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Survey on Voting System using Blockchain Technology

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***Abstract*—The use of information technology has in some ways revolutionized in many sectors. E-voting is said to be a symbol of modern democracy.While research on the topic is still emerging, it has mostly focused on the technical and legal issues instead of taking advantage of this technology and implementing it for good cause. Usefulness of e-voting will perform best when compared with the existing framework. The word "Vote" means to choose a candidate from a given list of candidates who will lead the organization or the group .The main goal of voting is to practice voting in such a way that every person votes to elect their leader. Most countries in the world, India is no exception, had trouble voting. Voting is still carried out in countries in physical mode. This physical mode process is not safe as it can be manipulated by members of voting commitment.There are many issues such as voting stations being too far and improper voting tools.The proposed flagship internet-based online voting system supported by blockchain technology solves this very problem. Blockchain technology uses encryption and hashing techniques with which it makes voting secure. In this case, each vote is considered as a unique transaction.A private blockchain is created using a peer to peer network where we store voting transactions.This application is programmed in such a way so that the details of voting are abstract from the user. Users will be given enough time for voting with the system running. The main purpose of this paper is to come up with a new unique solution, which does not require any technical skills. Since voting is in online mode, increased voter turnout is likely.In this project, the concept of developing an electronic voting system using blockchain technology is implemented..**

***Keywords*—Voting, Blockchain Technology ,Ethereum, Ledger, Peer, Election, E-voting., Voting**

1. INTRODUCTION

1.1 Decentralized System

We can define a decentralized system as a system in which there is not any single node in an interconnected network which has complete/sole authority. In the case of internet based and IT systems, we can call a form of networked computers as decentralized systems.

1.2 Blockchain

Individuals/organizations use the term 'blockchain revolution' to mean a variety of things, and it can be confusing. However, what is actually meant is decentralized records, i.e. records of transactions are present on the multiple nodes on the network, as opposed to storing data on a single centralized server.

Blockchain technology emerged way back in the 80's, but the emergence of Bitcoin is the most prominent reason why Blockchain is a popular topic now-a-days. Bitcoin was developed in 2009. Today Bitcoin is considered by many as the genesis of the emergence of the paperless, digital financial transactions in the real world using digital assets, despite the fact that this asset/currency may not have essential value due to the absence of transaction management by centralized controllers. It was developed using blockchain Equations as the base technology.

1.3 Elections

As we know, elections are a critical process for the proper functioning of democratic country's system. In the current scenario, the emergence of internet technology has also meant that a lot of outside factors can possibly influence the county's administration and processes which means making the procedure of election fair is very crucial and more basic than ever before. Many countries have been dealing or have dealt in the past with authoritative administrations which always means suffering for the common people. Common people had been robbed of their basic human rights and of the freedom that was guaranteed by their constitution. Given the circumstances, for the proper growth and development of the country, having a fair and reasonable election system is very vital. In our country i.e India, devices used for elections i.e EVMs are hugely criticized, reason being irregularities in the reports of the results of the elections. Many questions have been asked with regard to the internal design and architecture of EVMs and ways in which it might be prone to attacks/tampering. Also, other loopholes in existing arrangements of poll voting are exploited in the hope of picking up control. Several frauds have come to light in the current system such as booth capturing, ballot fraud and voter fraud. All this makes the process of elections untrustworthy. However these problems that are associated with the current election system can be solved if the voting process was more transparent and accountable i.e making it more fair. It should be noted that the voter's anonymity has been achieved in the current system but still it is not fully transparent. Because at the end of the day, voters are just expected to blindly trust the outcomes of the elections due to absence of verifiability in the system. However, the idea of integrating internet based voting solutions is getting a lot of traction in the country in recent times..[7] Telangana State Election Commission recently developed a mobile based e-voting application which was used in one of the districts for voting on a pilot basis.

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1.4 Existing System

Before 2004 there was a paper-primarily based totally vote casting device referred to as ballot paper device in India.[9] Voters needed to visit polling sales spaces and solidify their vote with the aid of using marking on seal in the front of the image of a candidate for which they desired to solidify their votes on ballot paper. Results have been introduced with the aid of counting the votes. The most voted winner was declared as the winner. India has populace greater than one hundred twenty crores the ballot paper vote casting isn't a great deal reliable, time ingesting and really hard to be counted number the vote and there are additionally troubles like harm of ballot paper,alternative of ballot paper containers with reproduction marking stamp seal for multiple candidate consequently there may be a sturdy want to triumph over those troubles.

[8]In order to conquer those troubles Electronic VotingMachines Were introduced. EVM's specially include two components:

1. Control Unit: It shops and assembles votes, utilized by ballot workers.
2. Ballot Unit: It is located withinside the election sales space and is used by the voters.

Both the devices are connected through a 5m cable and one stop of the cable is completely fixed to the ballot unit. The managed unit has a battery percentage inside, which motorizes the device.The ballot unit has sixteen candidate buttons and the unused buttons are protected with a plastic covering tab in the unit. An extra ballot unit may be used when there are greater than sixteen candidates. The extra ballot unit may be related to a port on the bottom of the primary ballot unit. EVM's across the world are called DRE's(Direct recording Electronic). EVM's are universally utilized in India because of the widespread elections of 2004. They had been utilized in all of the meeting polls and widespread elections of 2009. By the usage of EVM's, Votes are correctly recorded and there may be no hassle in counting, scalability, Accuracy, speedy assertion of effects and robustness of device. Main Problem lies in authentication, the man or woman who is vote casting might not be the valid man or woman. Problems like sales space taking pictures with the aid of using political parties, casting of votes with the aid of using underage humans and fraud vote casting can also additionally occur. A man or woman is supplied with the voter identity identification card as an evidence of identity, issued with the aid of the Indian government. Lot of troubles are visible in voter identity notification playing cards like misprinting of name, missing of name, no clean picture graph identity identification card, etc.

2. LITERATURE SURVEY

Paper titled "**The Next Gen Election: Design and Development of E-Voting Web Application**" [1] proposed a voting system based on the internet. The system has a login page where the voter can login and enter all its information and this will be stored on a centralized server. The server and database will be owned and maintained by the Election Commision of India. All the information related to the election like voters details and candidates details will be managed by the Election commission. Voters can access the voting link and cast their vote. A code is written in order to evaluate the results in real-time. According to the paper this will help us in reducing the high cost of voting and time required to conduct the election and also it simplifies the whole process of voting.

Paper titled **"Online Voting System using Cloud"** [2] mentioned that the traditional voting system includes many improper practices and breaches and hence the traditional voting system needs to be upgraded to an online voting system. Shifting to online voting solves the problem of consuming a lot of time. The paper suggests development of voting system where a voter can vote from anywhere through the internet using the system that is based on SQL server and Microsoft Azure cloud and C# as the programming language in order to implement functions like admitting voters, casting vote, verifying vote and declaring the results after completion of election. From this paper we have concluded that one of the most important parts of the admin portal is to verify the voter's ID before enrolling them into the system.

Paper titled '**An Efficient and Secure Students Online Voting Application**' [3] proposed a web based voting system having functions like vote capturing and tallying results over the web. The system will help in saving lots of processing time, avoiding human errors during the process and avoiding vote tampering. Each voter is verified based on the unique ID code which in this case is a student registration ID. As only unique IDs are allowed, this protects the system from proxy voting. The system will be fast to access, low cost and easy to maintain.

Paper titled **'Multi-Purpose Platform Independent Online Voting System'** [4] mentioned an online voting system for conducting elections in which a voter can vote from their current location. As the voter doesn't have to go to a polling booth to cast their vote, therefore more voters will participate in the election. The proposed system will be supported on Windows, Android or IOS. Verification of voters is done using QR code and OTP (one time password) and only verified voters will be allowed to cast a vote.

Paper titled **'Online Voting System Using Biometric Verification'** [5] proposes an electoral system which will be online and automated and makes the process of voting easy, safe and reduces overall time required for conducting the election. The project has two modules. In the first module all the voters are registered into the system and in the second module actual voting takes place. The system will have a database containing voters' unique identification numbers and fingerprints information. Project uses biometric verification in order to identify each voter uniquely.From this paper we have referred - the necessity of the privacy of voters during voting i.e The confidentiality of the voter should be preserved and there should not be any way to link the voter to the vote casted by the voter.

Paper titled **'A Brief Analysis of Blockchain Algorithms and Its Challenges'** [6] describes that blockchain serves as a ledger that allows transactions to take place in a decentralized manner. This paper focuses on many applications based on blockchain technology, including those covering numerous fields like financial services, government services, non-financial services, internet of things (IoT), and so on. With Blockchain as it is

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decentralized it eliminates the need for central authority. In this paper they have discussed in brief about the core structure and working of the blockchain technology i.e it is a public, shared and tamper proof ledger that allows people to share information in a trusted manner. A blockchain database is distributed, shared, fault tolerant and an append-only database that maintains the record in blocks. From this paper we have concluded that Blockchain with its key characteristics, has shown its potential to reshape traditional industries and one of them being Online Voting Systems.

3. SYSTEMS ARCHITECTURE

The system enables voters to cast their vote and is authenticated using OTP sent via phone number and email and will provide a unique ID to voters. Security is the most crucial fundamentals of this blockchain voting system.

For the proper working of the system we can list our assumptions and dependencies as follows:

3.1 Metamask Browser Extension

Metamask is a crypto currency wallet that allows users to interact with Ethereum Blockchain. Using metamask users can store and manage their account keys and exchange Ethereum based cryptocurrencies and tokens. Users can connect to decentralized networks through the web browser or through the browsers provided in mobiles as apps. Developers can use javascript plugin Web3js to initiate connections between a decentralized network and Metamask. Ethers are used as gas to perform transactions between metamask and smart contracts.

Metamask allows blockchain users to manage their wallet. Using the browser extension, users can use the wallet and perform transactions through the browser. When a transaction is performed, a metamask pops up and asks the user to confirm the transaction.

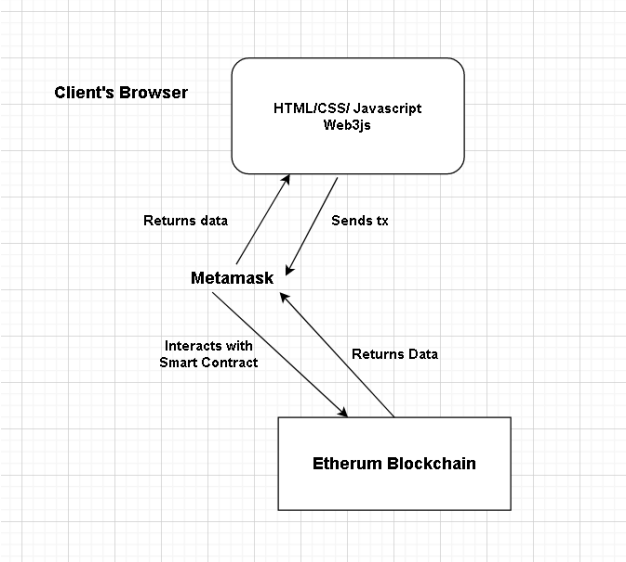

Fig 1: Metamask Working

3.2 Ganache

It is a private blockchain for instant Ethereum and Corda allotted software development.Used to set up a personal Ethereum blockchain which mimics the real international blockchain and which helps you to execute commands , run tests, and test out united states of america on the identical time as controlling how the blockchain works.It comes with flavors: a UI(User Interface) and CLI(Command Line Interface). The UI flavor is a computing tool software helping every Ethereum and Corda technology. The ganache-cli flavor is a command line tool that is available for Ethereum development.

3.3 Truffle

Truffle offers an improved environment primarily based totally on ethereum blockchain. Truffle is capable of compiling the ethereum contracts and migrating them. After migration contracts are deployed on ganache, any ethereum takes a look at the net (e.g. Ropsten, Rinkeby) or on an actual ethereum network.

It is a global elegance improvement tool, trying out a framework and useful pipeline for blockchains using the Ethereum Virtual Machine (EVM). With Truffle, you get:

- Built-in clever settlement compilation, linking, deployment and binary control.
- Automated settlement for speedy improvement.
- Scriptable, extensible deployment & migrations framework.
- Network control for deploying to any range of public & non-public networks.
- Interactive console for direct settlement communication.
- Configurable construct pipeline with aid for tight integration.
- External script runner inside a Truffle environment.

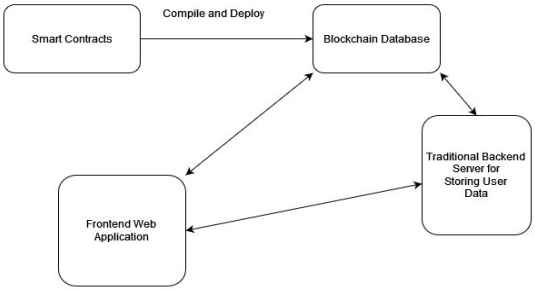

Fig 2: Proposed System

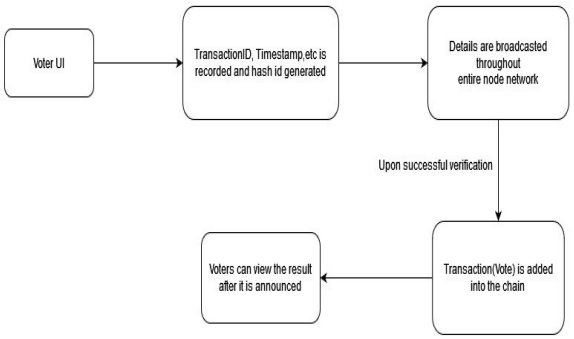

Fig 3: Internal flow of system

4. PROPOSED SYSTEM

Several studies are being done on using better technologies to improve elections. These studies tell about various risks involved in adopting e-voting systems such as software challenges, corrupt volunteers, network bandwidth, and the challenges of hackers. We've proposed to design the existing e-voting system integrated with the ethereum

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Blockchain technology. The proposed system has the following advantages as compared to the existing system:

• Users' will have unique id's so double voting is not possible.
• The voting transactions are stored on the ethereum Blockchain which are unchangeable which makes it tamper proof.

In the proposed system, a smart-contract which will be written in Solidity language which will contain the logic of the voting process. Smart-contracts once written will be compiled using truffle which will generate byte code and abi. Once the contract is compiled and deployed on the blockchain, it is not possible to make changes in the contract. This compiled contract can be accessed using web3.js which allows access to the variables and methods in the contract and interacts with the smart-contract.

Admin login will be used to add candidates which will be appearing in the election. .Voters will be able to register themselves on the portal using the registration process. Admin will verify the details of registered users and only the users with valid credentials will be able to vote in the election. Each time a user votes, a new block will be generated on the blockchain which will contain the details of that vote. That is each vote will be equivalent to one transaction on blockchain. A Metamask account will be used to perform the above transactions . Admin will have the authority to decide the duration of the election. While the election is live on a portal, a voter can vote for a candidate only once (this is ensured by the constraint in solidity code which is deployed on blockchain which is non-mutable). After the allocated time is over, admin will be able to see the election results with necessary details.

5. CONCLUSIONS

The current voting system can be improvised and secured by applying a web based voting solution. Blockchain technology has potential to be implemented in a far more secure and accessible voting system. The proposed blockchain-based e-voting system manages the election process, which makes the voting process simpler, voters can just simply login and exercise their right to vote. We believe that blockchain based voting systems can replace the traditional voting system in future.

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