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A MODEL FOR AUTOMATED DETECTION AND CONTROL OF AIR POLLUTION FROM VEHICLES

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Abstract

Concrete slab with opening are usually designed with help of traditional rules thumb proposed by building codes. Such methods however introduce limitations concerning size of opening and magnitude of applied loads. Furthermore there is a lack of sufficient information about the load carrying capacity of slab with opening. It is also difficult to model the complex behaviour of reinforced concrete structures analytically in its non-linear zone. This has led engineers in the past to rely heavily on empirical formulas which were derived numerous experiments for the design of reinforced concrete structures. Nowadays, for structural design and assessment of reinforced concrete members, the non-linear finite element (FE) analysis has become an important analytical tool. This thesis investigates the structural behaviour of two way reinforced concrete slab with and without for different slab length ratios and different opening ratios. The effect of openings sizes on crack formation is also analyzed. For this different models of slab with and without opening were modeled in finite element software ANSYS.

Introduction

The incomplete combustion in the engine of a vehicle leads to emission of different gases contributing to increase in the pollution and adversely affecting the environment. Detection and control of these gases is a important area of work. This emission from vehicles cannot be completely avoided but, it definitely can be controlled.

Over the years, there have been several regulations made by the Government to control the emission from vehicles; most of them being unsuccessful at the same. The Government of India introduced the Bharat Stage Emission Standards to control air pollution from vehicles. Several emission norms were come to control the emission levels from vehicles since two decades. The standards and the timeline for implementation are set by the Central Pollution Control Board under the Ministry of Environment & Forests. Bharat stage emission standards are emission standards instituted by the Government of India to regulate the output of air pollutants from internal combustion engine equipment, the first emission norms were

introduced in India in 1991 for petrol vehicles and the introduction of unleaded petrol in the market. On April 29, 1999 the Supreme Court of India ruled that all vehicles in India have to meet Euro I or India 2000 norms by June 1, 1999 and Euro II will be mandatory in the NCR by April 2000. Car makers were not prepared for this transition and in a subsequent judgment the implementation date for Euro II was not enforced. The standards, based on European regulations were first introduced in 2000. Progressively stringent norms have been rolled out since then. All new vehicles manufactured after the implementation of the norms have to be complaint with the regulations. Since October 2010, Bharat stage III norms have been enforced across the country. In 13 major cities, Bharat stage IV emission norms are in place since April 2010. The phasing out of 2 stroke engine for two wheelers, the stoppage of production of various old cars & introduction of electronic controls have been due to the regulations related to vehicular emissions.

Design Parameters

Now a day's air pollution is the biggest problem to solve/manage due to heavy increase in number of vehicles. The air pollution may impact severely on the global environment if it I not controlled in right manner and this system is mainly designed for controlling air pollution. When the pollution/emission level shoots beyond the already set threshold level, there will be a buzz in the vehicle to indicate that the limit has been reached and this information has been send to traffic control room which includes vehicle number, owner details and location of the location of the vehicle by using GPS.

1.1 **Proposed system** ARM microcontroller plays a vital role in this proposed system. The remaining modules are GPS, GSM, LCD, buzzer and relay are controlled by microcontroller. Microcontroller takes input from smoke sensor output. Based on smoke sensor output, microcontroller controls the remaining modules. Based on programming the EEPROM of microcontroller, automatically microcontroller controls all the modules without any manual instructions. MQ-2 sensor is used to detect pollution levels from vehicles. If the pollution level of vehicles crosses the standard emission level, then vehicle will be stopped by microcontroller, automatically. Sensor is mainly used to detect carbon monoxide (CO) concentrations in air. Whenever the CO concentration increases or exists in air, then sensor conductivity is high. We use simple circuit to convert the change of conductivity to correspond output signal of gas concentration. This sensor can also detect the combustible gas or flammable gas such as, methane, hydrogen and LPG. The advantages are long life and low cost. Good sensitivity to CO and combustible gases. It can detect combustible and smoke gases concentration from 300-10000 ppm in air. This

sensor can be fixed at emission outlets of vehicle. LM35 temperature sensor monitors the engine temperature and prevents it from getting overheated. LPC2148 is the ARM 7TDMI based 32 bit microcontroller which has the maximum number of pins used to programming IO, where the ports are mapped to virtual port. It has two 32-bit timers/external event counters. The microcontroller is used to perform four functions. First one is, compare emission values with standard value prescribed by the Government. Second one is, activates the timer and alerts the buzzer to indicate vehicle will be stopped after sometime due to the violation of standard emission values. Third one is, microcontroller activate the GPS to find location of vehicle and display in terms of latitude and longitude. Fourth one is, GSM mobile module is activated by microcontroller to send GPS values to service centre through text message. The microcontroller performs functions according to the software programmed in EEPROM of microcontroller.

1.2 **Operation** In this paper we are implementing pollution detection and controlling system based on the amount of pollution released from vehicles. We are doing, using real time operating system. First we will find out the pollution levels that will be done using MQ7 sensor. If the pollution level detected strikes beyond the pre-defined value, then it automatically sends a message containing vehicle number using GSM and its location using GPS.

Whenever the level of pollution crosses the standard level or threshold level which have been prescribed by Government, then fuel injectors break the fuel supplied to engine using relay circuit. The fuel injector takes the input from microcontroller and gives its output to motor. The fuel pump can be on or off by using relay circuit. If there is no pollution from vehicle, then ignition switch is in on state, so, vehicle is keep moving. If the pollution level crosses standard level, then ignition switch comes in to off state by using relay to control fuel pump. So, vehicle will be stopped. Whenever the pollution level reaches to maximum limit, a trigger pulse is given to GPS by microcontroller. The GPS is programmed when GPS receives a trigger pulse, it starts showing the location of vehicle continuously until the vehicle will be stopped. Whenever the GPS starts showing the location, then GSM module automatically sends a GPS values through text message to service centre by microcontroller. Max 232 provides serial communication between GSM module and microcontroller. At the time of registration with service centre number, first we have to send text message to GSM module of proposed system for storing service centre number in microcontroller. After that, the service center received message “Number Registered” from the GSM module of proposed system.

CONCLUSION

The results in the pollution control interfaces the modules like GSM, GPS, with controller ARM7 offering the high end outputs. The value as output is successfully carried out. Here with the help of GSM the messages are transferred and received as well. The main focuses on three concepts. The first concept is, detecting pollution level from vehicles and represent to driver of vehicle. The second concept is, avoiding the inconvenience to driver of the vehicle by sending text message to service center using GSM module. The proposed system can control the pollution. The third concept is, it can be easily deployed in vehicles. In this paper, MQ-2 gas sensor has been used to detect CO concentrations in air. It can also detect combustible gas which can lead to heavy explosions. This kind of sensors can also more useful in industries. The same concept can also be extended to industries.

In future we can add additional futures like traffic police have an authority to stop the vehicle remotely by sending a SMS using GSM, or by getting the driver's Driving License Number to the control system as such. When augmented as a real time project, will benefit the society and help in reducing the air pollution.

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