

Integrating Bio-Metric Authentication in E-Challan Machine

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Abstract:

In India, as of my last update in January 2023, it was not compulsory to link the Aadhaar card and driving license. However, the Aadhaar card, a unique identification document issued by the Indian government, and the driving license, a legal document that permits individuals to drive vehicles, can be linked for verification purposes. The proposed objective behind linking these documents was to streamline and authenticate personal information, reduce identity fraud, ensure a more accurate database, and make processes more efficient. It's recommended to verify the current status of linking Aadhaar and driving license with concerned authorities or the latest government regulations, as the specific requirements and status may have changed since my last update.

Keywords: Biometric Authenticate in E-Challan machine, Driving License, Vehicle fine.

I. Introduction:

Driving without a valid license is unlawful, and if apprehended by law enforcement, it can result in severe penalties and legal ramifications. Operating a vehicle without a license is considered a violation of the law in most jurisdictions worldwide. The repercussions of driving without a license could encompass fines, vehicle impoundment, negative points on your future driving record, and even arrest, depending on the severity and location.

It's essential to hold a valid driver's license when driving, as it demonstrates that you possess the required knowledge and skills to operate a vehicle safely. Driving without a license can have long-term implications on your driving record, leading to more severe consequences in the future. It's prudent to comply with regulations and obtain the necessary licenses and documentation before driving on public roads.

II. Literature review:

[1] Dr. R. D. Kokateb and Dr.V.R.Gosavic have developed an Optimize Multimodal Biometric Authentication System For Low Classification Error Rates Using Face And Fingerprint. The cumulative demand for consistent and protected recognition schemes now used in countless fields is noticeable evidence that more consideration should be given to biometric systems. Biometric schemes represent a resource of accurate programmed personal acknowledgment based on functional characteristics or behavioural features that are exclusive and cannot be lost or gone. Biometric systems are recycled in many regions such as id verification, airports, houses, mobile, and postcards. Unimodal biometrics analyse a single or individual property of the human body. These are various limitations like distortion in the data

where the acknowledgment rate of the system is very complex to the superiority of the biometric model. The second one is the non-universality which means that if each person can deliver a biometric process for a given organization, this modality will be universal. Though, not all biometrics are universal. The third one is the lack of uniqueness which means the features mined from the biometric process of different entities may be moderately identical but not fully unique. The fourth one is the inter-variation which means that the biometric statistics acquired through the training procedure of a person for producing a pattern will not be equal to the template produced from biometric material for the same person during the test phase. These dissimilarities can be due to the poor interface of the operator with the instrument. The fifth one is the spoofing process which means spoofed biometric modalities. To reduce these problems, one solution is to use multimodal systems which can increase the security of these problems

[2] Wei xu and Yujin Zhai have developed a Cross-modal biometric fusion intelligent traffic recognition system combined with real-time data operation with the wide application of cross-modal biometric recognition in various fields, as long as the biometrics of different modalities are pre-recorded, they can be used for cross-modal recognition based on these data. The intelligent transportation system can promote the maximum efficiency of transportation facilities and improve the quality of transportation services. The intelligent traffic recognition system can use cross-modal biometric technology and combine real-time data operations to make traffic recognition more rapid, accurate, and convenient. Today, with the rapid development of artificial intelligence, the traffic recognition system uses more technologies to achieve the effect of fast and accurate recognition. Research on the intelligent traffic recognition system of cross-modal biometric fusion combined with real-time data operation also has far-reaching significance for the development and expansion of the application scope of cross-modal biometric fusion. The intelligent traffic identification system is currently the most urgent technical problem to be solved by urban management. In recent years, scholars have applied cross-modal biometrics to traffic recognition systems, but there are relatively few applications and research combined with real-time data operations. Therefore, cross-modal biometrics combined with real-time data operation is applied to the research on the intelligent traffic recognition system, which has both theoretical and practical significance.

[3] Abdullah Saud and Nazar Elfadil have developed Biometrics can be defined as using the biological and behavioural characteristics of individuals to automatically identify them. A fingerprint is considered a biometric identifier that is dependent on biometric data for individuals. The discovery of fingerprints can be used in various applications like authentication methods, criminal search, and various security issues. Each fingerprint is a unique pattern that distinguishes a specific person and thus represents a secure means of identifying the allowed and disallowed persons.

[4] Cascone Lucia, Gao Zhiwei Nappi Michele have developed the Fourth Industrial Revolution, also known as Industry 4.0, which represents the rise of digital industrial technology that is propagating at an exponential rate compared to the previous three revolutions. Interoperability is a basis of production, where there is a continuous exchange of information between machines and production units that act autonomously and intelligently. Workers play a central role in making autonomous decisions and using advanced technological tools. It may involve using measures that distinguish individuals, and their behaviours and reactions. Increasing the level of security, allowing only authorized personnel access to designated areas, and promoting worker welfare can have a positive impact on the entire assembly line.

Thus, capturing biometric information, with or without individuals' knowledge, could allow identity verification and monitoring of their emotional and cognitive states during the daily actions of work life. From the study of the literature, we outline three macro categories in which the principles of Industry 4.0 are merged and the functionalities of biometric systems are exploited: security, health monitoring, and quality work-life analysis. In this review, we present an overview of all biometric features used in the context of Industry 4.0 with a focus on their advantages, limitations, and practical use. Attention is also paid to future research directions for which new answers are being explored

[5] Ali Saif Information Technology, Aviral Mittal, and Parth Tyagi have developed the aim of this paper to expand an online platform to facilitate the drivers and the visitor's police to manipulate the penalties for site visitor violations. The e-challan system is an online platform aimed at presenting a wide variety of assistance in managing and monitoring traffic penalties and supporting customers concerning the issues they face in paying for their challan. The e-challan system is largely interplay between police and drivers without problems through an internet platform or an app. This assignment prototype describes how challan will become smooth for customers through retaining it online. The net platform pursuits to lessen office work, guide techniques, and boost the benefits for the users.

[6] Durvesh Gade, Dikshant Kukreja, Anushree Khadye, Akshat Gangar, Khush Dattani, and Sonali Pawar have developed the E-challan system, effective and powerful watching of the traffic violators become straightforward for the traffic police. Within the age of medical aid, traffic defaulters are going to be ready to pay E-challan either online or offline, looking at the ability given by their town or state. The E-challan system has been introduced to avoid money transactions so everything is incredibly clean and clear. The govt. of Bharat has conjointly introduced. The traffic E-challan is paid online also as offline by the traffic violators.

[7] Allokik Pranshu, Sanjay Kumar Ijj, and Swarnalatha P have developed the idea that the aim of this paper is to develop an online platform to facilitate the drivers and the traffic police to manage the penalties for traffic violations. E-Challan System is an online platform aimed at providing a wide range of support in managing and monitoring traffic penalties, helping users regarding the problems they face in paying for their challan. The E-challan System is basically an interaction between Police and drivers easily through an online platform or an app. This project prototype describes how challan becomes easy for users by keeping it online. The online platform aims to reduce the paperwork and manual process and increase the convenience for the users.

III. Proposed Methodology:

When traffic police catch individuals without their driver's license, they are compelled to pay the associated fine. The Indian government has proposed a solution that involves linking one's Aadhaar card to their license. In doing so, we can access our driver's licenses using biometric scans, thereby avoiding confusion regarding duplicate licenses and reducing the fines imposed on the public for such mistakes. The implementation of such a system requires a multifaceted approach that incorporates biometric data verification of driver's licenses linked to Aadhaar cards in traffic police machines.

Here is a suggested methodology:

Understanding Biometric Integration:

- Biometric systems typically use fingerprints for identity verification. Choose the appropriate biometric method for your system

Legal and Regulation Compliance:

- Ensure that your system complies with all data privacy, biometric, and traffic laws. Consult legal experts to ensure adherence to regulations.

Developing the System:

- Engage software developers and data security specialists to create a system that integrates biometric data with existing e-challan machines.
- Utilize APIs or software development kits (SDKs) provided by Aadhaar and the license issuing authorities to Link Aadhaar with the license.

Biometric Sensor Integration:

- Install biometric sensors on the e-challan machines. Please ensure that the actions are of high quality and accuracy.

Database Integration:

- Create a secure database that links Aadhaar numbers with driver’s license details. This database should be accessible by e-challan machines for real-time verification.

User Interface Development:

- Design a user-friendly interface for traffic police to interact with the system. Ensure its intuitive and easy to use for quick verification.

Testing and Quality Assurance:

- Thoroughly robust security measures to protect biometric and personal data. It is crucial to prioritize encryption and consistent security updates.

Training and Deployment:

- Train Traffic police officers on how to use the system effectively. Ensure they understand the importance of data privacy and proper system operation.

Maintenance and Updates:

- To guarantee seamless operations, it's imperative to perform frequent updates and maintenance of the system. Stay updated with any changes in regulations or technologies.

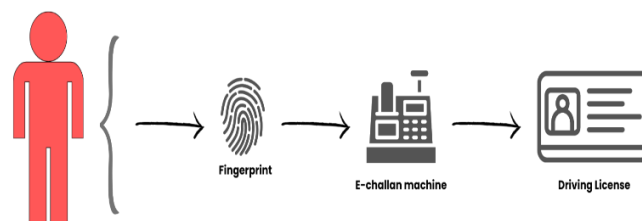


Figure 1: Proposed model for generation license in E-challan machine using fingerprint.

5 Stages of Design Thinking:

Stage 1 - Empathize: In this stage, we deeply empathize with the public who are traveling in an emergency situation and getting some other vehicles for transportation. We conducted interviews,

surveys, and research to understand their emotions, fears, and daily challenges related to the fines they are paying. So, they may get affected by the traffic rules and there are some high chances of getting the fined by the traffic police for not caring their license. Also, Persona (Fig 2), Empathy map (Fig 3) and Journey map (Fig 4) was designed for the empathize stage.

Stage 2 - Define: From the Empathize stage, the problem statement can be defined. Problem Statement: “The common public may be in an emergency situation at that time they may forget to take their license along with them in this situation if they are facing the traffic police, they are unable to show their license. In this technological era, we all used to carry our mobile phones with us but there may be conditions like fake license, uncharged mobile in a switched off state, and signal loss”, due to climatic conditions. In these situations, they need some secured device to access their license.

Stage 3 - Ideate: One workable security solution to guarantee that the license holder has access to their data is to incorporate biometric authentication into an e-challan machine so that users can access their own license. Identity verification and an additional degree of protection are provided by biometric authentication, which might involve fingerprint, facial recognition, or iris scanning. By adding biometrics to the e-challan system, license holders would have to physically authenticate their identity using a distinct biological trait before being able to access their license data. This procedure can aid in preventing fraudulent use of another person's information and unwanted access.

Stage 4 - Prototype: The prototype for integrating biometric authentication into an e-challan machine revolves around designing a user-friendly interface that guides individuals through the process of accessing their licenses. This involves several key steps: Firstly, the prototype will license using biometric authentication. It will detail the initiation of the process, the collection of biometric data (such as fingerprint or facial scan), the verification process, and finally, the access to the license information.

Next, low-fidelity wireframes will be designed to represent the e-challan machine's interface. These wireframes will illustrate each screen or step in the process. They will include prompts for capturing biometric data, such as a fingerprint scanning interface or a facial recognition prompt.

The design will showcase the biometric data authentication process, with an emphasis on its steps. The visual representation will illustrate how the system processes the data and notifies user of the authentication's success or failure. Successful authentication will grant access to the license.

To ensure a seamless user experience, the prototype will address potential authentication errors by providing prompts guiding users on how to retry or seek assistance. Additionally, the interface could include relevant contact information for technical support.

Wireframes will serve as a blueprint, undergoing testing with potential users, stakeholders, and colleagues to obtain feedback and refine the prototype's design. The goal is to prioritize clarity, simplicity, and efficacy in guiding users through the biometric authentication process. The key objectives for guiding users through the biometric authentication process are simplicity and efficacy.

Stage 5 - Test: In this stage, we deeply empathized about the public who are traveling in an emergency situation and getting some other vehicles for transportation. We conducted interviews, surveys, and research to understand their emotions, fears, and daily challenges related to the fines they are paying. So, they may get affected by the traffic rules and there is some high chances of getting the fine from the traffic police for not caring their license. Also, Persona (Fig 2), Empathy map (Fig 3) and Journey map (Fig 4) was designed for the empathize stage.

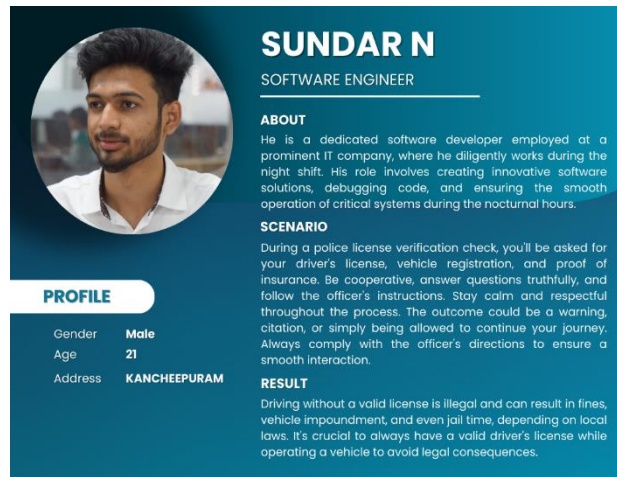


Figure 2: Persona.

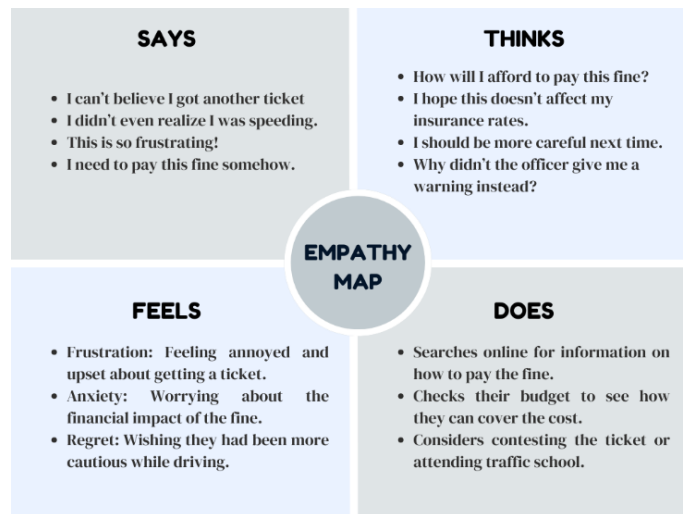


Figure 3: Empathy Map.



Figure 4: Journey Map.

V. Conclusion:

In conclusion, the design thinking approach applied to the integration of biometric authentication into the e-challan machine for license access represents a dynamic process focused on user-centered innovation. The iterative steps of empathizing, defining, ideating, prototyping, and testing have been instrumental in creating a user interface that prioritizes usability, security, and an intuitive experience. The testing phase served as a pivotal stage, offering invaluable insights derived from diverse user interactions and feedback. This user-centric feedback loop has been fundamental in refining the prototype, addressing usability concerns, and enhancing the authentication process. As a result of these iterative improvements, the finalized design represents a robust and user-friendly system. It successfully guides users through a seamless biometric authentication process, ensuring secure access to their license information via the e-challan machine.

VI. Future Scope:

Looking ahead, the integration of biometric authentication into the e-challan system for license access presents an innovative solution that holds significant promise and a wide range of future possibilities.

As technology continues to evolve, there are opportunities for further enhancements and refinements in biometric authentication systems. Advancements in biometric technology, such as more accurate and faster sensors, improved algorithms for data processing, and enhanced security measures, can be leveraged to fortify the system's reliability and efficiency. Moreover, the future holds potential for broader applications beyond license access. The use of biometrics in e-challan systems may expand to encompass

various law enforcement and administrative functionalities. This could include identity verification for other legal documents, automated fine processing, and potentially even integrating with national or international databases for law enforcement purposes. Considering the rapidly evolving landscape of data privacy and security, the future scope also emphasizes the importance of continued compliance with stringent regulations. Adapting to and staying ahead of evolving data protection laws will be vital to ensure user privacy and maintain legal conformity.

In addition, the incorporation of artificial intelligence (AI) and machine learning in biometric systems could lead to more adaptive and intelligent authentication processes. These technologies could enable systems to better recognize patterns, prevent fraudulent activities, and adapt to changing usage patterns over time.

The ongoing evolution of the e-challan system with biometric authentication can further facilitate a shift towards a more secure, efficient, and user-friendly infrastructure within law enforcement and administrative domains. This evolution will continue to be driven by a commitment to user-centric design, technological advancements, and compliance with evolving regulatory standards. The future scope holds the potential for even more seamless and secure interactions between individuals and the e-challan system, fostering greater trust and efficiency in accessing and managing licenses.

VII. Reference:

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