

Pollution Monitoring and Alert System inside a car

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Abstract— The pollution is a Major source of vehicle emission and these pollutants from the vehicles are Carbon monoxide, Carbon dioxide, Nitrogen dioxide and Hydrocarbon [1-3]. This pollution generates harmful effects to human health. Even suicidal death of passengers occurs due to leaks inside the car all around the world. The Proposed system detects the air pollutants in vehicle and alerts the user by sending warning message about the emission level of carbon monoxide and nitrogen dioxide using GSM. In order to help passengers, the system supports to locate the nearest service station. The system sends the car number and the particular geographical location of the car to the nearest police station during any emergency situation.

Keywords—Sensors, carbon monoxide, nitrogen oxide, hydrocarbons, microcontroller, GSM

I. INTRODUCTION

The major source of air pollution is from exhaust fumes of any vehicle. Carbon monoxide is the primary air pollutant around the world and in the United States it is the number one source that comes from vehicle exhaust. This exhaust gases produces 60% of all carbon monoxide emissions in the United States and will go up to 90% [7, 8]. If the air filters are not changed regularly in your car's air conditioning units then it will gather dust and cause the increase of pollutants in the air that the passenger breathe inside the car and even AC leak too occurs due to this.

1.1. Major pollutants

1.1.1. Carbon monoxide

Carbon monoxide is a colorless, odorless, poisonous gas which is emitted from the vehicle's exhaust as a result of incomplete combustion when burning fossil fuels such as coal, petroleum and natural gas. It interferes with the human blood's capacity to carry oxygen to the brain, heart, and other tissues. Newborn or unborn infants and passengers with heart disease are in greatest threat from this pollutant, but even healthy and normal passengers can experience headaches, fatigue and reduced reflexes due to CO exposure.

1.1.2. Sulphur dioxide

Sulphur dioxide is produced when fuel containing sulphur is burned down in diesel engines. Sulphur dioxide exposure constricts air passages, creating problems for young children and for passengers with asthma. The children small lungs need more effort to work harder than adult passenger's lungs.

1.1.3. Nitrogen dioxide

Nitrogen dioxide and correlated nitrogen oxides (NO_x) are produced when fuel is burned down. These compounds supply to the formation of ozone and are at great risk in health problem. The results of NO_x disclosure on the respiratory system is alike and are very similar to that of sulphur dioxide and ozone.

1.1.4. Particulate matter

Particulate matter includes little droplets of liquid and microscopic particles. Because of their small size, these particles are easily entered into the passengers body's and go profound into the lungs, where they may become trapped and cause irritation. Wheezing, asthma and similar symptoms that

are experienced by many passengers due to particulate matter. Particulate matter is a major toxic air pollutant.

1.2. Effects of air pollution inside the car

Pollution inside the car causes annoyance in the throat, nose, lungs and eyes and even cause breathing problems, aggravate existing health conditions in the passengers such as emphysema and asthma [4-6]. This contaminated air reduces the passenger body's resistance and decreases the ability to fight other infection in the respiratory system. Breathing air inside the vehicle cabin for the passenger that is filled with small particulate matter that can stimulate harden of the arteries, triggering cardiac arrhythmia or even provoke to a heart attack. Passengers with heart disease, children and older people are more susceptible to this pollution. This pollution disturbs kids more than the adults passengers due to higher concentrations of polluted air.

II. PROPOSED SYSTEM

The proposed system has two sensor units in which CO sensor used to sense the carbon mono oxide level and NO₂ sensor senses the nitrogen dioxide level. This values are send to the ADC channel and given to the microcontroller.

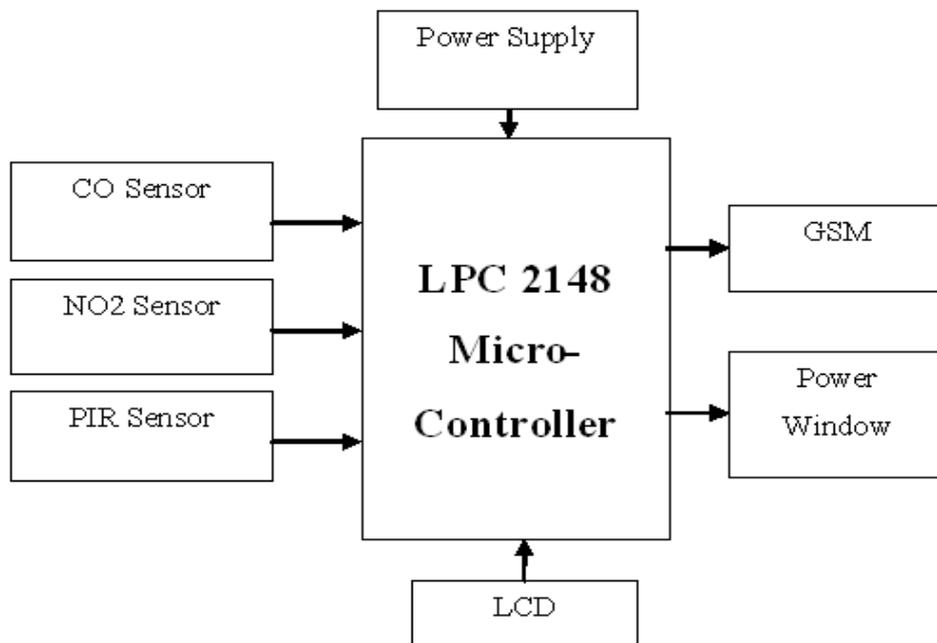


Figure 1. Block Diagram of the Proposed System

If this values are exceeds than a normal level means an automatically a warning message is sent only if the PIR sensor detects any human inside the car [9-11]. The complete overview of the system is found in the Figure 1. And the flowchart Figure 2, gives a complete schematic of these proposed system steps. The following components are used this project.

2.1. Hardware specifications

2.1.1. 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.

2.1.2. Nitrogen dioxide sensor

The Concentration is 0.1-10 ppm it is high sensitivity, small size, and light weight. Power ranges 5V voltage. It has Fast response reset function, simple drive circuit. They are Stable and have a long life.

2.1.3. Co sensor

MQ7 can measure CO concentrations ranging from 20ppm-2000ppm. The sensitivity of the sensor can be tuned using a potentiometer. Fast response and has wide detection range. 3 Pin are found they are Output, GND and VCC. They are Stable and have a long life.

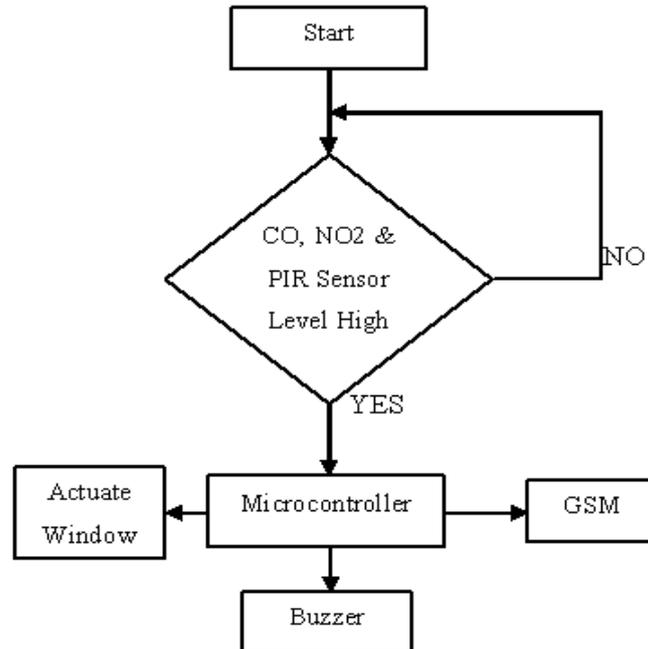


Figure 2. Flowchart of the Proposed System

2.1.4. 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.

2.1.5. GSM modem

It is a plug and play device. GSM Modem is simple and easy to interface using serial interface. It is used it to send SMS, make and receive calls. Messages are sent to the respected person say driver, the vehicle owner, and even nearest police stations for help.

2.1.6. 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.

III. CONCLUSION

Thus the proposed system senses the pollutants level and it will be displayed in the LCD. If the pollutants level increased than the normal level a warning message is sent to the passenger. If the passenger doesn't care about the warning signal means the pollutant level and vehicle number will sent to the nearest police station during critical situation inorder to avoid suicidal death.

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