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Vehicle Tracking and Control (VTC)

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ABSTRACT: Vehicle thefts now have become a major problem and slightly affects the economy. Thieves have mastered in stealing vehicles and only the common man has to suffer losses. The police aren't able to do much because that the thieves steal the car and sell their parts most of the time to prevent getting caught by the police. Just by knowing the location of vehicle, the police can take measures to catch the thief. Now-a-days, public transport including PMT (what we call the Pune Municipal Corporation bus), school buses, truck transport and many more have GPS tracking systems on their purposes to track vehicle's location for the safety of people, students, goods, etc. Today's market also has many GPS tracking systems but mostly are expensive. This project makes use of Arduino, GSM Module and GPS Module to track the location of the vehicle, uses a transistor to control the supply of ignition which in-turn reduces the cost of building the module and thus can be afforded by common man.

KEYWORDS: Arduino, GSM Module, GPS Module, GPS tracking system, Vehicle.

I. INTRODUCTION

The main concept of the project is to track the location of a stolen vehicle, control its ignition in a very easy manner. The commands for the control and tracking of the vehicle are sent through SMS on a phone number of the sim card inserted into GSM Module. The commands such as \$location, \$start and \$stop can be sent through a cell phone. These SMS are retrieved by the SIM800L GSM Module which sends command to Arduino. The Arduino then runs its source code and compares its conditions with the message.

\$location: The Arduino will retrieve the latitudinal and longitudinal values from the SIM800L GSM Module and then give it to process it to GPS Module which will then convert it into google maps link. The Arduino will get the Link and ask GSM Module to send the google maps link to the number where the message came from/ or a particular registered number only.

\$stop: After receiving the message from GSM Module, the Arduino will then pass current to the transistor which has the properties of stopping the current when there is a change in base of transistor.

\$stop: When received the message from the GSM Module, the Arduino will retrieve its current from the base of transistor which will restart the flow of current between the Emitter and Collector.

II. LITERATURE REVIEW

1. This project is a proposed design of tracking the location of a vehicle and controlling its ignition just by send SMS to a particular number. The module receives commands via a GSM Module embedded in the project. The Arduino here is the heart of the project module that controls and manages all the functions.
2. Just by sending simple SMS such as \$start, \$stop or \$location, this module has the properties to detect the location, control its ignition and prevent theft of the vehicle.
3. This module is much cheaper than the other GPS modules available in the market.

III. DESIGN

3.1 Architectural model of VTC (Vehicle Tracking and Control)

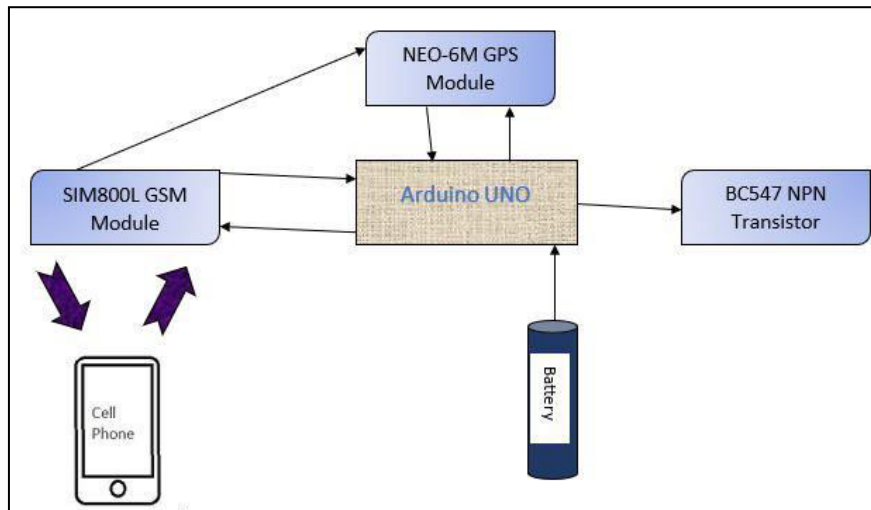


Fig-1: Architectural model for VTC

Sender/Receiver side: We can send message through cell phone and also receive messages by the same device.

Internal working side: Arduino UNO supplies power to all devices either by taking power from the battery or the vehicles ignition power. The SIM800L GSM Module is responsible for sending and receiving messages to the owner of the vehicle. The GPS Module is responsible to convert latitudinal and longitudinal values of the sim card's location into a Google maps link. The BC547 NPN Transistor has the task to control the current between Emitter and collector to flow according to the base current given by Arduino microcontroller.

3.2 Circuit Diagram of VTC

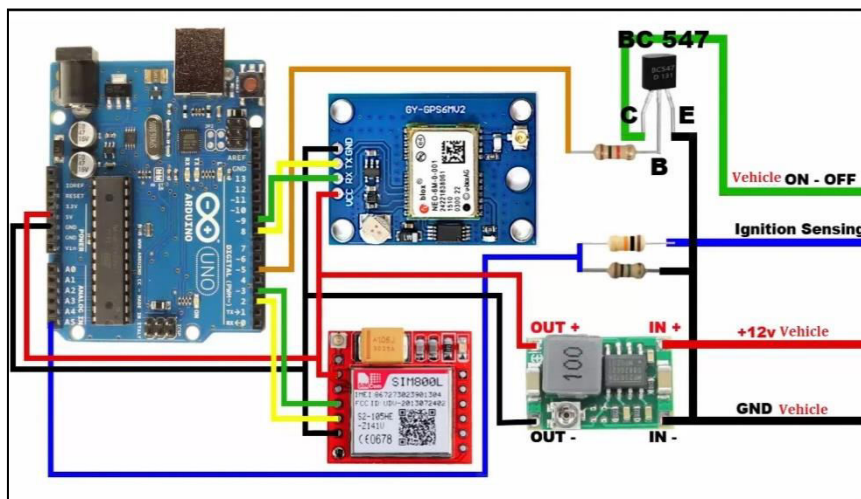


Fig-2: Circuit Diagram for VTC

The circuit contains Arduino UNO Board, SIM800L GSM Module, NEO-6 GPS Module, BC547 NPN Transistor, Mini-360 Buck Converter and some resistors for power flow control. The IN+ of Buck converter is connected to the +12V of Vehicle while the IN- is connected to the Ground of vehicle. The pins ~9 and 8 are associated with the RX and TX of GPS Module respectively. Similarly, 5V port of Arduino and VCC of GSM and GPS Module is associated with the OUT+ of buck converter. The ground of Arduino, GSM and GPS module are connected to the OUT- of Buck

Converter. Pin A5 of Arduino is associated with the ignition sensing of vehicle. The Emitter and Base of transistor are connected to IN- of Buck Converter and ~5 of Arduino respectively. The ON/OFF of vehicle is decided by the Collector pin of transistor.

3.3 VTC Requirements

3.3.1 Hardware Requirements:

- Arduino UNO
- SIM800L
- NEO-6 GPS Module
- Mini 360 Buck Converter
- Resistors (1K,1M,100K)
- BC547 NPN Transistor
- Jumper Wires

3.3.2 Software Requirements:

- Windows OS
- Arduino IDE Software

IV. WORKING

According to the diagram shown in Fig-1, the project module consists of Arduino, SIM800L GSM Module, NEO-6 GPS Module and Transistor. A Mini 360 Buck converter is also used here so as to decrease the voltage coming from the Vehicle. By sending SMS the Module runs. When a message is sent, the SIM800L receives it and forwards it to the Arduino micro-controller. The code embedded into the Arduino checks the conditions and what action to perform respectively. When location is asked, the Arduino module retrieves the latitudinal and longitudinal values of the current location of sim card from GSM Module and sends it to the GPS Module which then converts it into a Google maps link and sends back to Arduino. The Arduino forwards the message of the link to GSM Module and then that module sends the message. We receive the message in the form of link. When start/stop service is used, there is no use of GPS Module and the BC547 NPN Transistor comes into rune here. When message is received by GSM Module it forwards it to the Arduino micro-controller controls the Base pin of the transistor. When the Base is active high, the current passing from Emitter to Collector is active low and vice versa. This controls the flow of current and which leads to control of a connection.

4.1 Steps to control VTC

Make sure there is an active recharge in the Sim card installed in GSM Module.

Make sure you are sending SMS to correct phone number.

Send a message \$location to the phone number.

The processing will require some time but after a while, you will receive the message containing Google Mapslink in it.

Send a message \$stop. This will turn off the connection of ignition thus the vehicle will be unable to start.

Send a message \$start. This will turn on the connection of ignition back in case you find your car and want to drive home.

Advantages of VTC

- a) Relatively cheaper than other GPS Modules which track the location.
- b) Uses transistor which can control a connection.
- c) User can easily track location by just sending an SMS.

Disadvantages of VTC

- a) Uses a sim card which has to be recharged on time otherwise the project won't work.
- b) Using SIM800L GPS module leads to slow processing of data and may lead to delay in SMS.
- c) In remote areas where there is less network range, the Product might find it difficult to send or receive messages.

V. RESULTS AND CONCLUSION

- Thus, this system can track location of the vehicle and also control its ignition.
- This system can be installed on any vehicle including Buses, Trucks, Cars, Vans and even 2-wheelers.
- Implementation of this project will surely affect the theft rate of the area.
- Risk of vehicle being thieved is very low.

VI. FUTURE WORK

Keeping the future in mind, we will also try to develop systems that would show accurate location as compared to current model. We will also upgrade the ignition control and make it more automatic. We are also going to add an anti-theft system which will allow the owner of the vehicle to easily know what's going wrong in the vehicle. Additional features will also be added into the model thus making it more precise.

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