Advancing Secure E-voting Systems: A Systematic Review of Blockchain Applications

KY Dhananjaya[1#] and DVDS Abeysinghe[2]

[1]Department of Computer Engineering, Faculty of Computing, General Sir John Kotelawala Defence University
[2]Department of Computer Science, Faculty of Computing, General Sir John Kotelawala Defence University

[#]39-bce-0009@kdu.ac.lk

Abstract

The potential of blockchain technology to improve electronic voting systems' security, transparency, and election integrity is examined in this systematic research. Blockchain's decentralized architecture offers a revolutionary response to the ongoing problems related to voter fraud and manipulation in conventional voting procedures. The study's findings highlight the latest significant developments in protecting voter privacy, guaranteeing data integrity, and enhancing accessibility using blockchain frameworks, smart contracts, and cryptographic techniques through a thorough examination of recent research works. It is identified that encouraging openness and inclusion, along with blockchain-based voting systems, greatly reduces the possibility of election tampering and also increases public confidence. Additionally, voter involvement is increased by decentralized platforms and intuitive user interfaces, opening the door for digital democracy. Scalable, safe, and transparent elections are among the practical ramifications; nonetheless, issues like technology accessibility and regulatory compliance need more research. To overcome current constraints and fully achieve blockchain's potential for updating electoral procedures, future research should concentrate on optimizing these systems, as highlighted in this study.

Keywords: *Blockchain technology, Electronic voting, Voter anonymity, Data security, Smart contracts*