Software Requirement Specification on IOT Based Vehicle Emission Monitoring and Preventing System:

Introduction:

Now a days one of the greatest problems that the world is facing today is pollution, increasing every year and causing grave and also irreparable damage to the Earth. In order to minimize these issues, smart emission monitoring system has been used. In this system sensors such as co, hydrogen and gas sensors are connected to the input pins of arduino and the values are sensed.

If the sensed value goes beyond threshold value set in the program then automatically an alert message will be sent to the vehicle owner by using ESP8266 Wi-Fi enabled module in addition a buzzer is used for driver’s notice. At the same time the emitted level will be monitored by the agencies of national environment by uploading the data in the web page.

The objective is to smart monitoring system is to be more innovative, user friendly and more efficient than any other system. It will help to reduce the pollution in the environment.

This smart monitoring system is applicable for people to control the pollution. The ultimate goal of the software is to preventing the pollution comes out from the vehicles by smart monitoring system.

2)Overall Description:

2.1)Project Perspective :

In the current scenario, one of the greatest problems that the world is facing today is pollution, increasing every year and causing grave and also irreparable damage to the Earth. In order to minimize these issues, smart emission monitoring system has been used. In this system sensors such as co, hydrogen and gas sensors are connected to the input pins of arduino and the values are sensed.

If the sensed value goes beyond threshold value set in the program then automatically an alert message will be sent to the vehicle owner by using ESP8266 Wi-Fi enabled module in addition a buzzer is used for drivers notice. And this way it will helps to control the pollution, and it will help to minimize the global warming.

2.1.1) Block Diagram:



Fig.Architecture of Monitoring Vehicle Emission System using IOT

Arduino:

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet).it has 14 digital input/output pins (of which can be used as PWM outputs), analog inputs, A 16MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started.

Wi-Fi Module:

The ESP8266 Wi-Fi Module is self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. This module has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors.

CO Sensor (Carbon Monoxide):

MQ-7 gas sensor composed by micro AL2O3 ceramic tube, Tin Dioxide (SnO2) sensitive layer, measuring electrode and heater are fixed into a crust made by plastic and stainless steel net. They are used in gas detecting equipment for carbon monoxide (CO) in family and industry or car.

Hydrogen Sensor:

This is a simple to use hydrogen gas sensor. They are used in gas leakage detecting equipment in home and industry applications.

Gas Sensor:

Gas sensors are useful for gas leakage detection (In home and industry). It is suitable for The Grove-Gas Sensor (MQ2) module is detecting LPG, CH4, CO, Alcohol, smoke or Propane.

GSM Module:

Global System for Mobile Communication uses as variety of TDMA and is the three digital wireless technology such as TDMA, CDMA. It digitizes and compresses data and operates at either 900MHz or 1800MHz frequency band.

2.1.2) Problem statement:

To develop IOT based module to monitor vehicle emission and prevent this emission.

2.1.3) Functional Requirements:

* Mount the sensors:

1. The hydrogen, carbon monoxide, gas sensors are connected to the Arduino.

* Get the input values:

1. The values are sensed by the hydrogen, carbon monoxide sensors.
2. These values takes as the inputs to the Arduino.

* Compare the values:

1. The input values are compared to the threshold values which is set in the program.
2. If values go beyond the threshold values then these values will upload to the webpage and will get output.

* Output:

1. Buzzer will alarm.
2. The message will send to the vehicle owner with the help of wifi module.

2.2) Product Functions:

This Smart emission Monitoring System will detect and control the pollution in the environment. In this smart emission monitoring system the values are sensed by the sensors and then these values are compared to the threshold values which is set in the program and if input values goes beyond threshold values then buzzer will alarmed as a notification for vehicle driver and message will send to vehicle owner with the help of GSM module.

3) Specification Requirements:-

3.1) External Interfaces :-

Input description:

In this system the H2, CO, Gas sensors are connected to the input pins of Arduino and values sensed by these sensors is the input to this Arduino.

Output description:

The values get from these sensors is the input to the Arduino and these values are compared to the Threshold values which are set in the program and if the input value goes beyond Threshold values then output will be:

* The Message will send to vehicle owner through Wi-Fi Module.
* The buzzer will alarm to inform vehicle driver.

3.2) Functional Requirements:

* The system shall take the values from H2, CO and Gas sensors as an input.
* The system shall compare these values to the Threshold values which is set in the program.
* By analysing this comparison if the input values goes beyond than Threshold value then Message will send to vehicle owner using Wi-Fi module and Buzzer will alarm for vehicle driver as a notification.

3.3) Performance Requirement:

These smart emission monitoring system will sense the values from the sensors , these values will compare to threshold value and then output will get depends upon input values . After sensing the values from sensors it will take maximum 30 seconds to buzzer the alarm for notification of vehicle driver.

3.5) Logical Database:

In this system after comparing the input values with threshold values then these values will stored in database. The vehicle owner’s information is also stored in database.

3.6) Software System Attributes:

Reliability:

This system is very much reliable because the sensors will sense values and then after comparing the buzzer is alarmed quickly.

Availability:

This system will be available at the time of driving.

Maintainability:

In this system the sensors are used for sensing the values and buzzer used for notification for vehicle driver so it has not very much maintenance.

Portability:

This system is portable. You can fit this system on car or bike so it is very much portable.

4. Design constraint:

4.1 Data Design

a.Data Flow Diagram:

(CO,H2)

Emitted gases

Gas values

Get stored values

Owner will take actions

Owner

Database

4.2 Behavioural Design:

a.Activity Diagram:

YES

NO

Take proper preventing actions

Send message to owner and agency

If sensed value > threshold value

Compare with threshold value

Store in database

Sense gases

Emission of gases

4.3 Use Case Diagram:

Sense Gases

Agency

Owner

4.4 Flow Chart:

YES

NO

If sensor values exceeds threshold values

Send message alert to agency and owner

Monitor and store the value in database

Compare sensor values with threshold values

Arduino reads and stores the sensor values

Sensor senses the air level from the emission of the vehicle

References:

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