

## A COMPREHENSIVE SURVEY ON AUTHENTICATED ACCESS CONTROL FOR VEHICLES THROUGH DRIVER'S LICENSE AND BIOMETRIC VERIFICATION

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**Abstract**—This project introduces an innovative Controlled Access via Authentication System for vehicle ignition, merging driver's license, fingerprint, and facial recognition technologies. The system revolutionizes traditional key-based access, ensuring enhanced security and thwarting unauthorized access. Utilizing biometric verification through fingerprints, face detection, and driver's license information, the project not only boosts efficiency but also fortifies protection against potential theft. Safety concerns are addressed through the incorporation of an alcohol detection module, preventing car startup when alcohol is present, even for registered users. Moreover, the project includes a comprehensive vehicular safety system featuring an alcohol sensor, temperature sensor, distance detection sensor, and accelerometers. The sensor for alcohol enhances road safety by preventing vehicle startup when alcohol is present. The temperature sensor optimizes vehicle performance by monitoring and regulating operating temperatures. Additionally, distance detection sensors and accelerometers contribute to improved driving safety and control, facilitating driving analysis, obstacle detection, and cruise control. In essence, this project amalgamates cutting-edge authentication methods, robust safety features, and sophisticated sensors, paving the way for a smart and secure vehicle initiation system.

**Keywords**—Electronic Driver's License, RFID, Reader, FP module, Ignition System, GSM, Antitheft System, Vehicle.

### I. INTRODUCTION

This project centers on the evolution of an intelligent automobile, equipped with an array of sensors that assist the driver in analyzing various driving conditions such as topography, weather, and engine temperature. Distance detection sensors and accelerometers enhance the vehicle's capabilities for obstacle detection and cruise control.

Furthermore to standard features like controls for starting the car, managing power windows, and utilizing a heads-up display for multimedia, the influence of Artificial Intelligence (AI) and Machine Learning (ML) on vehicles has transformed them from luxury items to essential components of modern transportation.

To deal with the increasing competition among automotive manufacturers, there is one continuous drive to introduce new and advanced features in each vehicle edition.

One critical focus is on enhancing vehicle security, leading to the implementation of a clever system predicated on Arduino technology. This system enables automatic vehicle startup without traditional keys, utilizing facial recognition techniques.

Integration involves a laptop with an OpenCV module, capturing real-time photos and videos for face detection. An MQ3 gas sensor or alcohol sensor, directly linked to the Arduino, enhances the security features. The project aims to design an affordable embedded system ensuring that only face-authenticated users can set the vehicle in motion.

The core elements that make up this system include Arduino Uno, LCD Display, DC Motor, and Micro Switches. The Uno Arduino acts as the central coordinator, receiving and transmitting data among the modules. The laptop with the OpenCV module prompts users to authenticate by reading their faces, utilizing a pattern-matching algorithm for validation. Upon successful authentication, the system opens the valve connected to the fuel tank, allowing fuel supply to the engine and initiating vehicle motion. The valve operation is facilitated by a servo motor. The LCD Display provides outputs, user directions, and system status, creating a comprehensive and user-friendly smart vehicle initiation system.

### II. LITERATURE SURVEY

The study's survey is summarized in a tabular format, providing a comprehensive overview of relevant research works. The table encompasses crucial details such as the name of the study's survey, author(s), publication year, research objectives, and key advantages and disadvantages identified in each work.

Title	Authors	Year	Objectives	Advantages	Disadvantages
Biometric Based Authentication for Vehicle Ignition System.[1]	Abhilash AS , Hemanth R Patil , Lakshman Kumara , Mohammad Rakheeb, MR, Praveen	2023	The project's main objective is to enable vehicle authentication using the driver's fingerprint, enhance driver identification through live camera feed, and utilize GPS for locating the vehicle in case of misuse or theft.	Enhanced security with biometric authentication. Real-time monitoring capabilities and Remote control and alerts.	Reliance on network connectivity , Cost implications for IoT integration ,Privacy concerns associated with biometric data
Reliance on network connectivity , Cost implications for IoT integration ,Privacy concerns associated with biometric data.[2]	Mr. M. Rama Krishna, A. Naga Kumari, MD. Reshma, G. Tulasi e	2022	The described vehicle security system emphasizes the importance of safeguarding valuable assets against theft. Utilizing face recognition and powered by a Raspberry Pi circuit, the system replaces traditional keys with a user's face for ignition.	Prevents vehicle theft and unauthorized use, Detects alcohol consumption to promote safety, Allows owner authorization for vehicle start, Uses local database for enhanced security and privacy and Shows potential for ongoing improvement	One disadvantage is the potential vulnerability to spoofing or impersonation. Facial recognition can be tricked by using photos or videos, and QR codes can be replicated. Ensuring robust security measures to prevent unauthorized access is crucial to address this concern.
Raspberry Pi Based Vehicle Starter Using Face Detection[3]	Sayali Mane, Supriya Kadam	2022	The aim of this undertaking is to apply the Raspberry Pi for creating a facial recognition device for vehicle get admission to control. For future technology automobiles, this initiative adds situation of the art safety measures.	The Raspberry Pi-primarily based totally facial reputation machine is smaller, lighter, and consumes much less power, making it extra accessible than a PC-primarily based totally machine.	Converting image everytime to grayscale maybe not possible at all situations. capturing photo during night times will bring a need of light.
Design of an Anti-theft Alarm System for Vehicles using IoT[4]	Jorge Arellano-Zubiate, Jheyson Izquierdo-Calongos, Laberiano Andrade-Arenas	2021	The aim of this undertaking is to apply the Raspberry Pi for creating a facial recognition device for vehicle get admission to control. For future technology automobiles, this initiative adds state of the art safety measures.	The Raspberry Pi-primarily based totally facial reputation machine is smaller, lighter, and consumes much less power, making it extra accessible than a PC-primarily based totally machine.	Converting image everytime to grayscale maybe not possible at all situations. capturing photo during night times will bring a need of light.

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Public Vehicle Monitoring System with Camera and Biometrics Safety[5]	Parvathi Muddapu	2020	The aim of The system that is being suggested is to address the current shortcomings in monitoring mechanisms for women's safety during travel. By integrating GPS, biometric authentication, and facial recognition on a The Raspberry Pi 3B+ module, the goal is to establish a more effective and coordinated system.	camera that continually records the characteristics of the driver till they get at their destination and forwards this data distant in relation to linked remotely in terms of SMS messages	The essential component in the Power is part of design usage. Given that the face recognition process requires constant observation, camera consumes more energy To be able to remain "ON" every time.
creation of a vehicle ignition using fingerprint.[6]	Jamil Alsayaydeh, Vadym Shkarupilo Win Adiyansyah Indra, Adam Wong Yoon Khang	2019	The paper presents a prototype for ignition of vehicles using a fingerprint sensor, aimed at preventing theft. The system, employing GSM SIM 900 and Arduino, ensures secure ignition by allowing only authorized fingerprints.	Fingerprint recognition ensures unique and secure vehicle access, reducing the risk of unauthorized use.	Users can start the vehicle quickly by placing their fingerprint on the sensor, eliminating the need for traditional keys and streamlining the access process.
Motorcycle Engine Ignition Using Face Recognition and Messaging System.[7]	Laymar T. Santelices	2018	In today's world, as technological advancements and scientific study yields scientific breakthroughs, the necessity for security grows in all fields. The application of a car is becoming a fundamental requirement for everyone. Furthermore, it is critical to safeguard the car from theft.	Face recognition adds a robust layer of security to the motorbike ignition system, preventing unauthorized use. The messaging system provides convenient communication for riders, allowing them to receive important notifications and alerts directly through the motorcycle interface.	Technical glitches or malfunctions could hinder the ignition or messaging system, affecting the overall reliability.
Face Recognition Based Car Ignition and Security System.[8]	Ketan J. Bhojane	2018	The only method to power the automobile or supply ignition to The motor is with a vehicle key. By substituting the key with a specific user's face, the facial recognition-based automobile ignition system physically races the automobile ignition.	Users can Get the car started without traditional keys, providing a more convenient and streamlined access process.	The system could be vulnerable to spoofing attempts, where unauthorized individuals try to deceive the face recognition technology to gain access.

Title	Authors	Year	Objectives	Advantages	Disadvantages
Development and Implementation Using Raspberry and Arduino Pi based Ignition control system[9]	Fatima Jabeen	2017	This study offers an igniting mechanism that detects and alerts drivers in actual time for facial recognition, finger print authentication, and alcohol intoxication.	Arduino and Raspberry Pi platforms offer flexibility, allowing for customized features and adaptations in the ignition control system to meet specific project requirements.	Raspberry and Arduino Pi may have limitations in processing power, which could constrain the complexity or speed of certain functionalities in the ignition control system.
Face Detection and Face Recognition Using Raspberry Pi[10]	Shrutika V. Deshmukh	2017	Car thefts and identity fraud have been a severe problem in recent years. A facial recognition system must be built to prevent these thefts and identity fraud. The goal of this undertaking is to create a facial recognition based intelligent security solution.	The small form factor of Raspberry Pi allows for easy integration into various setups, making it suitable for applications with space constraints.	Varied lighting conditions or image quality may affect the accuracy of face detection and recognition, leading to potential errors.

### III. CONCLUSION

In conclusion, our survey paper thoroughly investigates the realm of "Authenticated Access Control for Vehicle Ignition System by Driver's License and Biometric Verification." The discourse unveils the pressing need for heightened security measures within the automotive sector, underscoring the vulnerabilities of traditional ignition systems. The integration of driver's license and biometric verification within the suggested framework represents a significant stride towards fortifying vehicle security. By establishing a multi-layered authentication process, the system not only addresses the constraints of conventional methods but also offers a robust defense against unauthorized access. This survey provides a panoramic view of existing technologies, critically evaluating their strengths and limitations, and advocates for the adoption of innovative authentication solutions to mitigate security risks in the rapidly evolving automotive landscape. As we advance into an era of interconnected vehicles and smart transportation systems, application of such advanced authentication mechanisms becomes not just a technological enhancement but an indispensable safeguard for vehicles, drivers, and the overall integrity of the automotive industry.

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