KYC Smart Card

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***Abstract*—The KYC SMART CARD project employs RFID technology to enhance identity verification by linking a smartcard with a centralized document repository, thus eliminating traditional document-based verification. This system significantly reduces inefficiencies, enhances security, and ensures accurate identity.**

***Index Terms*— RFID, Identity Verification, Smartcard, Centralized Document Repository, KYC.**

I. INTRODUCTION

A. Background

Radio Frequency Identification (RFID) technology has become increasingly prevalent across diverse industries, facilitating efficient identification and tracking of both individuals and objects. This project is designed to leverage RFID technology to create a smartcard-based system that simplifies and enhances the identity verification process. By integrating RFID capabilities with a centralized document repository, this system aims to improve security while minimizing errors that are often associated with traditional verification methods. As organizations continue to seek innovative solutions to enhance operational efficiency, the implementation of an RFID-based verification system offers a promising avenue for addressing these needs and challenges in real-world applications.

B. Motivation

The motivation for this project is grounded in the pressing need for secure and efficient identity verification solutions across various sectors. Traditional methods often involve cumbersome manual processes that can lead to significant time losses, data inaccuracies, and increased susceptibility to fraud. By implementing an RFID-based system, we aim to create a streamlined, user-friendly verification process that effectively addresses these challenges. This project not only seeks to enhance the accuracy and reliability of identity verification but also aims to foster a more secure environment where individuals can trust the systems in place to protect their personal information and facilitate seamless interactions.

C. Problem Statement

Current identity verification systems are often hindered by significant inefficiencies and security vulnerabilities. Manual verification processes, which frequently rely on physical documentation and signatures, can result in delays, inaccuracies, and potential misuse of identification. These shortcomings are particularly problematic in high-stakes environments where security is paramount. This project aims to address these issues by developing a smartcard-based RFID verification system that enhances the identity verification process. By leveraging RFID technology, we intend to create a more reliable and efficient system that minimizes risks while ensuring the integrity and security of user data throughout the verification process.

D. Objectives

The primary objectives of this project include developing an RFID-based verification system that streamlines the identity verification process and enhances security management of identification documents. Specifically, the project aims to minimize the errors and inefficiencies associated with traditional methods while providing a user-friendly interface for seamless authentication. Additionally, we seek to ensure that the system is scalable and adaptable for various applications, from educational institutions to corporate environments. By achieving these objectives, we hope to contribute a robust solution to the ongoing challenge of secure and efficient identity verification in today's digital landscape.

II. LITERATURE SURVEY

A. Existing Systems Review

A comprehensive survey of existing identification systems reveals a range of approaches, from manual

verification processes to more advanced biometric solutions. However, many of these systems continue to rely on traditional methods that are often time-consuming and prone to inaccuracies for instance, manual attendance systems commonly used in educational institutions require teachers to call out names or have students sign attendance sheets, leading to significant delays and potential errors. Additionally, while biometric systems offer improved accuracy, they can be costly and complex to implement. This project seeks to bridge the gap by proposing an RFID-based solution that integrates the strengths of existing systems while addressing their inherent limitations.

B. Limitations and Gaps

The limitations of current systems highlight significant gaps in efficiency, accuracy, and security. Traditional verification processes, which depend on physical documents and manual signatures, can result in lost or forged records and often lack real-time data updates. Furthermore, existing biometric systems, while effective in enhancing security, can present challenges related to user privacy and data management. These issues underscore the need for innovative solutions that combine the benefits of RFID technology with robust security measures. By identifying these gaps, this project aims to contribute valuable insights into the design and implementation of a more effective identification system that addresses both user needs and organizational requirements.

C. Contributions

USER	CONTRIBUTIONS
Andrew Neil	Developed the website backend, ensuring seamless communication between the server and the RFID system.
Dselva Jagan	Responsible for hardware development, including the selection and integration of RFID components.
Aakash Nadar	Worked on the frontend design, creating a user-friendly interface for accessing and managing identification data.
Manas Manjrekar	Developed the software for the RFID reader and controller, enabling effective data processing and communication.

III. PROPOSED SYSTEM

A. Introduction

The proposed RFID-based verification system is designed to facilitate seamless identity authentication in a variety of contexts. By employing smartcards that store unique user identifiers, the system allows individuals to verify their identities with ease. When a user presents their smartcard to an RFID reader, the system retrieves the necessary identification documents from a centralized server. This approach not only improves the accuracy and reliability of identity verification but also significantly reduces the time and effort required compared to traditional manual processes, thereby enhancing user satisfaction and operational efficiency across various applications.

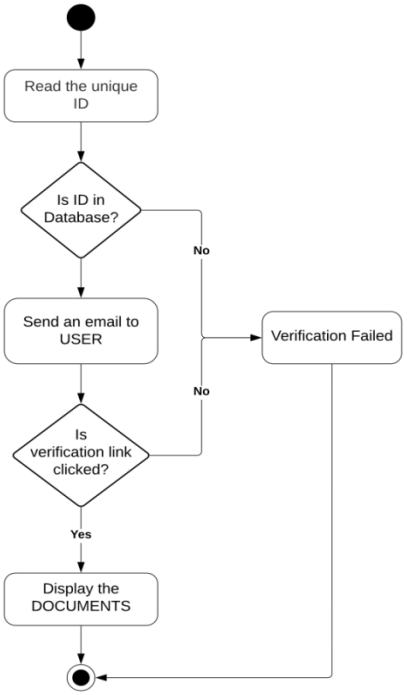
B. Architecture/Framework

The architecture of the proposed system consists of several key components: RFID smartcards, RFID readers, a centralized server for document storage, and a user interface for verification. Each smartcard is linked to an individual user profile, allowing for quick retrieval of identification documents during the verification process. The system's architecture is designed to ensure efficient data management, robust security, and user-friendliness. This integrated approach allows organizations to streamline their identity verification processes, reduce the potential for errors, and enhance overall security by maintaining strict control over access to sensitive identification information.

C. Algorithm and Process Design

The operational workflow of the RFID-based verification system can be broken down into a series of systematic steps. First, users register with the system by uploading their identification documents to the centralized server. Each user is then issued an RFID smartcard that is uniquely linked to their profile. During the verification process, users present their smartcard to the RFID reader, which communicates with the server to retrieve and display the relevant

identification documents. This algorithm ensures a quick and efficient verification process while maintaining high levels of security and accuracy in managing user data.



IV. DETAILS OF HARDWARE& SOFTWARE

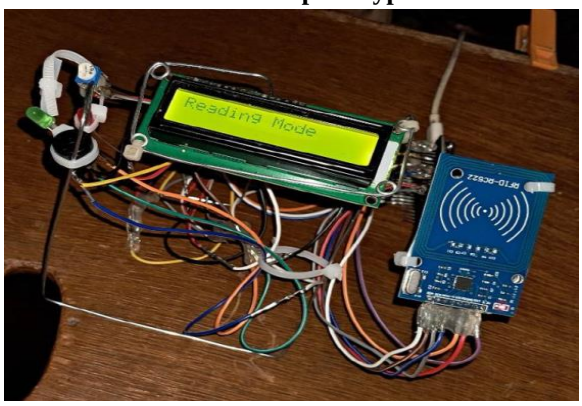
1. The implementation of the RFID-based verification system involves a combination of hardware and software components designed to work together seamlessly. Hardware includes RFID readers, which capture data from the smartcards, as well as the smartcards themselves, which store unique user identifiers. The backend comprises a secure server responsible for storing and managing identification documents. Software development involves programming languages and frameworks that facilitate communication between the hardware and the server, ensuring efficient data processing and retrieval. This integration creates a reliable and user-friendly system that meets the demands of modern identity verification.

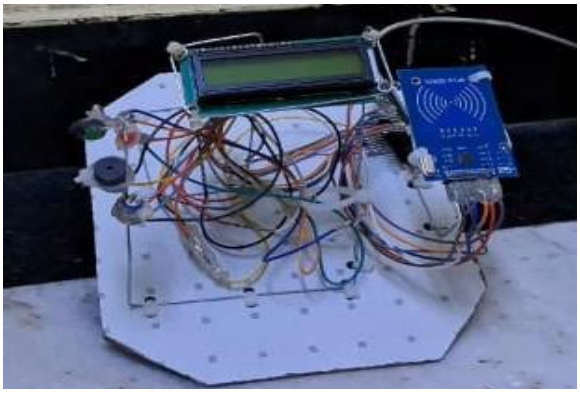
2. *Components Used:*

- RFID Reader (RC522): The system employs an RC522 RFID module, which isresponsible for reading the RFID tags presented by the user.
- 16x2 LCD Display: A liquid crystal display (LCD) is used to provide real-time information feedback, such as system status or document retrieval modes.
- ESP32 (Microcontroller): The system is driven by a microcontroller, which coordinates the communication between the RFID module and the server.
- Buzzer and LEDs: Visual and audio indicators are provided to signal successful or failed operations, improving user interaction.
- Wiring Setup: The various components are interconnected with a well-organized set of jumper wires to facilitate communication and power distribution.

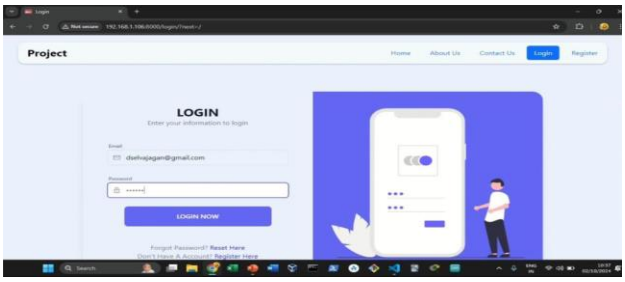
V. EXPERIMENTS & RESULTS

- **This is how the actual prototype looks like**

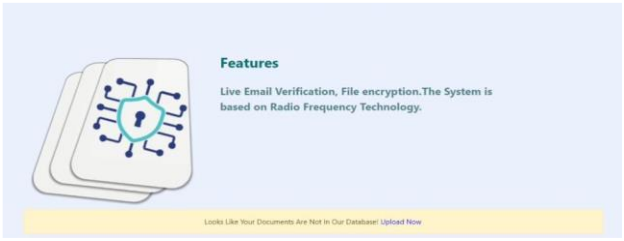




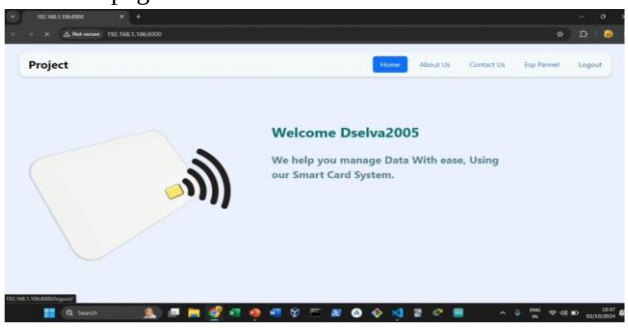
- **The Login Page**



- The user will be notified to upload their documents. The notification will disappear once the user uploads the documents.

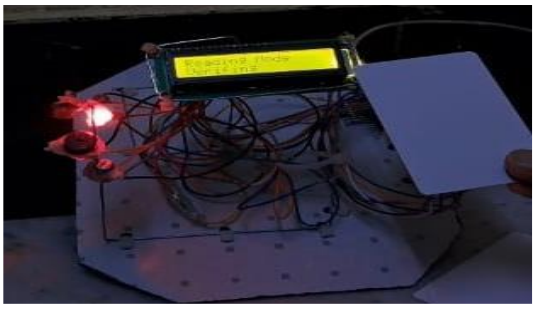


- Homepage

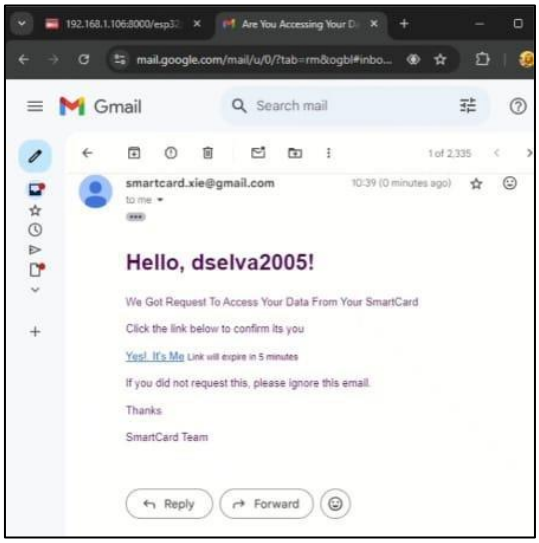


- When the user is found in the database and is authenticated. The green light indicates successful verification. The terminal shows the endpoints hits at the server.

- When the authentication failed.

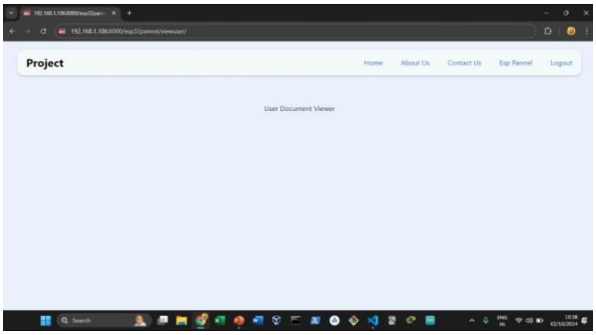


- This is the email sent to the user for 2-step verification.

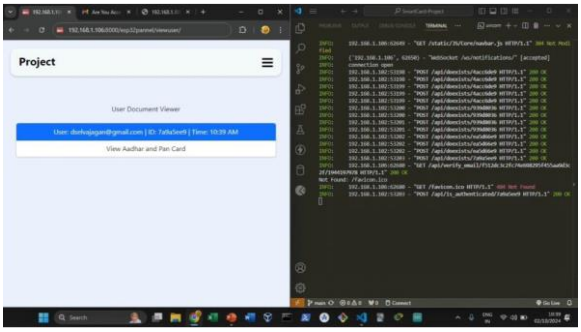


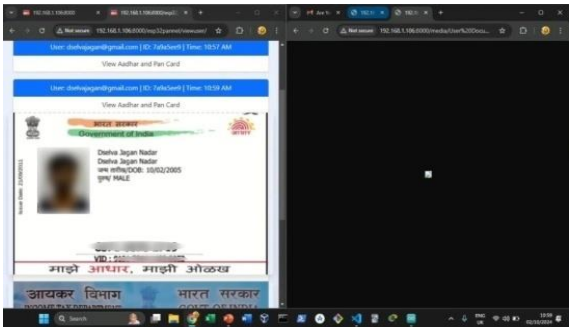
- When the user clicks the authentication link this is the page shown to them.

- This is the “VIEW ONLY” page where the documents are shown for KYC. These documents are displayed when the user clicks the verification link sent on to their email.



- The user documents are shown in “VIEW ONLY MODE”. But the documents are encrypted in the backend.





VI. CONCLUSION

1. The RFID-based verification system effectively addresses inefficiencies and security issues in traditional identity verification.
2. It ensures enhanced security, operational efficiency, and reliable authentication through RFID smartcards and centralized document storage.
3. Experimental results confirm its practicality and suitability for various applications.

VII. FUTURE WORKS

1. Strengthen security with advanced encryption and multi-factor authentication.
2. Integrate biometric systems for additional authentication layers.
3. Expand scalability to diverse sectors like healthcare, banking, and government services.
4. Incorporate real-time analytics and machine learning for performance optimization and anomaly detection.

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