

---

## A SURVEY ON - BEYOND IGNITION: ELEVATING VEHICLE PROTECTION WHILE DORMANT

Mrs. Ch. Srivatsa<sup>1</sup>, Nandimandalam Bharat Varma<sup>2</sup>, Sama Rishitha<sup>3</sup>,  
Kolichelime Divya<sup>4</sup>, Gollakota Krishna Bharat<sup>5</sup>

<sup>1</sup>Assistant Professor, Computer Science and Engineering, ACE Engineering College, India.

<sup>2,3,4,5</sup>Student, Computer Science and Engineering, ACE Engineering College, India.

DOI: <https://www.doi.org/10.58257/IJPREMS33606>

---

### ABSTRACT

This project aims to prevent vehicle theft by implementing a face recognition system. Drivers are enrolled in the system, allowing it to recognize them each time they enter the vehicle. Authorized individuals can access predefined functionalities, like starting the car. If an unauthorized person attempts to unlock the car, not only does the system trigger an automatic SMS alert to the owner and family members, but it also initiates an emergency shutdown of the vehicle's engine. GPS is used to track the vehicle's location and share it via SMS. Additionally, SMS alerts are also sent if the vehicle is detected moving without the engine running, using motion sensors to detect potential theft scenarios like a thief using a trolley.

Keywords: Vehicle theft prevention, Face recognition system, Driver enrolment, Authorized individuals, Predefined functionalities, Automatic SMS alerts, Emergency engine shutdown, GPS tracking, Motion sensors, Unauthorized access.

---

### 1. INTRODUCTION

Vehicle theft continues to be a prevalent concern worldwide, with thieves constantly evolving their methods to circumvent traditional security measures. In response to this persistent challenge, the implementation of advanced technological solutions has become imperative to safeguard valuable assets and enhance security measures. One such innovative approach is the integration of face recognition technology into vehicles, offering a robust deterrent against unauthorized access and theft.

This project endeavors to address the escalating issue of vehicle theft by introducing a sophisticated face recognition system designed to authenticate drivers and prevent unauthorized access. By enrolling drivers into the system, each individual becomes uniquely identifiable, enabling seamless recognition upon entry into the vehicle. This proactive security measure not only enhances convenience for authorized users but also establishes a formidable barrier against potential theft incidents.

The functionality of the face recognition system extends beyond mere identification, granting authorized individuals access to predefined functionalities essential for vehicle operation, such as engine ignition. In the event of an unauthorized attempt to unlock the vehicle, the system employs a multi-layered security protocol to swiftly respond to the threat. Instantaneous alerts are dispatched via SMS to the vehicle owner and designated family members, notifying them of the unauthorized access attempt. Concurrently, the system initiates an emergency shutdown of the vehicle's engine, effectively thwarting the theft attempt and minimizing potential damage or loss.

Furthermore, to bolster the efficacy of theft prevention measures, the project incorporates GPS technology to track the vehicle's location in real-time. This feature enables the system to transmit location updates via SMS, ensuring prompt notification to the vehicle owner in the event of unauthorized movement or suspicious activity. Additionally, motion sensors are strategically integrated to detect anomalous scenarios indicative of theft, such as unauthorized movement without the engine running, such as a thief employing a trolley to relocate the vehicle.

**PERSONAL VEHICLES:** Individuals can use the face recognition system to prevent unauthorized access to their cars, ensuring that only authorized drivers can operate the vehicle. This provides peace of mind and enhances the security of their personal property.

**FLEET MANAGEMENT:** Companies managing fleets of vehicles can implement the system to track the location of their vehicles in real-time and ensure that only authorized drivers are operating them. This helps in optimizing fleet operations, reducing theft, and improving overall security.

**TRANSPORTATION SERVICES:** Taxi companies and ride-sharing services can use the system to verify the identity of drivers and ensure that only registered drivers are providing services to customers. This enhances passenger safety and builds trust in the service.

**RENTAL CAR AGENCIES:** Rental car companies can deploy the system to prevent theft of their vehicles and ensure that only customers with valid identification can access and operate the rented vehicles. This reduces the risk of fraud and enhances the security of their fleet.

**LOGISTICS AND DELIVERY:** Companies involved in logistics and delivery services can utilize the system to track the location of delivery vehicles and ensure that only authorized drivers are handling the shipments. This helps in preventing theft and ensuring the timely and secure delivery of goods.

**LAW ENFORCEMENT:** Police departments and other law enforcement agencies can use the technology to secure their vehicles and equipment, preventing unauthorized access and ensuring that only authorized personnel can operate the vehicles. This enhances the security of law enforcement operations.

**MILITARY AND GOVERNMENT:** Military organizations and government agencies can deploy the system to protect their vehicles and sensitive equipment from theft or unauthorized access. This helps in safeguarding national security assets and ensuring the integrity of government operations.

In summary, the implementation of a comprehensive face recognition system represents a significant advancement in vehicle security, offering robust protection against theft and unauthorized access. By leveraging cutting-edge technologies such as facial recognition, GPS tracking, and motion sensors, this project endeavors to mitigate the risk of vehicle theft and enhance overall safety and security for vehicle owners.

## 2. LITERATURE SURVEY

As part of the Literature Survey, we have referred few project papers and the findings from them are:

Rajavardhan Reddy gogulamudi, Sessa Naga, Sumanth Jupudi, Gireesh Pirangi, "Face Recognition in Images with Missing Content using SVM for Vehicle Security", 12-13 May 2023. [1]

The study demonstrates the effectiveness of a face recognition model, employing Support Vector Machines, in enhancing vehicle security. By accurately identifying drivers and comparing faces with a dataset, the system unlocks the steering only for authorized users, thus preventing theft. Real-time implementation yielded high accuracies, with an extended model incorporating fingerprint recognition for added security. These findings underscore the model's efficacy in practical applications, ensuring robust protection against unauthorized vehicle access.

Mohanasundaram S, Krishnan V, Madhubala V, "Vehicle Theft Tracking, Detection And Locking System Using Open CV", 15-16 March 2021. [2]

The integration of face recognition technology enhances existing GPS and GSM-based theft detection and vehicle tracking systems. Through real-time authentication via a mobile application, users can securely access their vehicles. Unauthorized attempts trigger immediate alerts, while theft details are captured and stored for analysis. This innovation strengthens vehicle security and facilitates proactive theft prevention.

Rubini.R and Uma Makeswari.A, "Over Speed Violation Management of A Vehicle Through Zigbee" Vol.5 No 1 Feb-Mar 2013.[3]

The paper proposed a system has an alerting, recording and reporting system for over speed violation management. The Zigbee transmitter sends the speed limit of the particular lane entered by the vehicle and also gives alerts like "road works", "steep slopes", "school zone" in the form of acoustical messages and also in LCD. The receiver unit placed in the vehicle receives the messages and sends to the microcontroller. When speed of the vehicle nears the speed limit it displays the warning and if exceeds the limit, the microcontroller records the violated speed and time. The LCD displays the lane speed limit and shows the number of times, speed was violated. A GSM module sends message to the nearest traffic personnel immediately after a violation occurs. An authenticated device is also provided, which can be operated only by the traffic police in which he can retrieve the data stored at any time. Increase in the count of violation increases the penalty amount which can be collected in toll gates located nearby.

Syed Fasiuddin, Syed Omer, Khan Sohlerana, Amena Tamkeen, Mohammed Iqbal Abdul Rasheed, " Real Time Application of Vehicle Anti Theft Detection and Protection with Shock Using Facial Recognition and IoT Notification", 1 March 2020. [4]

The abstract presents a vehicle theft security system using facial recognition technology to enhance security during parking and driving in unsecured areas. It employs shock treatment for unauthorized ignition attempts and sends notifications via an IoT application. Utilizing a Raspberry Pi microprocessor, Pi Cam, and WiFi controller, the system offers simplicity, high security, and cost-effectiveness.

G.Sathya, FathimaShameema S, JyothiMol Sebastian, Jemsya K S "Automatic Rescue System for Ambulance and Authoritative Vehicles", Vol.2 - Issue 4 April - 2013.[5]

The describes a system to address traffic congestion in urban areas by utilizing an Ambulance Assistance and Routing System (AARS) with GPRS 3G technology. The system aims to reduce the death rate caused by traffic delays for ambulances. It proposes using GPS units in ambulances to identify their location and control traffic lights accordingly. A GPRS 3G modem facilitates communication between the ambulance and traffic junction controllers, allowing for smoother ambulance flow. To prevent misuse, RFID tags are suggested for doctors, ensuring security. The system is designed to assist traffic police in managing traffic and aiding emergency patients.

S.P.Bhumkar, V.V.Deotare, R.V.Babar, Sinhgad, “Intelligent Car System for Accident Prevention Using ARM-7” Volume 2, Issue 4, April 2012.[6]

Described a real-time online safety prototype that controls the vehicle speed under driver fatigue. The purpose of such a model is to advance a system to detect fatigue symptoms in drivers and control the speed of vehicle to avoid accidents. The main components of the system consist of number of real time sensors like gas, eye blink, alcohol, fuel, impact sensors and a software interface with GPS and Google Maps APIs for location.

JyotikaKapur “Accident Prevention via Bluetooth” Volume 2, Issue 4, July 2013.[7]

Describes the alarming increase in road accident deaths in India, with approximately 105,000 fatalities annually, according to the World Health Organisation. It proposes the use of Bluetooth technology to address this issue by enabling communication between vehicles. Bluetooth's features, such as low complexity, power efficiency, and cost-effectiveness, make it suitable for this purpose. The system suggests that when Bluetooth-enabled cars come within a specified distance (100 meters), an alarm notifies the drivers. If a car's speed exceeds 40 kmph in this proximity, the system automatically reduces its speed. The goal is to prevent accidents by enhancing communication and awareness among vehicles on the road. The abstract also mentions a figure illustrating the death rate over the past four years.

A. Pazhampilly Sreedevi, B. Sarath S Nair, “Image Processing Based Real Time Vehicle Detection And Prevention System”, 20-22 July 2011.[8]

A major problem today for car owners is that they are in constant fear of having their vehicles stolen from a common parking lot or from outside their home. Image processing based real time vehicle theft detection and prevention system provide an ultimate solution for this problem. The system described in this paper automatically take photos of driver and compares his or her face with database to check whether he is an authenticated driver or not. He can have access to the vehicle only if he is an authenticated driver. If he is not an authenticated driver an alarm rings and electrical connections are not activated. The technology used here is face recognition and face detection in real time. As the photos are taken in real time, several problems like unequal illumination and changes in the background may affect the system. To overcome this problem DCT normalization and background cancellation algorithms are incorporated along with basic face detection and face recognition algorithm. In this paper software and hardware details of the system are discussed. Technologically system is simple, accurate and maintainable.

P.R. Shahane, Subhashi Gupta, Rajat Shrivastav, Vignesh.S, Sushant Singh,” Vehicle Theft Detection Using Face Recognition”, 05 May 2019.[9]

The abstract proposes using facial recognition for vehicle security to prevent theft. Authorized individuals can remotely unlock the engine by facial recognition, while unauthorized attempts trigger an alert to the owner via a pre-installed application. The system utilizes the internet for global notifications, ensuring comprehensive vehicle protection.

Zhixiong Liu, Guiming He, “ Research On Vehicle Anti-theft and Alarm System Using Facing Recognition”, November 2005.[10]

The paper presents a vehicle anti-theft system that captures the driver's video images upon car startup, locates their eyes, and recognizes their face using the PCA algorithm. Unauthorized drivers trigger an alarm, and their image is sent to the owner or police via CDMA or GPRS networks. Tested in various conditions, the system proved robust and reliable.

### 3. COMPARISION ANALYSIS

S.No	Title	Work Done	Performance Analysis	Future Work	Drawbacks
1	Rajavardha Reddy,gogulamudi, Sesha Naga, Sumanth Jupudi,Gireesh	Developed a system for face recognition in images with missing content	Achieved satisfactory accuracy in recognizing faces even with missing	Explore deep learning approaches for improved	May suffer from reduced accuracy in scenarios where the missing content is crucial for accurate

	Pirangi- “Face Recognition in Images with Missing Content using SVM for Vehicle Security”-2023	using SVM.	content.	accuracy.	recognition.
2	Mohanasundaram S, Krishnan V, Madhubala V- “Vehicle Theft Tracking, Detection And Locking System Using Open CV”-2021	Implemented a system using OpenCV for tracking, detecting, and locking vehicles.	Demonstrated effective tracking and detection capabilities	Enhance the system's robustness against false alarms and tampering.	Relies on camera-based detection, which may be limited by environmental conditions such as poor lighting or camera angles.
3	Rubini.R and Uma Makeswari-“A Over Speed Violation Management of A Vehicle Through Zigbee”- 2013	Developed a system for managing over-speed violations in vehicles using Zigbee technology	Successfully monitored and managed vehicle speed violations.	Integrate with advanced driver assistance systems (ADAS) for proactive speed control.	Limited by the range of Zigbee technology, which may not be suitable for long-distance communication or urban environments with high interference.
4	Syed Fasiuddin, Syed Omer, Khan Sohelrana, Amena Tamkeen, Mohammed Iqbal Abdul Rasheed - “Real Time Application of Vehicle Anti Theft Detection and Protection with Shock Using Facial Recognition and IoT Notification” -2020	Created a real-time application for vehicle anti-theft detection and protection using facial recognition and IoT technology.	Demonstrated real-time detection and notification of unauthorized access and vehicle protection mechanisms.	Explore integration with predictive analytics for proactive theft prevention measures.	Relies on IoT connectivity, which may introduce vulnerabilities if not properly secured, and may face challenges in scenarios with unreliable network connectivity.
5	G.Sathya, FathimaShameema S, JyothiMol Sebastian, Jemsya K S- “Automatic Rescue System for Ambulance and Authoritative Vehicles” -2013	Developed a system for automatically rescuing ambulances and authoritative vehicles.	Demonstrated the ability to prioritize and clear the path for emergency vehicles.	Explore integration with traffic management systems for optimized routing.	Relies on real-time data and may face challenges in scenarios with unreliable network connectivity or outdated road information.
6	S.P. Bhumkar, V.V. Deotare, R.V.Babar,I.Sinhgad- “Intelligent Car System for Accident Prevention Using ARM-7”	Implemented an intelligent car system for preventing accidents using ARM-7	Successfully deployed accident prevention mechanisms in vehicles.	Explore integration with autonomous driving technologies for enhanced	May face challenges in scenarios where vehicles have limited computing resources or compatibility issues with existing vehicle

	-2012	technology.		safety features.	systems.
7	JyotikaKapur- “Accident Prevention via Bluetooth” -2013	Developed a system for accident prevention using Bluetooth technology.	Demonstrated effective communication between vehicles for accident prevention.	Investigate the integration with emerging vehicle communication standards like DSRC.	Limited by the range of Bluetooth technology and may not be suitable for scenarios where vehicles are not in close proximity.
8	A. Pazhampilly Sreedevi, B. Sarath S Nair- “Image Processing Based Real Time Vehicle Detection And Prevention System” -2011	Created a real-time vehicle detection and prevention system using image processing techniques	Achieved real-time detection and prevention of vehicle-related incidents.	Explore integration with cloud-based processing for scalability and real-time updates.	Relies heavily on image quality and may be affected by factors such as camera resolution and environmental conditions.
9	P.R. Shahane, Subhashi Gupta, Rajat Shrivastav, Vignesh.S, Sushant Singh- “Vehicle Theft Detection Using Face Recognition” -2019	Developed a system for vehicle theft detection using face recognition technology.	Demonstrated the ability to detect unauthorized access using facial recognition.	Explore integration with vehicle immobilization systems for enhanced security.	May face challenges in scenarios where lighting conditions or facial obstructions affect recognition accuracy.
10	Zhixiong Liu, Guiming He Research On- “Vehicle Anti-theft and Alarm System Using Facing Recognition” -2005	Conducted research on vehicle anti-theft and alarm systems using face recognition.	Provided insights into the potential of face recognition for vehicle security applications.	Investigate the feasibility of integrating with existing vehicle security systems.	Face recognition systems may suffer from accuracy issues due to variations in facial appearance and environmental conditions.

#### 4. FUTURE SCOPE

The future scope for the project outlined in the abstract is promising, with several avenues for further development and enhancement. One potential area for future expansion is the integration of advanced biometric authentication methods alongside facial recognition. This could involve incorporating technologies such as fingerprint or iris recognition to provide an additional layer of security and authentication for drivers. By implementing multiple biometric authentication methods, the system can further enhance its accuracy and reliability in identifying authorized individuals and preventing unauthorized access to the vehicle. Another future scope for the project is the integration of artificial intelligence (AI) and machine learning (ML) algorithms to continuously improve the system's performance and adaptability. By leveraging AI and ML techniques, the system can learn and adapt to new patterns of vehicle theft and unauthorized access attempts, enhancing its ability to detect and prevent such incidents in real-time. Additionally, AI-powered analytics can be utilized to analyze data collected from GPS tracking, motion sensors, and SMS alerts to identify potential security vulnerabilities and proactively address them. Furthermore, the integration of remote control and monitoring capabilities can enhance the system's usability and convenience for vehicle owners. This could involve developing a mobile application or web-based dashboard that allows owners to remotely monitor their vehicle's security status, receive real-time alerts, and even control certain functionalities such as locking/unlocking the doors or



starting/stopping the engine. By providing owners with greater control and visibility over their vehicle's security, the system can offer enhanced peace of mind and protection against theft.

## 5. CONCLUSION

In conclusion, the project "Beyond Ignition: Elevating Vehicle Protection While Dormant" represents an innovative approach to enhancing the security of vehicles during periods of inactivity. Traditionally, vehicle protection systems have predominantly focused on preventing theft during operation, largely centered around ignition security. However, our project extends the scope of vehicle security by incorporating advanced technologies and methodologies that address potential risks when the vehicle is dormant or parked.

## 6. REFERENCES

- [1] Rajavardhan Reddy gogulamudi, Sessa Naga, Sumanth Jupudi, Gireesh Pirangi, "Face Recognition in Images with Missing Content using SVM for Vehicle Security", 12-13 May 2023.
- [2] Mohanasundaram S, Krishnan V, Madhubala V, "Vehicle Theft Tracking, Detection And Locking System Using Open CV", 15-16 March 2021.
- [3] Rubini.R and Uma Makeswari.A, "Over Speed Violation Management of A Vehicle Through Zigbee" Vol.5 No 1 Feb-Mar 2013.
- [4] Syed Fasiuddin, Syed Omer, Khan Sohelrana, Amena Tamkeen, Mohammed Iqbal Abdul Rasheed - "Real Time Application of Vehicle Anti Theft Detection and Protection with Shock Using Facial Recognition and IoT Notification"-2020.
- [5] G.Sathya, FathimaShameema S, JyothiMol Sebastian, Jemsya K S "Automatic Rescue System for Ambulance and Authoritative Vehicles", Vol.2 - Issue 4 April - 2013.
- [6] S.P. Bhumkar, V.V. Deotare, R.V.Babar, I.Sinhgad "Intelligent Car System for Accident Prevention Using ARM-7" Volume 2, Issue 4, April 2012).
- [7] JyotikaKapur "Accident Prevention via Bluetooth" Volume 2, Issue 4, July 2013.
- [8] Pazhampilly Sreedevi, B. Sarath S Nair, "Image Processing Based Real Time Vehicle Detection And Prevention System", 20-22 July 2011.
- [9] P.R. Shahane, Subhashi Gupta, Rajat Shrivastav, Vignesh.S, Sushant Singh," Vehicle Theft Detection Using Face Recognition", 05 May 2019.
- [10] Zhixiong Liu, Guiming He, " Research On Vehicle Anti-theft and Alarm System Using Facing Recognition", November 2005.
- [11] Tanwar, S., & Agarwal, A., "Vehicle Anti-Theft Tracking and Alert System Based on GSM and GPS", 2014.
- [12] Mahajan, S. M., & Kuchekar, S. R., "An Intelligent Vehicle Security System Using Motion Detection", 2013.
- [13] Patil, P. S., & Shete, S., "Real-Time Vehicle Security and Monitoring System", 2014.
- [14] Sreejith, P. S., & Nair, P. N., "Vehicle Anti-Theft and Tracking System Based on IoT and GSM", 2017.
- [15] Kurniawan, R. H., & Manalu, R. S., "Development of a Vehicle Anti-Theft System Using GSM and GPS", 2017.
- [16] Raj, P. P., & Tamilarasan, R., "Real-Time Vehicle Tracking and Theft Prevention Using Arduino", 2017.
- [17] Karthikeyan, S., & Manikandan, R., "Vehicle Tracking and Locking System Based on RFID and GSM", 2016.
- [18] Kumar, A., & Kumar, V., "Design and Implementation of GPS and GSM-Based Vehicle Tracking and Theft Prevention System", 2019.