with low cost and low power, this can be extended to home, transport and industrial applications. Thus the project has been successfully designed and tested.

REFERENCES

- [1]. Chi-Man Vong —Application of RFID Technology and the Maximum Spanning Tree Algorithm for Solving Vehicle Emissions in Cities on Internet of Things| 2014 IEEE World Forum on Internet of Things (WF-iot)
- [2]. Rita Mahajan – Asst professor, Department of electronics” Air quality Monitoring System based on Arduino microcontroller.
- [3]. Nishigandha Athare, Prof. P. R. Badadpure [3] “Human safety and air pollution detection in vehicles”
- [4]. Anita kulkarni, T. Ravi Teja ”Automated System for Air Pollution Detection and Control in Vehicles ” /ijareeie.2014.0309061
- [5]. Poonam M Baikar , “Design of PID Controller Based Information Collecting Robot in Agricultural Field”-IJAR, EEIE volume 8-2014
- [6]. Poonam M Baikar, Neelam Punjabi, Chandrakant Kadu “Real Time DC Motor Speed Control using PID Controller in LabVIEW”
- [7]. Christo Ananth, G. Poncelina, M. Poolammal, S. Priyanka, M. Rakshana, Praghash. K., “GSM Based AMR”, International Journal of Advanced Research in Biology, Ecology, Science and Technology (IJARBEST), Volume 1, Issue 4, July 2015, pp:26-28
- [8]. S. Arun, Dr. J. L. Mazher Iqbal, “Embedded System Based Air Pollution Detection in Vehicles V. Siva Krishna” ,
- [9]. George F. Fine, Leon M. Cavanaugh, Ayo Afonja and Russell Binions ” Metal Oxide Semi-Conductor Gas Sensors in Environmental Monitoring”, Sensors 2010, 10, 5469-5502; doi:10.3390/s100605469
- [10]. J. N. Mohite, S. S. Barote Professor, “Low Cost Vehicle Pollution Monitoring System”.
- [11]. Areas Srinivas Devarakonda, Parveen Sevusu, Hongzhang Liu, Ruilin Liu, Liviultode, Badri Nath “Real-time Air Quality Monitoring Through Mobile Sensing in Metropolitan”
- [12]. Darshana N. Tambe and Ms. Nikita Chavan “Detection of air pollutant using ZIGBEE” International Journal of Ad hoc, Sensor & Ubiquitous Computing (IJASUC) Vol.4, No.4, August 2013