Embeded Technology for Vehicle Cabin Safety Monitoring and Alerting System

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Abstract: Motor vehicles are the prime source of transportation where vehicles with A/C play a major part. This paper designs an embedded system for a vehicle cabin, which senses the gases like carbon-monoxide andoxygen and displayed at each and every second. If the level of the CO increases than the normal level (30ppm) or the level of the oxygen decreases than the normal level (19%) then an alarm is generatedautomatically and also ventilation is provided immediately. A warning message is sent to the authorized user via GSM. The advantage of this system is proper detection and faster response time leading to fasterdiffusion of the situation, compared with the manual methods. By using GSM module Nowadays air polluting due to high emission of co (carbon monoxide) from vehicle violate the environment. We rectify this problem by use of co monitor fixed in every vehicle by manufactures. Co sensor continuously monitors co value from vehicle. If vehicle emits more amount of co than allowable value (fixed by traffic control dept.) stored microcontroller, our system send the car no and value of co to traffic control room by using GSM module. In addition our system alerts the ambulance incase of accident occur. MEMS sensor detect the accident. Our system send the car no and latitude and longitude (place where accident occurred) of GPS value to ambulance by using GSM module.

Key words: A warning message is sent to the authorized user via GSM

INTRODUCTION

Motor vehicles are they not only the prime source of transportation, but also the prime source of pollution. These motor vehicles contribute to over 30% of the hazardous gases that are released into the atmosphere. Outdoor pollution levels are the key concern, but the quality of air inside the vehicle plays a major part. As the vehicle cabin is small area, any suspended particulate such as dust, fumes, smokes entering in to it through either ventilation or through windows can cause serious health problems to the person inside [1]. These particulate matters can cause problems which may differ from acute and chronic effects on human health. The health effects range from minor irritation of eyes and the upper respiratory system to chronic respiratory disease, heart disease, lung cancer and even death. Even if the vehicle is equipped with the air cabin filters that are present inside the cabin so as to reduce the effect of the unwanted particulate, they cannot be a viable solution to control it. Even though the producers of various vehicles mainly concentrate on these safetyprecautions, the carelessness of the end users or the drivers regarding the condition of the vehicle may cause serious damage not only to the vehicles but also to the human lives. Such that even the minor eye irritation can make the driver to lose his concentration on the road, which may lead to serious accidents [2].

Hence to overcome these types of problems there is a need tomonitor several gases such as carbon monoxide (CO) and the oxygen level is required to ensure complete vehicle occupant comfort and safety [3]. The embedded system is used inside a vehicle cabin such that the presence or leakage of toxic gases can be detected by the gas sensors and proper precautions can be taken to avoid the driver fromgetting fatigue or drowsiness [4]. Headache, dizziness, weakness, nausea, vomiting, chest pain and confusion are the most common symptoms of CO poisoning. This paper designs an embedded system for toxic gas CO and oxygen level detection inside the vehicle cabin and to develop a sensing system using a sensor array and microcontroller. If the toxic gas reaches

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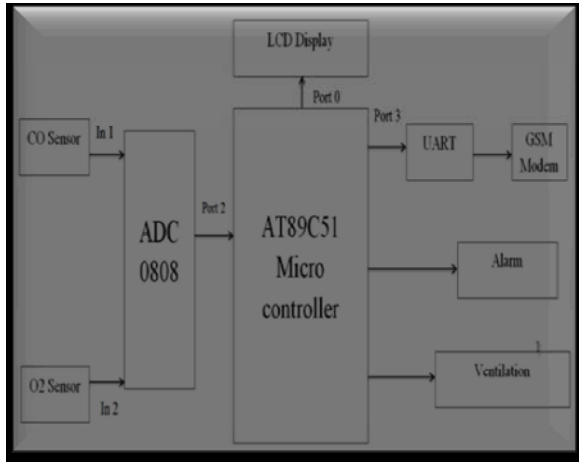
Fig 1.1:

the maximum threshold level, the detection unit detects, an alarm is generated immediately and the ventilation will be provided automatically. And then an SMS is send to the authorized user through the GSM module [4].

Block Diagram: The AT89C51 micro controller is connected to the Analog to digital converter such that the inputfrom the sensors are converted into digital input and then sent to the microcontroller it thendisplays the result through LCD. If a critical situation is experienced then an alarm is given foralerting the diver and ventilation is provided as an exhaust and as a remedy measure. A textmessage is sent to the authorized user indicating the critical situation of the vehicle. The blockdiagram of the proposed system is shown in figure 1.1.

Existing System: In the year of 2008, LIU zhen-ya, WANG Zhen-dong and CHEN Rong, "Intelligent ResidentialSecurity Alarm and Remote Control System Based On Single Chip Computer", the paper focuseson, Intelligent residential burglar alarm, emergency alarm, fire alarm, toxic gas leakage remote automatic sound alarm and remote control system, which is based on 89c51 single chip computer. The system can be automatic alarm, automatic calling the police hotline number. It can be usedvoice alarm and show alarm occurred address. It can set up and modify user password. It can berecordable and voice suggestion. It can be used telephone remote control electrical power [5].

In the year of 2008, Chen Peijiang and Jiang Xuehhua, "Design and implementation of RemoteMonitoring System Based on GSM", this paper focuseson the wireless monitoring system, because the wireless remote monitoring system has more and more

application, a remote monitoring system based on SMS of GSM is presented [6]. Based on the total design of the system,the hardware and software of the system is designed. In this system, GSM network is a medium for transmitting the remote signal. The system includes two part which are the monitoring centreand the remote monitoring station. The monitoring consists of a computer and a TC35 communication module of GSM. The computer and the TC35 are connected by RS232. Theremote monitoring station includes a TC35 communication module of GSM, a MSP430F149MCU, a display unit, various sensors, data gathering and processing unit. The software of themonitoring center and the remote monitoring station is designed by using VB. The result of demonstration shows that the system can monitor and control the remote communication between the monitoring center and the remote monitoring station and the remote monitoring function isrealized [7].

In the year of 2006, IoanLita, Ion Bogdan Cioc and Daniel Alexandru Visan, "A New Approach of Automatic Localization System Using GPS and GSM/GPRS Transmission", this paper focuseson, a low cost automotive localization system using GPS and GSM-SMS services. The systempermits localization of the automobile and transmitting the position to the owner on his mobile phone as a short message (SMS) as his request. The system can be interconnected with the caralarm system and alert the owner, on his mobile phone, about the events that occurs with his carwhen it is parked. The system is composed by a GPS receiver, a micro controller and a GSM phone. Additional, the system can be settled for acquiring and transmitting of information, when requested about automobile status and parameters or alert when it started engine, system can be used as navigation system. Optional, the system can be used as car low cost solution forautomobile position localizing and status, very useful in case of watching and monitoring by theirparents, as well as in car tracking system application. The proposed solution can be used in othertypes of application, where the information needed are requested rarely and at irregular period of time.

"Investigation of gas sensors for vehicle cabin air quality monitoring", this paper focuses on, car cabin airquality monitoring can be effectively analyzed using metal oxide compared with fabricated Moo3 based sensors possessed comparable gas sensing properties. The sensor has response 74% higherrelative to the hest commercial sensor tested [8]. In the year 2000, K. Galatsis,

W. Woldarsla, Y.X. Li and K. Kalantar-zadeh, "A Vehicle air quality monitor using gas sensors for improved safety", this paper focuses on A vehicle cabin air quality monitor using carbon monoxide (CO)and oxygen (02) gas sensors has been designed, developed and on-road tested. The continuous monitoring of oxygen and carbon monoxide provides added vehicle safety as alarms could be setoff when dangerous gas concentrations are reached, preventing driver fatigue, drowsiness andexhaust gas suicides. CO concentrations of 30ppm and oxygen levels lower than 19.5% wereexperienced whilst driving [9].

Proposed System:

- In this paper, we propose clipping scheme and equalizer as methods to reduce the effects of impulsive nois
- e and channel attenuation in power line communication(PLC) system. Clipping is cutting off the amplitude of the received signal over threshold level without its phase.
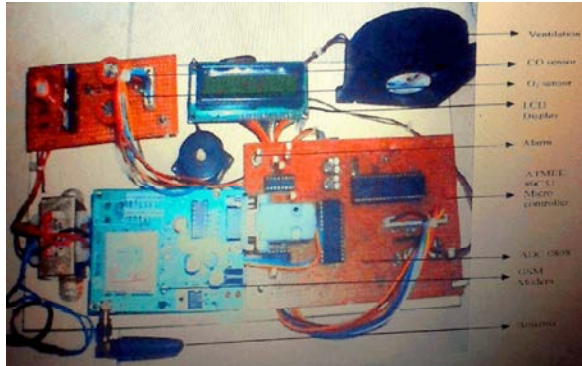
Hardware Kit Photo:

Fig 2: ATMEL microcontroller based hardware kit.

Hardware Description
Atmel 89C51 Microcontroller
Features:

- Compatible with MCS-51™ Products
- 4K Bytes of In-System Reprogrammable Flash Memory Endurance 1,000 Write/Erase Cycles
- Fully Static Operation: 0 Hz to 24 MHz
- Three-level Program Memory Lock
- 32 Programmable I/O Lines
- Two 16-bit Timer/Counters
- Programmable Serial Channel
- Low-power Idle and Power-down Modes

Carbon Monoxide(co) Sensor Features:

- High sensitivity
- Detection Range: 10-1000 ppm of CO
- Response time :< 150s
- Heater voltage: 5.0V
- Dimensions: 16 mm diameter, 10 mm high excluding pin, pins-6 mm High.

CONCLUSION

An embedded system is designed and tested for toxic gas detection inside a vehicle cabin usingATMEL 89C51 microcontroller. Toxic gas like CO is less sensible by human which endangersthe human lives. This critical situation can be avoided by implementing the sensors for sensingthe level of CO and oxygen level and is displayed every second. When the Co level exceedsnormal level that is CO is greater than 30ppm and if the Oxygen level decreases below the normal level of 19ppm then the designed system provides an alarm and also the warning message to the authorized user. Ventilation is immediately provided in the cabin, whenever this critical situation occurs. This prototype can also be used at Home; Educational and working institutions formonitoring the indoor air quality which intern enhance the quality of working environment.

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