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Implementation Of Vehicle Diagnostic And Tracking Tool Using Android

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***Abstract*— The objective of our project is to develop a system to keep a track on the vehicle and the person driving the vehicle .This novel and ingenious technique facilitates the owner of the vehicle to ensure the person driving the vehicle is driving ensuring safety measures like using a seat belt, and checking for consumption of alcohol . The person driving the vehicle must first authenticate himself through a one-time password ,also he must pass the alcohol test. Our system also consists of other sensors like touch sensor ,dizziness sensor ,fuel level sensor ,temperature sensor and speed sensor. The main objective of our system is to extract these sensor values with the help of AVR microcontroller and send them to a database via Bluetooth. At the same time these values will be displayed on the drivers android phone which we are using as a display device in the vehicle. The owner of the vehicle or whom so ever is monitoring the device can monitor these values through the database. Whenever the driver intends to do something wrong the administrator is updated immediately. Also through the Global Position System (GPS) the various locations of the vehicle can be tracked. This data can be used for tracking vehicle's performance and storing it for further maintenance. The Bluetooth system ensures quick updates to the owner of the vehicle and data stored in the database can be accessed when owner wants**

***Index Terms*— vehicle diagnostic ,tracking, vehicle Monitoring, sensors**

I. INTRODUCTION

Vehicle navigation is a new concept and a frequently used one. A lot of research work was needed to develop these components and ideas[1][2]. In recent years the diagnosis of faults and defects on a remote vehicle has received considerable attention due to several factors like 1)Advance communication technologies and broadband services. 2)Changes in the automobile industry where vehicles are made eco friendly ,safe and comfortable for customers[3][4].Additional services are introduced to make customers comfortable.3)Collecting and analysis of diagnostic data from the electronic circuit is very important[5].For vehicles it is crucial for accessing diagnostic data to track problems early as possible to avoid serious faults. Thus the best of information technologies must be used for achieving all these goals. Since the overall cost of embedding this system is very high.

Hence it is possible only in high end vehicles. A new and better system can be making the diagnostic and tracking customer oriented. This customer oriented vehicle diagnosis and maintenance can be offered. The sensor data and vital information about the vehicle and the driver is extracted and displayed to the user as well as sent to a remote server to the maintenance department[6][7].Through the wireless communication the sensor values are displayed and then sent through the mobile application to the remote server. If a correct diagnosis of a fault is made , instructions and commands will be sent to the driver as to how to deal with the defect [8].Also if the system has the location of the vehicle the administrator can guide the driver to the nearest service station.

Also in order to display all this data to the driver a special display device will be required as there is no in built screen in a vehicle. This will create a additional expense and it will be limited only to a few vehicles. Our system is a low cost alternative which is affordable and can be easily implemented in any vehicle. Choosing android as an operating system makes application development easy and user friendly. [10]

II. SYSTEM OVERVIEW

The purpose of the system is to build a cost efficient and reliable system which will send diagnostic information through an android application to a remote server for vehicle maintenance.

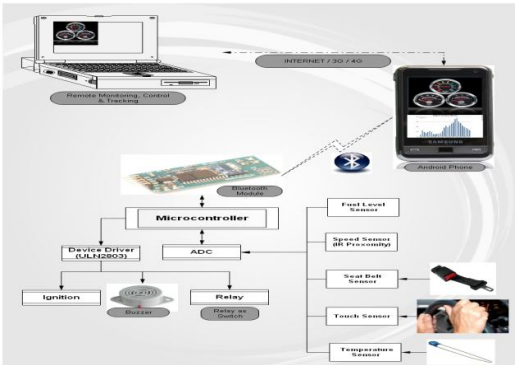

Fig 1: Overall Layout of System

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A. On Board diagnostic System(ODBS)

The OBD ie the on-board diagnostic system, is the system we have developed for tracking the vehicle and collecting diagnostic information. This OBD system is fixed in the vehicle which we are going to track. The OBD is the hardware which consists of various components. These components include a)AT Mega 32 microcontroller b) capacitors c)LED's d) Power supply e) IC's f) Sensors etc. The microcontroller is responsible for extracting sensor values. These sensor values are sent through the ADC via Bluetooth to the Android application. The OBD system consists of seven sensors viz Fuel level sensor ,speed sensor, Seat belt ,touch sensor, temperature sensor, drowsiness sensor and alcohol sensor. The alcohol sensor, touch sensor ,drowsiness sensor are new implementations.

B. AVR (AT Mega 32)

The AT Mega 32 being a much better featured microcontroller than the 8051 or 89C51 is used. AVR has three ports PA,PB,PC,PD. It is a high performance microcontroller .It has a advanced RISC architecture .It has 131 powerful instructions and 32 X8 General purpose registers. It has a fully static operation. It has 16 MIPS Throughput at 16 MHz. It also has non-volatile memory segments .It has a 32K byte of in-system Self-programmable flash memory. It also has a 1024 Byte Internal SRAM. It also contains a programming lock for software security. AVR has a programmable USARAT. It also has Six sleep modes a) idle b) ADC noise reduction c) Power- save d)Power down e) Standby f)Extended standby. it has two operating voltages a) – 2.7 - 5.5V for ATmega32L and b) – 4.5 - 5.5V for ATmega32

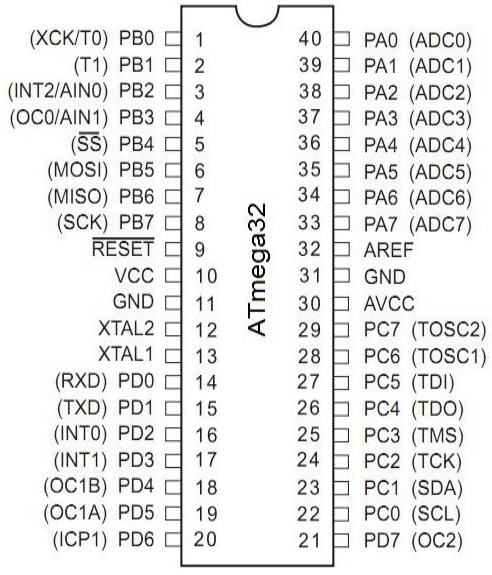

Fig 2:Pin Layout

C. Bluetooth Transeiver

The Microcontroller sends the measurements on its USRAT to the Bluetooth module. Bluetooth allows connection of various devices like mobile phones over a secure network which globally unlicensed by a short range radio frequency (2.45 GHz) and to enable the exchange of information between them. A Bluetooth transceiver module which is class 1(20 dBm) model has an networking range of 100 meters. The asynchronous data from the AVR microcontroller is sent to the Bluetooth module on the serial port at a speed of 9600bps.The mobile phone acts as a Master and the Bluetooth transceiver as a Slave. The microcontroller sends and receives data to and from the Bluetooth module which in turn sends and receives data in raw binary bytes. Bluetooth uses a radio technology called frequency hopping speed spectrum. Bluetooth connections happen only with a master-slave relationship where the master can connect with up to seven slaves.

D. The Complete Hardware

The hardware contains the PCB(printed circuit board) with various sensors joint to it. The AVR microcontroller which is responsible for extracting sensor values. The entire hardware is constructed on a custom-made printed circuit board

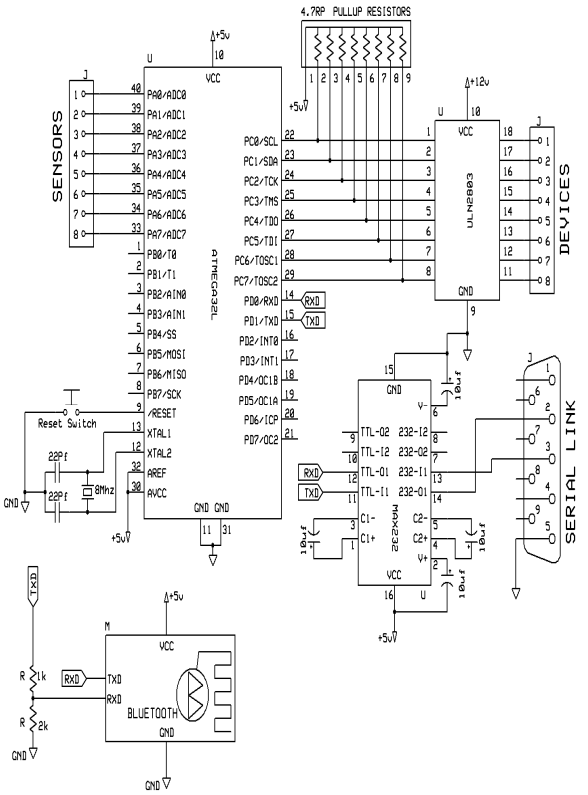

Fig 3: Schematic Diagram

III. THE MOBILE APPLICATION SOFTWARE

Android is a programming language based on JAVA and depends on the Linux kernel. The Android platform is made up of the operating system, middleware, user interface and application software. There are a number of operating systems like Symbian ,Windows ,RIM ,iOS etc other than android. Android has a number of advantages over other operating systems available for mobile devices like 1) It is an open platform ,Users can customize applications as per their needs. 2) All android applications are run in virtual machine resources. 3) Applications programs can combine data of the world wide web and data locally available in the

Android platform because android can access the mobile devices and Internet through the standard API. 4) Developing the android application is easy and quick since the android platform has a variety of useful libraries and tools. The android mobile applications performs the following tasks; a) Connection with the Bluetooth module b)Send requests to the OBD system. c) Receive requests from OBD system. d) Displays the sensor values to the user e) These values should be made available on the remote server.

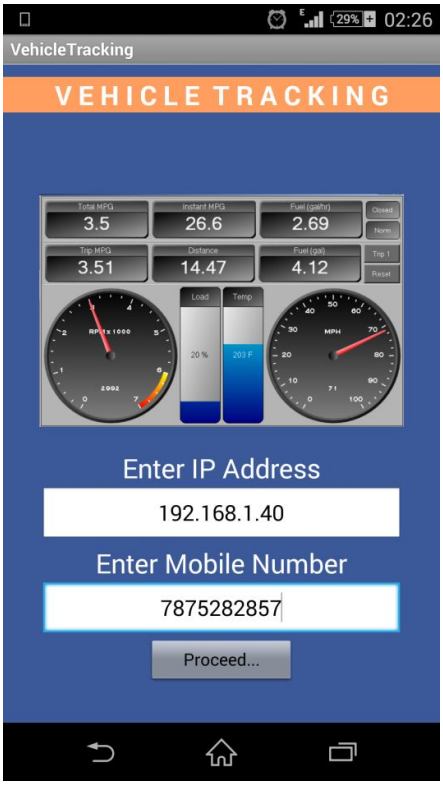

Fig 4: Mobile Application

A. *Developing Android Application*

We have developed an android application on windows 7 platform for Android 4.2 Sony Xperia Z2 phone various development environment software's like java development kit (JDK) ,Eclipse ,Android Software development kit (SDK) , Android virtual devices (AVD).ADT are used by eclipse to customize android applications. AVD is a collection of virtual devices where AVD simulates a virtual device to run and test the application software before it runs on the actual mobile device.

B. *Testing Mobile Application*

In order to make sure the mobile applications runs properly the hardware unit is connected to a small prototype vehicle with a 2 stroke engine. once the hardware was connected all the LED's lit in order along with Bluetooth pairing with the application software installed on the Sony Xperia Z2.The mobile application starts with the driver authenticating himself with a OTP.

C. *Remote Server Setup*

The remote server is where the actual sensors values will be stored for monitoring. The maintenance department will hold all these values to see how the vehicle is performing. The server has a static public IP address to which the application packets are sent. The mobile application sends data via the cellular internet from the OBD. At the server end an analysis of the data is carried on to detect malfunctions present or predict any possible defects. The server contains a My SQL database. The database has a NULL table .The values got from the OBD are recorded in the database. To make sure that fault detection and correction happens in time we need to have a high data rate internet connection .

IV. CONCLUSION

We have developed a system which is not only cost effective but also very reliable. Since the system is demonstrated in real time it shows the effectiveness of the system. The android application is user friendly and easy to use. The mobile application interacts with the hardware unit with the help of Bluetooth to acquire all the required sensor values. These values are displayed locally for the driver as well as sent to a remote server. This server is a maintenance server where sensor data can be monitored .

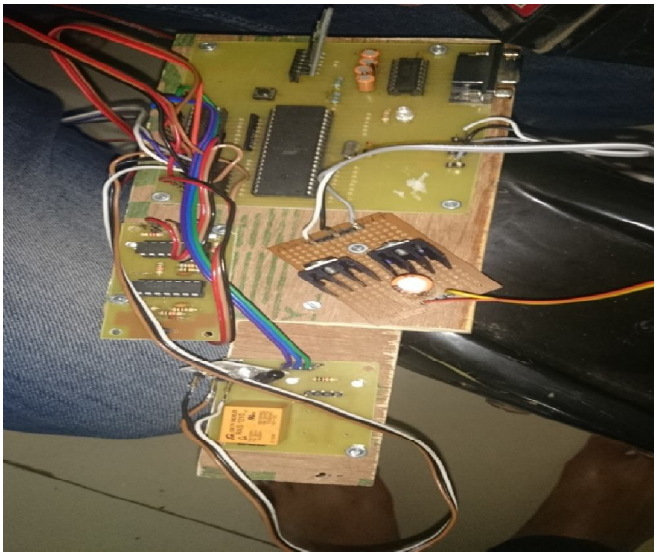

Fig 5: The PCB and other hardware installed in the vehicle.

V. ACKNOWLEDGMENT

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