Voting System Using Fingerprint

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Abstract—

This paper proposes a fingerprint-based voting system that uses biometric data from an individual's Aadhar card to enhance election security and streamline the voting process. By linking each voter's identity to their Aadhar, this system enables instant verification, allowing voters to cast ballots without needing additional identification. The process begins with fingerprint scanning, which is cross-referenced with the UIDAI's cloud-based database; successful matches grant access to vote, while mismatches trigger an alert. Although promising in terms of security and efficiency, the system's large-scale adoption requires careful consideration of data privacy, cybersecurity, and legal implications.

Keywords— Aadhar card, Data privacy, Electoral innovation, Electronic voting machines, Fingerprint-based voting, Security, Unique Identification Authority of India (UIDAI)

I. INTRODUCTION

The Current voting methods, using electronic voting machines and ink marks, face issues with ensuring each person votes only once, as ink marks can be tampered with. To address this, we propose a Fingerprint-based Voting System that securely verifies each voter through their Aadhar-linked fingerprint, preventing duplicate voting and enhancing election fairness. This approach promises improved security and reliability in the electoral process, tackling risks of fraud while advancing electoral innovation. With this technology, we're saying goodbye to the old ink marks and embracing a more secure way of confirming someone's vote. In a world where technology evolves quickly, it is a step forward to guarantee a trustworthy and foolproof voting process for everyone. Integrating advanced interdisciplinary approaches, such as biometric fusion, IoT security enhancements, and user-centric design, elevates the system's reliability, security, and user experience, ensuring a more transparent and trustworthy electoral process.[2]. As of 2024, India has over 5.5 million electronic voting machines (EVMs) deployed across 1.05 million polling stations. The Election Commission of India has also introduced the (VVPAT) system to enhance transparency, These advancements aim to improve election security and integrity.The first-generation machines, whose service life had expired, were not used in national elections[3].The existing EVMs have their limitations and vulnerabilities. In order to achieve the primary goal of this project, matching algorithm need to be designed in efficient way in order to increase system's accuracy. The proposed matching based on Gabor liner filter bank which consists of 8 filters which will extract the local and global feature of the fingerprint and convert the extracted information into variant vector (fingercode). The performance of liner filters is not accurate if the fingerprint image not clear. For that another objective is added to this project which is reducing the noise of the fingerprint image using sectorization and normalization. Voting machines are the total combination of mechanical, electromechanical, or electronic equipment (including software, firmware, and documentation required to program control, and support equipment), that is used to define ballots; to cast and count votes; to report or display election results; and to maintain and produce any audit trail information[4].

II. LITERATURE SURVEY

The majority of the worldwide election were using a paper-based voting rather than using fingerprint election system. The past experience of the electoral process required us to sharpen on the use of the latest technology in the electronic voting process. Nowadays, the current voting process has many safety problems, and it is very tricky to prove even simple security aspects about them. Furthermore, there is some possibility to work in the electronic voting system in terms of the authenticity of voters and to protect the electronic voting machine from offenders [10,11]. Presenting a secure electronic voting machine that incorporates biometric authentication to enhance voter identification and prevent fraud [4] which analyses the security vulnerabilities of India's electronic voting machines, highlighting potential weaknesses and suggesting improvements [3]. The existing EVMs have their limitations and the shown vulnerabilities, which have led to concerns about their security [4, 5, 6]. Providing an expert committee's evaluation of the upgraded electronic voting machine, voting system using finger print along with recommendations for enhancements [12]. This article discusses the financial aspects of India's elections, highlighting the significant costs involved in conducting elections. The paper [13] authors explore the "IOT Based Fingerprint Voting System" developed an IoTbased fingerprint voting system, achieving high accuracy in fingerprint matching with stored data. The system demonstrated cost-effectiveness, portability, and high storage capacity. Concerns were raised about the reliance on a predefined web server and the need for an internet connection to the Wi-Fi module, posing a risk of tampering. METHODOLOGY

A fingerprint-based protected voting system has been proposed, and it includes a number of important procedures to guarantee correctness, security, and dependability at every stage of the procedure. The approach can be divided into stages, with each stage concentrating on particular goals and duties.

A. Requirement Analysis Start by carefully examining the specifications for the fingerprint-based safe voting system. This entails comprehending the intended user base, the scope of the voting system (e.g., municipal, state, or federal), legal and regulatory issues, security specifications, usability elements, and technological limitations.

B. System Design Create the voting system's architecture based on the criteria that have been obtained. In order to do this, the components—such as the voting machines, backend servers, databases, and user interfaces—must be defined. To guarantee a flawless voting process, pay close attention to data flow, encryption mechanisms, and system integrations.

C. Fingerprint Data Collection and Storage Create a plan for gathering and safely storing fingerprint data. To safeguard the integrity and privacy of the fingerprint templates, use encryption methods and biometric standards. Put policies in place to guard against illegal access and guarantee that data protection laws are being followed.

D. Voter Registration Implement a user-friendly voter registration process that collects fingerprints, verifies identity through ID cards or other identification methods, and securely stores voter information.

Develop procedures for managing updates to voter records, including changes to names or addresses.

E. Voting Process Design the voting process to include voter authentication, display of ballot choices, secure recording of votes, and fingerprint-based verification of each voter. Ensure the system can support high volumes of concurrent users while maintaining security and performance standards.

F.Security Measures Enforce robust security measures across all levels of the system, including secure authentication, access control, audit trails to monitor system activity, and encryption for data in transit and at rest. Establish contingency plans to address potential security incidents or breaches.

G. Testing and Validation Conduct extensive testing to confirm the reliability, security, and functionality of the fingerprint-based voting system. Perform unit, integration, system, and security testing to identify and resolve any issues or vulnerabilities. Use usability testing to gather feedback and improve the voting experience.

H. Deployment and Training Deploy the voting system in its designated environment, whether at polling locations, online, or a combination of both.

IV. EXPECTED OUTCOME

The Secure Vote system revolutionizes the electoral process by integrating advanced biometric technologies for secure and accurate voting. The system enhances the efficiency of elections by automating voter authentication through fingerprint and retina scans, reducing manual errors and preventing unauthorized access. Voters benefit from a streamlined, user-friendly platform for casting their votes, while election officials gain real-time insights into voter participation and results. The system's robust security measures ensure the integrity of the voting process, mitigating risks of fraud and tampering. Overall, Secure Vote contributes to a more transparent, secure, and efficient electoral process, reinforcing democratic integrity and operational [6].

V. DISCUSSION

The proposed Fingerprint-based voting system represents a significant improvement over previous systems. This new system enhances security, expedites the voting process, increases transparency, and upholds the integrity of the voting process. It effectively prevents illegal voting, ensures ease of use, and provides real-time feedback to voters. Moreover, it prevents multiple votes by the same person and rigorously verifies voters' eligibility. These advancements contribute to a safer and more

efficient voting method, essential for the growth of a developing nation.
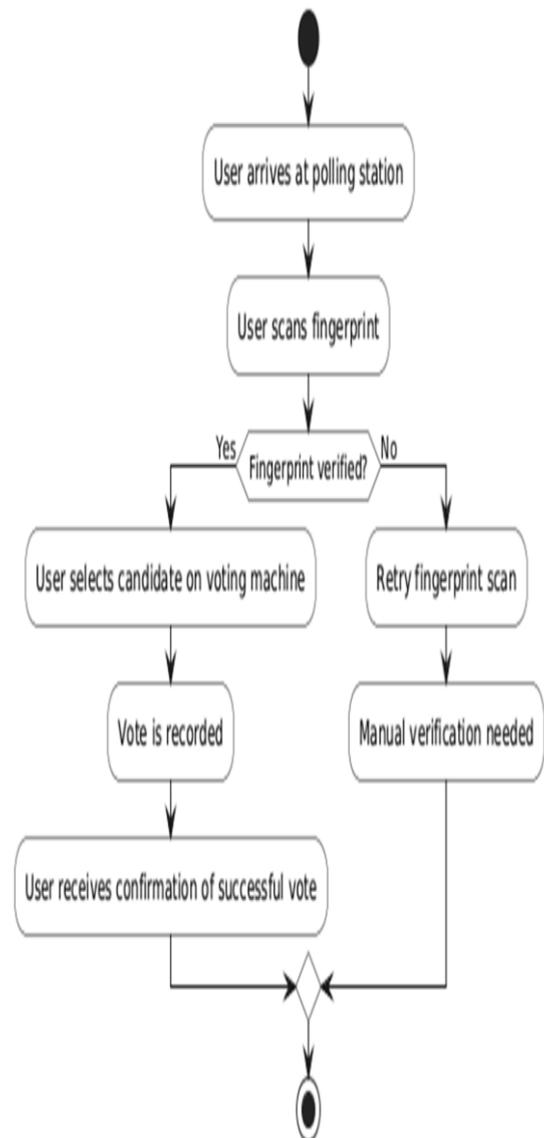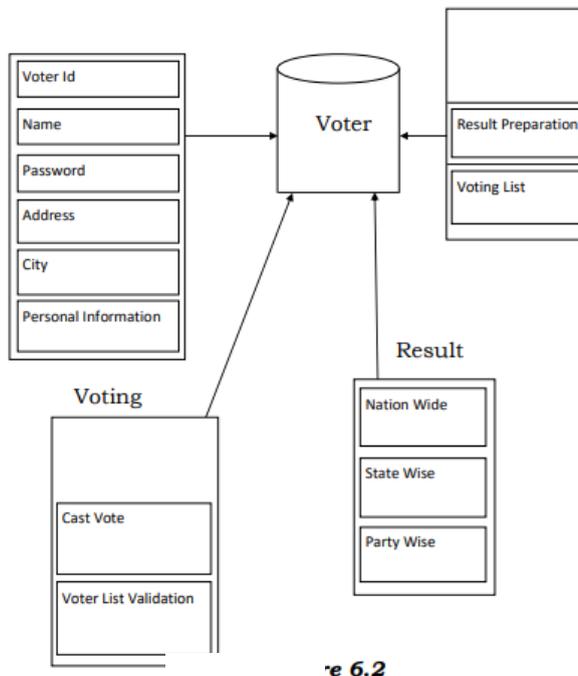

FIG.1. FLOWCHART FOR VOYING SYSTEM USING FINGERPRINT
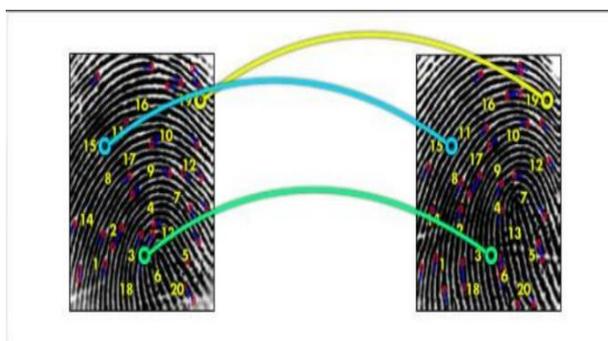
FIG.2 BLOCK DIAGRAM

FIG.3. ADMIN DASHBOARD

FIG.4 MATHCHING ALGORITHM

VI. ACKNOWLEDGMENT

An individual may possess certain limitations ,but through collaboration and support from insightful individuals, they can overcome obstacles and achieve their otherwise challenging dreams. The exchange of ideas leads to the creation of innovative approaches and more effective methods of work. When a person receives assistance or cooperation from others, it naturally evokes a sense of gratitude in their heart

VII. CONCLUSION

The Aadhar-based voting system offers a transformative solution to modern electoral challenges by enhancing security, inclusivity, and efficiency. Utilizing Aadhar's biometric authentication, it prevents fraudulent voting and boosts public confidence in the electoral process. By eliminating duplicate voting, it improves transparency and integrity, while simplifying voter registration for greater accessibility. The system's automation streamlines vote collection and result tabulation, ensuring faster, error-free results and strengthening public trust. Ultimately, this system reinforces democratic principles by promoting fairness, transparency, and accessibility, paving the way for more secure and reliable elections in the digital age.

VIII. FUTURE WORK

The fingerprint-based voting system offers numerous opportunities for enhancement and future development. Potential areas for future work include:

1. Enabling remote voting within electoral boundaries to improve accessibility.

2. Strengthening security measures to safeguard voter data and maintain system integrity.

3. Investigating the integration of advanced biometric authentication methods to enhance accuracy.

4. Incorporating blockchain technology to ensure the immutability of voting records.

5. Conducting comprehensive field trials and refining the system based on real-world usage.

6. Addressing scalability and infrastructure requirements to support a larger voter base

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