

EMBEDDED BASED VEHICLE SAFETY SYSTEM USING GSM TECHNOLOGY

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Abstract – *This proposed work is an attempt to design an advanced vehicle safety system that uses GSM to prevent theft and to determine the location of vehicle. Today theft is happening on the parking or in some insecure places. The safety of the vehicle is exceptionally essential. This system also saves the valuable life of humans as it encourages the strict use of helmets. The system will be activated only after wearing the helmet or else the user cannot able to access the vehicle. This system contains GSM modem, vibration sensor, HT12D decoder, PIC (16F877A) microcontroller, relay switch. GSM system is installed in the vehicle for sending the information to the user in case of any theft. It also tracks the position of the vehicle. Whenever the engine is ON, the GSM will send the information to the owner. This complete system is designed by considering the Lower range vehicles to provide them extreme safety. The proposed embedded system can be considered on a single chip microcontroller with low cost.*

Key words : GSM (Global system for mobile communication), Micro controller (PIC 16F877A), CID (cell ID finder),Helmet, Theft Protection

INTRODUCTION

These days' vehicle robbery cases are higher than any other time; it has got 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 form various types of burglary cases. It is a vehicle security gadget that offers fantastic insurance to the

vehicle. However this framework couldn't demonstrate to give complete security to the vehicle in the event f burglary. So a more created framework makes utilization of an inserted framework focused around GSM innovation. A vehicle is stolen every six minutes in India. It is known that millions of people lose their vehicles due to theft and accidents in addition to that there are many people

lose their lives due to accidents on the roads. Most cases of theft have been caused by the lack of remote control system. It is known that, traditional systems used to monitor the vehicles, which depends mainly on alarm signal. It has failed to perform its function for alarm can't be heard from distant places and the signal can be disabled. Many other vehicles have the same alarm signal and many other reasons led to reduce using such systems. To resolve such problems, it is decided to design this system to avoid vehicle theft and to know the current location of the vehicle using at any time. Using GSM technology whereas this system also enhances personal safety of individuals.

The main aim of the present research is to design and develop an advance and robust security system for vehicle that can prevent theft and provides information on robberies. The system being developed through the present work uses GSM system and can be made affordable so that it can be used in low cost vehicle even in two wheelers.

A lot of researches have been done for vehicle safety system depend mainly on GPS.

A BRIEF REVIEW

Baburao K.,Raju V.K., SrinivasaRao S., Prabu AV., AppaRao T., Narayana . Y. V., [1] describes development of GSM (global system for mobile communication) and GPS (global positioning system) based vehicle location and tracking system. This is an embedded system which will continuously monitor a moving vehicle and report the status of it on demand, recover a stole vehicle, field service management and it is used for food delivery and car rental companies. This project is designed using 8051 microcontroller.

Pethakar et al [2] Paper on RFID, GPS, ad GSM based vehicle tracking and employee security system consolidate the establishment of an electronic gadget in a vehicle, with reason planned machine programming to empower the organization to track the vehicle's area. At the point when the vehicle picks the worker; he/she needs to swap the RFID card. The micro controller matches the RFID card no. with its database records and sends the representative's id, taxi id & the taxicab position co-ordinates to the organization unit by means of GSM module. The GSM modem will get the message through the organization unit. On the off chance that workers end up/herself in an issue, he/she will press the catch. Microcontroller will distinguish the activity and sends a sign to the GSM which will arrange with to the organization unit and police.

The configuration and advancement of a burglary control framework for an automobile, which is being utilized to anticipate/control the robbery of a vehicle has been developed by Wankhade and Dahad. [3] The created framework makes utilization of an implanted framework focused around Global System for Mobile correspondence (GSM) engineering. The planned and created framework is introduced in the vehicle. An interfacing portable is additionally associated with the microcontroller, which is finally, joined with the engine. Once, the vehicle is being stolen, the data is being utilized by the vehicle owner or user for further handling. The data is passed onto the local handling protection framework which is as the SMS, the microcontroller unit peruses the SMS and sends it to the Global Positioning System (GPS) module and utilizing the triangulation system, GPS module sustains the precise area as latitude and longitude to the owner or user mobile.

Khan et al. [4] paper on GPS and GSM based following framework depicts the configuration of following or tracking unit that uses the worldwide situating framework (GPS) to focus the exact area of an article, individual or other resource for which it is appended and utilizing GSM modem this data can be transmit to remote client. This framework contains single-board inserted framework that is furnished with GPS

and GSM modems alongside ARM processor that is introduced in the vehicle. Amid item movement, its area can be accounted for by SMS message. The motivation behind this framework is to outline and incorporate another framework which is coordinated with GPS- GSM to give emulating peculiarity like Location data, Real time following utilizing SMS, track transport driver action and Communication is prompt therefore one can get running report rapidly.

Rashed et al. [5] paper describes a GPS based tracking system that keeps track of the location of a vehicle and its speed based on a mobile phone text messaging system. The system is able to provide real-time text alerts for speed and location. The present location can be locked and the system will alert the owner if the vehicle is moved from its present Locked location.

SYSTEM DESIGN

This paper proposes a vehicle safety system that consists of two main units: (1) vehicle unit (2) monitor unit. The main components of vehicle unit are microcontroller, RF transmitter, RF receiver, liquid crystal display (LCD). This unit is responsible for determining the current position of the vehicle via cell ID finder through GSM, connected to the microcontroller and continuously sends this information to the monitor unit via the RF transceiver. Another

function of this unit is that it can turn off vehicle engine as a response to a signal received from the monitor unit, if the vehicle was theft.

The second unit is the monitor unit which consists of a GSM module. This unit continuously receives messages from the vehicle unit. It processes and analysis these messages directly without any delays and displays the current position of the vehicle. When the vehicle is theft, the monitor unit makes a call to the owner and it allows to control the engine of the vehicle by sending ON and OFF commands to the GSM module. In this method, an IR sensor is used to detect the helmet. When the helmet is detected, the information is transmitted to the microcontroller by RF transmitter and received by RF receiver.

**BLOCK DIAGRAM
 Helmet Side**

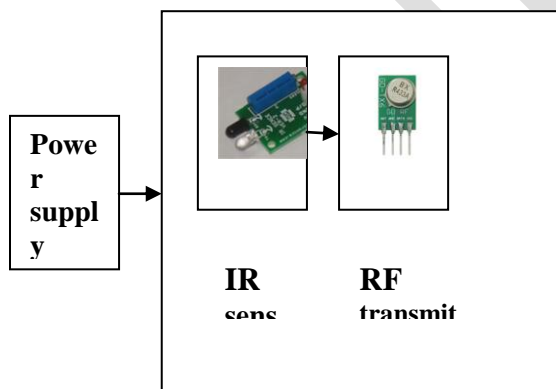


Fig 1. RF transmitter in vehicle safety system

A delay time has been given to wear the helmet. If the helmet is not wearred with in a delay time, then the engine will be OFF automatically.

If the owner sends “ON” MESSAGE then the information will be passed to the microcontroller through GSM. So that the relay will ON the engine part. If an “OFF” MESSAGE is sent, then the relay will turn OFF the engine.

Vehicle Side

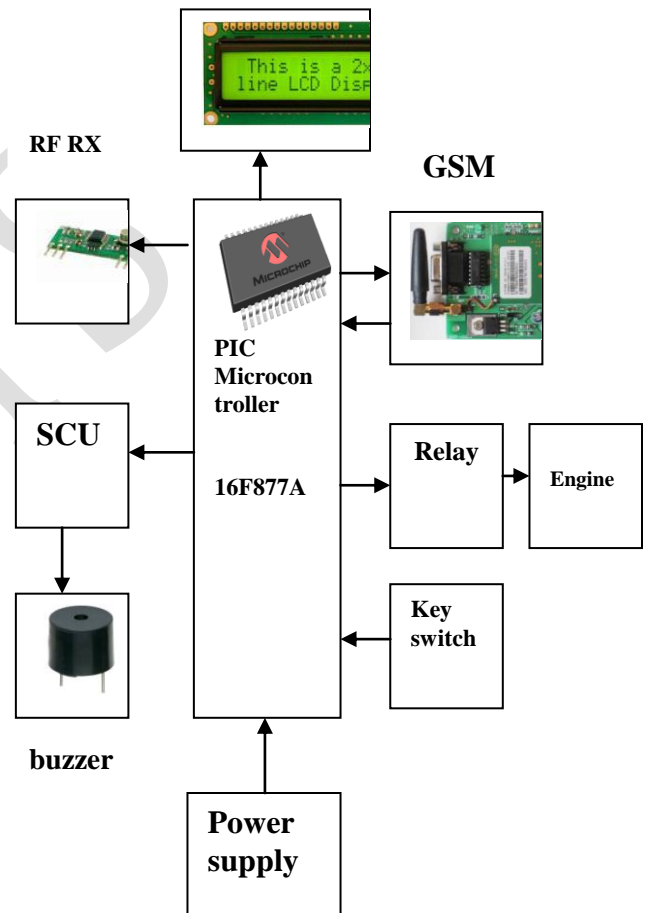


Fig 2. RF receiver and GSM in vehicle safety system

Later the local area code (LAC) of the vehicle position will be sent to the owner. Hence by using cell ID

finder, one can find the location of the vehicle.

GSM MODULE

GSM (Global System for Mobile) / GPRS (General Packet Radio Service) TTL –Modem is SIM900 Quad-band GSM / GPRS device, works on frequencies 850 MHZ, 900 MHZ, 1800 MHZ and 1900 MHZ. It is very compact in size and easy to use as plug in GSM Modem. The Modem is designed with 3V3 and 5V DC TTL interfacing circuitry, which allows the User to directly interface with 5V Microcontrollers (PIC, AVR, Arduino, 8051, etc.) as well as 3V3 Microcontrollers (ARM, ARM Cortex XX, etc.). The baud rate can be configurable from 9600-115200 bps through AT (Attention) commands. This GSM/GPRS TTL Modem has internal TCP/IP stack to enable User to connect with internet through GPRS feature. It is suitable for SMS as well as DATA transfer application in mobile phone to mobile phone interface.



Fig 3. GSM module

In this paper, GSM is used to alert the owner in case of any robberies. It provides vehicle-user communication. The modem can be interfaced with a Microcontroller using USART (Universal Synchronous Asynchronous Receiver and Transmitter) feature (serial communication).

RESULTS AND DISCUSSIONS

As the current technologies for vehicle safety system such as RFID device are bulky, space occupying, there is a need for designing GSM modem with vibration sensor in order to avoid the theft. The current practices for theft control system possess lengthy delay, are more vulnerable to control vehicular communications. Thus there is a need to improvise the existing system to prevent vehicle attacks. This can be done by providing different users a different access levels on the vehicle.

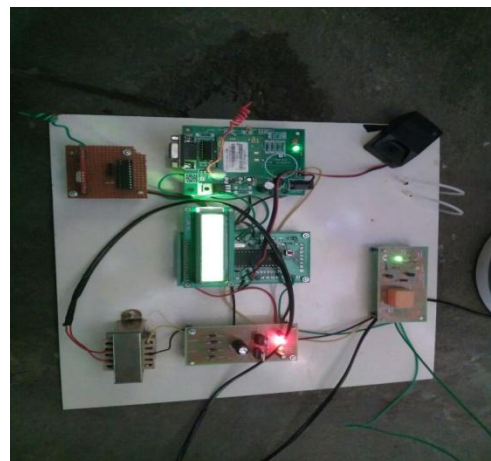


Fig 4. Hardware description of RF receiver



Fig 5. Implementation of RF transmitter



Fig 6. LCD display

Here, The user authenticates to the immobilizer unit, the immobilizer then queries the local database (to find whether the user has access rights) each model is mutually authenticated with the immobilizer unit and the scheme is applied to the decide whether the vehicle will start or not.

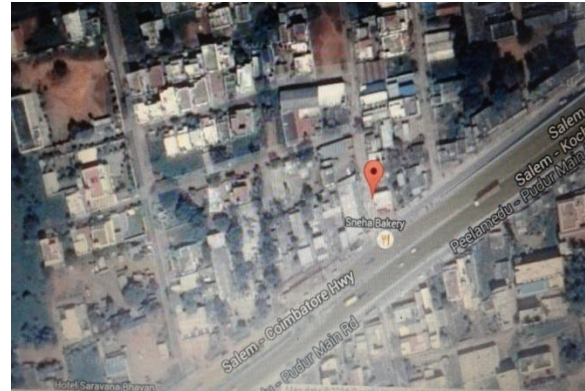


Fig 7. Vehicle tracking System

The online based following framework is a framework planned by joining of a few advanced data and communication technology. The framework compresses of vehicle-mounted following gadgets and web based application. Through the framework, clients or user will have the facility of checking the area graphically and other important data of the vehicle. The online framework empowers client to such location track on guide through created web application known as cell id finder and communicate with database server for vehicle tracking. The client can find the path of the destination or complete route with directions where he want to go through web application.

CONCLUSION & FUTURE WORK

This project provides security for all the vehicle users by avoiding

the vehicle theft using GSM technology & cell ID finder. It also reduces human risk by the strict usage of helmets while driving. The developed system used to display the current position of the tracked vehicle in the cell ID finder application. The system should be placed inside the vehicle in a suitable place so that it would not to be detected by the thief or unauthorized person. When the theft is identified, the vehicle engine can be turned off by sending a message from the monitor unit to the vehicle unit. The simulation of the whole system had been done using MPLAB.

The system owns many advantages over others such as represent real time tracking. For future needs it is very easy to add new facilities to the system. In addition to that, the system in the future can support biometric security approach for authentication, such as using finger print, iris, voice or hybrid to distinguish between the owner and the thief.

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