Car Theft Protection System

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Abstract-Modern cars employ is a single protection system which may be an alarm or a password protection, which can easily be hacked by a programmer/hacker. Apart from the protection systems, a wheel jammer is also fitted on the wheel of the car that will lock it in case of a breach. The result of such a comprehensive security system, it becomes virtually impossible to make car thefts happen. With three levels of security, even if the thief manages to breach the first level of security, the second subsystem gets triggered and hence its efficiency at minimizing car thefts becomes pretty high. We, here have developed a prototype of subsystems which is a dual door lock system using a password lock and a SIM based GSM module, keypad based door lock , engine freezing and trip wire. This is a comprehensive protection system which ensures that in case of any breach, there is a backup which gets triggered and makes it virtually impossible to rob the car.

Keywords-GSM, SIM, Engine freezing, door-lock, tripwire, motion sensor.

I. INTRODUCTION

According to the National crime statistics provided by the FBI in 2016, car theft appears to be on a rise this year in the US. Every year, the uptick is about 1%, which is tremendous. And with car thieves finding new ways to make car crime work for them, such as the recent "pinch and park" trend, it isn't a problem that's going away any time soon. It's true that modern security systems are great deterrents. But a new survey shows that thieves arecontinuing to target prestige vehicles and there's much more you can do to keep your car safe than just pressing the button on your car's remote and walking away.

Today's thieves use a variety of sophisticated techniques to gain access to cars and start the engine. The police and the insurance industry are playing catch-up as techniques evolve and try to adapt quickly to modern cars. Currently, amongst most of the people having their own cars, thefts are taking place while parking and sometimes at driving insecurity places. The safeness of vehicles is extremely essential. Vehicle tracking and locking system installed in the vehicle can be helpful to track the car and locking the engine motor.

The place of the vehicle can be identified using Global

Positioning System (GPS) and Global system mobile communication (GSM). These systems constantly watch moving Vehicle and report the status on demand. This is more secured, reliable and low cost.

GSM:

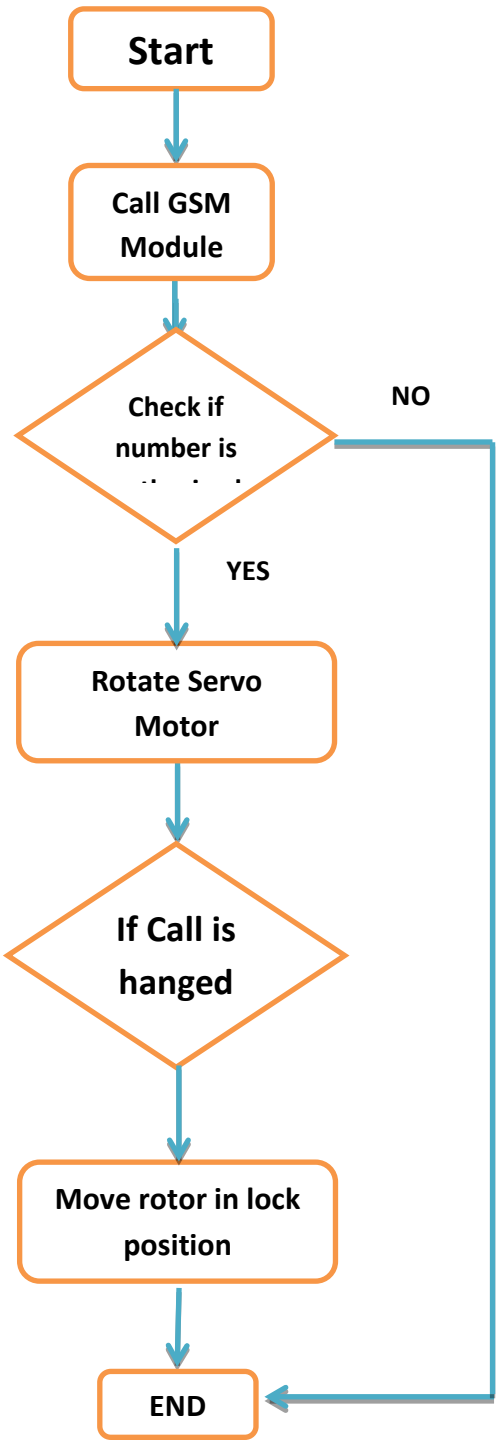
A digital mobile telephony system, which is globally accessed by more than 212 countries and territoriesGlobal system for mobile communication is completely optimized for full duplex voice telephony. Initially developed for the replacement of first generation (1G) technology, now GSM is available with lots of salient features with the constant up gradation of third generation (3G) technology. And now with the alliance of microcontroller, GSM MODEM could be further tailor-made for some of very innovative applications including *GSM based Car theft protection*, GSM based home-security system, GSM based robot control, GSM based voting machine control, GSM based stepper motor controller etc.

II. SYSTEM OVERVIEW

A.*GSM Based door locking*

a. Block diagram

b. Flow chart



c. Components Used

- SIM 900a
- Arduino Mega
- Servo Motor
- Connecting wires

d. Working

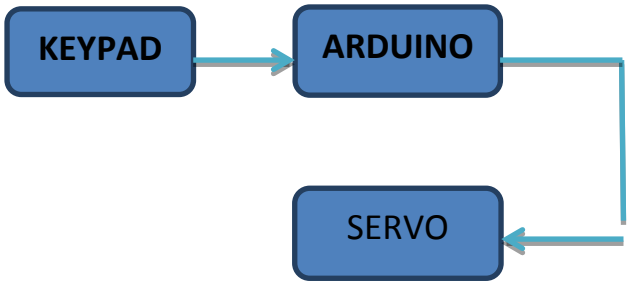
The arduino which acts as the microcontroller uses the GSM/GPRS library.

The car door can be locked or unlocked the door of our car by using our mobile phones. The car door will be unlocked only by the authorized numbers. Numbers can be authorized by storing them in the first three slots of the sim card present in the GSM shield. Once a call is made from the authorized numbers to the GSM shield placed in the car, the I/O pin of the arduino is triggered which rotated the servo motor to 'open' position. The degree of the rotation of the servo motor is set in the code.

On hanging up the call, the triggering of the I/O pin stops and the servo motor sweeps back into lock position thus locking the car. [8][11]

B .Keypad based door-lock

a. Block Diagram



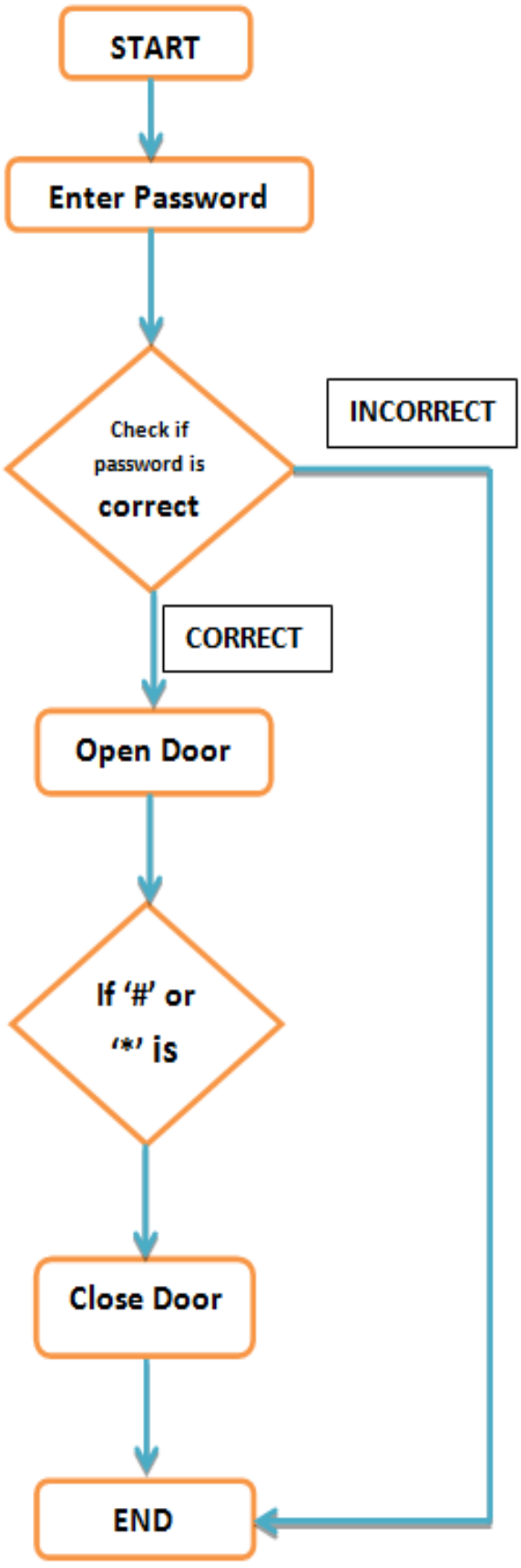
b. Components Used

- 4X3 Keypad
- Arduino Mega
- Servo motor

c. Working

The input device used is a 4 x 3 matrix keypad.The keypad is used so that the car door can be unlocked/unlocked in case the mobile network is not present.Connect the 7 pins of keypad to the 7 pins from 2-9 of the arduino microcontroller.Set the servo motor by connecting the signal wire to pin number 11.Set a 3 digit password to unlock the door. The password is set in the code. The door can be locked again by pressing '*' or the '#' key.Arduino uses the servo and keypad libraries separately.

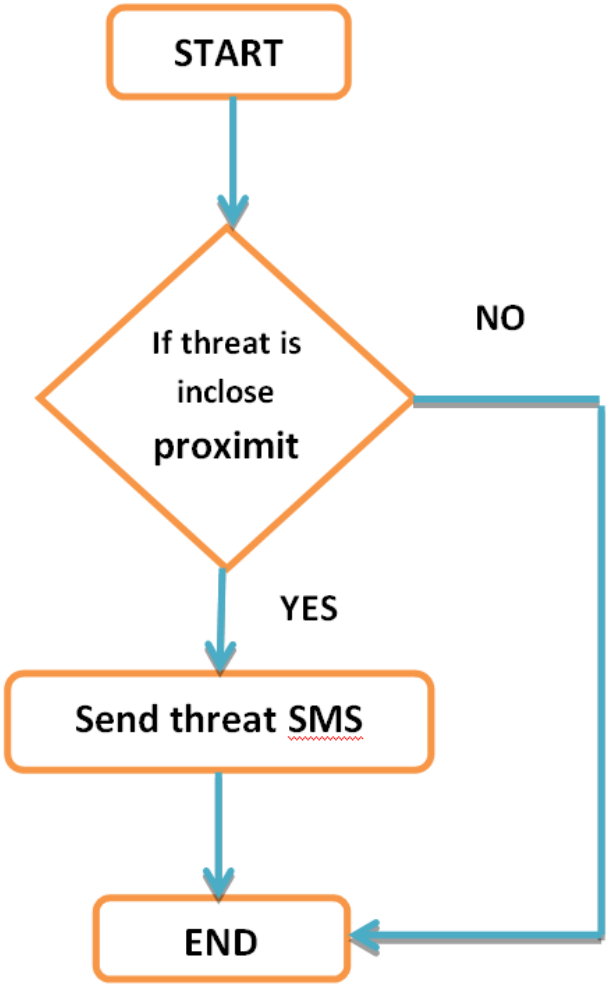
d. Flow chart



C. PIR Sensor based Threat Detection

a. Block Diagram

b. Flow chart



c. Components Used

- PIR sensor Module
- Arduino Mega
- Mobile Phone

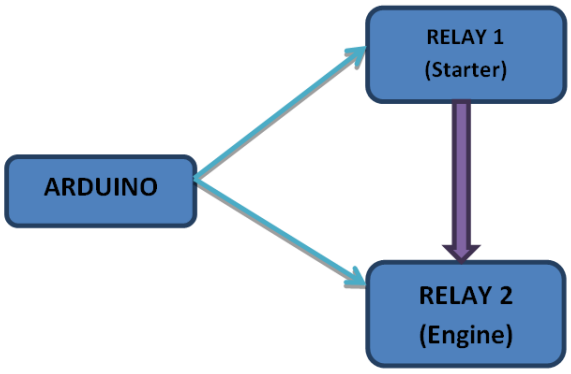
d. Working

Connect the Vout pin of the PIR to the I/O pin of the arduino. Connect the GSM module and its Tx, Rx pin to the Tx-Rx pin of the arduino respectively. Now if a person passes in front of the sensor motion is sensed and the Vout pin goes high. If IR-motion == 'HIGH'then the arduino pin triggers the GSM module through its Txpin to send a threat SMS to the mobile number specified in the code.

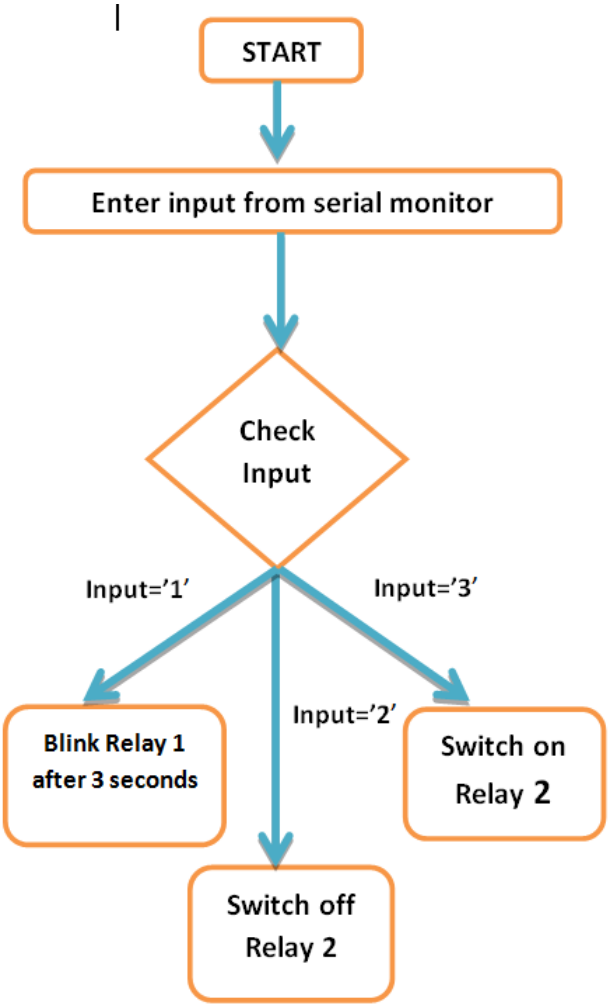
"Threat detected" SMS will be sent to the mobile of the used and the used will come to know that his car is in danger.[13]

D. Engine freezing

a. Block Diagram



b. Flow chart



c. Components used

- Relay
- Arduino

d. Working

Here two relays are used to emulate starter and the engine of the car. Relay is controlled from the serial monitor present in the arduino IDE software. If entered '1' from the serial monitor relay 1 (Starter) will blink after 3 seconds. This is because in a vehicle the starter plug gives the spark plug after three seconds during one attempt. When '2' is given from the serial monitor, relay 2(i.e. engine) will be closed(switched off). This implies that we have successfully frozen the engine. The car will not start even if the key is being rotated. Thus the car will be protected. In order to 'unfreeze' the car we give '3' from the serial monitor and the engine will be turned on again. This however is a preventive measure, on the grounds of security breaching, the car should be controlled via a GSM. Using the same code as that used to turn on and off the servo motor, with slight variation i.e. connecting arduino output to relay input, the car engine can be controlled using our mobile phones.[5][10][12]

III. HARDWARE

A.SIM900A:
B. Arduino Mega
C. Servo Motor
D. PIR Sensor
E. Matrix Keypad
F. Relay

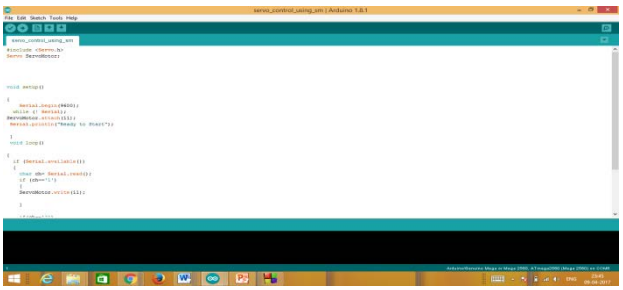
IV. SOFTWARE

A.Arduino IDE

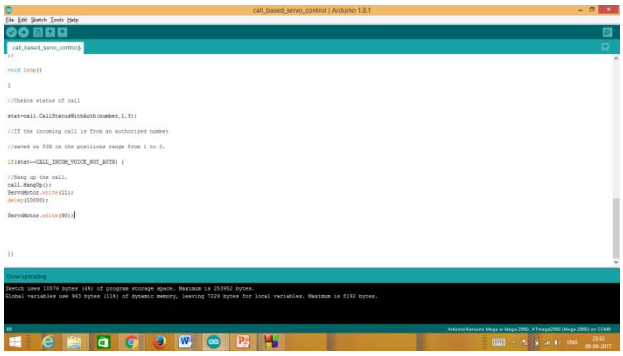
The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software.

B. Screenshots of the Arduino IDE.

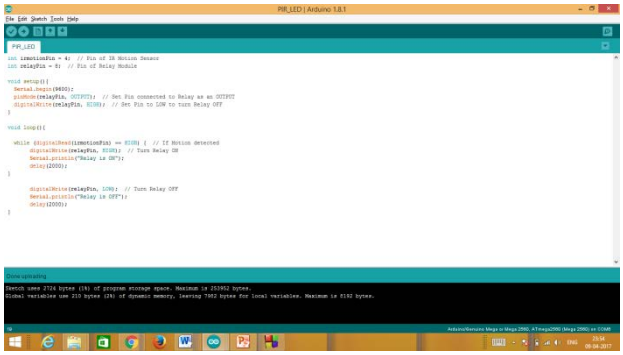
a. Servo motor control



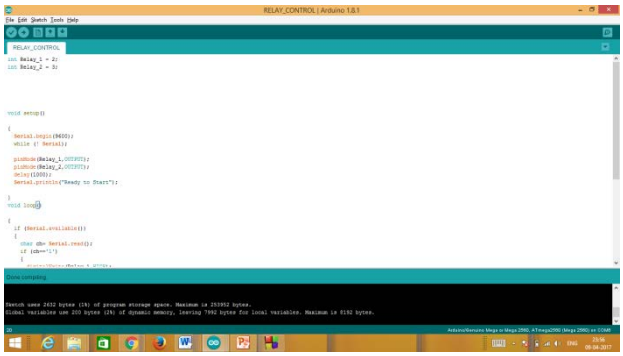
b. Call based locking



c. PIR based threat detection



d. Relay Control (Engine freezing)



V. CONCLUSION

A car theft protection system should minimize the chances of car robbery by providing complete security. The system created a multilevel security mechanism which makes it difficult for anyintruder to creep in. The first subsystem is a keypad based door locking mechanism which ensures that the door of the car gets open only after the correct password is entered. Also, for convenience and for providing another option, a GSM based door unlocking system is employed. The second subsystem comprises of a PIR sensor which senses the presence of an individual when he tries to forcefully enter the car and sends a message “THREAT DETECTED” to the owner of the car. The last subsystem uses two relays which are used to control the engine of the car using a serial monitor present in the Arduino IDE software. Using this we can turn off the engine when a thief tries to start the car. In this way , we can minimize possible car thefts and make it easy and tension free for the car users. Although no system can be considered as 100% foolproof, nevertheless by employing multiple levels of security the numbers of car thefts have been reduced by a considerable amount. Hopefully, this idea can be used as a possible security mechanism for future cars.

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Adwait Ranadive, Abhishek Vamsi, Palash Pandey, Apurvaraj Singh: Completed graduation from ‘Vivekanand Education Society’s Institute of Technology’, Mumbai University in the year 2017 from the Department of Electronics Engineering. The following project was made under the guidance of Dr. Rajani Mangala.

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