E-Voting System Application with 3-Step Authentication using Blockchain

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Abstract - This project aims to develop an e-voting system application that utilizes blockchain technology and a three-step authentication process to enhance security and accuracy in the voting process. The proposed system will leverage a distributed and tamperproof ledger to record all transactions and prevent unauthorized modifications. The three-step authentication process will provide an added layer of security to ensure that only authorized voters can participate in the voting process. The system will enable voters to cast their votes remotely, conveniently, and securely. This project has the potential to revolutionize the electoral process by providing a more efficient, reliable, and accessible means of voting, while also ensuring the integrity and accuracy of the results. Index Terms—Kinect sensor, Indian Sign Language (ISL gestures), gesture recognition

***Key Words*:** *Blockchain, E-Voting System, 3-Step Authentication.*

1.INTRODUCTION

In India, the traditional voting process is time consuming, expensive, and prone to errors and fraud. The use of Electronic Voting Machines (EVMs) has addressed some of these issues but has also introduced new concerns regarding security and transparency. Additionally, the current process requires manual registration with a voter ID, which can lead to issues of duplicate or bogus votes. The lack of proper authentication standards also leaves room for identity theft and manipulation of votes. Furthermore, voters who are unable to physically attend polling booths due to distance, illness, or other reasons are disenfranchised, leading to low voter turnout and a lack of representation. These issues call for a more efficient, reliable, and secure voting system that provides transparent and tamper-proof results while enabling all eligible citizens to cast their votes from anywhere. The proposed E-Voting System Application uses Blockchain with 3-Step Authentication and aims to address these challenges and revolutionize the democratic process in India as well as in any democratic country where Voting is a crucial as well as a critical element in society.

The current voting system in many countries involves manual registration with a voter ID, which allows voters to cast their votes in polling booths. However, this system is not foolproof, as it can be susceptible to issues like bogus votes and data manipulation. To address these challenges, this project proposes an e-voting system that uses Aadhar, a unique identification authority in India, for biometric

2. LITERATURE SURVEY

Aadhaar Base Voting System Using Blockchain Technology by Ms. Sayali B. Khatal states that by utilizing biometric subtleties and VID(Virtual ID) of citizens acquired from the Aadhar information base to

make the choice and furthermore utilizing the advanced key for the encryption of the votes inside the system but the Information here stored in a static database and is a 'hardware based system' which still is a problem in the current system.

Electronic voting machine based on Blockchain technology and Aadhar verification [2] by Navya A, Roopini R, Sai Niranjan A. S., Prabhu B proposes a EVM machine which is integrated with the Aadhaar verifications based on the Blockchain technology, which may help to reduce the risk of the manipulation of the vote but requires Manual intervention is required and does not solve the problem of abstention in the current system. At the first occurrence of an acronym, spell it out followed by the acronym in parentheses, e.g., charge-coupled diode (CCD).

BLOCKCHAIN BASED E-VOTING SYSTEM [3] by Mr. Shreeyash Pednekar states a validation process between Aadhar number is present in the UIDAI database following an OTP verification process. After that the voter can cast his vote and will be logged out. This will ensure that the voter can cast his vote only once but authentication of the voter's identity is still a problem, i.e., whether the voter itself is present while voting is not verified thus anyone can vote with anyone's Aadhar card.

Electronic Voting based on Virtual ID of Aadhar using Blockchain Technology[1] by Roopak T M, Dr. R Sumathi proposes a Biometric information and Virtual IDs from the Aadhar database have been used to construct a safe electronic voting system that allows voters to cast their ballots. The voter's identity card and Aadhar are independent documents, but a recent move to integrate the two has made it easier to employ biometric authentication during elections. Designing Aadhar-based biometric and digital (for example, one-time-password)-based authentication mechanisms for elections has garnered a lot of interest in academic circles. Although the magnitude of Aadhar makes it notable, alternative biometric-based population databases have arisen recently, with Indonesia's e-ktp (Kevindra Darwis and Lim 2011) system serving as one such them.

Blockchain Based E-Voting Recording System Design[4] by RifaHanifatunnisa and Budi Rahardjo proves that although there are many applications for block chain technology, they haven't yet reached its full potential. Electronic voting has been in use since the 1970s because it is more accurate and less prone to error than paper-based systems. With the development of block chain technology, significant efforts are being made to determine whether they may be used for voting. A set of already registered users are used in the proposed model's permissions-based voting system. Techniques for voting with the assistance of blockchains have been suggested in several studies.

Parameterizable FPGA Implementation of SHA-256 using Blockchain Concept [7] by Devika K. N. concentrates on the Design of Parameterizable Implementation of SHA256 algorithm in FPGA imparting Blockchain Concepts. SHA-256 is the key principle utilized in Blockchain architecture to impart security and privacy into a system. This one-way hash function generates unique output for a given input ensuring data authenticity and nonrepudiation. Through this implementation, main goal is to introduce this new technology into VLSI domain for securing hardware digital system designs and SOC's (System On Chip). The proposed methodology enables any bit length input message to get converted to fixed length message digest known as Hash. The design for the proposed architecture was simulated in Modelsim and synthesized in Xilinx Vivado Design Suite using Artix 7 FPGA.

3. PROPOSED METHOD

A. Proposed System The proposed system is been developed in three stages. User registration takes place in the first phase. The second stage requires the registration of candidates. The third step is to begin the voting process, during which the voter must successfully complete the three-step authentication process. If the voter completes the authentication process successfully. The voting dashboard, which includes the candidate's name and photo as well as the Unique IDs granted to them in the second procedure, is shown to the voter. The voter next casts their vote, which is then recorded in the block along with a timestamp and the candidate's unique ID. The voting summary report is generated and delivered to the admin at the conclusion of the procedure, and it is up to the admin to decide when to publish the reports

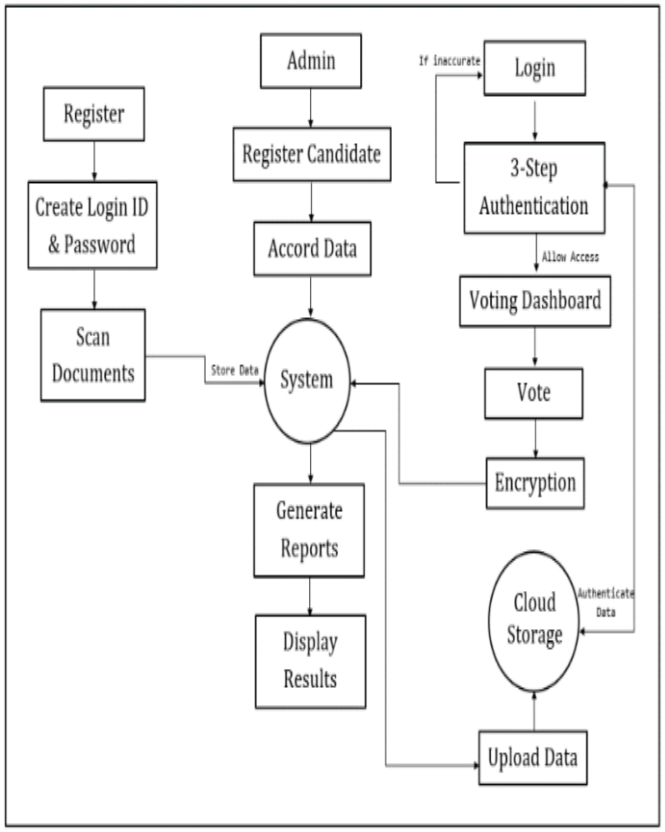

Fig -1: System Architecture

The given system includes following modules:

- Voter Registration
- Candidate Registration
- Voting Process
- Blockchain Manager
- Displaying Result

Voter Registration:

The initial module of the e - voting application based on the Aadhar virtual ID is the voter registration process. Voters may register by providing personal information such as their name, cellphone number, Aadhar card number, gender, address, password, and facial data. After successfully registering, the voter can log in to the application and cast their vote on election day.

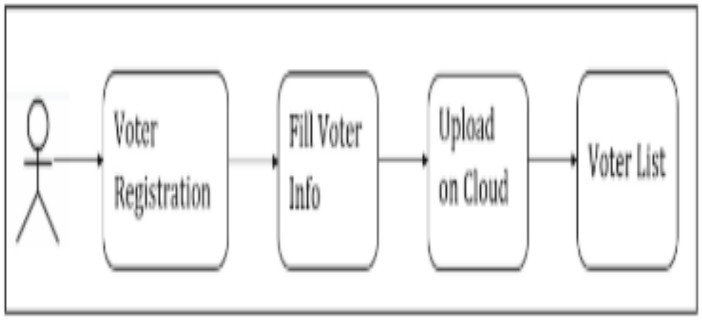

Fig. 2: Voter Registration Process

Candidate Registration :

The second module of the E-voting application is candidate registration. Candidate registration is done here. Candidates enter their Party name, Candidate name, and Party Symbol by the help of Admin. Candidate registration on the application is made upon entering this information
successfully registering, the voter can log in to the application

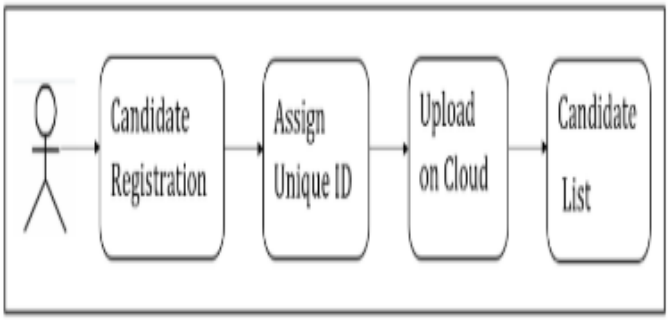

Fig. 3: Candidate Registration Process

Voting Process:

The voter must successfully complete the three-step authentication process, in which the voter has to verify its identity through verifying phone number, Aadhar Card and his face-by-face verification, before proceeding to the voting process after the login. If the voter successfully completes the authentication process, the voter is shown the

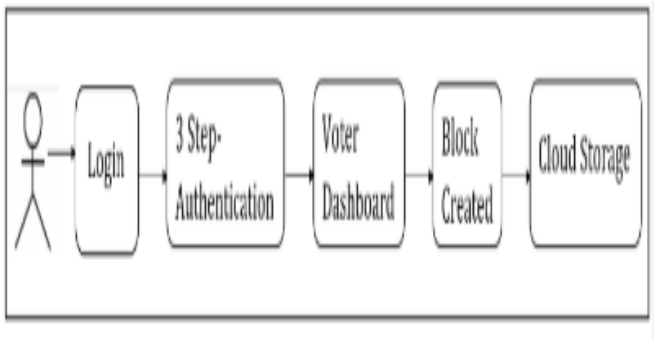

Fig. 4: Voting Process

Blockchain Manager:

The fourth module of our E-voting application is the block chain manager. A block-chain manager can control the voting process' security. This technology will assist us in protecting user and candidate data from corruption by using SHA256.Having followed voting, a new block of vote is produced and encrypted with hash function to prevent the user from casting more than one votes at the same time. The same user is therefore unable to vote again.

Displaying Result:

The fourth module of the online voting application is the outcome. Here after the whole process of registration and login of admin, registration and login of user, voting process, encryption of vote using block-chain and calculation of final votes to each candidate result are displayed.

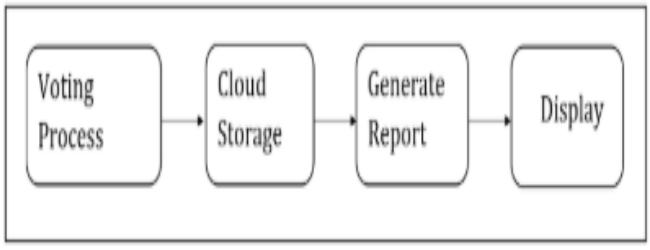

Fig. 5: Displaying Results after Voting Process

B. Process of creating and encrypting a block in the E-Voting System Application With 3-Step Authentication Using Blockchain.

- After the voter successfully completes the 3-step authentication process, they are presented with the voting dashboard that displays the candidate's name and photo.
- The voter then casts their vote by selecting their preferred candidate on the dashboard.
- The vote is then encrypted using a hashing algorithm, SHA256, which converts the vote into a unique string of characters that represents the vote.
- A block is then created to store the encrypted vote along with a timestamp and the candidate's unique ID.
- Before adding the block to the blockchain, the system verifies that the vote is valid and not a duplicate by checking the voter's authentication details and comparing them with previous votes.
- Once the vote is validated, the block is added to the blockchain using a consensus algorithm, such as Proof of Work or Proof of Stake.
- The block is then replicated across all nodes in the blockchain network to ensure that the vote is securely stored and cannot be tampered with.
- At the end, the blockchain is used to generate a summary report of the voting results, which can be verified by all parties involved in the election.

By using this process of creating and encrypting blocks in the E-Voting System Application With 3-Step Authentication Using Blockchain, the voting system becomes more secure, transparent, and tamper-proof, ensuring the integrity of the election results.

4. FEATURES OF THE GIVEN SYSTEM

A. For Voter

- He will be able to Register
- He will be able to Login using credentials
- He will be able to see Candidate Information
- He will be able to cast vote remotely

B. For Admin • He will be able to modify voter information

• He will be able to add/modify/delete candidates' information • He will be able to manage Voting Duration • He will be able to Display Result

• He will be able to Generate Report C. For Candidate

• He will be able to Register himself for Election by the submitting its details to the Admin.

• He will be able to Submit/Delete the Nomination for Election

5. RESULTS

Our project provides a secure and reliable method for casting votes in elections by using Aadhaar authentication and face verification, the system ensures that only authorized voters are allowed to cast their vote through 3- step Authentication and the use of blockchain technology ensure that the voting data is immutable and secure from tampering or manipulation. Overall, this project significantly reduces the potential for voter fraud, bogus votes, etc. and increases the transparency and security in the electoral process. It also covers aspects like providing two different interfaces for both, the user and the admin so as to tackle with different phases of the voting process.

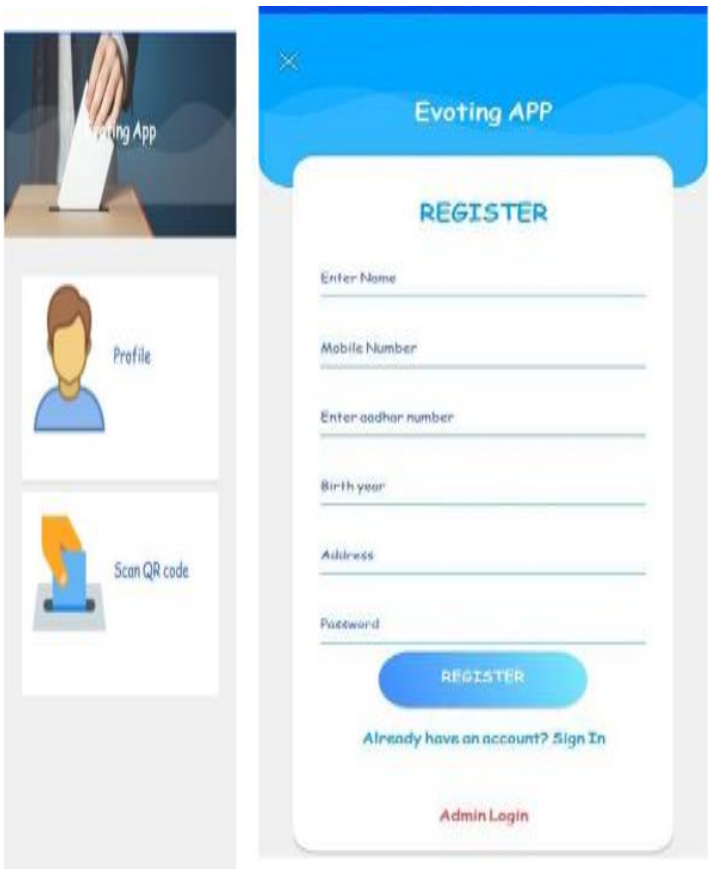

Fig. 6: Demonstration of app interface for Voters

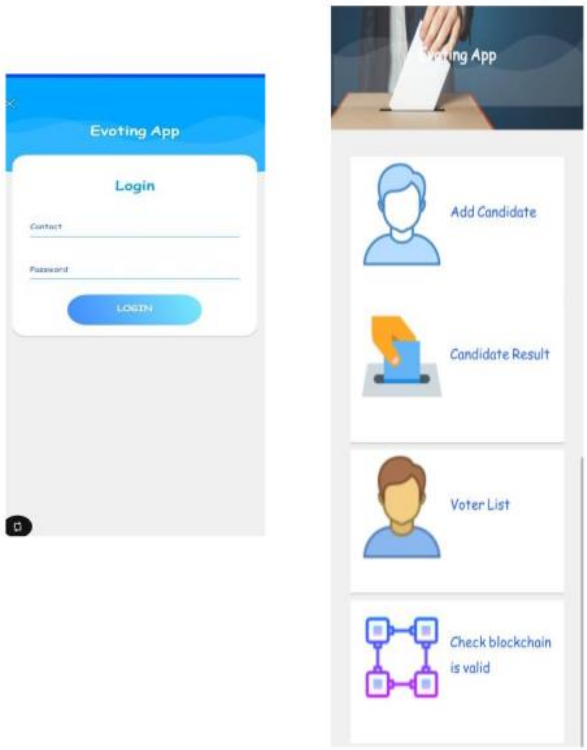

Fig. 7: Demonstration of app interface for Voters

6. CONCLUSION

The result of modernizing traditional administrative processes with more efficient ones is a critical need in today's rapidly developing world. As the pace of technological advancements accelerates, it is essential to adapt our administrative procedures to keep up with these changes. The implementation of new and innovative technologies can improve the efficiency, accuracy, and transparency of these processes.

The E-Voting System Application with 3-Step Authentication proposed in this project is an excellent example of how technology can be used to enhance traditional administrative processes. The system utilizes blockchain technology to provide a secure and transparent means of conducting elections, reducing the potential for fraud and manipulation while increasing accessibility and participation.

One of the significant advantages of this system is its user flexibility. The system allows voters to cast their ballots remotely, eliminating the need to visit polling booths physically. This feature not only saves time but also improves accessibility for individuals with physical disabilities, those who live in remote areas, or those who are unable to take time off from work to vote.

Moreover, the use of a blockchain-based distributed ledger ensures total transparency and accuracy in the voting process. The system records every vote in a tamper-proof block along with a timestamp and the candidate's unique ID, making it impossible to manipulate the results.

Another critical aspect of the E-Voting System Application is its robust security features. The three-step authentication process ensures that only authorized individuals can access the voting dashboard, and the use of blockchain technology provides an additional layer of security, making it virtually impossible for hackers to compromise the system.

In conclusion, the modernization of traditional administrative processes is essential for the continued growth and development of our nation. By embracing new and innovative technologies, we can improve efficiency, accuracy, and transparency while ensuring user flexibility and security. The E-Voting System Application with 3-Step Authentication is an excellent example of how technology can be used to enhance traditional administrative processes and pave the way for a brighter and more democratic future.

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