WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Online Voting System Using Blockchain And Fraud Detection

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ABSTRACT

This thesis endeavors to revolutionize the democratic process through the development of a secure and transparent online voting system using blockchain technology. The primary objectives include enhancing security, ensuring transparency, facilitating accessibility, and leveraging blockchain for a tamper-resistant voting system. Utilizing tools such as Ganache, MetaMask, Node.js, and Solidity, the methodology focuses on local blockchain development and user-friendly interaction. The successful implementation of smart contracts prevents fraud and multiple votes, achieving a high level of security. Despite limitations in accessing government databases, the project demonstrates significant strides in securing the electoral process, laying the foundation for future enhancements and government collaboration.

Keywords : Blockchain, MetaMask , Ganache, Online Voting , Solidity

1. INTRODUCTION

1.1 Voting System

In a democracy, the government is elected by the people. Voting is a method by which a Democracy work. Voting is something in which a group of people give their opinion and support to their preferred representative. underscoring the notion that an empire, nation, or governing body must heed its populace. However, as we all know nothing is 100% accurate. No matter how much anything is advanced it always needs improvement.

Addressing this issue could involve the adoption of blockchain technology. Blockchain technology offers a transformative solution to enhance voting systems and strengthen democracy. Its decentralized network, ensuring no single point of failure. Immutability guarantees data cannot be altered, enhancing integrity. Its tamper-resistant ledger, transparent transactions and smart contracts automate agreement can ensures transparent and secure elections, mitigating fraud risks, fostering a secure and trustworthy digital landscape.

1.2. Issues Identification

In contemporary democracies, the integrity of voting systems has emerged as a central concern, overshadowing the core principles of democratic processes. Challenges like tampering, fraud, and a lack of transparency have led citizens to question the legitimacy of election results. The vulnerability of traditional voting systems has been underscored by instances of manipulation, and the need for a robust solution is evident.

Blockchain, a revolutionary technology, offers a compelling solution for overhauling the current voting systems. By creating a decentralized and transparent ledger, each vote is securely recorded in a tamper-resistant block. This eliminates the risk of fraud and ensures the integrity of the electoral process. Blockchain's decentralized nature enhances security, reduces the potential for hacking, and fosters public trust. By replacing traditional voting systems with blockchain, we can pave the way for a more resilient, transparent, and trustworthy democratic process.

1.3 Inspiration And Motivation

The impetus for this endeavor can be encapsulated in the following summary:

1) Inspiration Strikes: In the recent Chhattisgarh Rajya Sabha election, I, like many others, couldn't vote due to being away from home for reasons like college exams and transportation constraints . Witnessing flaws in traditional voting systems sparked a vision for a secure and transparent online alternative.

2) Blockchain Revelation: Discovering blockchain's potential, I envisioned an encrypted, decentralized voting system, impervious to manipulation.

2. Background Information

A Alshehri, M Baza, G Srivastava, W Rajeh, M Alrowaily, M Almusali Applied Sciences, 2023 reveals its pivotal role in addressing cyber threats. Focusing on score voting challenges, a proposed privacy-preserving scheme introduces innovative measures, allowing voters to validate scores before encryption. Performance evaluations demonstrate the system's security and scalability, handling up to 10,000 transactions concurrently.

Shitharth Selvarajanl , Gautam Srivastava2,3,4*, Alaa 0. Khadidos5 , Adil 0. Khadidos6 , Mohamed Baza7 , Ali Alshehri8 and Jerry Chun-Wei Lin in proposed that the Industrial Internet of Things (IIoT) holds potential for transformative business models but faces security challenges. This literature review explores a novel Artificial Intelligence-based Lightweight Blockchain Security Model (AILBSM), combining blockchain and COSNN to enhance security, reduce execution time to 0.6 seconds, and improve classification accuracy to 99.8%.

Choudhary, P. K. (2021). Fraudwlent account recogni‘tion using supervised learning in Ethereum (Doctoral dissertation, Indian Institute of Technology Jodhpur). in 2021 explores the prevalence of illegal activities on Ethereum despite its widespread use. Focusing on detecting illicit accounts, a novel convolutional neural network and XGBoost classifier are proposed. With over 4000 Ethereum accounts, the model achieves a remarkable 98.39% accuracy and superior AUC, enhancing fraud detection in blockchain transactions.

3. Objective

The aims of this document can be generally outlined as follows:

1. Enhancing Security:

The primary goal of this research is to develop a voting system that prioritizes security. We aim to implement advanced measures, such as blockchain technology, to safeguard the integrity of the electoral process.

2. Ensuring Transparency:

Our focus extends to promoting transparency in voting procedures. By leveraging blockchain, we aspire to create a system where every transaction is traceable, ensuring an accountable and open democratic process.

3. Facilitating Accessibility:

We aim to revolutionize voting accessibility. The objective is to design a system that allows citizens to cast their votes conveniently from any location, at any time, fostering a more inclusive and participatory democracy.

4. Utilizing Blockchain Technology:

At the core of our research lies the utilization of blockchain technology. This innovative approach ensures a tamper-resistant and decentralized voting system, addressing the shortcomings of traditional methods and reinforcing the foundations of democratic governance.

4. Methodology

4.1 Software Used:

1. Ganache: Utilized Ganache for local blockchain development, offering a private test network to simulate Ethereum environments, aiding in secure and efficient smart contract testing

2. MetaMask: Integrated MetaMask for user-friendly interaction with decentralized applications. This browser extension simplifies Ethereum transactions, providing a secure and accessible bridge between the blockchain and users.

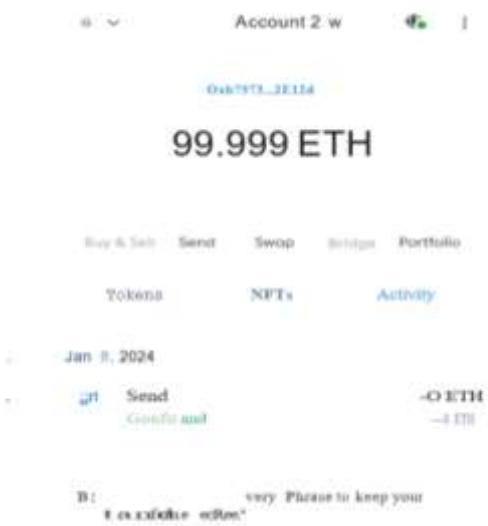

Figure 4.1: MetaMask Wallet

4.2 Programing Language used:

1. Node.js: Integrated Node.js to execute server-side code, ensuring seamless communication between the blockchain and web interface, enhancing the overall functionality and responsiveness of the application.

2. Solidity: Employed Solidity as the primary programming language for smart contract development, facilitating the creation and deployment of secure, decentralized applications on the Ethereum blockchain.

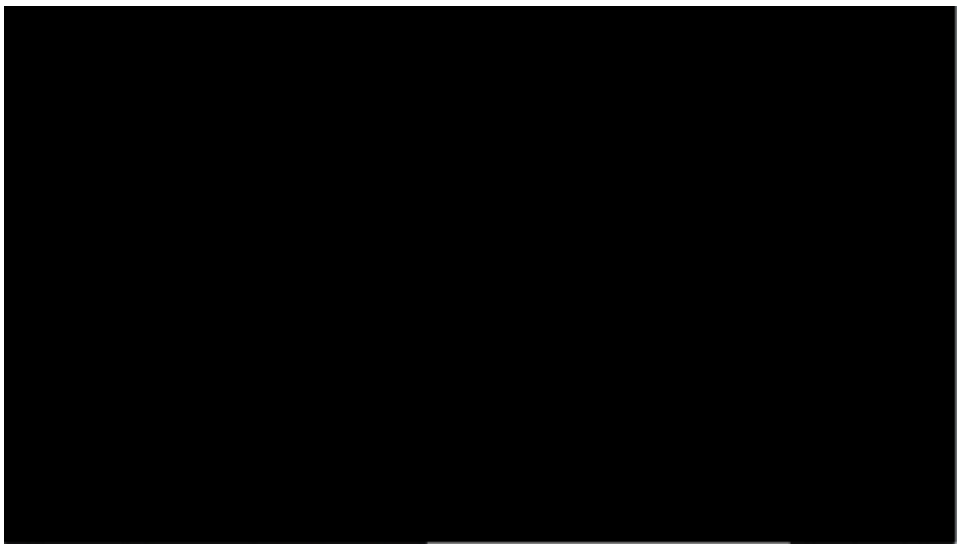

Figure 4.2: Solidity Program And Its Deployment

4.3 Other Tools Used:

1) Blockchain Platform (e.g., Ethereum): Employed for decentralized application development, using smart contracts to execute functions securely and transparently on the blockchain.

2) Integrated Development Environment (IDE, e.g., Remix): Utilized for smart contract coding, debugging, and testing, streamlining the development process and ensuring code integrity.

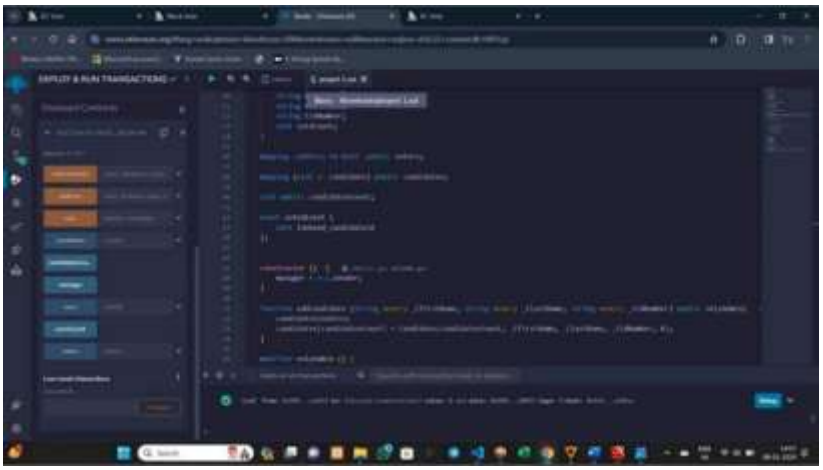

Figure 4.3: Solidity Compilation On Remix IDE

3) Testing Frameworks (e.g., Truffle): Employed to automate the testing of smart contracts, ensuring reliability and functionality before deployment on the blockchain network.

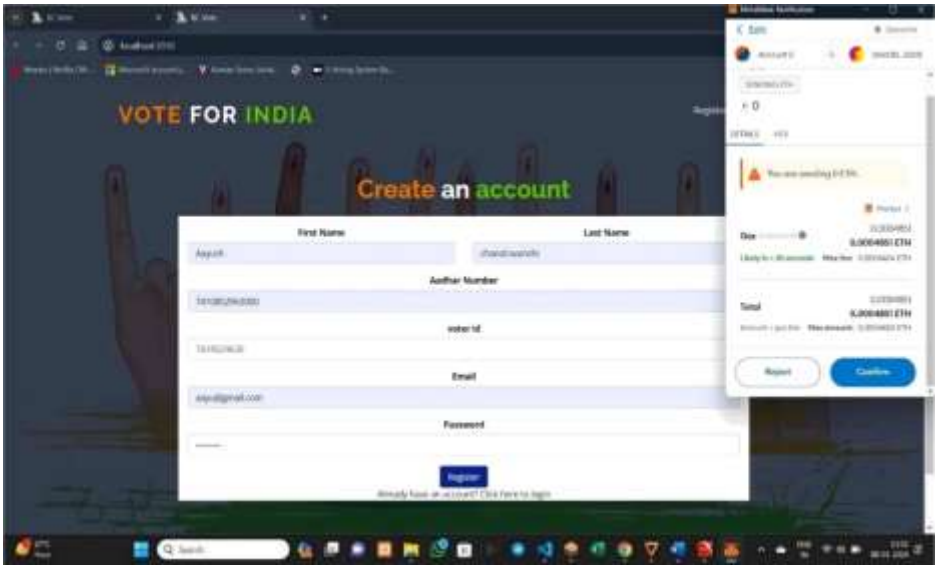

Figure 4.4: Login Page

Figure 4.5: Home Page

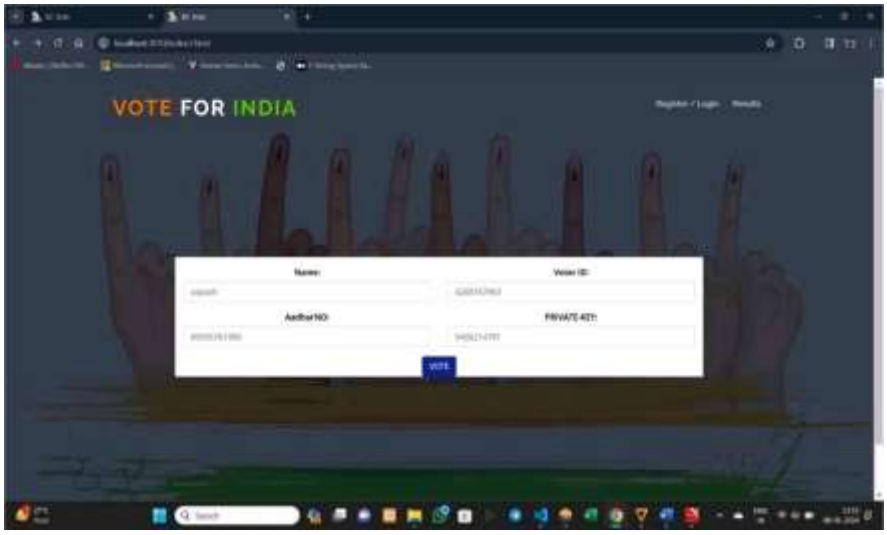

Figure 4.6: Voting page

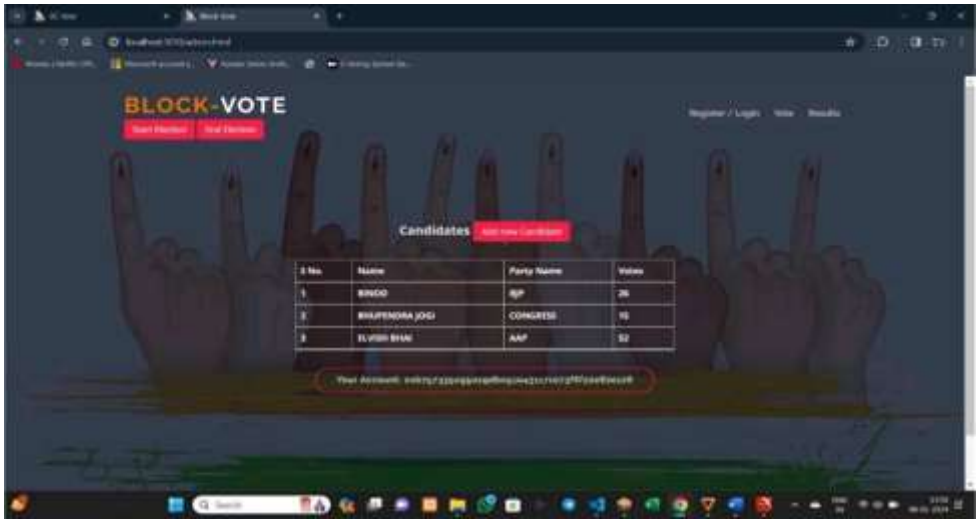

Figure 4.7: Admin Page

5. Analysis of Project Success

1. Successful Implementation of Smart Contracts:

The project demonstrates successful integration of smart contracts, allowing users to cast votes securely and efficiently.

2. Prevention of Fraudulent Accounts:

A notable achievement is the prevention of fraudulent accounts, ensuring the integrity of the voting process by verifying user identities.

3. Effective Prevention of Multiple Votes:

The system has been successful in preventing multiple votes from a single user, enhancing the fairness and accuracy of the electoral results.

4. Current Four Verification Factors:

The implementation incorporates four robust verification factors, ensuring a high level of security in the user authentication process.

5. Potential for Expanded Verification Factors:

The system is designed to accommodate up to seven verification factors, offering scalability and increased security with potential government collaboration.

6. Government Collaboration and Verification Factors:

While the project envisages collaboration with the government to leverage additional verification factors, current constraints limit the utilization of three additional factors.

7. Enhanced Security Measures:

The success of the project lies in its ability to maintain a secure environment, fostering trust among users and minimizing the risk of unauthorized access.

8. Limitation in Access to Government Database:

The inability to access the government database restricts the application from utilizing three potential verification factors, highlighting a constraint in the current implementation.

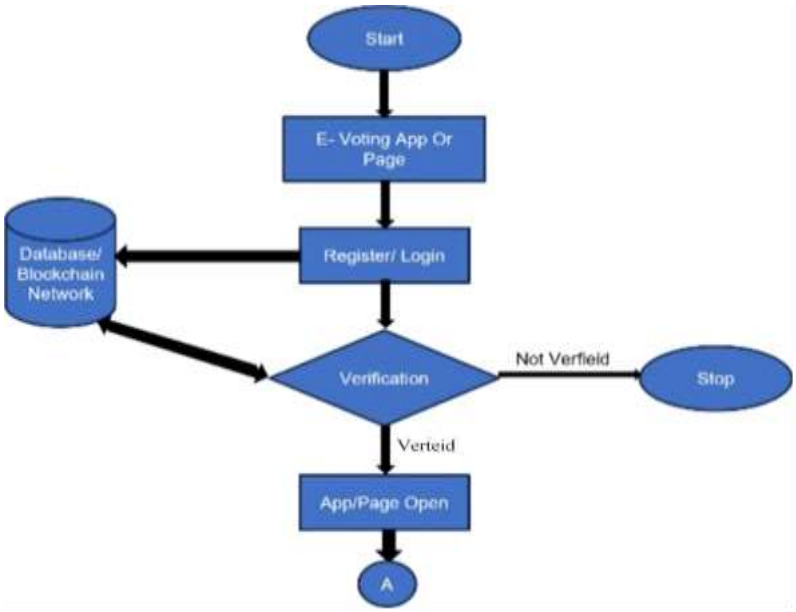

Figure 5.1: Flow Chart Of Working Part 1 Daigram.

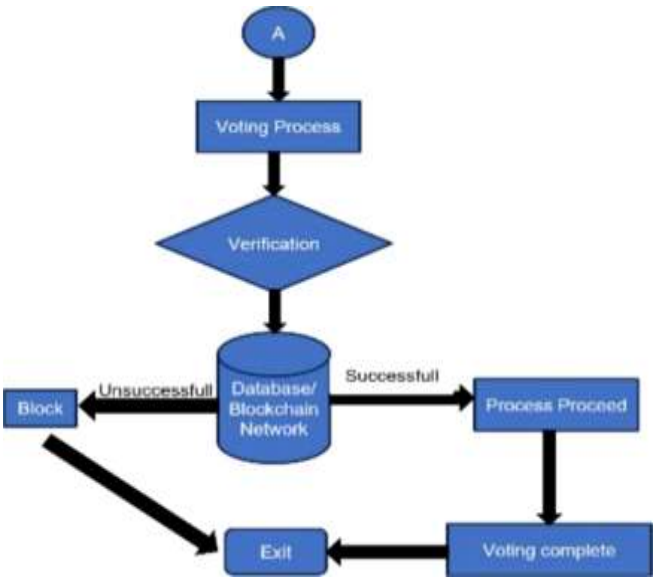

Figure 5.1: Flow Chart Of Working Part 2.

6. Conclusive Insights

In conclusion, the effective implementation of this voting system represents a noteworthy accomplishment. Under ideal circumstances, including access to government data and the deployment of government-issued blockchain, the system can operate optimally, ensuring a robust and secure electoral process.

The primary goal of achieving universal accessibility in the voting system has been successfully realized. Any individual, regardless of location, can actively engage in the democratic process, fostering inclusivity and civic participation.

Noteworthy metrics attest to the system's elevated standards of verification, encryption, and data security. These components collectively contribute to establishing a trustworthy and tamper-resistant voting environment, upholding the fundamental tenets of a secure electoral system.

Looking forward, the project envisions the incorporation of additional features to further fortify security and enhance efficiency. Ongoing innovation will pave the way for a continually evolving and resilient voting system. This research lays the groundwork for a secure, accessible, and progressively advanced democratic process.

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