CAR SAVVY using Raspberry-Pi

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Abstract- *In the present scenario, smart, efficient and intelligent means of driving has become an important aspect of achieving advancement in technology in terms of car automation.*

Therefore much emphasis has been laid on enhancing the artificial intelligence of having a car which requires less human action. Though people have acknowledged the importance of such a concept there has been very little research carried out in this field. Therefore with the help of a network of remote servers internet communication between the vehicle and the user end device can be established. This concept is called server computing which can be used to collect, store and manage the data obtained from the vehicle. This paper helps to explain how server and raspberry-pi module can be used to establish a connection between the vehicle and user end device. CAR SAVVY provides a more sophisticated and organized means of driving a vehicle which was not possible before.

Keywords- R-Pi, GSM, GPS.

I. INTRODUCTION

In the present scenario smart, efficient and intelligent means of driving has become an important aspect of achieving advancement in technology in terms of carautomation. Therefore much emphasis has been laid on enhancing the artificial intelligence of having a car which requires less human action. Though people have acknowledged the importance of such a concept there has been very little research carried out in this field. With the help of a powerful server where the car can be easily connected to the Internet (perhaps via Bluetooth to a smartphone), it could automatically search an online knowledge base and not only report a fault code but also let you know the most likely cause either based on the car's personal history or on the environment (an expert system could conclude "it is minus 15 degrees Celsius outside, and there is a water leak, and it is likely to be a cracked hose due to the cold temperature and there was a manufacturer recall notice concerning this hose"). All this could occur before you visit a mechanic. It could proactively detect issues from engine coolant temperature or oxygen sensor readings. It could work with nearly all cars in use today. Vehicle owners do not check the amount of carbon dioxide emissions into the atmosphere. Therefore, with the help of a carbon dioxide level sensor, the server will create an online mechanism which will provide a reminder to the vehicle owner that the vehicle requires servicing before the PUC certificate is renewed. If a person is travelling from one place to a destination, the GPS with notify the driver whether there is traffic on the particular path on which he is travelling and also it will show the driver an alternate path to reach the destination via google maps. This concept will also play a vital role in measuring the petrol level and notify the vehicle owner if there is an additional chemical added to the petrol above its permissible limits. A 12 digit RFID tag reader along with the app created will authenticate the vehicle owner at the petrol pump based on his record created and stored in the remote server. Each person will have a unique 12 digit identification code which is read on the RFID tag. Since it is a cashless payment scheme the money will be deducted online from the person's personal account. With the help of a network of remote servers internet communication between the vehicle and the user end device can be established. The server will be used to collect and store the data and as a result it becomes advantageous when we have to store huge amounts of data. For the communication to be established we need to write various fault finding codes and define various trouble shooting mechanisms to define and analyze various types of problems that may occur. We must set up and define a protocol with the help of which any failures that may occur during the lifetime of the vehicle can be rectified instead of trying to search for new algorithms. This may prove to be a less tedious and time consuming task. Therefore if we are able to establish a universal protocol to define all the failure mechanisms then we are able to analyze the problem and find the correct solution for the same. CARSAVVY provides a more sophisticated and organized means of driving a vehicle which was not possible before.

II. PROPOSED SYSTEM

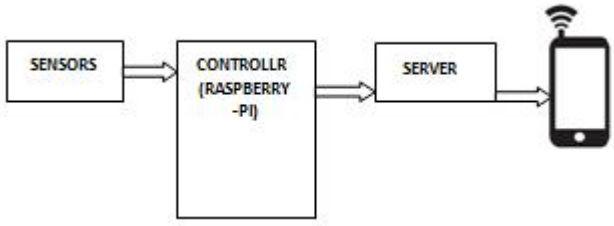


Fig 1. Block Diagram

The whole system contains various sensors which are used to interface with the raspberry-pi module. The raspberry-pi module then communicates with the hosting on the internet by means of an interconnecting module i.e. the server. The server in this case will be created by the laptop. Therefore through server, message regarding the status of the vehicle will be passed on to the user through an android app. The app will contain the information which is relevant to the user about the vehicle. Therefore this whole system provides an intelligent and efficient way of handling a vehicle and as a result makes driving much efficient.

The project is divided into four parts:

1. Car parameter diagnosis
2. Smoke sensor (CO2) for pollutant emission control
3. Distance estimation via Google maps
4. RFID authentication and cashless payment services

1. Car Parameter Diagnosis

In this part, we are using different sensors like Temperature sensor, Seatbelt sensor, Alcohol sensor and vibration sensor.

A) Temperature sensor used is LM35 which is a standard temperature sensor. Its operating range is −55°C to 150°C.
B) Seatbelt sensor used is IR sensor. Infrared (IR) technology addresses a broad variety of wireless applications, especially in the areas of sensing and remote control. In this part, if seatbelt is not properly inserted, then the IR sensor will sense it and provide a suitable signal to the R-Pi.
C) Alcohol sensor used is MQ3 sensor. This sensor will detect a particular chemical in alcohol and will provide suitable signal to the R-Pi.
D) Vibration sensor will detect vibrations produced in the car engine and parts. It will send a digital pulse to the RPi.

2. Smoke sensor (CO_2) for pollutant emission control

This sensor will detect CO_2 gas emitted from the vehicle. Sensitive material of MQ-2 gas sensor is SnO_2, which with lower conductivity in clean air. When the target combustible gas exist, the sensor's conductivity is higher along with the gas concentration rising. Please use simple electro circuit, convert change of conductivity to correspond output signal of gas concentration. MQ-2 gas sensor has high sensitivity to LPG, Propane and Hydrogen, also could be used to Methane and other combustible steam, it is with low cost and suitable for different application.

3. Distance estimation via Google maps

In this part, the user can get directions for reaching a particular place and reach faster by knowing about the current traffic situation. Therefore they can get information about the nearest petrol pumps, parking spots. If they encounter any problem, they can share their location with the mechanic.

4. RFID authentication and cashless payment service

The petrol pump will have an RFID reader which will authenticate the user with the help of a 12 digit tag. The stored data of the user will be accessed in the database and various services like cashless payment and petrol purity level detection services will be enabled.

III. ADVANTAGES AND APPLICATION

Advantages:

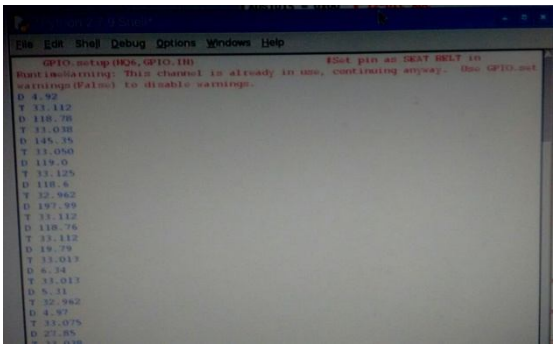
1. The person will be notified of any occurrence of fault in the vehicle prior to going to the service centre.
2. It will help reduce the emission of harmful chemicals into the environment.
3. Consumes less time.
4. Petrol theft can be avoided.
5. Cashless payment at petrol pumps.
6. With a managed service platform, server computing is much more reliable and consistent.

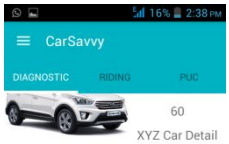
Applications

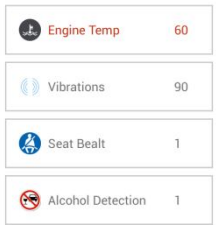
1. It is used in the automobile industry to check and verify the various parameters of the vehicle.
2. Cloud is used to store large amounts of data so that it can be processed later.
3. It is used to check the emission of harmful chemicals into the environment.
4. It is used to avoid petrol theft at petrol theft.

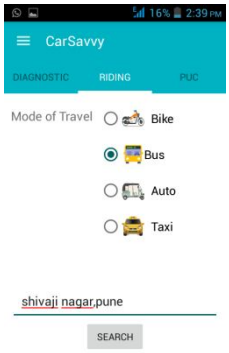
IV. RESULTS

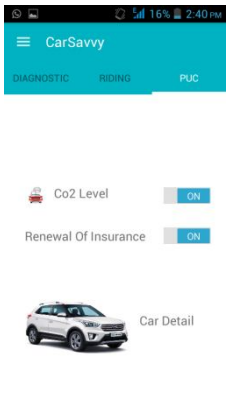
In this scenario we have connected various sensors to the R-pi microcontroller which will process various signals received from the sensors with the help of Raspbian OS.R-pi will get digital input from the sensors through ADC and will provide analog output to the server. Further the output can be accessed from the server on the android app.











V. CONCLUSION

In this report, the project CARIQ using Raspberry-pi has been successfully presented. The key information regarding CARIQ is Communication between the vehicle and user end device has been established for the data to be transferred from source to destination. Cloud computing has found an application in such vehicular systems and is found to be an efficient way handling huge amounts of data. However, there is a further scope for improvement in this project. For instance cloud can be used along with a server importance of the work or suggest applications and extensions.

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