Available online www.ejaet.com

European Journal of Advances in Engineering and Technology, 2015, 2(4): 90-94

Research Article ISSN: 2394 - 658X

Wireless Vehicle Monitoring and Safety System

Girish Nille, Deepanjali Yadav, Varsha Jadhav and Priyanka Nagargoje

Department of Electronics & Telecommunication Engineering
Navsahyadri Group of Institutions, Pune University, Pune, Maharashtra, India
girish.nille@gmail.com

ABSTRACT

The aim of this paper is to propose the low cost hardware unit of monitoring vehicle parameter and tracking by transmitting values to android phone or remote server. A hardware unit is fixed on vehicles OBD system with android phone. The cellular Bluetooth module which is in-built in the phone enables transmission of data. This data further used to monitor the different values of vehicle parameter along with that tracking of vehicle is also possible by enabling the internet connection.

Key words: Sensors, AVR microcontroller, Bluetooth module, GPS, Android

---

INTRODUCTION

Nowadays, vehicle navigation and location concept is well defined and frequently used. The simplicity of the communication controllers results from the reduced number of micro-controller driving the communication. Typical applications involving these networks include controlling door mechanisms, engine temperature, fuel level and many more. A typical car consists of minimum 14 sensors from which 4 may be considered for analysis like fuel level sensor, temperature sensor, touch plate sensor, seat belt sensor. Moreover, our choice of Android as our operating system platform is consistent with current market trends and shares and user acceptance of such platform. Automobiles used to be considered merely means of transportation with independent hardware. As diverse additional services and safe & convenient automatic internal control systems have been introduced to satisfy the customer's needs. Collection and analysis of diagnostic data from electronic control units is of paramount importance in the automotive industry, both from a life cycle support perspective post production and sales and as a tool in the product development.

LITERATURE SURVEY

Automation plays important role in today's technological world. Now automation is present in each and every field like in home, in hospitals, in labs, in industries [2]. The current changes in the automobile industry trends where vehicles are developed with a particular focus on eco-friendliness safety, besides comfort.

Nowadays in most of vehicles tracking system is present as well as it also monitors the different parameters like fuel consumption, engine speed, engine temperature etc., but few parameters which are not measured in today vehicles like drivers drowsiness, vehicle control. So to avoid this we are implementing this project. To finding the solution for this we are designing different sensors by interfacing it with Atmega32. Lots of work has been done in automation field, Table -1 shows reference papers and its drawbacks [1].

GSM Enhanced GPS Based Vehicle Tracking System

This project has proposed an anti-theft system which can be used to track vehicle. The SMS is send to the owner if his vehicle is unlocked. In case of unauthorized unlocking of vehicle the user gets alert about it through SMS. Hence it will give the location as well as prevent through the theft [2].

GPS-GSM Based Tracking Systems

This project is completely integrated so that once it is implemented in all vehicles, then it is possible to track anytime anywhere. It has real time capability, emerges in order to strengthen the relations among people, vehicle and road by putting modern information technologies together and able to forms a real time accurate, effective comprehensive transportation system [3-4]

Android Based Universal Vehicle Diagnostic and Tracking System

It is user friendly application software utilized to create on board vehicle diagnostic system. The mobile application software interacts with hardware interface unit wirelessly via Bluetooth to acquire desired vehicle parameters from ECU of vehicle [4].

Table - 1Reference Paper and its Drawback

Sr No.	Paper Name	Drawback
1	GSM enhanced GPS based vehicle tracking system	Diagnosis is not possible
2	GPS-GSM based tracking system	Data transfer through internet is not possible
3	Android based universal vehicle diagnostic and tracking system	Data transfer through internet is not possible

METHODOLOGY AND TECHNIQUES

One of the methods for project implementation is using black box which collects all the data in a specific duration and can be monitored after that. The other method consists of modules through which the data can be sent to a different place having a database by using GSM and GPS systems. This provides real time data to avoid delays and data redundancies which is important from security point of view. An electronic hardware unit is built to carry-out the interface between the vehicles diagnostic system and a Bluetooth module. The mobile device is capable of transmitting data to a server using cellular internet connection.

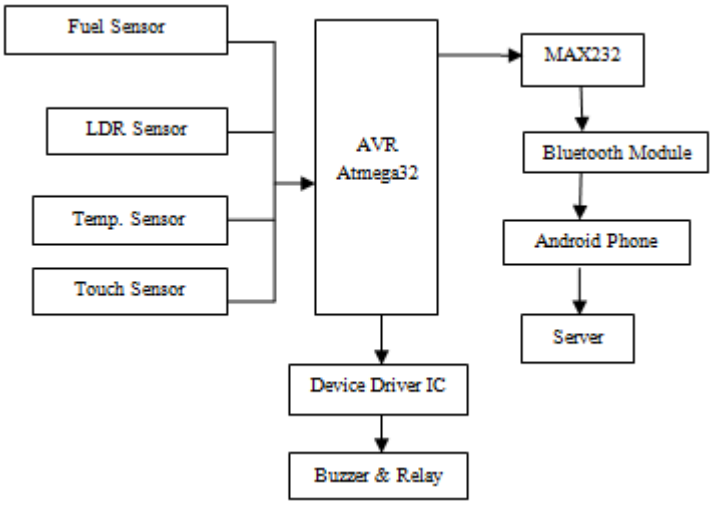

Fig. 1Block Diagram of vehicle monitoring

AVR ATmega32

We then provide a detailed description of the ATmega32 hardware architecture. This is the basic hardware configuration of Atmega32.PORT A is configured with eight tact (momentary) switches with accompanying denouncing hardware Fig.2. The AVR core combines a rich instruction set with 32 general purpose working registers. All the 32 registers are directly connected to the Arithmetic Logic Unit (ALU), allowing two independent registers to be accessed in one single instruction executed in one clock cycle. The resulting architecture is more code efficient while achieving throughputs up to ten times faster than conventional CISC microcontrollers

ULN2803

Featuring continuous load current ratings to 500 mA for each of the drivers, the Series ULN2803 high voltage, high-current Darlington arrays are ideally suited for interfacing between low-level logic circuitry and multiple peripheral power loads. Typical loads include relays, solenoids, stepping motors, magnetic print hammers, multiplexed LED and incandescent displays, and heaters. All devices feature open-collector outputs with integral clamp

Bluetooth Transceiver

The microcontroller is programmed to send the measurements on its UART to the Bluetooth module. Bluetooth provides a means to connect devices such as mobile phones over a secure, globally unlicensed short-range radio frequency (2.45 GHz) and to enable the exchange of information between them. We used the BluCOM-18 Bluetooth transceiver module, HC05 model that has an approximate range of 100 meters. The asynchronous data from/to the Atmega32 microcontroller is delivered to/from the Bluecomb18 Bluetooth module on the serial port at a speed of 9600 bps. The Bluetooth module is configured as a Slave and the mobile phone is considered to be functioning as a Master. The microcontroller sends/receives data to/from the Bluetooth module, which transmits/receives data continuously as raw employs a radio technology called frequency hopping spread spectrum, where data transmitted is chopped into chunks, which are transmitted on up to 79 bands, each with a bandwidth of 1 MHz centred from 2402MHz to 2480MHz

MAX232

Max232 is used for serial communication. Usually computer operates on RS232 protocol and microcontroller work on TTL/CMOS technology so to convert the digital data into TTL logic that can be understand by computer we use MAX232. In this project following sensors are used: Sensor is a device which convert input signal into electrical equivalent signal. In this proposed system we are using different types of sensors. Such as follows:

Fuel Level Sensor

In our project we are using the potentiometer as the fuel level sensor. The Floating material is used for the variation in the voltage of potentiometer. Electro- mechanical liquid level sensors are often designed with a float arm pinned to the centre of a rotary potentiometer. This design concept is used in most automotive fuel level senders because it offers the potential for both long life and low cost. The float arm is mounted vertically, and liquid level changes produce a rotary motion for the potentiometer contacts. This change of position alters the resistive value of the sensor.

Accident Sensor

We are using the simple mechanical switch as a seat belt sensor. In one type of micro switch, internally there are two conductive springs. A long flat spring is hinged at one end of the switch (the left, in the photograph) and has electrical contacts on the other. Seat belt sensor is used for the safety.

LDR Sensor (Eye Blink Sensor)

Two cadmium sulphide (cads) photoconductive cells with spectral responses similar to that of the human eye. The cell resistance falls with increasing light intensity. We connect 2.2k resister across for protection purpose.

Thermistor (Temperature Sensor)

A thermistor is a type of resistor whose resistance varies significantly with temperature, more so than in standard resistors. Thermistors differ from resistance temperature detectors (RTDs) in that the material used in a thermistor is generally a ceramic or polymer, while RTDs use pure metals. The temperature response is also different; RTDs are useful over larger temperature ranges, while thermistors typically achieve a higher precision within a limited temperature range.

Touch Sensor

Here we used capacitive touch sensor. It is based on the electrical capacitance of the human body. When, for example, a finger comes close to the sensor, it creates a capacitance to Earth with a value of 30 to 100 pF. This effect can be used for proximity detection and touch-controlled switching

CIRCUIT DIAGRAM

In above circuit diagram the input used is sensors. Sensor convert signal into its electrical equivalent. The sensors link requires +5V operating voltage. The sensor link is connected to AVR Atmega32 controller with pin no.33 to pin no. 40 which is port A of AVR. The sensor link as a input is connected to inbuilt ADC of this controller which convert analog signal in digital form i.e. in 0 or 1 form Here the reset circuit is connected to pin no.9 which is used as an input with active low mode. This reset switch is used to reset the programme which is burn in microcontroller.

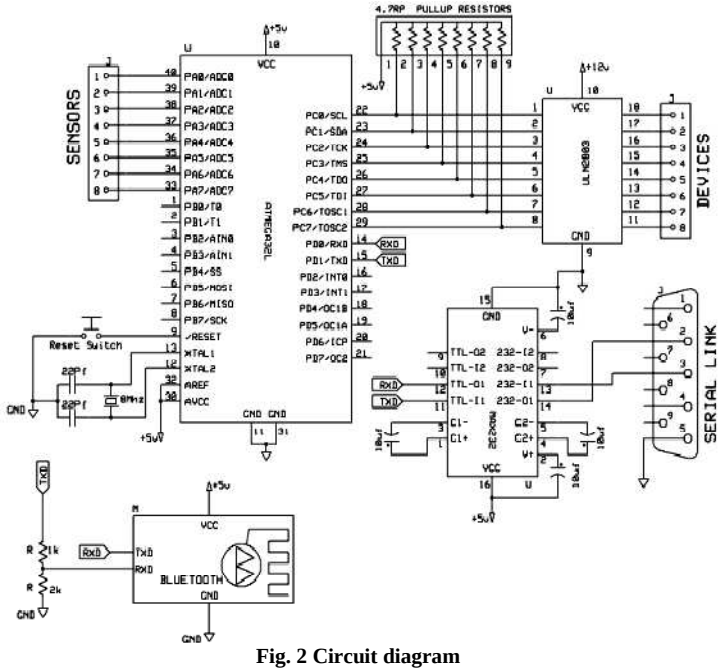

Fig. 2 Circuit diagram

XTAL 1 and 2 are input and output respectively of an inverting amplifier which can be configured as an on chip oscillator. A quartz crystal oscillator is connected to inputs XTAL 1 and 2. It needs 2 capacitors of same value i.e.22pf. Which will gives the smooth waveform. Pin no. 11 and 31 is connected to ground. Pin no.30 is a VCC and pin 32 is a REF which requires 5V supply. The devices like buzzer and relay are drives by device driver IC ULN2803. The output of this IC is given to AVR Atmega32 controller which used the pin no. 22 to pin no. 29 i.e. port C.

Here we are using MAX232 IC for serial communication .So by using pin 49 and pin 15 it is connected transmitter and receiver pins respectively. We also interfaced external Bluetooth module (HC05) having operating frequency 2.45GHz and range of 10m with AVR controller to send the signal to the smart phone also we use server instead of android device. We can view our vehicle real time by using server. Fig 3 shows the work done on PCB.

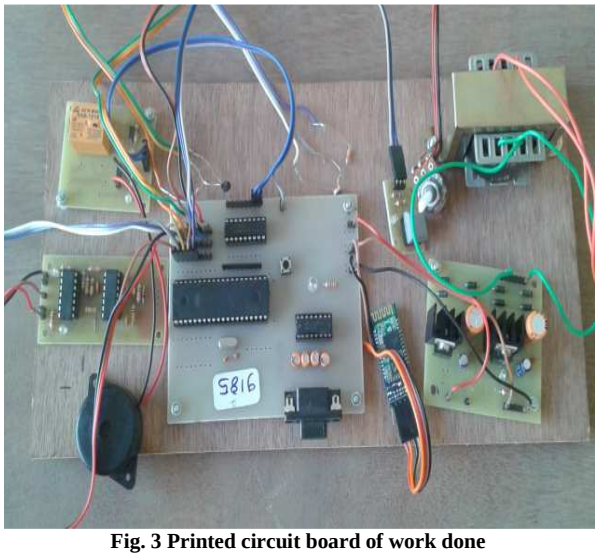

Fig. 3 Printed circuit board of work done

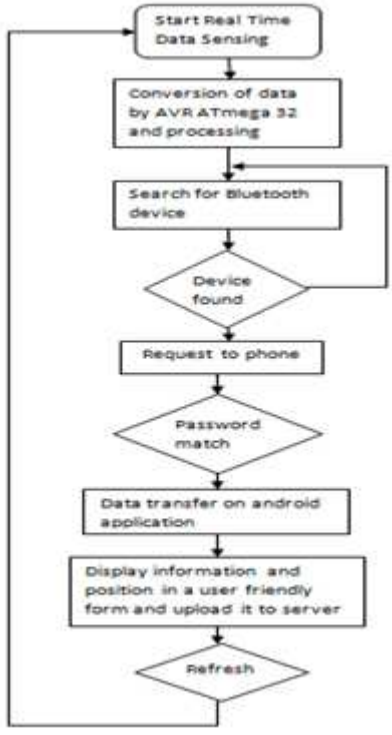

Fig. 4 System Operation Flowchart

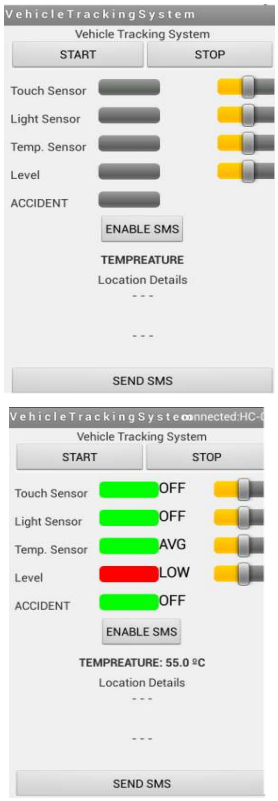

Fig. 5 Configuration menu on the mobile application

MOBILE APPLICATION SOFTWARE

We have developed android mobile application software for an Android 2.2 driven phone. We installed development environment preparation software which included the java development kit (JDK), Eclipse, Android software development kit (SDK), Android virtual devices (AVD). Meanwhile, Android development tools (ADT) is the plug-in through which Eclipse is customized for Android applications development. It provides a powerful integrated environment and extends the functions of Eclipse that allows users to create applications quickly and add components on the API. In this project coding is done with the help of net-bean and eclipse software.

Eclipse

Eclipse is popular IDE for java development, but may be used for other task and programming language. Android Development Tools (ADT) is a plug-in for the Eclipse IDE that is designed to give you a powerful, integrated environment in which to build Android applications. ADT extends the capabilities of Eclipse to let you quickly set up new Android projects, create an application, and debug your application using android SDK tool.

Net- Beans

Net-beans support latest java technologies and it is an open source. Net-Beans IDE is the official IDE for Java. With its editors, code analyzers, and converters, you can quickly and smoothly upgrade your applications to use new Java language. It has fast and smart code editing.

Fig 5 shows a screen shot taken from the Android mobile device displaying the measured and calculated readings.

CONCLUSION

We are implementing a universal integrated system which is composed of a combination of a low-cost hardware unit and user-friendly Android-based mobile application software utilized to create an onboard vehicle diagnostic system. The mobile application software will interact with the hardware interface unit wirelessly via Bluetooth to acquire desired vehicle parameters from the vehicle. These readings will be displayed locally to the user then can be sent to a remote maintenance server as HTTP packets via a cellular internet connection. The packets received will be tabulated in the server, and then made use of by the maintenance department which holds the server.

REFERENCES

[1] Nicolas Navet and Fran¸coise Simonot-Lion, *Trends in Automotive Communication Systems*, Richard Zurawski. *Embedded Systems Handbook: Networked Embedded Systems* - second edition, Taylor and Francis, CRC Press, **2009**, 13.1-13.24.

[2] Ashish Shrivastava, Nupoor Sharma, Radhika Arora, Shweta Dikshit and Yamini Sharma, *GSM Enhanced GPS based Vehicle Tracking System*, 2nd National Conference in Intelligent Computing & Communication, **2011.**

[3] Baburao Kodavati, VK Raju, S Shrinivasa Rao, AV Prabhu and T Appa Rao, *GPS-GSM Vehicle Location and Tracking System*, International Journal of Engineering and Application, **2012,** 1 (3), 616-625.

[4] Ashraf Tahat, Ahmad Said, Fouad Jaouni and Waleed Qadamani, *Android based Universal Vehicle Diagnostics and Tracking System* Communication Engineering Department Princess, Sumaya University for Technology, **2012.**

[5] Mi Jinkim, Jong Wook Jang and Yun Sik Yu, A Study on IN-Vehicle Diagnosis System Using OBD with Navigation, *International Journal of Computer Science And Network Security*, **2010,** 10 (9), 136-140.

[6] Bobe Anup Dattatraya, Ghoplap Siddharth Popatrao and Pol Sharad Ganpati, *Android Based Universal Vehicle Diagnostic and Tracking System*, International Journal of Modern Engineering and Management Research, **2014**, 2(1), 35-41.

[7] Datasheet *AVR ATmega32* and *RS232*, ATMEL Corporation, **2009**.

[8] Datasheet *MAX232* and *ULN2803*, Texas Instrument**, 1989**

[9] Dhananjay V Gadre, *Programming and Customizing the AVR Microcontroller*, McGraw-Hill, **2001.**