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Integrated Smartphone Based Dashboard For Vehicle

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Abstract: the design of "An Integrated smartphone based Dashboard for vehicle"is intended to developan integrated dashboard in automobile for smart cityapplication. The project involves the implementation of a proposed system used for successful real time data acquisition, fault diagnosis and display with child safety and vehicle monitoring features for any vehicle. Proper vehicle monitoring and maintenance can save time, money and improve the ownership experience. Our system is based on Microcontroller and Wireless Communication which is used to extract the vehicle's status or fault information, and then the results can be viewed to the driver to monitor various parameters like fuel consumption, engine temperature etc. for safe and careful driving. This project aims at developing an embedded system prototype for detecting the vehicle condition by monitoring the internal parameters collected from various sensors that are used in evaluating the vehicle‘s current state. These collected parameters will be displayed on owner’s smartphone. This project helps to minimize the space, electronics used, and material used for dash board in any vehicle as smart phone will replace entire dashboard. This also include voice commanding of many features from basic like start/stop the engine to advance features like calling, enabling entertainment, weather, map and many more using specially designed Android/IOS mobile application.
Keywords: dashboard, real time monitoring, sensors, Bluetooth, voice control.

I. INTRODUCTION

Car industry plays an important role as the back bone for the economy of any country. Dash board is one of the main parts of the car interior component and plays a very important role in different aspects such as safety, reliability, user friendly, technology, appearance and so on. Dash board is used for operating different functions in the car such as instrumental panel, audio and video devices, these functions are distributed inside vehicle that communicate with each other. The dashboard of automobiles is used to represent thevalues of parameters such as fuel level, speed, distancetravelled, etc. The present technology used for theindication of the parametric values on dashboard ofautomobile is easily implementable but at the same timeit compromises accuracy and sudden changes. Thatmeans the technology used today is trade-off betweenaccuracy and easy implementation. Thus approach of theproject try to indicate the parameters with relativelyhigher accuracy and better readability for the user.Car dash board like the other components of the car have lots of improvement in terms of extra features, updating the existing product to take the dash board at the new level. Car dashboard is provided with suitable functions to make the driver comfortable and easy to drive.Smartphones embed increasingly complex sensors that can be used for a wide range of connected applications. Their growing market penetration provides the opportunity to develop novel distributed sensing platforms that will constitute the foundation for emerging commercial applications. The progress of car dashboard and their changes in last few decades has had a significant impact on automotive industry in terms of technology. Perfect replacement for dashboard will be new generation smartphones which are widely used by human being. *Integrated smartphone dashboard for vehicle*” gives us ability to use smartphone as dashboard. A smartphone application has been developed to demonstrate the feasibility of our approach for vehicular application. This design and operation concept includes integration of sensors, communication technologies, to provide vehicle-wide abilities to present necessary parameters on smartphone.

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II. LITERATURE SURVEY

In recent decade various research are carried out on the dashboard system for automotive but only specified with individual functionality or advances in vehicle integrated systems in one of the research , Shivanjali Thorat *et al*, has proposed the design of "An Integrated Digital Dashboard for Automobile System" is intended to develop an integrated dashboard in automobile for smart city application. In today’s world when we look out for any vehicle’s dashboard the parameters are represented in analog form or in the form of bar for e.g. speed, fuel indication, battery level indication, etc. This doesn’t provide exact idea about the magnitude of parameters like fuel remaining in the tank, speed of the vehicle, battery life, etc. Hence it is very much necessary to support the user by providing the parametric values in the form of digits. This project is concerned about the

digitization of dashboard along with the indication of various features like battery level indicator, oil level indicator, distance to empty location of the vehicle by using GPS and GSM networks. These values are displayed on LCD [1]. Mr.Saurav V. Malpani *et al*, has proposed The system designs to provide a cheap cost means of monitoring vehicle parameters and displaying them on the android mobile smartphone. This article also represents the measurement and displaying readings of different parameters like oil level, engine temp, speed etc. This will be helpful in the maintenance of the vehicle. An electronic hardware is built to have an interface between the Bluetooth module and phone which is situated in the android mobile device. This system is able to transmit vehicle information to the RTO in case of exceeding traffic speed rules via SMS [2]. P. Sivakumar Jayashree *et al*, has proposed This paper describes the Driver's dashboard implemented in AFV to display important vehicle parameters and a vision system display to perceive the environment for day and night time driving. dashboard has been designed aesthetically such that it provides real time awareness of the vehicle condition by displaying the critical parameters which requires driver's attention for safe driving while automating of most of the driver's operation taking into consideration the ergonomics aspects as well in the design. Similarly, the vision system has been designed to perceive the vehicle surrounding during day and night time and during adverse weather conditions for driver [3].

Omnitracs XRS Mobile will run on many android and Windows Mobile-based devices, including both phones and tablets. Omnitracs XRS Mobile uses the Bluetooth capability of a mobile device to connect to an Omnitracs XRS Relay and obtain engine data automatically. The small, easily installed in-cab Omnitracs XRS Relay taps into the truck's computer. Data is transferred from the Relay via Bluetooth to the driver's smartphone, tablet, computer, or rugged device. The data is then transferred via cellular network from the mobile device to the Omnitracs XRS host website for data collection and analysis. The result is an easy-to-use dashboard of compliance and fleet optimization data and scorecards Drivers can use Omnitracs XRS Mobile to view and update Hours of Service (HOS) logs, record Driver Vehicle Inspection results, begin and end routes and stops, and perform a variety of other tasks. The information automatically collected from the Omnitracs XRS Relay, in addition to any information provided by the driver, is sent to the Omnitracs XRS host website using the mobile device's carrier network.[4] Rick Styll *et al*, describes that Dashboards can be the best starting point to provide a high-level view of the most relevant information to monitor, analyze, and collaborate around business performance. A growing number of organizations are creating dashboards to improve fact-based decision making, but if the dashboards fail to return results quickly or are difficult to understand, user adoption will soon wane.

III. METHADOLOGY

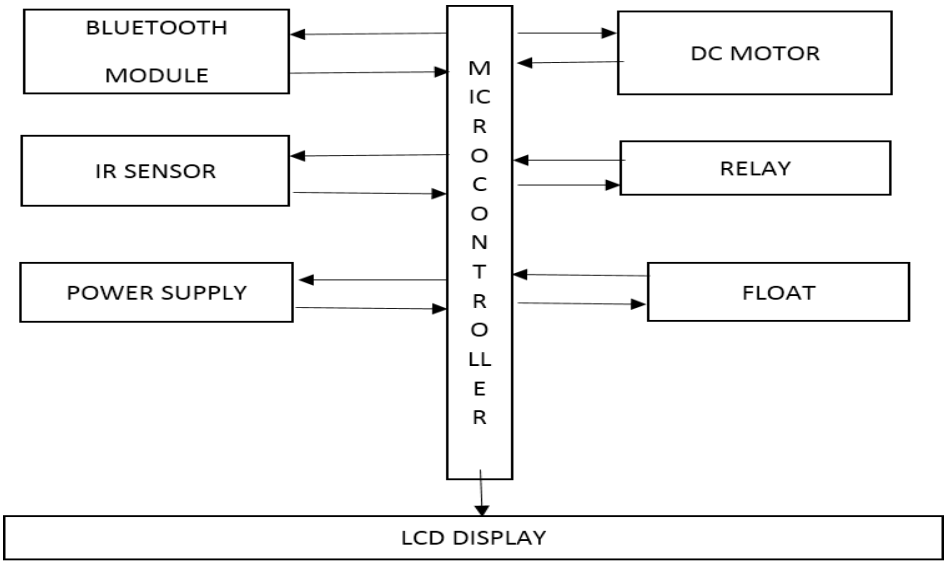


Fig.3.1 proposed system block diagram

The proposed block Diagramof overall systemwhich shows the interconnection between the different pins of the atmegha 2560 of Arduino Uno module and different components used in ignition module. Bluetooth are connected to connect microcontroller with smart phone, This Bluetooth module connected with microcontroller through the RXD and TXD. DC motor is connected to replicate to real life vehicle wheel. Power supply is used to give electrical power to microcontroller. Through pin 5v + supply is provided. Additionally Arduino Uno used as a platform. Vehicle batteryis 12V dc. Thus power supply is designed to bring thelevel down to 5V. Resistive divider network is used tobring the battery level down from 12V dc to 5V dc.Various parameters like oil level with conditioning, fuellevel, battery level, distance to travel are shown on adashboard in digital format. Resistive float sensor isused to measure the fuel level. Magnetic float sensor isused to check the oil level, it gives two outputs either 1or 0 i.e. it shows whether oil is low or high. An IRsensor is used to indicate whether the oil is expired ornot. If oil is red in color then an indication can be madethat the oil is not expired. GPS obtains the latitude andlongitude coordinates of the vehicle. GSM is used to send the message to the registered mobile number. MAX232 is the level converter IC. It converts the GPS andGSM logic level to the microcontroller compatible logiclevels.

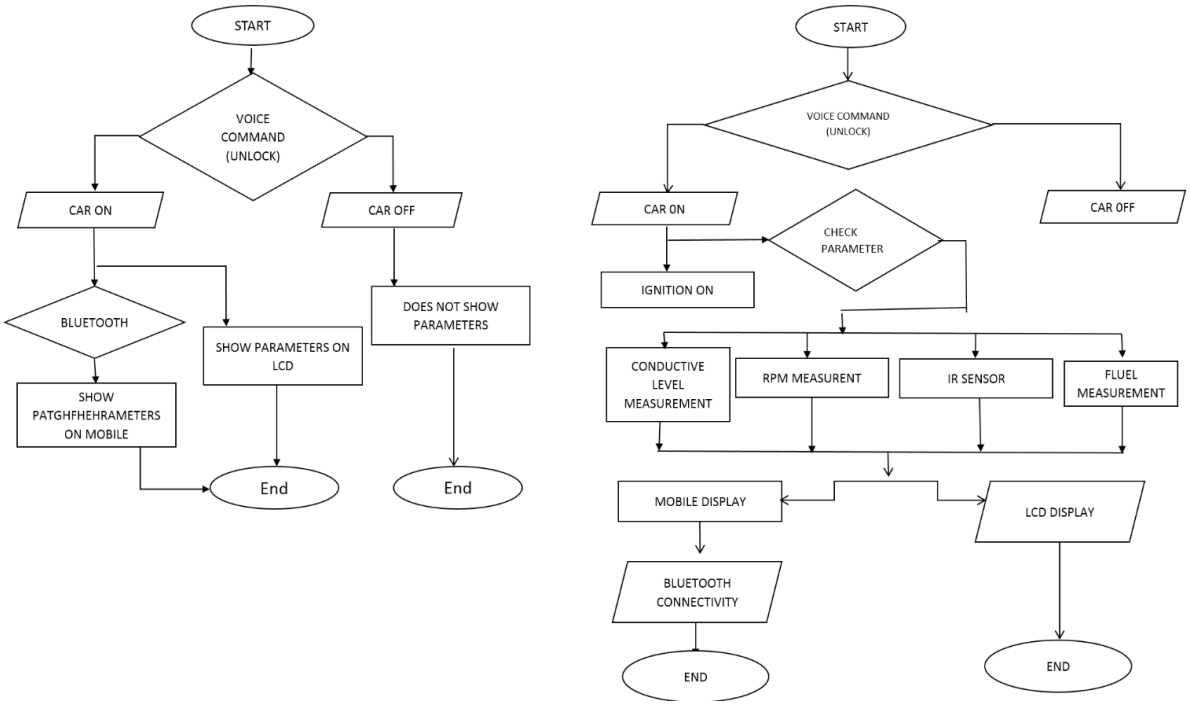


Fig.3.2 Flowchart Ignition Module&sensors Module

The Flow Diagram of ignition module is Show in the fig.3.2 The ignition module is provided with Bluetooth module for communicating between smart phone and Arduino. The Arduino is connected to the DC motor which indicates the real life vehicle wheel. Whenever the correct voice stream is send using the android software through Bluetooth, This string is recognized by microcontroller if the stream is correct microcontroller will allow to DC motor to start. If not the power will not be supplied to DC motor. This was all about how the ignition module allows DC motor to start if the voice string is correct the overall the working flow of ignition module can be understood by the flow chart given.

IV. SOFTWAREIMPLEMENTATION

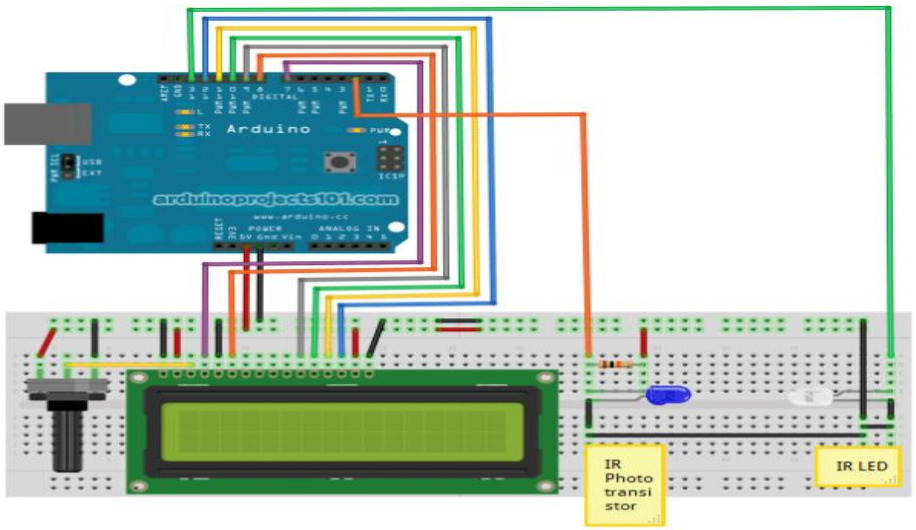


fig4.1: software based implementation on Circuit.io based web simulator using Arduino uno

The above circuit diagram shows how the RPM of motor by using the IR senor. The overall circuit has an IR sensor, motor and microcontroller and LED displays.the transmitter section includes an IR sensor, which transmits continuous IR rays to be received by an IR receiver module. An IR output terminal of the receiver varies depending upon its receiving of IR rays. Since this variation cannot be analyzed as such, therefore this output can be fed to a comparator circuit. Here an operational amplifier (op-amp) of LM 339 is used as comparator circuit.When the IR receiver does not receive a signal, the potential at the inverting input goes higher than that non-inverting input of the comparator IC (LM339). Thus the output of the comparator goes low, but the LED does not glow. When the IR receiver module receives signal to the potential at the inverting input goes low. Thus the output of the comparator (LM 339) goes high and the LED starts glowing. Resistor R1 (100), R2 (10k) and R3 (330) are used to ensure that minimum 10 mA current passes through the IR LED Devices like Photodiode and normal LEDs respectively. Resistor VR2 (preset=5k) is used to adjust the output terminals[9]

A. voice controller Arduino:

This android application can establish a connection with any Arduino/microcontroller project that involves a Bluetooth module! It allows the user to set a UUID of his own Bluetooth module in order to connect the android application with his projects!!! The default UUID that comes with this application is for the HC-05 Wireless Serial 4 Pin Bluetooth RF Transceiver Module RS232. (If you use default UUID in order to pair the BT module with your smartphone for the first time, you will have to give a 4-digit password. This password is '1234'.[10]

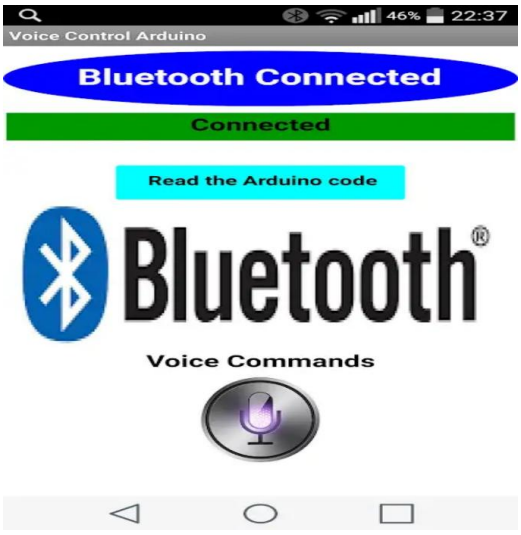


Fig4.2. Software implementation of Voice controller based Arduino UI for proposed system

B. Serial Bluetooth Terminal:

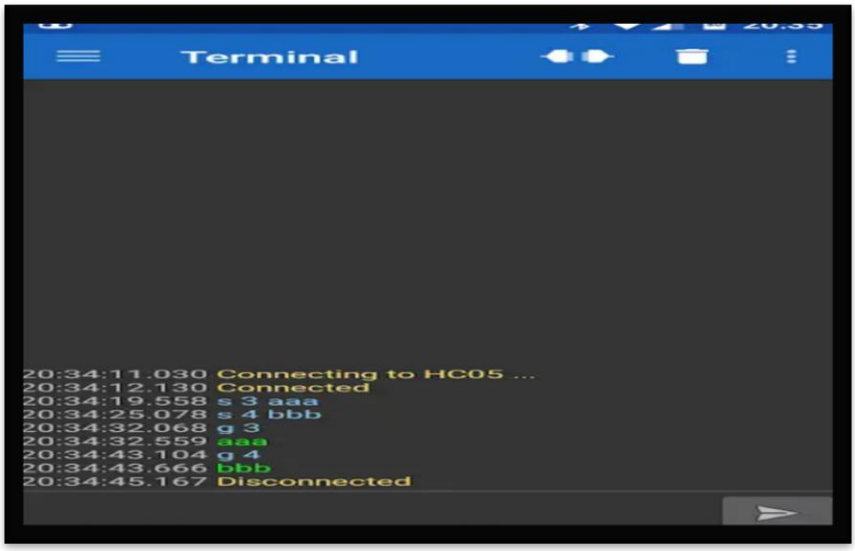
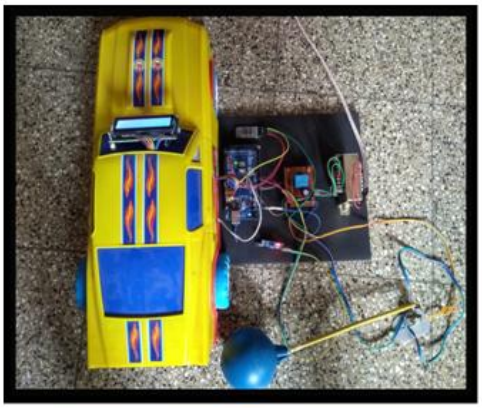


Fig4.3 Serial Bluetooth Terminal'

Serial Bluetooth Terminal' is a terminal / console app for microcontrollers, Arduino's and other devices with a serial / UART interface connected with a Bluetooth to serial converter to your android device. This app supports different Bluetooth versions such as Bluetooth Classic, - Bluetooth LE / Bluetooth Low Energy / BLE / Bluetooth Smart. This app supports different Bluetooth devices such as Bluetooth Classic (implementing standard Bluetooth SPP profile):HC-05, HC-06, Raspberry Pi 3 , Bluetooth LE (implementing vendor specific Bluetooth GATT services): - BBC micro: bit, (Based on Nordic Semiconductor nRF51822) HM-10, CC41-A, (based on Texas Instruments CC254x) also in this we used IDE software to program the Arduino with his own application software that enables the programmer to download and upload programs and other functionalities such as debugging. Download the Arduino IDE (The software name) from the Arduino download page

V. IMPLEMENTATION

The proposed system has two working phases. First one is to start the car and the second one is to show all the necessary parameters on smart phone using android application. Our system helps to show live parameters to the owner even if he is not driving the vehicle. This allows owner to monitor his/her vehicle even if it is at its remote place. Our system works as real time monitor and at the same time it will transmit all the necessary data to owner's smartphone.In this Project we have basically used several Sensors, Microcontroller, and Smartphone integrated them all in a single unit which performs certain useful operations. The Microcontroller is used to read all the data from the sensor and transmit it on Smartphone and also to represent them on LCD screen or Dashboard of vehicle. In our project Bluetooth Module is used to transmit data from Microcontroller to Smartphone and vice versa. And IR sensor is used to read RPM of the wheel of the vehicle and further calibrating we get the actual speed of vehicle.The Float is used to sensing the level of fuel in the vehicle. The conductive level sensing module is used for measuring the level of oil in the oil tank. In real life module we can use all the sensors that are present in the vehicle to sense parameters like speed, oil level, fuel level and represent them on smartphone screen using Bluetooth Module and Microcontroller.



We have used two software, the first one is Voice Control Arduino Software to give voice command the ignition of vehicle and the second one is Serial Bluetooth Terminal Software to represent all the vehicle parameters which is send by Microcontroller using Bluetooth Module.The Integrated Smartphone Dashboard for Vehicle operated by Voice successfully transmitted the vehicle parameters to the Smartphone using Android Software "Serial Bluetooth Terminal Software". And in Project the vehicle is successfully started by voice of the owner of the vehicle. So the Project is run successfully. This system uses voice driven principle which improves human machine interaction and makes the control of the system simple. Thus by following above methodology we suppose to perform complete tasks which are as follows,

1) Starting ignition in engine by voice control
2) Displaying basic parameters on owners smartphone
3) Controlling some advance features by voice of owner

Also this system will be able to send data to data base for any future use.

VI. CONCLUSION

This paper introduced a novel system Smartphone basedIntegratedDashboard for Vehicles. It is real sense of intelligent and integrated dashboard system which will allow user to access all the necessary parameters of running vehicle on their own smartphone. And our project also allows owner to start their vehicle by their own voice which will allow more security to vehicle.The real time monitoring system design for modify the existing dashboard. this project covers novel voice controlled features and also display some important vehicular parameter , as well as through this we can use smartphone as a dashboard in future with increasing functionality.

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