

GPS and GSM Based Automobile Anti-Theft Security System

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Abstract— Vehicle theft is the fastest growing type of crime in India. According to experts 100 vehicles stolen every day in India. To overcome this problem we developed the system, when user tries smart key to start the vehicle then the user will get a call through GSM. When user receive the call then vehicle will start. when user decline the call then vehicle will be locked and owner know that something went wrong. Owner is also able to use parking mode using separate key which is mainly used for nearby area or device ON or OFF. Our smart system has a motion sensor for wheel rotation, whenever any towing of vehicle is happened then rotation of Wheel is being detect and owner will get a message and current location of vehicle through GPS. The system is directly connected to vehicle ignition and provide safety to stolen vehicle.

Keywords: Global Positioning System (GPS), Global System for Mobile Communication (GSM), Vehicle, Security, Anti-theft

I. INTRODUCTION

The GPS and GSM Based Automobile Anti-Theft Security System. When user tries smart key to start the vehicle then the user will get a call through GSM. When user receive the call then vehicle will start. when user decline the call then vehicle will be locked and owner know that something went wrong and GPS receiver must be receive the signal of satellites to calculate a position (latitude and longitude) and send the data to Micro controller. In this project PIC microcontroller (PIC16Fxxx) is used for interfacing to various hardware peripherals all function is done by Micro controller. Microcontroller read the information of GPS Modem and display on LCD. In the vehicle, has different sensor's like, wheel rotation detection and key switch detection. When any sensor detected in vehicle, microcontroller send location and sensor status VIA SMS to user. For doing so a PIC16Fxxx microcontroller is interfaced serially to a GSM Modem and GPS Receiver. A GSM modem is used to send the position (Latitude and Longitude) of the vehicle from a remote place. The GPS modem will continuously give the data i.e. the latitude and longitude indicating the position of the vehicle

Our smart system has a motion sensor for wheel rotation, whenever any towing of vehicle is happened then rotation of Wheel is being detected and owner will get a message and send current location of vehicle through GPS to the owner. And in this system, key switch detection sensor which directly connected to the vehicle ignition for switch ON or OFF the device with the help of key. When thief was used master key to start the vehicle then key switch detect the key and vehicle will stop and send current location to the owner.

When owner will park the vehicle in front of your house or office for just a second then he is irritating while again authenticated his own system.so in this system parking

mode is also available. Parking mode is only used by the owner with the help of special key.

II. DESIGN OVERVIEW

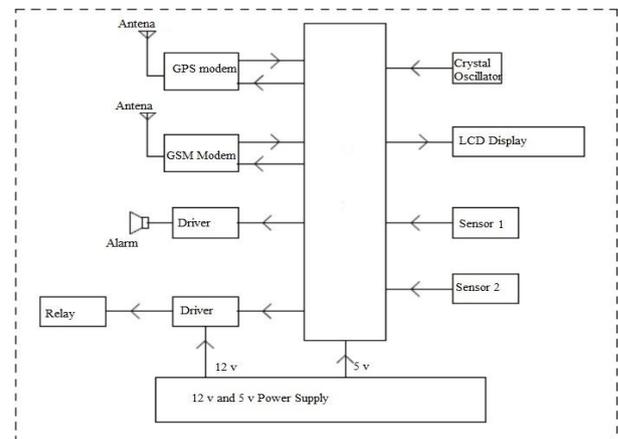


Fig. 1: block diagram of GPS and GSM Based vehicle Anti-Theft Security System

The block diagram mainly consists of following components.

- 1) PIC Microcontroller (PIC16Fxxx)
- 2) GSM Modem
- 3) GPS Modem
- 4) Relay
- 5) Relay driver
- 6) Alarm
- 7) LCD display
- 8) Crystal oscillator
- 9) Key switch sensor
- 10) Wheel rotation sensor
- 11) Power supply
- 12) Voltage regulator

A. PIC Microcontroller

PIC (Programmable Interface Controllers) microcontrollers are the world smallest microcontrollers that can be programmed to carry out a huge range of tasks. These microcontrollers are found in many electronic devices such as phones, computer control systems, alarm systems, embedded systems, etc. Various types of microcontrollers exist, even though the best are found in the GENIE range of programmable microcontrollers. These microcontrollers are programmed and simulated by a circuit-wizard software. PIC microcontroller is used for interfacing to various hardware peripherals. The current design is an embedded application, which will continuously monitor a moving Vehicle and report the status of the Vehicle on demand. For doing so a PIC16Fxxx microcontroller is interfaced serially to a GSM Modem and GPS Modem.

B. GSM modem

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. From the mobile operator perspective, a GSM modem looks just like a mobile phone. When a GSM modem is connected to a computer, this allows the computer to use the GSM modem to communicate over the mobile network. While these GSM modems are most frequently used to provide mobile internet connectivity, many of them can also be used for sending and receiving SMS and MMS messages. A GSM modem is used to send the position (Latitude and Longitude) of the vehicle from a remote place.

C. GPS Modem

The GPS modem will continuously give the data i.e. the latitude and longitude indicating the position of the vehicle. The GPS modem gives many parameters as the output, but only the NMEA data coming out is read and displayed on to the LCD

D. Relay

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relay. Relays are used where it is necessary to control the circuit by a separate low power signal, or where several circuits must be controlled by one signal. The first relay was used in long distance telegraph circle as amplifier. In this Mobile charging on coin insertion machine, the is used to start and stop the charging of the mobile phone. When the user will insert the coin through the coin acceptor box, the relay will switch ON and charging will start.

E. Relay Driver

A relay driver is an IC which is an electromagnetic switch that will be used whenever we want to use a low voltage circuit to switch a light bulb ON and OFF which is connected to 220V main supply. The required current to run the relay coil is more than the current that can be supplied by various integrated circuits like op-amp, etc. Relays have unique properties and are replaced by solid state switches that are strong than solid state devices. High current capacities, capability to stand ESD and drive circuit isolation are the unique properties of relay.

F. Alarm

An alarm device or system of alarm devices gives an audible, visual or other form of alarm signal about a problem or condition. Alarm devices are often outfitted with a siren. Alarms have the capability of causing a fight-or-flight response in humans; a person under this mindset will panic and either flee the perceived danger or attempt to eliminate it, often ignoring rational thought in either case. A person in such a state can be characterized as "alarmed".

G. LCD Display

A light-emitting diode (LED), is an electronic light source. Luminescence from an electrically stimulated crystal had been observed as early as 1907. The LED was introduced as a practical electronic component in 1962. All early devices emitted low-intensity red light, but modern LEDs are available across the visible, ultraviolet and infrared wavelengths, with very high brightness. LEDs are based on the semiconductor diode. When the diode is forward biased

(switched on), electrons are able to recombine with holes and energy is released in the form of light. This effect is called electroluminescence and the color of the light is determined by the energy gap of the semiconductor. The LED is usually small in area (less than 1 mm²) with integrated optical components to shape its radiation pattern and assist in reflection.

H. Crystal Oscillator

A crystal oscillator is an electronic circuit that uses the mechanical resonance of a vibrating crystal of piezoelectric material to create an electrical signal with a very precise frequency. This frequency is commonly used to keep track of time (as in quartz wristwatches), to provide a stable clock signal for digital integrated circuits, and to stabilize frequencies for radio transmitters/receivers.

I. Key Switch Sensor

The Ignition key on an automobile comes in two types, a manual key or a start button as is the case in the newer vehicles using key-less entry system. This ignition switch, enabled with the turn of the key or the press of the switch, enables the control system that activates the main electrical systems that allow the engine to be started, the use of power windows, parking lights, and the media player. When one of these items are turned on, the driver must be reminded not to leave the vehicle as it would drain the battery, or worse, someone could drive away with the car. To prevent this, the collective inputs of various sensors help the microprocessor give out an audio-visual alarm when the driver gets up from the seat.

J. Wheel Rotation Sensor

The increasing complexity of road traffic makes great demands on drivers. Driver assistance systems relieve drivers and optimize safety on the road. Therefore, modern driver assistance systems are part of the standard equipment in almost all new cars in Europe and pose new challenges for garages. Vehicle electronics today play a key role in all comfort and safety features. The optimal interaction of complex electronic systems ensures fault-free function of the vehicle and thus improves traffic safety.

K. Power Supply

There are three main DC voltage sources available to supply power for our microcontroller projects: Batteries, wall adapters or the USB port of a computer. Generally, the power level requirement is dictated by the requirements of the devices that you use to build the circuit. These devices consist of the actual microcontroller and any peripheral hardware connected to it in some way. Peripherals may be sensors or other integrated circuit devices (ICs). So then, what do I mean by "dictated by the requirements of the devices?" To answer that question, let's start with a discussion of the power requirements of actual microcontroller.

L. Voltage Regulator

The voltage regulator is a system designed to automatically maintain a constant voltage level. A voltage regulator may use a simple feed forward design or may include negative feedback. It may use an electromechanical mechanism, or

electronic components. Depending on the design, it may be used to regulate one or more AC or DC voltages. Electronic voltage regulator are found in devices such as computer power supply where the stabilize the DC voltages used by the processors and other elements. In automobile, alternators and central power station generator plant, voltage regulators control the output of the plant.

III. WORKING

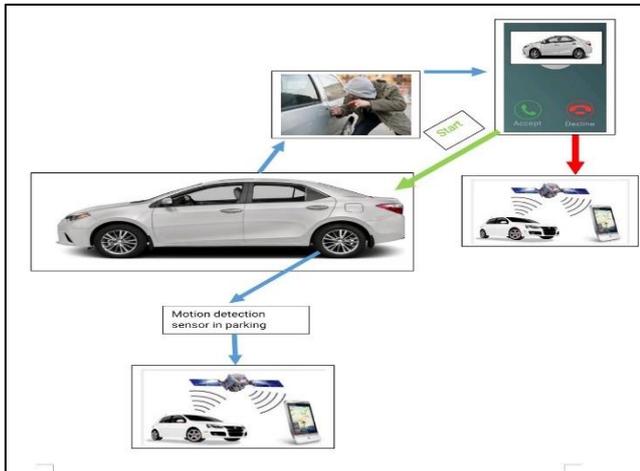


Fig. 2: Working GPS and GSM Based Automobile Anti-Theft Security System.

When the user has to park the vehicle in the parking, we have a parking mode option here, so that user is able to park the vehicle having no afraid of thief. For this now the user on this parking mode, by this the vehicle is secure from all kind of problems that could, for example a thief comes and tries smart key to on vehicle at that instant of time the user will get a call on phone through GSM. When this happens the user gets to know that something is wrong with my vehicle, here the user has two option one is picking up the call and the other one is to decline the call, picking up the call is when the user itself want to allow the vehicle to be used by that person who has inserted the smart key, so picking call has no issues the vehicle can be easily be used.

But when user gets the call and gets to know that someone is stealing the vehicle at that time he has to decline the call, after declining the call the user will get the current location of the vehicle through GPS. By knowing the location of vehicle the user can easily detect where the vehicle is being stolen by the thief. Our smart vehicle has a motion sensor for wheel rotation, whenever any rotation of wheel is being detected it will send current location of vehicle to the owner. now suppose for example the thief is not using smart key but is picking up the vehicle by some tactics then at this time motion occurs and results in he rotation of wheels, as soon as the rotation takes place a call again is send to the owner and the Same procedure is being repeated over here and by this user is able to find the vehicle.

IV. PROJECT OUTCOME



When the user has to park the vehicle in the parking we have a parking mode option here, so that user is able to park the vehicle having no afraid of theifs. For this now the user on this parking mode, by this the vehicle is secure from all kind of problems that could, for example a theif comes and tries smart key to on vehicle at that instant of time the user will get a call on phone through GSM. When this happens the user gets to know that something is wrong with my vehicle, here the user has two option one is picking up the call and the other one is to decline the call, picking up the call is when the user itself want to allow the vehicle to be used by that person who has inserted the smart key, so picking call has no issues the vehicle can be easily be used.

V. CONCLUSION

At the end we have come to a conclusion that our project give more security to bike and car. Our project will replace the traditional lock and it will be a user friendly because we can lock Vehicle by Mobile. this project has also have parking mode. And key switch and wheel rotation sensor help to the theft. The system is very cheap since the technology is easily accessible; the system is secured as the security standard is maintained by network providers and is effective, mostly in areas with network availability, the system is usual friendly since the vehicle can be immobilized by just an SMS.

VI. FUTURE SCOPE

As we need to send SMS each time when we want to drive the car or keep the car in parking area, it includes daily expense of SMS. This cost can be reducing by using alternate way such as switches, or digital lock. If we use switch, this switch is known only to owner or driver of the car. By using this switch, we can lock or unlock the car within some specified delay. Hence, we can mobilize and demobilize the car using switch which will be fitted inside the car. Location of switch will be known to owner of car to maintain the security of the car. Thus, cost of SMS will get reduced. The facility of switch will be an alternate way of SMS.

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