A Comparitive Analysis on E-Voting System Using Blockchain

Kanika Garg
Krishna Engineering College
AKTU, Uttar Pradesh, India
gargkanika7@gmail.com

Pavi Saraswat
Krishna Engineering College
AKTU, Uttar Pradesh, India
pavisaraswat@gmail.com

Sachin Bisht
Krishna Engineering College
AKTU, Uttar Pradesh, India
bisht09sachin@gmail.com

Sahil Kr. Aggarwal
Krishna Engineering College
AKTU, Uttar Pradesh, India
aggarwalsahil1998@gmail.com

Sai Krishna Kothuri
Krishna Engineering College
AKTU, Uttar Pradesh, India
saikrishnakothuri@gmail.com

Sahil Gupta
Krishna Engineering College
AKTU, Uttar Pradesh, India
sahilgupta9946@gmail.com

Abstract— In a democratic country like India (which is the largest democracy in the world), Voting plays a major role in the selection of government officials as well as showing our opinion how the governing body to be formed. Time to time, researches are conducted in order to tackle the difficulties in the centralized voting system to make it more anonymous, reliable and secure while preventing any kind of frauding. Even though the use of e-voting through the electronic medium, we have to face well-known problems of maintenance and fraud. Currently, various researches are conducting in-order to make secure and reliable voting system while tackling issues of anonymity and security. Through Decentralized System, focus is drifting towards making Voting Process simple, secure and anonymity in the hand of the public. This paper presents a literature review on the papers and the techniques used to tackle voting challenges.Keywords— *blockchain, ethereum, smart contracts, e-voting, solidity.*

I. INTRODUCTION

Trust, Autonomy and intermediaries are three big problems which we are facing in present time like we are obliged to trust banks for securing our money for our transactions. We depends upon these third parties to ensure our privacy and security in terms of our data. So in any case in today's world we have to trust these organisations which act as intermediaries. These three big problems can be solved through a undeniably ingenious invention called blockchain. As the applications build using blockchain are decentralised and owned by multiple parties and no one can change or update data in the blockchain. If someone tries to do so it will not be accepted by stakeholders. Hence, making blockchain completely trustable. Their is no single owner of blockchain, means no single authority is controlling it and anyone can participate in the network (depending upon the type of blockchain i.e public, private and consortium). Blockchain is a read and write only database i.e once data written on blockchain cannot be altered or changed.. These features of blockchain can be very useful in building a perfect e-voting solution (i.e. building a decentralised voting platform) over traditional system, Encountering the challenges which we are our facing till now. is derived from the Greek word kryptos which means hidden or secret. It is a technique for safe communication in the presence of unsecure third party. It is a science and practice of hiding information and it is a combination of both mathematics and computer science branch. It involves both encryption and decryption of data. And it enables to send the data securely over the insecure network. Encryption is applying key on plain text to convert it into cipher text and decryption is the reverse process of encryption. Cryptography model is of basically two types one is symmetric model and asymmetric model.

A) E-voting

Voting is a very crucial part of any election or decisive process. Not only, It shows the power of individual right but also their concern on the topic. Currently, various researches are conducting in-order to make secure and reliable voting system while tackling issues of anonymity, fairness, reliability, and availability.

Through the use of Blockchain, the focus is on making the Voting Process fair and without any third party intervention.

B) CHALLENGES OF VOTING

• Privacy: There shall be no third party intervention of any kind regarding Election. Only Voter is allowed to view his/her details and to whom voted. The only disclosed information in election is total votes to candidates as well as in entire election.

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• Lack of Evidence: Although privacy with anonymity can ensure safeguards against electoral fraud. There is no way to ensure that votes are being casted under effect of bribes or any form of electoral fraud. This issue has root from the beginning.

• Fraud-Resistance: Each qualified voter should be able to vote exactly once and no other persons should be able to vote. The system must verify the identity of each potential voter and determine their status, but must not allow this information to become associated with their vote.

• Ease-of-Use: Elections must serve the entire public. It must be design in such a way that it can be used with minimal training and some technical skills.

• Scalable: Election is a means to serve a large population. It must be flexible enough to work at large scale also.

• Speed: In this Computer Driven era, It must be ensure that results are declared within few hours of election procedure ends.

• Low Cost: Cost is one of the major for any system design. The System must be cost efficient , having good efficiency and require least maintenance as possible.

II. LITERATURE SURVEY

In this review, we have tried to give comprehensive view e-voting in thematic basis like e-voting with iot and fingerprint, e-voting with blockchain and Aadhar verification, etc. We have tried to cover every aspect and approach take by individuals to make robust system.

A. Research Questions

It is Few research questions on the basis of survey that can be answered are:

RQ1: Is System prone to any physical error i.e easy to maintain? i.e error in machine like fingerprint sensor not working

RQ2: Does it have any authentication?

RQ3: Is it complete decentralize system? #empty ballot or multiple vote

RQ4: Is it provide mobility and flexibility in use? An EVS can provide similar mobility and flexibility by eliminating location restrictions and time/schedule restrictions (availability). Therefore, it is reasonable to assume that an EVS with mobility could increase voter participation.

RQ5: Does it provide Anonymity?

	Authentication	**Platform**	**Anonymity**	**Voter Verification**	**Decentralised**	**Technology used**
Biometrc Aadhar Verification [10]	Aadhar Card	Hardware	Yes	yes	Partial decentralized	Biometric + Finger print scanner
IOT fingerprint [16]	Finger print	Hardware	Yes	yes	Partial decentralized	IOT + Finger print scanner
Permissioned Blockchain [6]	Yes	Software	Yes	Permission	Decentralized	Blockchain
followmyvote [18]	None	Web Based	No	No	Centralized	Web Application
Estonian Voting System [11] [13]	Eid	Software	yes	yes	Partly	-
DVBM [13]	Postal	Web bases	yes	No	partly	-
Norwegian i-voting system [11]	MiniID	Software	yes	yes	partly	-
ivote [13]	Postal	Web	yes	yes	unknown	-

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civitas [13]	Postal	Software	yes	yes	yes	Java
Votebook (New york University) [12]	Yes	Software	yes	-	Decentralized	Permission Blockchain
Openvotebook network (New castle university) [12]	Yes	Web Based	yes	-	Decentralized	Ethereum Blockchain
The proposal of university of maryland [12]	Yes	Hardware	yes	-	Centralized	Ethereum Blockchain with ZKP and Markle tree.
New South Wales iVote System [11] [13]	VoterID, PIN	Software	Yes	yes	-	-
Bronco Vote [14]	Yes	Web Based	yes	yes	yes	Ethereum Blockchian
Plymouth Model [15]	Yes	Software	Yes	Yes	Yes	Blockchain

Table 4.1 Comparing all the existing methodologies

ID	RQ1	RQ2	RQ3	RQ4	RQ5
[10]	X	X			
[16]	X	X			
[6]		X	X	X	X
[18]				X	
[11]		X		X	X
[13]		X		X	X
[11]		X		X	X
[13]		X		X	X
[13]		X	X	X	X
[12]		X	X	X	X
[12]		X	X	X	X
[12]		X			X
[11]		X		X	X
[14]		X	X	X	X
[15]		X	X	X	X

Table 2: Information that which all papers answer what all research questions.

III. CONCLUSION AND IMPLICATION OF FUTURE WORK

In this paper, an empirical review has been performed to understand issues faced by a voting system. All the related papers are taken from thesis and literature and have been studied. After reading this paper, others will be able to understand various methodology in voting.

There will always remain the concern of authentication of the user and will require some sort of biometric device or unique id. We can say the same about Blockchain based solution is a better alternative but our goal always remains in making secure and reliable system irrespective of platform and giving the voting system more transparency and error-free. The E-Voting topic is still a hot debate both politically as well as individual level. It will require mutual understanding among people and strong foundation rules so that it will not be misused.

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