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Unified Database Data Vault System (Uni-DB)

Mini Jain[1], Madhav Aman Srivastava[2], Khushi Rajput[3], Harshit Singhal[4], Nupur Singh[5]

[1]B.Tech. (Assistant Professor) Department of Information Technology, NIET, Greater Noida, Uttar Pradesh, India
[2]B.Tech. (Scholar) Department of Information Technology, NIET, Greater Noida, Uttar Pradesh, India
[3]B.Tech. (Scholar) Department of Information Technology, NIET, Greater Noida, Uttar Pradesh, India
[4]B.Tech. (Scholar) Department of Information Technology, NIET, Greater Noida, Uttar Pradesh, India
[5]B.Tech. (Scholar) Department of Information Technology, NIET, Greater Noida, Uttar Pradesh, India

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Abstract – As we enter a new era of digitalization, there are many security issues that remain a major concern for digitalization. The availability of numerous applications and software on the market has made our daily lives much easier. There are still many features that are lagging behind digitalization.

Our research discovered that people still have to carry their documents in hard copy for many documentation processes. Despite the fact that there are many applications and software that operate as an e-document vault, it is still not recognized as authentic manner of producing documents. Our research has resulted in the Unified Database Data Vault System (Uni-DB), which can play an important role in empowering citizens at the national level. The effort attempts to make government services more accessible to citizens through digital methods. This allows citizens to generate documents at the office authority rather than carrying the paperwork in hard form. The Uni-DB facilitates effective e-validation, e-authentication, and expediting the documentation process, as well as the avoidance of fabrication, manipulation, or duplication of documents.

The paper outlines the three main components of the initiative, including the creation of digital infrastructure, delivery of services digitally, and increasing digital literacy.

1.INTRODUCTION

In today's world, the need for secure and efficient document management is more important than ever. Documents play an important role in our daily lives, whether for personal identification, legal documentation, or financial transactions. Carrying and presenting hard copies of documents, on the other hand, is inconvenient and can expose you to security threats such as loss or theft. To address this issue, the Unified Database Data Vault System (Uni-Db) was created as a project to connect residents to many sectors where hard copies of their documents are not required.

The Uni-Db is a Python-based system that employs the R307X fingerprint sensor to scan an individual's fingerprint and confirm their Aadhaar card number (UIDAI ID). The technology then allows officials from the relevant sector to access the individual's needed paperwork for document processing. The Uni-Db protects an individual's documents by granting access only when the user is present and provides their UIDAI ID and fingerprint.

The Uni-Db project intends to improve e-validation, e-authentication, and the documentation process. The solution eliminates the need to transport physical copies of papers, saving time, effort, and resources. In addition, the Uni-Db removes the possibility of document fabrication, manipulation, or duplication, ensuring the legitimacy and validity of the papers given.

The technical features of the Uni-Db project and its possible impact on document management are examined in this research report. The article delves into the system's architecture, design, and implementation, as well as its security features such as encryption and secure data storage. The study also discusses the Uni-Db's advantages and disadvantages, such as its simplicity of use, efficiency, and possibility for data breaches.

The Uni-Db project has the potential to transform document management and authentication, making it more secure, efficient, and accessible to individuals and organizations alike. The purpose of this study paper is to provide a thorough overview of the Uni-Db system, its characteristics, and its possible impact on document management.

2. LITERATURE SURVEY

[1]. This research article includes a complete introduction of fingerprint identification and its practical uses, as well as a discussion of the technology's obstacles and limitations. This study examines the uniqueness of fingerprints and their applicability for biometric identification.

[6]. This report describes a study of fingerprint identification utilising the R307X sensor module. The authors detail the system's hardware and software design, as well as its testing and performance evaluation.

[7][8]. These papers offer a fingerprint identification system based on the R307X sensor module and machine learning algorithms. The authors detail the system's hardware and software design, as well as its testing and performance evaluation. They also explore the application of machine learning methods for fingerprint feature extraction and categorization.

[9]. This paper describes the design of a serial to USB converter based on the FT232RL sensor. The authors detail the converter's hardware and software designs, as well as its testing and performance evaluation.

[10]. This paper examines the design and implementation of a USB to serial converter based on the FT232RL sensor. The authors detail the converter's hardware and software designs, as well as its testing and performance evaluation.

[12][13][14]. These papers give a study of image comparison in Python using the SIFT technique. The authors describe the SIFT technique and its Python implementation, as well as image processing with NumPy and OpenCV. They also discuss the method's performance on a picture dataset.

3. OBJECTIVE

The primary objective of the Uni-Db project is to develop, implement, and deploy a system that utilizes an individual's UIDAI ID and fingerprint, authenticated through the use of an R307x fingerprint sensor, to verify their identity. The Uni-Db system aims to provide a secure, efficient, and user-friendly document management solution that eliminates the need for individuals to carry hard copies of their documents. By enabling document e-validation and e-authentication, the system expedites the documentation process and mitigates the risk of document tampering, fabrication, or duplication. The main goal of the Uni-Db system is to improve the overall user experience by simplifying the document management process and streamlining document authentication, making it easier for residents to access a wide range of services and facilities. Ultimately, the Uni-Db project seeks to enhance the efficiency, security, and accessibility of document management for the benefit of citizens and organizations alike.

Sub goal of this project include:

1) Developing a user-friendly interface for individuals to access and manage their documents securely through the Uni-Db system.
2) Integrating the Uni-Db system with various government agencies, financial institutions, and other organizations to enable quick and efficient document processing.
3) Implementing strict security measures, such as data encryption, secure data storage, and access control, to protect sensitive user information.
4) Conducting thorough testing and quality assurance to ensure the Uni-Db system is reliable, robust, and free of errors.
5) Providing comprehensive training and support to users and stakeholders to ensure the effective adoption and use of the Uni-Db system.
6) Developing a system of metrics to measure the effectiveness and impact of the Uni-Db system, such as the number of documents processed, time saved, and user satisfaction.

4. METHODOLOGY AND PLANNING OF WORK

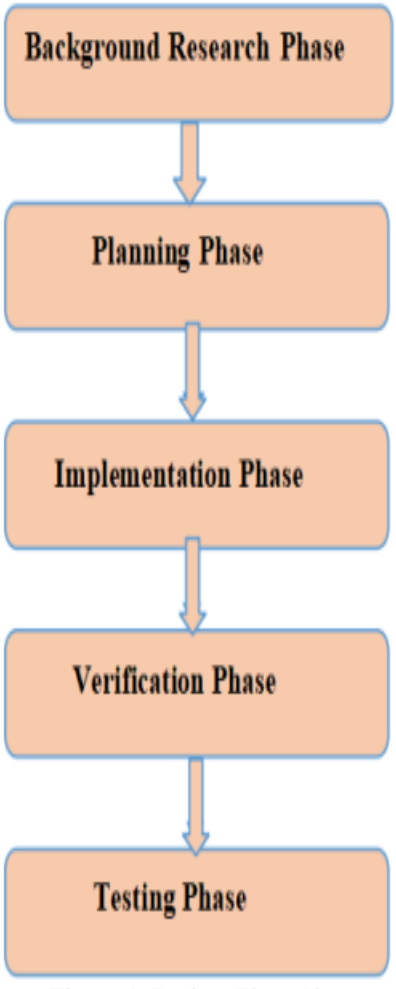

Figure 1. Project Flow Chart

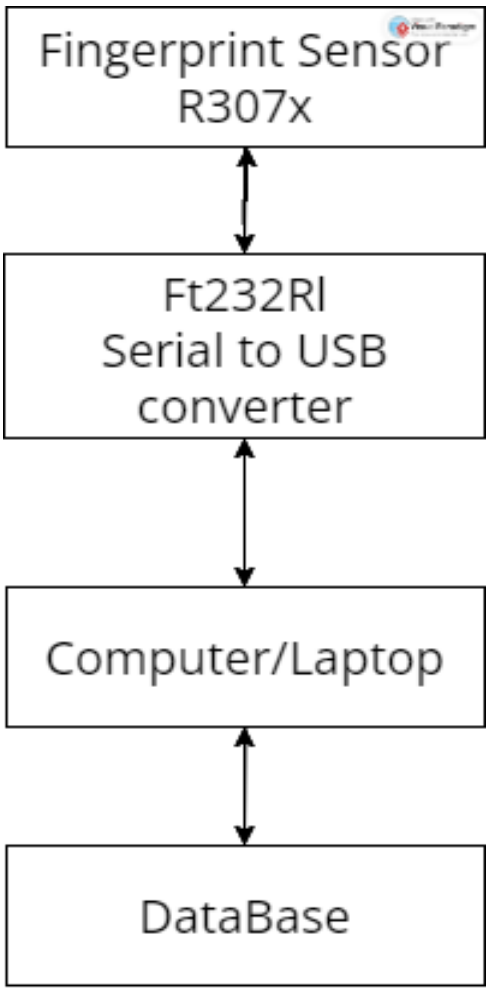

Figure 2. Block diagram of project's overall structure and components

The project goes through the phases outlined in Figure 1. The first phase is the literature survey, in which a comprehensive review of relevant existing research is conducted. The next phase is the planning phase, in which possible methods and approaches for the project are determined based on the literature review. The feasibility of the design, including features, cost, and hardware specifications, is then reviewed before a prototype is created. Each component is tested and the functionality of the prototype is evaluated, using a commercial fingerprint sensor as a reference. The final sensor unit consists of a R307x fingerprint sensor, FT232RL serial to USB converter and the computer or laptop. The fingerprint sensor module captures the image of fingerprint which are then later compared with existing fingerprint image stored in the database, then the SIFT algorithm generates the required score of matched fingerprint images and if it passes certain threshold then it will be considered as the same fingerprint image. Thus, giving the authority to access the particular individual documents who has provided their UIDAI id and the fingerprint.

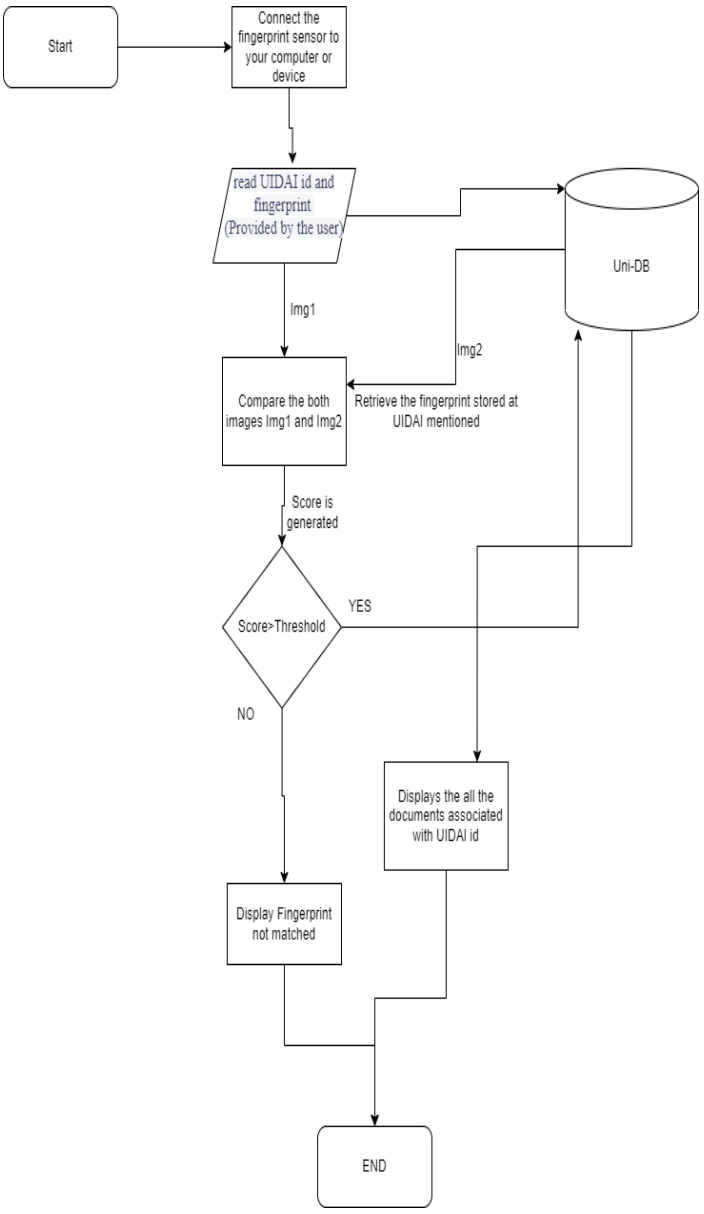

Figure 3. Depicts the flow chart of the Uni-DB system.

5. SIMULATION AND RESULT

The system is comprised of R307x fingerprint sensor module, FT232RL USB UART connector. At first the user will be asked to give there UIDAI id then they will be asked to provide there fingerprint then on clicking the retrieve button or submit it will first retireve the fingerprint image from the database which is stored at the time of registration associated with the provided UIDAI ID and then compares it with the current fingerprint and generates a score, using SIFT algorithm.

After the score is generated, it is compared with threshold already set, if the score is equal or greater than the threshold then it will be considered as matched fingerprint and then it will fetch all the document associated to the respective UIDAI ID provided by the user initially Figure 4 as reference.

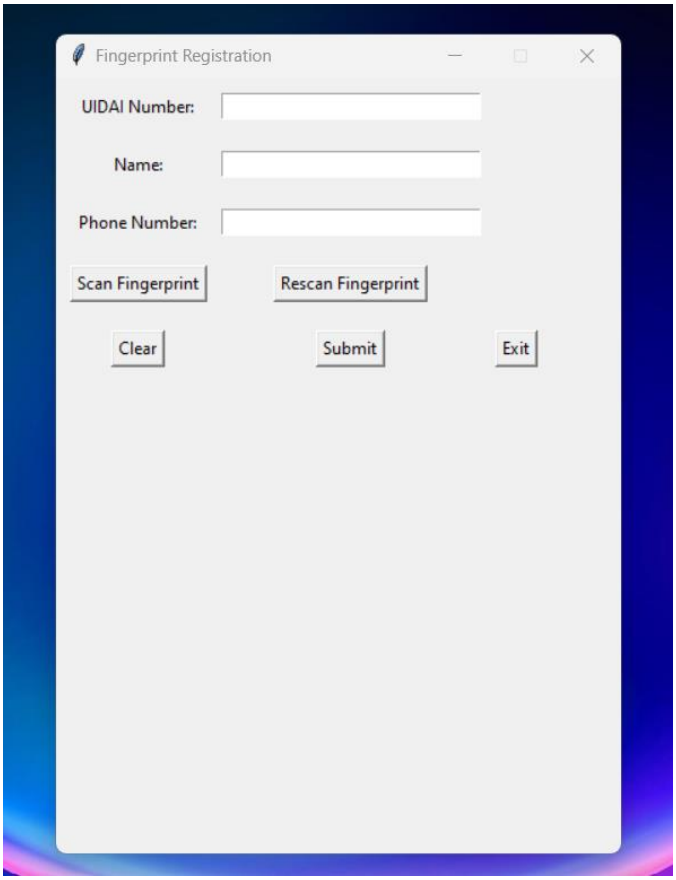

Figure 4. Registration Form

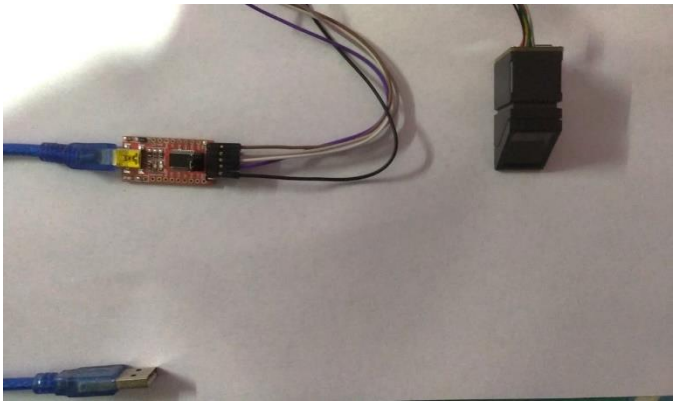

Figure 5.

Figure 5. shows the finished proposed project. This model comprises of R307X fingerprint sensor module, FT232RL USB UART.

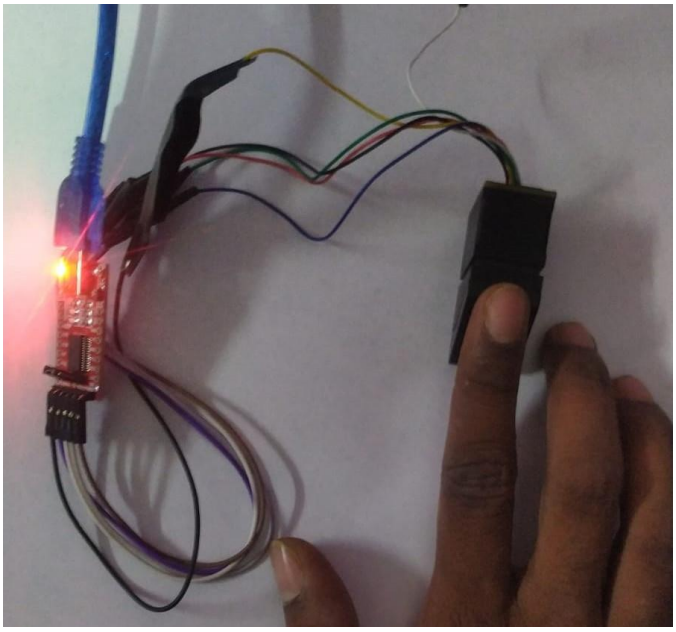

Figure 6.

Figure 6. shows a finger being placed on R307X sensor. The sensor captures the image of the fingerprints and send it to the computer or laptop. The code will compare the current image with the stored image in the database associated to the UIDAI ID provided by the user.

6. CONCLUSION

In conclusion, the Unified Database Data Vault System (Uni-Db) project offers a viable answer to the difficulties of document management and authentication. The system makes use of biometric identity technologies and digital infrastructure to deliver a safe, efficient, and user-friendly solution for document management. The Uni-Db reduces the need for individuals to carry hard copies of their documents while also accelerating the documentation process, lowering the danger of document tampering, fabrication, or duplication. The initiative has the potential to revolutionize document management and authentication, making it more secure, efficient, and accessible to both individuals and organizations. While there are some concerns about the security of the system, the study notes its benefits, such as ease of use, efficiency, and enhanced accessibility.

Further research and development of the Uni-Db project could lead to its widespread adoption and successful implementation in a variety of areas. Overall, the Uni-Db project offers a comprehensive document management system that has the potential to improve overall user experience and benefit citizens and organizations alike.

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