

# Smart Anti-Theft System for Vehicle Security

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**Abstract**— 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. GSM system is also installed in the vehicle for sending the information to the owner of the vehicle the preventive measures are controlled by owner's GSM mobile. This complete system is designed taking in consideration the low range vehicles to provide them extreme security.

**Key words:** Vehicle Security, Smart Anti-Theft System

## I. INTRODUCTION

These day's vehicle robbery cases are higher than any other time, it has gotten to be fundamental to give a vehicle a superb security with the main solid hostile to burglary gadget. Vehicle focal locking framework guarantees the best ensure to secure your vehicle from various types of burglary cases. It is a vehicle security gadget that offers fantastic insurance to your vehicle. However this framework couldn't demonstrate to give complete security and openness to the vehicle in the event of burglary. The outlined and created framework is introduced in the vehicle. Whether one is holder of single vehicle or in excess of 1000, Vehicle Tracking System (VTS) is an answer for spot, track and secure your portable resources. It is intended for exact and ongoing following and reporting of your vehicle(s), regardless of where it is placed.

The principle point of the present exploration work is to outline and create a shrewd and strong security framework for vehicles that can avert robbery and burglary. This system will also help to retrieve the vehicle back if incase the vehicle is stolen. To create a smart anti-theft system for vehicle security. This would help the owner of the car to take precautions actions when it will be under attack by thief. These actions are designed in such a way that it can be controlled by the owner's mobile handset itself. The proposed work is cost-effective, reliable and has the function of preventing theft and providing accurate tracking system. A smart anti-theft system is one of the essential systems that use GPS system. It is fundamental because of the huge numbers of uses of both GSM and GPS frameworks and the wide use of them by a great many individuals all through the world. Tracking vehicle using GPS services to acquire coordinates (longitude and latitude).

## II. A BRIEF REVIEW

In many previous research works, the authors have given some analytical view of the circuitry used in the various projects, while in some GPS is commonly used as global navigation satellite to track the vehicle. The location information is sent in the form of message to the owner of the vehicle or it can be traced using internet through Google maps. A number of developments have taken place in anti-

theft systems for vehicles and some of the relevant ones are as follows.

This paper introduced by G.S.Prasanth et al. [1] describes a vehicle tracking system by using GSM technology only. The system uses the SMS service to get information about the vehicle's exact location. The microcontroller stimulates GSM module via text message to forward the details about the stolen vehicle. The microcontroller which receives the delivery messages through the GSM module evaluates the time gap between successive messages to determine the exact location of the vehicle.

Montaser et al. [2] described an effective security system for anti-theft using an embedded system occupied with a Global Positioning System (GPS) and a Global System of Mobile (GSM). The user can track the position of targeted vehicles on Google Earth. Using Kalman filter which is used to get the discrete coordinates and the GPS locator, the target's current location is determined and sent, along with various parameters received by vehicle's data port, via Short Message Service (SMS) through GSM networks.

An integrated GPS-GSM system is proposed in this paper by Mohammad A et al. [3] to track vehicles using Google Earth application. The remote module has a GPS mounted on the moving vehicle to identify its current and accurate position, and to be transferred by GSM with other parameters acquired by the automobile's data port as an SMS to a recipient station. Kalman filter is used to enhance the accuracy.

Three stages of protection are stated in the paper by Mohammad Abuzalata et al. [3] to strengthen the security of the car: Firstly, when the user accesses the car by the car key and types the wrong password, the power is disable. If the power shifted by others, the second level comes by disabling the starter motor from being turned on, so the stolen keys cannot turn the car on. A microcontroller is programmed using C language.

This paper describes an advance security system in car by J.R.Shaikh1 et al. [5] which consists of a face detection subsystem, a GPS module, GSM module and a control platform. The other modules transmit necessary information to users and help to trace the vehicle all the time, even when the vehicle is lost. This system prototype is built on the base of one embedded platform ARM7 which controls all the processes.

The paper stated by P.Bagavathy et al. [6] gives a cost effective approach to the vehicle tracking system which uses the Global Positioning System (GPS) and Global System for Mobile Communication (GSM) technologies along smartphone application for tracking of any movable asset by just clicking a button.

The vehicle anti-theft tracking system based on Internet of things is designed in this article by Zhigang Liu et al. [7]. This system is controlled by an RFID module to switch

on and off. When the car is stolen, the vibration sensors and pyro electric infrared sensors mounted inside the vehicle are triggered, and GSM module will send the location information obtained by GPS module to the owner's mobile phone, thus owners can check the position of the vehicle with an android software.

In this paper a simple and cost effective vehicle tracking system is described by Shruthi .K et al.[8] which uses the Global Positioning System (GPS) and Global System for Mobile Communication (GSM) technologies along with a smartphone application for tracking any movable vehicle.

### III. FINDINGS

To perform a function installed in the car we have to mount it with a microcontroller that is the controlling unit of the system. For sending signals on a wireless network we can make use of GSM module or WIFI network or make use of beacons technology for connecting devices. DTMF technology needs a decoder to convert the signals that can be interpreted by the microcontroller for the electric shock system the circuit requires AC supply.

The system can be mounted on vehicles manufactured without security or low-end mid-range vehicles. For GPS tracking things needed to develop are an application, GPS module. A GPS module contains of a receiver, an antenna and a transmitter, which can be used to get the current location of the vehicle and therefore these vehicles can be tracked using google maps by the owner of the vehicle through his mobile. The Wi-Fi module can be used to connect the microcontroller to the server through internet which can be used to transmit messages by establishing a duplex communication. Messages such as coordinates of the vehicle i.e. longitude and latitude to the owner's mobile.

### IV. PROPOSED ARCHITECTURE

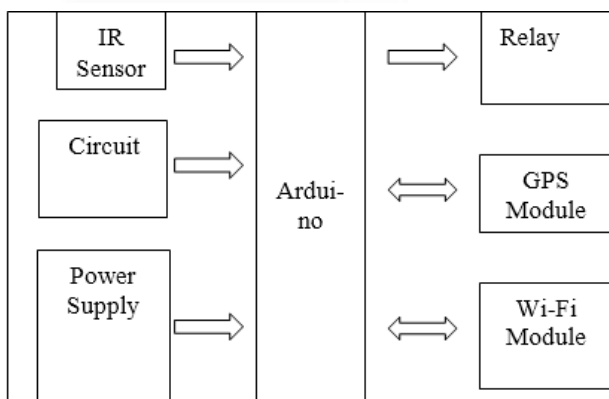


Fig. 1: Anti-Theft System Architecture.

In this system our main component is Arduino Uno. It is programmed using embedded C programming language. The components of the architecture are IR motion sensor for detecting the theft moment, GPS module, Wi-Fi module, ATmega328, relay and DC power source.

The software tools required are micro C for embedded C programming, PIC simulator for simulating our program. The hardware design is split into two parts.

The main circuit is divided into two circuits one is for detecting the motion of thief and other is for controlling the precautionary measures by switching on/off the relay.

### V. PROPOSED SYSTEM

We provide a security system that comes with different functions performed by our microcontroller to enhance security. The functions that we provide are ignition cut-off, and electric shock system.

Our first step is to install the equipment in consumer's vehicle. The equipment will be the circuits that perform the aforementioned functions.

The vehicle will also be installed with a Wi-Fi. The communication between the owner of the vehicle and the system installed is done using the Wi-Fi module. Furthermore if the vehicle is stolen, the GPS module can be used to track the vehicle through offline and online real time tracking. This tracking is displayed through an application we are going to develop. Offline tracking is done using a GPS receiver and a Wi-Fi module which will notify the owner by sending a message to registered number. This message will contain the longitude and latitude of the current location.

The Global Positioning System (GPS), originally Navstar GPS, is a space-based radio navigation system owned by the United States government and operated by the United States Air Force. It is a global navigation satellite system that provides geo location and time information to a GPS receiver anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites.

The GPS does not require the user to transmit any data, and it operates independently of any telephonic or internet reception, though these technologies can enhance the usefulness of the GPS positioning information.

The GPS provides critical positioning capabilities to military, civil, and commercial users around the world. The United States government created the system, maintains it, and makes it freely accessible to anyone with a GPS receiver.

A GPS unit takes radio signals from satellites in space in orbit around the Earth. There are about 30 satellites 20,200 kilometres (12,600 mi) above the Earth. The orbital period is 11 hours and 58 minutes. Each circle is 26,600 kilometres (16,500 mi) radius due to the Earth's radius. Far from the North Pole and South Pole, a GPS unit can receive signals from 6 to 12 satellites at once. Each satellite contains an atomic clock which is carefully set by NORAD several times every day.

The radio signals contain very good time and position of the satellite, including its ephemeris. The GPS receiver subtracts the current time from the time the signal was sent. The difference is how long ago the signal was sent. The time difference multiplied by the speed of light is the distance to the satellite. The GPS unit uses trigonometry to calculate where it is from each satellite's position and distance. Usually there must be at least four satellites to solve the geometric equations.

The ESP8266 is a low-cost Wi-Fi microchip with full TCP/IP stack and microcontroller capability. The chip first came to the attention of western makers in August 2014

with the ESP-01 module, made by a third-party manufacturer, Ai-Thinker.

This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes-style commands. However, at the time there was almost no English-language documentation on the chip and the commands it accepted.

## VI. METHODOLOGY

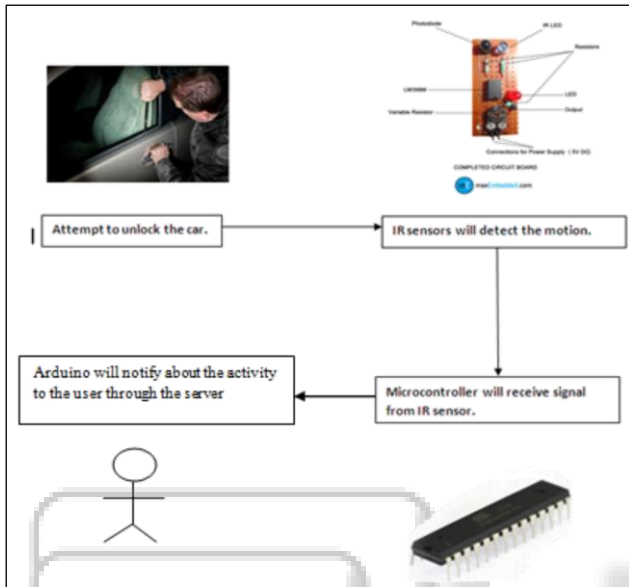


Fig. 2: Block diagram for detecting thief movement Whenever someone tries to unlock the vehicle without the owner's permission, the IR motion sensors will detect the motion and will inform the microcontroller, which will notify the owner about this suspicious activity by sending the message to the registered mobile number.

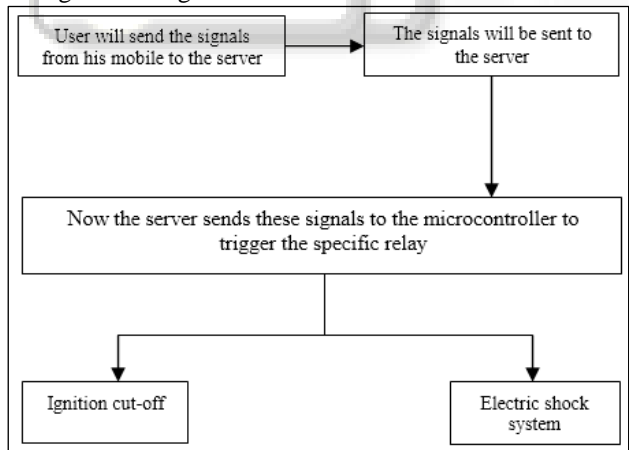


Fig. 4: Block diagram for switching different systems using DTMF decoder circuit using relay

Now the owner of the vehicle will make a call to the GSM kit. Once the connection is established between the owner and the car, the owner will make use of the DTMF technology to control different preventive measures installed in the car in order to stop the burglary.

## VII. CONCLUSION

From this framework it can be seen that the proposed security systems are working as per their requirement and the total

control lies with the owner of the vehicle. The owner can control the functioning of the preventive measures using DTMF technology which has no range barrier. These security measures are preventing the thief from stealing the car. In case the vehicle is stolen the owner can still track the vehicle back using either online or offline tracking system.

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