VECHICLE SECURITY SYSTEM USING FACE RECOGNITION

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ABSTRACT

This project explores using face recognition technology in vehicles to make them safer and more personalized for drivers and passengers. Instead of using keys which can easily be lost or stolen vehicles can use face recognition to recognize people and allow only approved individuals to unlock and start the car.

Cameras inside the vehicle scan and recognize faces using openCV, matching them with stored profiles. Privacy is also protected with data encryption. Early tests show that face recognition can make vehicles more secure and convenient for users.

I.   INTRODUCTION

The use of facial recognition for vehicle security offers a modern and highly secure alternative to traditional methods such as keys or passwords. These types of cars are equipped with cameras. This is often combined with non-AI facial recognition software that verifies the driver's identity when someone approaches the vehicle. And the system scans and matches the person's facial features with previously stored templates. If the competition is successful The vehicle will be unlocked and access will be allowed. If not then The car will remain locked. And car owners can be alerted if suspicious activity is detected.

This method not only eliminates the need to carry keys or remember passwords; But it also provides increased security. This is because facial features are more unique and difficult to replicate than real keys. Without having to rely on AI on the internet or cloud servers, facial data servers... Inside maintains privacy and prevents unauthorized access. Moreover, without an Internet connection, the system is more reliable and works smoothly in any location.

It also facilitates security with facial recognition, for example in a home with multiple users. The car can adjust settings such as seating position, mirrors and climate control based on a known driver profile. This customized experience increases usability and ensures that only authorized users can access the vehicle, making it a forward-looking solution to vehicle safety.
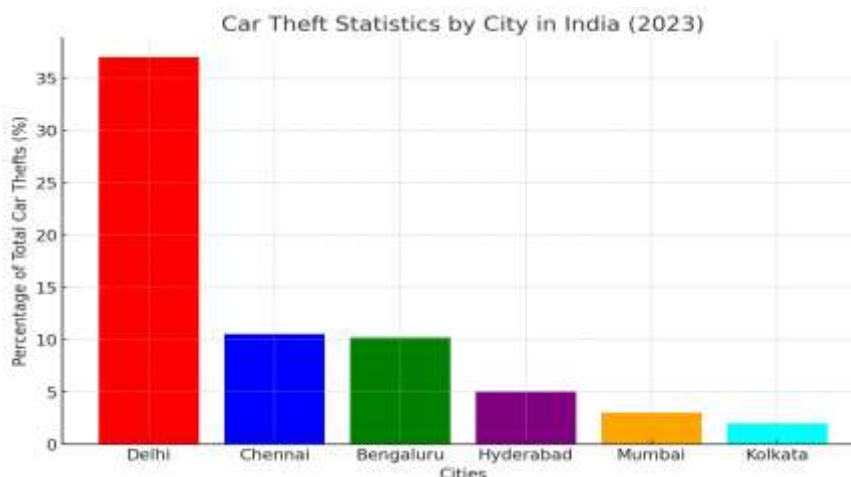
 The bar chart shows that Delhi has the highest percentage of car thefts among the listed cities, accounting for over 35% of total reported car thefts in 2023.

Delhi: Over 35% of total car thefts, the highest among the cities.

II. LITERATURE REVIEW

1. Ketan J. Bhojane, S. S. Thorat says that car ignition system that uses facial recognition instead of a traditional key to start the car. The system works by detecting and tracking the driver's face using algorithms in MATLAB and Raspberry Pi B. Facial recognition is chosen because it's widely used in technology and is effective for security. The system needs to be reliable, so a strong face detection method is crucial for it to work smoothly and safely.

2. Tipparti Anil Kumar, Y Prithvi Murthy , Ch Yashwanth Goud ,N Harsha Vardhan says that facial recognition to unlock and start cars, replacing traditional keys for better security. The system works by recognizing the driver's face using computer vision, even in low light, and includes features to prevent hacking or spoofing. Unlike RFID or fingerprint systems, which can be hacked or damaged, this facial recognition system is a secure, practical solution for car access. Tests show it is reliable and efficient.

3. Prof. Pranali Langde,Nikhil Dharpure,Kanchan Bashine,Snehal Bhowate,Poonam Gajbhiye,Samiksha Paidlewar says that As car thefts increase, a new vehicle security system uses face detection to prevent unauthorized access. When a person sits in the driver's seat, a hidden camera captures their face and checks it against a stored image. If the face is unrecognized, the system sends an alert with the person's photo to the owner and keeps the ignition locked. If the person is verified, the ignition unlocks, allowing the car to start. This system offers a real-time, effective solution to protect vehicles from theft.

4. Chandan A D, Chiranth Gowda A B, Sanju M G, Umme Javeriya R, Shilpa R says that With thefts and fraud on the rise, there's a need for better security systems. The proposed face recognition system only allows authorized people to access the vehicle or area, blocking anyone else. It's more accurate and efficient than traditional security methods like keys or alarms, offering better protection against theft and fraud.

5. Ms. E. Devisri, N.Lahari chowdary, M.Mahesh Babu, T. Naveen Kumar, E. Purushotham says that The vehicle security system uses a camera to check the driver's face. If it matches an authorized person, the car starts, and the owner gets a location update. If the face doesn't match, the car stays off, and the owner is alerted with the car's location. It can manage multiple drivers and cars, offering extra security by tracking the vehicle and sending alerts if someone unauthorized tries to use it.

6. Tanishq Harit,Utsav Agarwal,Utkarsh Singh says that car security system that uses facial recognition to ensure only authorized people can access and start the car. The system is built with an Arduino Uno and programmed using Python. It has two stages of facial recognition: one for unlocking the car and another for starting the engine. If someone unauthorized tries to access the car, the engine stays off, and the owner gets an email alert. The system uses hardware like the Arduino, motor driver, and motors, showing that it works effectively in real-world situations to keep the car safe.
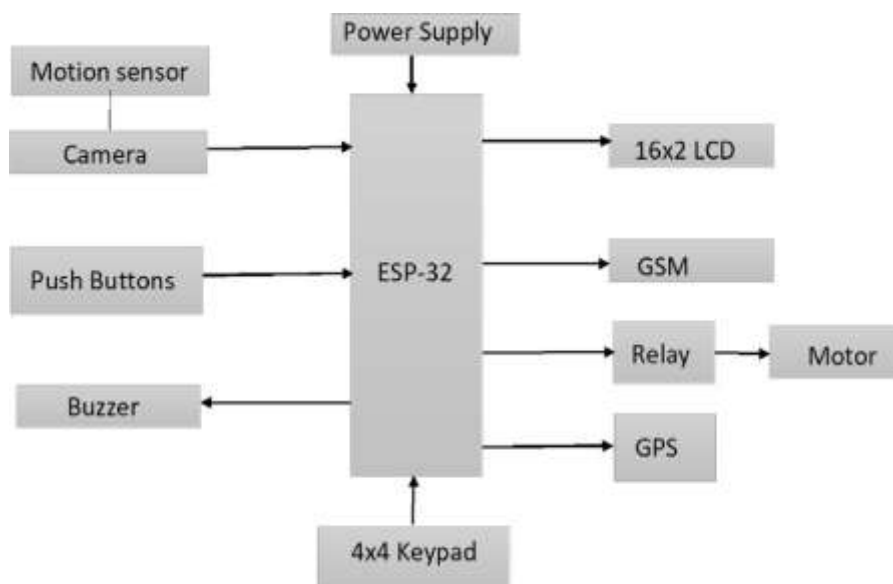
III. BLOCK DIAGRAM

Figure: Block diagram

The face recognition-based vehicle security system uses a central ESP32 microcontroller to manage and secure vehicle access. When the motion sensor detects movement, a camera captures an image of the person near the vehicle. The system checks if this person's face matches authorized faces. If authorized, it triggers a relay to allow the vehicle to start. If not, it sends an SMS alert and location update to the owner and activates a buzzer to warn of unauthorized access. A keypad allows manual overrides, and an LCD display provides real-time feedback on the system's status.

IV.   COMPONENTS

- **ESP-32**

The ESP32 is a low-cost, low-power system-on-chip (SoC) microcontroller that provides Wi-Fi and Bluetooth connectivity for embedded devices. It is popular for the Internet of Things (IoT) because it offers low power consumption, high power consumption and reliable wireless connectivity.
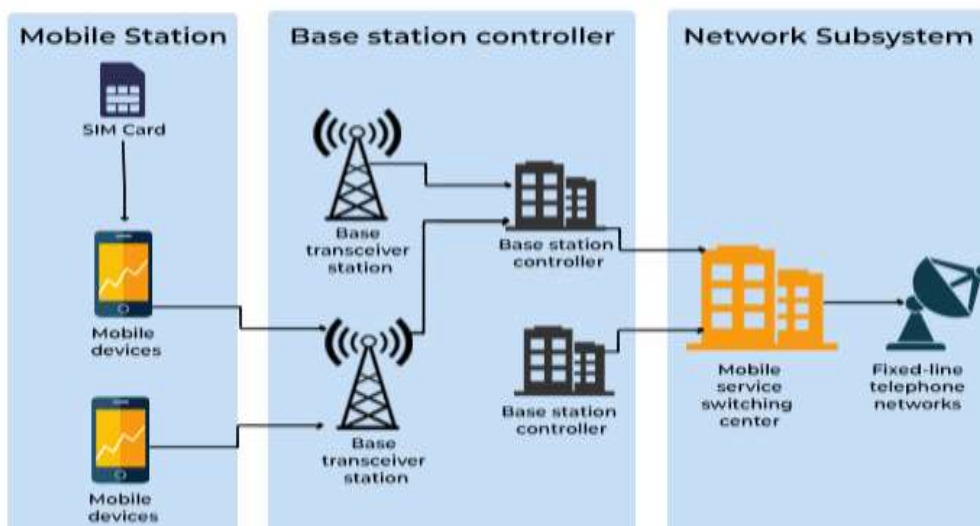
- **Webcam**

A webcam is a small camera that connects to a computer or device, capturing live video or photos. It's commonly used for video calls, streaming, and security. Webcams often include a microphone and can be built-in or attached externally. They're widely used for online meetings, virtual events, and even for facial recognition in security systems.

- **GSM**

GSM (Global System for Mobile Communications) is a standard for digital mobile communications, especially cell phones and other mobile devices. Originally designed for voice calls but since expanding to support text message access (SMS), internet access, multimedia messaging and many other services, GSM has become the most widely used mobile communications standard in the world

- **GPS**

GPS is a system that uses satellites to find your exact location on Earth. It's essential for things like getting directions, helping emergency responders find people quickly, and tracking vehicles in real time, making everyday navigation and safety much easier.

V. ALGORITHM

1. Start the system and initialize all components.
2. Check if motion is detected.
3. If no motion is detected, recheck the status.
4. If motion is detected, run the face recognition algorithm.
5. Determine if the recognized person is authorized.
6. If the person is authorized, start the motor.
7. If the person is not authorized, send an SMS alert.
8. End the process.

VI. CONCLUSION

This system is built around an ESP32 microcontroller, which controls several components. "This security system features a user-friendly keypad for input, a powerful DC motor to control doors or locks, and a loud buzzer for alerting you to potential threats. With the press of a button, the motor activates to open or close doors, while the buzzer sounds to deter intruders or notify you of unauthorized access.". There's also an LCD screen to display messages or information. The system has a camera (ESP32 CAM) that might be used for things like face recognition. "This security system includes GPS for location tracking and GSM for mobile connectivity, enabling real-time updates, remote monitoring, and automated alerts for enhanced security and peace of mind." Overall, this setup is likely designed for a security or monitoring application, possibly for controlling access or tracking.

ACKNOWLEDGEMENTS

VII. REFERENCES

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