

# Annunciator for Vehicle Air Pollution

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## ABSTRACT

Vehicle has its own emission of gases, but the problem occurs when the emission is beyond standardized values. The emission occurs due to incomplete combustion of fuel. This emission is very hazardous to environment. This emission from vehicles cannot be completely avoided, but it can be controlled. The aim of the project is to detect air pollution and control it. This pollution control circuit consists of various sensors like CO<sub>2</sub> sensor and GSM, GPS kind of devices. It is a real time work where a demo application has been made in which LPC2148 is used and a system is made where all these devices get integrated and work accordingly. When the air pollution is above the threshold level then we can send message to RTO by using GSM. The GPS module is used to locate the vehicle position where it is halted. This project helps to save our environment by controlling the pollution of vehicles.

**KEYWORDS:-** LPC2148, CO<sub>2</sub> Sensor, GPS, GSM.

## I. INTRODUCTION

Vehicle will have emission but the problem occurs when it is beyond the standardized values. The primary reason for this breach of emission level being the incomplete combustion of fuel supplied to engine, which is due to the improper maintenance of vehicle this emission from vehicles cannot be completely avoided but, it definitely can be controlled. With the evolvement of semi-conductor sensors for detecting the various gases, this project aims by using those semi-conductor sensors at the emission outlets of vehicles which detects the level of carbon dioxide in the fuel combustion. During this time period, the GPS starts locating the nearest service stations. The synchronization and execution of the entire process is monitored and controlled by a micro controller the incomplete combustion in the engine of a vehicles leads to emission of carbon dioxide contributing to increase in the pollution and adversely affecting the environment as well as human health. Detection and control of these gases is an important area of work. These are critical things to control so here we come up with a concept to reduce pollution. As a solution to the above problems we aim to build an automated control system for emission level control of vehicle. Smoke detector is used to detect the carbon dioxide percentage in the smoke released by the vehicle due to combustion of fuel in it. Sensor is fixed at the end of the exhaust of vehicle from where smoke is released into the environment. The sensor detects carbon dioxide and gives it to the Microcontroller to check the maximum percentage of carbon dioxide content released by vehicles. So the controller checks the percentage of carbon dioxide, if it exceeds the threshold level the system gets triggered and then it sends SMS by using GSM system to the owner as well as RTO office.

## II. SYSTEM RESOURCES

### A. LPC2148 Micro controller

Based on ARM-7 family LPC2148 is the widely used IC. This IC is manufactured by Philips (NXP) and it is pre-loaded with many inbuilt peripherals making it more efficient and it is useful a necessary for the beginners as well as high end application developer. Here we used LPC2148, which is a 16 bit micro controller. Three inbuilt timer/counter is present in LPC2148 microcontroller which will be used for the timer configuration. It performs three functions namely comparison, timer and triggering circuit. The microcontroller takes in two inputs; one from the smoke sensor's output and another being the pre-defined

threshold value. When the concentration of carbon dioxide is greater than the threshold value, the microcontroller triggers the timer circuit and in forms the owner of the vehicle. Apart from the timer being triggered, a trigger is also given to the GPS, which helps in locating the nearest service station by SMS.

#### B. Liquid-crystal display (LCD)

A liquid-crystal display (LCD) is a flat-panel display. Here we use the 16\*2 display for displaying the how much amount of the carbon dioxide is exhausted by the vehicle. It is 16 pin display 3 pins for the control purpose and 8 pins are for the data input. It is used in computer, digital watches, DVD and CD player. LCD is combination of two states of matter that is solid and liquid. LCD has low power consumption. It has two types of display, which are dynamic scattering and field effect display.

#### C. GSM Technology

GSM is known as Global System for Mobile Communication. It is used for sending the message to one or more than one mobile number at a time. It is digital mobile telephony system. GSM is not only used in Europe but also other parts of the worlds. It uses Time Division Multiple Access techniques. GSM is used for TDMA and CDMA. In GSM we can use AT commands. It is used for digitized and compresses the data. Frequency band for GSM is either 900 MHz or 1800 MHz; it is wireless technology and world's fastest growing communication technology.

#### D. GPS Technology

GPS is known as Global System Positioning. It is a satellite-based navigation system that is used for sending and receiving radio signals. By using GPS technology we can find the location of any object or vehicle to monitor continuously using satellite signals. For locate the receiver in 3D space three satellite signals are used and fourth satellite is used for time accuracy. GPS will give the information of parameters like longitude, latitude and attitude for detecting the position of the object. With the help of these parameters we can easily locate the position of any object or vehicle. Here In this GPS technology, the communication takes place between GPS transceiver and GPS satellite. The GPS signal allows repeating this calculation every 6 seconds. Many GPS units show derived information such as direction and speed, calculated from position changes. This is a global navigation satellite system. It provides geolocation and time information to a GPS receiver anywhere on the Earth.

#### E. CO<sub>2</sub> Sensor

A carbon dioxide sensor or CO<sub>2</sub> sensor is an sensor for the measurement of carbon dioxide gas in the polluted air. The most common principles for CO<sub>2</sub> sensors are infrared gas sensors (NDIR) and chemical gas sensors. Measuring carbon dioxide is important in monitoring air quality for the human health and many industrial processes for saving environment. In this paper, carbon dioxide sensor (MQ-2) which can measure CO<sub>2</sub> concentrations ranging from 10 to 10,000 ppm is considered. This sensor basically finds usage in sensing carbon dioxide concentrations (ppm), in the exhaust of vehicle and gives an analog output. Input of the sensor is given to the ADC pin of LPC2148. Additionally, it has a very long life time and is available at low cost. Also it can be used for a wide range of applications.

### III.DESIGN OF PROPOSED EMBEDDED SYSTEM

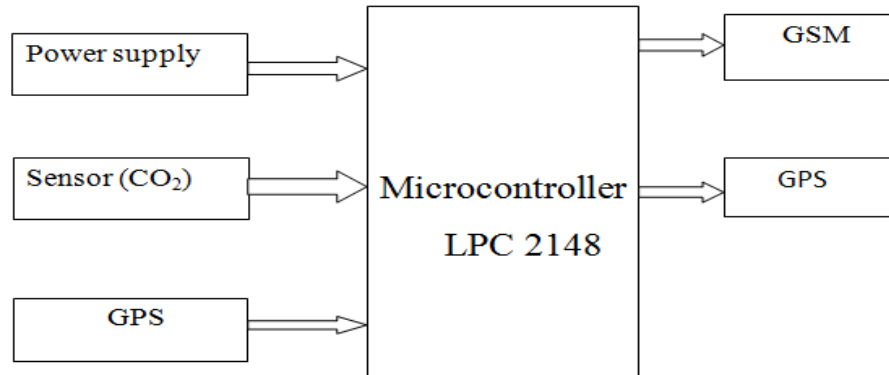


Fig1: Block diagram of proposed system

The proposed system consists of above blocks shown in fig1. Here micro controller is the main heart of the system followed by CO<sub>2</sub> sensor, GSM, LCD and GPS. The design of the proposed system is explained as follows. The total Equipment of this project is placed inside a vehicle; implemented system is shown in fig1. Here we have GPS (Global Positioning System) module by which we can get the location of the vehicle, the location values are displayed on the LCD (Liquid Crystal Display). In this project we have sensor which are interfaced to the micro controller. CO<sub>2</sub> sensor through which we can measure the temperature and amount of CO<sub>2</sub> released from the vehicle. These values are also displayed on LCD. Whenever these values exceed the threshold then intimation is given to the RTO including vehicle's exact position. The operation of the system is explained as follows. The proposed system consists of power supply, which is of single-phase 230Vac. Then it is step down to 5v dc which is sufficient to our system. In the next step all the modules get initialized. As the proposed system uses semi conductor sensors at the emission outlets of vehicles which detects the level of pollutants and also the indication of this level are displayed on LCD using GPS.

### IV .WORKING OF THE PROPOSED SYSTEM

Annunciator for Vehicle Air Pollution system is mainly used for controlling the pollution by stopping the vehicles



Fig2: Prototype of Proposed System

When it reaches the threshold value defined by the user, based on the RTO standards. Here we use CO<sub>2</sub> sensor. Implementation of the proposed system is shown in fig2 and the working of the system is explained above. Before switch on the kit, first we switch on the GSM module. Then we switch ON the power supply block having 230V A.C supply as input to the step down transformer. After it is step down to 5V D.C which is sufficient to our system. Next all the modules get initialized, GSM, GPS are connected. As we are using CO<sub>2</sub> the value of sensor displayed on the LCD. In addition to this latitudinal and longitudinal values are also displayed using the GPS, which monitor the exact position of the vehicle. The standardized threshold limit values are set. In referred to this, pollution in the vehicle increases and exceeds the threshold limit the indication is given to owner. Even if the vehicle continued the same then an SMS is sent to the RTO, displaying the sensor values.

#### IV.CONCLUSION

The existing “Annunciator for Vehicle Air Pollution” is an Integrating feature of all the hardware components been used and developed in it. The Presence of each and every module has been reasoned out and placed very carefully. Hence the contributing to the best working for pollution control. Secondly, using highly advanced IC’s like GPS module, GSM technology with the help of growing technology, the project has been successfully implemented with a unique idea. Thus the project has been successfully designed and tested. This project can be extended using high efficiency GPS receiver and a GSM module. The GSM module gives the intimation of the person with this system through SMS services to the pre-defined authority’s phone numbers. 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, yielding high accuracy, this can be extended to home, transport and industrial applications.

### ACKNOWLEDGEMENT

We express our sincere thanks to Mr. S.V.Bhise, Assistant Professor, Department of Electronics and Telecommunication Engineering of Marathwada Mitra Mandal's Institute of Technology, Lohgaon, pune. For his valuable guidance and continuous encouragement in course of our work.

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