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A Review Paper on Vehicle Tracking using GPS and GSM

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Abstract: *The ability to track vehicles is useful in many applications including security of personal vehicles, public transportation systems, fleet management and others. Furthermore, the number of vehicles on the road globally is also expected to increase rapidly. Therefore, the development of vehicle tracking system using the Global Positioning System (GPS) and Global System for Mobile Communications (GSM) modem is undertaken with the aim of enabling users to locate their vehicles with ease and in a convenient manner. The system will provide users with the capability to track vehicle remotely through the mobile network. The system will utilize GPS to obtain a vehicle's coordinate and transmit it using GSM modem to the user's phone through the mobile network. The developed vehicle tracking system demonstrates the feasibility of near real-time tracking of vehicles and improved customizability, global operability and cost when compared to existing solutions. In this article, we have reviewed about the GSM and GPS based Real Time Vehicle Tracking and an Anti-theft System. The article tries to discuss the working and the spreading awareness about the benefits associated with GPS and GSM tracking systems.*

Keywords: *Global System for Mobile Communications (GSM), Global Positioning System (GPS), Tracking, Security*

I. INTRODUCTION

In the last few decades, India has progressed at such an enormous rate that many companies have strongly established themselves here. These companies bring a huge amount of workforce with them. Arranging transportation to such a huge mass is a cumbersome task involving many intricacies. Generally, this transport is arranged through the local transport vendors on a yearly contract basis, recently happen mishaps such as burglary, rape cases etc. As more and more people migrate from village to urban area; the urban lifestyle is becoming more complex. The condition of the road is also become worse due to heavy traffic and high ratio of vehicles on roads. Every year, more than 1.25 million people are pronounced dead in accident in all over the world. The development of satellite communication technology is easy to identify the vehicle locations. Vehicle tracking systems have brought this technology to the day-to-day life of the common person. Today GPS used in cars, ambulances, fleets and police vehicles are common sights on the roads of developed countries. All the existing technology support tracking the vehicle place and status. The GPS/GSM Based System is one of the most important systems, which integrate both GSM and GPS technologies. It is necessary due to the many of applications of both GSM and GPS systems and the wide usage of them by millions of people throughout the world.

This system designed for users in land construction and transport business, provides real-time information such as location, speed and expected arrival time of the user is moving vehicles in a concise and easy-to-read format. This system may also be useful for communication process among the two points. Currently GPS vehicle tracking ensures their safety as travelling. This vehicle tracking system found in clients vehicles as a theft prevention and rescue device. This system installed for the four wheelers, Vehicle tracking usually used in navy operators for navy management functions, routing, send off, on board information a security. The applications include monitoring driving performance of a parent with a teen driver. Vehicle tracking systems accepted in consumer vehicles as a theft prevention and retrieval device. If the theft identified, the system sends the SMS to the vehicle owner.

II. EASE OF USE

Usability is the ease of use and learnability of a human-made object such as a tool or device. In software engineering, usability is the degree to which a software can be used by specified consumers to achieve quantified objectives with effectiveness, efficiency, and satisfaction in a quantified context of use. The object of use can be a software application, website, book, tool, machine, process, vehicle, or anything a human interacts with. A usability study may be conducted as a primary job function by a usability analyst or as a secondary job function by designers, technical writers, marketing personnel, and others.

In this paper we review five published research papers from different years mainly focusing on “TRACKING SYSTEMS USING GPS AND GSM MODULE” We will study them thoroughly and compare them to the best of our knowledge and give our honest review on which paper tells about the proper system of tracking a vehicle based on speed, technology used, methods implemented and time consumed.

III. METHODOLOGIES

1) Paper I-Vehicle Theft Detection and Tracking based on GSM and GPS

Prof. Shikalgar Parvin B.¹, Mr.Suraj Shivaji Sutar²,

Mr. Akash Nandkumar suryawashi³, Mr.Prasad Hindurav Zambre⁴,

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The proposed GPS/ GSM based System has the two parts, first is a mobile unit and another is controlling station. The system processes, interfaces, connections, data transmission and reception of data among the mobile unit and control stations are working successfully. These results are compatible with GPS technologies. In this proposed work, a novel method of vehicle tracking and locking system used to track the theft vehicle by using GPS and GSM technology. This system puts into sleeping mode while the vehicle handled by the owner or authorized person otherwise goes to active mode, the mode of operation changed by in person or remotely. If any interruption occurred in any side of the door, microcontroller is interrupted and SMS is sent to the microcontroller. The controller issues the message about the place of the vehicle to the car owner or authorized person. When send SMS to the controller, issues the control signals to the engine motor. Engine motor speeds are gradually decreases and come to the off place. After that all the doors locked. To open the door or restart the engine, authorized person needs to enter the passwords. In this method, tracking of vehicle place easy and doors locked automatically, thereby thief cannot get away from the car.Maintaining the Integrity of the Specifications.

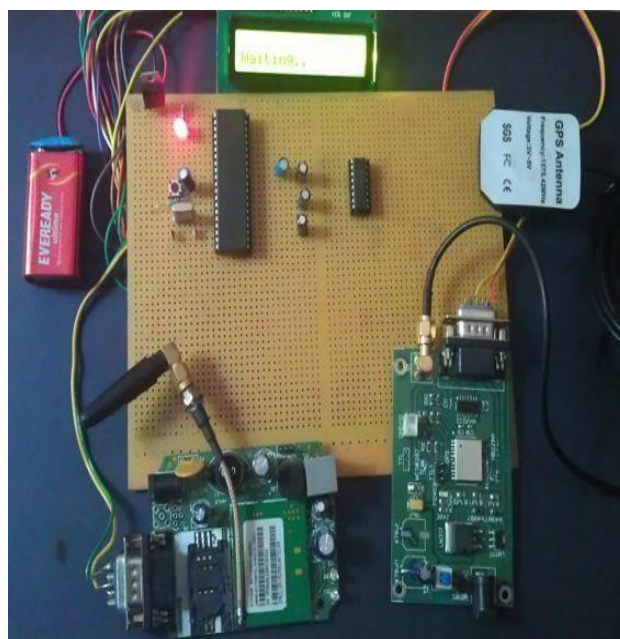


Figure 1 Hardware Design of the Sytem

A novel method of vehicle tracking and locking systems used to track the theft vehicle by using GPS and GSM technology. This system puts into the sleeping mode vehicle handled by the owner or authorized persons; otherwise goes to active mode. The mode of operations changed by persons or remotely. When the theft identified, the responsible people send SMS to the micro controller, then issue the control signals to stop the engine motor. After that all the doors locked. To open the doors or to restart the engine authorized person needs to enter the passwords. In this method, easily track the vehicle place and doors locked.

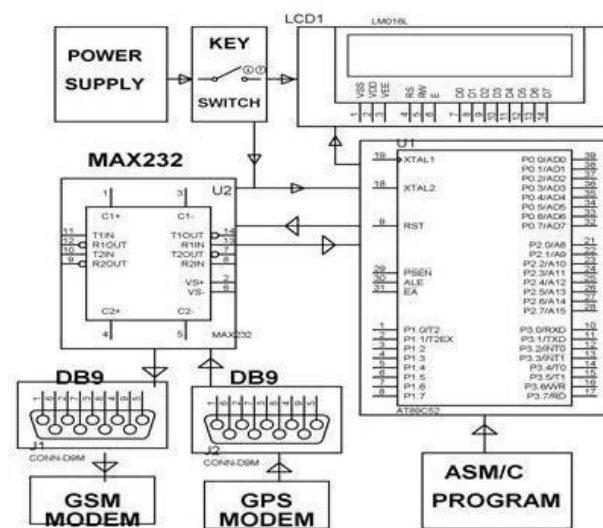


Figure 2 Block Diagram Of The System

2) Paper II: Tracking and Recovery of the vehicle using GSM and GPS

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Today, most of the companies keep track of their vehicles and their mechanical conditions using various preinstalled smart sensing system. The position of the vehicle is send by GSM modem as a SMS. In case of any accident, the system will sense it and inform passenger's relatives, nearest Police Station and Medical Facility for performing required emergency action. To inform the accident and request for emergency action, GSM technology will be used to provide the essential information to the emergency services. In order to implement this system, an electronic device will be installed in respective vehicle which will track the vehicular GPS information that the Emergency Services will be received when that vehicle would meet an accident.

PURPOSE: This technology continuously track the vehicle and report whenever is asked and send rescue alert message after any emergency situation such as collision of vehicle take place. For this, they used Renessa's microcontroller and serially interfacing it to GSM modem and GPS receiver. GSM Modem sends the position of the driver which is provided by the GPS and the same data is sent to the nearest Police Station, Emergency Facilities, and other per-registered Emergency Contacts. All the parts in the system are controlled and coordinated by the "Renesa Microcontroller". When any impact pressure is detected, sensors are triggered and system sends signal to the microcontroller. According to programing of the microcontroller, processing of the input signal is done and output is produced. Design and implementation of vehicle tracking system for giving information about the location of the vehicle and accident in real time is described in this paper. As in the car the air bag transmitter section detects the collision and sends the data to the receiver. After decoding the received signal by RF decoder, it is transmitted to microcontroller. Controlling and processing incoming signals and taking necessary actions using produced output by microcontroller as instructed by the program written in it. The message will be sent to ambulance and police station using the GSM module with GPS coordinates. Implementation of this system has a very low cost model and based on easily accessible off the shelf electronic module.

3) Paper III: Real Time Vehicle Tracking and Locking System Using GPS and GSM Technology-An Anti-Theft System

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This research deals with the design & development of a theft control system for an automobile, which is being used to prevent/control the theft of a vehicle. The developed system makes use of an embedded system based on Global System for Mobile communication (GSM) technology. The designed & developed system is installed in the vehicle. An interfacing mobile is also connected to the microcontroller, which is in turn, connected to the engine. Once, the vehicle is being stolen, the information is being used by the vehicle owner for further processing. The information is passed onto the central processing insurance system which is in the form of the Short Message Service(SMS), the microcontroller unit reads the SMS and sends it to the Global Positioning System (GPS) module and using the triangulation method, GPS module feeds the exact location in the form of latitude and longitude to the user's mobile. By reading the signals received by the mobile, one can control the ignition of the engine; say to lock it or to stop the engine immediately. The main concept in this design is introducing the mobile communication into an embedded system. The designed unit is very simple & low cost. The entire design unit is on a single chip.

This project deals with the design & development of a theft control system for an automobile, which is being used to prevent or control the theft of a vehicle. The simulation of the circuit design and its implementation is done using PROTEUS software. This system is designed to improve vehicle security and accessibility. With the use of wireless technology vehicle owners are able to enter as well as protect their automobiles with more passive involvement. Ideally, this project could be made more convenient and secure with the use of satellite modems instead of cell phones as tracking device as the system may fail when there is no network coverage. This design can be made more enhanced in future to support camera, handset phone / hands free, mobile data LCD display, web based tracking software, also PC based stand alone software. In our project the security system is based on embedded control which provides security against theft. The GSM modem provides information to the user on his request. The owner can access the position of the vehicle at any instant. He sends a message in order to lock the vehicle. The GPS receiver on the kit will locate the latitude and longitude of the vehicle using the satellite service. This is reliable and efficient system for providing security to the vehicles through GSM, GPS and serial communication. The maximum speed according to the standard is 20kbits/sec.

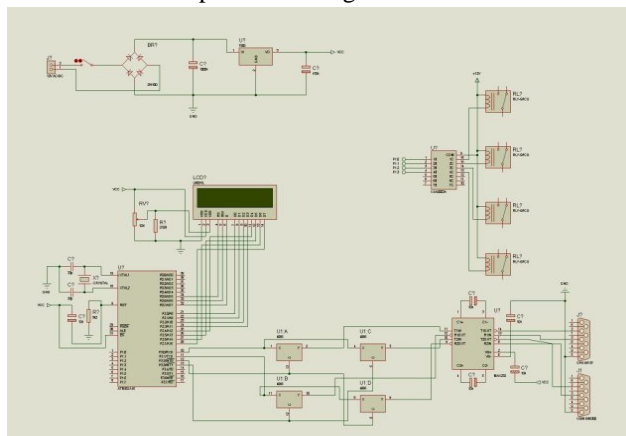


Figure 3 Circuit Diagram Of The Proposed System

4) PAPER IV-Automatic Vehicle Accident Detection and Messaging system using GSM and GPS Modem

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According to the project when a vehicle meets with an accident, a sensor situated on the vehicle will detect it immediately and send a message to the microcontroller. The microcontroller then sends the alert message with the help of GSM modem to a police control room or rescue team which will include the location with the help of GPS. Also the alert message containing the location of accident will be send to the relatives of the victim. In case there is no casualty the driver can terminate the alert message by a switch provided in the vehicle. This will save the valuable time of rescue team. The project is useful for detecting the accident precisely with the help of sensor and microcontroller.

WORKING: A sensor will sense the occurrence of an accident and give its output to the microcontroller. Here a button sensor is used for detection which will get pressed when the vehicle meets with an accident. A buzzer is present in this system with starts beeping indicating that the system is now activated. The GPS detects the latitude and longitudinal position of the vehicle.

It is essential to locate the position to provide medical assistance. The phone numbers are pre saved in the EEPROM by the user. These numbers can be changed at any point of time. The microcontroller sends an alert message to these pre saved numbers using the GSM module. Any message can be pre entered in the system by the user. A LCD screen displays the status of the output. In case there is no casualty, the sending of the message can be terminated with the help of a switch. The switch will restart the microcontroller and its function will start from the beginning.

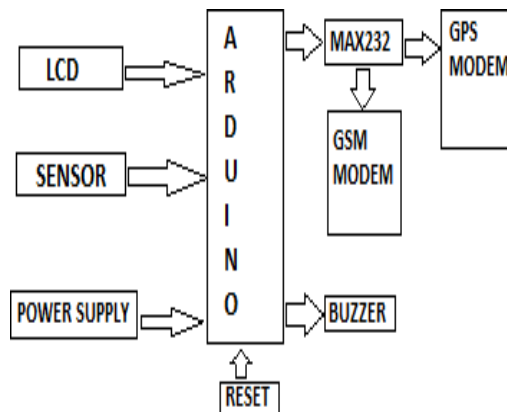


Figure 4 Block Diagram Of Arduino Based Gps System

1) *Purpose:* This system provides the optimum solution to poor emergency facilities provided to victims in road accidents in the most feasible way. With the help of this technology immediate action can be taken when an accident occurs by alerting the respective people by sending a message. The drawback with this system is that it does not work without network. So in areas where no network is available the system will not be able to send the alert message. The proposed method is highly beneficial to the automotive industry. This will help the medical teams to reach the accident spot in time and save the valuable human lives. There is always scope for new improvements by interfacing it with different systems.

5) Paper V- GSM and GPS Based Real Time Vehicle Theft Tracking and Control System

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The aim of this work is to build a secured and authentic vehicle anti-theft system which will have the ability to reach the vehicle subsystems from a distal location where there is GSM network. This is the anti-theft system that not only pause your vehicle but also track the location of your lost vehicle. We have made a system which will supply users the capability to track vehicle distantly through the mobile network. Specifically, the system is supplying the owner of the vehicle to pause his moving vehicle whenever he found it riding by the new person. This is done by sending a command to the GSM modem included in the system to stop the engine.

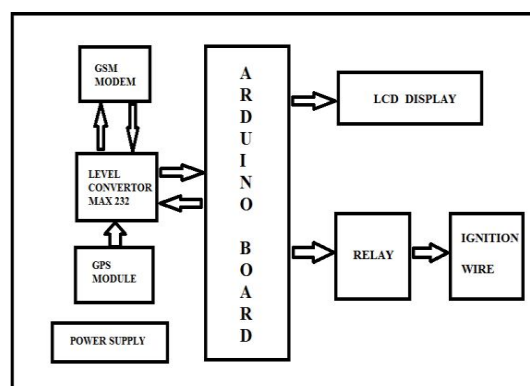


Figure 5 Block Diagram Of The Proposed System

The proposed system is described that integrates new technologies offering a tracking of stolen vehicle by using GPS and GSM technology and vehicle security and smooth fleet management.

IV. COMPARISON AMONG SYSTEMS

Papers	Researches
Paper I	A novel method of vehicle tracking and locking system used to track the theft vehicle by using GPS and GSM technology. This system puts into the sleeping mode vehicle handled by the owner or authorized persons; otherwise goes to active mode.
Paper II	Implementation of this system has a very low cost model and based on easily accessible off the shelf electronic module.
Paper III	This is reliable and efficient system for providing security to the vehicles through GSM, GPS and serial communication. The maximum speed according to the standard is 20kbts/sec
Paper IV	The proposed method is highly beneficial to the automotive industry. This will help the medical teams to reach the accident spot in time and save the valuable human lives.
Paper V	The proposed system is described that integrates new technologies offering a tracking of stolen vehicle by using GPS and GSM technology and vehicle security and smooth fleet management. The system is versatile, extendable and totally adjustable to user needs.

V. CONCLUSION AND RESULT

A. Arduino Board

Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board. Arduino is a tool for making computers that can sense and control more of the physical world than your desktop computer. It's an open-source physical computing platform based on a simple microcontroller board, and a development environment for writing software for the board. Arduino can be used to develop interactive objects, taking inputs from a variety of switches or sensors, and controlling a variety of lights, motors, and other physical outputs. Arduino projects can be stand-alone, or they can be communicated with software running on your computer (e.g. Flash, Processing, Max MSP.) The boards can be assembled by hand or purchased preassembled; the open- source IDE can be downloaded for free. The Arduino programming language is an implementation of Wiring, a similar physical computing platform, which is based on the Processing multimedia programming environment.

B. Voltage Regulator IC 7805

A three terminal voltage regulator is a regulator in which the output voltage is set at some predetermined value. Such regulators do not require an external feedback connection. Hence, only three terminals are required for device of such types, input (VIN) output (VO) and a ground terminal.

C. Relay

Relays are simple switches which are operated both electrically and mechanically.

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