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INTERNATIONAL JOURNAL
FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

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Vehicle Tracking System using GPS and GSM Technology

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Abstract - The vehicle tracking system is a device installed during a vehicle to enable the owner or a 3rd party to trace the vehicle's location vehicle tracking system that works using GPS and GSM technology, which might be the most cost-effective source of auto tracking and it might work as anti- theft system. It is an embedded system which is employed for tracking and positioning of any vehicle. This design will continuously monitor a moving Vehicle and report its status as and when requested. A GSM modem is employed to send the position (Latitude and Longitude) of the vehicle from a foreign place. The GPS modem will continuously give the info i.e., the latitude and longitude position of the vehicle. The same data is shipped to the mobile at the opposite end from where the position of the vehicle is demanded. When the user request is sent to the GSM modem, the system automatically sends a return reply thereto mobile indicating the position of the vehicle in terms of latitude and longitude in real time.
Keywords: GPS, GSM, vehicle tracking, sensors

I. INTRODUCTION

The safety of personal and public vehicles may be a major concern nowadays so having GPS vehicle tracking system ensure their safety while travelling. This vehicle tracking system are often installed in consumers vehicles as a theft prevention and retrieval device. Police get the exact location details and then they follow the signal transmitted by the tracking system to locate a stolen vehicle. Generally, this technique is supposed to be installed for the four wheelers except for country like India where majority of the people using two wheelers, here is that the cheapest source of an anti- theft tracking system. These systems are commonly employed by fleet operators for fleet management functions like routing, dispatch, on-board information and security. Other applications include monitoring driving behavior, like an employer of an employee, or a parent with a teenager driver. It is also popular in consumer vehicles as a theft prevention and retrieval device. The Police can follow the signal emitted by the tracking system and locate the stolen vehicle.

II. PROBLEM STATEMENT

This project is targeted to serve as good indication of how important it is to curb car theft in the country. Surveillance is specified to the car's alarm system, and they would send the data to the owner of the vehicle via SMS when the alarm is triggered. Due to the inefficient conventional car security alarm, the likelihood of the car is often stolen is high. The main reason is that the alarm is restricted to the audible distance. Somehow if there's differently of transmitting the alarm to the car owner that's not limited to the audible and line of sight, the system is often upgraded. SMS may be a good selection of the communication to exchange the traditional alarm, because it is often done and doesn't require much cost.

Even most of people know GPS can provide more security for the car but the main reason people do not apply it because the cost. Advance car security system is too expensive. Cost for the gadget is too high. Besides that, people also must buy the service monthly. It's not limited to only personal vehicle there are some businesses where there is a need of these system like Transport Business with this system, they can track their vehicle present location.

III. RELATED TECHNOLOGY

A. GPS

The Global Positioning System (GPS) is the only fully functional Global Navigation System (GNSS). The GPS uses a constellation of between 24 and 32 Medium Earth Orbit satellites that transmit precise microwave signals that enable GPS receivers to work out their location, speed, direction, and time. A GPS system receives signal from at least three satellites so that it can calculate distance for triangulation technique to compute its two-dimension (latitude and longitude) and as when need it can calculate distance with the help of four satellite to compute three-dimension (latitude, longitude, and altitude) position. GPS was developed by United States for Military purpose in 1971 but later on was also used in vehicle tracking. It is widely use in navigation purpose.

B. GSM

A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile

operator, just like a mobile phone. GSM (Global system for mobile) uses a process called circuit switching.This method of communication allows a path to be establishedbetween two devices. Once the two devices are connected, a constant stream of digital data is relayed.

Global System for Mobile Communication is a type of device uses SIM card to get operate and with subscription basis same as we all operate mobile with sim card to get communicate with other mobile. In GSM it uses circuit switching technique to interchange the data. GSM networks consist of three major systems the Switching System (SS), The Base Station (BSS) and the Mobile Station (MS)

C. Switching System (SS)

The Switching System is very important operative system as its handle crucial operationsinside the five database which it holds it perform major task like call processing and functions related to subscriber. Here is the Database name which Switching System Holds (HLR, MSC, VLR, AUC and EIR) MSC Cooperate with Home Location Register (HLR) whereas (VLR) Visitor Location Register handle mobile calls and routing of phone calls. (AUC) Authentication Centre handle security end of the system and the last (EIR) Equipment Identity Register holds the crucial information about the mobile equipment's.

D. Base Station System (BSS)

Base Station System plays an important role in Mobile Communication. BSS as an outdoor unit it contains iron rods and are usually high in length Base Station System has the duty to connect subscribers to themobile networks.

All the communication is formed in Radio transmission. The Base Station System is divided in furthermore two systems. These two systems, they're BTS and BSC. BTS (Base Transceiver station) use radio transmission to handle communication with mobile station and BSC (Base station controller) it helps to creates physical link between subscriber (MS) and BTS, then manage and controls functions of it.

E. Mobile Station

Mobile Station Consist of two things mobile unit and a smart card which is also known as Sim Card (Subscriber Identity Module) it gives user personal mobility. It also has unique number as International Mobile Number (IMEI) For Unique Identification.

F. Microcontroller

Microcontroller is very important part of these tracking device as it is the only way for communication between GSM and GPS receiver. It is a small computer on a single integrated circuit containing a processor core, data memory, A/D converter and programmable input/output

IV. METHODOLOGY

### A. Design of Tracking System

AT89C51 Microcontroller has been used for interfacing various hardware peripherals This application will continuously monitor the moving vehicle and can send the report of the current location as an when requested by the user GSM Modem and GPS Receiver are being serially connected to Microcontroller AT89C51. Here First GPS will send the position of the vehicle from the remote place and it will continuously send the position of the vehicle by calculating latitude and longitude GPS modem forward only NMEA data to the GSM modem and after that as an when request comes from the other end mobile device GSM sends that NMEA data to the user so that user can identify the current location of the vehicle. User sends the request on the number which is GSM modem and in reply the system sends the vehicle position in terms of Latitude and Longitude. The code written inside the internal memory of Microcontroller i.e., ROM with the help ofserial communication Microcontroller AT89C51 processes theinstructions and act as interface between GSM and GPS.

The block diagram of tracking system using GPS and GSM technology is presented in figure. The project is vehicle positioning and navigation system we can locate the vehicle around the globe with micro controller, GPS receiver, GSM modem. Microcontroller used is AT89C51. The code is written in the internal memory of Microcontroller i.e., ROM. With help of instruction set it processes the instructions and it acts as interface between GSM and GPS with help of serial communication of AT89C51. GPS always transmits the data and GSM transmits and receive the data GPS pin TX is connected to microcontroller and GSM pins TX and RX are connected to microcontroller serial ports. Microcontroller communicates with the help of serial communication. Firstit takes the data from the GPS receiver and then sends the information to the owner in the form of SMS with help of GSM modem. GPS receiver works on 9600 baud rate is used to receive the data from space Segment (from Satellites), the GPS values of different Satellites are sent to microcontroller AT89C51, where these are processed and forwarded to GSM.

At the time of processing GPS receives only $GPRMC values only. From these values microcontroller takes only latitude and longitude values excluding time, altitude, name of thesatellite, authentication etc. E.g., LAT: 1728:2470

Block Diagram
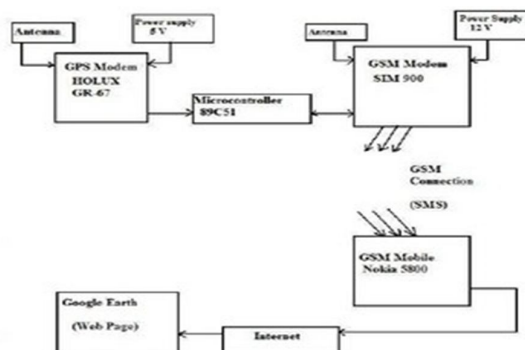
V. FUTURE SCOPE

In this paper we've proposed an anti-theft system which may be wont to track a vehicle fitted with the proposed device in it.It also can be utilized in wildlife tracking, asset tracking and in stolen vehicle recovery. In the future we may integrate other related devices during a vehicle like sensors. We can create a server to ascertain the vehicle route and other information on our computer and that we can save the trajectory of it.

VI. CONCLUSION

The sensors installed in the vehicle will report the vehicle information to our server and form an intelligent tracking system. There are various reasons why car owners and public vehicle operators like better to have a GPS. Fleet operators usually deploy vehicle tracking systems for fleet management functions like routing, dispatch, on-board information and security. Other applications include monitoring driving behavior, like an employer of an employee, or a parent with a teenager driver.

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