



HEADS UP DISPLAY

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Abstract —Today automation forms an integrated part of any automobile company. Adding more electronics to the automobiles makes it more comfortable leading to fully automated automobiles. Drivers spend a significant amount of time to check speedometer. So projecting that information on the windshield can prevent dangerous distractions. A head-up display or heads-up display also known as a HUD—is any transparent display that presents data without requiring users to look away from their usual viewpoints hence decreasing the levels of distraction as well as the amount of accidents. This project deals with acquiring the data (vehicle speed, fuel level etc.) from the vehicle and displaying it onto the windshield. So that the driver can just look through the windshield for his/her speed limits for safer driving.

Keywords-component, HUD, Speedometer.

I. INTRODUCTION

In a world where Google glass, snowboard goggles are a trend, it is about time our cars get to enjoy the same treatment. HUDs or Heads-up displays, bridges that gap for everyday cars. They are fashioned in such a way that the driver's eyes always focused on the road with next to zero interferences.

Augmented reality blends the real word and sensory data. It is now everywhere even in automation industry. Surely this technology will benefit the driver with safer driving environment. This paper deals with the technology named as HUD (Heads-up Display). This device will retrieve the data from the car from its OBD-II port and will display it on the windshield. It will provide the driver with safer driving conditions. It is fast, affordable and user friendly. As it takes real time data from the car it is more accurate than the GPS.

A head-up display or heads-up display also known as a HUD—is any transparent display that presents data without requiring users to look away from their usual viewpoints. A HUD also has the advantage that the driver's eyes do not need to refocus to view the outside after looking at the optically nearer instruments.

II. LITERATURE SURVEY

Anup Doshi, Shinko Yuanhsien Cheng, Mohan Manubhai Trivedi (2009), The paper examines a prototype interface (DAD), capable of presenting alerts in the field of view of the driver. This paper effectively conveys the importance of HUD by its results as that “the driver spent only 37% of the normal time looking down while the time spend looking through the windshield was increased by 10%” this nick of time is precious when we talk about avoiding accidents or even reducing the severity of accidents[1].

<http://www.bloomberg.com/> Tech companies trying to build a kind of projection system containing millions of tiny mirrors (Digital light processing) which will produce clear images across a wide area of the windshield regardless of the weather. [2]

www.cartelligent.com, this website shows HUDs as implemented in 38 different makes of cars and primarily in Audi, BMW, Cadillac and Lexus. It shows the assistance in various driving conditions and connectivity mode, basically providing driving directions to the driver. [3]

III. PROPOSED METHODOLOGY

Figure 1: shows the proposed methodology for HUD design. This project requires fast processor so that it can retrieve real time data from the car. The code should be optimized for faster execution. This will be an add-on to the automobile hence it should be affordable and user friendly. The display unit should provide unambiguous data to the driver.

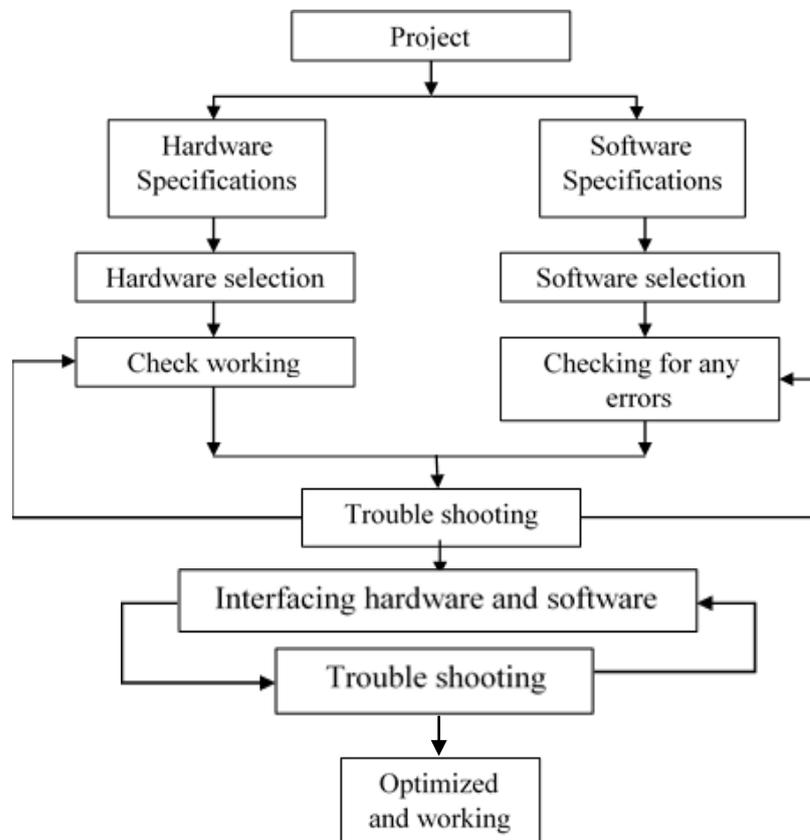


Figure 1 : Methodology

IV. TECHNOLOGIES USED

This project uses the following hardware and software.

- A. ELM327 USB connect to acquire data from the car OBD II port.

It is a programmed microcontroller produced by ELM Electronics which helps the user to read the on-board diagnostic codes. It supports all the standard OBD II protocols.



Figure 2: ELM327 USB

B. Raspberry Pi 2 Model B+ v1.1 for processing the data.

Raspberry Pi 2 Model B+ used in this project is a second generation Raspberry Pi which uses a Broadcom BCM2836 SoC and quad-core ARM Cortex-A7 processor, with 1 GB RAM, 256 KB shared L2 cache



Figure 3: Raspberry Pi 2 Model B+

C. LCD HDMI display to display the output.

LCD HDMI display directly pluggable into any revision of Raspberry Pi. It works perfectly with the Raspbian OS directly with the drivers provided by the manufacturer.

Following are the Steps to use full screen of LCD Display

- Go to LXTerminal
- Type command “sudo nano /boot/config.txt”
- Now uncomment the following lines or if it is not present than write it after #DMT (computer monitor) modes
- `hdmi_group = 2`
- `hdmi_mode = 87`
- `hdmi_cvt 800 480 60 6 0 0 0`
- Then press Ctrl + X , press Y and ENTER
- Now reboot your Raspberry Pi

The results from the ELM327 are obtained as list of parameters and their respective values, these values are represented graphically. Figure 4 represents such a graphical presentation for speed as a circle with varying radius depending on speed.

All of the programming to read car values and to display it in graphical form was carried out using python programming. The coding and code simulation was done in PyCharm software to check the correctness of the program. After debugging, the program was run on a car after the hardware connections were made. The fig below, shows the final output of the project.

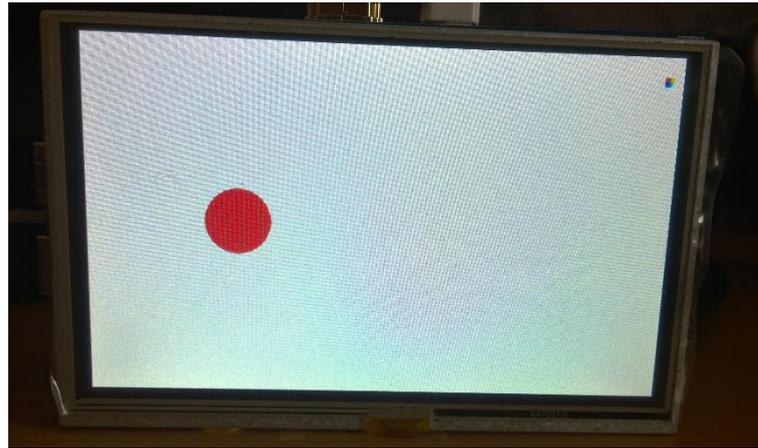


Figure 4 : Speed represented graphically as a circle

V. CONCLUSION

The HUD system with the proposed methodology is designed. This system's implementation was carried on different makes of car having an OBD port. The output varies as the sensors in a car vary from model to model. Hence a varied output will be seen depending on the car used to implement this system.

VI. FUTURE SCOPE

The design of this project is team work. There is debate going on that HUDs could eventually become more of a necessary requirement than a luxury across many countries. It could also serve as graphical user interfaces in any environment. HUD system with audio assistance can be developed. GPS could also be integrated with this system thus making HUDs a one stop for every information needed.

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