Sustainable Development and Intelligent Real-Time Vehicle Mileage Calculation Device: An Analysis

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ABSTRACT---The device, Intelligent Real-Time Mileage Calculation (IRTVMC) System, will give the real-time value of the mileage of the vehicle. This system is reducing the consumption of fuel by knowing the mileage of the vehicle and the speed which is to be maintained by a driver to get a particular best mileage as well as cover the distance by knowing the mileage/litre. It will also overcome various problems faced during calculating the actual average of the vehicle and help to know the amount of fuel present in the fuel tank in terms of numerical value. Hence using minimum components will become easy to determine the current mileage of the vehicle, which will help to get accurate and current mileage instead of mileage range given by the manufacturers.

Keywords—Fuel Tank, Processor, Digital Odometer, Fuel Sensor, Digital Display, Real Time, Consumption, Pollution, Fuel Consumption.

1. INTRODUCTION

Nowadays, it must know the complete information of the vehicle, and we are using. At the time of getting a new vehicle we all ask for mileage first then we prefer the vehicle with the best mileage. However, we have to calculate the mileage manually. There is no such system which directly displays the current mileage to end user. Also, there was no such system which displays the information about total fuel in tank and consumption of it. Due to such problems, we are unable to know the proper speed that should be maintained by the driver. So because of that the fuel consumption increases, which causes pollution.

Another thing that we have never know how much fuel have added to the tank and how much correctly consumed which separates. If we need extra fuel and the pump person is adding less fuel in paid money. So, we were not aware of such losses.

As the environment-friendly movement increases in popularity, more and more electric vehicles (EVs) of all kinds as electric scooters, cars, buses and cargo trucks that will grace the roads. Present designers will be challenged to provide systems that can act adapted to a wide variety of different types of intelligent real-time vehicle mileage calculation devices with vastly diverse performance requirements [1]. The different systems used to monitor vehicle health, real-time location, fare collection, mileage, and other operating data are not integrated, which hampers the efficiency and reliability of the system [2]. While initial automobile tires pressure, which monitors their tire pressure level, deformation, wheel loading, friction, tread wear, are possible to improve the reliability of tires and tire control systems. However, in installing sensors in a tire, many problems have to be considered, such as compatibility of the sensors with tire rubber, wireless transmission, and battery installation [3]. Information technology (IT) has modified many industries, from the education sector, the health care sector to the government sector, now in the early stages of transforming road transportation systems [4]. Even, if the portable information terminal is misplaced, a third party is prevented from illegally browsing data stored in the portable information terminal. When a control signal system received information through a wireless communication system and when the received control signal system is an instruction signal to execute an encryption process on plaintext data stored in data memory [5]. SWTRACK: An intelligent model for cargo tracking based on off-the-shelf mobile devices was introduced by Oliveira et al. in 2013 [7].

Today, we are all facing the constraints of high fuel costs. Unless our vehicle comes with an onboard monitor that displays actual fuel consumption, then knowing what user fuel consumption is can be done if the user calculates miles driven by burning. To create the “Real-Time” Interface needed as:

i. On-Board Diagnostics (OBD-II) Interface device
ii. OBD-II J1962 Connector Cable
iii. Win 98 or better through laptop running
iv. Installed Microsoft Excel 2000-2003 or better
v. DAS-Data Acquisition Software

With the On-Board Diagnostics Generation-II (OBD-II) that it had made mandatory on all automobiles sold in the USA in 1996, it is possible to create an interface between the road vehicles electronic control module (ECM) and a computer to access this data [8]. Support vector machines

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(SVMs) have been applied successfully to construction knowledge domains. However, SVMs, as a baseline model, still have a potential improvement space by integrating hybrid intelligence [9].

The design of "Low-Cost Intelligent Real-Time Fuel Mileage Indicator (LCIRTFMI) for Motorbikes" is intended to developing a low-cost device that can actively display the fuel mileage of a motor-bike and display it, in real time onto display information which attached on the dashboard of a vehicle along with other driver information system. A unique method and system have been devised for giving instantaneous mileage readings information in real-time (RT) during driving conditions and idling conditions both corresponding to the amount of actual fuel consumed and the actual distance travelled by automobile. This device can be attached as an enhancement to existing motorbikes too, which works on a carburettor and even on motor-bikes with fuel injection technic. The calculations done by humans to manually check the mileage of a vehicle can be automated with the implementation of this device [10].

The RT estimation calculator machine configured for determining a first battery operated power consumed over a predetermined distance, wherein the first battery operated power will determine based on velocity and initial power. The real-time mileage calculator is coupled to the estimation calculator and configured for determining an estimated remaining distance based on the first battery operated power, the first predetermined distance, and a power balance [11].

Fleet Management System (FMS) is a highly eco-friendly system which gets more and more attention among the industrial sector. Recent years, actual fuel consumption has become one of the most critical issues due to global warming and hence, the establishment of a fuel consumption monitoring system is required. In this study, the FMS, a system which was capable of precisely monitoring and calculating the actual fuel consumption had designed. This FMS was composed of the front end Vehicle Tracking System (VTS) and the back end Management Server (MS). VTS was established and installed into the vehicles, based on several well-known technologies, such as Mobile Telecommunications Technology of GPRS or 3G, Global Positioning System (GPS), and On-Board Diagnostics II (OBD-II) [12]. A first unit then calculates an air pressure value by measuring aerodynamic force data which the vehicle receives from air based on a pressure value of air sensed by the air pressure sensor and driving information depending on the driving of the vehicle, and a method thereof [13]. A person, who is getting information with a display interface by smartphone, tablet, PC, or any telematics/in-vehicle device installed in the vehicle. The display interface presents an RT target for the driver to follow to maximise fuel economy and safety, achieved by modulating the accelerator pedal appropriately [14].

It has designed and implementation of the digital fuel gauge, which measures the specific level of fuel adding while fuel filling process. All fuel bunks were having types of digital displays unit in order to display the value of fuel adding to the vehicle and have been explored a technique to measure the amount of fuel available in the tank during static as well as dynamic conditions. This information system displays the level of fuel in the tank by using a load sensor, flow meter and vibration sensor. These sensors have interfaced with a development board-Arduino. Thus, it is an efficient information system to detect the fuel volume in the fuel tank, to get an instantaneous level of fuel volume and to avoid petroleum shortage at the various fuel stations at the time of filling of tanks [15].

In this paper, we proposed techniques with digitalised displays system that calculated current mileage per litre to get rid out of increasing rates of petrol and diesel. It will change the traditional method of calculating average mileage manually by replacing it with the automated method. It will also help the user to know what speed should be maintained by vehicle to avoid accidents and to reduce the excessive use of fuels. It will also let the user know the consumption of fuel by the vehicle so that automatically the pollution will be controlled. One of the other uses is that the user can get the idea of how much he can travel or how much he has travelled in one litre of fuel. It will also help in environmental fact to know-how and reduce the consumption of fuel.

In the present paper, Section 2 gives a fundamental theory and device description of IRTVMC. The device description of the block diagram is in section 3, and the summary and their conclusion had drawn in section 4.

2. FUNDAMENTAL THEORY AND DEVICE DESCRIPTION OF IRTVMC

The original real-time vehicle mileage calculation (IRTVMC) system, which will give the real-time value of the mileage of the vehicle and it will reduce the unnecessary loss of fuel and will help to control the pollution by displaying the fuel consumption. It can be used in such kind of vehicles so that it will be helpful in many ways like calculating mileage, displaying fuel consumption, displaying how much distance can travel the vehicle in total fuel remaining in the tank. The invention is an electrical device that works with the help of the processor and its memory. Other devices like odometer and fuel sensor which have used in new vehicles used for the system. Using readings from fuel sensor and odometer, the processor will calculate the current readings of mileage. The formula for calculating the mileage is:

$$\text{Current Mileage} = \frac{\text{Distance Traveled}}{\text{Fuel Consumed}}$$

So using the formula processor will calculate the values and stores them for further use.

3. RESULTS & DISCUSSIONS

Fig. 1 shows a description of the basic ideas about the actual device. What are the inputs and what will be the output also shown with the help of arrows?In IRTVMC, the

first working is of the processor to accept the inputs from fuel sensor and odometer which are inbuilt inside vehicles and then the processor will process the data and display the output on display panel of the vehicle. As the devices like odometer and fuel sensor are already present inside the vehicle, only the processor is to be needed to connect to them. The vehicle battery itself will provide the power supply to the processor. An additional feature added is that it will let the user know that how much distance it can travel in remaining fuel so that total consumption of fuel will also determine which will help to detect any losses during fuel filling. Hence using minimum components will become easy to determine the current mileage of the vehicle, which will help to get accurate and current mileage instead of mileage range given by the manufacturers.

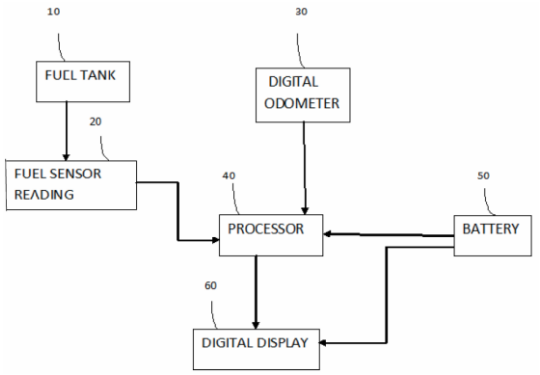

Fig. 1: Process diagram of the IRTVMC

While Fig 2, describes the flowchart of the system. It will help to describe the technical functioning of the system. All stages with their basic functioning will be given with the help of the flowchart. Failures or rollbacks stages are shown in Fig. 2 also.

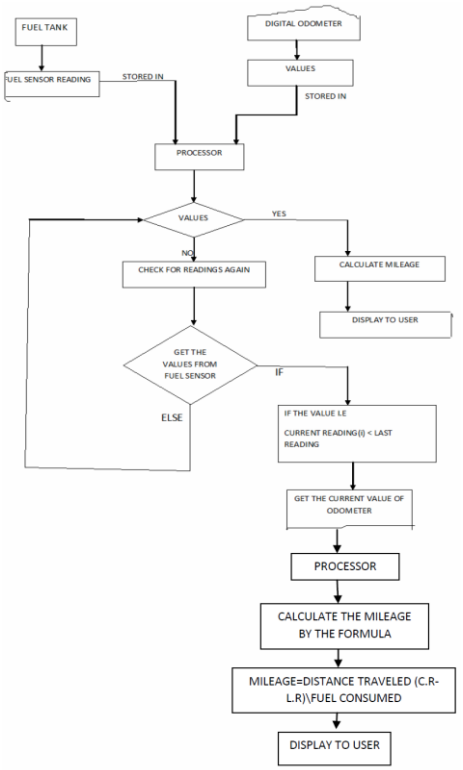

Fig. 2: Flow Chart of IRTVMC

4. SUMMARY AND CONCLUSION

The device IRTVMC focuses on providing the RT mileage of the vehicle as well as the exact quantity of fuel present in the fuel tank. By using the fuel sensor, we will get the exact amount of fuel present in the fuel tank. The odometer is an instrument for measuring the distance travelled by a wheeled vehicle. The initial data from the odometer and the fuel sensor will be stored in the processor. As soon as one litre of fuel had consumed, the reading of total distance travelled has processed in the processor. The stored readings of both fuel sensor and odometer will be processed in the processor to give the mileage as the output. The further study about IRTVMC system will focus on extracting much more accuracy and use the IRTVMC system to analyse the status, which will much improve vehicle management and road safety. It will also help the user to know what speed should be maintained by vehicle to avoid accidents and to reduce the excessive use of fuels and about knowing the consumption of fuel by the vehicle so that automatically the pollution will be controlled. One of the other uses, which gives an idea of travelling distance in one litre of fuels. It will also help in environmental fact to know-how and reduce the consumption of fuels and improve the human health life due to tension-free driving, the wealth of the nation being without harming of the environmental and development of sound public administration policy.

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