

Accident Prevention Due To Hazardous Gases in Automobile

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ABSTRACT: In the increasing trend of modernization, luxury and self-comfort are prioritized in people's mind. Hence automobile companies keep on adding up comfort in their product. This also includes air-conditioning system. At the same time, safety plays a major role. Due to improvised technology, engineers are successful in reducing the emission of greenhouse gases from air-conditioning system. But, improper usage of this air conditioning system leads to emission of carbon monoxide, a toxic gas which may even lead to death when inhaled for a longer time. Our project focuses on detecting the emission of carbon monoxide and takes preventive measures in decreasing the vulnerability of carbon monoxide inhalation.

I. INTRODUCTION

Carbon monoxide is a hazardous and toxic gas which has severe effect on humans when inhaled. Statistics say that about fifty people die every year due to inhalation of carbon monoxide of which 5% is due to emission of carbon monoxide from air-conditioning systems in automobile. Carbon monoxide poisoning results when carbon monoxide enters the bloodstream through the lungs and forms carboxyhemoglobin, a compound that inhibits the blood's capacity to carry oxygen to organs and tissues. It also clots the blood in arteries and veins. Thus prolonged inhalation of carbon monoxide leads to death of a person. It results from the incomplete combustion of fuel and is emitted directly from the vehicle tailpipes. This is most likely to occur at low air-to-fuel ratios in the engine, for example, when the car is at a standstill. A certain amount of carbon monoxide could seep into the vehicle if there is a leak or fault in the exhaust system. The gas could seep in from any part of the car. So, our project helps in monitoring the emission of carbon monoxide continuously and prevents the accidents that occur due to carbon monoxide poisoning.

II. COMPONENTS

- Carbon monoxide sensor
- Microcontroller
- Power window motor
- Warning system

III. CARBON MONOXIDE SENSOR

A carbon monoxide sensor (MQ-7) is a device that detects the presence of the carbon monoxide (CO) gas in order to prevent carbon monoxide poisoning. CO sensors are designed to measure CO levels over time and sound an alarm before dangerous levels of CO accumulate in an environment, giving people adequate warning to safely ventilate the area or evacuate.



Sensitive material of MQ-7 gas sensor is SnO₂, which with lower conductivity in clean air. It makes detection by method of cycle high and low temperature, and detect CO when low temperature (heated by 1.5V). The sensor's conductivity is higher along with the gas concentration rising. When high temperature (heated by 5.0V), it cleans the other gases adsorbed under low temperature.

Technical Data:

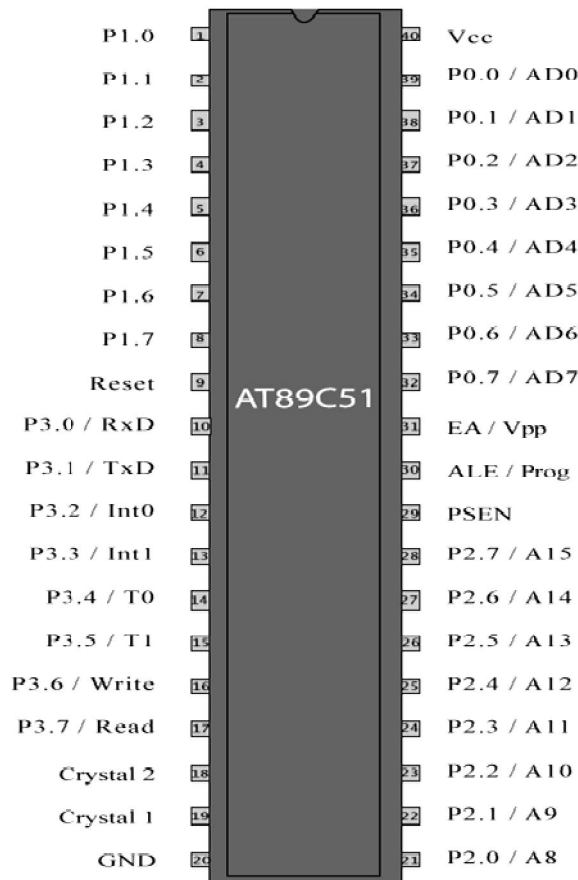
Mo		M	
SensorType		Semiconductor	
StandardEncapsulation		P	
Detection Gas		Carbon Monoxide	
Concentration		10-10000ppm CO	
Circuit	Loop	V _c	≤10
	Heater	V _H	5.0V±0.2VAC or DC (High)
	HeaterTime	T _L	60±1S (High) 90±1S (Low)
	Load	R _L	Adjustable
Character	Heater	R _H	31Ω±3Ω (RoomTem.)
	Heater	P _H	≤3W
	Sensing	R _s	2KΩ-20KΩ(in100ppm CO)
	Sensitivity	S	Rs(in air)/Rs(100ppm CO)
	Slope	α	≤0.6(R _{300ppm} /R _{100ppm})
Condition	Tem. Humidity	20%±2%;	
	Standardtestcircuit	V _c :5.0V±0.1V; V _H (High) : 5.0V±0.1V; V _L (Low): 1.5V±0.1V	
	Preheattime	Over48 hours	

IV. MICROCONTROLLER

AT89C51 is a low-power, high-performance CMOS 8-bit microcomputer with 4 Kbytes of Flash Programmable and Erasable Read Only Memory (PEROM). The device is manufactured using Atmel's high density nonvolatile memory technology and is compatible with the industry standard MCS-51TM instruction set and pinout. The on-chip Flash allows the program memory to be reprogrammed in-system by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel is a powerful microcomputer which provides a highly flexible and cost effective solution to many embedded control applications.

The AT89C51 provides the following standard features: 4 Kbytes of Flash, 128 bytes of RAM, 32 I/O lines, two 16-bit timer/counters, a five vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator and clock circuitry. In addition, the AT89C51 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port and interrupt system to continue functioning.

This microcontroller continuously receives data signal from MQ-7 sensor and monitors the carbon monoxide level. When the carbon monoxide level goes beyond the safe level, the microcontroller actuates the power window motor and the warning system of the automobile.

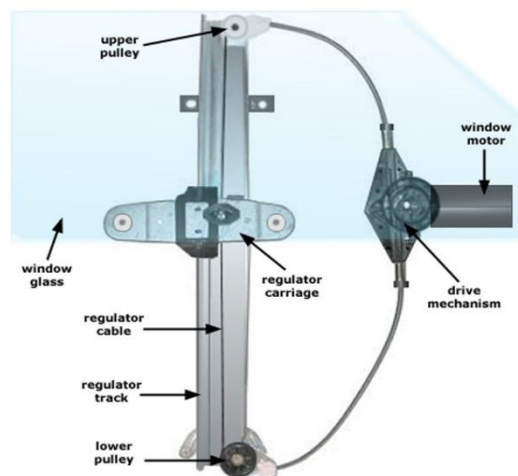


V. POWER WINDOW MOTOR

The power window motor is a small motor that has an attached worm gear. This worm gear is a length of metal with a spiral on one end, similar to that of a screw. The worm is attached to a gear; this circular gear has teeth around the outside. We can all picture this as a form of cog. As the worm turns it moves the gear by linking the teeth inside the spiral; the gear is then linked to several spur gears. Spur gears are used to create gear reductions in machines with motors.

The worm is fixed at a specific angle to the gear, which allows the worm to turn the gear, but prevents the gear from turning the worm. The motion of the worm and gears create a gear reduction which gives enough force to turn or rotate things, this is called torque.

There are supporting bars below each electric window and attached to each bar is an arm. This arm slides along the bars as the window rises and falls. The other end of the arm has a plate with teeth that slot into the teeth of the gears; as the gears turn so does the arm and in turn raises or lowers the window glass. On the opposite side of the bars is a counter arm that counteracts the weight of the window, so if the main arm is raised on the right side of the window the counter arm will be raised on the left, ensuring that the glass rises and falls evenly and in level with the horizontal.



VI. WARNING SYSTEM

In this project we used Buzzer and indicator for warning system.

(a) Buzzer

Buzzer is an electronic device commonly used to produce sound. Light weight, simple construction and low price make it usable in various applications like car/truck reversing indicator, computers, call bells etc. Piezo buzzer is based on the inverse principle of piezo electricity discovered in 1880 by Jacques and Pierre Curie. It is the phenomena of generating electricity when mechanical pressure is applied to certain materials and the vice versa is also true. Such materials are called piezo electric materials. Piezo electric materials are either naturally available or manmade. Piezoceramic is class of manmade material, which poses piezo electric effect and is widely used to make disc, the heart of piezo buzzer. When subjected to an alternating electric field they stretch or compress, in accordance with the frequency of the signal thereby producing sound.



(b) Indicators

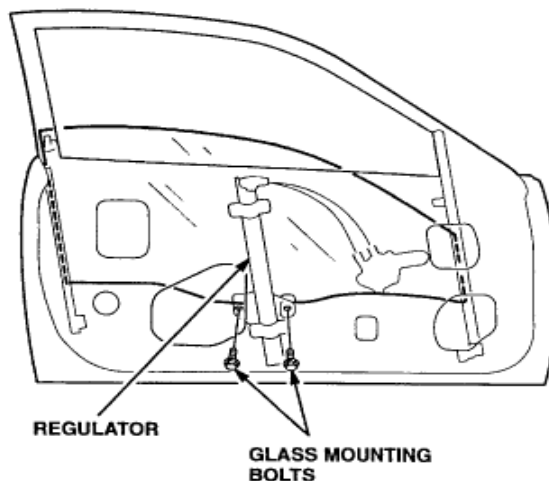
All vehicles must have direction indicators which signal your intention to turn. Most vehicles have hazard warning lamps which flash direction indicators in both directions at the same time.

In our proposed system, if carbon monoxide is emitted both the rear indicator of the vehicle will blink which pays an attention of the other vehicle to ensure that the vehicle is in trouble.



VII. WORKING

In our proposed system, emission of carbon monoxide from the air conditioner is detected by MQ7 sensor, if sensor detects the traces of carbon monoxide emission it gives signal to the microcontroller. Upon receiving signal from the sensor, the microcontroller actuates the motor drive which in turns the windows of the automobile should get opened. Hence, carbon monoxide will escape to atmosphere. In addition to that, buzzer is alarmed to alert the passengers and both the indicator of the vehicle is blinked in order to alert the other vehicles in the road.



VIII. CONCLUSION

This project is an innovative and safety purpose concept. This is simple and yet effective methodology to reduce accident in the vehicles. The ultimate aim of our project is to enhance the technology along with the safety aspects and hence we made it. This project will enhance the present day safety features in vehicles and also reduces the accidents, which was increasing year by year. Thus the project will solve the unaware scenario of the emission of poisonous carbonmonoxide gas in air conditioning system and hence it reduces the aftermath and will make your journey a happier and healthier one.

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