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Web based Vehicle Tracking, Monitoring, and Security System

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***Abstract*—A vehicle tracking system is an electronic device installed in a vehicle to enable the owner or a third party to track its location. This paper describes a practical model for tracking vehicles based on the Global Positioning System (GPS), a global mobile communication(GSM). GSM modem is used to send the position (Latitude and Longitude) of the vehicle from a remote place and to receive the commands to control the ignition of the engine; by the SMS (Short Message Service) or GPRS (General Package radio service). GSM modem and GPS module are Controlled by Atmel atmega16 micro-controller. The system can be interconnected with the car alarm system. Application has been created and installed on the display unit (Laptop) for displaying the location of vehicle location on Google Map.**

***Index Terms*—GSM, GPS, micro-controller.**

I. INTRODUCTION

VEHICLE tracking system is the technology used to determine a vehicle's location using different methods like GPS and other radio navigation systems operating through satellites and ground-based stations. Vehicle information like location details, speed, distance travelled, etc., can be viewed on a digital mapping with the help of software via Internet.

A. System Architecture

Mainly Vehicle tracking systems consist of two-part com- ponents. The first part components are GSM Modem, GPS Module, micro-controller, and relay Module. The second part is the monitoring device. It can be a PC or smart-phone connected to the internet. Figure 1 shows the architecture of the vehicle tracking, monitoring, and security system.

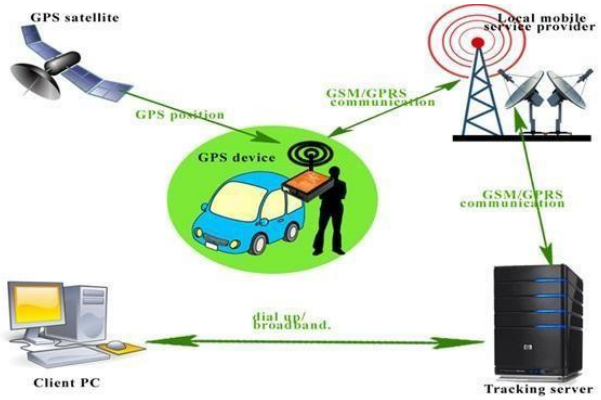

Fig. 1. Architecture of the vehicle tracking, monitoring, and security system.

1) GSM Modem: A GSM modem is a specialized type of modem that accepts a SIM card and operates over a mobile operator subscription, just like a mobile phone. From the mobile operator's view, a GSM modem looks just like a mobile phone. When a GSM modem connected to a computer allows the computer to communicate over the mobile network, these GSM modems are most frequently used to provide mobile internet connectivity. Many of them can also use for sending and receiving SMS and MMS messages[2].
GSM modem can be a dedicated modem device with a serial, USB, or Bluetooth connection, or it can be a mobile phone that provides GSM modem capabilities. The term GSM modem is used as a generic term to refer to any modem that supports one or more of the GSM evolutionary family protocols, including the 2.5G technologies GPRS and EDGE and the 3G technologies WCDMA, UMTS, HSDPA, and HSUPA. Figure 2 shows the GSM Module.

Fig. 2. GSM Modem

GSM modem supports an "extended AT command set" for sending/receiving SMS messages. It also comes in various in- terfaces, such as PCMCIA Type II, USB, and Serial. However, the main difference is that the GSM Modem is wireless, while the dial-up modem is wired. Some GSM Modems also has a GPRS feature that allows transmission of data over TCP/IP (internet)[1].

2) GPS Module: A GPS navigation device is a device that accurately calculates geographical location by receiving information from GPS satellites. Initially, the United States military used it, but now most receivers are in automobiles and smartphones[5]. The Global Positioning System (GPS) is a satellite-based navigation system made up of a network of a minimum of 24, but currently 30 satellites placed into orbit by the U.S.

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Department of Defense. Military action was the original intent for GPS, but in the 1980s, the U.S. government decided to allow the GPS program to be used by civilians. The satellite data is free and works anywhere in the world[3]. Figure 3 shows the GPS Module.

Fig. 3. GPS Module

3) Micro-controller: A micro-controller is known as the actual small computer on a single integrated chip. It consists of all the microprocessor CPU features: ALU, PC, SP, and register. Also, it has some other features like RAM, ROM, serial I/O, parallel I/O, counters, and a clock circuit[4].Figure 4 shows the Micro-controller Outline.

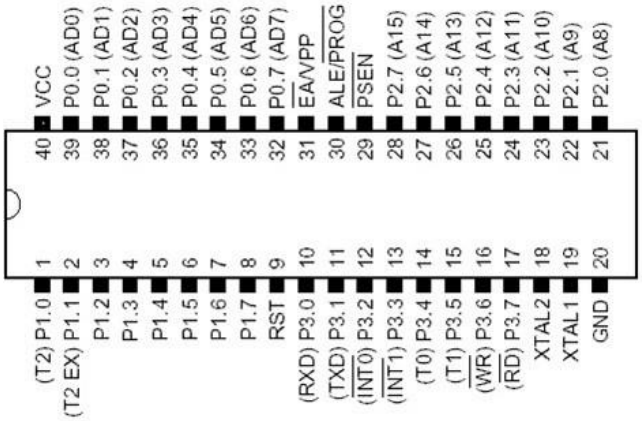

Fig. 4. Micro-controller Outline

A micro-controller works like a microprocessor. It reads data, does calculations of data, and controls the data as well. The micro-controller is used to control the machine's operation, and it is done by uploading a fixed program on micro-controller ROM[6].

II. METHODOLOGY

This paper shows the design of an embedded system used to track and position any vehicle by using the Global Positioning System (GPS) and Global system for mobile communication (GSM). Atmel atmega16 micro-controller is used for inter- facing to various hardware peripherals. The current design is an embedded application, which will continuously monitor a moving Vehicle and report the vehicle's status on demand. The micro-controller is interfaced serially to a GSM Modem and GPS Receiver. A GSM modem is used to send the vehicle's position (Latitude and Longitude) from a remote place. The GPS receiver will continuously give the data, i.e., the latitude and longitude indicating the vehicle's position. Different types of sensors such as infrared sensors and fire detector are used for detecting different types of the problem encountered in the vehicle such as theft, accident, fire warning, etc. In any of these cases, messages will be automatically sent to the intended receiver. When a request by the user is sent to the number at the modem, the system automatically sends a return reply to that particular mobile indicating the vehicle's position in terms of latitude and longitude. A program has been developed, which is used to locate the vehicle's exact position and to navigated track of the moving vehicle on Google Map. The vehicle can be disabled just by sending the SMS from the owner's mobile phone to the GSM modem, which is in the car. Figure 6and 5 show the block diagram and the PCB design of the system respectively.

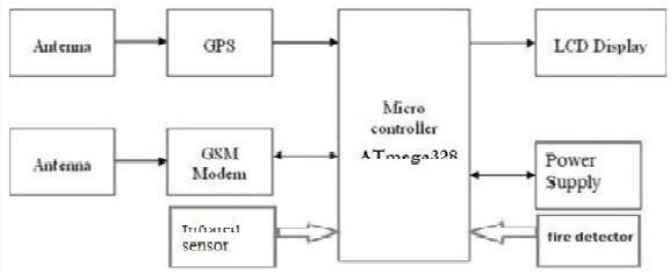

Fig. 5. System Block Diagram.

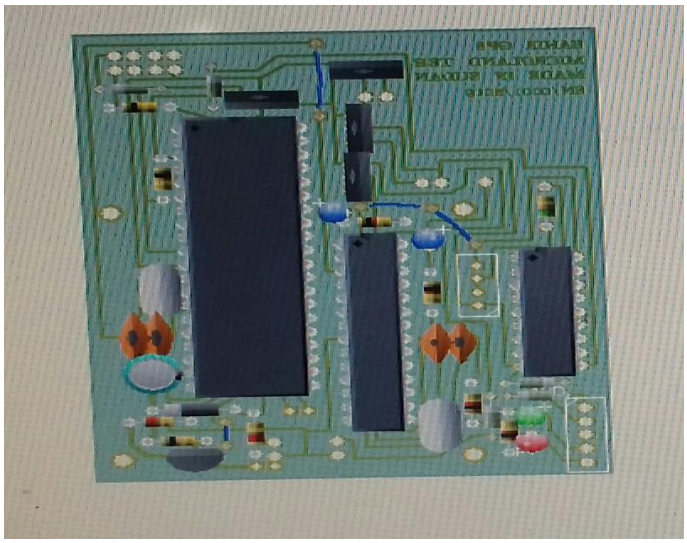

Fig. 6. PCB Design of the System.

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III. RESULT

Using this vehicle tracker based on GPS, the owner can view his car's current location and see the speed and direction the vehicle is travelling and check the route history. Figure 7shows the picture of the constructed system.

Fig. 7. Picture of the Constructed System.

IV. CONCLUSION

The device has been successfully designed and implemented for the "Vehicle Security System With Theft Control. It has been developed by integrating features of all the hardware components used. The presence of every module has been reasoned out and placed carefully, thus contributing to the unit's best working. Secondly, using highly advanced IC's and the help of growing technology, the project has been successfully implemented and tested. Finally, we conclude that GPS and GSM based Security System add a huge for the rapid growth of technology.

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