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Online Voting System Using Blockchain

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Abstract :

The main goal of this project is to make electronic voting better by using blockchain technology.Blockchain is like a digital ledger that keeps records secure and transparent. Unlike traditional votingsystems that have security flaws because they rely on a central authority, blockchain works in a decentralized way. This means that many people can access the same database, making it harder to tamper with. Blockchain uses encryption, decentralization, and agreement among users to ensure thattransactions are safe and trustworthy. Each person in the network has their own private key, like a digital signature, which proves their identity when they make transaction. The aim of this project is tocreate a voting system that is very secure and transparent, allowing people to vote from anywhere inthe world with confidence.This paper suggests a way to vote online using blockchain technology. Blockchain is useful for many things and is known for its secure and decentralized nature. The proposed system is an Android app with extra security measures. To log in, users need a special ID key. Then, they use their fingerprint for authorization. Additionally, voters get verified with a one-timepassword for extra safety. When someone votes, their vote is recorded as a transaction on the blockchain, creating a secure record of all the votes. This ensures that each vote is counted correctlyand no one can tamper with the results.

Keywords : *Blockchain , Ethereum , Security , AES Algorithm, Cryptography.*

1. INTRODUCTION

Elections are super important for democracy because they decide who runs the country. But a big problem is that a lot of people don't trust the way elections are done. Even in big countries like India, the United States, and Japan, there are issues with the voting system. Over time, the way we vote has changed, but so have the ways people try to cheat.

Some big problems with voting today include cheating by changing votes, hacking electronic voting machines, taking over polling places, and manipulating election results. This project looked into these problems and tried to come up with a better way to vote online that fixes them.

To make sure voting is safe and private, we need a fancy system that uses special math called hashing, blocks to store votes securely, and a flexible way to collect and announce results using blockchain. This project suggests using a type of blockchain called Ethereum to make a secure online voting system. Each voter would get a special ID that can't be tampered with. They'd then vote by sending a special token from their digital wallet to the candidate they want to vote for. This can be done from anywhere, not just where you live. Blockchain also keeps votes secret while still letting everyone check if things were done fairly.

2. Literature Review

A. Votereum: A Blockchain-based Electronic Voting System: Linh Vo-Cao-Thuy, Khoi Cao-Minh, Chuong Dang-Le-Bao, and Tuan A. Nguyen, 2019. "Votereum: "A Blockchain-based Electronic Voting System", conducted by the University of Information Technology at Vietnam National University HCMC, Vietnam, meticulously analyzes the prerequisites for modernizing the voting process. In addition to proposing Votereum, an innovative Electronic voting system leveraging blockchain technology, the research delves into key aspects such as security, scalability, and accessibility. Overall, the proposed Electronic voting system presents a comprehensive solution to modernize and secure the electoral process, paving the way for inclusive and transparent democratic practices.

B. Digital Voting: Voting Infrastructure Utilizing Blockchain: Vaibhav Anasune, Pradeep Choudhari, Madhura Kelapure, and Pranali Shirke Prasad Halgaonkar, 2019. "Digital Voting: Voting Infrastructure Utilizing B-chain", offers a concise examination of various methodologies utilized in contemporary voting procedures. The manuscript seeks to construct a framework adept at confronting present and forthcoming challenges while rectifying deficiencies inherent in prior frameworks.

C. Decentralized Voting Platform Based on Ethereum Blockchain: David Khoury, Elie F. Kfoury, Ali Kassem, and Hamza Harb, 2018, "Decentralized Voting Platform Based on Ethereum Blockchain", authored by the Department of Computer Science at the American University of Science and Technology, presents an innovative approach to creating a decentralized and trustless voting platform, leveraging Blockchain technology to mitigate trust-related concerns. In addition to ensuring data integrity and transparency, the system incorporates robust privacy measures to safeguard voter anonymity.Moreover, the platform implements smart contracts on the Ethereum Virtual Machine (EVM) to automate the execution of voting procedures, enhancing efficiency and reliability. The system also features a tamper-resistant audit trail, enabling stakeholders to verify the integrity of the voting process and results.

D. Survey on Blockchain Based E-Voting Recording System Design: G Bhavan, "Survey on Blockchain Based E-Voting Recording System Design", 2018. By integrating blockchain technology into the distribution of databases in e-voting systems, one of the primary vulnerabilities, database manipulation, can be significantly mitigated. This approach ensures that voting data remains tamper-proof and transparent, thereby enhancing the overall integrity and trustworthiness of the electoral process. In addition to employing blockchain for data distribution, robust encryption techniques such as the Advanced Encryption Standard (AES) will be utilized to secure sensitive information obtained from the fingerprint sensor. This ensures that voter biometric data remains

confidential and protected against unauthorized access or tampering. This helps to address concerns related to electoral fraud and manipulation, ultimately bolstering confidence in the democratic process.

E. lockchain-Based E-Voting System: *Friðrik* Þ. Hjálmarsson and Gunnlaugur K. Hreiðarsson, in their 2018 paper "Blockchain-Based E-Voting System" from the School of Computer Science at Reykjavik University, Iceland, assess the viability of distributed ledger technologies by examining a case study focused on the electoral process. In addition to describing the election process, the paper details the implementation of a blockchain-based application designed to enhance security and reduce the expenses associated with conducting a nationwide election. the utilization of blockchain technology enables the creation of a transparent and immutable ledger of voting records, ensuring the integrity and auditability of election results. This fosters trust and confidence among stakeholders, including voters, election officials, and candidates. minimizing the risk of fraudulent activities such as double voting or identity theft. The paper highlights the scalability and efficiency advantages of blockchain-based e-voting systems, which can accommodate large-scale elections while streamlining administrative processes and reducing logistical challenges. The research helps enhancing security, transparency, and cost-effective promoting democratic principles and civic participation and thereby minimizing risk of thefts.

3. Proposed System

We're proposing a user-friendly voting system through an Android app that's not only easy to use but also highly secure. Here's how it works: Voters first register within the app, with their details stored centrally. Once registered, they log in to participate in voting. To ensure security, users verify their identity with a one-time password sent to their device. After logging in, users see their dashboard with all relevant information. Security is further ensured through fingerprint authentication. Each user receives a single token to cast their vote, transferring it to their chosen candidate's wallet. Additionally, we're developing a web app to track voting statistics. Importantly, only one vote is allowed per account, and once cast, the account is disabled for further voting.

This voting system aims to democratize the voting process by leveraging the widespread use of smartphones and the accessibility of Android applications. By enabling voters to register and participate in elections conveniently from their mobile devices, we hope to increase voter turnout and engagement. The emphasis on security features such as authentication, authorization, and verification ensures that only eligible voters can participate, safeguarding the integrity of the electoral process.

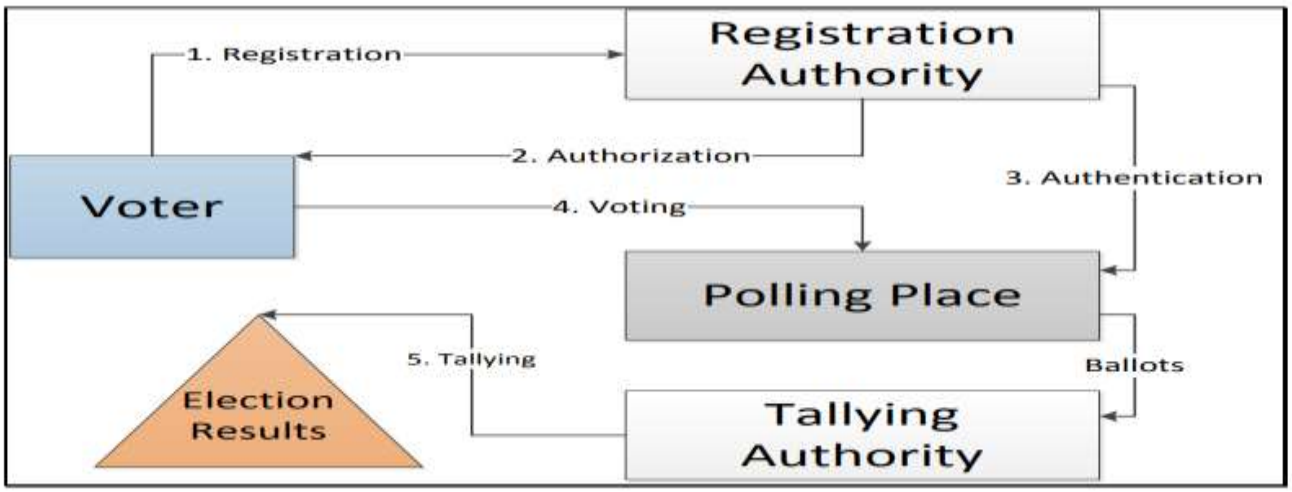

Fig : Dataflow Diagram of Proposed System

In summary, our proposed voting system not only prioritizes accessibility and security but also underscores the importance of transparency and fairness in democratic elections. By harnessing the power of technology, we strive to create a voting environment that is inclusive, trustworthy, and conducive to active citizen participation.

4. Working Methodology

Blockchain is like a digital ledger that's shared and updated by many computers. There are different types of blockchains: public, private, and consortium. Examples of public blockchains are Ethereum and Bitcoin. These blockchains are secured by complex math problems. In this research, Ethereum's public blockchain is used. Each blockchain consists of blocks, where each block contains transactions. A block has two main parts: the header and the body. The header holds important information like previous transactions and timestamps, while the body contains the actual transactions.

Think of Ethereum as a platform that allows developers to create and run complex programs called smart contracts without needing a middleman. It's like a more flexible version of Bitcoin's technology. With Ethereum, you can build things like markets, digital agreements, and more, all using a shared database that's secure and unchangeable. Vitalik Buterin, the creator, saw the potential for this technology to revolutionize how we handle agreements and data. Ethereum, launched in 2015, has quickly become one of the most valuable cryptocurrencies after Bitcoin. It's expected to become even more popular and widely used in the future, potentially surpassing Bitcoin in both value and adoption.

Hashing is a way to convert any kind of information into a fixed size. It's like taking a big messy pile of stuff and turning it into a neat little package. We use a function called SHA-256 for security, which is really strong and hard to break. It's kind of like a super-secret code that scrambles things up so well that it's almost impossible to unscramble without the right key. This helps keep data safe and secure.

Another important thing is AES encryption, which uses a key to both lock and unlock information. It's really good at keeping things private, and unlike some other methods, it can handle different sizes of data easily.

In order to vote for a preferred candidate, individuals must first fill out a registration form. This form collects voter information and requires the upload of certain documents. Once completed, the form is submitted, and the individual's details are recorded in the database. It's important to note that filling out the registration form is mandatory - without it, a person cannot vote. After submission, the provided phone number and email address are verified to ensure the registration process is complete. Once verified, the individual becomes eligible to participate in the voting process.

After submitting the registration form, individuals become eligible to vote. They then sign in using their credentials in the authentication module, where their details are checked for accuracy. Access to the dashboard is granted only after successful verification. The first step in the dashboard is OTP verification to ensure security. Once verified, users authenticate themselves with their fingerprint. Subsequently, a voter wallet is generated, and a token is issued to the voter for casting their vote. Votes are cast by transferring the token from the voter's wallet to the wallet of their chosen candidate.

5. Result

Figure 1 : User Login Module

Figure 1 shows the voters login display. New voters has to sign up using their voters id and their password. If the voter is already signed up , then he can login using the same credentials previously set by him/her.

nce the voter is signed up , they can explore the different candidates standing for election. From there , voters can cast the vote to their favourite candidate. All the information of candidates and voters is safe and secure.

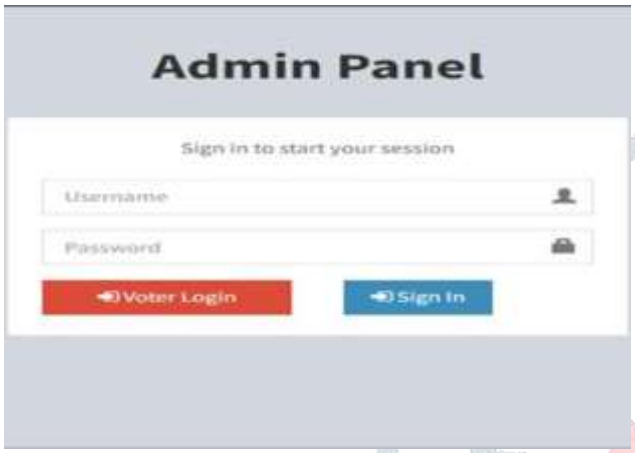

Figure 2: Admin Login Module

Figure 2 shows the admin login display wherein the admin has to login itself with it's username and password.As many admins can login and can create their own voting dashboards.

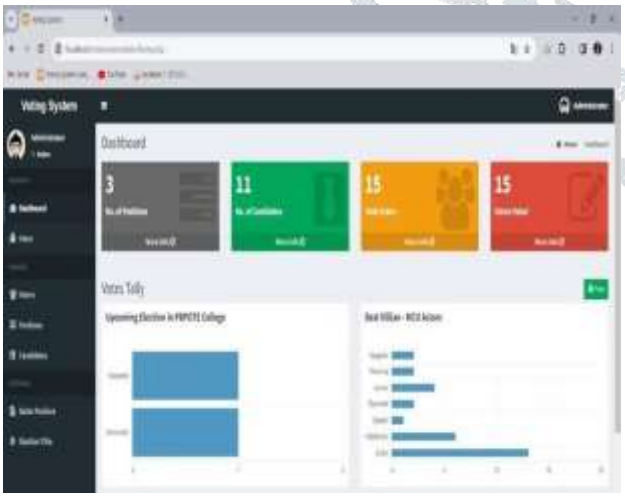

Figure 3 : Dashboard

Figure 3 shows the dashboard of voting paradigm. This is managed by the respective admin of the voting system. From there the admin can manage the number of voters , the participating candidates , can see the votes casted. Admin sets the voting time and the voters must have to vote within that set time. After the time is exhausted , no voter can cast vote. The result is also displayed in the same dashboard.

6. Conclusion

The main goal of this project is to make electronic voting better by using blockchain technology. Blockchain is like a digital ledger that keeps records secure and transparent. Unlike traditional voting systems that have security flaws because they rely on a central authority, blockchain works in a decentralized way. This means that many people can access the same database, making it harder to tamper with. Blockchain uses encryption, decentralization, and agreement among users to ensure that transactions are safe and trustworthy. Each person in the network has their own private key, like a digital signature, which proves their identity when they make transactions.

The aim of this project is to create a voting system that is very secure and transparent, allowing people to vote from anywhere in the world with confidence. This paper suggests a way to vote online using blockchain technology. Blockchain is useful for many things and is known for its secure and decentralized nature. The proposed system is an Android app with extra security measures. To log in, users need a special ID key. Then, they use their fingerprint for authorization. Additionally, voters get verified with a one-time password for extra safety. When someone votes, their vote is recorded as a transaction on the blockchain, creating a secure record of all the votes. This ensures that each vote is counted correctly and no one can tamper with the results.

7. Future Work

The current system employs Ethereum, a public blockchain. It's open to everyone, allowing participation without any barriers. However, it faces challenges in scaling and has limited throughput. To address these issues, a consortium blockchain can

be utilized. This type blends features from both public and private blockchains.

The current system targets small groups, but we aim to expand it into a nationwide voting system. Alongside the existing fingerprint module for authorization, we'll integrate a facial recognition module for enhanced security.

8. References

1. Kriti Patidar, Dr. Swapnil Jain (2019, July). Decentralized E-Voting Portal Using Blockchain. In 2019 10th International Conference on Computing Communication and Networking Technologies (ICCCNT). https://doi.org/10.1109/ICCCNT45670.2019.8944820

2. Akhil Shah, Nishita Sodhia, Shruti Saha, Soumi Banerjee and Madhuri Chavan.(2020,January). "Blockchain Enabled Online-Voting System.". International Conference on Automation, Computing and Communication 2020 (ICACC-2020). https://doi.org/10.1051/itmconf/20203203018

3. Kashif Mehboob Khan, Junaid Arshad, Muhammad Mubashir Khan. (2018, January). "Secure Digital Voting Syatem based on Blckckchain Technology." International Journal of Electronic Government Reseach.(IJEGR). http://dx.doi.org/10.4018/IJEGR.2018010103

4. Bayu Adhi Tama, Bruno Joachim Kweka, Youngho Park, Kyung-Hyune Rhee.(2017, August). "A critical review of blockchain and its current applications." International Conference on Electrical Engineering and Computer Science (ICECOS). http://dx.doi.org/10.1109/ICECOS.2017.8167115

5. Sarah Al-Maaitah; Mohammad Qatawneh; Abdullah Quzmar. "E-Voting System Based on Blockchain Technology: A Survey." 2021 International Conference on Information Technology(ICIT). https://www.researchgate.net/publication/353490441_EVoting_System_Based_on_Blockchain_Technology_A_Survey

6. Albin Benny, Aparna Ashok Kumar, Abdul Basit, Betina Cherian and Amol Kharat.(2020, August). "Blockchain based E-voting System." Blockchain based E-voting System by Albin Benny :: SSRN

7. David Khoury, Elie F. Kfoury, Ali Kassem, Hamza Harb. Decentralized Voting Platform Based on Ethereum Blockchain, IEEE International Multidisciplinary Conference on Engineering Technology (IMCET), 2018. https://doi.org/10.1109/IMCET.2018.8603050

8. Fridrik p. Hjalmarsson, Gunnlaugur K. Hreidarsson. Blockchain-Based E-Voting System, 2018. https://doi.org/10.1109/CLOUD.2018