

## **Abstract**

This research paper presents the development of an electronic voting system that utilizes blockchain technology and Zero Knowledge Proof to enhance privacy and security during voting. Electronic voting systems have many issues regarding privacy, data integrity, and proper transparency, whereas traditional voting systems face the issue of being cost-effective. This research has solved the previously mentioned issues by using ZKP over the polygon network. Furthermore, ZKP, along with blockchain technology, helps in the decentralization, immutability, and transparency of the stored data while maintaining the confidentiality of the voter identity in the process of authentication and vote validation. Moreover, cryptographic verification is aided through role management and a user interface, which results in a quicker verification process than traditional methods. Using a polygon network as the medium for conducting tests has shown a low transaction cost of 0.010 POL to facilitate voting while providing substantial privacy. The approach presented in this research has significantly improved over traditional E-voting systems in terms of cost, security, and scalability, indicating that this approach is better suited for election processes today.

## **Keywords**

E-voting, Blockchain, Zero Knowledge Proof, Smart Contracts, Privacy, Polygon