GPS Based Vehicle Tracking and Engine locking System

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ABSTRACT

Security systems and navigators have always been a important part of human"s life. The developments of advanced electronics have brought revolutionary changes in these fields. In this paper, we will present a vehicle tracking system that use a GPS module and a GSM modem to find the location of a vehicle and offers a range of control features. To complete the design successfully, a GPS unit , a relay, a GSM Modem and a MCU units are used. There are five features made known in the project. The purpose of this project is to remotely track a vehicle"s location, remotely switch ON and OFF the vehicle"s ignition system and remotely lock and unlock the doors of the vehicle. An SMS message is sent to the tracking system and the system acknowledges to the users request by performing convenient actions. Short text messages are authorized to each of these features. A webpage is specifically designed to view the vehicle"s location on Google maps. By using relay based control concept introduced in this paper, number of control features such as turning heater on/off, radio on/off etc. can be execute in the same fashion.[1]

I. INTRODUCTION

The vehicle tracking system is an electronic device that tracks the vehicle"s location. Most of the tracking systems use GPS module to locate the vehicle"s position .Many systems also interface communication components such as satellite transmitters to communicate the vehicle"s location to a remote user. Google maps are used to view the vehicle"s location. The design of the tracking system is divided into three parts; basic design, intermediate design and an advance Design. The basic design of the vehicle tracking system consists of a GSM module, a GPS module, a MCU (ATMEGA 32), a Relay circuit and a LCD. The user sends SMS and the system responds to the user's request by providing the coordinates of a location in accordance to the requirements of mobile phone users through the GPRS network. The intermediate and advance design is an improvement of the basic design. There are five features introduced in the project. SMS codes are specifically assigned to each of these features. For example, if the user sends 555 to the tracking system. The GSM modem will receive the SMS and transmit to the MCU unit, where the SMS code will be compared against the codes stored in the library. In this project, the code "555" is assigned to find the location of a vehicle. So, the MCU will get the location from the GPS module and reply back

to the user with the location coordinates (i.e. Longitude and Latitude). These coordinates can be used to view the location of a vehicle on Google maps. The vehicle tracking system presented in this paper comprises of a cost effective and special tracking technology. The tracking systems are not only bounded to shipping industry and fleet tracking but also used in cars as a theft prevention tool.

This paper provides an overview of the background analysis related to vehicle tracking and control systems, component"s choice and full development process of the tracking system. The paper is divided in five main sections: related research, choice of components, design of a system, simulation of designs and implementation process. In the related research section, we will outline the research carried out so far. Then, we will discuss the components used. The design section will focus the software and hardware design process. The assembly of components will be explained in the implementation section. Finally, the implementation process section will include the software simulations and images of the hardware in working condition.[2]

II. RELATED RESEARCH

There are n number of papers has been published on the development of vehicle tracking system using GPS and GSM Modem differential GPS algorithm that is capable of providing real-time near PPP service is presented In error sources in GPS measurement are calculated ,vehicle navigation application is presented. A web application and a mobile application related to vehicle tracking are presented. Safety challenges related to tracking system and GPS are discussed in great detail. A novel method of vehicle tracking is presented in using wireless sensor technology, passive sensors, android based tracking self-power tracking system and tracking system based on cloud computing infrastructure. A vehicle tracking system based on color histogram distance and binary information is implemented. In development of real-time visual tracking system for vehicle safety applications is discussed and the concept of focus of expansion (FOE) is introduced. A low cost real time tracking system that provides accurate localizations of the tracked vehicle is presented in .Vehicle tracking coupled with vehicle registration number recognition is introduced in Following huge demand of accurate vehicle tracking systems, researchers proposed number of novel methods to improve the accuracy of tracking systems.[3]

III. CHOICE OF COMPONENTS

1. The Microcontroller unit (MCU)

There are two ways to control an electronic circuit either using: Microprocessor or MCU. The Microprocessors are usually referred to as general-purpose microprocessors because they do not contain RAM, ROM and I/O ports. So, system designers have to add an external RAM, ROM and I/O ports to make a system functional. Addition of these components will make the system bulkier and much more expensive. The advantage of using microprocessor is that the designer can decide the amount of RAM, ROM and I/O ports needed to accomplish a task.[4]

Figure 1. Microprocessor

However, MCUs have a CPU in addition to the fixed amount of RAM, ROM and I/O ports, which are embedded on a chip with support functions such as a crystal oscillator, timers and serial or analog input output (I/O) The MCUs are designed for embedded applications and can be used in remote controls, power tools, toys and other appliances. Invention of MCUs has reduced the size and cost of designs. MCUs are suitable where cost and space are critical. There are four types of MCUs (8 bit): 8051 family, PIC, Zilog and Freescale. The MCU families are not compatible with each other, which means, if we write a code for 8051 MCU it will not work on PIC MCU. This is mainly due to different instructions and registers set in each MCU.
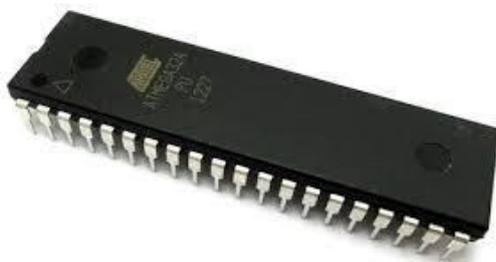
Figure 2. AT MEGA 32 IC

To choose among these MCUs, there are specific criteria set for designers: MCU should meet the task at hand efficiently and cost effectively. Software development tools such as compilers, assemblers and debuggers should be available in the market Wide availability and reliable sources of the MCU used. Designer should also consider the speed, Packaging, power consumption, the amount of RAM, ROM on chip and cost per unit [6]

(a)   (b)

Figure 3. (a) PIC Microcontroller (b) Zilog Microcontroller

2.GSM Modem

A GSM module is a second generation digital mobile cellular technology, which covers a fairly broad geographic area. This offers customized travel, financial, reference and commercial information to the users It can operate in 400MHz, 900MHz and 1800MHz frequency bands. The GSM modem can accept a SIM card just like a mobile phone and operate on a subscription to a network of mobile data transfer. The GSM Modem supports three types of services namely bearer or data services, supplementary services, and telecommunication services. A typical GSM picture is given below:
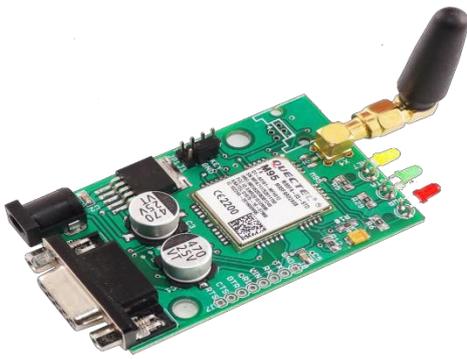
Fig.4. A GSM Modem(Global System for Mobile Communications).

3. GPS Modules

The first GPS (navigation system) was designed by Honda in 1983 Pioneer claims to be the first with a GPS-based auto navigation system, in 1990 Magellan claims to have created the first GPS-based vehicle navigation system in the U.S in 1995.

Each GPS (satellite) transmits data that indicates the current time and its location. It transmits signals to a GPS receiver. This receiver requires an unobstructed view of the sky, so they can only be used effectively outdoors.[8]

Figure 5. GPS Module

4 .Vibration Sensor

Vibration sensor is capable of measuring vibration of the engine when it starts. If the vehicle met an accident, the sensor will send voltage equivalent to the intensity of hit, to the microcontroller at once. Then microcontroller sends a notification to the owner/contact list as SMS, if the sensed signal voltage is greater than or equal to some stored threshold value.

So this will be helpful to report any accidents occurring at night. Thus we use this sensor for security of rider. There are two threshold values one to detect intrusion and another to detect accidents. In the security system piezoelectric sensor is used. It is generated by pressure on certain crystals which will develop a potential difference or voltage on the crystal face. If the crystal oscillates, an AC voltage is formed. The sensor is modelled as a charge supply with a shunt capacitor and resistor, or as a voltage source with series capacitor and resistor.[9]
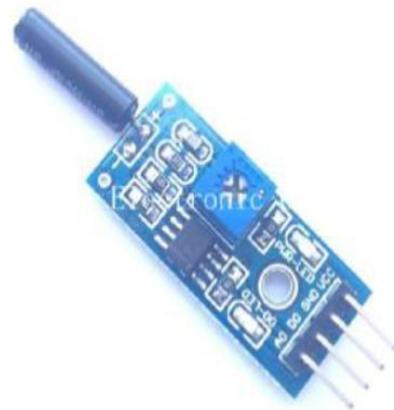
Figure 6. Vibration Sensor

IV. PROCESS OF THE SYSTEM
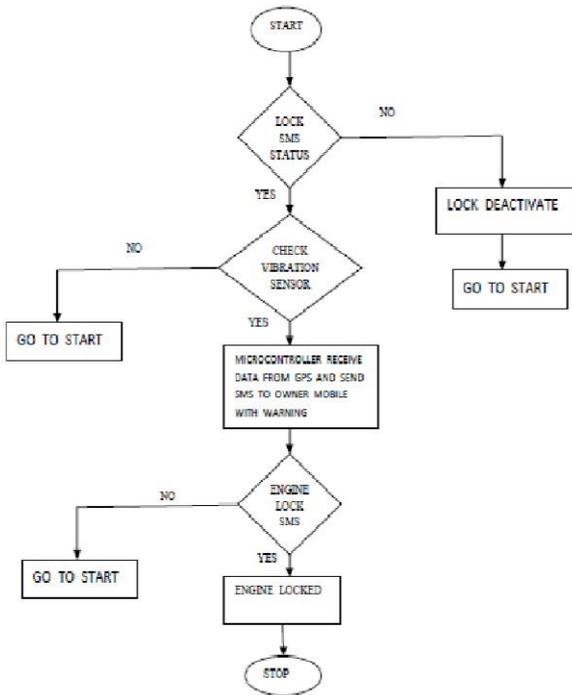
Figure 7. Flow chart of the system

The embedded system is installed in the engine of the vehicle along with GSM and GPS module. The instrument allows to active the 5V and then ignition of the engine will start, hence start the vehicle. The instrument has two modes of operation ,one is user mode and second one is theft mode .When engine will start ,then the instrument will check the lock status, if it is the owner engine will start as user mode and no SMS will be send to owner but if it is somebody else ,theft mode comes into practice and it gives as SMS notification to the concerned party as programmed that is the vibration sensor in the instrument will sense the value of the vibration of the engine.

V. RESULTS AND DISCUSSION
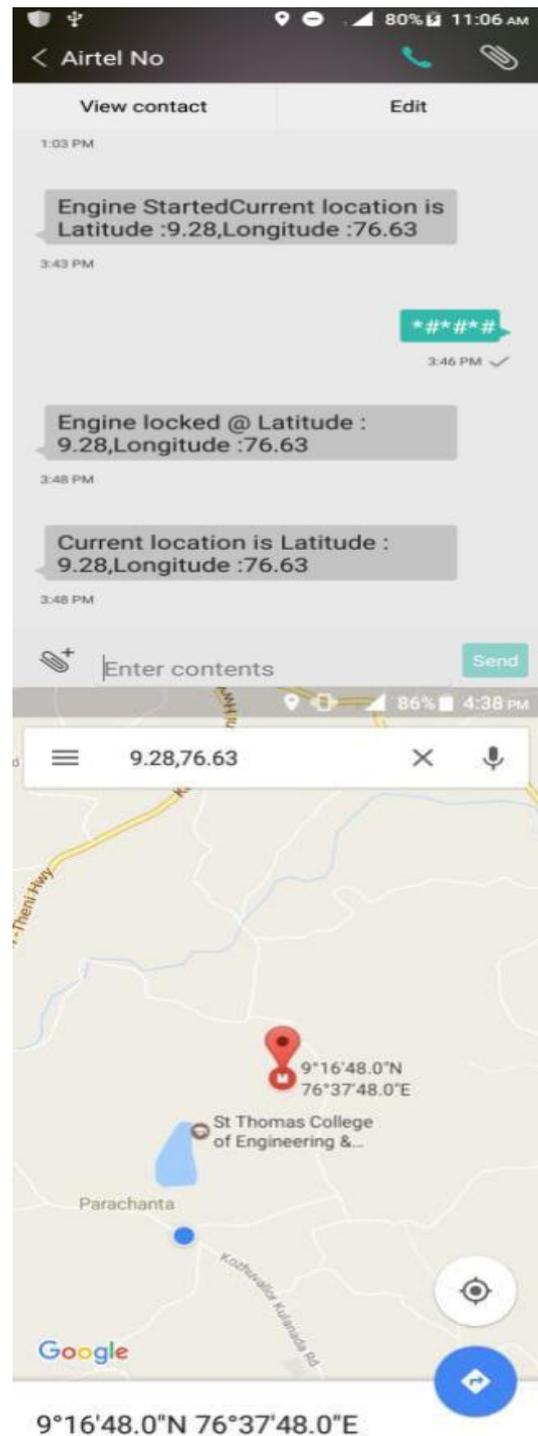
Figure 8. Message send to owner"s mobile and location of vehicle

In this paper, we proposed design of unique engine locking system to control seizing of vehicles using GSM and GPS technology based embedded system. The instrument has simple design, low cost, compact and reliable. This instrument can change by setting lock status field. If the vehicle accessed by unauthorized person, then owner get SMS and lock the system using the password. The delay incurred for engine locking is 2-5 minutes.[11]

If the engine will vibrate more than 10 sec ,then the sensing value is given to the microcontroller. If the value is greater than the threshold value then sending a message "Engine Started" through GSM mobile to owner"s mobile for the further action for prevention of the vehicle theft.

After receiving this message the owner can send password „#" for getting the current location of the vehicle, then the longitude and latitude will be received by the owner. If the owner will send password „*"
,then the owner can lock the engine of the vehicle through this password and receiving a message "Engine Locked" and "current location" is also include As part of the message.[10]

VI. CONCLUSION

Day by day the vehicles increasing so as theft, on the basis of this we can be generate the proposed system that is helpful. When accidents occur during the night time, the incident can report immediately as SMS to the owner"s contact list so that the injured persons can be hospitalized as soon as possible. As future improvement we can add extra features to the proposed system by using hidden cameras in the front and back side of the vehicle so that the details like number of the vehicle is given as SMS to owner"s mobile so

that we can take the details for further investigate, on procedure.[12]

VII. ACKNOWLEDGMENT

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