International Journal of Psychosocial Rehabilitation, Vol. 23, Issue 05,
2019 ISSN: 1475-7192

Design of an automobile tracking anti-theft system using GSM and GPS

[1]Bhagya Laxmi Behera, [2]Sarmistha Satrusalya

Abstract--- *An automobile tracking system is an electronic gadget introduced in an automobile to empower the proprietor or an outsider to follow the automobile's region. This paper proposed to plan an automobile tracking system that works by utilizing GPS and GSM innovation, which would be the least expensive source of automobile tracking and it would function as an anti-theft system. It is a system dependent on an embedded which is utilized for chasing and placing of any automobile by utilizing Global Positioning System (GPS) and Global system for mobile communication (GSM). This plan will consistently analyse a moving automobile and report the status of the automobile on request. For doing so a microcontroller is interfaced sequentially to a GSM Modem and GPS Receiver. A GSM modem is utilized to send the position (Latitude and Longitude) of the automobile from a remote place. The GPS modem will persistently give the information, for example, the latitude and longitude demonstrating the situation of the automobile. Similar information is sent to the mobile at the opposite end from where the location of the automobile is requested. At the point when the solicitation by the user is sent to the number at the GSM modem, the system consequently sends a reply to that mobile demonstrating the location of the automobile in the form of latitude and longitude.*

Index Terms— *GSM (global system for mobile communication), GPS (global positioning system), Micro-controller, Anti-theft, Tracking*

1. INTRODUCTION

India has advanced on the huge rate that numerous organizations have set up themselves here. These organizations have tremendous work power. Assembling the transportation to such gigantic power is a troublesome assignment. This transportation is assembled through nearby transport automobiles on a yearly premise.[1] In any case, this has caused numerous accidents like assault, theft and so on. Hence the proposed tracking system will help us in finding the area of automobile through satellite communication. GPS & GSM based automobile chasing and location system will give real-time, mapping and reveal this data back to checking the gadgets and improving the degree of science provided. A GPS based automobile tracking system will illuminate where your automobile is, where it has been and to what extent it has been. The GPS (Global Positioning System) system utilizes geographic position and time data from the Global Positioning Satellites. Some systems don't permit full inclusion of the course, then it is hard to decide whether a truck or another conveyance automobile is going on a planned path. In this manner, we have to utilize an elective system that permits nonstop observing movements, acquiring data of plausible deviations or even emergencies.[2]–[4]

Deaprtment of Electronics and Communication Engineering, Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar,
bhagyalaxmibehera@soa.ac.in, sarmisthasatrusalya@soa.ac.in

Received: 10 Nov 2018 | Revised: 20 Dec 2018 | Accepted: 02 Jan 2019

The wellbeing of private and public automobiles is a significant concern these days so having a GPS automobile tracking system guarantees their security while voyaging. This automobile tracking system can be found in the purchaser's automobiles as a robbery counteractive action and recovery gadget. Police can pursue the sign transmitted by the tracking system to find a taken automobile. For the most part, this system is intended to be introduced for the four-wheelers yet for a nation like India where many individuals utilize bikes, it is least expensive enemy of robbery tracking system. Automobile tracking systems are usually utilized by fleet administrators for the working of fleet management, for example, dispatch, on-board data, routing, and security. Different applications incorporate observing driving behaviour, for example, a business of a worker, or a parent with a youngster driver. Automobile tracking systems are also dominant in customer automobiles as a burglary avoidance and recovery gadget. Police can just pursue the sign radiated by the tracking system and find the taken automobile. [5], [6]

II. **GPS:**

The Global Positioning System (GPS) is a satellite radio route system created by the Department of Defence (DoD) possessed by the United States Government (USG) and worked by the United States Air Force (USAF). GPS has provided routing navigation, positioning and timing administrations to military and regular citizen clients on a ceaseless overall premise since the first dispatch in 1978. A boundless number of clients with a civil or military GPS recipient can decide the exact time and area, in any climate, day or night, anywhere in the world.

The system utilizes a medium earth orbit satellite transmitting microwave signals enabling a GPS receiver to decide its position, speed and time. Various sorts of solutions can be done utilizing GPS beneficiaries relying upon the calculations, kind of estimations and adjustments utilized in the route arrangement. A GPS receiver measures the pseudo-range of the system, for example, the obvious range among satellite and recipient, utilizing the code stage estimations, which give a gauge of the prompt ranges to the satellites, or the transporter stage estimations, which is the contrast between the period of the bearer signal produced at the beneficiary and the transporter got from a satellite at the moment of the estimation. The transporter stage estimation is given in a small amount of a cycle, yet this doesn't contain any data about the quantity of complete cycles i.e. integer ambiguity.

GPS systems requirements are:

a) Multiple access abilities with the goal that no impedance in the GPS signals from different satellites should happen.

b) Avoiding some measure of multipath impedance.

c) Minimization of obstruction from sticking, ridiculing of signal and so on up to a specific level.

d) Low power signal so it ought not to meddle with the line of sight signal of the microwave.

GSM Technology
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A GSM modem is a particular sort of modem which acknowledges a SIM card, and works over membership to a mobile operator the same as a portable phone. GSM (Global system for mobile) utilizes a procedure called circuit switching. This technique for communication enables a way to be built up between two gadgets. When the two

Received: 10 Nov 2018 | Revised: 20 Dec 2018 | Accepted: 02 Jan 2019

gadgets are associated, a steady stream of advanced information is relayed. GSM systems comprise of thee significant systems the Switching System (SS), The Base Station Subsystem (BSS) and the Mobile station (MS).

- **The Switching System**: -The Switching system is an exceptionally employable system in which numerous pivotal activities are directed, SS systems holds five databases within it which performs various functions. If we talk about significant assignments of SS system, it performs call processing and functions related to the subscriber. These databases form SS systems are HLR (home location register), MSC (mobile switching centre), VLR (visitor location register), AUC (Authentication centre) and EIR (Equipment identity register). The MSC in participation with Home Location Register (HLR) and Visitor area register (VLR), deal with portable calls and directing of telephone calls. An authentication centre (AUC) is a little unit that handles the security end of the system and the Equipment identity register (EIR) is another significant database that holds urgent data of mobile equipment.
- **The Base Station System** (BSS): The base station system has a significant job in mobile communication. It is a portable unit which comprises of iron rods. BSS are liable for associating subscriber to the mobile station. The Base Station System is additionally separated into two systems. These two systems, are BTS and BSC. BTS (Base Transceiver Station) handles communication utilizing radio transmission with mobile station and BSC (Base station controller) makes a physical connection between the subscriber (MS) and BTS, and control all the function on this system.
- **Mobile Station** (Subscriber): MS comprise of a portable unit and a smart card which is also known as a subscriber identity module (SIM) card. This card fitted with the GSM Modem and gives the client increasingly close to home portability. The device itself is recognized by an exceptional number known as the International Mobile Equipment Identity (IMEI). [7]–[9]

III. **MICRO-CONTROLLER***:*

The microcontroller is the core of this gadget. It is the interface between the GSM module and the GPS beneficiary. A microcontroller is a little PC on a solitary coordinated circuit containing a processor, information memory, A/D converter and programmable info/yield peripherals. In this gadget, the microcontroller is customized so that it invigorates the GSM modem in message sending when a solicitation is sent by the client. Micro-controller is small and simplified with the goal that they can incorporate all the functions required on a solitary chip. Having the microcontroller is of extraordinary use, as it has low structure cost and adds knowledge to the system.

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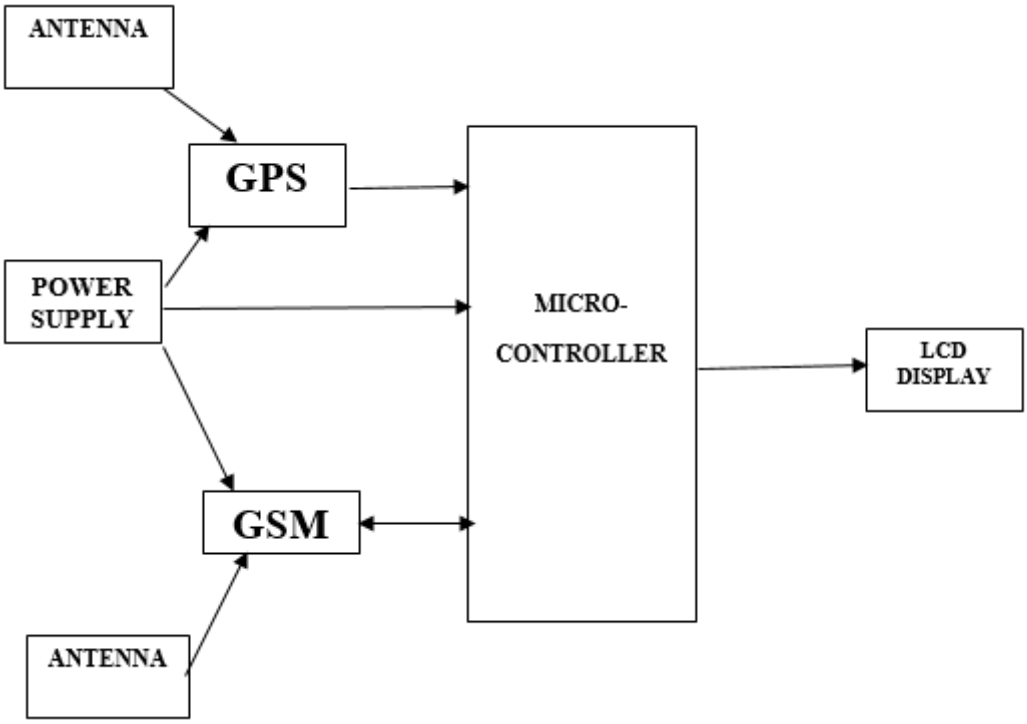

Figure 1: Block diagram of System design

IV. SYSTEM DESIGN

It comprises of two units:

1) **Transmitting Unit**: Transmitting unit contains GPS and GSM which is preloaded in a telephone. Hence the mobile will be utilized as a transmitting unit.

a) **GPS**: The United States Department of Defence (DoD) has built up the Navistar GPS, which is an all-climate, space-based route system to address the issues of the USA military powers. The satellite constellation of GPS is 32 satellites and it uses CDMA (code division multiple access) as media access. There are many schemes used for modulation such as BPSK (1), BPSK (5), BPSK (10), etc. and centre frequencies are 1575.42 MHz, 1227.60 MHz, 1176.45 MHz The frequency bands for this system are L1, L2, and L5.

b) **GSM**: A GSM modem is a remote modem that works with a GSM remote system. It carries on like a Dial-up modem. The working of the GSM modem depends on directions; The AT Commands are given to the GSM Modem with the assistance of PC or Controller. GSM Provides proposal, not the Requirement. It characterizes functions and interfaces prerequisites in detail however don't address the equipment. [10][11]–[15]

Working:

a) This device will consistently demand to the GPS satellite for its area data.

b) Simultaneously GPS satellites will give the area data to GPS devices introduced in the automobile.

c) The GPS device will send the area data back to the server.

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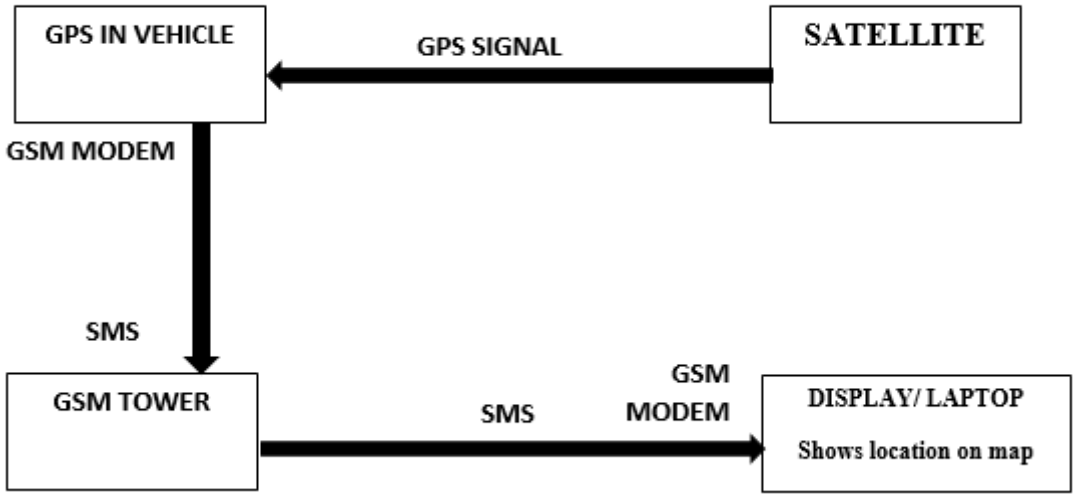

Figure 2: Representation of work flow of the system

2**) Monitoring unit**: Monitoring unit can be an Android Application or a Web Application through which the client will become acquainted with the real position of the proposed automobile. The Application will show the distinctive coordinates (longitude and latitude) received from GPS devices and plot them on Google Maps.

Working:-

a) The device access database from the main server.

b) The location information is easily plotted on google maps according to the database

In this paper, it is proposed to plan an installed system that is utilized for tracking and locating of any automobile by using Global Positioning System (GPS) and Global system for mobile communication (GSM). In this system, a microcontroller is utilized for interfacing various equipment peripherals. The present plan is an embedded application, which will persistently monitoring a moving automobile and report the status of the automobile on demand. For doing so a microcontroller is interfaced sequentially to a GSM Modem and GPS Receiver. A GSM modem is utilized to send the position (Latitude and Longitude) of the automobile from a remote place. The GPS modem will persistently give the data i.e. the latitude and longitude showing the situation of the automobile. [9], [16]–[24]

V. APPLICATION

1) Security Department like the Police Department, Military Department Etc.

2) To monitor Public Busses (PMT Busses, State Transport Busses and so on.) and Private Busses just as Automobiles.

3) Companies like Food Delivery, Car Rental, and College Transport can also utilize this system.

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VI. ADVANTAGES

Business armada administrators are the biggest clients of automobile tracking systems. These systems are utilized for operational functions such as steering, security, dispatch and gathering on-board information. These are additionally utilized for fire finders in enormous automobiles like the train, bus, etc. since the automobile like train contains a huge number of people and the sending alarm of fire mishap can spare numerous lives. The applications for this system are in military, navigation automobiles, airships, remote monitoring, remote control, security systems, and so on. [26]

VII. RESULT AND CONCLUSION

In this paper, we have proposed an enemy of burglary system which can be utilized to follow an automobile fitted with the proposed gadget in it. It can likewise be utilized in resource or wildlife tracking and taken automobile recuperation. Later on, we may incorporate other related gadgets in an automobile, for example, sensors. [27]–[31] We can make a server to see the automobile course and other data on our PC and we can spare its direction. The sensors introduced in our automobile can report the automobile data to our server and it can form an intelligent automobile tracking system. There are different reasons why automobile proprietors and open automobile administrators want to have a GPS. You can easily recognize your location, regardless of whether you are voyaging locally or in an outside land, having a GPS is genuinely a preferred advantage. If you think you are lost, you can utilize your GPS to know your definite area. An automobile tracking system is used to get the exact location of it and send the location to the server so it is a reliable system.

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Received: 10 Nov 2018 | Revised: 20 Dec 2018 | Accepted: 02 Jan 2019