DESIGN AND CONSTRUCTION OF AN AUTOMATIC GSM CAR DEMOBILIZER AND TRACKING SYSTEM

BY

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DECLARATION

, Dare Kazeem Akintayo declare that this work was done by me and has never been presented elsewhere for the award of a degree. I also hereby relinquish the copyright to he Federal University of Technology, Minna.

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DEDICATION

This project is dedicated to almighty Allah, the beneficent and the most merciful. Who has given me the opportunity and has seen me through, up to this level of my life. Also to my beloved parents, Mr. Ahmed Olusola Dare and Mrs. Dupe Dare for their supports and wiliness up to this time. My sincere appreciations also go to my lovely one Miss Oniyangi Zainab Oluwashola whose care and support never came short for me when needed. May Allah give you more grace and increase your caring ability.

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ABSTRACT

The GSM CAR DEMOBILIZER AND TRACKER DEVICE is a device that corporates electronic circuitry together with a mobile phone in demobilizing and acking of cars. It prevent an unauthorized operator from starting the car due to the fact at the connectivity and other mechanism involved in the operation of the demobilizer e known to only to the car owner.

It demobilizes a car whether being stolen in the owner's car park or hijacked at un point and it is basically necessitated by the condition that the car fuel pump is lectronic and can be controlled with a relay due to the switching action of a thyristor aused by a transducer called light dependent resistor (LDR) and the car can be tracked sing the BTS (base transmission station) mounted by a mobile communication provider .g. Globacom Nigeria Company.

So, due to the fact that most cars have an electronic car fuel pump, this is one of the underlying reasons why this project was ever designed.

This project was constructed using discrete components, the main component being a thyristor (SCR) and supporting components like the light dependent resistor and a relay.

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CHAPTER ONE

INTRODUCTION

The cost of cars nowadays are becoming so expensive that most victims of stolen cars cannot afford to replace them .But , the fact still remain that the car theft is a common phenomenon these days owing to the high cost of cars. As a result of the high cost of cars and their usefulness to the domestic and economic life of the owners, it is very necessary to take different security measures on cars so as to prevent them from intruders or the so called thieves.

Many methods of securing cars have been employed by different manufacturers; some are built in cars security system from the car manufacturer while some are bought then fixed in the cars by the authorized owner. This project named AUTOMATIC GSM CAR DEMOBILIZER AND TRACKING SYSTEM is an electronic security and tracking device built in order to reduce the ugly trend of car theft in Nigeria, most particular in Minna and Niger state as a whole.

The GSM (Global System for Mobile Communication) tracking device is a better solution toward this problem because it provides security to the car when snatched at the gun point. Its principle of operation depends very much on the mode of silicon controlled rectifier (SCR) also known thyristor when used as a switch. Other components used for the design and construction of this project include a relay, a photo resistor i.e. Light Dependent Resistor, Resistor and A micro switch used as a reset switch for switching off the thyristor manually.

The design also involves a GSM mobile phone subscribed to a GSM network provider called Globacom Nigeria Telecommunication Company which provides the effective tracking of a stolen car.

1.1 DEFINITION OF PROJECT

A car tracking system is the most successful recent developed in-car security device which uses technology for example Global System for Mobile communication (GSM) technology to locate stolen cars.

It founds usefulness as a demobilizer in the protection of a motor car against unauthorized operation, for example theft. It was built with an SCR (silicon controlled rectifier) also known as thyristor and works based on it's principle as a switch.

As a car tracking device, it contain GSM mobile phone which take care of the tracking unit of the security system and this GSM mobile phone has a Globacom Nigeria Telecommunication Company's Subscriber Identity Module (SIM) card inserted and registered in it as it's GSM mobile network provider for it's easy and efficient tracking.

This project achieve its aims only when the car in which it was installed, is snatched by a thief, and the owner is able to make a call to the handset attached to the security system, which eventually stops the stolen car along the way to give the exact location of the car to the authorized owner so that the police can do their job and return to the owner after some few hours of the theft operation provided that the project is well designed and proper circuit connection where ensured to provide an effective output.

1.2 AIM /OBJECTIVES

The project was designed to meet the following objective:

i. To provide a theft deterrent system which is not subject to the foregoing disadvantages.

ii. To provide a theft deterrent system which permits a stolen car to be demobilized, traced and locate.

iii. To provide car protection which is readily installed in a car.

iv. To provide theft deterrent which is reliable in operation i.e. logical enough in operation in order to confuse an intruder, and relatively inexpensive to implement

1.3 FEATURES OF THE SECURITY DEVICE

The following are the features of the car security device;

i. The GSM security device has the ability to demobilize car while in motion and immobilizes it while static or parked.

ii. It has automatic mode when the car is parked

iii. The GPS (Global Position system) of a GSM network provider e.g. Globacom Nigeria Telecommunication Company, enable you to locate your car nationwide and beyond. More so, you can be abroad and still have control over your car.

1.4 BENEFITS OF THE SECURITY DEVICE

The benefit of the GSM car demobilizer and tracking device can be listed as follows;

i. In case your car spoils and you are not there you can always trace such cars with the help of the device and put your mind at rest.

ii. It reduces the risk to ones life in a bid to save your car from theft. In such process, one can lose his life but with the help of this device, you can take a walk not minding whether you have your key or not to save your life first.

iii. The haulage companies will value this device as it helps the haulage operators to be more exact in their business.

1.5 METHODOLOGY

This project design enable a stolen car to be demobilized and tracked at a particular place after being snatched at the gunpoint or stolen in the car park of the owner by an intruder.

It has been properly designed to operate in a car with a brain box or fuel pump running on a 12volts, 60amperes battery. This 12 volts from the car battery is also meant to serve as the power supply to the security system and this action takes place as soon as the car ignition is ON.

Due to the fact that an SCR have no state in between, it therefore behaves like a switch, the two possible switching states of an SCR i.e. the ON and OFF states was used to achieve the successful design and construction of the demobilizer.

The switching states of thyristor help to drive the relay (an electromechanical switch) plunger to its normally open state when de-energized i.e. to make or break the action of the relay.

This circuit was designed in such a way that the make or break states of the relay controls the fuel pump of the car whenever a strong light is illuminated on the photo resistor [1].

A GSM mobile phone of NOKIA 2600 model was used as the illuminant to the photo- resistor and also serves as the tracking unit for the security device.

With this project in a car, car hijacked by an intruder will be demobilized and would not be moveable except correct procedures are carried out. This includes, when a car is snatched the owner calls the GSM number of the mobile phone in the security system. The phone illuminates a strong light on the LDR and reduces its resistance [1].with the decrease in the LDR resistance, the voltage drop across the resistor connected in series with this LDR becomes high enough to trigger the thyristor (i.e. about 2volts) [2] this consequently switched off the 12volts, 10Amperes relay which continues the connection between the car battery and the fuel pump, and eventually the car stops. Because, this interruption of the power supply of the fuel pump will stop the supply of fuel to the injector.

Afterwards the owner of the stolen car assumes the stoppage of the car as soon he is able to make a successful call to the handset attached to security device .the handset receives the call by illuminating only it backlight because both the vibration and ringing tones of the phones has been disabled during the construction of the security system. So that the intruder does not suspect the presence of the security device.

At the instance, the owner of the stolen car can now make the call to the customer care operator of the Globacom Nigeria Telecommunication Company by dialing 08050020121 0r 121 in short form on another handset using same network to request for the tracking of the handset number of the mobile phone in the security system which assumes the locations of the stolen car that have been demobilized. As soon as the car is located, the thyristor would be switched off manually by pressing a reset switch that energizes the relay again for continuity of power supply to the fuel pump which then supplies fuel to the ignition and at this instance, the car can start.

This project also contain a zener regulator circuit which provides up to about 5.0 volts power, for charging the phone battery in the security device for a reliable and effective operation of the project .and further more, it contains a protective resistor (choke) of low resistance of about 0.47ohm, which help to absorb the heat dissipated along the reset wires used in connecting the micro switch (reset switch) to the circuit.

1.6 PROJECT SYNOPSIS

- Chapter one of this project reports gives introduction to general principle and importance of this project.
- Chapter two explained the literature review.
- Chapter three of this project deals with the design analysis and the power control unit.
- Chapter four gives the construction, testing, result and precaution of the project.
- Chapter five contains conclusion and recommendation of the project.

CHAPTER TWO

LITERATURE REVIEW

2.1 BRIEF HISTORY AND DEVELOPMENT

Car securities where not thought being necessary until its existence, there was no much need for security systems, since stealing of cars was not a problem. Then later in the year 1896 and beyond, the story changed as car became the target for the thieves because of its value, reasonable easy to resell and its usefulness to human life.

Being car security conscious is important since motor car is often second most valuable asset of its authorized owner.

Briefly the Nigeria government car theft index given by the national police, shows that 25% of all reported crime, 40% of vehicle crime occurs in the road, outside the home and 30% happens in car parks [3]. Some study claim that a car get broken into every twenty seconds in the united state [4].

Government crime statistic shows that vehicles related crime has decreased since 1997. However, nearly half a million vehicles are still stolen in Nigeria every year and 40% 0f those stolen car are never returned to their owners [4]. Since all these insecurity act of stealing and hijacks of all automobiles are problems both manufacturers and the users are faced with the challenges of making it secured against thieves and unauthorized person.

2.1.0 METHOD USED

The present invention relates in general to a system for locating missing object and in particular to a system for locating missing vehicles in a circumscribed geographical area.

In recent years, the theft of mobile vehicle assumed unprecedented portions. This problem extended not only to passenger cars but to trucks carrying valuable cargo, pleasure crafts and even aero planes [5]. Various systems have been device in an attempt to thwart such thefts and they have enjoyed only a limited degree of success. Mostly commonly these systems have taken the form of alarm devices which are set off when an unauthorized person either enters or starts the car, such alarms normally receives their power from the vehicle's car battery circuit and thus they can often be disabled before the theft occurs. Further, the alarm provides a signal for a limited time period only as determined by the available battery power. If the alarm signal is not observed within the time period, it is ineffective to prevent the theft and it provides no clues there after for locating the vehicle [6].

Other types of theft deterrent systems may perform a vehicle disabling function, such as shorting the ignition, or locking the steering column, etc these systems have also encountered difficulties not only because they can be disabled before the theft occurs, but because they present a danger to the legitimate driver of the vehicle who may have to observe the prescribed procedure which avoids the occurrence of such a lock –out. Further such systems are expensive to install and the installation must often be performed when the vehicle is manufactured [6].

Aliyu Asimau .O. [futminna, Nov.2008], describes an automatic car immobilizer which it's principle of operation require the use of electromechanical switch to power the ignition of car. The design ensured that if the main switch is closed, and the key starter is turned to the start position with stepping on the break pedal for a period of time, before one applies pressure on the accelerator. This whole process put the ignition coil in an enable state; initially it was disabled. If the break pedal of the car is not pressed for the provided time (5 seconds) the car would not start .She made use of an SCR, timing ICs and an operational amplifier as a voltage comparator [7]. Aliyu's construction does not provide rooms for the demobilization and tracking of a car should in case an intruder is able to break in the car or hijacked on the road.

In the year 1990, sheffer vehicle location system was invented by U.S patent inventor, Sheffer Eliezer A. with patent inventor number: 891805. He describes a system for detecting an emergency in a vehicle, such as forced entry, and using existing cellular radio network to transmit an alarm signal from the vehicle to adjacent cell sites

The mobile telephone switching or MTSO is modified in order to transmit a signal indicating the signal strength of received alarm signal to an external; to Telephone Company, central alarm station. The transmitted signal also includes vehicle identifying information. At the central alarm station, the approximate position of the vehicle can be estimated based on the strength of the signal received from the vehicle at the adjacent cell sites. A police car can then be dispatched towards the vehicle location. The tracking devices turn on its own cellular car radio so that the tracking vehicle itself tracked using the same technique. In this way an operator in the central alarm monitoring station can observe the relative position of the original vehicle and the tracking vehicle or vehicles. Since, the exact position of the tracking

vehicle is known; this can be used to provide the tracking vehicle with instructions for moving toward the target [5].

One disadvantage of sheffer invention is that it requires modification of the software at the MTSO so that it will generate the required signal strength signals transmission to the central monitoring station. This would be relatively complex and expensive procedure.

So, with the use of a thyristor, relays and other electronic components, desirable electrical construction becomes realizable and it provides advantages over the limitations of the previous methods or devices that as been described earlier.

The car demobilizer and tracking device as ensured adequate security of the car at anytime, at any place even in abroad, provides the most simplest, fastest and accurate method of demobilizing, tracing and locating a stolen car. It requires no complex electronic components or software and installation method for tracking like that of Sheffer Eliezer as it makes use of the existing BTS of GSM network provider.

Other advantages of this project is it ability to be reset manually to its normally working operation after the stolen car had been recovered back by the police from where it's abandoned by the thief or intruder which is also a principle that makes it operate like a car immobilizer when parked. Because of its non complexity, it is very cheap and requires low power consumption as it makes use of the 12 volts, 60A car battery.

2.1 MOBILE COMMUNICATION TECHNOLOGIES

Cellular technology is one of the fastest growing telecommunication industries of the world; it may easily be one of those industries which may never suffer form economics of the

world. Even today millions of users are subscribing to different mobile networks in the world for example the MTN, GLO, CELTEL, STARCOMS AND ETISALAT e.t.c.

There are numerous mobile communication technology which makes growth of cellular industries to this extend one of the technology which is by far the best and most widely used in mobile communication is the GSM (Global System for Mobile Communication) [8].

Mobile technology has groomed a lot in past few years, major reasons for rapid advancement in mobile network technology is the requirement for being mobile or connectivity on the move. Latest mobile handsets offers features which one had never thought of, ultimately it forces mobile network companies to bring these features into practice taken commercial advantages.

Cellular networks and mobile phones vary from geographical locations and provider to provider, but still standard communication methods are more or less same every where. Basic communication takes place using electromagnetic microwave with cellular base stations. Cellular networks have huge antennas known as Base Transceiver station (BTS) [8].

Mobile handset has low powered transceivers which transmit voice data to the closed BTS which can usually be within 5 to 8 miles radius [8].

2.2 MOBILE PHONE AS A TRANSCIEVER

Transceivers are devices which have the capability of transmitting and receive data at the same time. Mobile handset registers itself at mobile networks switch or exchange as soon as it starts transmitting. Usually it means when handset is turn on, it ties to register itself to the network of the inserted SIM card i.e. the Subscriber Identity Module card .mobile

networks uniquely identify each and every registered mobile handsets which had incoming calls[8].

Handset will always be registered to the nearest base transceiver station for communication, incase if user of the network is on move, mobile phones in this case will handoff to many closest BTS during the call and keep the connection alive with the nearest base station. Incase of unavailability of the BTS, handset will be disconnected from the network resulting in dropping of ongoing call [8].

Base Transceiver Station also operated on less power radio frequency transmission; they make their presence feel by broadcasting signals for transceiver of mobile handsets communication between BTS and mobile sets takes place in stream of digits data, which is digitized audio. Each mobile network operates on unique radio frequency [8].

CHAPTER THREE

SYSTEM ANALYSIS AND DESIGN

3.1 BLOCK DIAGRAM

The car demobilizer and tracking device helps to deter the hijack of a car by an unauthorized person. For the benefit of achieving easy comprehension, the circuit is broken-down into simplified units in order to properly analyze and explain the function of each of the different parts that made up the whole circuit of the car demobilizer; these are the power unit, detector and switching unit, control unit, voltage regulator unit and the Reset.

The block diagram of the car demobilizer and tracking device, showing the entire various units that make up the whole circuitry is as shown in the figure 3.1 below

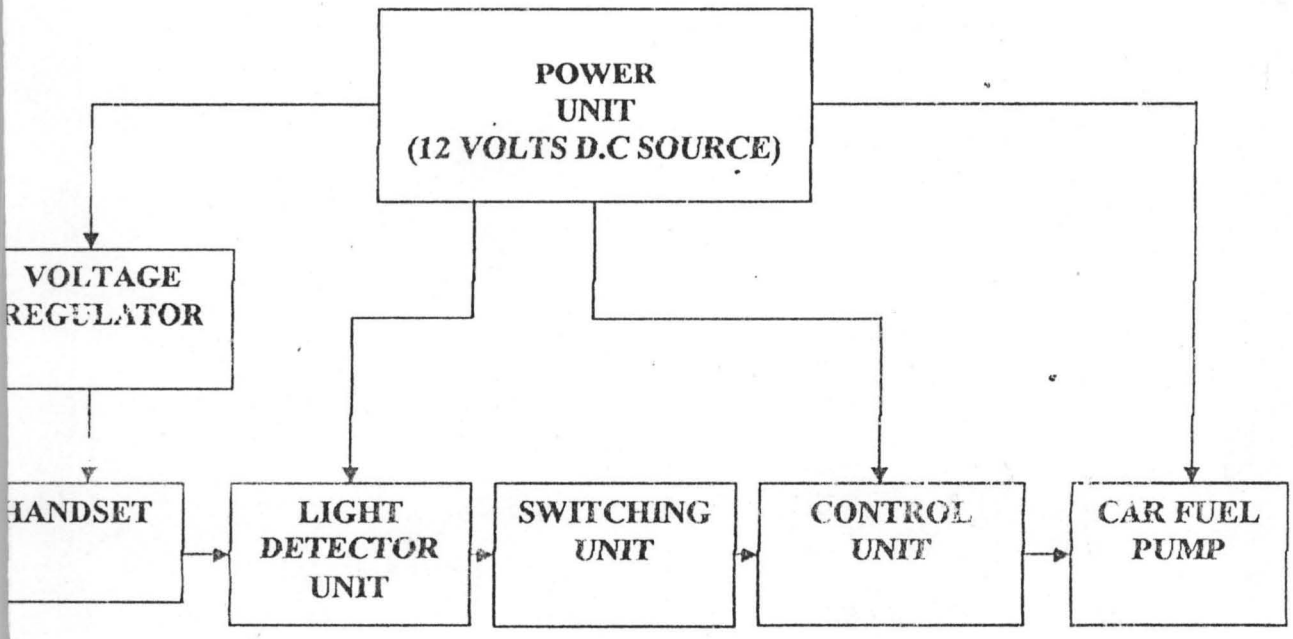

Figure 3.1 BLOCK DIAGRAM

The integration of the various units shown in the block diagram above makes up the car demobilizer and tracking device. Each of these units is quite essential and plays important role in building the entire device. In the next section, a thorough analysis shall be made on each of the units starting with the power supply units up to the control unit.

3.2 THE POWER SUPPLY UNIT

Most of the electronic devices and circuit required a D.C voltage source for their operation. Dry cell rechargeable batteries are one form of d.c voltage source; they have the advantage of being portable and ripple free.

The voltage regulator unit feeds from the 12 volts, 60amps d.c supply so as to enable the continuous charging of the mobile phone from which the detecting unit senses a light.

It also provides a sufficient voltage required for the demobilizer circuitry. Hence, this is the reason for the use of a 12v rechargeable battery.

3.3 THE SCR TRIGGER: DETECTOR AND SWITCHNG UNIT

Thyristor is solid state semiconductor device with four layer of alternating N and P-type material. They act as bi-stable switches, conducting when their gate receives voltage pulses and continues to conduct for as long as they are forward biased (that is as long as the voltage across the device has not reversed).

If a positive potential V_G i.e. the gate voltage is applied at the terminal with respect to the cathode, the breakdown voltage of the thyristor occurs at a lower value of V_{AK} .by selecting an appropriate value of V_G , the thyristor can be switched into the on state suddenly[9].

It should be noted that once avalanche breakdown has occurred, the thyristor continues to conduct, irrespective of the gate voltage, until the potential V_G is removed and the current through the device (anode-cathode) is reduced from the manufacture's value .the gate voltage is characterized in term of the gate trigger voltage .fig 3.3 below shows how the thyristor is triggered by the detector unit.

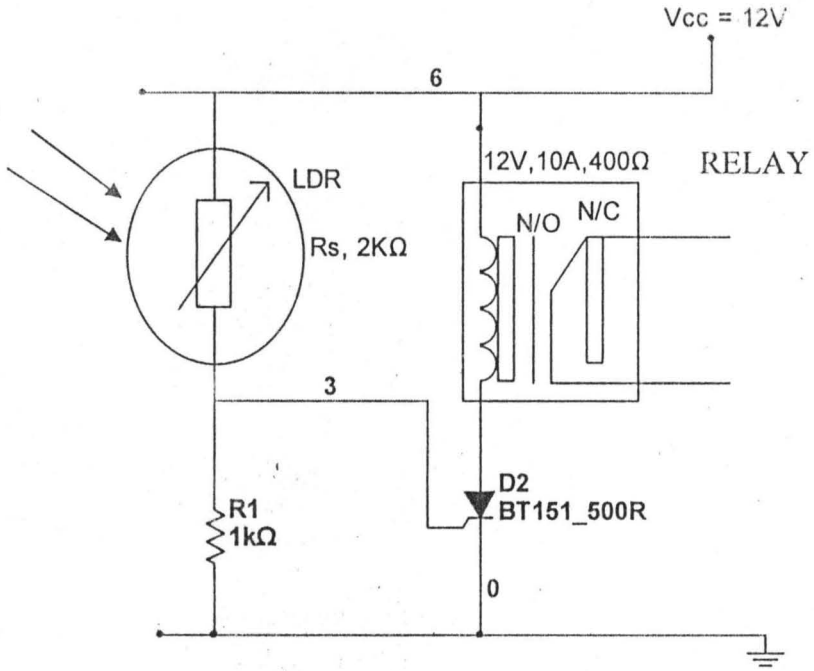

Fig. 3.3 SCR Trigger: Detector and switching unit

Rs represent a light or radiators sensitive resistor (LDR) that is, an element whose resistance will decrease with the application of light illumination. The cathode gate potential is determined by the divider relationship established by Rs and resistor, R_1 [1].

However, if Rs decreases, the potential of the junction, J will increase until the SCR is forward biased, causing SCR to turn on.

During the design, voltage applied between Vcc to ground is 12 volts with current rating of 60 amps; the whole process is controlled using the formula;

$$\mathbf{V_G\ (gate\ voltage)} = \frac{R_1 \times V_{cc}}{R_1 + Rs}$$

Hence, $R_1 (V_{cc} - V_G) = V_G \times Rs$

$$\mathbf{R_1} = \frac{V_G \times Rs}{V_{cc} - V_G}$$

From the design, the minimum gate trigger voltage for the SCR used is 2 volts [2]. When light falls on the LDR, the resistance decreases to approximately 2 kΩ (measured). Therefore, the values can be assigned as follows;

V_{cc}= 12V, LDR= 2.0kohms, V_G =2 V. hence, the value of resistor R1 can be calculated as;

$$\mathbf{R_1} = \frac{V_G \times Rs}{V_{cc} - V_G}$$

$$= 2\times \frac{(2\times 1000)}{(12v - 2v)} = \mathbf{400\ \Omega.}$$

The value of R_1 can be adjusted. It can be chosen within the range of 1kohm- **1MΩ** [9].

It should be noted that the gate voltage is at **2 V.** however, if Rs decreases, the SCR is forward biased causing the SCR to turn on and de-energizes the relay.

3.4 CONTROL UNIT: FUEL CONTROL

The fuel tank is located at the source that is inside or next to the fuel tank. Fuel pump is required to draw the gas toward the engine [10].

The fuel pump required for this design work is an electrical car fuel pump, which is used in cars with electronic fuel injection, meaning that it is powered and controlled electronically with the car battery. It does not use the pre-existing force such as vacuum to draw the fuel along the lines. The fig 3.4 below illustrates how the relay takes control of the fuel pump.

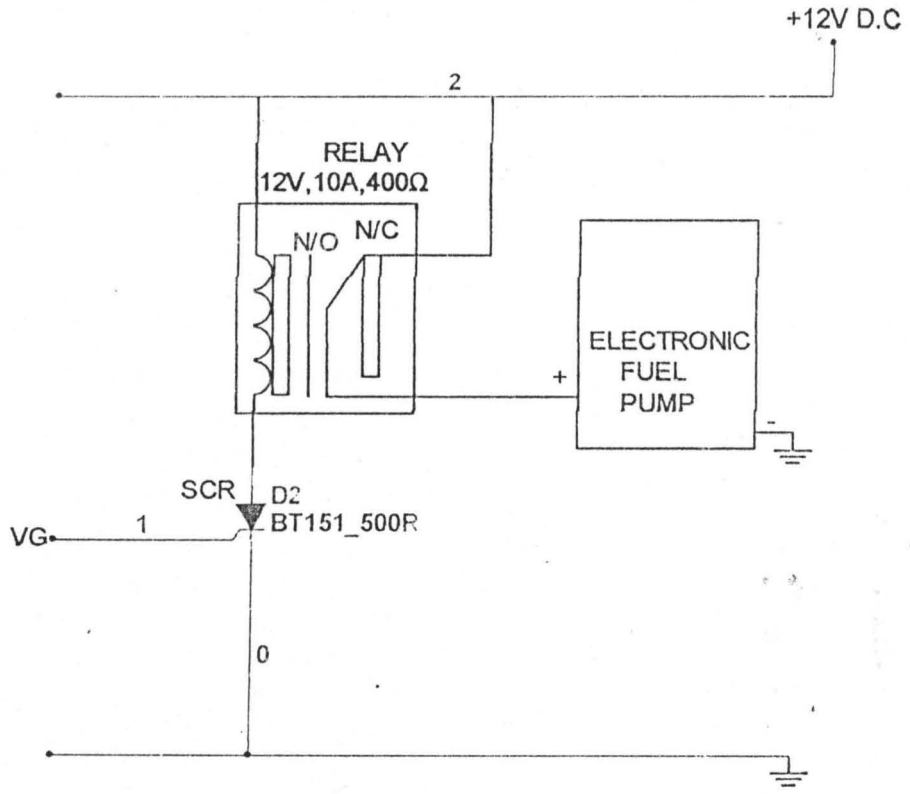

Fig. 3.4 The fuel control unit

A fuel pump generally, constantly pump gasoline to the engine, and gasoline not used is simply returned back the gas tank. Component of an electric pump is an electric control

unit mostly of two terminals labeled the anode (+) and cathode (-) which regulates the fuel pumps operation leading to added safety.

During the design, the wire connected to the common pin of the relay, and the wire from the normally closed pin from the relay in the security panel are used to interrupt direct connectivity of the fuel pump and the car battery .so, whenever the relay is de-energized by the SCR switching action i.e. during the on and off state of SCR, the fuel pump is controlled.

Whenever the SCR is in its on state, the fuel pump fails .when the fuel pump fails, a car with fuel pump failure will act like it is out of fuel even when there is enough gas in the tank [10].

3.5 RESET UNIT

The device is reset by pressing the reset button made of micro switch which opens the conduction path of the SCR and reduces the anode current to zero.

The 0.45ohmjoule, 5 watt resistor (choke) included in the design will resist temperature or heat due to excessive current that may be produced by the reset wires during the reset action so that it does not get into the main circuit.

The principle characteristic of the standard micro switch is that it resists temperature between -30 and 80 Celsius degree [11].

3.6 VOLTAGE REGULATOR; HANDSET CHARGING UNIT.

The constant reverse voltage Vz of the zener diode makes it a valuable component for the regulation of the output voltage against both variations in the input from an unregulated power supply or variations in load resistance.

The current through the zener diode will change to keep the voltage at within the limits of the threshold of zener action and the maximum it can dissipate. Fig 3.6 below shows the voltage regulator circuit which gives output that keeps the handset charging.

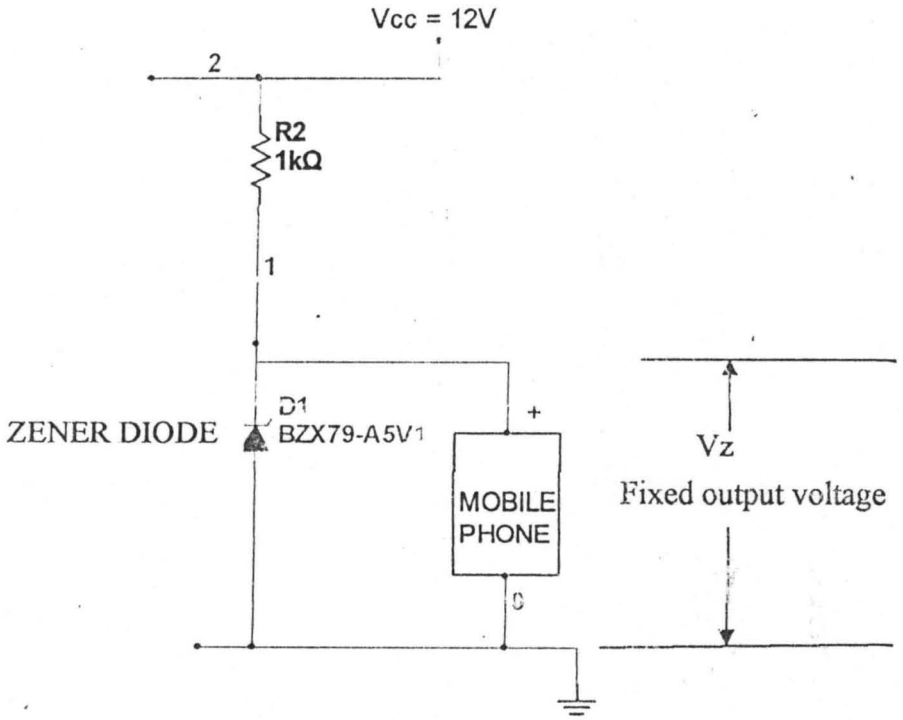

Fig. 3.6 The zener voltage regulator unit

The zener voltage Vz is the output voltage required. The input voltage Vs must be few voltage greater than Vz. The resistor R2 limit the current through the circuit .the current through the resistor is constant, so when there is no output current all the current flows

through the zener diode and its power rating Pz must be large enough to withstand this. Using the relationship below, the value of R_2 can be calculated;

$$R_2 = \frac{V_{CC} - V_Z}{I_Z} \qquad (3.3)$$

Where Vs = 12 and Vz =5.0v. Note, that the current required to charge the handset, I_A is 350mA (for a 2600 model nokia phone) which may vary from one model to another. But, in order to charge the handset based on the current rating, one need at most one tenth (1/ 10) of the I_A [12]. Therefore; one-tenth of 350mA is 35mA. During the design, zener current Iz was taking as 7.0mA, hence using equation 3.3 above;

$$\mathbf{R_2} = \frac{12v - 5v}{7.0mA} = \mathbf{1k\Omega.}$$

The design resistance, R_1 = 1 kΩ. This limits the current so that you don't burn the zener diode if the load resistor gets disconnected.

3.7 MODE OF OPERATION

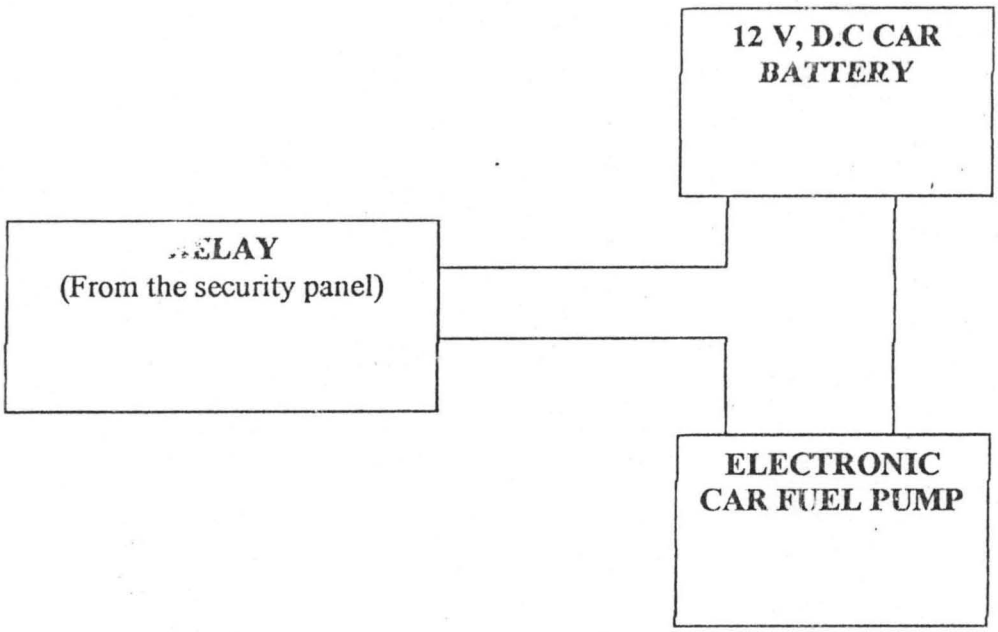

Figure 3.7 the mode of operation of the design.

This system depends on the use of relay (an electromechanical switch) apart from the major or primary component involved i.e. the thyristor which de energizes the relay anytime a call is made to the car.

The relay interrupts the continuity of the electronic fuel pump connection to the 12 volts D.C battery .this connection involve tracing of the positive and negative terminal wires that connects the car battery to the fuel pump.

The positive or anode wire will be cut then connect to the relay on the security panel as shown in fig 3.5 above. This connection serves as a control to the fuel pump. So, that whenever the car is called, the already energized relay while the car is running, is automatically de-energized and therefore demobilizes the car.

This arrangement of components has been done in accordance with the principle of operation.

3.8 COMPONENTS USED

Table 3.8.1: List of components used with values.

SERIAL NUMBER	COMPONENTS	VALUES
1	Resistors R1,R2	**1kohm**
2	Light dependent resistor, Rs	**2kohm**
3	Thyristor	**V_G =2.0volts, I_H =20mA, I_{GT} = 0.1A (100ma)**
4	Zener diode	**5.0 volts**
5	Nokia 2600 phone	**3.5- 5.0 volts (D.C)**
6	Micro switch	**0.45ohmjoule, 5watts**

3.9 LIMITATION

The limitation of this project occurs due to the choice of a GSM network provider to be used for the design. Because no network may lead to no demobilizing and tracking of the stolen car. Therefore a better and more reliable GSM network providers SIM card should be used for the design.

Also, this design was made to function on a 12 volts D.C battery only .meaning that it will not be suitable for other car or vehicles with power other than 12 volts e.g. the 24 volts types.

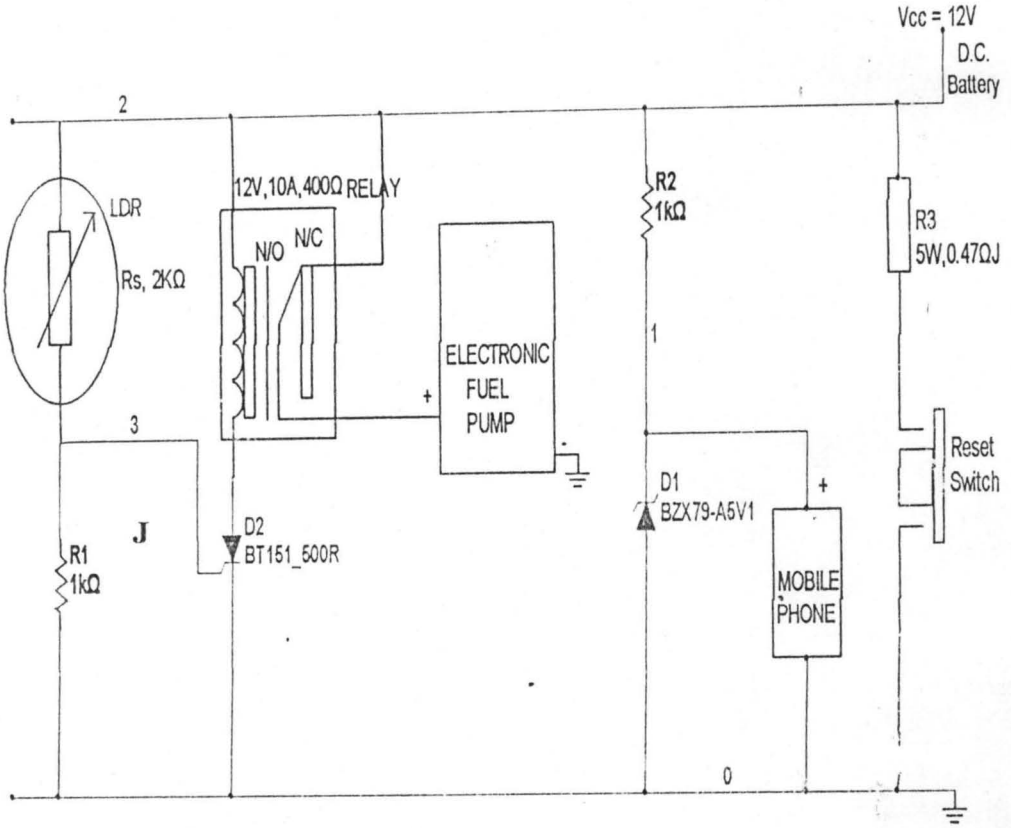

Fig. 3.9 the circuit diagram for the automatic GSM car demobilizer and tracking system

CHAPTER FOUR

CONSTRUCTION, TESTS AND RESULTS

4.1 CONSTRUCTION

An overview of the component to be used was done to ascertain their suitability and availability before the construction was embarked on.

The bread board proved to be very useful and played an integral role in the design and construction of this project work, as theoretical designs were realized with ease and the various components were easily experiment with.

The components were fixed to the Vero board by placing each pin of the component in separate hole and the pins were soldered into circuit in accordance with the specified design .this ensure immovability of the components, hence this stage of the construction is referred to as the final stage of the construction.

Soldering of the components was done with care to prevent damage to the components. Soldering of the micro switch was done such that minimal heat is applied to the pin to prevent damage to the switch.

The arrangement of the component was done taking into cognizance possibility of need to replace a component or effect corrections in case of malfunction.

4.1.1 CASING

The case is light and it is not a conductor, hence it will not interfere with the operation of the device. It is very portable so that it can be kept hidden from the intruder when installed in the car.

4.2 TOOLS USED

The tools used in the design and construction of this project work include;

1) A 60 watt soldering braids.
2) 12volts power sup
3) Cutting pliers.
4) Long nose pliers.
5) File
6) Brush
7) Voltmeter and
8) Soldering flux.
9) De-soldering braids

4.3 TESTING

The following components were tested in the course of this project design work to ensure their various proper working conditions.

Relay continuity test was carried out to ensure the relay is not faulty and to identify the pins representing the normally closed to the common i.e. the plunger of the relay in order to avoid wrong connection.

The light dependent resistor (LDR) was exposed to sunlight and its resistance was measured.

Resistance of the various resistors were measured and compared with the color codes on it to ascertain their rating.

The output of the zener diode was tested and measured to ensure that the output is sufficient to charge the handset.

Furthermore, the whole circuit was tested to ensure that it fulfils the aims and objective of it design.

4.4 DISCUSSION OF RESULTS

A 60 watt bulb was connected to the output terminals of the project work and to a power supply and continuity was observed as the bulb switches on and as a call was made to security device, the bulb switches off. This operation will be realizable when a car fuel pump is used at the security relay terminals because most fuel pumps operate on 12 volts power supply.

The test result on the 5 volt zener diode gave 4.8 volt as the regulated voltage. This show that it has a tolerance of 20%, which is an acceptable one and it is also sufficient to charge the mobile phone.

4.5 PROBLEMS ENCOUNTERD

The major problem encountered was at soldering stage, when short circuits were made in the course of soldering components that were very close .These availability of de-soldering braids made it possible to separate the short circuited joint as a result of lack of flux

in the soldering leads which made fixed components on the Vero board to be shaky and causing an open circuit.

4.6 HOW THE PROBLEMS WERE SOLVED

Meters were used to test all the soldered point to ensure that there was no short circuit and de-soldering braid was used to remove all the baked joints.

4.7 PRECAUTIONS

1. It was ensured that all the components were in order before they used for the project work.
2. The actualization of the entire circuit on bread board was achieved first before soldering on the Vero board to avoid starting all over again.

The configuration of components like thyristor and relay were known before put into use to avoid unnecessary damage.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 CONCLUSION

The main aim of this project was to design and construct a portable and economical car demobilizer and tracking device, which would prevent the rising problem of car theft and high way robbery of cars by intruders.

The design and actualization of this project will secure car since demobilizing the car will prevent or causes difficulty in operation of the thief. When considering a design for car demobilizer, a number of key elements have to be considered. These elements are;

1. Good understanding of thyristor operation and switching principle.
2. Use of smaller number of components to ensure that the design is small. Since this also determines how secure it is in the car.

All these above mentioned factors have been considered in the design and construction of this project to ensure its portability, effectiveness and ability to demobilize and track a car.

This design could be used for any automobile if the principle of operation of this system is well known to the designer and provided that the designer has better way of achieving the same security goal. Unless the principle of operating this device is known to the operator, once the car is demobilized, the car will remain at a point and will not agree to start up.

5.2 RECOMMENDATION

This project work has been designed to reduce all possible methods to car theft and to provide greatest possible amount of protections to car owners. Improvement in the quality of the design could be made to provide for other needs in car security.

It maintenance is low because of the limited numbers of component used for its design, ability of the components to withstand reasonably harsh conditions (for at least a year) and any of them can be easily replaced when bad.

Haulage Company can also find it very useful as it will help the haulage operators to be more exact in their business.

As a further improvement on this project, it is suggested that the use of a voice recorder should be incorporated in the future design of the car demobilizer and tracking device so that it enable the victim to know what have been transpired in your car .

It also suggested that the use of microcontroller i.e. microchip technology should be use to turn on and off the ignition key.

[11] http://en.wikipedia .org/wiki/micro_switch;(22nd, June, 2009).

[12] John Hewes, (2009), the Elect. Club http://www.kpsec.freeuk.com/powersupp.html, (14th, July, 2009).