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Smart Bike System

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ABSTRACT

Vehicles being the most widely used machines need to get smarter compared to their current technology. The necessity described by the younger generation of users, the millennials, for their devices to be smart and their vision to have more computerized and smarter applications of various sensors. The invention and development of better-computerized systems for infotainment and control of vehicles have taken speed and research is done mainly in an open-source on Linux kernel-based operating systems. The Smart Bike System is a Raspberry pi based operating system(AGL) for bikes tracks the various components of the bike like Speed, Quantity of fuel, Distance covered in a single trip, Temperature, Date and Time. We make a note that the current system of dashboards for representing the various aspects of a bike is old. A significant improvement would be made in the quality of the bike and the way people use it if the current computer technology of the world embraces the vehicular system. Automotive Grade Linux(AGL) is an (open source tech) operating system for automobiles which when installed on a computer in synchronization with the parts of a motor-bike has an ability to display more information in a more colorful and animated format like a computer desktop but specifically for automobiles.

Keywords : Automotive Grade Linux, Raspberry Pi, Open Source, Linux Foundation, Internet Of Things, GPS, Wi-Fi, Computerised - Bike

I. INTRODUCTION

An analogy could be made where the current instrument cluster systems in bikes or two-wheelers can be compared to wristwatches. Some have an analog display, some have a digital display and some purely digital.These systems particularly focus on tracking the following values from the various sensors in the bike-

- Speed
- Quantity of fuel
- A Total Distance covered in a single Trip
- Time
- Temperature (Only In Digital Dashboard)

The current scene of dashboard technology in commuter bikes in India is that people are still using all the afore-mentioned systems and to check the onboard diagnostics of how the vehicle is working i.e. a digitally accurate way of checking how the bike is functioning properly with respect to time.

In the age of handheld computer devices that boast 4gb of ram, connects to the internet, GPS, etc., the dashboard tech of vehicles is far too left behind. Some costly bikes do have an Electronic control unit fitted inside them that help them control the fuel to oxygen supply ratio for better functioning of engines.

II. LITERATURE REVIEW

The Linux Foundation launched Automotive Grade Linux (AGL) in 2012 with the goal of building a common software platform that could eliminate the fragmentation that has plagued the automotive industry. In 2016, AGL released the Unified Code Base (UCB), an open-source infotainment platform that includes an operating system, middleware, and application framework. The community is currently working on the sixth release of the platform. [1]

The approach was based on the assumption that drivers are generally using specific features within certain environments ever and ever again. Based on this knowledge in the form of detected correlations between interactions and environments, an on-board computer would be able to provide contextual personalized shortcuts or contextual personalized automation.[2]

Overall, test results show positive feedback of the participant towards the inclusion of adaptive interfaces in vehicles. The design principles applied have shown to provide a good user experience as well as an increase in perceived road safety. These principles must be clearly aimed to understand user preferences in terms of the functionalities that are most frequently used. Furthermore, one of the main premises of such adaptation is the introduction of HMI changes without having a high impact on the ultimate purpose of the application. [3]

IVI contains a number of individual working modules that have been elaborated further in the report. Each of these modules is a combination of hardware and software. The modules contain embedded microcontrollers that take inputs from the user and drive a display device. These microcontrollers may be programmed to work as per the desired functionality. Microcontrollers form the "brain" of these systems, where the entire processing work takes place. For example Processing of audio files to play music from a source file, etc. [4]

III. SYSTEM OVERVIEW

The project consists of four major components; Raspberry Pi, Analog To Digital Converter - ADS115, Automotive Grade Linux and TouchScreen Display . The block diagram is shown below:

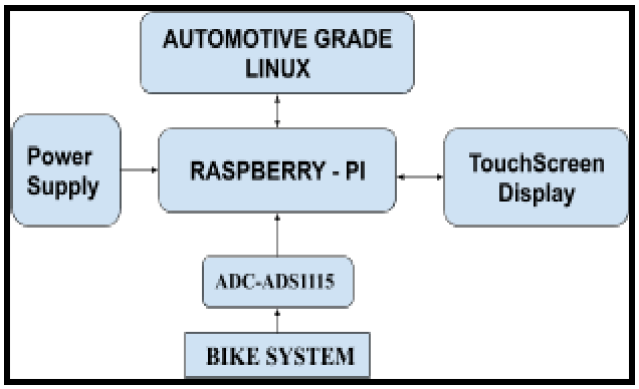

Figure 1. Block Diagram

3.1 HARDWARE USED:

a) Raspberry Pi : The Raspberry Pi is a small pocket size computer used to do small computing and networking operations. It is the main element in the field of internet of things.The AGL Project supports building images for the Raspberry Pi 3 and the Raspberry Pi 4 boards.

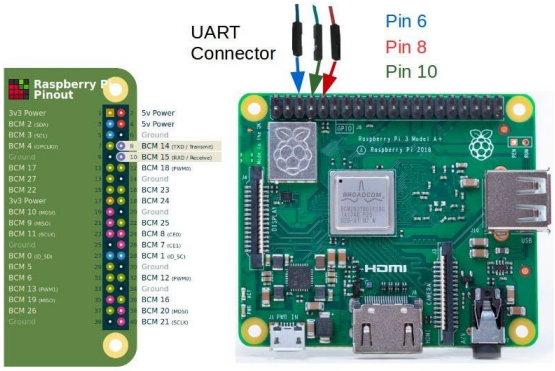

Figure 2. Raspberry Pi

b) ADC - ADS1115 : (ADS111x) are precision, low-power, 16-bit, I2C-compatible, analog-to-digital converters (ADCs) ADS1115 are great analog to digital converters that are easy to use with the Raspberry Pi using its I2C communication bus.

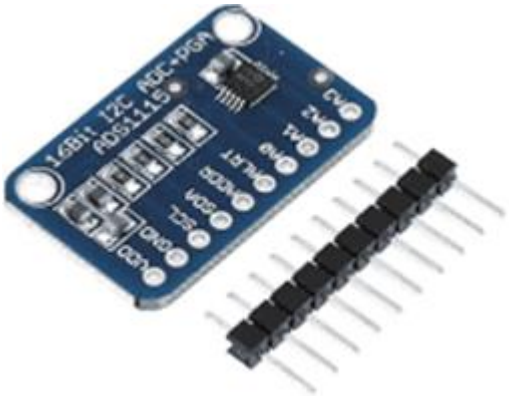

Figure 3. ADS1115

c) 7" Touch Screen : Display :Raspberry Pi 7" touch screen monitor gives users the ability to create all-in-one, integrated projects such as tablets, infotainment systems and embedded projects. The 800 x 480 display connects via an adapter board which handles power and signal conversion.

Figure 4. Touch Screen Display

3.2 SOFTWARE USED:

d) Automotive Grade Linux : Automotive Grade Linux is a collaborative, open source project that brings together automakers, suppliers, and technology companies for the purpose of building Linux-based, open source software platforms for automotive applications that can serve as de facto industry standards.

e) XDS Dashboard : X(cross) Development System is a tool that allows users to easily cross build applications. X(cross) Development System (XDS) is a set of tools that provide a multi-platform for cross development with near-zero installation.

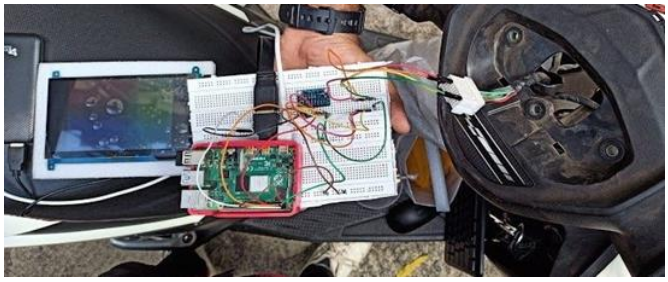

Figure 5. Hardware Setup For Smart Bike System

IV. DESIGN IMPLEMENTATION

The application development process in AGL:

1. Build the image you are going to run on the hardware device.
2. Download or build the Software Development Kit (SDK) you use to create your application.
3. Create bootable media using your image.
4. Boot your hardware device with the media.
5. Prepare your environment so that you can develop an application. You can develop the application using XDS or using a stand-alone SDK.
6. Create your application.
7. Deploy the application to your hardware.
8. Debug the application

Figure 6. HomeScreen

AGL Operating System HomeScreen results in following features:

- Rich User Experience (Rich UX)
- Driver Distraction Mitigation
- Variations Support

V. RESULT

A raspberry pi based operating system for bikes demonstrated how a small computer can act as the brain of a bike, keeping attention on the various sensors and storing the data. The operating system will give a soul to this combination of motors and computers and will make the bike come alive. Adding the connection with the internet will make it communicate with other bikes. Achieving this level of technology will definitely make things efficient, safer, to describe it in one word -futuristic.

5.1 APPLICATIONS:

The raspberry pi based operating system for bikes can -

1. Applications on Graphical Data Representation of sensors collected data
   a. Track the various components of the bike like
      - ✓ Speed
      - ✓ Quantity of fuel
      - ✓ Distance covered in a single trip[between starting the bike, traveling above a certain threshold value(in rpm) and then stopping the bike],
      - ✓ Temperature
      - ✓ Date and Time.

2. Sensory Info Database
   a. It can store these values procured from the sensors for a long time in a memory card until timed to delete
3. Inbuilt GPS applications
   a. Ability to predict the correct path from current location to destination
   b. Ability to predict the correct average time required to reach the destination

4. 4. Battery Information
   a. It can show the charge in the vehicle battery on a scale of 1 to 100%.

5. 5. UX & UI
   a. compared to current technology used, the proposed system will have a better user interface where the user will be able to view information about the vehicle.
   b. It will also give the user a better experience when using the vehicle

6. 6. Wireless Communication
   a. The proposed system will able to connect with smartphones using wifi or Bluetooth and share information directly to the dashboard without having to take out the phone
   b. It can also communicate with a similar system nearby.

7. Other Applications

a. Any other supportable application can be installed and run on the system.

b. For Example Media App,Phone App, Maps, Radio,.Etc

Figure 7. Media App

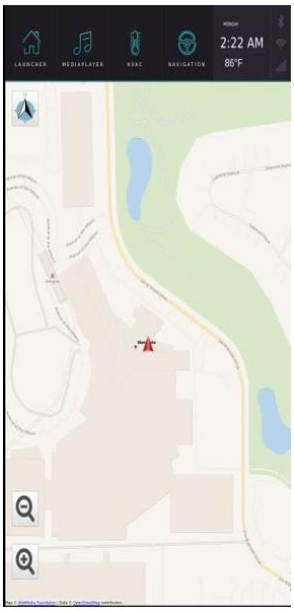

Figure 8. Maps

Figure 9. Radio App

Figure 10. Phone App

VI. CONCLUSION

Smart Bike system is Reliable, Stable, Quick, Low Cost & Effective Solution to recurrent Problems In This continuously Emerging World of Technology. The sensors are successfully interfaced with raspberry pi and communication is achieved also we learned how to create a complete operating system from scratch. All observations and experimental tests prove that this project is a complete solution to the field of enhancing driving experience. Implementation of such a system can definitely help to improve the current vehicle Industry.

VII. FUTURE SCOPE

Our project can be improvised by using the advent of technology, there is a lot of scope to where we can take this current system of dashboards. Bikes have not been completely computerized yet, microprocessors can be fit inside current commuter bikes that can prolong the life of the bike. Many other functions of the bike could be controlled faster and moreover automatically if computers are used.

These microprocessors can be programmed so as to provide the most accurate digital information from various sensors of a bike and can act as a brain for a bike and an intelligent Bike can be made using advanced algorithms of Artificial Intelligence and other domains.

As of now, the Smart Bike system is designed to improve the current bike dashboard system based on Raspberry pi and Automotive Grade Linux. In future, new Operating Systems and Hardware with more enhanced features and capabilities can be added according to need and preference of Users. Additionally, Many features can be built which will allow Users more flexibility and driving experiences. This Project is the one new step towards the world of Electric Bikes and IOT and 5G technologies.

Secondly, the Applications are based on normal functionality. In future, the more powerful operating systems with intelligent applications can be developed for drivers. So that the Users can get more advanced functionality and improved driving. Additionally, weightage can be added to Automotive Grade Linux. Therefore, the implementation is more relatable.

VIII. ACKNOWLEDGEMENT

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IX. REFERENCES

[1]. Case Study: Automotive Grade Linux www.linuxfoundation.org/projects/case-studies/automoti ve-grade-linux]

[2]. Intelligent In-Car-Infotainment Systems: A Contextual Personalized Approach; Sandro Rodriguez, Garzon Daimler Center for Automotive IT Innovations Berlin, Germany

[3]. Integration of an Adaptive Infotainment System in a Vehicle and Validation in Real Driving Scenarios; Miguel Angel Galarza, Teresa Bayona, and Josep Paradells; Universitat Politècnica de Catalunya, Barcelona, Spain.

[4]. In-Vehicle Infotainment System; Aadarsh Kenia, Sneha Kadam, Pooja Purushothaman; Department of Computer Science, F.C.R.I.T, Vashi.

[5]. Version 1.0 , Automotive Grade Linux Requirements Specification , May 28, 2015.

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