

# Vehicle Theft Detection using GSM on Raspberry pi

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**Abstract-** In recent years the crime related to vehicle theft has been a tremendous rise with intruders becoming smarter every day. As we know in serious crimes stolen vehicles are used that results in loss of life or physical injuries. This generates a crucial need for an effective vehicle theft diagnosis system. In this project, a compact, cheap and efficient system is studied, designed and explored using Raspberry Pi 3 as the core processing unit of the whole system. We are using the MEMS accelerometer sensor which is placed on the vehicle. First the key is inserting in key slot and it will be detected and if engine of car is started then owner will receive a message indicating that the engine is started using Global System for Mobile communication (GSM). We are also looking to rash driving situation. When driver is driving on high speed and taking dangerous drift it is detected by MEMS sensor placed on car then alert message is sent to the owner. This device functions in two modes which are user mode and theft mode. This paper explores the possibility of a compact, viable, cheap and efficient vehicle theft detection system.

**Indexed Terms-** IR Sensor, Raspberry -Pi, GSM, Switch, MEMS ADxL 345, 16X2 LCD

## I. INTRODUCTION

In recent years, we observe vehicle thefts are increasing at a high rate around the globe and people have started to use the theft control systems installed in their vehicles. Anti-theft vehicular systems which are available in market are very expensive. Hence, we are designing and developing simple and low-cost vehicle theft control scheme. This Anti-Theft Detection system provides a greater advantage to any person who can afford a cheap product which could provide anti-theft detection features to any vehicle. The Anti-theft detection system works by using Raspberry pi as

hardware tool, IR sensor for detecting and GSM for sending message, accelerometer sensor for detection of rash driving and 16x2 LCD display. In this system there will be two modes user mode and theft mode.

User mode and theft mode will be switched by using GSM module by sending the message from the owner. Automatic monitoring of vehicles is possible which will be helpful for personal vehicles and rented cabs etc. The best solution for saving of money and Reduction of man power is possible by using this system by Using Raspberry pi board. The proposed system get information related to the vehicle like speed, rash driving and it will inform the owner.

## II. PROPOSED SOLUTION

In this proposed system continuous monitoring of personal vehicles and school vehicles at real time is possible and if the unauthorized person tries to access the vehicle then this system helps to gather the information such as key detection, engine started or not and rash driving detection and it will gives the alert message to the owner's Smartphone. The proposed system uses Raspberry pi board which placed inside the vehicle. In this system there should be two modes user modes and theft mode. In the user mode there will be normal operation that means owner or authorized person is driving the vehicle. When the user is not driving the vehicle then it will be in theft mode which is done by switching the modes by sending the messages to the system by using GSM and whenever the system in theft mode and if unauthorized person accesses the vehicle then it will send the alert message to the owner. Owner can switch the two modes that are user mode and theft mode by using GSM module.

The modes can be switched by sending the message to the system for user mode message will be User mode and for theft mode message will be Theft mode. When

the system is operating in user mode, when key is detected and engine will be started no message will be sent to the owner. Hence, we can avoid unnecessary data in user mode.

The GSM module would get communicate to raspberry pi board. Key detection is provided by IR sensor. If unauthorized person tries to insert key then IR sensor will detect it and message will be sent to the owner also if engine gets started then also it will send the message to the owner. If engine gets started then again message will be sent to the owner mobile number. By using GSM module this message will be delivered to the owner. That input will be given to the raspberry pi. The MEMS ADxL 345 is accelerometer sensor which will detect the condition of rash driving.

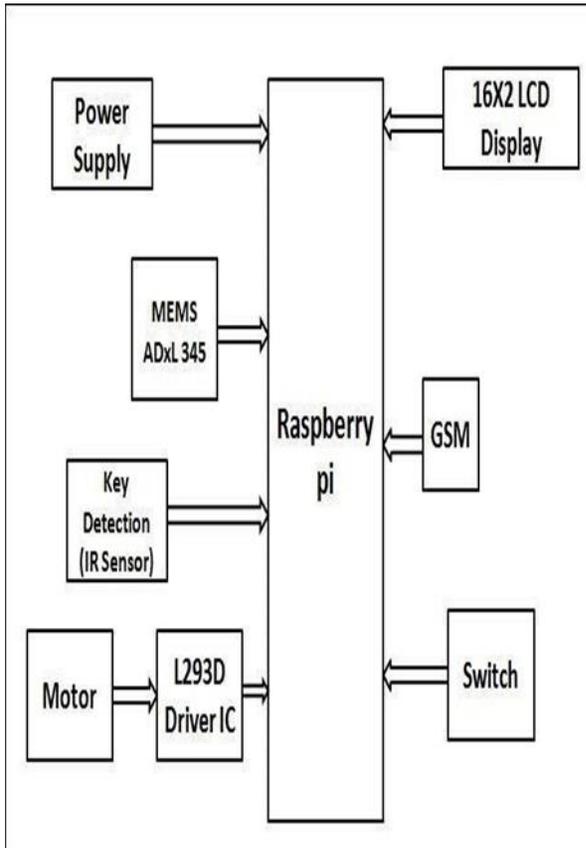


Figure1. System Block Diagram

### III. MODULES USED

#### A) RASPBERRY PI

The Raspberry Pi is a type of computer which is single board and credit card sized. The aim of this device is

to providing low-cost computers. Their ultimate goal is to provide small, affordable chip size computer. The price of raspberry pi board is Rs.2, 495 for model B. The general purpose input output pins on each board allow the user to connect other boards. Ethernet port is provided. Features of Raspberry pi b board are as follows:

- 1) 5V and 1A maximum power from an adaptor.
- 2) 700 MHz ARM1176JZF-S core (ARM11 family, ARMv6 instruction set).
- 3) 1GHz operating speeds.
- 4) Four USB ports – keyboard, mouse and for external memory
- 5) Raspberry pi 3 boards use IEEE 802.11 wireless local area network.
- 6) HDMI port is available.
- 7) 40 general purpose input output pins are available.



Figure 2. Raspberry pi [5]

#### B) GSM MODEL

GSM modem is a device that accepts any SIM card and operates just like a normal phone. It looks similar like a mobile phone. To communicate over mobile network this model is connected to computer. GSM modems provide mobile internet connectivity to the device.



Figure 3. Global System for Mobile Communication [6]

C) IR SENSOR

An infrared sensor is device that emits light so as to sense or to detect some objects in the environment. The sensors which measures infrared light, instead of emitting a light that's known as a Passive.



Figure 4. IR LED [7]

IR LED is again a simple diode which emits out the IR radiations. The function of this diode is to transform electricity into light. Electron-hole pair principle is used here.

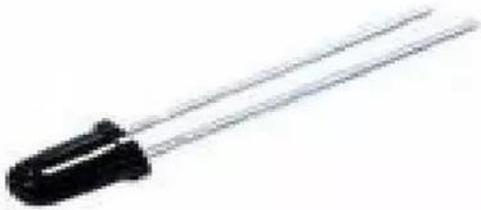


Figure 5. Photodiode [8]

The photodiode is also called as a p-n junction diode. It can be connect with the reverse bias direction. The detector is used to convert light into electricity. Whenever number of photons or a light falls on detector it works effectively.

D) LCD DISPLAY

LCD module area unit terribly usually employed in most embedded comes, the explanation being its low-cost worth, accessibility and software engineer friendly it's sixteen Columns and a pair of Rows. The 16x2 interprets to a show 16 characters per line in two such lines. During this digital display every character is displayed during a 5x7 element matrix.

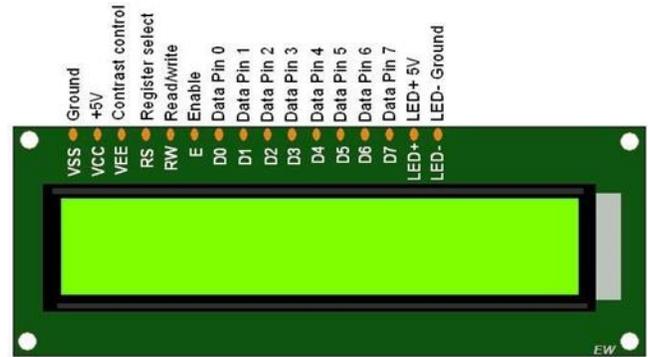


Figure 7. LCD display module [9]

E) ADXL 345

The accelerometer ADXL345 could be a tiny, thin, ultra-low power, 3-axis measuring system. It measures the dynamic acceleration and static acceleration. In that serial communication can be done using I2C, SPI. If the static acceleration measuring then due to gravity, we find out the angle the device is tilted at with respect to the earth. And if the dynamic acceleration measuring, we can find the way the device is moving. This accelerometer sensor is used for mobile device applications. Several special sensing functions square measure provide. This accelerometer sensor is used in various applications.



Figure 8. ADxL345 [10]

IV. FLOWCHART

In this algorithm there are two modes: USER Mode and THEFT Mode. If authorized person is not driving the vehicle then by sending the message using GSM to the system authorized person switches the system into the theft mode. If owner or authorized person accessing the vehicle then normal operation will takes place. But if system is in theft mode and if unauthorized person tries to access the vehicle it will send alert message to the owner’s mobile and if the unauthorized person inserts a key and engine is started then message will get sent to the owner otherwise no message sends to owner. If there is a situation of rash driving then message will get sent to owner.

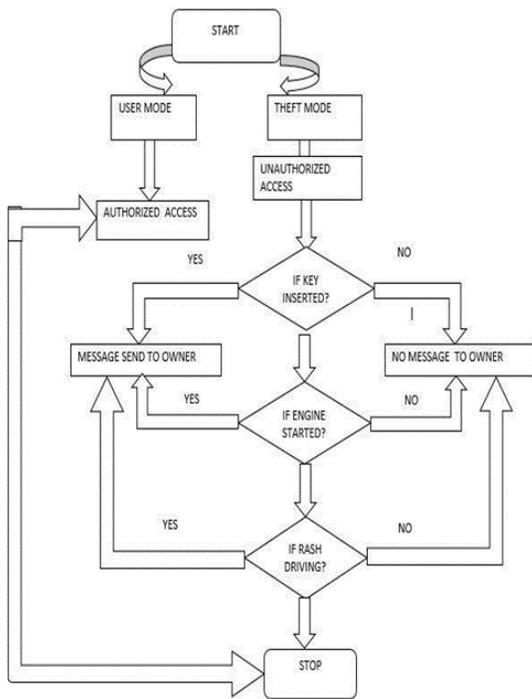


Figure 9. Flowchart

V. APPLICATION

- 1) Multiple vehicle detection- This proposed system can be used for multiple vehicle detection rather than single vehicle. It is especially used for rented cabs (Taxi), school or college buses transports and personal vehicles.
- 2) In a Big Mall- In such places need for the security of customers vehicles increases. So this system can be used to monitor the environment and hence secure the vehicle. [3]

- 3) Vehicle theft detection system- In day-to-day life need of security has been rapidly increases. This system can track the exact location of vehicle using GPS. It is also used in a large public places like parking of vehicles.[3]

VI. FUTURE SCOPE

- 1) By using GSM, SMS are accessible simultaneously we can incorporate the call include for simplicity task.
- 2) The intimation message in that proposed system is sent to the authorized person over GSM which can also be done over e-mail.
- 3) This proposed system can be used for multiple vehicle detection rather than single vehicle.
- 4) This system is especially used for rented cab, School or college buses transports and personal vehicles.
- 5) This project is categorized under embedded system
- 6) By using GPS we can find the exact location of the system.

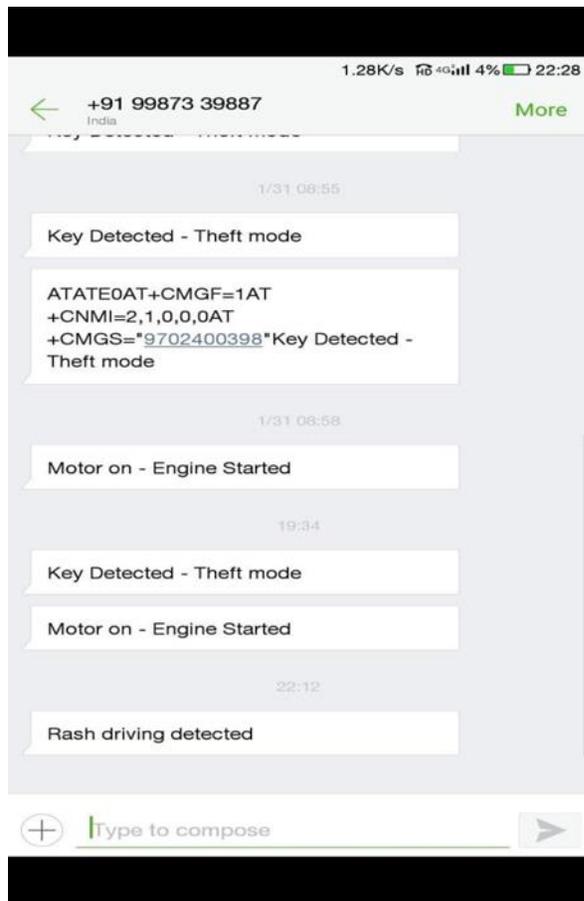
CONCLUSION

The Vehicle theft detection system plays a major role. It can provide safety of vehicle and gives a security solution. The work of this system is cost-effective and reliable. In this system we are using switch for changing the user mode to theft mode. This system used for clients in various areas especially in large parking areas and it provides real-time information such as vehicle speed, vehicle rash driving situation and the time at which vehicle start and stop via SMS in users mobile. It also gives the alert message if any thieves access. The advantage of this system is that it provides reliability and security. Whenever there is any unauthorized access, it will alert the owner. It provides all essential information of vehicle to the owner an users mobile the vehicle theft detection is easy.

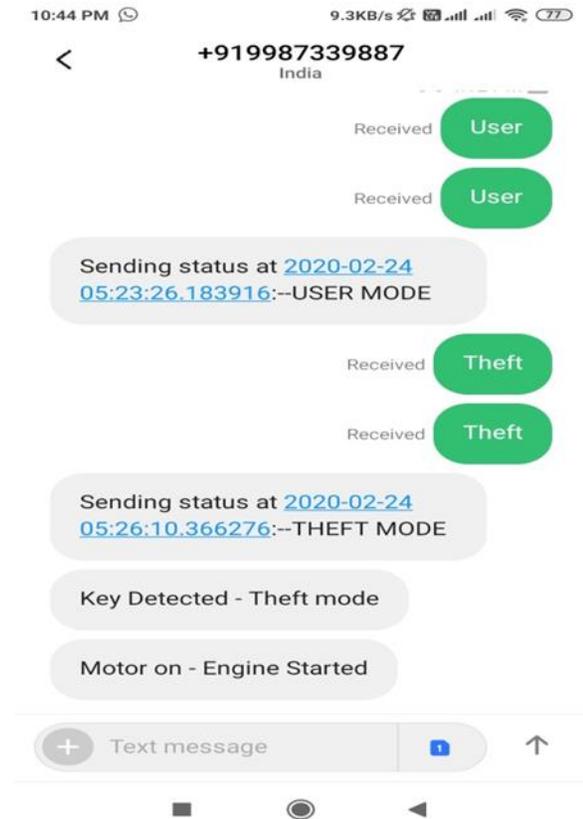
RESULT

In our system, there are two modes: USER and THEFT. If owner is driving a vehicle means system is in user mode. AS GSM have both transmitter and receiver hence we are sending a text message to GSM through owner’s phone like a “User”. Now GSM will

received that message and again GSM will send “User” message to the owner’s phone. It means the system is switch from theft mode to user mode and no messages will be send to owner as owner itself driving a vehicle.



Now if owner wants to switch to a theft mode then again we are sending a text message to GSM through owner’s phone like a “Theft”. Now GSM will received that message and again GSM will send “Theft” message to the owner’s phone. It means now the system is in theft mode. If any unauthorized person access a vehicle some alert messages will be send to the owner. Likewise if that unauthorized person started a vehicle then “Motor on- Engine started” message will send to owner and also display on LCD. And if that unauthorized person taking a dangerous drift then “Rash driving detected” message will send to owner and also display on LCD.



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