

GLOBAL JOURNAL OF ADVANCED ENGINEERING TECHNOLOGIES AND SCIENCES**APPLICATION OF HMI TECHNOLOGY IN AUTOMOTIVE SECTOR****Somashekar Patil*, Indira Bidari, Pooja Shettar**

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ABSTRACT

An HMI (Human Machine Interface) is a software application that presents information to a user about the state of a process, accept instructions and implement the operators control instructions. Typically in HMI, information is displayed in graphic format (graphical user interface or GUI). As HMI is the need of hour in automobile industry, new vehicles are designed with more sophisticated safety features and driver vehicle relationship evolves. The focus in this paper is to identify and develop a human machine interface (HMI) technology that will enable the driver to interact with automobile system in a safe and efficient way. Sometimes, it so happens that the driver will not remember the service details of various parts, replacement of any other parts or lubrication of engine. This may lead to malfunction of vehicle; it may get stuck while travelling which results in accidents. To overcome such problems here we discuss about techniques which ensures regular servicing of various parts of vehicle.

KEYWORDS: HMI (Human Machine Interface), GUI (Graphical user interface), service details, malfunction, IVIS (In Vehicle Information System), I-DEAS (Integrated Design and Engineering Analysis Software).

INTRODUCTION

India being the second most populated country in the world and the growth rate of Indian economy is also high as compared to developed countries, which attracts the presence of huge demand in the automobile industry. Automotive industry today is the most lucrative industry. India's passenger car and commercial vehicle manufacturing industry is the sixth largest in the world, with an annual production of more than 3.9 million units in 2011.

Whenever a person wants to buy a new vehicle, customer not only concentrates on the initial cost to be paid but also the way the company provides the service and maintenance. Now a day's car companies not only give importance to the architecture but also look at the overall development of the vehicle i.e, they want to include as many features as possible at a potential rate. The more the ease of service provided by the companies, the more is the orientation of the customer towards the company. Today's car architectures are automated to do so [1].

The automation embedded is to provide LCD screens displaying "service details about particular part of vehicle" with mobile applications (phone call, messaging, GPRS, music etc).

Most of the car manufacturers are making great efforts in designing and promoting 'In Vehicle Information System (IVIS)', which combines traditional car functions with internet radio, social networking communication and other forms of internet connections. One of the most compelling illustrations of IVIS is big screen based navigation system. If we compare two same model cars (BMW 325i) from 2000 and 2013, we will clearly notice that the biggest difference between the interior of these two cars is an 8-inch LCD display screen - not only for basic GPS-based map, but also to display the service details of various parts of vehicle, replacement of any other parts or lubrication of engine etc.



Figure 1: Model in 2000



Figure 2: Model in 2013

EXISTING SYSTEM

A motor vehicle service is a series of maintenance procedures carried out at set time interval or after the vehicle has travelled a certain distance. The service intervals are specified by the vehicle manufacturer in a service schedule [2].

Maintenance tasks commonly carried out during a motor vehicle service include:

- Change the engine oil
- Replace the oil filter
- Replace the air filter
- Replace the fuel filter
- Replace the spark plugs
- Tune the engine
- Check level and refill brake fluid
- Check level and refill power steering fluid
- Check level and refill automatic transmission fluid
- Grease and lubricate components
- Inspect and replace the timing belt if needed
- Check condition of the tires.

Types of services:

- The completed services are usually recorded in a service book which is rubber stamped by the service centre upon completion of each service.
- The service intervals are specified by the vehicle manufacturer in a service schedule and some modern cars display the due date for the next service electronically on the instrument panel.

PROPOSED SYSTEM

Routine car maintenance can be a difficult task to keep up with. However, there can be serious implications of not staying up to date on your car's maintenance schedule.

Consequences of Procrastinating: Failing to take care of your vehicle by having it regularly maintained can have negative effects.

- *High expenses* – A reason many people use for not keeping their car maintained is cost. Unfortunately, regular maintenance left uncompleted can lead to much higher expenses down the road.
- *Accidents* – Sometimes your car is trying to tell you something. Things such as squeaky brakes left untreated can lead to much worse problems such as brake failure that can lead to serious accidents.
- *Severe damage* – As you can expect, leaving little problems unrepaired can lead to increased damage to your vehicle. A little problem is much easier to remedy than trying to undo severe damage.

So it's of prime importance for the vehicle owner to ensure that servicing is done at regular intervals. But in this busy world no one has time to remember the service due dates or to maintain them properly. So through this project we are planning to provide a platform through which a person will get information about the updated service details without putting more efforts [2]. This can be done with the help of HMI Technology.

RESULTS

The team has developed software which will keep updating about the service details of various parts to the driver at any point of time. Initially, the service details and the service due dates of various parts will be provided by the vehicle manufacturers. After the first service has been carried out, the driver just needs to provide the date of service as input to the system and then system will automatically update all the information and gives due dates for the next service to be carried out [3]. The same procedure will be followed after each service. The code is written in the Java script using the tool Net Beans. The output of the program is shown in fig.3



Figure 3: Snapshot of the program output

The solid modeling of the dashboard along with LCD screen has been done by the team using I-DEAS, a designing tool and the proposed model would approximately look as shown in fig. 4



Figure 4: Snapshot of the solid model.

Working of the Program:

A new icon with the name 'Service' will be provided on the HMI screen to support our project. Once the driver touches the icon, a dialogue box will open and display various service related options. The driver can get the service details of a particular part by selecting it. For example if the driver wants to know the due date for replacing the engine oil, then he just needs to click on the engine oil option. By doing so, the driver will be getting the information of last service date of the engine oil and along with next due date. The driver can go back to home page of service icon and he can exit from there or he might go for getting the details of other parts[4].

After each service, the service details provided to the system should get modify according to the date of service. At this stage, it calls for driver intervention. The driver just needs to provide the date on which service has been carried out. Further updates will be taken care by the system itself [6].

The working of the proposed idea can be summarized through flow chart as follows:

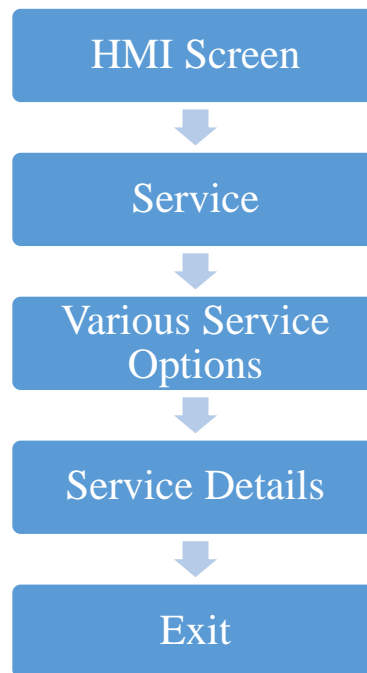


Figure 5: Flowchart of the working process

CONCLUSION

Consumer behavior consists of all human behavior that goes in marketing before and post purchase decisions. One can sustain in the competitive market only after understanding the complex consumer behavior. The main objective of the paper is to explore the effect of perceived service. In the public safety and security field applied business are needed with regards to standardization for system and services.

An HMI is a software application that presents information to user. In this paper driver will get to know the service details of various parts which are recorded in the system through GUI. Hence with this, it is easy to get rid of many problems arising in future. It is often frustrating to encounter any form of car trouble, particularly if you are in a hurry or far from an auto shop. These types of incidents can be avoided if you are able to regularly have your car checked. Regular car maintenance and repair can help to prevent the possibility of you being stuck in these situations. Car repair and maintenance is important. When experiencing any form of car trouble it is important that you immediately have your car checked. By doing so you will be able to prevent any huge damage to your car. By the proposed project you are able to save time, effort and money.

FUTURE SCOPE

The disadvantage with this improvement is that when the driver needs to operate the system, they are forced to take off their eyes from the road for few seconds. Based on the report of the U.S. National Highway Traffic Safety Administration, 20% of injuries and 16% of fatalities are closely related to driving distraction (NHTSA, 2010) [6]. The research on eye movement shows that for more than two seconds moving eyes away from the road in front will significantly increase the probability of traffic accident occurrence.

To overcome these safety problems with existing LCD screen, we propose a concept that combines human voice recognition technology with service details i.e. if driver is busy in driving then he can just click on an icon on LCD screen and there after he will get to know the service details of various parts of vehicle with human voice and there is no need for him to look at the screen. This will definitely help in decreasing the number of accidents. Currently in the proposed idea, the driver needs to give the date on which service has been carried out as a input to the system. Further in the future there is a scope that, the driver intervention can be completely removed by using some other means of automation.

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