

Title: Transforming online voting: a novel system utilizing blockchain and biometric verification for enhanced security, privacy, and transparency

Author Names: Md Jobair Hossain Faruk, Fazlul Alam, Mazharul Islam & Akond Rahman

Abstract: As a cornerstone of democratic governance, elections hold unparalleled significance, shaping a nation's trajectory. However, the prevailing ballot-paper based voting systems continue to face trust issues among significant populations. As a result, e-Voting has emerged as an appealing alternative, with numerous countries opting for its implementation globally. While e-Voting systems offer several advantages, they also come with their own set of challenges. Even a minor vulnerability can lead to massive manipulations in voting results. In recent years, there have been efforts to revolutionize the e-Voting paradigm by harnessing the potential of emerging technologies such as biometrics and blockchain. This paper proposes a Internet-based voting that adopts blockchain technology and biometric identification techniques. We use biometric modalities, such as fingerprint and facial recognition, for voter authentication while leveraging Hyperledger Fabric framework as blockchain network and ensuring a secure, transparent, and tamper-evident voting record. We demonstrate the proposed system with 100 participants in a preset environment where we collect the biometrics data. The results indicate that 87% of participants successfully registered with biometrics, while 88% cast their votes with a combination of either voter ID and fingerprint or voter ID with facial recognition. Our findings suggest that the proposed system allows voters to access the system seamlessly and automate identity verification procedures while ensuring a secure, decentralized, and distributed database network that maintains transparency. Future research shall be carried out in collaboration with election officials and voters to improve the system in real-world scenarios.

Keywords: Internet-Based Voting Secure Voting Protocol Decentralized Ledger Voter Identity Verification

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