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A Review of a Blockchain E-Voting System for Secure Voting

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Abstract **- Blockchain technologies deliver an endless variety of applications that benefit from distributed economies. The proposed model is an Android application that has enhanced security features, which include both authentication and authorization. Authentication is incorporated by using a unique identification and authorization is done by using a fingerprint. Voters are also being verified by time password. The security in this project is implemented by using a 128-bit AES encryption algorithm and SHA-256 along with the blockchain. The vote is cast in the form of a transaction, where a blockchain is created, which keeps track of the tallies of votes. Through this, atomicity and integrity are maintained This blockchain-based voting system that satisfies the legal requirements of legislators has been a challenge for a long time. Distributed ledger technologies are an exciting technological advancement in the information technology world Blockchain technologies offer an infinite range of applications, benefiting from sharing economies. This project aims to evaluate the application of blockchain as a service to implement distributed electronic voting systems. The project elicits the requirements for building electronic voting systems and identifies the legal and technological limitations of using blockchain as a service for realizing such systems.**

I. INTRODUCTION

The Quick Key Generator system is a webpage that houses all your passwords and usernames in one step. Electronic voting (E-Voting) is one of the methods of casting votes that use electronic systems because of properties such as transparency, decentralization, irreversibility, and non-repudiation. In general, two main types of e-voting can be identified: e-voting (for example EVMs located at polling stations) and remote e-voting via the Internet (also called i-voting). Blockchain has a lot of potential when integrated into many areas. Elections have a very major role in democracy because they are the deciding factor in the future of a country, but the major concern is that society doesn't trust the election system. A flawed electoral system is an issue faced by even the world's largest democracies like India, the United States, and Japan. Over time, the voting systems have evolved, and the breaches of security have evolved.

The major issues that need to be addressed in the current voting system are vote rigging, EVM hacking, polling booth capture, and election manipulation. The problems were investigated in the voting systems in this project, attempting to propose an online voting model that can solve these problems. Using an efficient hashing algorithm technique, block formation and sealing, data collection, and result declaration by versatile blockchain methods are needed to solve the issue of a high-end-to-end system that ensures security and privacy. This project proposes an online voting system that uses the blockchain Ethereum to create a wallet with the credentials of the user. The elector will obtain an authenticated and tamper-proof personal ID. The voter will get the chance to vote in the form of a token, which will be transferred anonymously from the voter's wallet to the candidate's wallet.

The vote can be cast from any geographical area in the voter's allotted constituency. Blockchain also helps to preserve voters' anonymity while still being open to public inspection. The proposed voting system uses a more stable, tamper-proof blockchain (unchanged by voting modifications either by the voter or by any other third party) and is more cost-effective. We would also extend the constraints of structure, engineering, design, and implementation in our society for the voting mechanism.

II. LITERATURE REVIEW

1) Himanshu Agarwal, G.N.Pandey:
2) Online Voting System for India Based on AADHAR ID: A high-security password is checked in the main database before voting is allowed. The voter will be able to confirm if the vote is transferred to the correct candidate or party. A person from his or her allocated constituency may also vote. The tallying of The votes can be done manually, thus saving the data.
3) S.Chakraborty, S.Mukherjee: Biometric voting system using the Aadhar card in India The main goal of this venture is to create a safe electronic voting machine using the fingerprinting technique that distinguishes evidence so that we can use the Aadhar card database for specific marks. The online voting

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confirmation process should be possible. during the race voting season using finger vein detection, which enables the electronic poll reset to allow voters to cast their votes.

4) Hari K. Prasad, Arun Kankipati, and Sai Krishna Sakhamuri: Security Analysis of India's Voting: A Real Indian EVM Security Review is taken from an anonymous source. The project states that EVM is vulnerable to extreme attacks that may alter the outcome and breach the ballot's confidentiality. Use custom hardware; two attacks have been demonstrated.
5) BasitShahzadRaju, JonCrowcroft: :
6) Trustworthy Electronic Voting They suggested a system that makes use of appropriate hashing methods.to ensure data security This project introduces the concepts of block creation and block sealing. The Implementation of a block-sealing principle helps make the blockchain flexible to meet polling processes requirement.

III. OBJECTIVE

The objective of implementing a blockchain e-voting system is to create a secure, transparent, and tamper-proof platform that enhances the efficiency, accessibility, and integrity of the voting process. This system aims to address the shortcomings of traditional voting methods and provide a trustworthy means for citizens to cast their votes in elections. The key objectives of the blockchain e-voting system include:

Security and Transparency: Develop a system that ensures the security and privacy of voters' identities and choices while maintaining full transparency in the voting process. Utilize blockchain's cryptographic principles to prevent unauthorized access, tampering, or manipulation of votes and voter information.

Tamper-Proof Recordkeeping: Implement a distributed ledger using blockchain technology to create an immutable and chronological record of all votes cast. This ledger will provide a verifiable and auditable trail, reducing the potential for fraud and ensuring the accuracy of results.

Accessibility and Convenience: Design an intuitive and user-friendly interface that enables voters to participate remotely and conveniently, thereby increasing overall voter turnout. This system should be accessible via various devices, ensuring inclusivity for individuals with different technological capabilities.

IV. SYSTEM REQUIREMENTS

The role of the system analyst is pivotal, serving as an investigator and delving profoundly into the current system's functioning. During the analysis phase, an exhaustive examination of the system's operations and their interconnections is conducted. This encompasses both internal processes and external interactions within the system. A holistic perspective is adopted to comprehend the system as a cohesive entity, facilitating the identification of its input sources and streams.

V. PROBLEM DEFINITION

The problem statement for blockchain voting is to conceive and develop a system capable of addressing the shortcomings of conventional voting methods while incorporating the advantages of blockchain technology. This entails establishing a platform that ensures secure and transparent voting processes, maintains data integrity, and promotes voter confidence.

VI. EXISTING SYSTEM

Several states and organizations in India have experimented with e-voting systems in local elections and internal processes. Some of the prominent e-voting initiatives include:

Electronic Voting Machines (EVMs): EVMs have been a staple in Indian elections since the early 2000s. While not fully digital or online, these machines have streamlined the voting process by replacing paper ballots and manual counting.

Fig-1

Remote E-Voting for NRIs: In 2010, the Election Commission of India introduced remote e-voting for non-resident Indians (NRIs) to facilitate their participation in elections. This initiative aimed to address the challenges faced by NRIs in physically voting due to geographical constraints.

Fig-2

Proxy Voting: Some state elections have experimented with proxy voting for specific categories of voters, allowing them to vote through a designated proxy voter. This approach aims

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to facilitate voting for those who may find it difficult to vote in person.

VII. LIMITATIONS OF THE EXISTING SYSTEM

Limited Accessibility: The current system restricts participation among the elderly, disabled, and geographically distant members. This limitation compromises representation and excludes certain perspectives from influencing the decision-making process.

Voter Verification Challenges: Balancing accurate voter identification with privacy preservation remains intricate. The paper-based system lacks efficient means of verifying member eligibility and deterring fraudulent voting.

Vulnerability to Fraud and Manipulation: The absence of robust security measures renders paper ballots susceptible to tampering, impersonation, and multiple voting instances. These vulnerabilities undermine the sanctity of the voting process within IEEE.

Technological Barriers: Despite technological advancements, challenges related to remote voting persist. Concerns about members' varying technological prowess and data security must be resolved to ensure a seamless transition to digital voting.

VIII. ARCHITECTURE

- In this system, we have used a decentralized network to store voting data in the form of blocks. Blocks are interconnected with each other to create the chain of voting records.
- Once the data gets stored, it cannot be tampered with as blockchain is so securitized. Voter Registration: Users register via the web application, and their data is stored on the blockchain.Authentication and Verification: Secure authentication methods and one-time passwords enhance user verification

- Voting and tokenization: Each voter receives a unique voting token stored on the blockchain. Tokens are transferred to candidates' wallets to cast votes.
- Transparency and Auditability: Blockchain's immutability ensures transparency and traceability of the voting process.
- A web application is under development to monitor voting statistics, providing details on total voters, votes cast, and voting percentages. Blockchain's decentralized nature ensures that the monitoring process remains transparent and tamper-resistant.

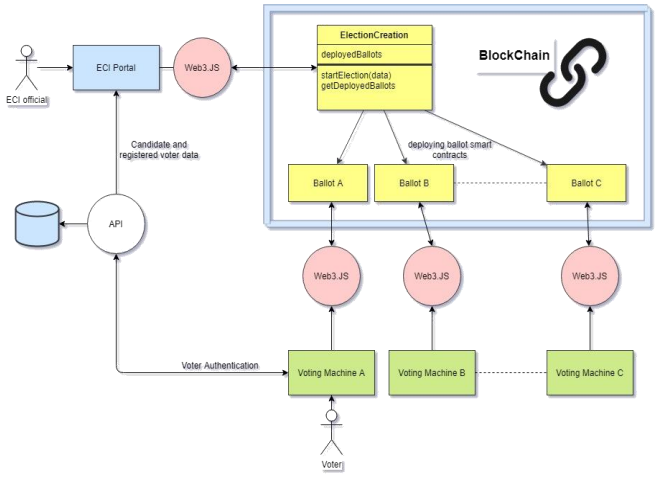

Fig-3 Block Diagram

- The web application's user interface is designed to offer an intuitive experience for voters.
- Users can access the dashboard, which displays real-time data retrieved from the blockchain network.

IX. CONCLUSION

The conclusion of this project explores the potential of blockchain technology and its usefulness in the e-voting scheme. The project proposes an e-voting scheme, which is then implemented. we introduced a blockchain-based electronic voting system that utilizes smart contracts to enable secure and cost-efficient elections while guaranteeing voters' privacy. We have shown that blockchain technology offers a new possibility to overcome the limitations and adoption barriers of electronic voting systems which ensures election security and integrity and lays the ground for transparency. we are focused on improving the resistance of blockchain technology to the 'double spending' problem which will translate as 'double voting' for e-voting systems. Although blockchain technology achieves significant success in the detection of malleable change in a transaction however successful demonstrations of such events have been achieved which motivates us to investigate it further. To this end, we believe an effective model to establish trustworthy provenance for e-voting systems will be crucial to achieving an end-to-end verifiable e-voting scheme. The work to achieve this is underway in the form of an additional provenance layer to aid the existing blockchain-based infrastructure.

RESULTS

The Blockchain E-Voting System project underscores its potential to reshape the democratic process. By leveraging blockchain's inherent security and transparency, coupled with advanced tools, the system demonstrated a tangible solution to challenges faced by traditional voting systems. The increased accessibility, tamper-proof data storage, and emphasis on voter privacy collectively position this system as a reliable and progressive alternative to conventional

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methods. The successful implementation of this system marks a significant step towards fostering trust, security, and inclusivity in modern elections.

1) . HOME PAGE OF THE WEBSITE

Fig-4 Home Page

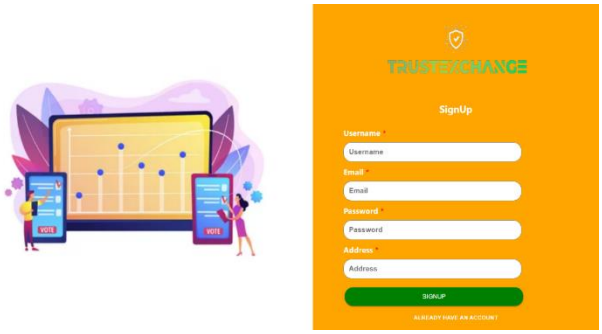

Fig-5 signup page

User Registration:

details such as name, email, and contact information New users access the registration page of the Blockchain E-Voting System. They provide essential personnel.

Blockchain Identity Creation: A unique digital identity is generated for the user using blockchain technology. This identity is cryptographically secured, enhancing data privacy and security.

Access and Verification:

After registration, users receive an email with a verification link. Clicking the link activates their account, granting them secure access to the e-voting system.

Fig-6 Candidate details

Here, the Election Commission adds the candidate and their qualifications to the board, which helps the voter select their candidates easily.

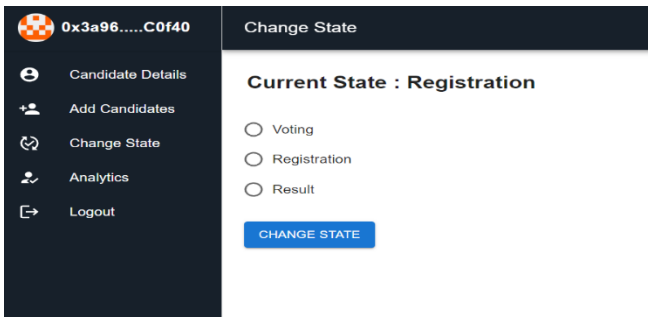

Fig-7 change state

Fig-8 voting result

Here After the election, the election officer will announce the result by simply changing the state from voting state to result state.

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