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Enhancing Democratic Integrity through a Blockchain-Based Election Voting System: A Path to Inclusion and Sustainable Development

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This paper presents the development of a blockchain-based election voting system designed to address the persistent challenges of traditional voting methods, including vote tampering, fraud, and limited accessibility. The problem of ensuring secure, transparent, and trustworthy elections has become increasingly critical in both local and national contexts. To solve this, the objective of the project was to create a voting platform that leverages blockchain technology to provide security, transparency, and inclusivity for voters, including those in remote or marginalized communities. The system was designed using a decentralized ledger to ensure that votes are recorded immutably and transparently, reducing the risk of tampering and fraud. Voter anonymity, real-time vote auditability, and accessibility from any internet connected device were among the core features aimed at enhancing trust and inclusivity in the electoral process. The methods employed included the rapid prototyping approach, enabling iterative improvements through stakeholder feedback and extensive testing. The results demonstrated that the blockchain-based system significantly improved election security, reducing vulnerabilities such as vote manipulation, while also enhancing accessibility and user experience. The system's performance under high voter turnout simulations confirmed its scalability for national-level elections. This work contributes to the ongoing efforts to modernize voting systems, offering a viable solution that addresses both security concerns and accessibility barriers. It lays the groundwork for future advancements in democratic technology, with the potential to reshape electoral processes globally.

Keywords: Blockchain , Voting , Hyperledger fabric , Secure , Inclusive , Democratic.