Study of Improvement in Car Security and Positioning System

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Abstract : Security, especially theft security of vehicle in common parking places has become a matter of concern. An efficient automotive security system is implemented for anti-theft using an embedded system integrated with Global Positioning System (GPS) and Global System for Mobile Communication (GSM). This proposed work is an attempt to design and develop a smart anti-theft system that uses GPS and GSM system to prevent theft and to determine the exact location of vehicle. The system contains GPS module, GSM modem, Infrared sensors, DTMF decoder IC MT8870DE, 8051 microcontroller, relay switch, vibration sensor, paint spray and high voltage mesh. In case of accident this system automatically sends the message for help to one's relatives. The preventive measures like engine ignition cutoff, fuel supply cutoff, electric shock system (installed on steering wheel) and paint spray system are installed in the vehicle which is controlled using user or owner GSM mobile. The owner can lock or unlock his/her vehicle with the help of SMS. This complete system is designed taking in consideration the low range vehicles to provide them extreme security.

Keyword : GPS , GSM , microcontroller 8051, tracking.

1. Introduction

These day's vehicle robbery cases are on top of the other time, it's gotten to be fundamental to convey a vehicle an outstanding security with the most solid hostile to burglary gadget. Vehicle focal locking framework guarantees the simplest ensure to secure your vehicle from various varieties of burglary cases. it's a vehicle security gadget that provides fantastic insurance to your vehicle. However this framework couldn't demonstrate to offer complete security and openness to the vehicle within the event of burglary [1]. So, a more created framework makes utilization of an inserted framework focused around GSM innovation. The outlined and created framework is introduced within the vehicle. Whether one is holder of single vehicle or in more than 1000, Vehicle Tracking System (VTS) is a solution for spot, track and secure your portable resources. it's intended for exact and ongoing

following and reporting of your vehicle(s), irrespective of where it's placed. Combination of high-affectability GPS units in vehicle following frameworks has empowered these gadgets to figure in numerous sorts of situations, as an example, characteristic ravines, urban gulches and far under substantial foliage, the length of system scope is solid. right away GPS vehicle following guarantees their wellbeing as voyaging.. This framework introduced for the four wheelers, Vehicle following generally utilized as a component of naval force administrators for war fleet administration capacities, directing, send off, ready for and security. The applications incorporate observing driving execution of a guardian with a young person driver. Vehicle following frameworks acknowledged in shopper vehicles as a burglary avoidance and recovery gadget. within the event that the burglary recognized, the framework sends the SMS to the vehicle holder. subsequently vehicle manager sends the SMS to GSM modem appended to the controller, issue the important signs to prevent the robbery[1]. The principle point of the current exploration work is to stipulate and make a shrewd and powerful security framework for vehicles which will avert robbery and provides data on mischances. The framework being produced through the current work utilizes GPS and GSM innovation and might be made moderate so it may be utilized as a component of ease vehicles even in bikes.

2. Hardware Description

GSM Model

A smart anti-theft vehicle security system (Fig. 1) comprises GSM module, GPS module, 8051 microcontroller, infrared sensors, DTMF decoder IC MT8870DE, relay, paint spray and high voltage mesh. The hardware design is split into two parts- GSM and GPS. the most circuit is split into two circuits one is for detecting the motion of thief using infrared sensors and other is for DTMF tone decoding for switching on/off the relay. The bock diagram (Fig. 2), when thief tries to unlock the car, the infrared sensors placed near the door will sense the motion or movement and can sent the signal to 8051 microcontrollers. The microcontroller which is connected to triggering circuit will send the triggering signal to relay [2]. The relay is connected to GSM mobile through earphone. The microcontroller will send triggering signal thrice to GSM mobile and call are going to be made to user informing him or her that somebody is trying to unlock the vehicle.

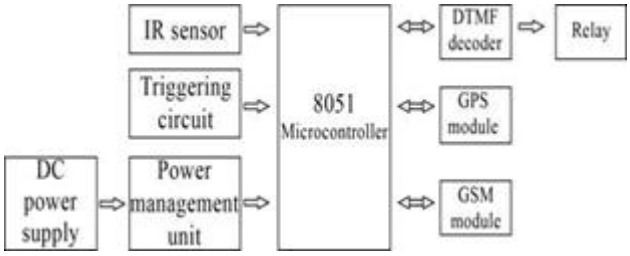


Fig 1: Block diagrams of GSM and anti-theft architecture

GPS Model

The Global Positioning System (GPS) may be a space-based satellite route framework that offers area and time data all told climate conditions, anyplace on or near the world where there's an unhampered observable pathway to four or more GPS satellites. The framework gives basic abilities to military, common and business clients as far and wide as possible [1]. Each satellite continually transmits messages that include the time the message was transmitted and satellite position at time of message transmission. The receiver uses the messages it receives to see the transit time of every message and computes the space to every satellite using the speed of sunshine. Each of those distances and satellites' locations define a sphere. The receiver is on the surface of every of those spheres when the distances and therefore the satellites' locations are correct. These distances and satellite's locations are wont to compute the placement of the receiver using the navigation equations. This location is then displayed, perhaps with a moving map display or latitude and longitude; elevation information could also be included the recorded location data will be stored within the tracking unit, or it should be transmitted to a central location database, or to internet connected pc, employing a cellular (GPRS or SMS), radio, or satellite modem embedded within the unit. this permits 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.

Fig 2: Block diagram of GPS tracking system

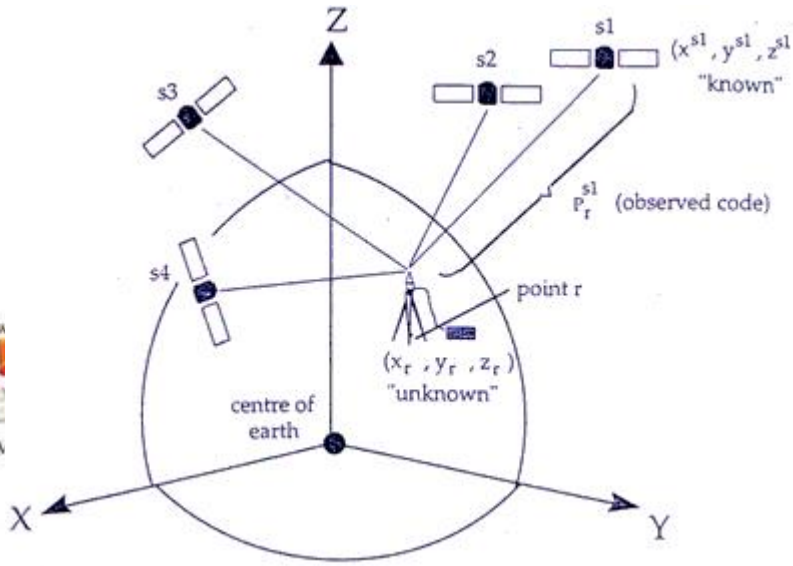


Fig 3: Position on the plane

3. System Design and Implementation

a. Programming

Programming is the key part of implementing an efficient project. As, it can be simply ascertained that the GSM, GPS and LCD devices, get interfaced with the controlling devices "microcontroller" with the help of the appropriate program burn on it. The main purpose of

programming is to control and supervise the intelligent devices (GPS, GSM and LCD) to operate automatically. This section contains all the information about programming we used in this project.

b. Simulator and compiler

All the programs are developed in C\C++ language. The development tool used for these programs is "Keil uvison". It is used for building, debugging and developing applications based on 8052 microcontrollers.

c. Hardware implementation

The project hardware is divided into two major parts,

a) Microcontroller based control unit that controls GSM and GPS.
b) Relay board.

The microcontroller-based system is divided into sub modules connected to each other.

d. Microcontroller based control unit and its components

The control unit placed in the car comprises of the following major components.

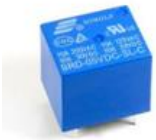
a) Microcontrollers 8052 (two)
b) GSM module (SIM 900)
c) GPS module (HOLUX m-89)
d) LCD board
e) Power board

e. Car Module

Car module includes relay and servo motor as its major components [5].

i. Relay

Relay is used in a circuit as a magnetic switch to turn on a second circuit.
A relay is an electromagnetic switch, which is activated when a small current is passed through its coil.
The interesting fact is that this small current is capable of turning on a secondary circuit which works on much larger current.
When you construct your own circuit you must consider the voltage ratings that will energize (trigger) it.



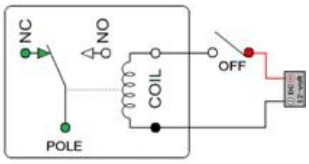


Fig 4: Relay Internal structure of relay

ii. Servo motor

Specifically, in this circuit, an effort has been made to rotate the servo motor 180 degrees and then stops and then rotates 180 degrees back (in the direction it began).
Servos are motors that are used to accurately control physical movement. This is because they generally move to a position instead of continuously rotating. They are ideal for making something rotate over a range of 0 to 180 degrees.

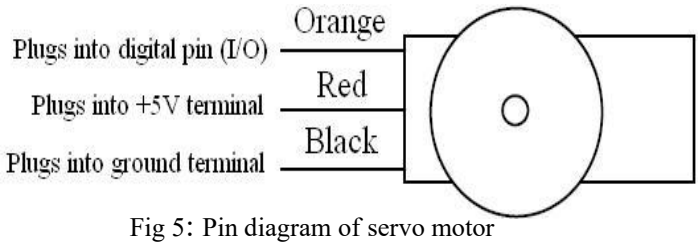


Fig 5: Pin diagram of servo motor

iii. Power Supply

The voltage, typically 220V rms, is connected to a transformer, which steps that AC voltage down to the level of the desired DC output. A diode rectifier then provides a full-wave rectified voltage that is initially filtered by a simple capacitor filter to provide a DC voltage. This resulting DC voltage usually has some ripple or DC voltage variation.

A regulator circuit removes the ripples and also remains the same DC value even if the input DC voltage varies, or the load connected to the output DC voltage changes. This voltage regulation is usually obtained using one of the popular voltage regulator IC units.

AC to DC:

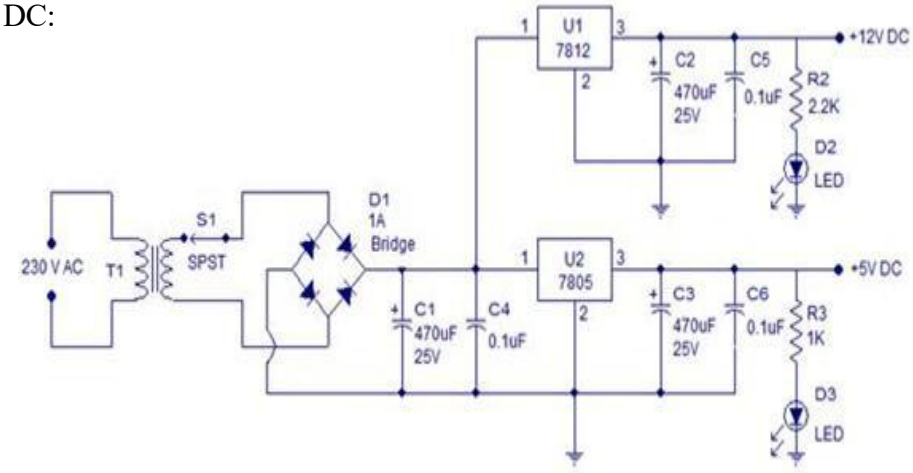
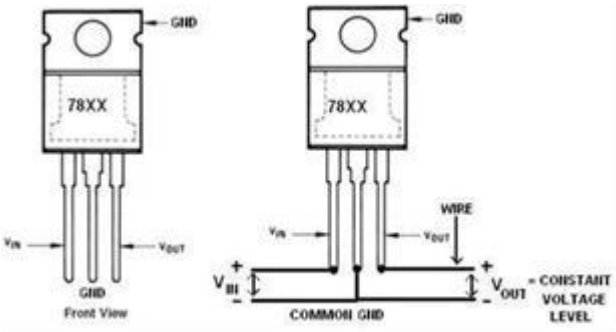


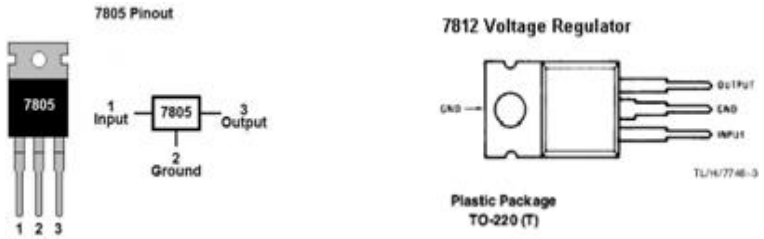
Fig 6: 12V, 5V AC to DC power Supply

iv. Voltage regulator (IC 7812/05)

7812/05 are a voltage regulators integrated circuit. They are a member of 78xx series of fixed linear voltage regulator ICs. The voltage source in a circuit may have fluctuations and would not give the fixed voltage output. The voltage regulator IC maintains the output voltage at a constant value. The xx in 78xx indicates the fixed output voltage it is designed to provide. 7805 provides +5V regulated power supply. Capacitors of suitable values can be connected at input and output pins depending upon the respective voltage levels.

(A)





(B) (C)

Fig 7: Voltage Regulator (A) 78XX, (B) 7805, (C) 7812

4. Expected Results

The online based tracking framework may be a framework planned by joining of some present-day data and communication technologies. The framework comprises of vehicle-mounted following gadgets, a focal server framework and web-based application [10]. Through the framework, clients will have the power of observing the world graphically and other important data of auto. This framework is meant to serve undertakings with a boundless number of vehicles and complicated utilization prerequisites. the net framework empowers client to scan area track on guide through created web application install Google Map and interface with database server for vehicles track subtle elements. Utilizing the web based framework empowers clients with diverse working framework stages to effectively achieve the requested subtle elements by the presence of web access. Fig. demonstrates a top level view of a typical online based vehicle tracking framework. the realm is acquisitioned from satellite utilizing GPS receiver area coordination sent through GPRS, the GSM system will pass the info to the target server as HTTP packets. Also through the net the purchasers can peruse track on electronic guide utilizing reason composed web application on site. The client can discover the way of the terminus or complete course with headings where he have to experience web application.

Fig 8: online tracking using web application

In offline tracking, GPS receiver after receiving the signal from satellites calculates the position of vehicle and convert it in the form of latitude, longitude, altitude and speed information. This information is send to the user by GSM modem or mobile phone connected to circuitry board. In case

of accident, GSM modem or mobile will send the help message to one of the family member whose number is registered [10]. The Experiment was conducted for checking the sensitivity of GPS tracking system.

5. Future Work

In future, there will be an attempt to install a GPS system with which the location of the vehicle can be instantly located at any time remotely from anywhere. Furthermore, more functionalities to automate the vehicle remotely from anytime anywhere with the app are under process too. It is also planned to increase the security of the vehicle by cutting off the battery supply thus adding to its security.

6. Conclusion

Tracking framework or system is attending to be progressively vital in expansive urban areas and it's more secured than different frameworks. it's continuous ability, rises with a particular end goal to fortify the relations among individuals, vehicle and street by assembling present day data advances or technologies and prepared to structures a true time accurate, compelling exhaustive transportation framework. Updating this setup is easy which makes it hospitable future a prerequisite which likewise makes it more efficient. The proposed work is cost-effective, reliable and has the function of preventing theft and providing accurate tracking system [1]. a sensible anti-theft system is one in all the essential systems that homogenize both GPS and GSM systems. it's fundamental due to the massive numbers of uses of both GSM and GPS frameworks and also the wide use of them by an excellent many individuals at some stage in the globe. This framework intended for clients in area development and transport business, provides real-time information like location, speed and expected point in time of the user is moving vehicles in a very concise and easy-to-read format. This framework might likewise valuable for correspondence process among the 2 focuses.

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