

Smart Computer In Vehicles

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ABSTRACT

Nowadays, computerized automotive systems are an ongoing evolution, continually improved from year to year to provide more efficient. The basic fundamentals is that most vehicles have some audio, video and Bluetooth facilities incorporated, even the security system is considered the spring of invention these appeared more popular. But they were manufactured with simple designs, but it was not cost effective.

To make this as efficient, on-board computers evolved slowly (i.e. As Existing, Carputer system which comes under a category of mobile computer or tablet are modified specifically to be installed and run in car. They looks as smartphones and PDAs Which become powerful, and have included useful technologies like Global Positioning System and Bluetooth, they have become the predominant base platform). Still these too were most costly. Thus, introducing the enhancement of this progression with simple and **cost efficient system** using **Raspberry Pi**, is equivalent to the chip used in PC's which include as the facilities of carputer and too incorporates all peripheral installation through USB and network through interface of various linux Operating system and incorporate design of Security system, obstacle detection (through image processing), location finder (GPS), cellular communication (GSM) and sensors such as (ultrasonic sensors, vibrator sensors etc.) installed in same circuit.

By using this Kit a new revolution can be done, "MINI COMPUTER IN A CAR WITH SECURITY AND SENSOR" at low cost and user interface system.

Keywords:- GSM, Wifi, GPS

I. INTRODUCTION

Embedded Technologies is now in its prime and the wealth of knowledge available is mind blowing. Embedded systems are considered when the cost of implementing a product designed in software on a microprocessor and some small amount of hardware is cheaper, more reliable, or better for some other reason than a discrete hardware design.

Need for the embedded systems are because general-purpose computers, like PC, would be far costlier for majority of product that incorporates some form of embedded systems technology. Another reason to have embedded system is because general-purpose solutions might also fail to meet a number of functional or performance requirements such as constraints in power-consumptions, size-limitations, reliability or real-time performances etc.



Fig. 1 Overview of smart computer in vehicles

II. EXISTING SYSTEM

Carputer system is an existing system which comes under the category of a mobile computer or tablet or modified specifically to be installed and run in cars. They looks as smartphones and PDAs which become powerful,

and have included useful technologies like GPS and Bluetooth, they become the predominant base platform. Still these too were costlier and it has no facility to incorporate multiple technologies within a single system.



Fig. 2 Existing carputer system

III. PROPOSED SYSTEM

The proposed system introduces the enhancement of this progression with simple and cost effective system using **Raspberry Pi**, (is somewhat equivalent to the chip used in PC's which include as the facilities of carputer) and incorporates all peripheral installation through USB. Even networking through Linux operating system via LAN adapter is possible and also it incorporate design of security system and sensors such as (reverse camera, vibrator sensor, etc.) installed in same circuit. A new **revolution** can be done by using this kit namely “**MINI COMPUTER IN A CAR WITH SECURITY AND SENSOR**” at low cost with user interface system.

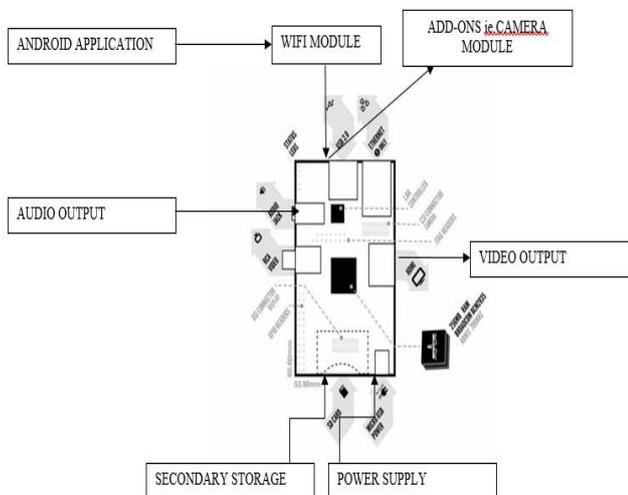


Fig. 3 System architecture

A. OS INSTALLATION

Raspbian is a free operating system. It's a Debian optimized for the RPI hardware. An OS is the set of basic programs and utilities that makes RPI to run. However, this Raspbian provides more than a pure Operating System: it comes over with 35,500 packages, and pre-compiled software's bundled in a nice format for easy installations on your RPI.

Raspbian Operating system is an unofficial version of Debian Wheezy ARMHF with compilation settings with control to produce optimized "hard float" code that will run on the RPI. This provided significantly faster and good performance for applications that makes the heavy usage of floating point arithmetic operations. All the other applications will also gains some more performance through the use of advanced instruction of the ARMv6 CPU in RPI. Although Raspbian OS is primarily the effort of Mike Thompson (mthompson) and Peter Green (plug wash), it have also benefits greatly from the enthusiastic support of RPI community member who wish to get the maximum performance in their device. The initially build of over 35,500 Raspbian OS packages, optimized for best performance on the RPI, was completed in June of 2011. However, Raspbian OS is still under actively development with an emphasis on improving the stability and performance of as many Debian packages as possible.

B. SECURITY

a) VIBRATOR SENSOR:

Vibrator sensor works on electromechanical principle in accordance with the electrodynamic principle and is used for measuring the bearing absolute vibration.

In Smart Computer in Vehicles, vibrator sensor is used for security purpose (i.e.) the sensitivity level is set in the sensor such that the user can activate the sensor through android application with the help of wifi module.

b) GSM MODULE:

Global System for Mobile Communication is a cellular network, in which mobile phone connect to it by searching the cells in the immediate vicinity. The coverage of each cell vary according to the implementation environments. Sometimes mobile network operator restrict the handset that they sell for the use with their network. This is called locking and is implemented by software features of the mobile phone. The subscribers usually contact the provider

to remove the lock, and utilize private services to remove the lock, or use software and websites to unlock the handset themselves.

In Smart Computer in Vehicle GSM module is used by the user who doesn't have a smart phone or android phone to have an application to activate the security sensor, in this case the sensors can be just activated by sending a message.

C. LANE DETECTOR

a) WEBCAM:

A webcam is a video camera that feeds its image in real time to or through a computer network. When "captured" by the computer, the video stream may be saved, viewed or sent to other networks via systems such as the internet. Unlike an IP camera (which connects using Ethernet or WiFi), webcam is generally connected by a USB cable, or similar cable, or built into computer hardware, such as laptops. The most popular use of webcam is the establishment of video links, permitting computers to act as video phones or video conference stations. Other popular uses include security surveillance, computer vision, video broadcasting, and for recording social videos. Smart Computer in Vehicles uses webcam to visualize the obstacle around the car to prevent user from accident.

b) LANE DETECTION THROUGH IMAGE PROCESSING:

The processing of images using mathematical operations by using any forms of signal processing for which the input is an series of image, or videos, such as a photograph or video frame; the output of the image processing may be either an image or a set of characteristics or parameters related to the image. Image processing usually refers to digital image processing, but optical and analog image processing also are possible. Computer graphics and computer vision are closely related to image processing+.

Smart Computer in Vehicles uses image processing technique in webcam to detect the obstacles through edge detection algorithm and uses the threshold algorithm to convert the images into black and white and further produces a alarm to user to notify about the detected obstacle around the car.

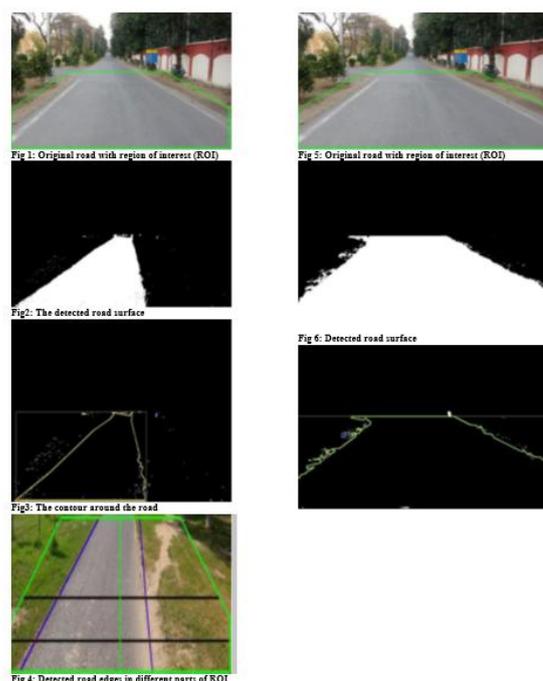


Fig. 4 Phases of lane detection

E. WIFI MODULE

Wi-Fi is a technology which allows electronic devices to connect to a wireless LAN (WLAN) network. Access to a LAN is usually password protected, or it may be open, which allows any device within its range to access the resources of the WLAN network. Devices which can use Wi-Fi technology include PC, video-game consoles, smart phones, digital cameras, tablet computers and digital audio players. Wi-Fi compatible devices can connect to the Internet via a WLAN network and a wireless access point. Wifi is less secure than wired connections, such as Ethernet.

In Smart Computer in Vehicles wifi module is used to communicate with pins available in the raspberry pi to activate or to deactivate the sensors incorporated in it. Wi-Fi module is secured from strangers with the help of SSID code in it.

F. WEBIOPI

It is a raspberry pi's toolkit and also used to control the pins of raspberry pi in a user friendly manner. WEBIOPI is a web browser developed easily by connecting the ip address of the wifi module which is connected with the raspberry pi. The language used for WEBIOPI is Python, with facilities to load and execute custom script, using a comprehensive structure with setup

and loop functions. Includes simple web apps, to debug GPIO, devices and Serial interface

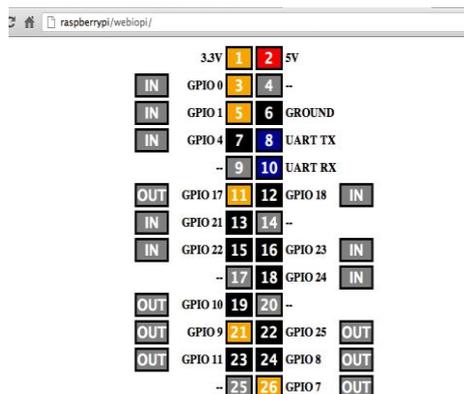


Fig. 5 Overview of WEBIOPI

G. RASPBERRY PI SMART SERVICE RECORD

SCSR is an end user application which provides different useful functionalities where now the current automobile field lack for. By this application the service record of the customer is maintained by cloud services, as a whole which also benefits by retrieving the database even when the entire system fails. The options provided to the user such as printing the Customer feedback form, Uploading form into cloud and registering the new Customer Feedback form. The Cloud database can be maintained by the end user at a regular period of time.

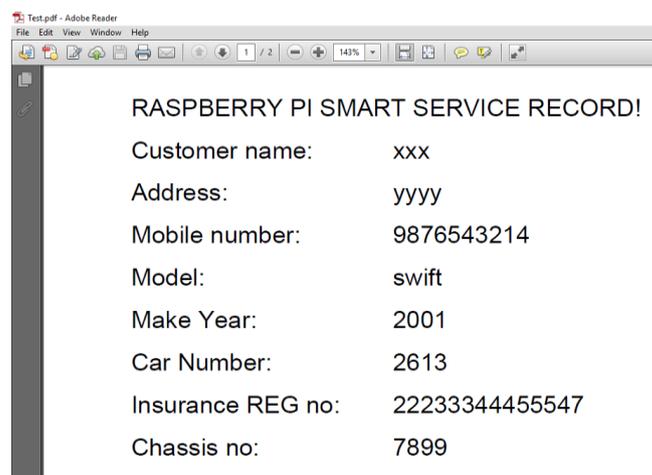


Fig. 6 Raspberry pi smart service record

IV. CONCLUSION

Thus the “Smart computer in vehicles” is to develop a mini computer system with security, lane detector and many other special features in a cost efficient manner by using a raspberry pi board.

FUTURE ASPECT

The pins and other features available in the raspberry pi board can be used for adding extra modules in it, also the software and hardware provided are enhanced based on the evolutions. Kodi Operating system is used to display the speed gauges and some additional gauges via raspberry pi display. This can be achieved in the same module by replacing the operating system. Already present features such as controlling system in the car can be automated by using the RPI.

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