Blockchain-Based Secure Voting System

A Project report submitted

in partial fulfillment of requirement for the award of degree

BACHELOR OF TECHNOLOGY

in

SCHOOL OF COMPUTER SCIENCE AND ARTIFICIAL INTELLIGENCE

by

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CERTIFICATE

This is to certify that this project entitled **"Blockchain-Based Secure Voting System**" is the bona fide work carried out by **VARSHA, HASINI, GREESHMA, PAVAN KUMAR, SATHWIK,** as a Project for the partial fulfilment to award the degree **BACHELOR OF TECHNOLOGY** in **School of Computer Science and Artificial Intelligence** during the academic year 2024-2025 under our guidance and Supervision.

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Abstract:

The **Blockchain-Based Secure Voting System** aims to enhance the integrity, transparency, and security of the voting process by leveraging blockchain technology. In this system, votes are recorded as transactions on a decentralized ledger, ensuring that they are tamper-proof, traceable, and immutable. The use of blockchain ensures that once a vote is cast, it cannot be altered or deleted, preventing fraud and manipulation. Smart contracts can be used to automate the verification process, ensuring that only eligible voters can participate. This system eliminates the need for a central authority, reducing the risk of data breaches and election tampering. Voters can also verify that their votes were counted accurately, ensuring transparency. The blockchain-based voting system provides a secure, efficient, and transparent alternative to traditional voting methods, promoting trust in democratic processes.

Introduction:

The **Blockchain-Based Secure Voting System** is an innovative approach designed to address the vulnerabilities present in traditional voting methods, such as fraud, manipulation, and lack of transparency. By utilizing blockchain technology, this system ensures that votes are securely recorded, immutable, and transparent. Blockchain, a decentralized and distributed ledger, guarantees that once a vote is cast, it cannot be altered, providing a tamper-proof environment. The system enhances voter privacy and ensures that only eligible individuals can vote through secure digital identities.

Additionally, the decentralized nature of blockchain eliminates the need for a central authority, reducing the risks of data breaches and election tampering. Through the use of smart contracts, the system can automate the verification process, ensuring accuracy and efficiency. This secure and transparent system aims to restore trust in the electoral process, promoting fair and free elections while eliminating common security concerns in traditional voting systems.

With the integration of blockchain, the system enables remote voting, allowing citizens to cast their votes securely from any location using digital devices, without the need to physically visit polling stations. This can increase voter turnout and participation, especially for those with mobility issues, or those living in remote areas. Additionally, the transparency offered by blockchain ensures that all voting data is publicly verifiable, without compromising voter anonymity. This system also reduces the costs associated with traditional paper-based voting systems, such as printing ballots and employing election staff. Ultimately, the blockchain-based voting system promises to transform the electoral landscape by offering a modern, secure, and scalable solution to the challenges of traditional voting.

Objective:

The main objective of the **Blockchain-Based Secure Voting System** is to provide a tamper-proof, transparent, and efficient voting platform that ensures the integrity of the electoral process, enhances voter privacy, and reduces the risk of fraud or manipulation by leveraging blockchain technology.

Comparison Table:

Criteria	Previous methodology	Proposed methodology
Security	Vulnerable to fraud, tampering, and vote manipulation.	Tamper-proof, immutable, and secure due to blockchain's decentralized nature.
Transparency	Limited transparency; results are controlled by a central authority.	Full transparency; every transaction (vote) is publicly verifiable on the blockchain.
Cost	High costs associated with paper ballots, manual counting, and election staff.	Instantaneous or near-instantaneous vote tallying and result publishing.
Accuracy	Errors in manual vote counting or technical issues can lead to inaccuracies.	Lower operational costs due to automation, digital processing, and reduced infrastructure needs.
Accessibility	Voters must physically visit polling stations, which may limit participation.	Automatic and accurate vote recording through blockchain with minimal human intervention.
Speed of Results	Slow due to manual counting and verification processes.	Voters can cast their votes remotely using digital devices, improving accessibility.

Tools:

Hardware Tools:

1. **Fingerprint or Face Scanners**: Verify voter identity using fingerprints or facial recognition.
2. **Security Chips (TPM)**: Protect voting data by securely storing important information.
3. **USB Keys or Smartcards**: Store voting information and help voters securely log in.

Software Tools:

4. **Ethereum**: A platform that records votes on a secure, unchangeable blockchain.
5. **Truffle**: A tool to help programmers write and test the voting system.
6. **Web3.js**: Connects the voting website to Ethereum, ensuring votes are securely recorded.

Proposed methodology:

The proposed methodology focuses on creating a secure, transparent, and tamper-proof digital voting platform using blockchain technology. The goal is to ensure each vote is recorded permanently.

1. System Overview

The system uses blockchain as its core for storing, validating, and auditing votes. Every vote is treated as a transaction and is recorded in a block on the blockchain. Once the block is added to the chain, the data becomes immutable. The platform supports remote voting through web or mobile devices, providing both convenience and accessibility.

2. Components of the System

- **A) Blockchain Network**
  A decentralized blockchain network like Ethereum serves as the storage and validation layer. Smart contracts are used to automate vote submission, verification, and counting, reducing the chance of human error or manipulation.
- **B) Voter Authentication**
  Before casting a vote, the system verifies the voter's identity using biometric data (fingerprint or facial recognition) or a secure digital ID. This ensures that only eligible voters can participate and prevents duplicate voting.
- **C) Voting Application**
  A user-friendly application is used to simplify the voting process for citizens. The app securely connects to the blockchain network using tools like Web3 and allows the voter to select their choice and cast the vote.

3. Voting Workflow

1. **Voter Registration:**
   Voters register and their identity is verified using biometric or cryptographic methods. A unique digital ID is assigned and stored on the blockchain.
2. **Voter Authentication:**
   During the election, voters log in and authenticate using the same secure method to prevent fraud.
3. **Casting the Vote:**
   Authenticated voters select their candidate and cast their vote using the application.

4. **Vote Storage and Counting:**
   Votes are securely recorded on the blockchain. Once the election ends, the smart contract automatically tallies the votes and publishes the final results.

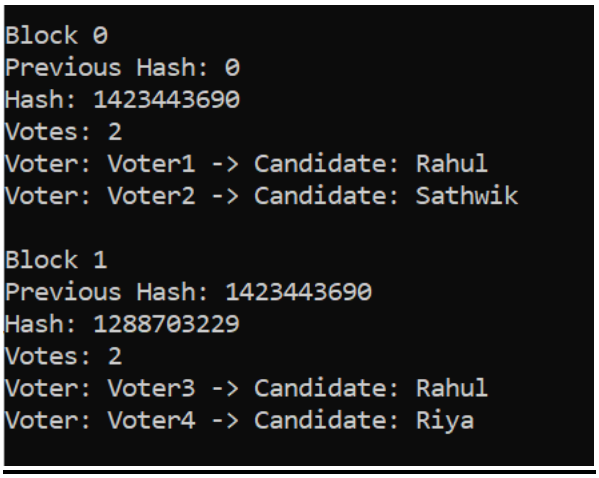
4. Advantages

- Immutable and tamper-proof records of all votes.
- Decentralized control eliminates risks of manipulation.
- Allows remote voting, improving accessibility and convenience.

5. Challenges and Considerations

- Requires reliable internet access for all users.
- Initial setup of blockchain and biometric systems demands investment.
- Public understanding and digital literacy need to be improved for wider adoption.

OUTPUT:



Conclusion:

The Blockchain-Based Secure Voting System ensures a safe, transparent, and tamper-proof way of conducting elections. By using blockchain technology, it protects votes from being altered and builds trust in the voting process. This system also allows remote voting and automatic result counting, making elections faster, fair, and more accessible for everyone.

References:

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