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IoT Based Vehicular Pollution Monitoring and Controlling System

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Abstract: ***Day by day the number of vehicles is increasing very fast. 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 an important area of work. This emission from vehicles cannot be completely avoided but, it definitely can be controlled. The aim of the project is to monitor and control the pollutants in the vehicle by using the IOT. When the pollution/emission level shoots beyond the already set threshold level, there will be a LCD display in the vehicle to indicate that the limit has been reached or not and also the updated in the IOT web page. After existing the limit a warning will be given, then after a certain time given for to service the vehicle if they serviced the pollution will be in the set threshold level. If they didn't service the vehicle it will be automatically turned off. This Paper Presented the design and development of IOT Based Vehicular Pollution Monitoring and Controlling System for green revolution.***

Keywords: Pollution, CO Gas, IOT Module, Internet of Things, CO Sensor, GPS Location Finder, Vehicle Pollution Monitoring, Relay Driver, PIC Microcontroller, Opto Coupler

1. Introduction

Monitor air pollution on roads and track vehicles which cause pollution over a specified limit. Increasing number of automobiles is a serious problem that has been around for a very long time. The project is to monitor and control the pollutants in the vehicle by using the pollution control circuit. Air excellence monitoring in addition management has gained abundant attention latterly as the impact of air quality on several aspects of life. Besides the detrimental effects of toxic emissions on the environment and health, work productivity and energy efficiency are affected by air quality. Many researches have shown that, in a work place, the rise of CO2 levels ends up in an increase within the amount of unstable carbon - based mixtures (VOCs), odours, and microorganisms in the air.

Moreover, nearly revisions have revealed that CO2 - based air controls can result in up to 50% energy savings (CO2 - based ventilation control can typically reduce HVAC cost in most buildings by 5% to 20%). Recently, Wireless Sensor Networks (WSNs) have attained an excessive latent for an extensive applicability in the arenas of monitoring, observation, information gathering, and medical telemetry. This potential can be attributed to their attractive characteristics: WSNs can perform self configuration and reconfiguration in the instance of any changes (for example a network topology change). WSNs can be monitored remotely. WSNs adapt well to mobility.

2. Existing System

2.1 Working Principle

Wireless sensors are used in most of the in real time applications for collecting physical information. The impossible measurements in typical ways have currently become attainable using the wireless technology. In this technology, the measurement of air quality is one of the difficult areas for the researchers.

The main source of atmosphere pollution happens due to vehicles. The high inflow of vehicles in urban areas causing more air pollution and decreasing air quality that leads to severe health diseases. The main objective of the paper is to introduce vehicular pollution monitoring system using Internet of Things (IoT) which is capable of detecting vehicles causing pollution on the city roads and measures various types of pollutants, and its level in air. This paper also reports the status of air quality whenever needed to the environmental agencies.

Figure 1: Basic Block Diagram

The proposed systems also assures the existence of wireless sensors for vehicle pollution system that specialize in a straight forward accessibility of real time data through internet using IoT. The measured data is also shared to vehicle owner, traffic department and agencies of national environment. This system is a low cost and provides good results in controlling the air pollution especially in the urban areas.

3. Proposed System

3.1 Introduction

In this Proposed system, we could easily monitor the CO Level of a Vehicle and it would be controlled through the IOT. If it is used on real time application almost 60 to 74% of CO Emission will be reduced.

3.2 Block Diagram

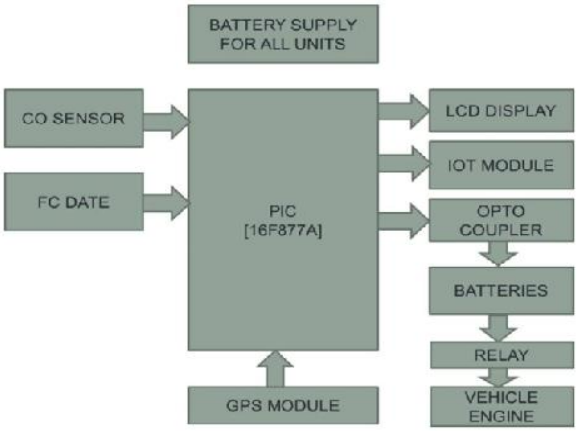

Figure 2: Block Diagram

3.3 Components

- Batteries
- PIC Microcontroller [16F877A]
- CO Sensor [MQ7]
- GPS Module
- IOT Module [Node MCU]
- Relay Drivers
- Opto Couplers
- LCD Display
- Vehicle Engine

3.4 Working

Vehicle pollution will be monitored continuously and if it is exists above the limit it will indicate you by LCD Display and also it will shows in the IOT web page. An certain time will be given for to service the vehicle after its exits the limit. [eg: one day will be given for to service]. If it is not serviced, the vehicle will be automatically turned off then the GPS Location shared to the IOT web portal of Pollution control Board and also in your IOT web page. After you completing the service and you must buy an pollution control test certificate by the Pollution control board and you have to pay the penalaty for not serviced the vehicle after the alert given by the board. After all these works the vehicle will be turned on by these way the CO emission will be controlled.

4. Components Working

4.1 RelayDriver

A Relay is an electro - magnetic switch which is useful if you want to use a low voltage circuit to switch on and off a light bulb (or anything else) connected to the 220v mains supply.

4.2 PIC MicroController

PIC is a family of Harvard architecture microcontrollers made by Microchip Technology, derived from the PIC1640. Originally developed by General Instrument's Microelectronics Division. The name PIC initially referred to "Programmable Interface Controller".

PICs are popular with both industrial developers and hobbyists alike due to their low cost, wide availability, large user base, extensive collection of application notes, availability of low cost or free development tools, and serial programming (and re - programming with flash memory) capability.

4.3 CO Sensor

A carbon monoxide detector or CO detector is a device that detects the presence of the carbon monoxide (CO) gas in order to prevent carbon monoxide poisoning. CO is a colorless and odorless compound produced by incomplete combustion.

It is often referred to as the "silent killer" because it is virtually undetectable without using detection technology. Elevated levels of CO can be dangerous to humans depending on the amount present and length of exposure. Smaller concentrations can be harmful over longer periods of time while increasing concentrations require diminishing exposure times to be harmful.

5. Result

IOT Based Vehicular Pollution Monitoring And Controlling System which helps for in the Monitoring the CO Level and also Control the CO Emission. The Output of this Project are successfully designed and Verified for various vehicles.

Figure 3: LCD DISPLAY (A) CO Level [Normal] and FC Date Monitoring

Figure 4: CO Level [Abnormal]and ADC Output

Figure 5: GPS Location

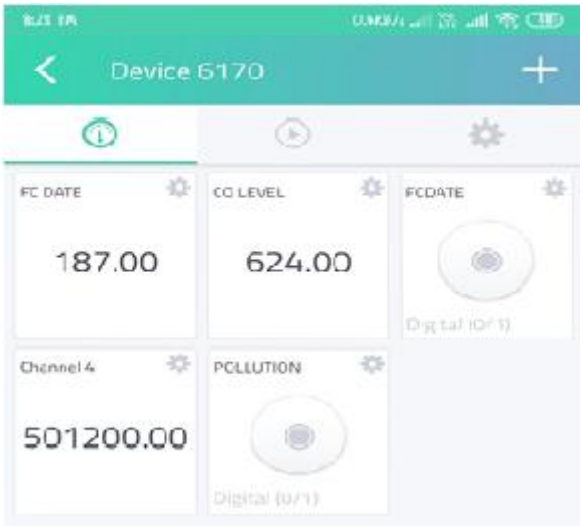

Figure 5: IOT WEB PAGE [Before Vehicle Turn Off] [A] Monitoring the FC Date and CO Level

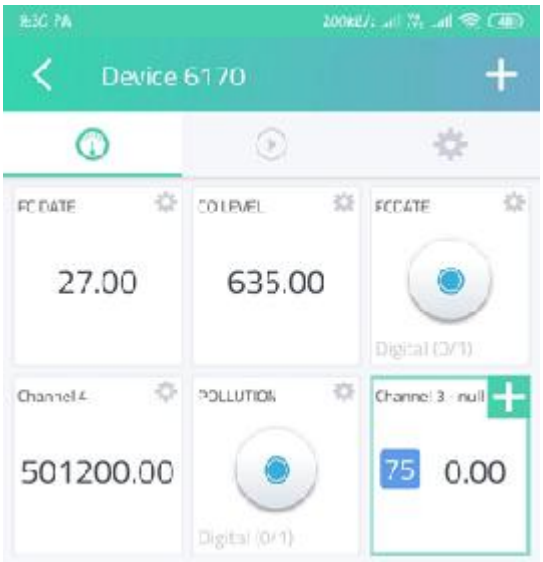

Figure 6: IOT PORTAL [After Vehicle Turn off] [A] GPS Location [B] Used to TURN ON the vehicle

6. Conclusion

This Paper Presented the design and development of IOT Based Vehicular Pollution Monitoring And Controlling System for green revolution. The Performance of the system is also verified using the IOT Technology.

The Designed Smart intelligent environmental systems monitors the pollutants produced by the vehicles and also warn the vehicle owner to control the pollution if that vehicle owner not control the Pollution after a certain time vehicle will be automatically turned off by the Pollution control board. If you want to turn on the vehicle you complete the process which said by the Pollution control Board.

By, This we can control the air Pollution by 64% and the developed system is low cost, simple to Operate and easily track the vehicle location.

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