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Advanced Vehicle Tracking System Using ARM7

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***Abstract* - To Track the position of the vehicle by means of GPS device and automatically sending the data to the remote server webpage and display the current position of the device in the Google map to the authorities. In institution or in ATM cash filling vehicle, most of the time we need to monitor position or path vehicle whether it's moving in correct direction or not. This system used the ARM7 controller. The real time vehicle tracking and monitoring system tracks the vehicle and displays the current location of the vehicle in the remote server using Google maps. It has the ability to communicate over the remote areas where user needs the current location of vehicle. It can provide Tele-monitoring system for inter-cities transportation vehicles such as taxis and buses. This system is integrated with GPS and GSM to provide features like Location information and Real time tracking using SMS.**

I.INTRODUCTION

The GPS tracking unit is a device that uses the Global Positioning System to determine the precise location of a vehicle and to record the position of the asset at regular intervals. The recorded location data can be stored within the tracking unit, or it may be transmitted to a central location data base, or internet-connected computer, using a cellular (GPRS or SMS), radio, or satellite modem embedded in the unit. This allows the asset's location to be displayed against a map backdrop either in real time or when analyzing the track later, using GPS tracking software. Data tracking software is available for Smartphone with GPS capability.

The Proposed design is cost-effective, reliable and has the function of accurate tracking. When large object or vehicles is spread out over ground, the owners often find it difficult to keep track of what is happening. They require a system to determine the vehicle's travel time and for how long it travelled. Also the need of tracking in consumer vehicle is used to prevent any kind of theft. GSM and GPS based tracking system will provide effective, real time vehicle location, and reporting. A GPS-GSM based tracking system will inform where your vehicle is, where it has been and how long it has been. The system uses geographic position and time information from the Global Positioning Satellite. The system has an "On-Board Module" which resides in the vehicle to be tracked. The On-Board module consists of GPS receiver, a GSM modem and Raspberry Pi.

II.SYSTEM CONFIGURTION

The real time vehicle tracking embedded system consists of the ARM 7 board interfaced with GPS and GSM. This system provides the features of Real time tracking using SMS and information is transmitted to remote server or to an particular domain using encryption algorithm in the domain website data is retrieved by means of decryption algorithm and displayed in the Google maps

A. Block Diagram

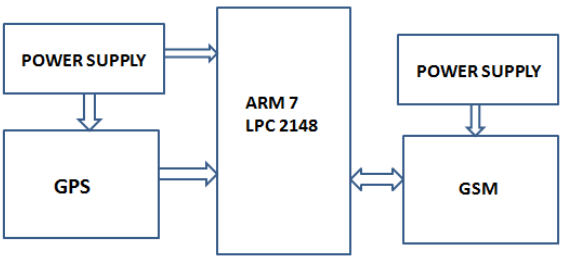

Fig.1. Block Diagram of the Tracking System

Fig.1 shows the block diagram of the real time vehicle tracking embedded system. The system consists of main components:

ARM 7
GPS
GSM
Power Supply

This board is the central module of the whole embedded processing system. Its main parts include: main processing chip, memory, power supply HDMI Out, Ethernet port, USB ports and abundant global interfaces.

B. ARM7 Processor

The circuit of ARM7 microprocessor and peripheral equipment includes a ARM7 chip, a clock circuit, a resetcircuit, a 32MB flash memory, . All of these make up the control and process core of the system. The on chip features can significantly reduce the total system cost to design network devices. It has 8 kB to 40 kB of on-chip static RAM and 32 kB to 512 kB of on-chip flash memory, so it can execute longer programming code and has larger RAM to store more data.

The real time vehicle tracking system uses the GPIO pin, Micro SD slot, USB port and Micro USB connector. The GPIO pins are used for serial communication for interfacing GSM and GPS. The GPS is connected to GPIO 19 & 20 pins(TX & RX) and GSM is connected to GPIO 33 & 34 pins (TX & RX).

C. Hardware Interfacing

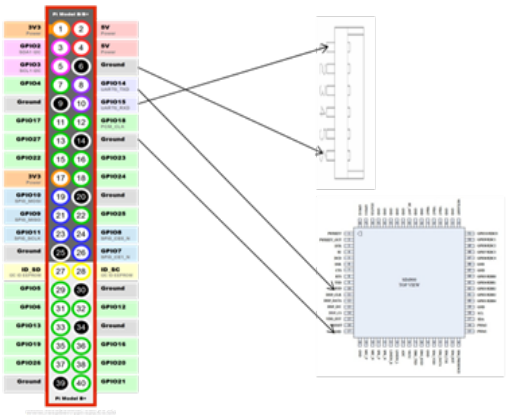

Fig.2.Hardware Interfacing

Fig.2 shows the hardware interfacing of the real time vehicle tracking embedded system. The GPIO is a dual inline package with 64 pins connector. It is interfaced with GPS and GSM through GPIO 19 and GPIO 21 pins. The GPS is connected to receiver pin (GPIO 21) of arm7 to receive the locations such has latitude, longitude and speed. The GSM is connected to transmitter pin (GPIO 33) of arm7 to send message to the remote server or domain..

D. GPS

GPS-634R" is a highly integrated smart GPS module with a ceramic GPS patch antenna. The antenna is connected to the module via an LNA. The module is with 51 channel acquisition engine and 14 channel track engine, which be capable of receiving signals from up to 65 GPS satellites and transferring them into the precise position and timing information that can be read over either UART port or RS232 serial port. Small size and high-end GPS functionality are at low power consumption, Both of the LVTTL-level and RS232 signal interface are provided on the interface connector, supply voltage of 3.6V~6.0V is supported. The smart GPS antenna module is available as an off-the-shelf component, 100% tested. The smart GPS antenna module can be offered for OEM applications with the versatile adaptation in form and connection. Additionally, the antenna can be tuned to the final systems' circumstances.. Because the system is based on GPS data which is sent through GPRS net, it must be initialed at first. The initial instructions are following: Reset User settings initialized Following are the some instructions that are associated with GPS module and are useful in the system design. AT+ID=X:
this instruction is used to set the terminal address. Each device must be set the address which indicates its ID, the default ID is 139XXXXXXXX. The default address is the SIM card mobile phone number which contains 11 numbers, the address can be changed as required.

AT+IP=? this instruction is used to inquire the IP address.
AT+PORT=X:this instruction is used to set the port number of the application software in surveillance center server.
AT+PORT=? this instruction is used to inquire the port number.

AT+HTH=X□AT+HTH=? □this instruction is used to set and inquire the time intervals of the GPS positioning information which the terminals send automatically. The unit of the time interval is second.

AT+BAUD=X,AT+BAUD=? this instruction is used to set and inquire the initial baud rate. The default is 4800 and does not need changing usually.

AT+APN=X,AT+APN=? this instruction is used toset and inquire the connect port of GPRS telecommunication. The default value is CMNET.

AT+AGREE=X,AT+AGREE=? this instruction is used to set and inquire the net communication protocol.The default value is TCP protocol. The terminal on car supports the UDP and the TCP protocol. Users can change the protocol as needs.

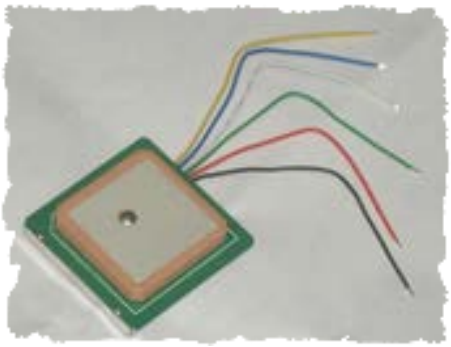

Fig.3. GPS MODULE

E. GSM

GSM/GPRS Modem-RS232 is built with Dual Band GSM/GPRS engine- SIM900A, works on frequencies 900/ 1800 MHz. The Modem is coming with RS232 interface, which allows you connect PC as well as microcontroller with RS232 Chip (MAX232). The baud rate is configurable from 9600-115200 through AT command. The GSM/GPRS Modem is having internal TCP/IP stack to enable you to connect with internet via GPRS. It is suitable for SMS, Voice as well as DATA transfer application in M2M interface. The onboard Regulated Power supply allows you to connect wide range unregulated power supply. Using this modem, you can make audio calls, SMS, Read SMS; attend the incoming calls and internet through simple AT commands.

The GSM Modem is interfaced with raspberry pi. The GPS receiver of vehicle terminal receives and resolves the navigation message broadcasted by GPS position satellites, computes the longitude and latitude of vehicle coordinates, transforms it into the GSM message form by GSM communication controller, and sends the message to remote user.

Fig.4. GSM MODULE

III. SOFTWARE REQUIREMENTS

A.KEIL C

Keil software is the leading vendor for 8/16-bit development tools. Keil software is represented worldwide in more than 40 countries, since the market introduction in 1988; the keil C51 compiler is the de fact industry standard and supports more than 500 current device variants. Now, keil software offers development tools for ARM. Keil software makes C compilers, macro assemblers, real-time kernels, debuggers, simulators, integrated environments, and evaluation boards for 8051,251, ARM and XC16x/C16x/ST10 microcontroller
Families.

B.FLASH MAGIC

Flash magic can control the entry into ISP mode of some microcontroller devices by using the COM port Handshaking signals to control the device. Typically the

Handshaking signals are used to control such pins as Reset, PSEN and VCC. The exact pins used depend on the specific device. When this feature is supported, Flash Magic will automatically place the device into ISP mode at the beginning of an ISP operation. Flash Magic will then of the ISP operation.

C.HTML LANGUAGE

Welcome to HTML Basics. This workshop leads you through the basics of Hyper Text Markup Language (HTML). HTML is the building block for web pages. You will learn to use HTML to author an HTML page to display in a web browser.

Objectives

By the end of this workshop, you will be able to:

a. Use a text editor to author an HTML document.
b. Be able to use basic tags to denote paragraphs, emphasis or special type.
c. Create hyperlinks to other documents.
d. Create an email link.
e. Add images to your document.
f. Use a table for layout.
g. Apply colors to your HTML document.

TABLE I HTML BASICS

Tag	Description
<html>	Defines an HTML document
<body>	Defines the document's body
<h1> to <h6>	Defines header 1 to header 6
<p>	Defines a paragraph
 	Inserts a single line break
<hr>	Defines a horizontal rule
<!-->	Defines a comment

IV.SOFTWARE- ALGORITHM

The software algorithm of real time vehicle tracking system is described here the ID for every individual. The variables are initialized and the serial port is connected for transmitting the data. The baud for serial transmission is 9600. The Google map is displayed in the official domain name website created. The GSM will send the information message to the remote domain. Encryption and decryption algorithms are used to transmitting the data to the domain securely.

Step 1 : while starting the vechile,kit initialize automatically.
Step 2 : program in the module initialized.
Step 3 : GPS module obtains the latitude and Longitude value
Step 4 : GSM module sends the collect information Of GPS to remote domain.
Step 5 : Transmitting data are encrypted and decrypted at receiving domain.
Step 6 : Run the domain ip address on the browser.
Step 7 : Initially latitude, longitude values will be displayed.
Step 8 : show map button in GUI is pressed; it will load the current location in the Google map.
Step 9 : msg send button in GUI is pressed; the gsm will send the location information to the remote user.
Step 10 : we can change the receiving data phone Number by means simple sms to the module

V.EXPERIMENTAL RESULTS

1. Hardware Interfacing

The remote monitoring system is interfaced with ARM 7, a GSM Modem, a GPS module, a laptop and a mobile is shown in Fig.5 and Fig.6.

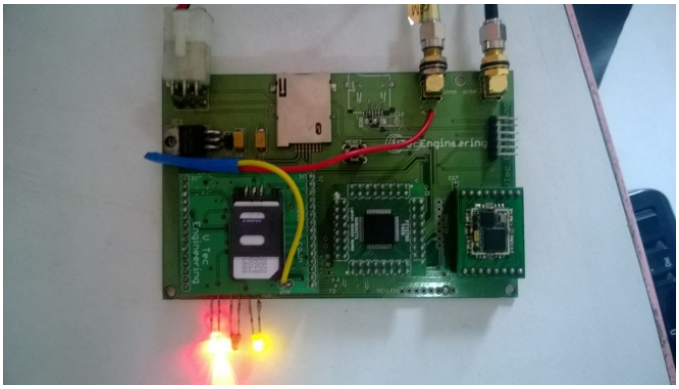

Fig.5. raspberry pi

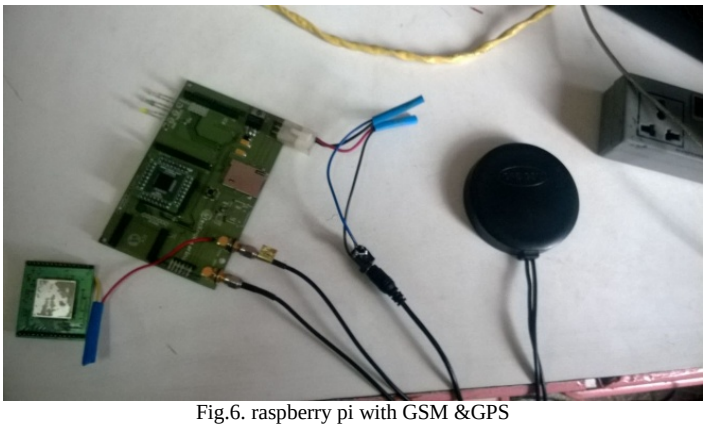

Fig.6. raspberry pi with GSM &GPS

2. *Front Panel GUI Of The Webpage*

The system GUI is created using HTML Language. The GUI contains the latitude, longitude , module id, date and time, speed of the vehicle and state will be displayed. It consist of show map button, msginit button and msgsend button which performs the desired function when pressed shown in Fig.7.

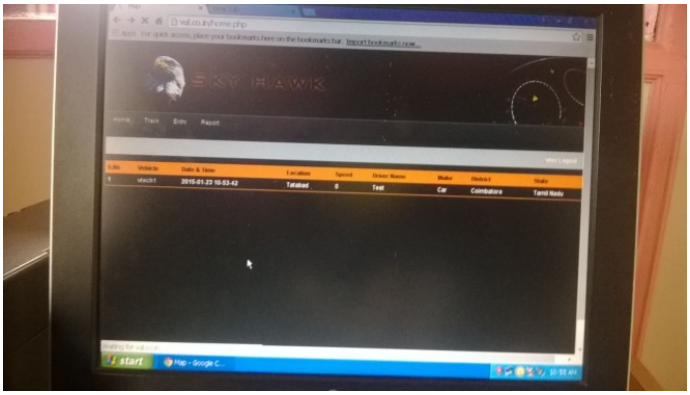

Fig.7. GUI OF THE WEBPAGE

3. *Google Maps*

The system design GUI created using HTML is played we will get the information of latitude, longitude, speed using GPS. When we press the TRACK button we will be getting the location which is plotted in Google maps. When we press the msg send button the information will send to remote user with Google map link of current position. The Fig.8 shows location of vtec technologies. The Fig.9 shows location of central theatre.

TABLE II GUI CREATED USING HTML

LOCATION	LATITUDE	LONGITUDE
VTEC	1106.0435,N	7657.9696,E
CENTRAL THEATRE	1100.2769,N	7695.4682,E

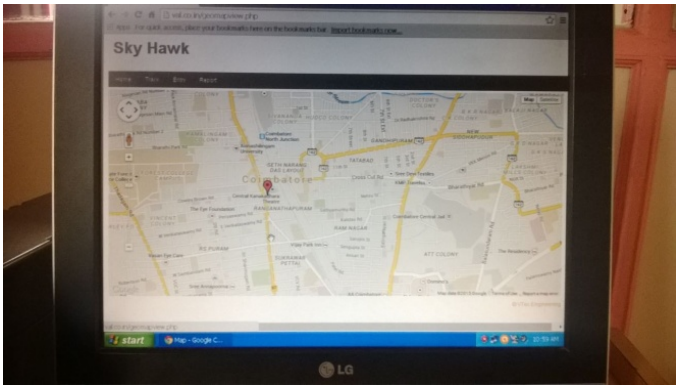

Fig.8. Google map location of VTEC

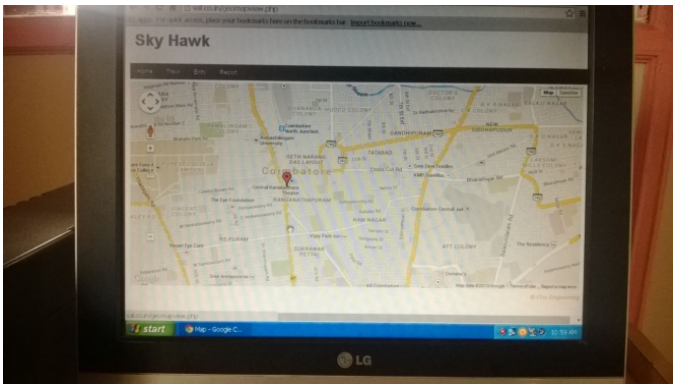

Fig.9. Google map location of Gandhi Park

4. *Remote User*

The message sent from GSM is received in mobile phone. Fig.10 contains the latitude and longitude value with the google link.

Fig.10. SMS message in mobile phone

VI.CONCLUSION AND FUTURE SCOPE

The prototype of tracking system which provides the function of accurate tracking using Google maps in ARM7 was successfully developed and tested. Tracking system is becoming increasingly important in large cities and it is more secured than other systems. It is completely integrated so that once it is implemented in all vehicles, then it is possible to track anytime from 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. This system has many advantages such as large capability, wide areas range, low operation costs, effective, Strong expandability and Easy to use in vehicle traffic administration. Experimental results taken at different places of the vehicle using Google maps is viewed using mobile phone.

In the proposed system, the GPS information like latitude, longitude is sent through SMS with Google map link but they are stored in any database for future reference. In future we can include some other feature like stopping the car by means of sms and if driver is drunk then vehicle will not get start.

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