Ethereum Blockchain based E-Governance System

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***Abstract*: E-Governance system faces a number of challenges like transparency, privacy, robustness, security issues. One crucial challenge is to make the system free from manipulation. We propose an e-governance system based on ethereum which is decentralized so it is free from any manipulation by a central authority. The consensus creates a transparent environment for e-voting, users can submit their vote directly from ethereum wallets. The blockchain with smart contracts emerges as a good candidate to use in developments of safer, cheaper, more secure, more transparent and easier-to-use e-voting systems.**

***Keywords:* Block chain, smart contract, ethereum, E-Voting.**

I. Introduction

The blockchain technology that shines like a star after the entrance and widespread acceptance of Bitcoin [1], the very first cryptocurrency in peoples' everyday life, has become a trending topic in today's software world. The software programs enforced by smart contracts [2] are written into a blockchain and are immutable. Hence they work properly, autonomously and transparently forever, without any external stimuli [3]. The blockchain technology might be a very suitable solution for e-voting projects. E-Voting is studied extensively, and many applications are tested and even used for a while. However, very few implementations are reliable enough and are still in use. Transparency is the key issue which needs to be addressed.

While most government elections and many organizational elections are held physically using sealed paper ballots, other polls and questionnaires are usually made on the Internet or SMS channels, notarized accounts are counted and publicly announced. But, legacy paper-to-box voting systems create some questions; How reliable are the notaries at hand? How can we be sure that the votes people gave are not changed before they are counted on the system? How can we verify the transparency of the system? How can we prevent the tricks that reduce people's trust in the polls? How expensive is to hold an election in one vote centre with 1000 voters, including material, logistics and salary costs? What about 1000 vote centres and 1,000,000 voters? And repeat all the setup for each election, considering there are a few each year? These and other similar problems have gradually entered a growth trend.

II. Literature Survey

A. *Towards Secure E-voting Using Ethereum Blockchain*

Author: Ali Kaan Koc; Emre Yavuz; Umut Can Cabuk; Gokhan Dalkilic;

E-voting, on the other hand, is another trending, yet critical, topic related to the online services. The blockchain with smart contracts emerges as a good candidate to use

in developments of safer, cheaper, more secure, more transparent, and easier-to-use evoting systems. Ethereum and its network are one of the most suitable ones, due to its consistency, widespread use, and provision of smart contracts logic. An e-voting system must be secure, as it should not allow duplicated votes and be fully transparent while protecting the privacy of the attendees.

B. *Proof of Vote: A High-Performance Consensus Protocol Based on Vote Mechanism & Consortium Blockchain*

Author: Kejiao Li; Hui Li; Hanxu Hou; Kedan Li; Yongle Chen

Bitcoin introduces a revolutionary decentralized consensus mechanism. However, Bitcoin-derived consensus mechanisms applied to public blockchain are inadequate for the deployment scenarios of budding consortium blockchain. We propose a new consensus algorithm, Proof of Vote (POV). The consensus is coordinated by the distributed nodes controlled by consortium partners which will come to a decentralized arbitration by voting. The key idea is to establish different security identity for network participants so that the submission and verification of the blocks are decided by the agencies' voting in the league without the depending on a third-party intermediary or uncontrollable public awareness. Compared with the fully decentralized consensus–Proof of Work (POW), POV has controllable security, convergence reliability, only one block confirmation to achieve the transaction finality, and low-delay transaction verification time.

C. *Blockchain Based E-Voting Recording System Design*

Author: Rifa Hanifatunnisa; Budi Rahardjo

Increasingly digital technology in the present helped many people lives. Unlike the electoral system, there are many conventional uses of paper in its implementation. The aspect of security and transparency is a threat from a still widespread election with the conventional system (offline). General elections still use a centralized system, there is one organization that manages it. Some of

the problems that can occur in traditional electoral systems are with an organization that has full control over the database and system, it is possible to tamper with the database of considerable opportunities. Blockchain technology is one of the solutions, because it embraces a decentralized system and the entire database are owned by many users. Blockchain itself has been used in the Bitcoin system known as the decentralized Bank system. By adopting blockchain in the distribution of databases on e-voting systems can reduce one of the cheating sources of database manipulation.

D. Comparison and Analysis of Governance Mechanisms Employed by Blockchain-Based Distributed Autonomous Organizations

Author: Stephen DiRose; Dr Mo Mansouri

One of the distinguishing features of blockchain-based Distributed Autonomous Organizations (DAO) is the lack of a central authority. Changes to blockchain data are achieved through consensus amongst blockchain network participants, rather than through a central node's authoritative decision. Similarly, governance, i.e., changes to features and underlying source code, is achieved through a decentralized mechanism. As adoption of blockchain has increased, the need to evolve and adopt new features has grown. These changes highlight the mechanism by which the network, rather than a central node, makes decisions. One change, in particular, proposed increases to the block size to address scalability limitations, has been particularly demonstrative of the governance mechanisms employed by disparate blockchains.

E. A Blockchain-Based Network Security Mechanism for Voting Systems

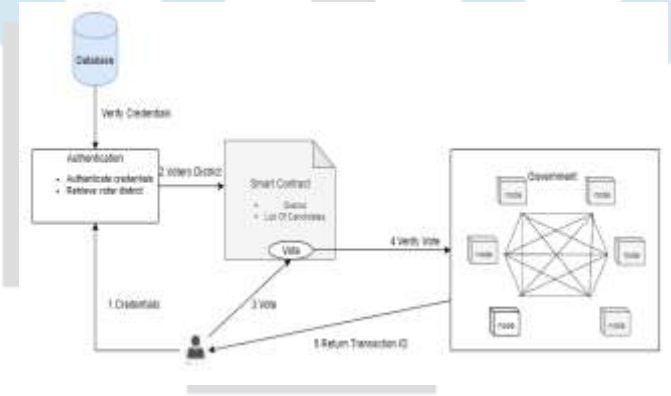
Author: Hsin-Te Wu; Chang-Yi Yang

As technology advances, many countries have now opted for electronic voting systems. Any voting system must follow principles of transparency and impartiality in order to achieve fairness; the electronic voting process must also be protected against cyber attacks or denial-of-service attacks (DDOS) because such attacks may affect the processing time in voting procedures and even hinder the fairness in voting. This study establishes a network security mechanism for voting systems based on blockchain technology. The blockchain mechanism employs a distributed architecture that can prevent system shutdown resulting from malicious cyber attacks; additionally, any user in the blockchain can authenticate data integrity, which satisfies requirements of transparency and impartiality in voting systems.

III. Problem Statement

To provide a secure voting environment and show that a reliable e-voting scheme is possible using blockchain. The challenges of e-governance implementation are many and vary from country to country. Our aim is to build a transparent and secure decentralized e-governance system.

IV. System Architecture



1. Voter and Candidate registers with valid credentials
2. Initialize Election
3. Voter authentication and validation using the database.
4. If a voter is valid and has not cast any vote then the voter is eligible to vote otherwise not.
5. Assigning the vote token to the valid voter.
6. Voter cast vote using vote token.
7. The token is transferred to the appropriate candidate's wallet.
8. Verify the vote
9. If the vote is valid then the block is added to blockchain and transaction ID is returned to voter.
10. Stop election and calculate vote count, publish the result.

REFERENCES

[1] S. Nakamoto, "Bitcoin: a peer-to-peer electronic cash system", [Online]. Available: https://bitcoin.org/bitcoin_pdf

[2] C. D. Clack, V. A. Bakshi, and L. Braine, "Smart contract templates: foundations, design landscape and research directions", Mar 2017, arXiv:1608.00771

[3] E. Maaten "Towards remote e-voting: Estonian case", Electronic Voting in Europe-Technology, Law, Politics and Society, vol. 47, pp. 83-100,2004