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# CAR INTERIOR ATMOSPHERE SAFETY MONITORING SYSTEM

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**Abstract**—The car's interior atmosphere must always be favorable for the passengers to survive. But if the passengers inside the car experience any of these situation like pollution entering inside the cabin, tail gate leakage, A/C compartment leakage and for a prolonged time all windows of the car are closed with passengers in it then it will slowly pave the way to unpleasant situation i.e. hazardous for the passengers to survive and finally even leads to death. All over the world these situation prevailed and are still prevailing. Thus this proposed embedded solution is an alert system that monitors the toxic gases inside the enclosed space. The oxygen sensor, microcontroller and GSM help to be better monitoring alert system for the safety of the passengers inside the car.

**Keywords**—.Sensor, microcontroller, GSM modem, carbon monoxide, volatile organic compounds, nitrogen oxide, hydrocarbons

## INTRODUCTION

The interior atmosphere of the car must always be good for the passengers. The passengers have to survive inside the car without undergoing any form of disturbances. But all over the world many people had died because of unpleasant atmosphere they faced inside the car. Unpleasant atmosphere is nothing but toxic gases. Toxic gases like carbon monoxide, volatile organic compounds, nitrogen oxide, hydrocarbons and volatile organic compounds [1-3] and even increase in carbon dioxide gas are main threat to the passengers inside the car.

These toxic gases occur mainly due to pollution entering inside the cabin, tail gate leakage, block inside the tail gate and A/C compartment leakage. When these gases are found in higher level inside the vehicle cabin then it will lead increase in drowsiness of the passengers and the driver of the car which tends the drivers to get into accidents. During the closed environment i.e. enclosed space inside the car's cabin, then these gases will be recirculates inside the closed cabin of the car. This recirculate air will gradually decrease the oxygen for the passengers to survive pave way to drowsiness will later lead to fatigue.

Fatigue is frequently coupled with feelings of drowsiness or sleepiness, loss of alertness, inability to concentrate, lack of sleep and slowed reactions. The fatigue symptoms can derive from exhaust pollutants such as nitrogen oxide, hydrocarbons and carbon monoxide causing headaches, nausea, and dizziness finally reducing the hand-eye coordination that may increase the possibility of accidents [4, 5]. The Department of Transport in Australia has once stated that fatigue is the root cause for 20% of crashes involving a fatality [6].

An O2 deficient environment has been termed "hazardous" by OSHA when the O2 concentration is less that 19.5% [7]. Low O2 levels can damage the driver's decision, increase heart rate and weaken the muscular coordination. Thus fatigue will lead to head ache, lack of concentration, muscular coordination, hand-eye coordination and increased heart rate finally lead to slow death of the passengers inside the car cabin.

A particular report stated that the motor vehicle exhaust gas suicides caused by CO poisoning. A study of U.S. deaths found that 57% of unintentional CO poisoning deaths occurred in automobiles [8]. The year 2002 in Australia, statistics indicate that 416 persons (18%) died from motor vehicle exhaust gas [9].

The Finest method to prevent these poisonous gas consumed by any living being is to ensure proper oxygen is consumed by them with the help of oxygen therapy. Breathing pure oxygen can carry the oxygen level in the blood of any living being back to normal. Therefore proper ventilation is very essential [10-12] to maintain the oxygen level to the standard level and thereby avoiding any dangerous situation. Therefore, the oxygen concentrations must be measured and estimated accurately for the safety, health and comfort of any living being inside the vehicle.

## PROPOSED SYSTEM

An embedded based safety monitoring and alert system is proposed based on the microcontroller and oxygen sensor, GSM modem. The oxygen sensor help to identify the level of oxygen that any number of passengers need to survive. If the threshold value says 19% ppm is lowered then incremented of any form of toxic gases like carbon monoxide, volatile organic compounds, nitrogen oxide, hydrocarbons and volatile organic compounds and even increase in carbon dioxide gas are prevailed inside the enclosed space of the car. This oxygen sensor will help to monitor the O2 level inside the car's enclosed cabin to make sure that that all the passengers and the drivers are safe and comfortable. This oxygen sensor will be placed inside the car in such a way that it will help to detect the oxygen gas that are found inside the car for the passengers to survive.

### A. SYSTEM DESIGN

Proposed System is to ensure that how to avoid these critical situations to the passengers inside the closed car cabin, the main motive is the lives of the passengers must be saved. The complete overview of the system is found in the Figure 1.

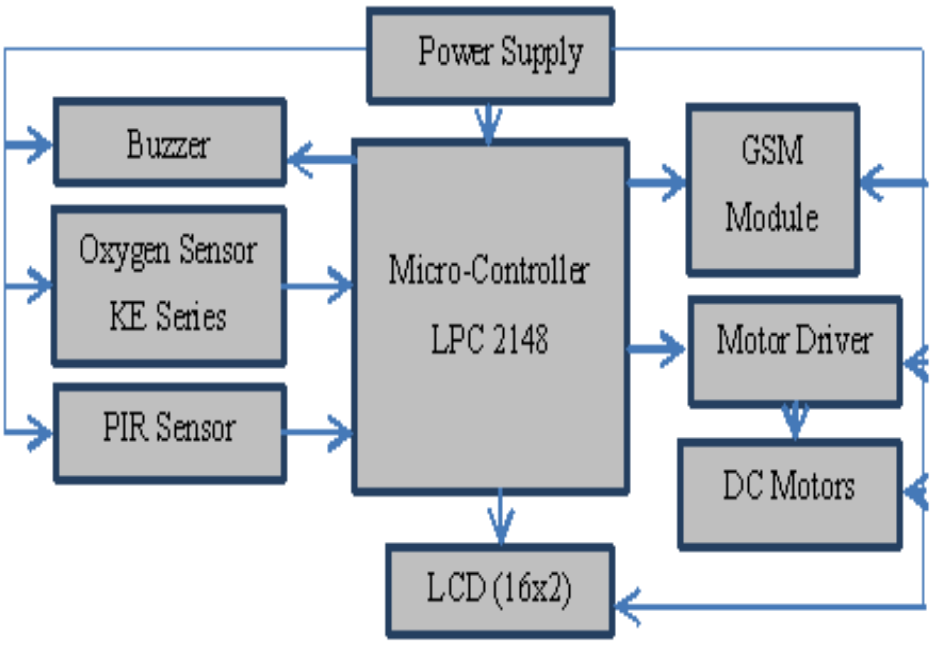


**Figure 1.Block Diagram of the Proposed System**

The stepwise procedure of the proposed system

- Oxygen reading will be continuously checked by the microcontroller if it has crossed the critical limit.
- If the critical limit is reached then the microcontroller will check the PIR sensor is true or false. True means passengers are found inside the enclosed space, false means no passengers are found.
- If the PIR sensor is true then the condition is satisfied, buzzer will ring, SOS (save our soul) message will be sent to the respective person and the window will be lowered automatically.

Thus, the flowchart Figure 2, gives a complete schematic of these proposed system steps. These steps will help in specifying on how the proposed system works on the real time world. Figure3.Shows the final overview of the Proposed System

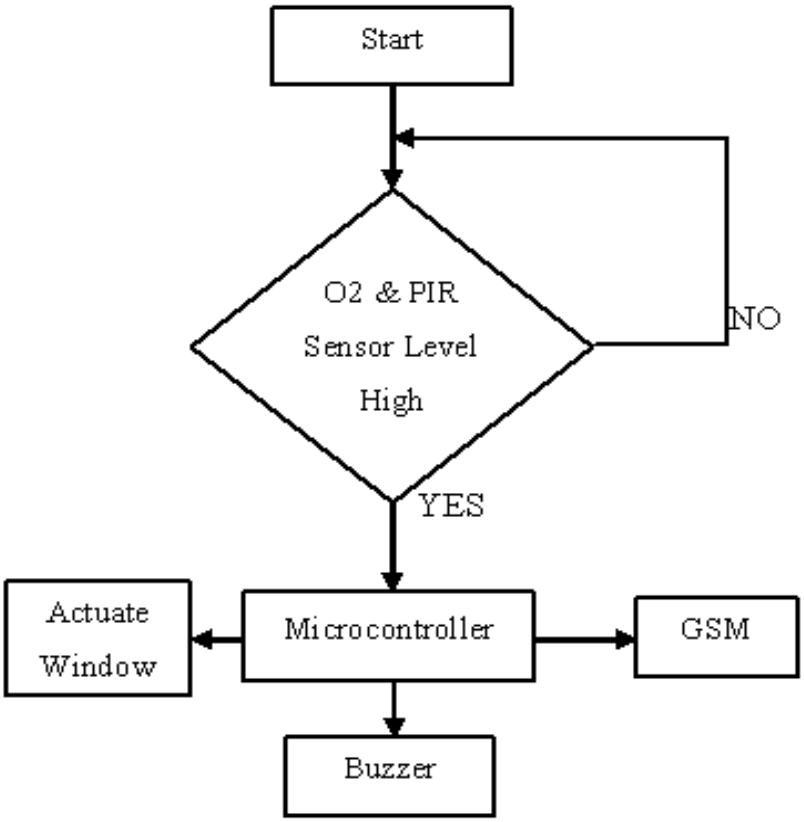


**Figure 2.Flowchart of the Proposed System**

## A. HARDWARE SPECIFICATIONS

### LPC 2148 MICROCONTROLLER

The LPC2148 is a 32-bit microcontroller platform with Thumb extensions. The features included are 512KB on-chip Flash ROM along with In-Application Programming and In-System Programming i.e.(IAP) and (ISP) respectively, ADCs, USB 2.0 Full Speed Device Controller, Two I2C serial interfaces, two SPI serial interfaces, PWM unit, optional battery backup and General purpose I/O pins.

### OXYGEN SENSOR

The KE-25 Oxygen Sensor is a unique galvanic cell type sensor which provides a linear output voltage signal relative to percent oxygen present in a specific atmosphere. The sensor features long life expectancy, excellent chemical durability, and it is not influenced by CO2, making it ideal for oxygen monitoring.

### PIR SENSOR

PIR sensor detects any living being moving around within 10m distance i.e. the detection range is between 5m to 12m from the sensor. PIR detects the levels of infrared radiation of any living being. Power is usually up to 5V.

### GSM MODEM

GSM modem is used for Wireless connectivity. Any GSM network operator SIM card can be accepted by this modem. The Save our soul messages can be sent to the respected person say driver, the vehicle owner, and even nearest police stations using this modem which will be connected along with the microcontroller.

### POWER SUPPLY

Variable power supply is needed since the actuating window needs 24 volts and the microcontroller needs 5 volts and all the sensors to need 5 volts. So a variable power source of 1.5 V to 24 V is needed.

**LCD DISPLAY**

Here 16x2 LCD Display is used for displaying the monitored Temperature reading.

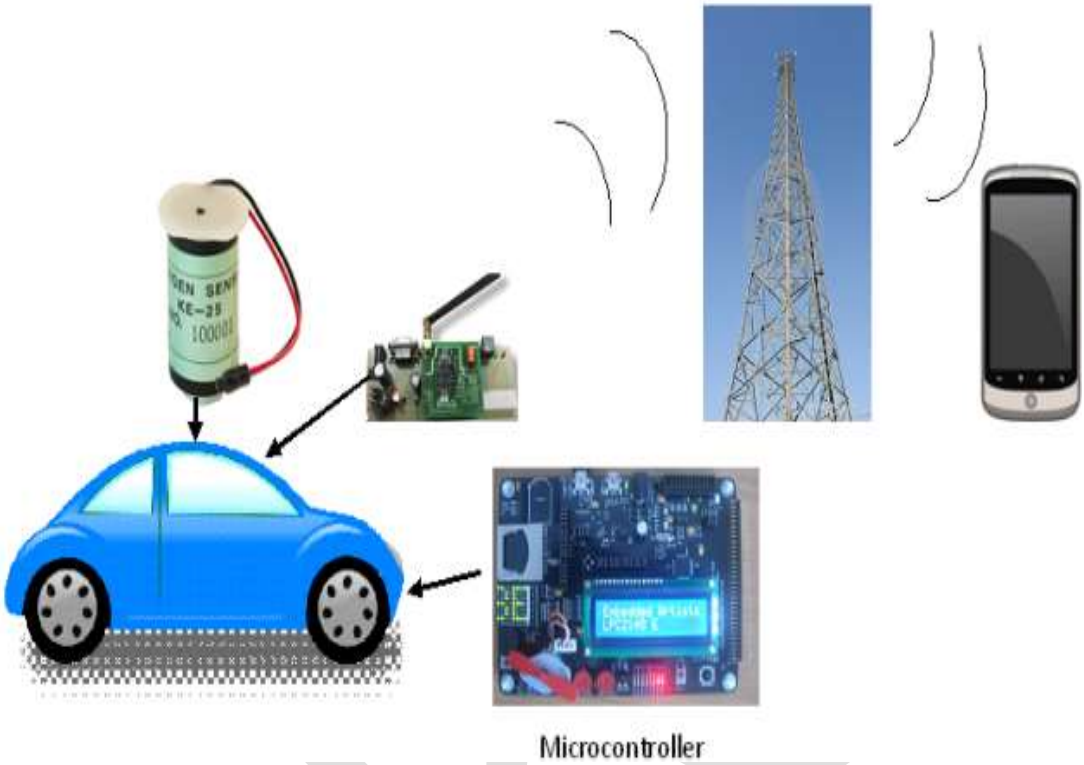


**Figure 3.Overview of the Proposed System**

**ACKNOWLEDGMENT**

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## CONCLUSION

Thus this proposed system has more advantage of real time scenarios. With the help of this oxygen sensor which is more reliable, durability and efficiency can be achieved. Thus this system for the existing problem that has been prevailed for a very long time must be made mandatory in all the vehicles i.e. old or new so that the world will have a better solution.

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