

“An IoT Based Vehicle Theft Detection and Remote Engine Locking System”

Madhu M Nayak (Assistant Professor, CSE Dept.), Spandana M Suresh, Tejaswini, Vaishnavi V, Yashaswini S

Dept. of Computer Science and Engineering
GSSS Institute of Engineering and Technology for Women, Mysuru.

Abstract: An IoT based vehicle theft detection and remote engine locking system is GSM technology that helps the users identify the vehicle in theft mode and enables the controlling mechanism technique. At present day scenario, there is a rise in the number of vehicle thefts exponentially. Criminals are becoming smarter day by day and have reached the stage of applications present against the existing vehicle safety system. Vehicle theft has become a major issue which should be traced and prevented. The proposed system overcomes most of the limitations and the cost effectiveness and also reducing complications by making use of few high-priced products like ignition key. In proposed method we have the extension for controlling mechanisms which remotely locks the vehicle engine and prevents the theft. In proposed technique, user start/stop the vehicle either by using the android application or by the ignition key, tracks exact location (latitude, longitude) of the vehicle using the application. Android application is very helpful for locking the vehicle engine in case of theft and upon rash driving of vehicles. In this way vehicles are provided with better controlling mechanism and thus reducing the crimes.

Key Words: *Internet of Things, Vehicle theft detection, Remote engine locking system, Rash driving Detection, Keil Software, Android application.*

1. INTRODUCTION

The population of India according to 2018 census stands at 135.26 crores. The total number of registered vehicles in India stood at 30.92 million in the same year. In 2018 about 44,158 cases of vehicle theft was reported and only 19.6% of these cases could be solved. Every year the rate of vehicle theft increases by 10% to 12%. Rise in population is directly proportional to the rise in number of vehicles. With this, the risk of vehicle theft has also increased tremendously. Stolen vehicle does not only cause economic loss to the owner, it also may be used in certain criminal activities. This might put the owner of the vehicle in danger and unwelcome situations. Thus, having a functional and efficient anti-theft tracking and detecting system has become a necessity. This project “An IoT based vehicle theft detection and remote engine locking system” helps the user to track the location (with latitude and longitude) of vehicle at any given point of time with the help of an android app that will be installed in their phones. It makes use of GPS trackers that are installed in the vehicle to detect the location of the vehicle. Vehicle can be accessed either by ignition key or by the android application. Usually user makes use of the android app to start, stop and lock the vehicle. Only if the mobile is not working or any other emergency, he makes use of the ignition key. When the user is using the ignition key, alert message will be sent to the user as well as the guardian as the vehicle is started using the ignition key. User has to inform prior to the guardian that, he is the one using the vehicle. Or else guardian will lock the engine using the android application. This system also includes a software that detects rash driving of the vehicle. Once this is detected the guardian will be alerted with a message about the same. With such effective systems we could control the theft of vehicle to a greater extent. People will have a way of stopping the crime from happening instead of reporting the crime after it has already taken place, as the chances of solving such cases are really low at present time.

1.1 PROBLEM STATEMENT

Problem statement of this project is that, once the vehicle is being stolen, owner cannot track and lock their vehicle. The chances to get their vehicle back is very difficult. It makes so hard to track the vehicle when there is no evidence. So, this system will track and monitor the vehicle's location using the android application and remotely locking the engine. Vehicle tracking system has been nominated as one of the best tracking systems for the losses of the vehicle. Generally, GPS tracking uses a system which is useful to find the actual location. So, by improving this system we make use of GPS and android based smart phones.

1.2 EXISTING MODEL

The existing technology mainly uses beepers or alarms and biometrics to the detect the theft. These commercially available products are very high priced. Using a buzzer will help the user to prevent theft in nearby parking condition. If the vehicle is parked far away it becomes difficult to prevent the theft and hence using buzzers is not effective technique. In certain existing the systems the fuel lines are cut off as soon as theft is detected, this might be dangerous at times.

1.2.1 Drawbacks of The Existing System

In existing system one can only detect if the vehicle is stolen but cannot lock the vehicle and any person with the ignition key can start the vehicle. They are highly costly and cannot be afforded by all individuals.

1.3 PROPOSED SYSTEM

In the proposed system, detection of vehicle start, tracking the vehicles location using GPS is being implemented and also remotely locking the engine which is implemented using an android application that will be present with user's phone. In the system the GPS tracks location of vehicle. Here both the ignition key as well as the start button in the app must be used to start/stop the

vehicle. SMS alert is sent to user upon vehicle start and also in case of rash driving conditions. Then owner using the lock option in android app to lock the vehicle permanently. This will help the user from preventing the theft of the vehicle. The android app mainly used to start/stop the vehicle, engine locking function and also to monitor the movement of the vehicle at any given time with its latitude and longitude.

1.3.1 Advantages of Proposed System

Prevents the unauthorized person from stealing the vehicle. Helps in tracking the vehicle. Detection and notification with remotely locking the engine mainly aims to reduce vehicle theft to a great extent. Rash driving can be detected and controlled. Cost effective. High security can be achieved with the help of this application.

2. RELATED WORKS

A Literature survey is a type of review article, where literature review is a scholarly paper which includes the current knowledge as well as the theoretical and methodological contributions to a particular topic.

Paper Title	“Smart Anti-Theft Vehicle Tracking System based on Internet of Things”	“Theft Detection and Controlling System of a Vehicle using GSM”	“A smart Vehicle Tracking, Accident Detection, Alert Generation Using IoT”	“Design and Implementation of a Vehicle Theft Control Unit Using GSM and CAN technology”
Methodology	Switch is provided for turning on/off the fuel line of vehicles during any emergency. RFID used for authentication purpose and the LinkIt ONE development is used as the control board system for prototyping wearable and IoT device.	An anti-theft system used to cut-off the fuel supply for the engine from the carburettor a solenoid-valve, GSM system, buzzer & GPS system, 8051 module, ATmega328 microcontroller are used in this system.	Alcohol sensor is used to check if the driver is drunk or not. To check the vibrations produced, vibration sensors are used. To detect speed breakers and potholes on the road, accelerometer is used	This System, deals with the design and development of theft control system by making use of embedded system, which is based on Global System for Mobile provisioning/communication (GSM) Technology along with CAN bus technology and RFID system.
Implementation Drawbacks	<p>*It is an Anti-theft vehicle tracking system based on IoT which only tracks the vehicles location (latitude and longitude).</p> <p>*It uses RFID based driver authentication-system which provides an extra layer of security.</p>	<p>*When the vehicle is stolen, an alert message is sent to the owner to trace the vehicle's location.</p> <p>*When the owner finds any threat, with the help of SMS he will cut the ignition of the spark plug with the help of relay.</p>	<p>*To remove the unwanted sound and noise from the readings of the sensor, Signal Conditioning circuit is used.</p> <p>*Via Bluetooth, the hardware unit is connected to the mobile applications.</p>	<p>*This system is reliable, when a cellular network is available</p> <p>*This system makes use of a mobile phone which is embedded in the vehicle with an interfacing Engine Control Module (ECM) through control area network (CAN).</p>

3. HARDWARE DESCRIPTION

I. P89V51RD2 Microcontroller

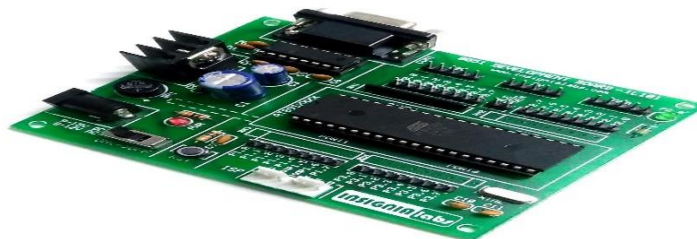


Fig 1: P89V51RD2 Microcontroller

The main center part of the project is the microcontroller. Here we are using the 8051 based Philips P89V51RD2 microcontroller. The P89V51RD2 are 80C51 microcontrollers with 64kB flash and 1024 B of data RAM. A key feature of the P89V51RD2 is its X2 mode option. The flash program memory supports both parallel programming and in serial ISP.

II. DC Motor



Fig 2: DC Motor

A DC motor is an electrical machine that converts electrical energy into mechanical energy. NR-DC-ECO is high-quality low-cost DC geared motor. It contains Brass gears and steel pinions to ensure longer life and better wear and tear properties. The output shaft rotates in a sintered bushing.

III. 16 X 2 LCD Module



Fig 3: 16 X 2 LCD Module

A liquid crystal display or LCD is a combination of two states of matter, the solid and the liquid. LCD is an electronic display module which uses liquid crystals to produce a visible image. The 16 x 2 translates 16 characters per line display in 2 such lines. A liquid-crystal display is a flat panel display or other electronically modulated optical device that uses the light-modulating properties or liquid crystals combined with polarizers.

IV. Ignition key

The key is used in a motor vehicle to turn the switch that connects the battery to the ignition system and other electrical devices. The ignition key is used to start and stop an automobile. It is also used for locking the engine.

V. ADC 0809



Fig 4: ADC 0809

The ADC0808, data acquisition component is a monolithic CMOS device with an 8-bit analog-to digital converter, 8-channel multiplexer and Analog Span Adjusted Voltage Reference microprocessor compatible control logic. The converter features a high impedance chopper stabilized comparator. The 8-channel multiplexer can directly access any of 8-single-ended analog signals. ADC0809 offers high speed, high accuracy, minimal temperature dependence, excellent long-term accuracy and repeatability, and consumes minimal power.

VI. ADXL335 Accelerometer

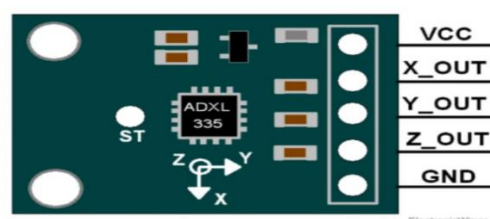


Fig 5: ADXL335 Accelerometer

The ADXL335 is a small, thin, low power, complete 3-axis accelerometer with signal conditioned voltage outputs. It can measure the static acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration resulting from motion, shock, or vibration. The user selects the bandwidth of the accelerometer using the CX, CY, and CZ capacitors at the XOUT, YOUT, and ZOUT pins. Bandwidths with a range of 0.5 Hz to 1600 Hz for the X and Y axes, and a range of 0.5 Hz to 550 Hz for the Z axis.

VII. GSM Module



Fig 6: GSM Module

The main objective of GSM system fitted with the GSM module is to determine the fact of invasion to the controlled territory and to aware the owner by the phone or cell phone (send SMS). The principle of GSM alarm system operation: protected area is equipped with all necessary sensors and control panel with the GSM module.

VIII. Vibration Sensor

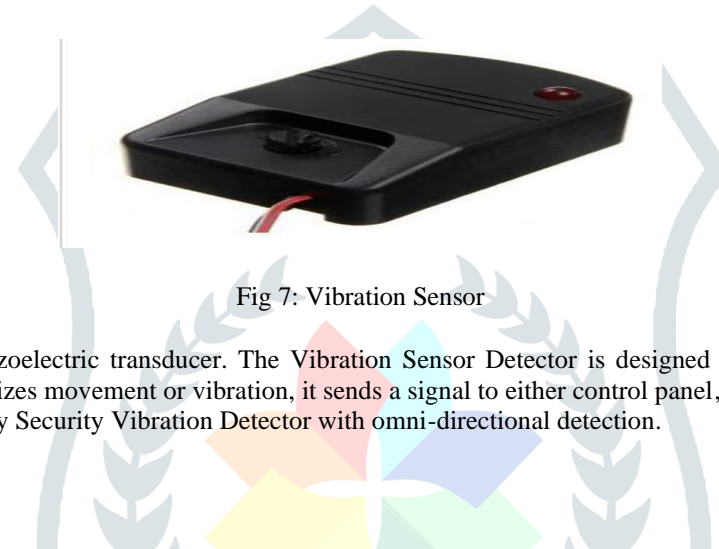


Fig 7: Vibration Sensor

This sensor buffers a piezoelectric transducer. The Vibration Sensor Detector is designed for the security practice. When Vibration Sensor Alarm recognizes movement or vibration, it sends a signal to either control panel, which developed a new type of omni-directional high sensitivity Security Vibration Detector with omni-directional detection.

4. WORKING

4.1 PROPOSED SYSTEM

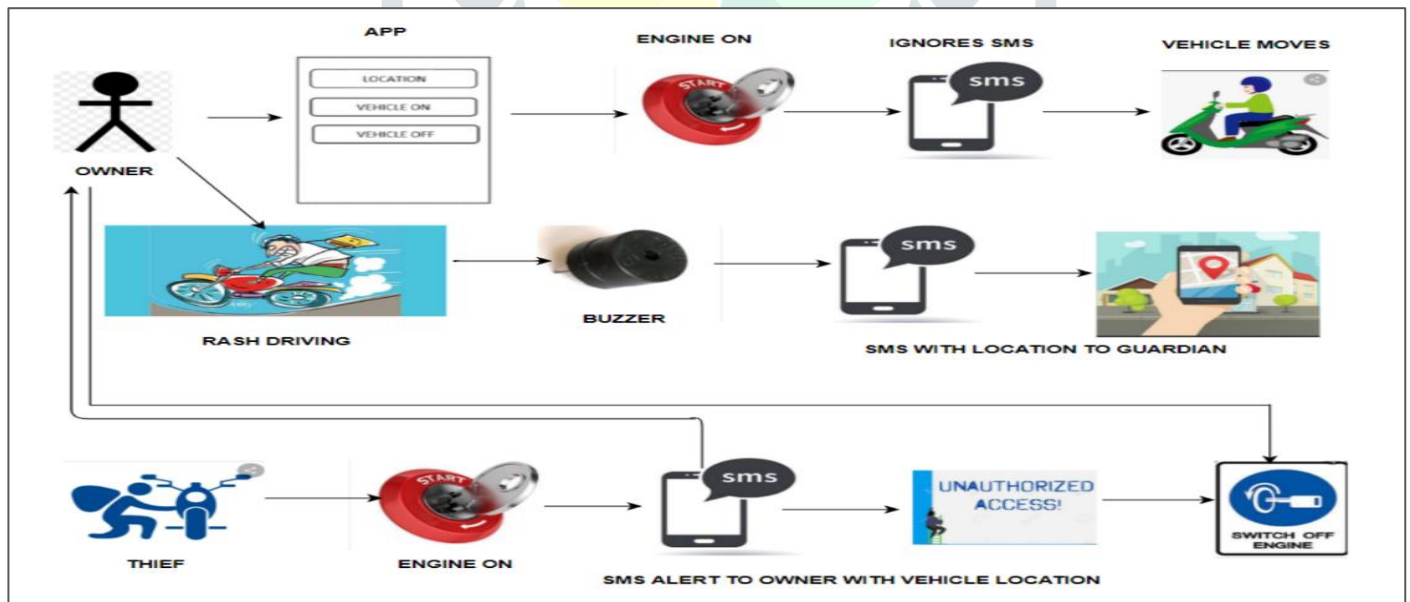


Fig 8: Proposed System Architecture

The system architecture of the proposed system is shown in Figure 8. The entire system architecture is divided into 3 modules: owner, theft detection and rash driving detection.

- Owner:** Owner starts the vehicle using the android application. Application consists of a “Vehicle ON”, “Vehicle OFF” and “LOCK” options. When he selects “Vehicle ON” option, the vehicle starts. Once the vehicle is ON, the GSM module sends an SMS to the registered mobile number notifying the owner that the “vehicle started using the android application”. Owner will ignore the message as he was the one to access the vehicle. Owner chooses “Vehicle OFF” to stop the vehicle.

- **Theft Detection:** When the vehicle is accessed using the ignition key a message will be sent to the owner as well as his guardians that “vehicle started using the ignition key. If it was an unauthorized access then the owner /guardian will use to android application to lock the engine of the vehicle so that the theft can be prevented. The vehicle cannot be restarted using the ignition key.
- **Rash Driving Detection:** If rash driving is identified, a message will be sent to the owner and the guardian stating that the user is driving the vehicle rashly, then guardian can use the android application to stop the vehicle.

ANDROID APPLICATION PART: The android application consists of the following modules

- **Vehicle ON and OFF Button:** This is used by the owner or the guardians to start and stop the vehicle. When the "Vehicle ON" button is used, vehicle is started & the owner receives a message as “Vehicle started through Android application”. Similarly, with "Vehicle OFF" button we can turn off the vehicle engine.
- **Location Button:** This shows the exact location along with latitude and longitude of the vehicle at any given point of time.
- **Lock Button:** This is used when the owner detects an unauthorized access of the vehicle. A message will be received saying “Vehicle started using ignition key”. When such a message is received the owner can lock the engine of the vehicle with the help of the android application and prevent the theft of the vehicle. Here up to 3 members (owner/guardian) have the access to lock the engine in case of an unauthorized access. Others can use the app for only ON and OFF.

5. EXPECTED RESULTS

5.1 HARDWARE PART

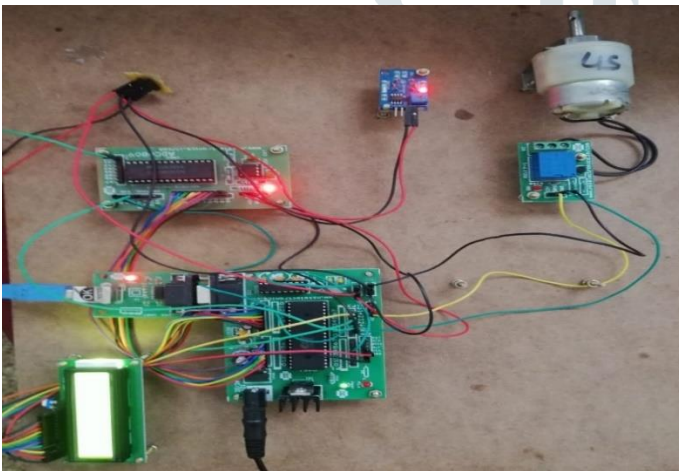


Fig 9: Overview of The Project



Fig 10: Vehicle Turned ON Using Ignition Key

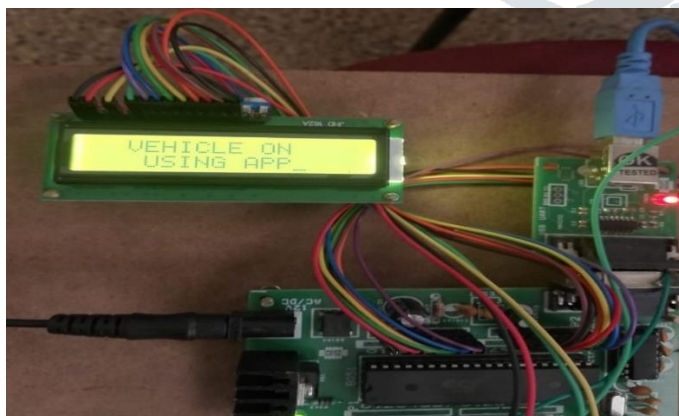


Fig 11: Vehicle Turned ON Using Android app



Fig 12: Vehicle Locked

The Fig 9 represents the overview of the project and how the hardware components are connected to each other. Fig 10 is the representation of vehicle turned ON using the ignition key. Fig 11 is the representation of vehicle turned ON using the android app. Fig 12 is the representation of vehicle lock scenario when an unauthorized person has accessed the vehicle.

5.2 ANDROID APPLICATION PART

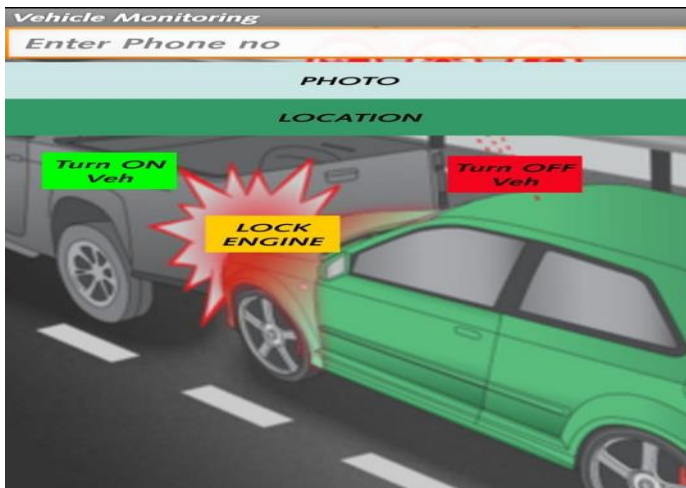


Fig 13: Vehicle Monitoring Application



Fig 14: Track Me Application

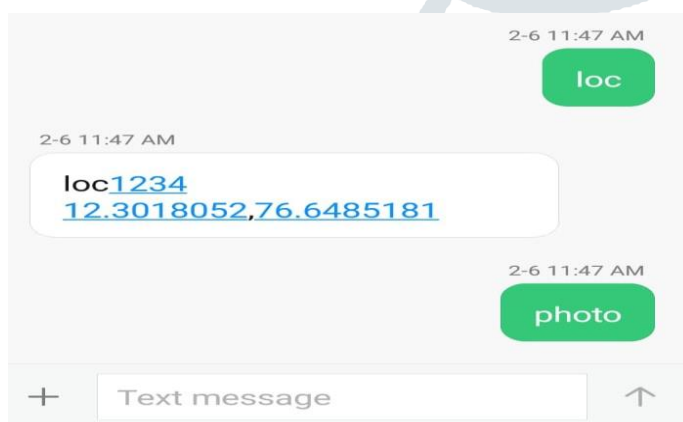


Fig 15: Latitude and Longitude Sent to Owners cell phone

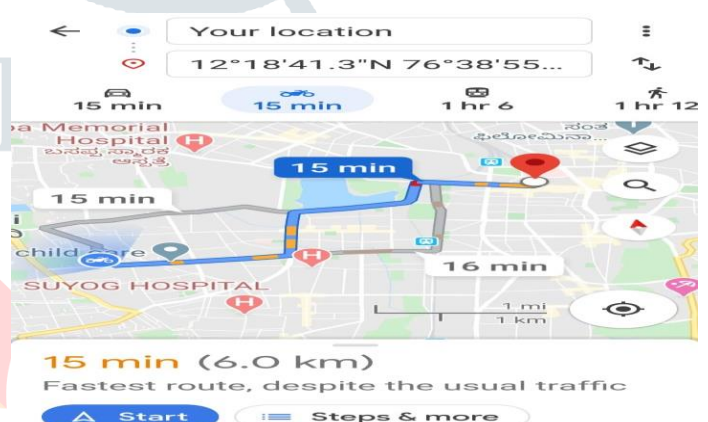


Fig 16: Tracking Exact Location Of The Vehicle

The Fig 13 and Fig 14 are the two android applications developed for this project. Fig 15 is the representation of owners and guardians receiving the SMS of location (latitude, longitude). Fig 16 represents the tracking the exact location of the vehicle.

6. CONCLUSION

The foremost objective of this project is to assist and ensure the safety and security of the vehicle. As security systems are becoming a unavoidable necessity in life, our proposed system provides safety and detects theft efficiently at a very low cost. The main purpose of this project is to prevent vehicle theft and to lock the engine using an application and also has a rash driving detection system that can be monitored using the application. The proposed system mainly aims to provide a low-cost theft detection system also aims to safeguard their vehicle from theft.

7. REFERENCES

- [1] https://www.researchgate.net/publication/326090932_Design_and_Implementation_of_Smart_Vehicle_Theft_Detection_using_Raspberry_PI_And_IOT_for_Real_Time_Applications
- [2] <https://www.projectsof8051.com/gps-based-vehicle-theft-detection-system-using-gsm-technology/>
- [3] <https://Ieeexplore.ieee.org/document/8728460>
- [4] <https://www.ijraset.com/files/serve.php?FID=17845>
- [5] <http://ieeexplore.ieee.org/document/7913034/>
- [6] <https://www.engpaper.com/gsm-gps-2018.htm>