

## Automobile Security System Using Face Recognition and the Global Positioning System

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### Abstract

*In the current world, the use of automobiles is a fundamental requirement for all. As the number of automobiles is increasing, so are the cases of thefts. Thus, the protection of vehicles becomes the need of the hour due to this insecure environment. The current vehicle safety technology has a wide range of drawbacks, including a high false alarm rate, quick and easy deactivation, etc. Hence, this paper emphasizes the techniques and methodologies which can be used to enhance the security of vehicles. This paper offers the development of a vehicle security system using the Face Recognition Technique and Global Positioning System. A car is typically the most costly and significant asset next to a home, so this system lets you keep this asset safe and protected with wireless technology.*

**Keywords:** Vehicles, Automobiles, Security, Face Recognition, GPS, GSM.

### 1. Introduction

The use of vehicles becomes very important in today's world and hence the need to protect them from theft is required. Owners are terrified of getting their car stolen from the parking lot or outside their homes with the invention of powerful theft methods. Current technology has loopholes in its security implementation creating attack vectors from benign devices such as the infotainment system to more severe systems.[9] The vehicle protection we have today is limited due to many reasons like siren cannot be heard due to long-distance, most of the cars have similar sounds, alarms can be disabled on theft attempts.[1] By considering the above points, the main aim of this paper is to protect the vehicle from unauthorized access using a fast, easy-to-use, reliable system that consists of an Infrared sensor, Face Recognition System, a GPS module, and a GSM module. Access to the vehicle is permitted if the individual is certified. Else a picture and the precise location of the vehicle will be submitted to the owner by MMS. Face recognition and detection technologies are more sophisticated, easier to deploy, and people can be identified without their knowledge.[10]

### 2. Problem Statement

#### 2.1. Statement of problem

The protection of today provides little in terms of safety for vehicles. No further response or option may be available to assist the vehicle owner to find it back when the vehicle is

stolen. This system will increase the security of the vehicles. Face Recognition is a reliable pattern for person identification and with help of GPS and GSM modules, the intruder and the vehicle can be tracked easily.

## 2.2. Existing Vehicle Security Systems

The existing car security systems include a smart key, car alarm system, immobilizer, etc. However, these security devices don't seem to be very successful in reducing the number of car thefts. The car alarm system which is been used since the beginning of the automobile era has some major drawbacks. Due to a drastic increase in its installation, it is clear that almost all kinds of car alarms are easily unintentionally activated (often due to high sensitivity settings) implies that people who hear them often ignore them.[4] The New York City Police Department reported in 1994 that car alarms could potentially make car theft and break-in crimes more common.[4]. The next move came in the form of mechanical immobilisers in an effort to avoid vehicle theft by using steering locks and gear locks to protect a vehicle while it was not in operation, which worked until opponents discovered a way to defeat the mechanisms and weaken the vehicles to a point that the mechanical immobilisers could be disabled in seconds.[10] Hence, considering all the above issues there is a serious need to look into the enhancement of the automobile security system.

## 3. Literature Survey

**Table 1. Literature survey**

Sr No.	Title	Author	Advantages	Disadvantages
1.	<b>“Real Time Biometrics based Vehicle Security System with GPS and GSM Technology” [1]</b>  (Published-17 <sup>th</sup> May 2015)	N. Kiruthiga, L. Latha, S. Thangasamy	The system provides security at both levels, i.e. when the battery supply is provided or not.[1]	Fingerprint machines can be deceived and outsmarted by hackers, such as finding fingerprints of the target on another surface such as the drinking glass and using these prints to access the system. [5]
2.	<b>“Development Of Smart Car Security System using Multi Sensors” [6]</b>  (Published-2017)	M.Mathankumar, Suryaprakash Shanmugasundaram Dr.P.Thirumoorthi, U.Rajkanna	Even if the thief manages to steal the car, the owner can easily track the vehicle and can also identify the thief by using MMS. [6]	The drawback here is that you are able to steal keyless RFID cards quickly. Furthermore, the key will fail upon contact with a metallic object. [1]

3.	<b>“Smart Security System for Vehicles”</b> [3]  (Published- 4 <sup>th</sup> April 2019)	Dr. Pramod Sharma, Akash Shrivastav, Vivek Parashar, Okesh Kumar, Ram Naresh	The device built renders the vehicles keyless.[3]	Glitches in the system can happen due to the keypad access.
4.	<b>“Car theft prevention device”</b> [12]  (Published- 1995)	] L. C. Berman J. C. Noe	The system provides extra protection over traditional key and lock	The intruder can observe and repeat a hidden sequence. Lack of flexibility.
5.	<b>"Anti-theft vehicle security system using fingerprint scanner as well as manual"</b> [14]  (Published- 2018)	] S. Dashore N. Verma	Biometrics are strengthening the Classical defence. The Password incorporates contingency.	The system can be possibly Vulnerable to spoofing with fingerprints. The password access by the attacker would allow the bypass of biometrics.

The research and study done as shown in **Table 1.1** were significant as it showed the implementation of various security systems in automobiles and thus can help us to speculate the ways to enhance the security of vehicles.

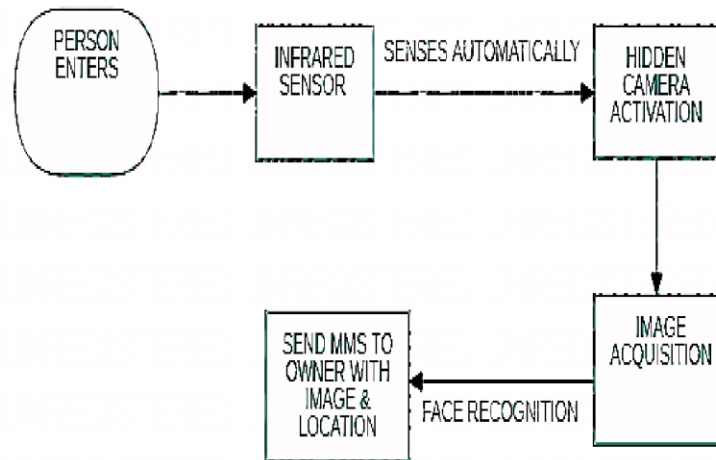
## 4. Proposed System

### 4.1. Issues Focused

The major issues that can be solved using this system:

1. System failure as a result of a stolen password and decrypted data encryption.
2. To safeguard the vehicle against unauthorized access.
3. It does not require a person's active cooperation.
4. More convenient, as soon as one sits in place, it is sensed.

## 4.2. System Architecture

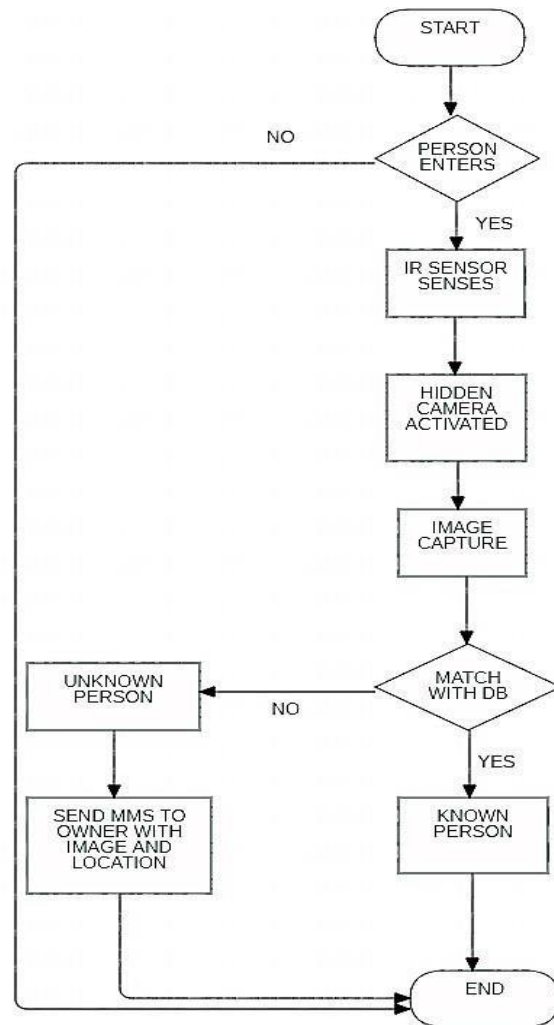


**Figure 1. Block Diagram**

The proposed system consists of an infrared sensor near the door. A GPS tracker is also set up to acquire the exact location of the vehicle. It also comprises a camera which will be hidden in the steering wheel. The picture of the driver is transmitted to the face recognition device using a camera. If a mismatch is found, by sending an MMS containing the acquired picture of the driver as well as the current location of the car, the owner is alerted about the vehicle theft.

## 4.3. Proposed Methodology

As shown in **Figure 2**, the working starts when a person tries to enter the car. The images of the authorized people must be stored in the database. As soon as the person enters, the infrared sensor attached to the door automatically activates the hidden camera placed in a relevant position near the steering wheel. The camera acquires the image of the person and compares it to the prebuilt image. If the images do not correspond, an MMS would be sent to the owner that consists of the acquired image and the exact location of the vehicle.



**Figure 2. Flow Chart for the System**

The system consists of four modules:

1. Image acquisition
2. Face recognition
3. Location tracking (GPS)
4. Owner module (GSM)

**4.3.1. Image Acquisition:** A sensor is triggered when a person enters the car, which in turn triggers a hidden camera in the steering system. The camera records and transfers the driver's image to the database for further processing.

**4.3.2. Face Recognition Module:** The face recognition module is used for processing the captured image. Processes such as face detection and face recognition compose the module. The image acquired is detected and then compared with the predefined images i.e the images which were earlier stored in the database. It checks if the images correspond to each other.

**4.3.3. Location Tracking (GPS):** The live location of the vehicle is tracked most feasibly. So, thereby vehicle can't be moved somewhere. With the use of GPS devices, there is proper progress in the system. It is connected to the vehicle. It sends position data on an ongoing basis and alerts the user to the location.

**4.3.4. Owner Module (GSM):** The owner module includes the procedure of sending MMS to the owner when the vehicle is pursued by an unauthorized user. To this purpose, the output of the face recognition module is used. If an unauthorized person attempts to drive the car, the MMS containing the person's picture and the current location of the automobile is sent to the owner. With solid evidence, the owner can then tell the police about the theft.

## 5. Algorithm

Steps of processing:

Inputs: (IR sensor value, face i/p, GSP i/p)

Outputs: (MMS, Vehicle Tracking) Pseudo

Code:

Start

While (person enter==1) { if (ir  
val==1)

{

    Activate camera;

    Image acquisition;

}

if (face ip==stored id)

{

    Person authorized;

}

else

{

    Send MMS;

    Send Location;

}

}

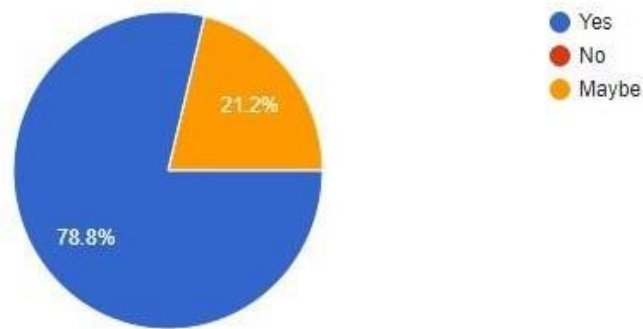
End

Hence, by using the above algorithm in the model the owner will have solid proof about the theft and also the location of his vehicle which in turn will help him to acquire his car back.

## 6. Feedback Survey

A survey was conducted to see and understand the perception of the people about the Automobile Security System using Face Recognition and GPS. The survey was conducted among (n=100) 100 people and the following response was recorded.

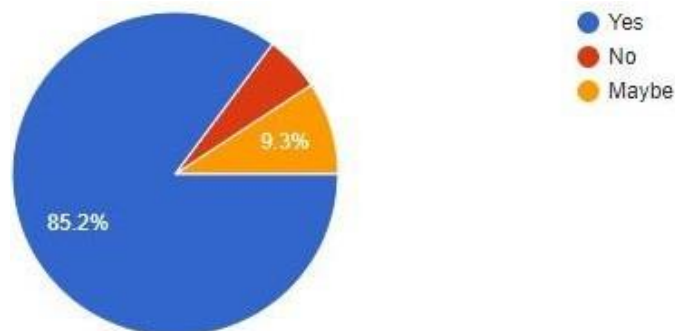
(1) Do you feel the need for an enhancement in the vehicle security system?



**Figure 3. Pie chart showing feedback survey analysis for enhancement in vehicle security system**

Survey has shown that a majority of people feel that there should be an enhancement in the security system of vehicles. About 79% of people share the same opinion that the existing security systems aren't enough to protect the vehicles. Hence, this shows the need for much more efficient security.[8]

(2) Do you think face detection and recognition techniques and GPS will help increase vehicle security?



**Figure 4. Pie Chart showing Feedback Survey Analysis for a preference for face detection and recognition techniques and GPS.**

According to the survey, about 85% of the people think that this approach towards security and protection of vehicles will be efficient. Due to a large number of advantages that face recognition offers like faster processing, seamless integration, and automation of identification this model offers a smart security system for automobiles.[8]

## 7. Conclusion

In all applications, protection is the essential criterion. This model is, therefore, a novel effort to improve automotive safety. A real-time car protection system based on face recognition technique, Global Positioning System (GPS) and Global Mobile System (GSM) has been proposed in this paper. This system can be used to reduce thefts and at the same time, it will enable the vehicle owner to recognize the intruder by monitoring his vehicle. The results obtained through face recognition show that they can have almost

perfect accuracy. It, therefore, proves to be a promising technique for improving protection.

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