

Blockchain-Based Decentralized Voting System

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Problem Statement

- Traditional voting systems rely on centralized databases, which create single points of failure.
- Data tampering and unauthorized access can compromise election integrity.
- Lack of transparency reduces public trust in electoral outcomes.
- Manual verification and dependency on intermediaries slow down the process.
- Ensuring both voter anonymity and data security is challenging in existing systems.

Significance of Blockchain in the Voting Domain

- Blockchain technology revolutionizes the voting process by introducing transparency, decentralization, and immutability.
- Each vote is treated as a transaction, validated through consensus, and permanently recorded in the blockchain ledger.

Key Advantages:

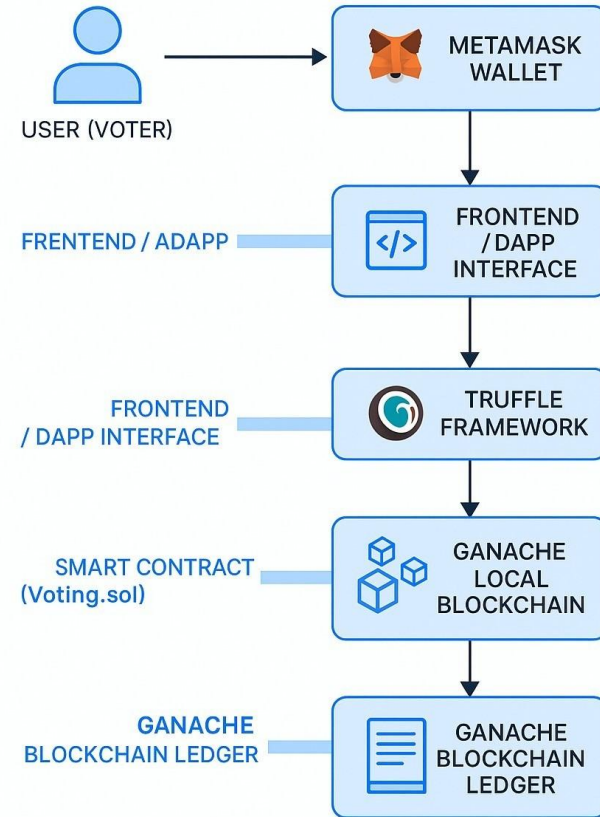
- **Transparency:** Every vote is publicly verifiable on the blockchain.
- **Security:** Cryptographic mechanisms prevent tampering and duplication.
- **Immutability:** Once recorded, votes cannot be altered or deleted.
- **Decentralization:** Removes single points of failure and centralized control.
- **Auditability:** Enables real-time monitoring and verifiable election results

Stakeholders and Their Roles

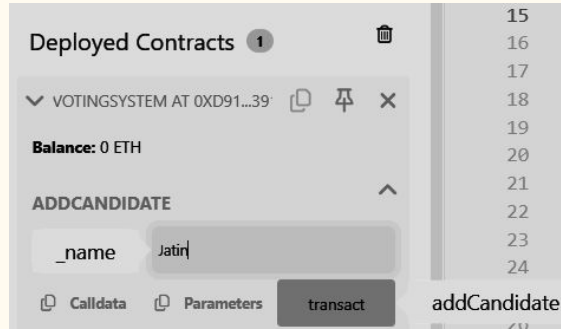
Stakeholder	Role / Responsibility
Election Commission	Deploys the smart contract and initializes the voting period.
Voters	Authenticate using MetaMask and cast votes securely on the blockchain.
Candidates	Participate in the election; their vote counts are updated via smart contract logic.
Auditors / Observers	Verify transactions on the blockchain and validate election results.

Architecture Diagram:

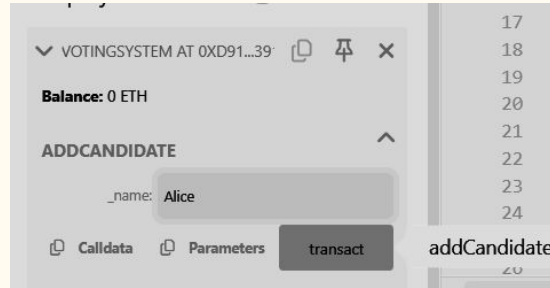
Architecture of Blocentralized Voting System implementusing Truuffle, Ganache anMetaask



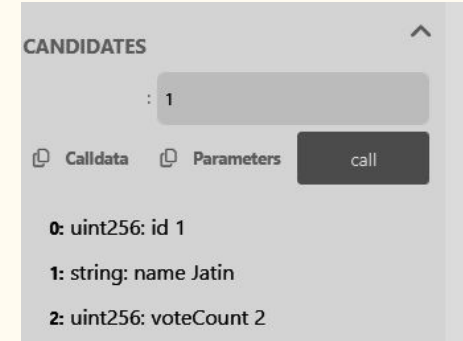
Experiment 6



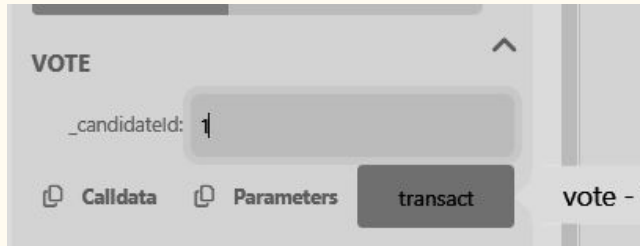
Adding Candidate



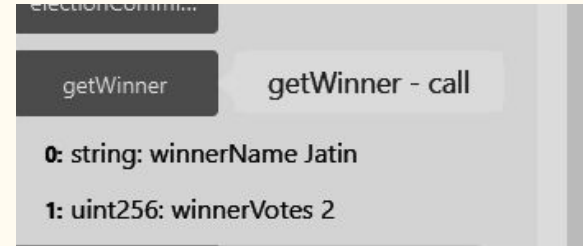
Adding Candidate



Cast Vote

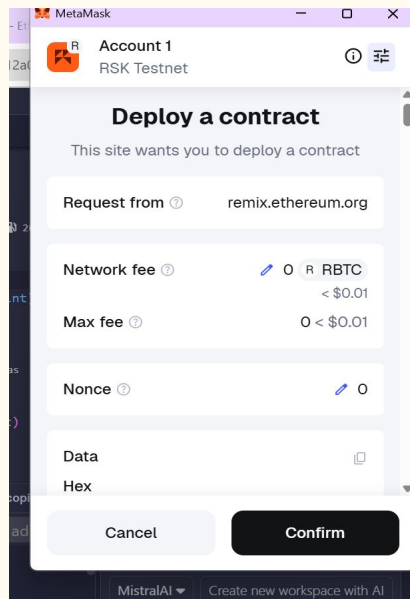


Check Votes using candidates(id) function

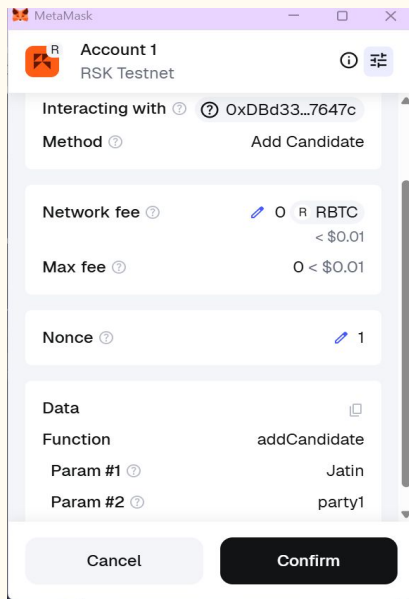


Declare Winner using getWinner()

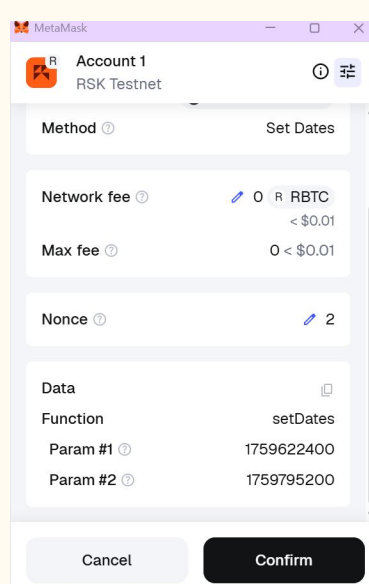
Experiment 7



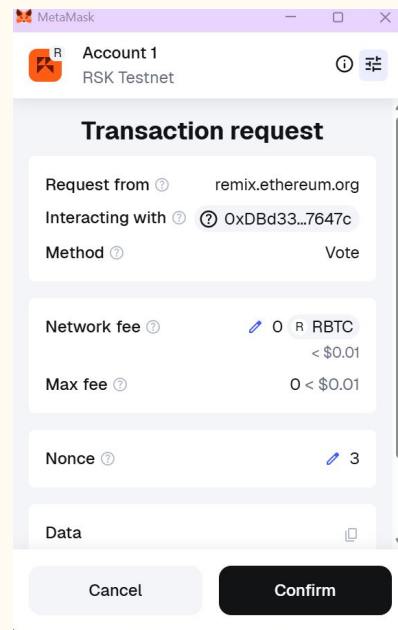
Deploying the
contract with
metamask



Adding a
candidate



Set voting dates



Vote

Experiment 8

The screenshot shows the 'Decentralized Voting Using Ethereum Blockchain' interface. The 'Add Candidate' form has 'Name' set to 'Narendra Modi' and 'Party' set to 'BJP'. The 'Define Voting Dates' form has 'Start date' set to '05-10-2025' and 'End date' set to '06-10-2025'. A transaction request overlay is visible on the right, showing details for the 'Add Candidate' action.

Field	Value
Request from	127.0.0.1:8080
Interacting with	0x1683B_94B76
Method	Add Candidate
Network fee	0.0166 ETH (\$75.64)
Speed	
Max fee	0.0181
Nonce	12

Transaction request details:

- Request from: 127.0.0.1:8080
- Interacting with: 0x1683B_94B76
- Method: Add Candidate
- Network fee: 0.0166 ETH (\$75.64)
- Speed:
- Max fee: 0.0181
- Nonce: 12

The screenshot shows the 'Decentralized Voting Using Ethereum Blockchain' interface. The 'Add Candidate' form has 'Name' set to 'Rahul Gandhi' and 'Party' set to 'INC'. The 'Define Voting Dates' form has 'Start date' set to 'dd-mm-yyyy' and 'End date' set to 'dd-mm-yyyy'. A transaction request overlay is visible on the right, showing details for the 'Add Candidate' action.

Field	Value
Request from	127.0.0.1:8080
Interacting with	0x1683B_94B76
Method	Add Candidate
Network fee	0.0166 ETH (\$75.64)
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- Nonce: 12

The screenshot shows the 'Decentralized Voting Using Ethereum Blockchain' interface. The 'Welcome for Voting' screen displays the current voting status: 'Voting Dates: Sun Oct 05 2025 - Tue Oct 07 2025'. Below this, a table shows the current candidates and their total votes.

Name	Party	Total Vote
Rahul Gandhi	INC	1
Narendra Modi	BJP	1

Please select one of the candidates and click the vote button.

Conclusion

- Successfully implemented a Decentralized Voting System using Truffle, Ganache, and MetaMask.
- Ensured security, transparency, and immutability of votes through blockchain technology.
- Demonstrated wallet-based authentication and smart contract automation for vote recording.
- Eliminated the need for intermediaries, ensuring a trustless and tamper-proof process.
- Showcased how local blockchain networks can simulate real-world decentralized systems.
- Proved the potential of blockchain for future large-scale e-governance and secure digital elections.