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Voting System Using Blockchain

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ABSTRACT:

Online voting is becoming popular for its cost-cutting and convenience benefits, but it brings security risks. Blockchain technology offers a secure, decentralized solution, making votes verifiable and tamper-proof. However, challenges like privacy protection and transaction speed remain. Ensuring secure remote voting and improving scalability are crucial for the success of blockchain-based voting systems.

I.INTRODUCTION:

In every democracy, election security is a matter of national security. For years, the computer security field has explored electronic voting to reduce election costs while enhancing security. Traditionally, voting has relied on pen and paper, but updating this system is crucial to prevent fraud and ensure votes are traceable and verifiable.

Electronic voting (e-voting) uses technology to cast and count votes. While it promises greater efficiency, it must meet strict standards for security, accuracy, privacy, and accessibility. E-voting can involve various technologies, including voting machines at polling stations or internet-based voting (i-voting) from any location. Despite its potential, physical security concerns, such as the risk of tampering with voting machines, remain a significant challenge.

II.LITERATURE SURVEY:

After 2000, voting machine problems made headlines worldwide, prompting the government to allocate funds to fix them. Unfortunately, electronic voting machines often worsened the situation. While these machines shouldn't be abandoned, they need improvements to boost accuracy and public trust.

Voting is inherently challenging due to four key requirements:

1. Accuracy: A voting system must capture and accurately tally each voter's intent, ensuring votes can't be tampered with.

2. Anonymity: Secret ballots are crucial for democracy, so voting systems must protect voter privacy.

3. Scalability: Systems must handle large elections, like the hundreds of millions of voters in the U.S., India, and Brazil, and manage the complexity of numerous concurrent elections.

4. Speed: Quick results are expected, especially in the U.S., where election results are anticipated on the same day.

Historically, voting methods evolved from stones and pot shards to paper ballots, mechanical booths, punch cards, and optical scan machines. Now, computerized voting machines and internet voting offer potential for greater efficiency and convenience, but they must overcome significant design challenges to ensure security and trust.

III.PROBLEM STATEMENT:

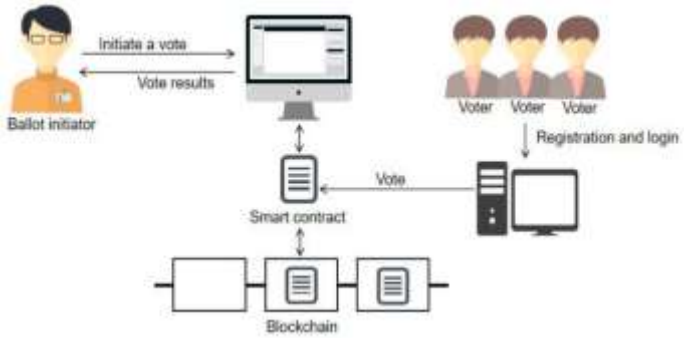
This paper explores how blockchain technology can enhance and streamline e-voting systems, making them more efficient than ever. While each country has unique laws and implementations, our proposed solution addresses the specific issues of conventional paper elections in the Democratic Republic of Congo. Although tailored to this country, the solution can be adapted for use in other nations.

Traditional election systems face many challenges, and while online systems have attempted to automate voting, issues of privacy and security remain. For instance, electronic voting was used in the 2009 Austrian Federation of Students election and some Swiss elections, but concerns persisted.

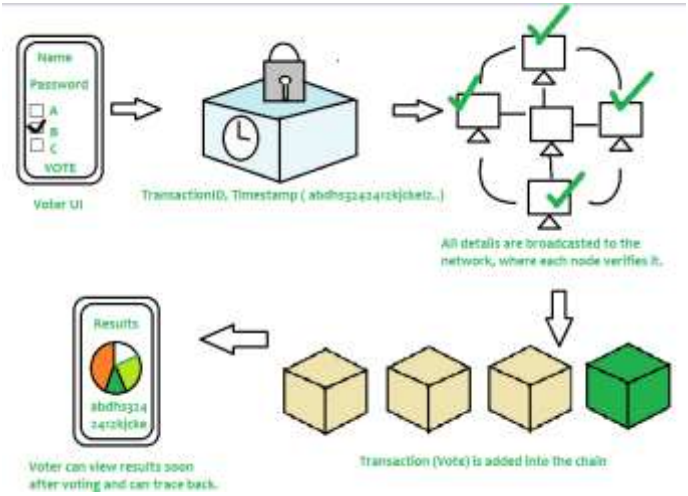
Blockchain technology offers a promising way to improve both conventional and electronic voting. With its inalterable and easily verifiable nature, blockchain can significantly enhance voter security, privacy, and data integrity. These features make it a strong candidate for revolutionizing traditional election methods.

System Diagrams(Architectures):

1.



2.



IV.PROPOSED METHODOLOGY:

Verifying Voter Identity

While blockchain voting sounds straightforward, implementing it is complex. A major challenge is verifying voter identity to prevent multiple votes or voting by non-citizens. This requires a central authority to verify citizenship or residency.

A potential solution involves submitting passport or driver's license scans, linking that identity to a mobile device with passwords, two-factor authentication, or biometrics like fingerprints. This ensures the person who submitted the documents is the same person voting.

Maintaining Anonymity and the Secret Ballot

After verifying identity and eligibility, it's crucial to separate this information from the actual vote to maintain the secret ballot, a cornerstone of democracy. Blockchain voting must hide identifiable information to ensure votes are anonymous. Techniques like zero-knowledge proofs, ring transactions, or encryption can help, but each has its own technical challenges. Balancing verified identity with true anonymity is a significant hurdle.

Cybersecurity and Blockchain

Cybersecurity experts generally agree that blockchains are highly secure, becoming nearly impossible to hack with the right network size and consensus algorithm. However, ensuring anonymity while verifying identity is complex and essential for secure voting.

Benefits of Blockchain Voting

1. Increased Transparency: Blockchain voting offers greater transparency. Unlike traditional systems, where you trust poll workers to count votes correctly, blockchain allows you to track your vote and confirm it was counted accurately, though without tying it to your identity.

2. Reduced Fraud and Election Rigging: Increased transparency reduces the chance of fraud. Blockchain identity verification makes it harder to cheat or vote in the wrong jurisdiction. In countries with rigged elections, blockchain could promote true democracy, though it requires government cooperation. Over time, blockchain could become an international voting standard.

3. Everyday Voting in Real Time: Blockchain allows real-time vote tracking and tallying, enabling quicker elections. Digital voting reduces the need for polling infrastructure, making frequent referendums possible. This could transform daily life, allowing people to vote on local issues like traffic routing or park funding directly from their phones.

4. Corporate Governance and Autonomous Organizations: Blockchain voting isn't just for governments. Companies could use it for employee or shareholder votes on initiatives. It could even enable ownerless businesses where shareholders vote on every decision.

5. Increased Voter Engagement: Blockchain could drastically increase voter turnout by making voting as easy as using a smartphone or computer. This could lead to more direct democracy, though it might also cause voting fatigue as people realize the benefits of electing representatives to handle policy decisions for them.

1. Encryption

When new data is added to the blockchain, it goes through a specific process:

1. Transaction Occurs: Imagine you make an impulsive Amazon purchase. This transaction, along with thousands of others, gets grouped into a block.

2. Transaction Verification: A network of computers verifies your purchase details, including time, amount, and participants.

3. Storage in a Block: Once verified, your transaction, along with others, is stored in a block with digital signatures.

4. Hashing the Block: The block receives a unique code or hash, and the hash of the previous block, then gets added to the blockchain.

Once added, the block's data is publicly accessible. For example, Bitcoin's blockchain lets you see transaction details, timestamps, and other information about the block.

2. Authentication and Permission

To secure the e-voting system, we use public key cryptography for authentication without a third party, thanks to blockchain's peer-to-peer methodology.

Security Protection: Ensuring voters' devices are secure is critical. Even authenticated devices can be attacked through software or system vulnerabilities. Regular checks for tampering help detect potential intrusions quickly.

Permission:

1. Enrollment Control: A permission chain with access control rights managed by a system administrator ensures that only legal devices can register on the blockchain.

2. Secure Channel: We assume a secure channel to prevent man-in-the-middle attacks, ensuring message integrity and reliable communication between nodes.

3. Fast Synchronization: New devices register by syncing with a few randomly selected, trustworthy nodes, avoiding lengthy synchronization.

Company

This paper explores using blockchain for an electronic voting (e-voting) system and makes the following contributions:

1. Researching existing blockchain frameworks suitable for e-voting.

2. Proposing a blockchain-based e-voting system using a "permissioned blockchain" to enable liquid democracy.

The paper is structured as follows:

Chapter II: System Analysis - We discuss current system issues, blockchain solutions, feasibility, and development requirements.

-Chapter III: Blockchain-Based E-Voting System - We present our proposed system, addressing security, legal considerations, and limitations, and include a flow chart and E-R diagram.

VI.CONCLUSION:

To Overcome all the Shortcomings in the Present Voting System, we came up with the Modern Technology of Blockchain i.e. E-Voting System using Blockchain. By using this modern technology, following things can be Achieved: - Cheap Voting System, Accurate Voting System, Fast Voting System. Every Citizen desire to have a Transparent and Direct Form of Democracy which is clear-cut obtained from this E-voting system using Blockchain. Faith of People in the Voting System is Increased therefore, many People Come Forward to vote, thereby Increasing the Percentage of People Voted. The Pen and the Paper Election is Eradicated thereby creating Accuracy in the Voting System. Everybody Prefers Time, and Cost Efficient Systems so this E-Voting System using Blockchain is apt for Transparent Democracy. Ethereum Private Blockchain allows hundreds and hundreds of Transactions

in a Second. Utilization of the Smart Contracts Lower the Load on the Blockchain. For Countries with Greater Populations, some additional Technology should be added in this E-Voting System using Blockchain to avoid Errors. The main reason behind this system is to present an idea of implementation of blockchain in the voting system.

V.FUTURE SCOPE:

Democracies depend on trusted elections and citizens should trust the election system for a strong democracy. However traditional paper-based elections do not provide trustworthiness. In this paper, we proposed a blockchain-based e-voting system that provides a trusted, secure and fast voting system for Turkey. The proposed system is suitable to apply in another country whereas integration is hard work since each country has different laws and election system changes between countries.

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