ISSN (O) 2393-8021, ISSN (P) 2394-1588

IARJSET

International Advanced Research Journal in Science, Engineering and Technology

Impact Factor 8.066 ⁙ Peer-reviewed & Refereed journal ⁙ Vol. 11, Issue 7, July 2024

DOI: 10.17148/IARJSET.2024.11786

ELECTRONIC VOTING MACHINE USING FINGERPRINT

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Abstract: The integration of biometric technologies into voting systems represents a significant advancement in ensuring electoral integrity and enhancing voter authentication. This paper explores the design and implementation of an electronic voting machine (EVM) that leverages fingerprint recognition for secure and efficient voter identification. The proposed system incorporates a fingerprint scanner to authenticate voter identity, reducing the risk of fraud and errors associated with traditional voting methods. Key features of the EVM include real-time fingerprint matching, an encrypted data storage mechanism, and a user-friendly interface to streamline the voting process. The system's robustness is evaluated through simulated voting scenarios and real-world testing, demonstrating its capability to enhance security, increase voter confidence, and improve overall election administration. This approach not only addresses challenges related to voter fraud and identity verification but also represents a step forward in modernizing electoral processes through biometric innovation.

Keywords: Electronic Voting Machine, Fingerprint Recognition, Biometric Authentication

I. INTRODUCTION

In the modern democratic process, the integrity and security of elections are paramount to ensuring fair and accurate representation. Traditional voting methods, while widely used, often face challenges related to voter identification, ballot tampering, and administrative inefficiencies. The advent of biometric technologies offers a promising solution to these issues, particularly through the application of fingerprint recognition in electronic voting systems. Electronic Voting Machines (EVMs) have revolutionized the voting process by introducing automation and reducing manual errors. However, despite their advantages, traditional EVMs are not immune to concerns about voter fraud, impersonation, and the accuracy of voter rolls. To address these concerns, integrating biometric authentication—specifically fingerprint recognition—into EVMs presents a significant advancement.

Fingerprint recognition technology provides a highly secure and unique method of verifying voter identity. Each individual's fingerprint is distinct and stable over time, making it an ideal biometric trait for authentication purposes. By incorporating a fingerprint scanner into EVMs, the system can authenticate voters with high accuracy and speed, thereby minimizing the risk of fraudulent activities and ensuring that only eligible voters can cast their ballots. This introduction explores the rationale behind using fingerprint recognition in electronic voting systems, outlining the technological benefits and potential challenges associated with its implementation. The paper further delves into the design considerations and operational advantages of fingerprint-based EVMs, highlighting their role in enhancing the security, efficiency, and reliability of modern electoral processes.

II. LITERATURE SURVEY

The paper [1] "Arduino based smart electronic voting machine" discusses the implementation of a smart voting system that utilizes fingerprint recognition with Arduino. While the concept of such a voting system isn't new, it's crucial to ensure that it meets expected standards through the effective use of technology for broader adoption.[2] "EVM using biometric and unique identity card", this paper outlines a methodology for a secure electronic voting machine (EVM) using face recognition, biometrics, and a unique card with IoT integration. It discusses peer-to-peer applications and networking. Additionally, it covers fingerprint-based electronic voting machines, highlighting their ability to speed up result tabulation. The paper also reviews previous works on electronic voting machines. The paper [3] aims to develop a system that addresses current and future challenges, eliminating the drawbacks of previous architectures. It discusses a basic e-voting approach and architecture, emphasizing eligibility, uniqueness, and accuracy.[4] Fingerprint based voting system, this paper refers us to use iris scanner as an alternative or complementary for fingerprint-based system.

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EVM using biometric and unique identity card, this paper explains about the methodology of secured EVM using face recognition, biometric, a unique card with IOT. the previous works in the field of promoting security of Electronic Voting Machines through biometrics are reviewed in [5]. In order to improve electoral security, to construct a fingerprint authentication Aurdino is used. By providing a secure and efficient means of verifying voter identity, this technology promotes transparency, reduces fraud, and ensures the integrity of the democratic system [6]. The paper [7] refers to the use of fluid sevm fingerprint unique ID to avoid hacking the data.

III. METHODOLOGY

The methodology for developing and implementing an electronic voting machine (EVM) with voter registration and fingerprint-based voting involves several key stages: system design, voter registration, fingerprint enrolment, voting process.

1. System Design:

1.1Hardware Components:

Fingerprint Scanner: High-resolution optical or capacitive sensor to capture fingerprint images.

Microcontroller/Processor: Central processing unit to handle data processing, voter authentication, and vote casting.

Display Unit: Touchscreen or LCD for user interaction and instructions.

Data Storage: Secure, encrypted storage for voter data and voting records.

1.2 Software Components:

Fingerprint Recognition Algorithm: Software for fingerprint capture, feature extraction, and matching.

Voter Registration Module: Interface for inputting and managing voter data.

Voting Interface: User-friendly interface for selecting candidates and casting votes.

2. Voter Registration:

2.1. Data Collection:

Voter Information: Collect personal details such as name, address, and identification number.

Fingerprint Enrolment: Capture fingerprint images of each voter using the fingerprint scanner.

2.2. Data Processing:

Fingerprint Extraction: Use fingerprint recognition algorithms to extract unique features from each fingerprint.

Database Creation: Store encrypted biometric templates and voter information in a secure database.

2.3. Validation:

Verify Data Accuracy: Ensure all collected data is accurate and complete.

Update Voter Rolls: Regularly update and maintain the voter database to reflect any changes.

3. Fingerprint Enrolment:

3.1. Fingerprint Scanning:

Capture Multiple Impressions: Take multiple scans of each finger to create a comprehensive biometric template.

Quality Check: Ensure the captured fingerprints are of high quality and suitable for recognition.

3.2. Template Generation:

Feature Extraction: Process fingerprint images to extract unique minutiae points or patterns.

Template Storage: Store these features as encrypted biometric templates in the voter database.

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4. Voting Process:

4.1. Voter Authentication:

Fingerprint Verification: During the voting process, the voter provides a fingerprint scan.

Match Verification: Compare the scanned fingerprint with stored templates to verify identity.

4.2. Voting Interface:

Candidate Selection: Once authenticated, the voter is presented with a list of candidates or options on the touchscreen display.

Vote Casting: The voter selects their choice and confirms the vote.

4.3. Vote Recording:

Data Encryption: Encrypt vote data before storing it in the secure database.

Vote Confirmation: Provide a confirmation screen to the voter, showing a summary of their selection.

The block diagram and flow chart of the proposed system is shown in figure below.

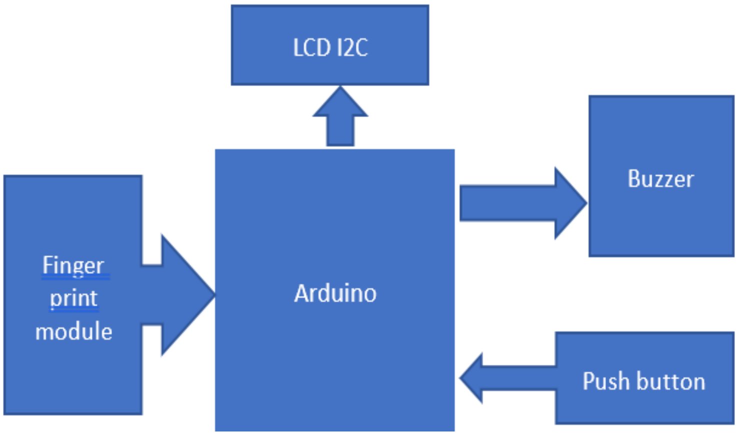

Figure 1: Block diagram of the proposed system

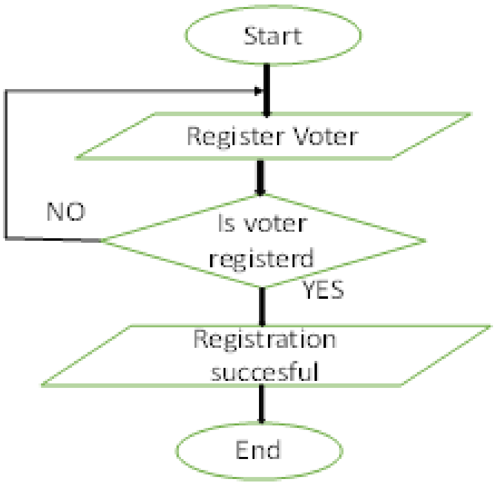

Figure 2: Flow chart of voter enrolment

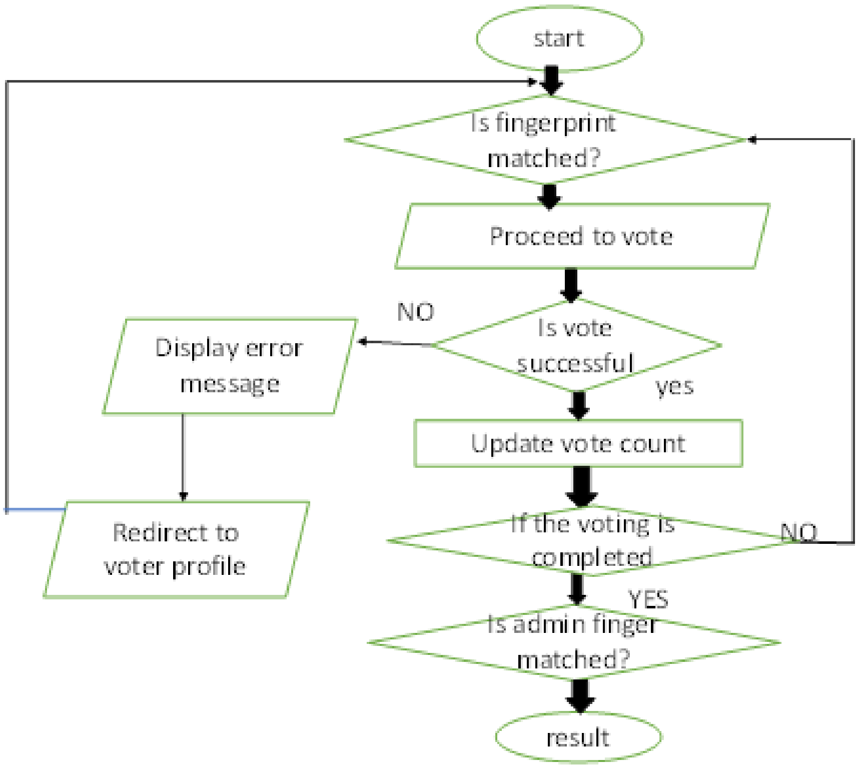

Figure 3: Flow chart of vote casting

IV. RESULT

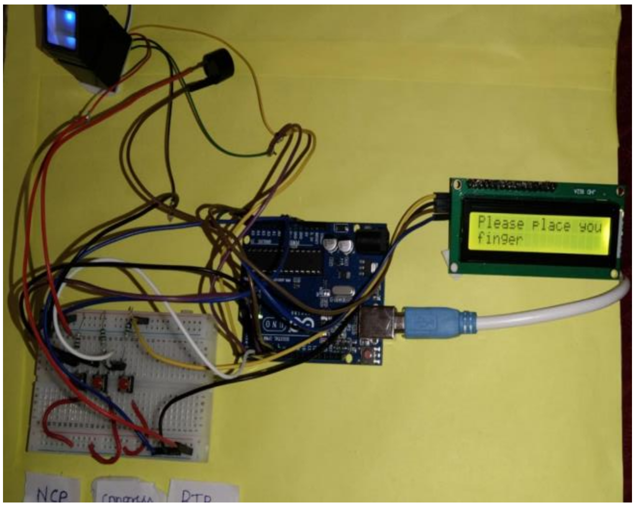

Figure 4: Circuit Connection

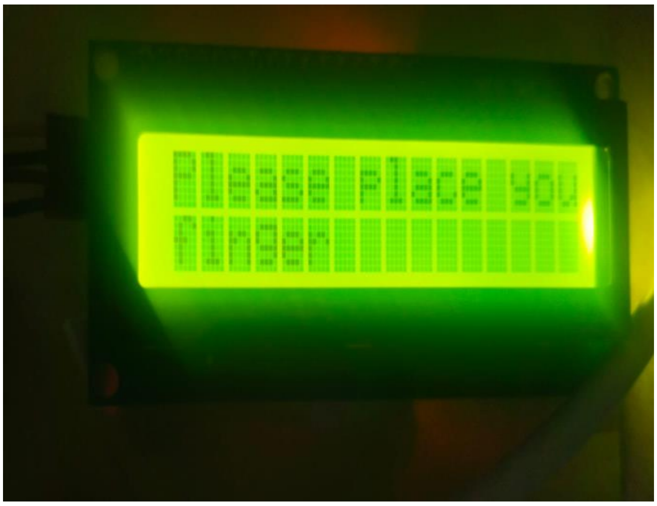

Figure 5: Snapshot of instruction given to the voter

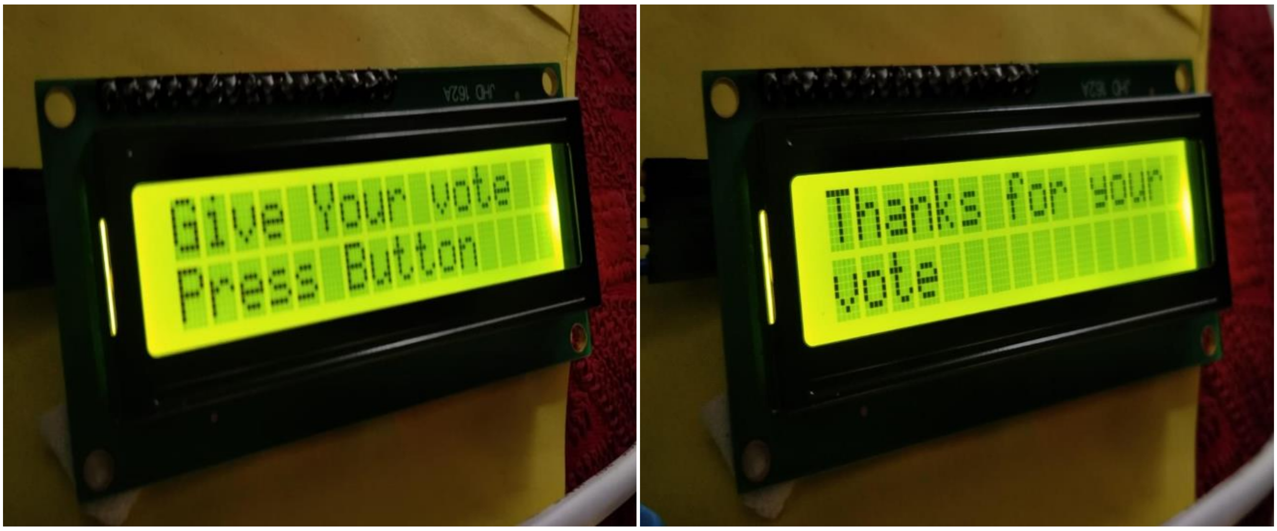

Figure 6: Snapshot of instruction given to the voter to cast the vote

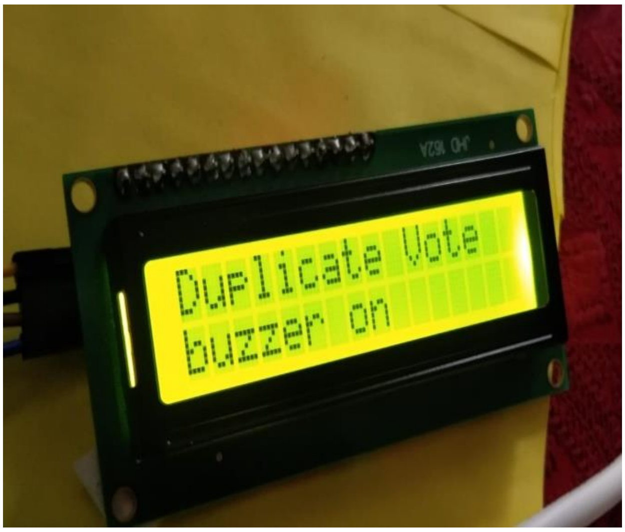

Figure 7: Snapshot of displaying duplicate vote

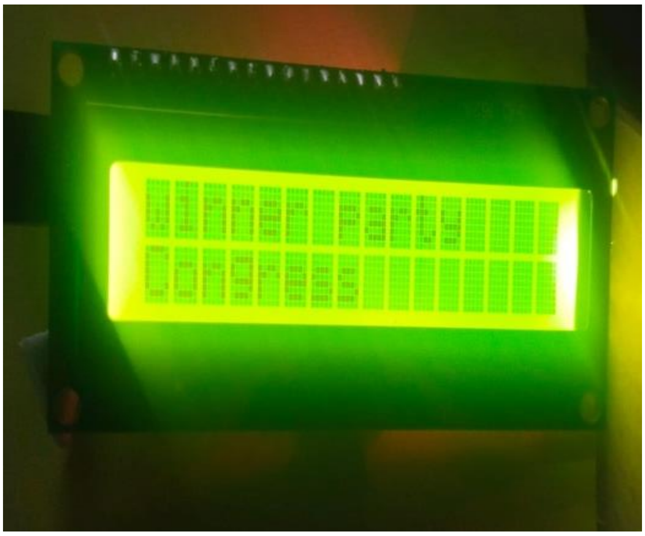

Figure 8: Snapshot of displaying the result.

V. CONCLUSION

The proposed system addresses many of the issues encountered during voting, such as illegal voting. Its effectiveness relies on its user-friendliness. It ensures a safer voting method, essential for the healthy growth of a developing nation or committee.

The proposed fingerprint-based voting system is superior and faster than previous systems. The new system blocks illegal voters, is easy to use, transparent, and maintains the integrity of the voting process.

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