

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

FEDERAL UNIVERSITY OYE EKITI

**DESIGN AND CONSTRUCTION OF A CAR TRACKER AND IGNITION
ALERT SYSTEM USING A GSM AND GPS MODULE**

BY

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FEBRUARY, 2019

**DESIGN AND CONSTRUCTION OF VEHICLE TRACKING AND IGNITION
ALERT SYSTEM USING A GSM AND GPS MODULE**

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EEE/13/1092

**A PROJECT REPORT SUBMITTED TO DEPARTMENT OF ELECTRICAL AND
ELECTRONICS ENGINEERING FEDERAL UNIVERSITY OYE EKITI**

**IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF
BACHELOR OF ENGINEERING (B.ENG) DEGREE IN ELECTRICAL AND
ELECTRONICS**

FEBRUARY 2019

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CERTIFICATION

This project work titled "Car tracker and ignition alert system using GSM module and GPS module" by Adesanya Daniel, meets the requirements for the award of Bachelor of Engineering (B.Eng.) degree in Electrical and Electronics Engineering Department, Federal University Oye-Ekiti.

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DEDICATION

This report is dedicated to Almighty God, for his love, guidance and blessing through my stay at the university. To my parents, Mr and Mrs Adesanya G.O who made my academic pursuit a reality through their financial, Moral, and Physical support.

ACKNOWLEDGEMENT

I acknowledge the Almighty God, for giving me wisdom and knowledge to complete my course. Sincere gratitude, appreciation and thanks go to my parents Mr and Mrs Adesanya for their love, care, moral and financial support.

I also thank my supervisor Prof Engr. Akinsanmi for his suggestion, support and encouragement during the writing of this report.

My immense gratitude also goes to my Head of Department, Engr. Dr. Oritcha, the departmental project coordinator, Engr. G. K. Ijamaru, Engr. Olusuyi and Engr. Sammi and the entire staff of Electrical and Electronics Engineering.

Also to my good friend Aluko Pichardson who's ideas were more than helpful in the course of this project.

Finally, my profound gratitude goes to my colleagues who has been with me since the inception of my programme.

ABSTRACT

This project presents the design and construction of a Vehicle tracking and ignition alert system using GPS and GSM technologies for its working operation. The GPS and GSM module interconnected to the microcontroller locates the vehicle at every point in time while the GSM module sends a signal to the car owner when the switch button is pressed for ignition alert confirmation so if the vehicle owner confirms the ignition process the car starts at ignition but if he does not confirm it then the buzzer triggers an alarm to indicate theft. The project is divided into the hardware and software the hardware includes the GPS, switch button, GSM module, SIM card and the microcontroller cable connection. The software includes the programming of the microcontroller and it is programmed in such a way that once the car is being kick started a switch button is being triggered which sends an SMS alert to the owner to confirm whether the car should start or not then if the owner confirms it then the engine starts. Thus, the aim and objective of then project is achieved

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LIST OF ABBREVIATIONS

GPS Global Positioning System

GPRS General Packet Radio Service

SIM Subscriber Identification Module

HTTP Hypertext Transfer Protocol

GSM Global System for Mobile communications

EGSM Extended Global System for Mobile communications

DCS Digital Cellular Service PCS Personal Communications Service

TTF Time-To-First-Fix

CS Communication Service

PHP Hypertext Preprocessor

XML Hypertext Mark-up Language

WAMP Windows Apache MySQL PHP

GGSN Gateway GPRS Support Node

PCB Power Circuit Board

AT Attention commands

MISO Master in Slave Out

MOSI Master Out Slave In

SCK Clock Signal from master to slave

GND Ground Signal

GPIO General Purpose Input/output

MCU Microcontroller Unit

RISC Reduced Instruction Set Computer

CHAPTER ONE

1.0 INTRODUCTION

A car tracker and ignition alert system is an Electrical and Electronics project circuit by which a vehicle is being secured by monitoring and confirming the ignition process of the car at either the presence or absence of the car owner by the car owner confirming whether or whether not to start the car using a GSM and GPS technology. A car tracking system is an automated device that makes it easy to locate and at some time monitor the position timing and mobility of a carriage using a GPS technology [1] Developed by the American Military, GPS is a global system which uses satellites to show the locations as well as the timings, anywhere over the earth. It usually requires at least 4 satellites to be on the visible horizon. It is easily accessible with a GPS receiver. Also, GSM which was developed by the ETSI with the aim to back the mobile communication, has now become worldwide accepted standard.

The basic purpose of a vehicle tracking system with ignition alert system is to enable the user/ owner of a vehicle to have total control over the entire vehicle starting and shutting down process at every point in time and to determine whether or not to allow the vehicle to be started. Also, to track a specific target vehicle or other objects. The tracking device is able to relay information concerning the current location of the vehicle and its speed, etc. Most of such tracking systems consist of an electronic device as usually installed in-vehicle and can be used for tracking motor cycles, buses, and trains. The vehicle tracking system proposed in the paper has the following features • Acquisition of a vehicle's geographic coordinates and a vehicle's assigned ID from an in-vehicle device in real-time using the GPS module • Transmission of a vehicle's location information and a vehicle's ID to a web server after a specified time interval using the GSM/GPRS module • Database is designed to store and manage received vehicle's location information • Whenever a user requests the vehicle location, it can be accessed from the database and monitored on Google maps in real-time using a Smartphone application • Ignition alert confirmation system which enables the Owner of the vehicle to have full control to the starting up and

Previous works on this project have gone from transmitting via Radio to GSM, GPRS till date where 4G and GPS are all integrated into one system for efficiency sake. However, this has not solved the problem because this entire system is only helpful most times for post event investigation i.e when a vehicle owner notice he or she can't find his or her vehicle then contacts the police and a review will be conducted to trace the vehicle's location history and then eventually may help to trace such vehicles. Beyond this technology, after much research, I found out that expert rubbers tamper with this tracking device immediately the can escape with such vehicles which may not allow such vehicle to be recovered. The result of this research work has devised a means of solving this Global problem by integrating an ignition alert system which confirms the ignition process of the vehicle each time it is started. This will give the owner of each vehicle whose vehicle has this device installed to determine whether to allow the vehicle to start or Not. This alert is sent to the owner's mobile phone stating to allow or disallow his or her vehicle to be started from a specific location showing the vehicle's present status at the same time therefore enabling on the run Security and prevention rather than Cure. The message is sent through the GSM module and the location of vehicle is detected with the help of the GPS module. The project, "Vehicle Tracking with Ignition Alert System using GPS and GSM Technology" is designed and developed to accommodate the needs of today's vehicle fleet company to keep track on their fleets. It is a very useful and versatile device, and in fact it is able to be used by anybody who needs to keep track on their valuable goods, increase safety and not just by the vehicle fleets company. This chapter will be covering the general background of this project, its concept, objectives, scope and the problem statement. A GPS-GPRS based tracking system gives all the specifications about the location of a vehicle. The system utilizes geographic position and time information from the Global Positioning Satellites in order to track the movement of the vehicle. Google Maps is used for mapping the location. The GSM modem fetches the GPS location and sends it to the server using GPRS. The device includes modern hardware and software components that help to track and locate automobiles both online

Earth, it measures the time taken by radio signals to travel from four or more satellites to its location, it then calculates its distance from each satellite, and from this calculation it determines the longitude, latitude, and altitude of that position. By following triangulation or trilateration methods the tracking system determines the location of the vehicle easily and accurately [2]. Trilateration is a method of determining the relative positions of objects using the geometry of triangles. To "triangulate," a GPS receiver accurately measures the time taken by the satellite to make its brief journey to Earth (less than a tenth of a second) and hence measures its distance from the satellite using the travel time of the radio signal. To determine the distance between it and the satellite, the measured time is multiplied by the speed of a radio wave that is 300,000 km (186,000 miles) per second [2]. The coordinates of latitude and longitude can be sent to the user on request via SMS, or it may be transmitted and stored in the database, using a cellular or satellite modem that is the GSM modem embedded in the unit. This enables the user to display the asset's location on the Google map either in real time or later whenever the user wants the data for further analysis

1.1 BACKGROUND OF THE PROJECT

In today's world transportation plays a very important role in the life of mankind, also it makes it possible for people to connect one another within a nation. The emphasis of this project lies upon the security and protection of cars as a means of transportation. The protection and security of cars requires a car tracking and ignition alert system for the effective monitoring of a vehicle, therefore the ability to monitor the ignition process of a car is very important in determining if the car should start or not in case of theft. Some Embedded system such as GSM and GPS plays very important role in helping to secure and protect a car by giving an exact and real time location of vehicle and also sending an SMS alert to the car owner at the point of ignition whether the car should be started or not. The traditional technique for tracking the movement of vehicles in a commercial fleet involves the use of a central dispatch centre and a two-way radio communication in each

are also popular in consumer vehicles as a theft prevention and retrieval device. Police can simply follow the signal emitted by the tracking system and locate the stolen vehicle. When used as a security system, a Vehicle Tracking System may serve as either an addition to or replacement for a traditional car alarm. The existence of vehicle tracking device then, can be used to reduce the insurance cost, because the lost risk of the vehicle drops significantly.

These days, most of tracking applications use Global Positioning System (GPS) in their tracking systems to report position information automatically back to a central location. In such implementations of tracking applications, use Global Positioning System (GPS) as the Location Estimation technology and Network Transmission (SMS/GPRS) as the Location Transmission technology in those tracking systems. GPS based tracking applications are widely used in Europe and developed countries

1.2 STATEMENT OF PROBLEM

Security issues of lives and property has been a major threat in Nigeria and this have led to cases of stolen cars within the country. The advanced in technology has brought so many wireless systems to reduce the rate of theft in developing countries and developed countries. Nevertheless, there are still so many problems affecting the rate at which cars are being stolen in Nigeria which this project has taken into consideration. These includes

1. Real time location of a vehicle information with the help of GPS module which in turn help the security agents locate a stolen vehicle.
2. Networking communication without cable, through the help of GSM module embedded in the system which in turn sends SMS alert to the car owner in case of theft to confirm whether the engine should start or not.
3. Continuous protection of the Fleet.
4. On the Run Ignition Alert System.

1.3 MOTIVATION

The rate at which Cars are being stolen in Nigeria has actually been the greatest motivation for this project work. And with this issue there is a serious need for us to start developing technological project to help eradicate if not completely to a reasonable extent the theft of

1.4 SIGNIFICANCE OF THE STUDY.

This project is designed to identify and to solve the 21st century vehicle and luxury safety challenges and to procure the best solution to talking them to Nigeria and the world at large.

1.5 AIM AND OBJECTIVES OF PROJECT

The aim of this project is to design and construct a Car Tracker and ignition alert system using a GSM and GPS module. The objectives are:

1. To design the GPS/GSM and switch button based on the system.
2. To establish a wireless communication for transfer of data between car owner and the ignition process of the car engine.
3. To study and investigate the basic operation of the GPS module.
4. To enable the car engine starts as soon as the car owner authenticates it to start when an SMS is being received by the help of the SIM 800 GSM Module provided there is a SIM Card inserted into the module for transmitting and receiving data.
5. To trigger an alarm when the vehicle owner does not confirm the ignition process at recipient of an SMS alert in case of theft

1.6 SCOPE OF PROJECT

This project desires to focus on the protection and security of car thereby developing a tracking system that is cost effective by using some hardware components which includes the transformer which helps to convert AC to DC and the ATmega8 microcontroller is programmed in such a way that the GSM module interconnected on the Vero board sends an SMS alert at the point of ignition and the GPS module tells the location of the car at a particular time. But there are some limitations to the working principles of the project and these includes lack of GSM network coverage to receive SMS alert at the point of ignition. This project is divided into five chapters as follows: Chapter 1: entails the introduction, scope, background, aims and objectives, statement of problems and motivation of the whole project Chapter 2: explains the literature review and theoretical

CHAPTER TWO

LITERATURE REVIEW

2.0 INTRODUCTION

Car tracking and ignition alert system is a framework can manage both pace and security, the Car tracker is a GPS based vehicle following framework that is utilized for security applications also. The task utilizes two primary hidden ideas. These are GPS (Global Positioning System) and GSM (Global System for Mobile Communication). The fundamental utilization of this framework in this setting is following the vehicle to which the GPS is associated, giving the data about its position at whatever point required and for the security of every individual going by the vehicle. This is finished with the assistance of the GPS satellite and the GPS module appended to the vehicle which should be followed. For this we utilize GSM module which has a reception apparatus as well. In this manner we have at the Base station; the complete information about the vehicle. Alongside following the vehicle, the framework is utilized for security applications also. The crisis catch is utilized by the driver or the traveller in order to caution the worried of crisis conditions. On squeezing this catch, a caution will be initiated which will help the traveller representative in crises and keep them secure all through the trip. The vehicle can likewise be immobilized remotely. This framework introduced for the four wheelers, Vehicle following generally utilized as a part of naval force administrators for naval force administration capacities, directing, send off, on board data and security. The applications incorporate observing driving execution of a guardian with an adolescent driver. Vehicle following frameworks acknowledged in shopper vehicles as a robbery anticipation and recovery gadget. In the event that the robbery recognized, the framework sends the SMS to the vehicle proprietor. After that vehicle proprietor sends the SMS to the controller, issue the vital signs to stop the motor. [5].

2.1 RELATED WORKS

system on command. The interaction between a GSM modem and a GPS receiver is facilitated using a microcontroller. The modem sends the Longitude and Latitude position of any vector from an unknown place. When the user demands or requests, the system accordingly delivers a reply to the device indicating the location of a vehicle with respect to the latitude and longitude values. Microcontroller's internal memory i.e. ROM (Read-Only Memory) consists of the code. Processing of the instruction is done using instruction set and acts as an ally between GSM and GPS. GPS only transmits data whereas GSM imparts as well as receive data. The microcontroller is linked to the GPS pins and a serial connection is established between the GSM pins and microcontroller. The data is received by the GPS receiver from numerous satellites i.e. processing of data containing GPS results from diverse satellites is done by the microcontroller which is then acquired by the GSM modem. The receiver sends the data to microcontroller which is then processed by the microcontroller and catches only latitude and longitude numerical values blocking information such as interval, elevation, alias of satellite, verification etcetera. On the user end the GSM enabled device acts like an SMS receiver and acting as a SMS sender is a GSM modem connected serially to the microcontroller. In terms of power, the GSM uses 12 volts whereas microcontroller circuitry and GPS use 5 volts which are provided by a 12 volts /3.2 Ampere battery. The coding of the microcontroller was achieved using a C programming language.

The Authors in [2] proposed a smart anti-theft system is one of the essential systems that homogenize both GPS and GSM systems. 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. This framework intended for clients in area development 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 framework might likewise valuable for correspondence process among the two focuses.

In the initial period of tracking only two radios were used to enhance the information

Base station was dependent on the driver for the information and a huge size fleet could not have been managed depending on man-power only.

The Author in [3] was able to design a drunk driver detection and alert system. The drunk-driver detection and alert system (DDAS) is implemented by leveraging the smart gas sensing, embedded computation, mobile communication and satellite based location tracking technologies and integrating the same with vehicle control system for autonomous operation. The design of the system is backed by breath based alcohol gas sensing method that monitors breath alcohol concentration (BrAC) of the driver from fixed distance in an obstruction-free manner. The sensor signal activates the alert system and/or vehicle control unit when BrAC equivalent to BAC level crosses the preset legal limit as standardized by the countries. A few of the important design challenges are: to design a system that can reliably sense the driver breath alcohol concentration at a certain distance from the driver in contrary to the mouth-piece breath analyzer and is convenient to house in the vehicle without causing obstruction to the driver and that the system should be able to differentiate among the drunk drivers and others in the vehicle, initiate alert signal timely to warn local traffic on road also the system must support remote communicate of alert SMS with vehicle tracking information to authorized persons and take timely preventive mechanism to stop driving under such condition. The system consists of low power, small size modular components that are interfaced to an embedded microcontroller ATmega328 on Arduino Uno. It an integrated system that is housed on the steering wheel of the vehicle to detect drink and drive situation, activate an 'audio alert', send remote 'alert message' to authorized person and stop the vehicle from starting.

The Author in [4] researched and designed this project using 8051 microcontrollers in this Project it is proposed to design an embedded system which is used for tracking and positioning of any vehicle by using Global Positioning System (GPS) and Global system for mobile communication (GSM). In this project AT89S52 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

where the position of the vehicle is demanded. An EEPROM is used to store the mobile number. The hardware interfaces to microcontroller are LCD display, GSM modem and GPS Receiver. The design uses RS-232 protocol for serial communication between the modems and the microcontroller. A serial driver IC is used for converting TTL voltage levels to RS-232 voltage levels. In the main they are easy to steal, and the average motorist has very little knowledge of what it is all about. To avoid this kind of steal we are going to implement this project which provides more security to the vehicle. When the request by user is sent to the number at the modem, the system automatically sends a return reply to that mobile indicating the position of the vehicle in terms of latitude and longitude from this information we can track our vehicles.

The Author in [5] designed and introduced a programmed limitation framework utilizing GPS and GSM SMS administrations. The framework licenses confinement of the vehicles and transmitting the position to the proprietor on his cellular telephone as a short message (SMS) at his solicitation. This framework is likewise given crisis switch which can be squeezed when a man driving vehicle needs assistance. This switch assumes the liability to bolt the motor. The framework can be interconnected with the vehicle caution framework and alarm the proprietor on his cell telephone. This following framework is made out of a GPS beneficiary, Microcontroller and a GSM Modem. GPS Receiver gets the area data from satellites as scope and longitude. The Microcontroller for s this data and this handled data is sent to the client/proprietor utilizing GSM modem. The framework additionally comprises of liquor sensor and flex sensor. Liquor sensor recognizes whether the driver is inebriated or not. In the event that he's smashed then the signal is turned on, motor is killed and the message and additionally area of the vehicle is sent to the beneficiary versatile number utilizing GSM module. Flex sensor distinguishes the vehicle collision. On the off chance that a vehicle collision happens then instant message and area of the vehicle is sent to the beneficiary portable number through GSM module. The exhibited application is an case answer for car position and status, extremely helpful if there should arise an occurrence of vehicle burglary circumstances, for observing pre-adult

vehicle won't work anymore. The system consists of microcontroller, sensors, LCD, buzzer, relays, motor, GSM and GPS. The system responds only in any one or all of the following cases:

Alcohol sensor detects whether the driver is drunk or not. If he's drunk, then the buzzer will be turned on and the message is displayed on LCD. GSM module will send the message and if owner give missed call to GSM module it will send location to the recipient mobile number.

If an emergency switch is pressed indicating that the driver needs help, it will cause engine to lock. GSM module will send the message and location to the recipient mobile number.

If flex sensor detects the occurrence of accident, then the buzzer is turned on. GSM module will send the message and if owner give missed call to GSM module it will send location to the recipient mobile number.

In case of car theft, owner gives a missed call to the GSM module. GSM module will send the message and location to the recipient mobile number.

The researcher in [6] proposed tracking system based on cloud computing infrastructure. The sensors are used to monitor the fuel level, driver conditions, and speed of the vehicle.

All the data transferred to cloud server-using GSM enabled device. All the vehicles equipped with GPS antenna to locate the place. To avoid the drunk and drive, the alcohol sensor installed to monitor the driver status. The proposed technology significantly avoids the accident in highways. Application. According to their research paper, they had built on a produced VTS (The Aram Locator) offering a system-on-chip (SOC) replacement of the current microcontroller-based implementation. The proposed SOC was built on a field programmable gate array (FPGA) promising a cheaper design, a more cohesive architecture, a faster processing time and an enhanced system interaction. Different designs, and their hardware implementations, were proposed with different levels of integration. Performance analysis and evaluation of the investigated designs were included.

The researcher in [7] designed a Face Detection System used to detect the face of the driver, and compare with the predefined face. The car owner is sleeping during the night time and

This paper was designed by the author in [8] as vehicle tracking system using GSM and GPS module which combines the installation of an electronic device in a vehicle with designed android application to track the vehicles location. The main aim of the device will be collecting the data from field and delivers it to server from where it will be fetched by android application and the vehicle real time location can be viewed on google maps in android application using internet. The program for interfacing of modules is written in sketch code and obtained GPS values are transmitted with the help of GSM module to the web link provided by server and that link is required to be mention in the programming of the microcontroller. sign is there at the starting of GPS value every time when the location is send on the web link. The locations coordinates (latitude and longitude) are having the format of ddmn.mmmmm. i.e. Degrees minutes and Decimal minutes. The Android application will the show output of the system in google maps as soon as the users open this application in their android based phones. The application will automatically fetch its location and will start showing the actual position of the vehicle, this application will only work if internet is available and the server used is open GPS for tracking and monitoring vehicle.

The Author in [9] designed a project titled a real time vehicle tracking system is a device which will be imbedded into a vehicle and monitoring that vehicle in real time. In tracking device, GPS receiver receives the data or information mainly latitude and longitude of the particular vehicle from the satellite which information is transferred over mobile phone via Short Message Service (SMS) by using GSM modem. GSM modem is connected with Arduino Uno R3 microcontroller. The positional information is also transferred to a remote server over Hypertext Transfer Protocol (HTTP) connection. HTTP server stores the acquiring positional data in the database. A web application had been built using Hypertext Preprocessor (PHP), JavaScript or jQuery which is a library of JavaScript, Hypertext Markup Language (HTML) with embedded Google Map. The JavaScript runs in the browser and integrates this information into Google Maps through Google Maps Application Programming Interface (API) which displays the position on a map. Since the

sensor installed to monitor the driver status. The proposed technology significantly avoids the accident in highways

The author in [11] designed this system to track the position of the vehicle, also this can be used in public transportation medium to know the position of the bus. The system will send the message automatically to ambulance, police and all the pre-registered contacts in case of any accident or emergency. From tracking the exact location of vehicle in few feet's this system uses GPS (Global Positioning System). To receive SMS and reply to this SMS with the location of the vehicle, GSM is used. 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 programming of the microcontroller, processing of the input signal is done and output is produced. tracking the vehicle, one camera is used to track the vehicle and second is used to identify the number on the number plate. By using various algorithms, vehicle can be tracked and movement of vehicle is captured from first camera.

This project titled smart vehicle tracking system whose author in [12] designed the a Vehicle tracking system which is generally operated by GPS is attached with the vehicle. satellite signals is first received by it and then it determines its position co-ordinates with latitude and longitude. These coordinates are generally observed on a computer screen and by using mapping software we can see the exact position of our vehicle. generally, vehicle tracking technology user can access the information of a vehicle based on vehicle's position, speed and distance traveled and duration of each stoppage with a central operating center by entering the mobile number of user through mobile phones or websites using SMS or Internet. vehicle- tracking technology is advantageous for tracking and monitoring both commercial and passenger vehicle. as concerned with personal vehicle tracking, it allows recovering our stolen vehicle by pin pointing that gives the exact location.

The author in [13] demonstrated through his study whether Information Technology increases the efficiency of public organizations. Firstly, the needs of the organization are

determined and then measured in performance indicators. The Information Technology

to perform “automate” and “informate”. The “automate” means that saving the coordinate information automatically into the system and then providing information about the update status of the vehicles. At the same time, many reports are produced during the “informate” process for decision makers in order to manage the vehicle efficiently. During the study, a decrease is observed from the cost of vehicles in terms of fuel consumption and corporate expenses and also the penalty costs. As discussed earlier, the Ministry of Justice is an example of this result. With IT based National Judiciary Informatics System project, the ministry has saved 459 million Euro in 10 years. It is clearly stated that IT based studies cause reduction in costs of the organizations.

This design developed and tested by the Author in [14] titled a vehicle tracking system to track the exact location of a moving or stationary vehicle in real-time. This paper has described the design and implementation of our vehicle tracking system. An in-vehicle device, a server and a Smartphone application are used for the vehicle tracking system. In this work, the in-vehicle device is composed of a microcontroller and GPS/GSM/GPRS module to acquire the vehicle's location information and transmit it to a server through GSM/GPRS network. On the other end, the web interface written in PHP is implemented to directly connect to a database. A vehicle's geographic coordinates and a vehicle's unique ID obtained from an in-vehicle device are recorded in a database table. And a Smartphone application has been created to display a vehicle location on Google maps. The system was able to experimentally demonstrate its effective performance to track a vehicle's location anytime from anywhere. Furthermore, our implementation is low-cost that is based on easily accessible off-the-shelf electronic modules.

In this thesis, by the Author in [15] developed a vehicle tracking system that is flexible, customizable and accurate. The GSM modem was configured and we tested and implemented the tracking system to monitor the vehicle's location via SMS and online on Google map. To display the position on Google map we have used Google map API. The Arduino is the brain of the system and the GSM modem is controlled by AT commands that enable data transmission over GSM network while the GPS provide the location data.

where there is very high urban as well as rural vehicular transition every day. There can be various other applications that can be built over our existing platform. Hence, we have designed our system in such a way that upgrading this system is very easy which makes it open for future requirement without the need of rebuilding everything from scratch, which makes our system even more efficient. This thesis has widely increased our knowledge of GPS and also improved our programming skills. We have also ensured the reliability of our system through various field tests that we have done during our thesis and the initial results that we obtained through our prototype are very promising. This makes our thesis complete, robust and we can even think of commercialization of this system in future.

The project with the Autor in [16] is all about controlling theft of a vehicle. The system is about making vehicle more secure by the use of GPS, GSM technology and a web application. The simulation is done by PROTEUS software. It can also be beneficial for:

1. Parents to look after their children.
2. To track animals in jungles
3. Delivery services
4. Cops department and fire services

This project can be further enhanced by the use of camera and by developing a mobile based application to get the real time view of the vehicle instead to check it on PC, which would be more convenient for the user to track the target.

The researcher in [17] resolved that Vehicle tracking system makes better fleet management and which in turn brings large profit. Better scheduling or route planning can enable us handle larger job loads within a particular time. Vehicle tracking both in case of personal as well as business purpose improves safety and security, communication medium, performance monitoring and increases productivity. So in the coming year, it is going to play a major role in our day-to-day living. Main motto of the accident alert system project is to decrease the chances of losing life in such accident which we can't stop from

Google map I have used Google map API. The microcontroller is the brain of the system and the GSM modem is controlled by AT commands that enable data transmission over GSM network while the GPS provide the location data. Whenever the GPS receives a new data it is updated in the database and hence the location is viewed on Google map. The system provides accurate data in real time that makes it possible for the user to track the vehicle and it also enables an early retrieval if the car is stolen. This thesis has widely increased my knowledge of GPS and also improved my programming skills.

The Author [18]. in this research resolved that Vehicle tracking system makes better fleet management and which in turn brings large profits. Better scheduling or route planning can enable you handle larger jobs loads within a particular time. Vehicle tracking both in case of personal as well as business purpose improves safety and security, communication medium, performance monitoring and increases productivity. So, in the coming year, it is going to play a major role in our day-to-day living.

Main motto of the project is to incorporate different types of sensors so that they help in decrease the chances of losing life in such accident which we can't stop from occurring. Whenever accident is alerted the paramedics are reached to the particular location to increase the chances of life. This device invention is much more useful for the accidents occurred in deserted places and midnights. This vehicle tracking and accident alert feature plays much more important role in day to day life in future.

The researcher in [19] explained that Tracking framework or system is getting to be progressively vital in expansive urban areas and it is more secured than different frameworks. It has continuous ability, rises with a specific end goal to fortify the relations among individuals, vehicle and street by assembling present day data advances or technologies and ready to structures a real time accurate, compelling exhaustive transportation framework. Updating this setup is simple which makes it open to 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.

In [21] the Authors the design of GPS which is partly similar to the design of ground-based radio navigation systems, such as LORAN and the Decca Navigator, developed in the early 1940s and were used during World War II. Additional inspiration for the GPS system came when the Soviet Union launched the first Sputnik in 1957.

A team of U.S. scientists were monitoring Sputnik's radio transmissions. They discovered that, because of the Doppler Effect, the frequency of the signal being transmitted by Sputnik was higher as the satellite approached and lower as it moves away from them. They realized that since they knew their exact location on the globe, by measuring the Doppler distortion it was possible to pinpoint where the satellite was along its orbit.

The first satellite navigation system was first successfully tested in 1960. It delivers a navigational fix approximately once per hour using a constellation of five satellites. In 1967, the U.S. Navy introduced the timation satellite which demonstrated the ability to place accurate clocks in space that is the technology used by the GPS system. In the 1970s, the ground-based Omega Navigation System, based on signal phase comparison, became the first world-wide radio navigation system.

The paper presented by the Authors [22] described a real time tracking system that provides accurate localizations of the tracked vehicle with low cost. GM862 cellular quad band module is used for implementation. A monitoring server and a graphical user interface on a website is also developed using Microsoft SQL Server 2003 and ASP.net to view the proper location of a vehicle on a specific map. The paper also provides information regarding the vehicle status such as speed, mileage.

The Authors in [23] worked on automobile anti-theft system using GSM and GPS module. The system is developed using high speed mixed type single-chip C8051F120 and stolen automobile is detected by the use of vibration sensor. The system remains in contact with automobile owner through the GSM module, for the safety and reliability of automobile.

The Authors in [24] explained the development and deployment of GPS (Global Positioning System)/GSM (Global System for Mobile Communications) based Vehicle

sensor-KXSC72050 of Koinix Company to acquire moving direction of a vehicle. The system will acquire positions of the vehicle via GPS receiver and then sends the data to supervised center by the SMS (Short Message Services) or GPRS (General Package Radio Service) service. The supervised center comprises of a development kit that supports GSM techniques-WMP100 of the Wavocom Company. Finally, the position of the mobile vehicle will be displayed on Google Map.

The Author [26] proposed simple bus tracking system in UCSI University, Kuala Lumpur, Malaysia. The tracking system provides students with the location information of a bus within a fixed route. The students are provided with a status of the bus after specified time interval using LED panel and a Smartphone application. Real-time bus tracking systems are beneficial to college students who attend colleges with large campuses. With the bus tracking system, they can spend more time studying, sleeping, or relaxing rather than waiting for a delayed bus. Spending less time waiting for a bus improves the comfortable and effective time management of the students as well. Also, the bus tracking system helps improve children's safety when it is equipped in school buses.

An anti-theft tracking system is one way to prevent or detect unauthorized access of devices considered valuable. The Author [27] proposed the design and implementation of a vehicle tracking and anti-theft system for protecting a vehicle from any intruders using GPS/GSM technology based on tracking systems.

The system used Kalman filter proposed by the authors in [28] to reduce positional errors, thus improving the accuracy of the position determination. When a vehicle's ignition is turned on, a vehicle's owner receives a confirmation SMS that a vehicle is running now. If the access to the vehicle is illegal, the vehicle's owner sends a SMS to turn off the vehicle. A laptop embedded with Google Earth is used for tracking and viewing the location and a status of the vehicle on a map. A Smartphone will be good alternative to replace the work that the laptop performs.

Smartphone more easily because the Smartphone has available social network services. So, the system would become more efficient to users of social network and Smartphone, they allow quick monitoring of the location and status of the vehicle.

The work done by the Authors in [30] presented vehicle tracking system using GPS, GSM modem and micro-controller. The work is implemented for monitoring the movement any time of any equipped vehicle. In this system, GPS receiver receives the location data and convert this data into the data string of NMEA 0183 format in continuously periodic manner. At operator station, the receiver receives and put this reading into the GUI application made in MAT-LAB. The application contained an algorithm which gets the NMEA reading and converts into degree format suitable for Google earth which is called by using an algorithm. The system can be improved by connecting GSM modem to the GUI, for lower the need of operator and making the system more reliable.

The Author in [31] presented a vehicle tracking and management system using GPRS, GSM, the Internet and GPS, essentially helpful for fleet operators in monitoring driving the behavior of employee. The system consists of the web and mobile application for the end user. The developing approach for making this system includes The proposed GPS vehicle tracking system is mainly executed using JAVA 2 Enterprise MDP (Mobile Information Device Profile), combined with the CLDC (Connected Limited Device Configuration). The SMS alerts are also provided for the notification of the certain events. The system can be improved by increasing the services of the application and improving GUI.

The Authors in [32] proposed front-end intelligent and web-based FMS to manage vehicle fleet efficiently and effectively. This implemented work includes an intelligent frontend terminal installed in targeted vehicles which communicate with fleet management control center through GSM channels, which is monitored by using web-based dashboard.

The Authors [33] in this thesis presents the Tracking System mainly using GPS/GPRS,

The Authors in [35] worked on embedded hardware, circuits, software, and networking. The technologies we are using are a lot of fun to work with. We plan to continue working on the project on our own time. During the course of the project, many students and faculty have remarked that this is something that the University Shuttle system needs badly. There are also many technologies such as AJAX, SQL Server Notification Services, SQL Server Reporting Services, WAAS, SMS, and WAP that would enhance our project and we have a desire to learn them. The tracking unit also needs a small LCD to report basic information.

The Authors in [36] explained that Vehicle security system is key requirement in large cities. Today vehicle thieving is increasing; with this system it can be controlled. The vehicle can be turned off, only with a simple SMS. This setup can be made more interactive by adding a display to show some basic information about the vehicle and also add emergency numbers which can be used in case of emergency.

The Author in [37] explained that the foremost objective of the paper was to assist and ensure the safety and security of the vehicle. To investigate the performance of the whole strategy, several trials have been conducted on the different locations in order to get the GPS coordinates. The assistive device in this work will inform the owner if someone tries to steal the vehicle. In the distant future, it can be extended to a system to suit outdoor environments and can be made compact for usage and future works may be carried on for developing android application to avoid message throwback.

The Authors in [38] proposed 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

In [40], Authors proposed the design of a vehicle tracking system that works using GPS and GSM technology. This system built based on embedded system, used for tracking and positioning of any vehicle by using Global Positioning System (GPS) and Global system for mobile communication (GSM). This design will continuously watch a moving Vehicle and report the status of the Vehicle on demand.

The Authors in [41], proposed a vehicle cabin safety system, security based on embedded system by modifying the existing modules. This method monitors the level of the toxic gases such as CO, LPG and alcohol within the vehicle provided alert information as alarm during the dangerous situations. The SMS sends to the authorized person through the GSM. In this method, the IR Sensor used to detect the static obstacle in front of the vehicle and the vehicle stopped if any obstacle detected. This is avoiding accidents due to collision of vehicles with any static obstacles.

In [42], the Authors proposed a remote monitoring system based on SMS and GSM was implemented. Based on the total design of the system, the hardware and software designed. In this paper, the GSM network is a medium for transmitting the remote signal. This includes two parts that are the monitoring center and the remote monitoring station. The monitoring centers consist of a computer and communication module of GSM. The software-monitoring center and the remote monitoring station implemented by using VB. The result of this demonstration shows that the system can watch and control the remote communication between the monitoring center and the remote monitoring station.

The Authors in [43], proposed a tracking system based on cloud computing infrastructure. The sensors are used to monitor the fuel level, driver conditions, and speed of the vehicle. All the data transferred to cloud server using GSM enabled device. All the vehicles equipped with GPS antenna to locate the place. To avoid the drunk and drive, the alcohol sensor installed to monitor the driver status. The proposed technology significantly avoids the accident in highways.

constructed. This system puts the ignition process of the car to active mode when the car owner confirms yes whenever an SMS alert is being received and passive mode when the car owner confirms no, hence the buzzer triggers an alarm to notify people within the environment in case of theft. The simple mode of operation is that when the car is being ignited the push button attached to car starter senses a signal and sends an SMS to the microcontroller. The controller issues the message about the ignition process of the car to the car owner or authorized person to either confirm yes or no.

3.1 REVIEW OF FUNDAMENTAL CONCEPT

The design and construction of this project can be implemented using so many techniques based to achieve different result, based on so many related designs that has been carried out on this project it can be concluded that not only can the concept of this project track a car and monitor the ignition process of the car it can also monitor accident, alcohol and many more using the GPS and GSM technologies. Some used LCD screen to display the result or mobile android app. Comparing and contrasting different author with the project related to this their major aims are to secure a car from theft but different approach has been applied to get the desired aim.

3.1.1 GPS TECHNOLOGY

GPS (Global Positioning System) works in all the weather conditions be it storm be it flood, covering the entire world throughout the year absolutely for free. This satellite-based navigation system has GPS satellites, which orbit the Earth two times in a day. Each and every satellite sends a unique signal to the GPS receivers. The GPS receivers then decode the signals and then calculate the exact location of the user. The receiver basically takes the time taken by it to receive signals as the source of calculating position.[8] This is a navigation technology providing accurate location and information. Preserved by the U.S, GPS is a space-based satellite system, granting contact to anyone owning a GPS supported receiver. Started in 1973 was designed for military purpose but later was allowed for

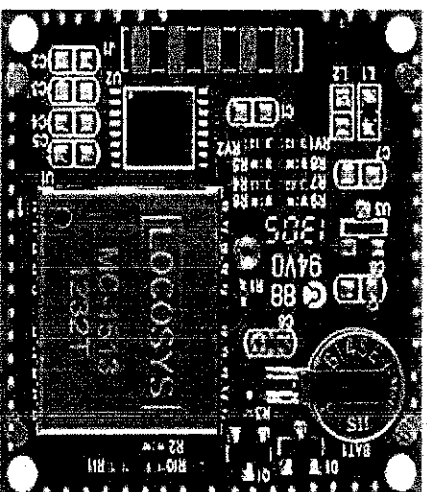


Figure 1 GPS receiver

3.1.2 GSM TECHNOLOGY

This GSM technology was established in 1982 to develop a common mobile telephone standard. Although it resembles the traditional modem, but differs in the way it transmits and receives data. A dial-up modem uses telephone lines whereas a GSM modem makes use of radio waves. A GSM modem uses commands with each command beginning with AT i.e. Attention followed by a character. For example, Dialing command would be -- ATD123123234. A GSM modem obtains a SIM (Subscriber Identity Module) and making use of circuit switching establishes a communication between two devices. Once connected constant streaming of data takes place. [1]

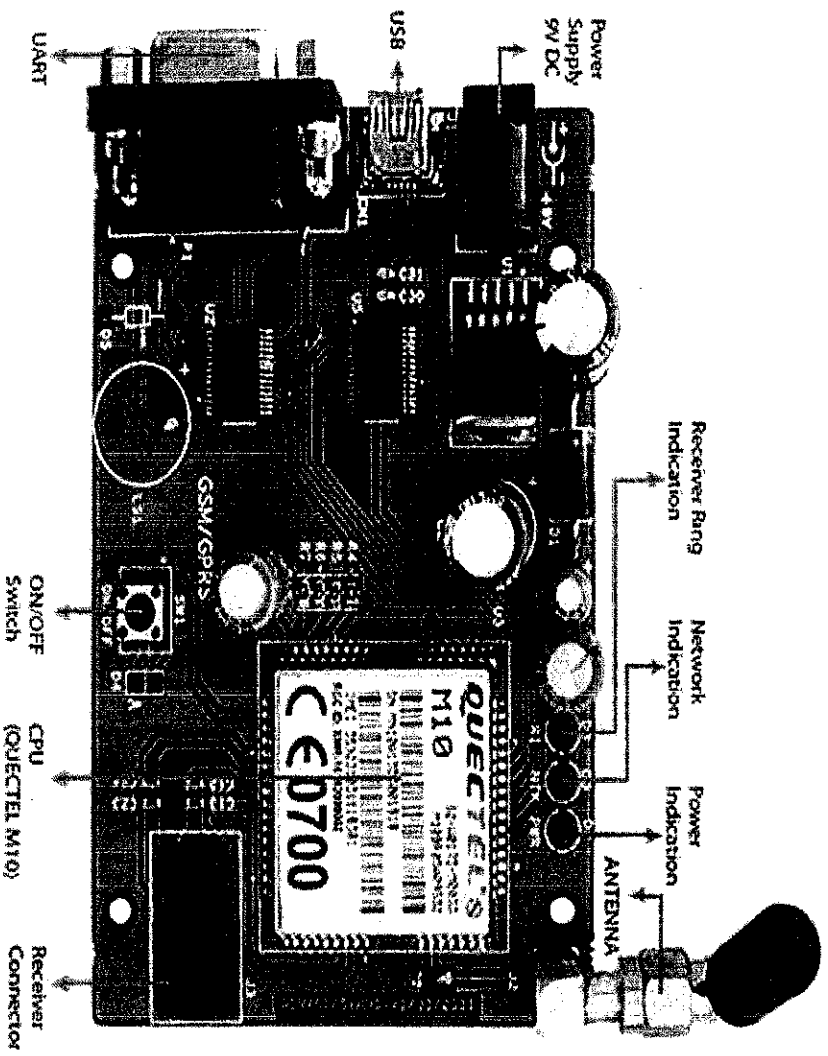


Figure 2 GSM modem

3.1.3 DIFFERENT TYPES OF TRACKING SYSTEM

There are three main types of GPS vehicle tracking that are widely used. They all use active devices. They are:

1. Automatic Vehicle Location (AVL) system
2. Assisted Global Positioning System (AGPS)
3. Radio Frequency Identification (RFID)

widely used. The tracking method uses GPS satellite to locate the vehicle equipped with GPS modem by sending satellite signals. The accuracy of the tracking method depends on the AVL system which provides the vehicle location with the accuracy of about 5m to 10m. The information transmitted by the tracking system to the base station is location, speed, direction, mileage, start and stop information and status of vehicle. The information of the vehicle is often transmitted to the central control system (base station) from the vehicle after every 60 seconds. If the base station receives the data, it displays it on a computerized map. GPS receiver on the vehicle receives the signals of its geographic location. Then the receiver sends that data plus speed, direction, etc. to the base station via a radio system. [9]

3.1.5 ASSISTED GLOBAL POSITIONING SYSTEM

Assisted global positioning system is a terrestrial RF network used to improve the performance of GPS receivers as it provides information about the satellite constellation directly to the GPS receivers. AGPS uses both mobiles and cellular networks to locate the accurate positioning information. AGPS is used to overcome some limitations of GPS. With unassisted GPS, locating the satellites, receiving the data and confirming the exact position may take several minutes. The tracking method of AGPS uses GPS satellites to track the vehicles. A GPS receiver in vehicle is always in contact with 4 satellites (3 satellites determine latitude, longitude and elevation and the fourth provides element of time) hence it never fails to detect the location of a vehicle. Location of the vehicle is provided with accuracy of between 3m and 8m, and speed of 1km using this method. Information like Vehicle location, average speed, direction, path traversed in a selected period and alerts (Engaged/Unengaged, speed limit, vehicle breakdown and traffic jam) are delivered by the tracking system to the base station. The system provides continuous updates after every 10 seconds while the vehicle is in motion. It also provides data storage for up to 1 year. The location is retrieved from the GPS device and relayed as a SMS using the cell phone by the Client Node to the Base station. [9]



Figure 3 Buzzer

3.1.7 MICROCONTROLLER

Microcontroller is responsible for acting as an interface between GSM module and GSM receiver. Microcontrollers are small chips which simplify the functioning. Low-cost design and adding intelligence to the system makes microcontroller chips highly reliable. It is programmed to energize the modem when requested in terms of message forwarding. The microcontroller used in this work is Atmel@AVR@ ATmega8 and it is a low-power CMOS 8-bit microcontroller based on the AVR RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega8 achieves throughputs approaching 1MIPS per MHz, allowing the system designed to optimize power consumption versus processing speed.

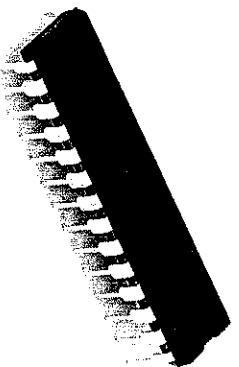


Figure 4 Microcontroller



Figure 5 Transformer

COMPONENTS OF POWER SUPPLY

The power supply unit consist of Step-down transformer, Rectifier unit, Input Filter, Regulator unit and output filter.

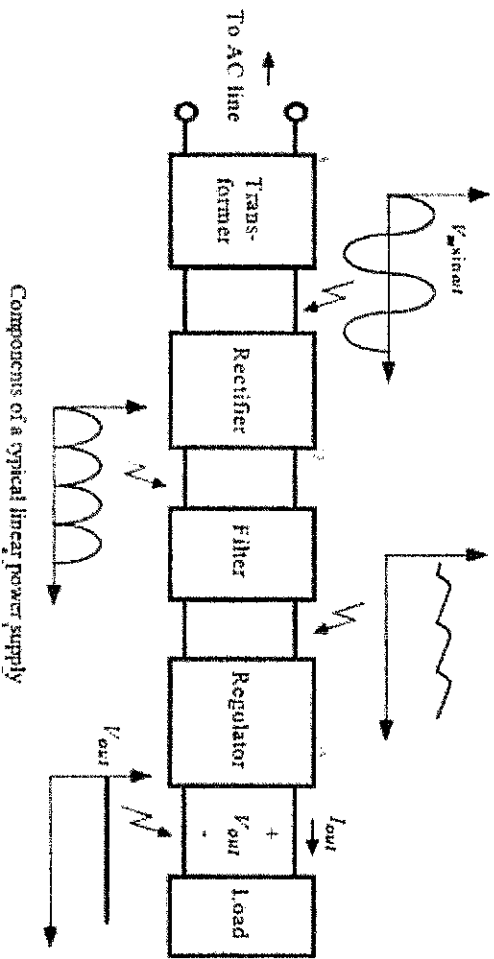


Figure 6 Component of power supply

3.1.9 BLOCK DIAGRAM

The block diagram includes the major components used in the circuit and these components are ATMEGA 8 microcontroller, GPS module, GSM module, buzzer and power supply.

3.2 WORKING PRINCIPLE OF DESIGN AND OPERATION

This project is all about car tracker and ignition alert system which takes permission before a car is being ignited and triggers an alarm in case of theft. The tracking system takes input from GPS and it converts the data format and sends it to the Rx (receiver pin) of microcontroller and this microcontroller stores this data in USART buffer and the data stored is sent again through Tx pin into max232 this max 232 sends the data into GSM.

The ignition in the sense comes into the picture when the car is being started, there is a button attached to the kick starter, as the car is key is being used to start the car the button sends a message that the car is being ignited to the registered GSM mobile, so if the authorized owner of the car gives a go ahead then the Car will be ignited successfully but if he does not the buzzer triggers an alarm and yet the car won't be able to start and all this were made possible through the help of the microcontroller. This project is meant to be powered by a DC but for the case of testing it was powered with an AC power supply using a step down transformer. The system consists of both the hardware and software.

3.2.1 TOOLS USED

1. Multimeter: for taking measurement of voltage and others
2. Laptop: for designing software application and programming microcontroller
3. GSM phone: for receiving SMS alert
4. Screw drivers: for attaching the casing of the project firmly
5. Soldering Iron: for heating joining wires and the circuit hardware

3.2.2 FUNDAMENTAL CIRCUIT DIAGRAM

This project required an interconnection of different components illustrated below

1. The microcontroller board which contains the atmega8 chip, with input and output terminal. The microcontroller stores code and functions as an analog to digital converter which controls the behavior of the GSM module
2. The GSM and GPS module is connected to the microcontroller outputting the data

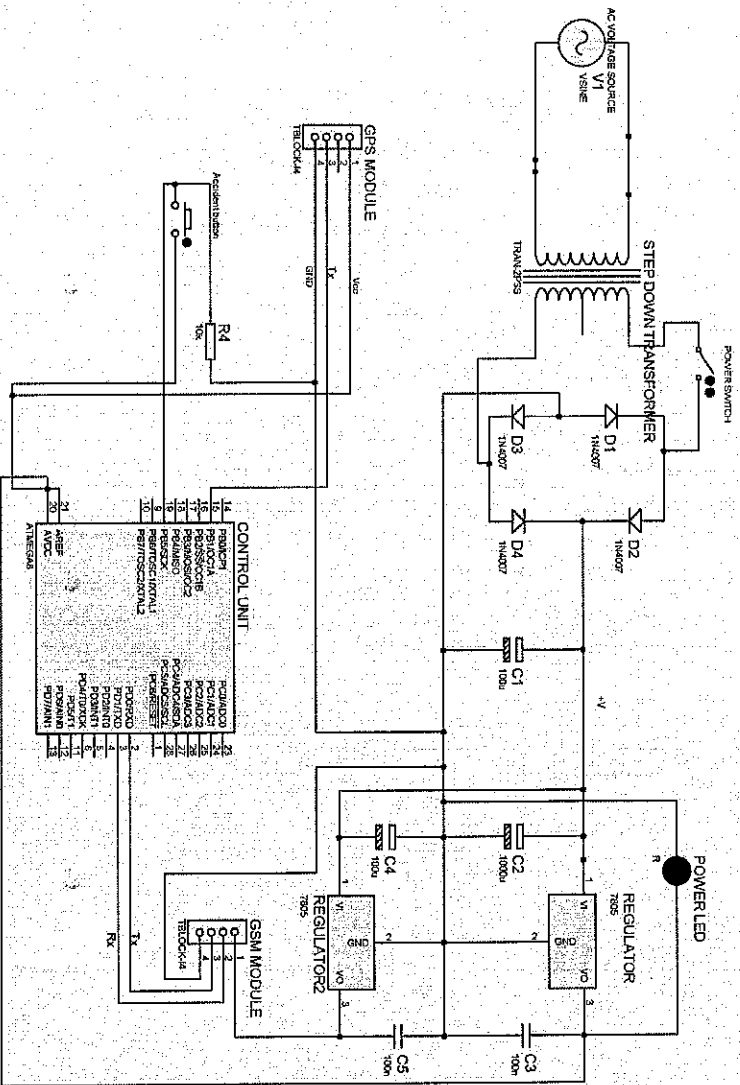


Figure 8 Circuit Design

CHAPTER FOUR

4.0 TESTING, ANALYSIS OF RESULTS AND DISCUSSION

The below processes were taken during the implementation of this project as arranged in each subsection.

4.0.1 PRE-IMPLEMENTATION TESTING

All components bought were properly tested to ensure they are all in good working condition before implementation.

4.0.2 TOOLS USED

1. Multimeter: for taking measurement of voltage and others

2. Simulation of circuit
3. Hardware assembling
4. Microcontroller code design
5. Coupling of parts
6. Testing
7. Casing

4.0.3.1 SIMULATION OF THE CIRCUIT

After the circuit have being designed the required components were interconnected as shown in the figure below using the proteus software. Afterwards the design code was uploaded to run the design which the design in turn runs after doing the required connection

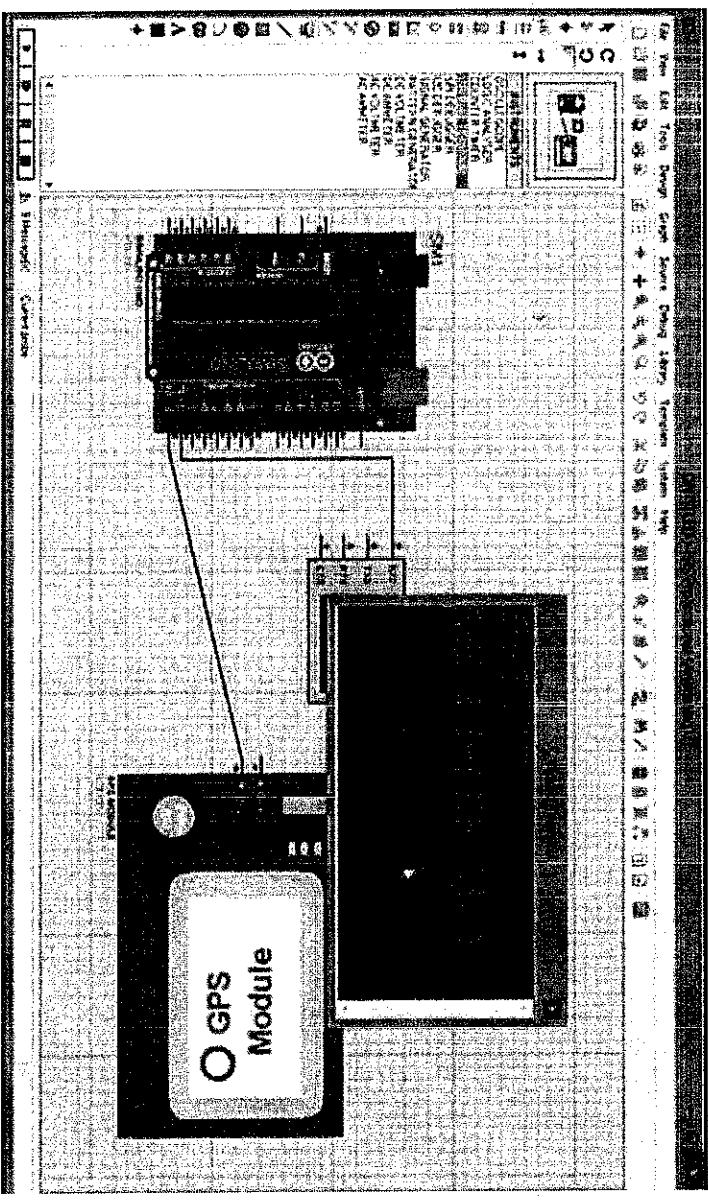


Figure 9 simulation on proteus

4.0.3.2 HARDWARE ASSEMBLING

3. The power terminal was connected to 220/230 V transformer which was stepped down to 12v output voltage with a voltage regulator.
4. The microcontroller was coded using simplified C and the hardware was combined with the code for the microcontroller.
5. The hardware was powered by an AC source and tested.

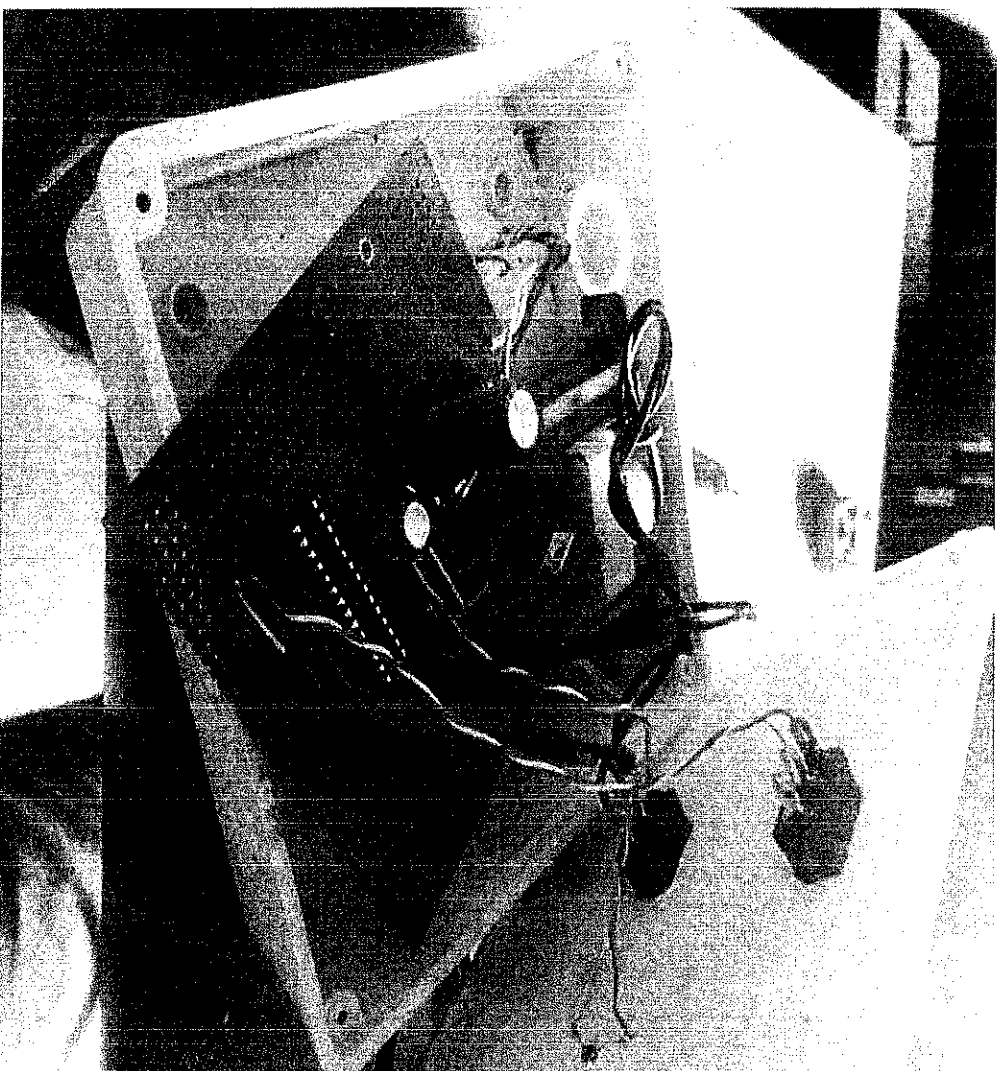


Figure 10 Interconnecting of project hardware

4.0.3.3 CASING OF THE PROJECT

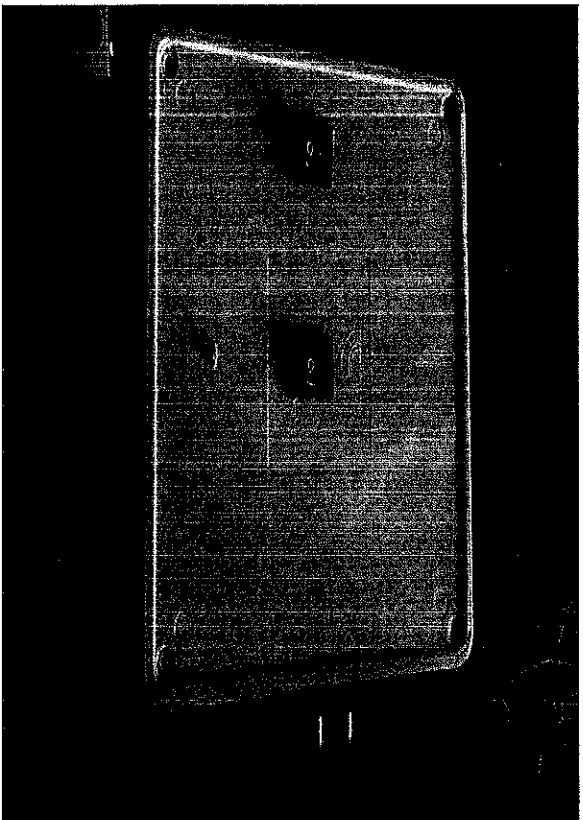


Figure 11 Casing of the project

4.0.4 FINAL COUPLING AND OVERALL PERFORMANCE EVALUATION

4.0.4.1 COUPLING

The system implementation board was attached to the base of the casing by the application of screw and it was tightly attached to it. This is to prevent vibration and displacement on motion. Vibration can cause the system to malfunction, displace the connected components and it can also loosen wires and joints. The ignition switch and the main power switch buttons were attached to the cover casing.

4.0.4.2 PERFORMANCE EVALUATION

It is primary to know the system's working principle before testing. The operating sequence of this circuit includes the following:

1. At ignition, the tracking device is switched on and establishes an open circuit between the engine and the vehicles brain box through the immobilizer. This will put the vehicle on

Having understood the above analysis, we can now deduce that the operational principle of the circuit under user permission and user Denial. Under User permission, the GSM module sends a Yes command i.e a 1 to the microcontroller and the vehicle's circuitry is changed from been open circuited to been closed circuited and then the vehicle is started successfully.

EXPECTED PERFORMANCE UPON USER DENIAL

When the command received is "No" i.e a 0 input into the microcontroller, from the GSM module then the microcontroller then tells the brain box to stop the engine permanently by maintaining the open circuit already established. Then triggers the buzzer, and send short messages (SMS) to the user.

RESETTING THE CIRCUIT

When the buzzer is been triggered by the microcontroller, it will continue alarm until it completes its oscillation period which is between 20 to 30 seconds will send SMS to all the mobile numbers programmed into the microcontroller and until the ignition is turned off. In case, the user is sure of the security of his vehicle and wishes to manually disable this function a switch button has been attached to the device which will permit such. However, it is not safe to do that.

4.1 TESTING

4.1.1 TESTING OF POWER SUPPLY UNIT

The components in this unit consist of a rechargeable 12V DC battery and a Stepdown transformer. The components were individually tested and the values the individual component were verified. After the construction of this unit, a performance test was carried out in the lab to ensure that the voltage delivered by the power supply unit was within the specified range that is required for the operation of this project.

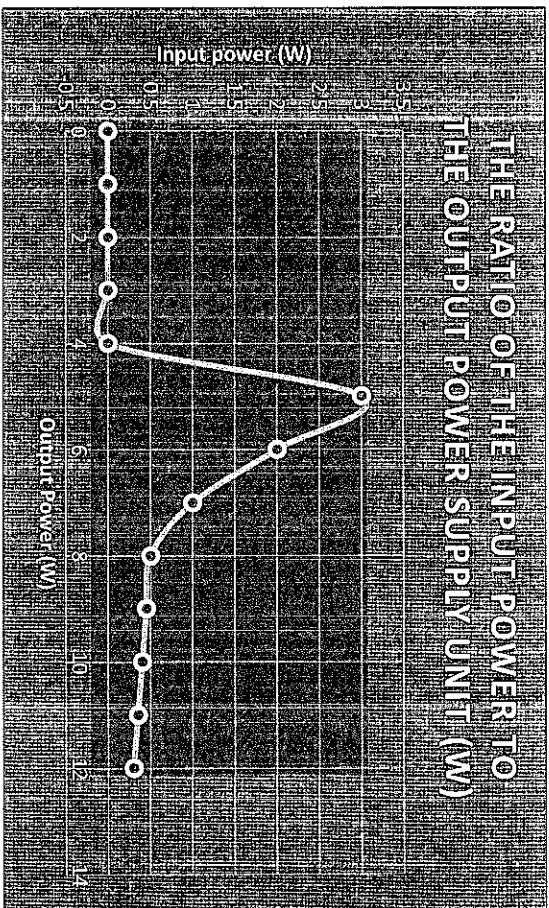


Figure 12 Power Graph

4.1.2 TESTING OF THE BUZZER

The buzzer was put to test and was found in perfect working condition and was correctly connected to the circuit. The transistor connected across the output pin of the microcontroller helps to trigger the buzzer and also helps for audibility of the alarm.

4.1.3 TESTING OF THE GSM MODULE

The GSM module was also tested to be in good working condition. At ignition, a message was sent out from the SIM present in the module to the pre-programmed numbers.

4.1.4 OVERALL TESTING AND RESULT

The testing of the design was done at the lab and the result were seen as evident to the working operation of the design project. For monitoring the ignition process of the car I have included a feature which will send an SMS alert to the user to permit the process and if ignition process not permitted then an alarm is being triggered to notify people against theft. SMS will be included the value of latitude and longitude of the vehicle. A link is also

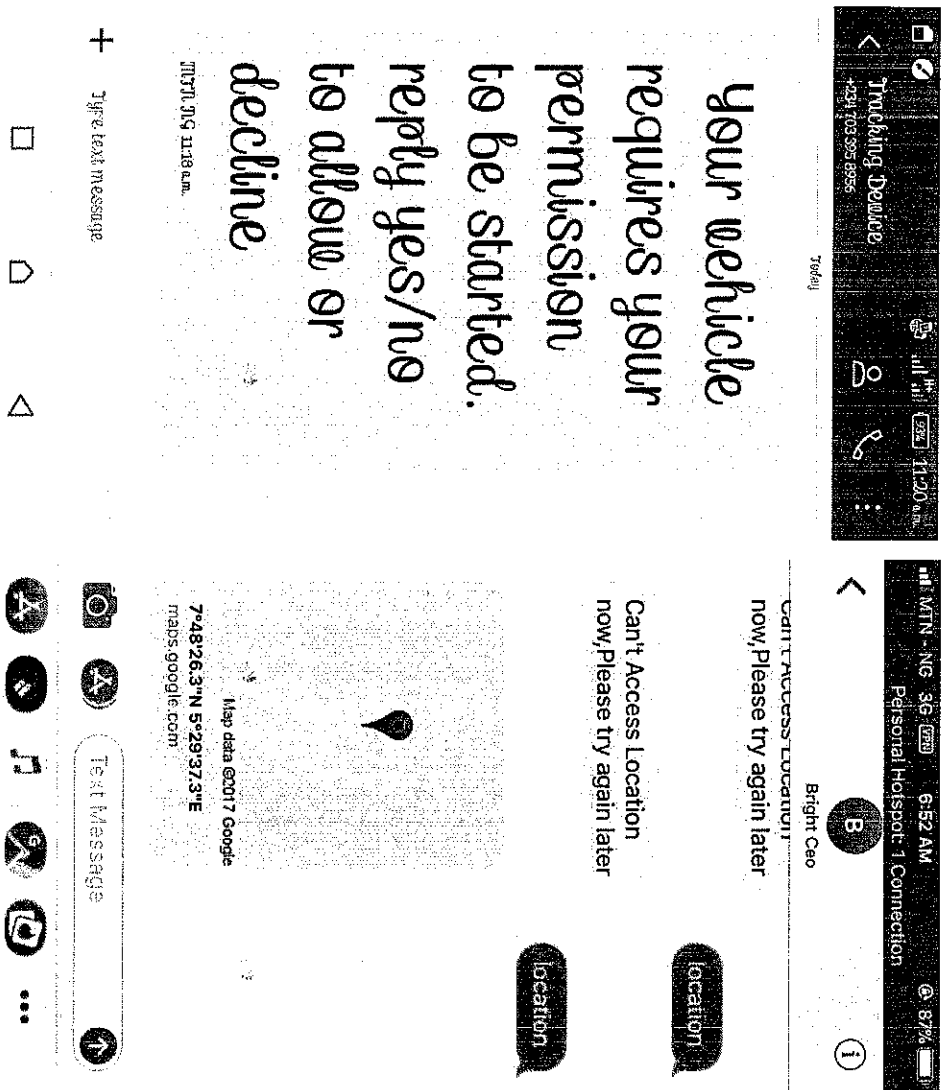
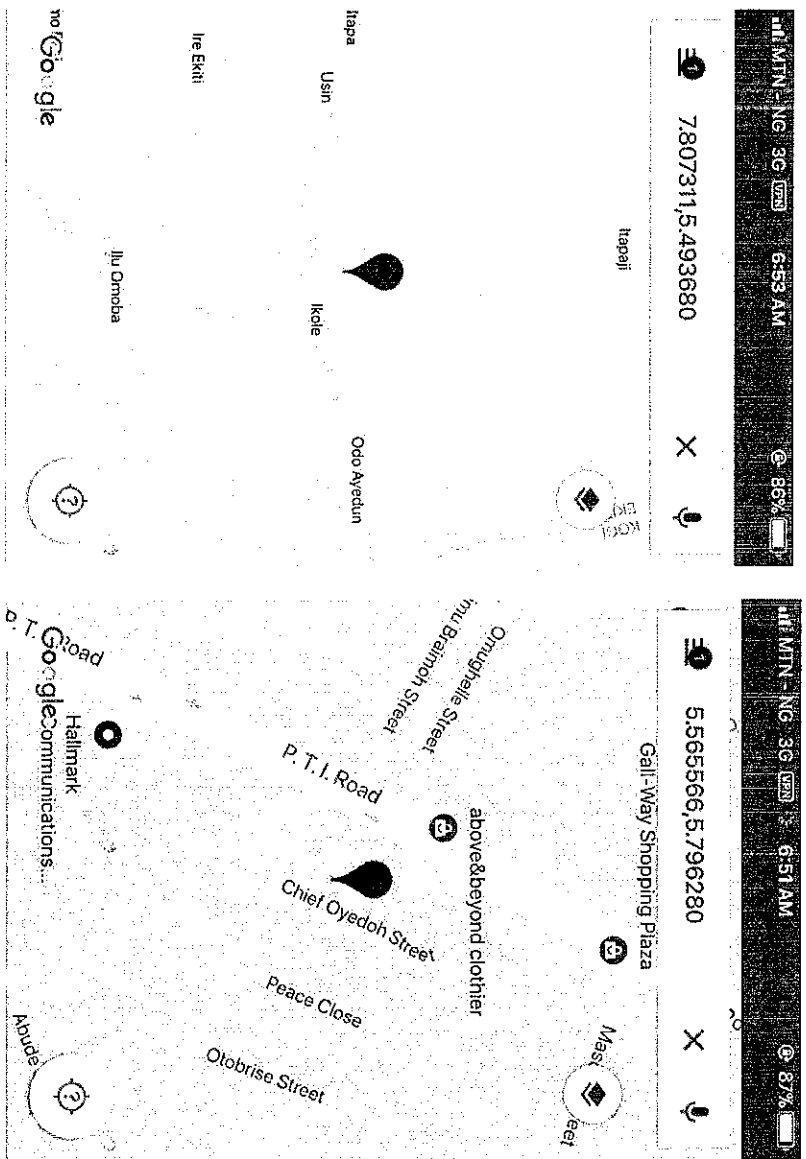


Figure 13 Tracking Message



7°48'26.3"N 5°29'37.3"E

5°33'56.0"N 5°47'46.6"E

Figure 14 View of location on website through Google map

4.2 ANALYSIS

This project work deals with assembling, soldering and casing. The components used were internationally sourced for. They were all gotten once and assembled on the Vero board according to the circuit design. Then after it was tested working and okay. The project is designed using a microcontroller for tracking and positioning of any vehicle by using

parameters as the output, but only the NMEA data coming out is read and displayed. An EEPROM is used to store the mobile number. The hardware interfaces to microcontroller are Buzzer, GSM modem and GPS Receiver. The design uses RS-232 protocol for serial communication between the modems and the microcontroller. A serial driver IC is used for converting TTL voltage levels to RS-232 voltage levels. In the main they are easy to steal, and the average motorist has very little knowledge of what it is all about. To avoid this kind of steal we are going to implement this project which provides more security to the vehicle. When the request by user is sent to the number at the modem, the system automatically sends a return reply to that mobile indicating the whether to start the vehicle or not, from this we can track our vehicles. [1].

4.2.1 ANALYSIS OF THE BUZZER

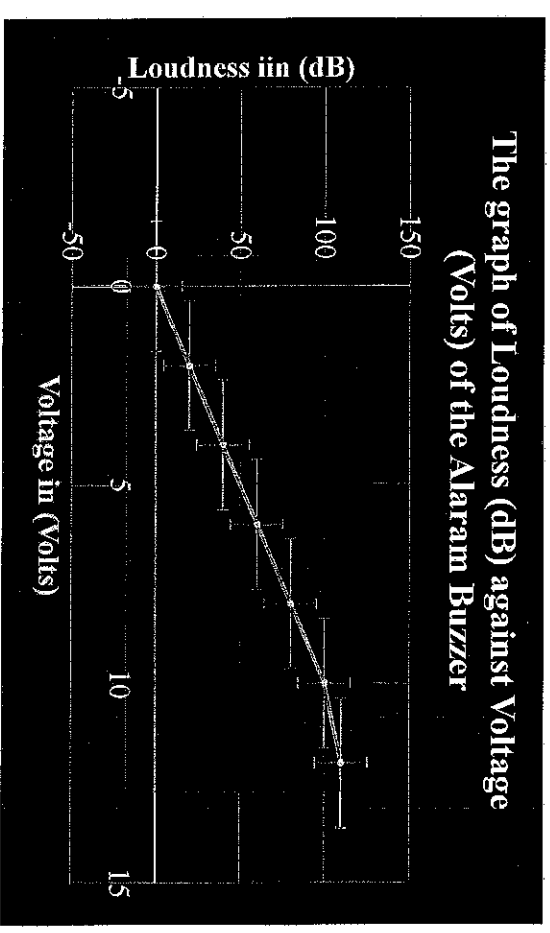


Figure 15 Buzzer Loudness

The graph above shows the relationship between the loudness of the buzzer and the input voltage. As the voltage input increases, there is also a corresponding increase in frequency

- Network Failure.

These threats are been mitigated by:

1. Provision of additional components to serve as redundant components thereby improving the reliability of the system.
2. It was ensured that the project was constructed under the instructions of an Expert.
3. I ensured I put on all necessary safety wears to avoid accident.

This project was carried out under almost caution and care therefore no risk was incurred.

4.3.3 SOCIAL, LEGAL, ETHICAL AND PROFESSIONAL CONSIDERATIONS

This project was designed and implemented to conform with the standards of Institute of Electrical and Electronics Engineers (IEEE). It was also ensured that all safety rules and regulations were duly observed during the course of the project.

CHAPTER FIVE

5.0 CONCLUSIONS AND RECOMMENDATIONS

This chapter concludes the chapters in this thesis. It includes conclusion, recommendation of the project, its limitations, likely future works etc. This project has undergone the process of construction, implementation, testing, and analysis and has been completed. Therefore, the aim and the objectives of the project was achieved.

5.1 CONCLUSIONS

The design and construction of this project was able to successfully monitor the ignition process of every Vehicle and track the vehicle against theft, this project is flexible, customizable and accurate. The aim and objectives of this project which is to ensure that before anybody could start a particular vehicle there must be a permission granted by the car owner was fully achieved. The GSM modem was configured and we tested and implemented the tracking system to monitor the vehicle's location via SMS and online on

1. Investigate how to protect the data collected on the website by making sure users only get to access only those devices that they are authorized to. Generally increased security to protect Vehicle tracker identity.
2. To develop a mobile application for the different types of mobile Operating Systems rather than just using a desktop application.
3. Developing a means to show track record of where the vehicle has been rather than just the position it is located.

5.3 CONTRIBUTION TO KNOWLEDGE

The major contribution to knowledge established by this project based on research is the addition of an ignition Alert System and the approach applied towards achieving it. The immobilizer added to the system in form of switch button signals the flow of current from the ignition line and brakes the flow till a yes message is received from the GSM module through the microcontroller makes it more advanced than the conventional vehicle tracking system.

5.4 LIMITATIONS

At the completion of this project I realized some limitations which are discussed below

1. Due to the effect of poor GSM Network coverage, the design of GSM module becomes an issue because this can lead to delay of the expected SMS of the ignition process confirmation.
2. Due to obstacles like tall buildings or such infrastructure which block view of the sky, often causes multipath error to the receiving signal of the GPS receiver.
3. Components used in the design of this project cannot be found in IKOLE EKITI. A lot of travelling was done to make this project a reality
4. The data created by GPS can be stored on a computer. Even the best computer security systems can be compromised. This can lead to personal data becoming available to criminals. The information provided by the GPS can tell criminals user schedules or areas visited to frequently. Certain GPS work with vehicles and complete functions on the car.

2. An Emergency number like the Police could also be included to the recipient of the SMS alert so that once the car owner stops the car from being ignited and the buzzer alarm comes on the police receives an SMS immediately.
3. A server can be created to record the route of the vehicle. The hardware can be made more intelligent by installing sensors like fire sensors and proximity sensors. In case of fire, the device will automatically send the message to the registered mobile user.

5.6 CRITICAL APPRAISAL

With the state of vehicle theft in the country, there has been a focus on the deployment of different versions of vehicle tracking system to vehicles to counter and curb the theft. This project “Vehicle Tracking system with Ignition alert system” is designed and implemented to mitigate the annual number of recorded stolen vehicles across the 36 states in Nigeria. With the advancement in technology particularly the Global System Mobile (GSM) technology, securing our Vehicle and luxuries is now simplified. It's now possible for users to control and monitor routes and location in of our vehicles remotely, with the help of their smartphones. The development also brings in other advantages like cost effectiveness and much needed efficiency. The system consists of Relay that senses the flow of current and brakes the flow, vibration sensor as transducers for detecting vehicle movement. The signals are then processed by an embedded microcontroller unit which then activate the GSM module and send SMS message the Owner' mobile phone device, and activating an attached alarm system simultaneously. Initial testing of this system shows that it worked as expected.

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