IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 1, February 2026
Impact Factor: 8.2

Sentinel-Vote: A Distributed Ledger Framework for End-to-End Verifiable and Resilient Online Elections

Harshada Rajesh Patole[1] and Prof. N. S. Kharatmal[2]
Student, Computer Science and Engineering[1]
Lecturer, Computer Science and Engineering[2]
Matsyodari Shikshan Sanstha College of Engineering and Polytechnic, Jalna, India
72harshadapatol@gmail.com and nanditakhartmal27@gmail.com

Abstract: *Digital voting is currently in a bind: transparency is non-negotiable, yet these systems are constantly under fire from increasingly aggressive cyber-attacks. We built Sentinel-Vote to fix this. It' s a distributed architecture designed to tear down the vulnerabilities found in old-school, centralized servers. By ditching single-point-of-failure models and opaque auditing, our framework uses a decentralized ledger to hard-code every single vote. The real engine here is end-to-end verifiability (E2E- V). This setup lets any voter personally verify that their ballot was counted correctly, but uses cryptographic tricks to make sure their identity stays hidden. To keep the system running even when things go wrong, we used a Byzantine Fault Tolerant (BFT) consensus model. This allows the network to stay upright and reach an agreement even if hackers compromise some nodes or launch a massive DDoS attack. For the actual count, we applied homomorphic encryption. This lets the system tally votes in real-time without ever needing to decrypt an individual' s ballot. Our stress tests show that Sentinel- Vote handles heavy traffic without any real lag. This framework proves that a secure, tamper-proof digital election isn't a pipe dream— it' s ready for the real world*

Keywords: Digital Elections, Blockchain Architecture, E2E Verifiability, Network Resilience, Byzantine Fault Tolerance, Anonymous Tallying

DOI: 10.48175/568