

# Online Voting System using Blockchain

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## ABSTRACT

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**India is the world's most democratic country. Voting is very important in a democratic country like India, from village elections to Prime Minister Elections. So, to ensure a security, privacy of each voter and transparency is difficult task. Current voting system has some limitation and it's relied on truth, but we can generate better alternatives to this using a blockchain technology. Blockchain technology can address the flaws in today's electoral system by making the polling process transparent and accessible, preventing unlawful voting, enhancing datasecurity, and verifying the polling results. As a result, this technology is an attractive alternative to standard electronic voting solutions that include dispersed, non-repudiation, and security protection features.**

**Keywords - Block chain, NodeJS, Truffle, Ganache, Meta mask and Solidity.**

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## I. INTRODUCTION

In the era of Industry 4.0, block chain is a technology that is fast gaining traction. It is widely utilized in supply chain management systems, healthcare, payments, business, IOT, voting systems, and other areas because of its high security and transparency features.

The Online Voting System using Block chain is a software platform that allows a certain group to securely conduct votes or elections by balancing security, accessibility, and the overall requirements of the voting event. To be more specific, this system will be outlined and built-in order to prevent the integrity of the votes through the use of Block chain technology. Due to the limits and downsides of the traditional ballot voting method, our programme will address all of these issues for the end-user. The procedure will be separated into two stages: registration and voting. Both the phases will be carried out by balancing the technical coordination on the client-side and the server-side. Thus, the platform will provide two user-level accesses at a certain time-voter and administrator. The software will facilitate the voter's specific features to register, cast the vote, view results, and administrators with security controls and access. The purpose of this project is to provide the description of the project requirements for Online Voting System using Block chain Technology. It will

elaborate the requirements for the development of the decentralized voting system. It will also explain the software system constraints, interface. By stating these requirements explicitly, we ought to ensure that any potential miscommunications are dealt with at an early stage of development.

## II. LITERATURE REVIEW

Blockchain-Based E-Voting System, this is electronic voting system implemented using the blockchain technology. This system enables the secure and cost-efficient voting system with considering the privacy of the individual user. Blockchain technology ensures the security and integrity of voting system and hence possibility of overcoming a limitation of current working system of voting. [1]

The paper suggests a solution using Blockchain to put an end to all injustices in the general election. Security and the integrity of the voting data is provided entirely by theory. Voter privacy is another requirement guaranteed by system. Finally, the suggested Blockchain voting mechanism has greatly shortened the time it takes to get results. [2]

The paper represent review on the current voting system and their limitation and discussed various technique to tackle these challenges. The main goal is to make secure

and reliable system irrespective of the platform and it should be more error free as well as follow transparency. So study find that blockchain technology based solution may be better alternative in future. [3]

The system is designed using blockchain which is decentralized, and it does not need to depend on the trust. In this system any registered user can vote easily through any device by connection it to internet. The system is designed in manner that blockchain will be publicly verifiable and distributed so nobody able to corrupt it. [4]

The paper is about complete separation as well an open, blockchain online legal system. Blockchain may be a peer- to-peer network. The purpose of using the blockchain is to remove the central control and consider mediators. Blockchain is being read and research is still ongoing to address this disruption technology in various fields other than finance industry such as Network of Materials, medical or healthcare, electronic voting, shipping, online trading, housing, security and privacy. [5]

Blockchain-enabled e-voting (BEV) could lower voter fraud and broaden voter participation. On a computer or a mobile device, eligible voters cast an anonymous ballot. BEV makes use of tamper-proof personal IDs and an encrypted key. This article discusses a few BEV implementations along with potential advantages and difficulties of the strategy. [6]

In the paper, we will suggest a concept for a new electronic voting system that might be used in municipal or national elections by utilizing the open source Blockchain technology. The Blockchain-based system will be safe, dependable, and anonymous, and it will contribute to a rise in voter turnout and public confidence in their governments. [7]

To increase dependability and address concerns about manipulation from the client system, the process may be translated to the blockchain network. A solution can be developed that consists of two blockchains: the vote blockchain and the voter blockchain. However, due to the significant effort involved in encrypting all the votes, this approach is not suitable for large-scale application. [8]

Proposed system is electronic voting model based on IOT and it uses blockchain technology for cost effectiveness, transparency and privacy. In this system author proposed an algorithm to protect voters' privacy and it also verify the result in real time. [9]

A method that uses the switching rules of all nodes in blockchain creation, with the guaranteed value of all nodes joining the blockchain. This study is about the recording of electronic voting results that take place after the completion of the electoral process.

Information similar to the results for each node distributed under the blockchain permission protocol. Discusses recording of voting results using blockchain algorithm for all polling stations. Unlike Bit coin with Proof of Work, this thesis suggested a method based the pre-determined opening of each node system inbuilt with blockchain. [10]

### III. METHODOLOGY

Let's take a brief explanation on the basic workflow of the application. Admin will first build a voting instance by launching the system on a blockchain network (EVM), then construct an election instance and begin the election with all of the election's information filled in, including candidates for voters to vote on. The potential voters then join the same blockchain network and register to vote. Users' information is presented on the admins' panel, i.e., the verification page, once they have successfully registered. The administrator will then verify that the registration information is correct and matches his records. If the answer is affirmative, the administrator accepts the registered user, making them eligible to vote in the election. Following admin permission, the registered voter casts their vote for the candidate of their choice on the voting website. The admin stops the election after a certain amount of time, depending on the size of the election. Therefore, the voting is closed, and the results are published at the top of the results page, declaring the winner.

We have used ganache to create a local block chain. Ganache gives us 10 accounts which we can use as admin and voters. Each of these accounts contain account address, private key and 100ths. If we want to view and login to admin page, we import one account through meta mask extension. Through meta mask we can manage our accounts, i.e., we can import and remove the accounts. Once we have imported the account we can view and edit the admin page. Admin can verify the voters so they can vote. And then admin can start the election. Each process has a certain transaction fee and a gas fee which must be accepted through meta mask. And that amount will be deducted from the account which we are using and can be checked in ganache. Therefore, each transaction is stored in the block chain, and this can be seen in the block column in ganache. And each account can verify if the transaction is valid or not. In addition to this security feature, we cannot access the web page unless we login from the current account. We have used truffle to compile and migrate the smart contracts which is written in solidity. The front-end part is done using HTML, CSS and JavaScript. We have also used web3 to fetch account address from meta mask to the JSON file.

Possible features to improve within the app: -

- **Email Verification:** Adding email/phone verification (OTP, etc.) while registering for voters.
- **Automated Verification:** Adding an automated verification rather than manually approving by the admin for the registered users. This could

be based on the custom cooperation email, custom list of emails, or custom list of phone numbers, etc.

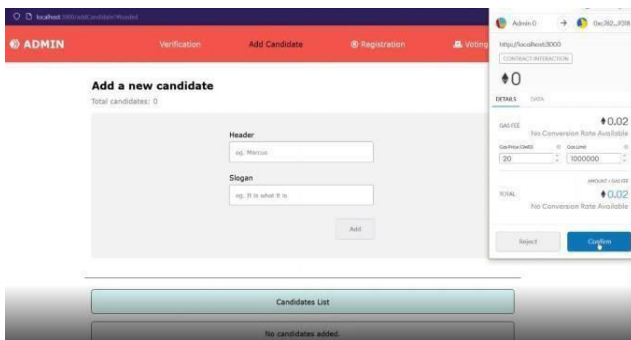
- **Report:** Option to generate a report at the end of an election. The report could contain a range of information including the number of people that were eligible to vote, the number of people that participated in the election, a bar-chart/pie-chart showing the election statistics, etc.
- **Workflow improvements:** overall workflow improvements for example, option to add candidates within the election setup page, with overall GUI improvements.
- **Multiple election instance:** ability to create multiple election instances without having to re-deploy the smart contract.

#### IV. RESULT AND DISCUSSIONS



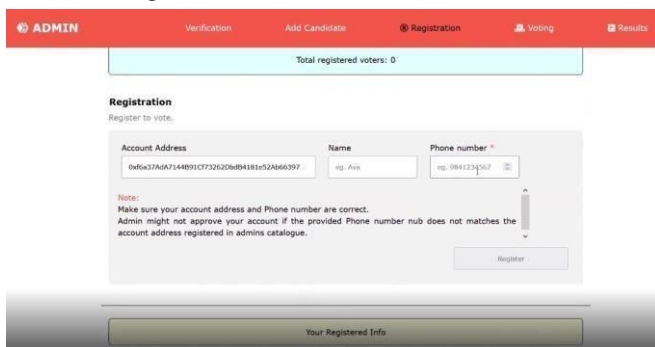
**Fig 1: Home Page**

This is home page of our system and by using this page, we can register for admin and voters. Also we can see the previous election results.



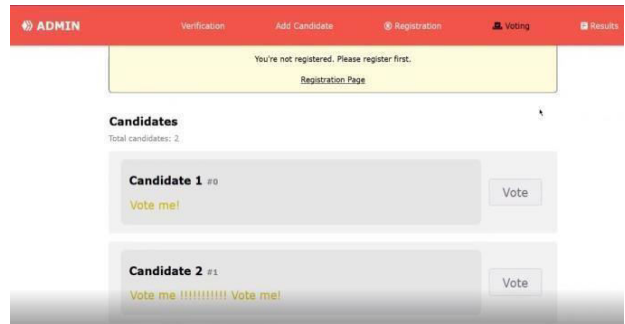
**Fig 2: Candidate Page**

In Candidate page, admin can add candidate name and their slogans.



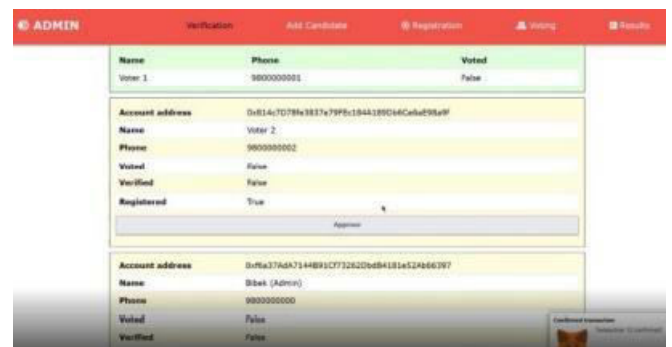
**Fig 3: Registration page for Voter**

Here voters can register themselves by using their name and phone number. In the system for each user unique key is provided by which they can vote only once.



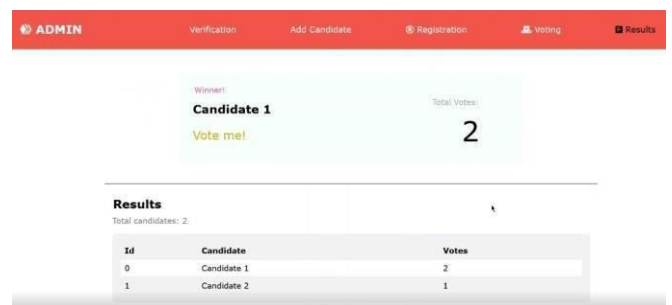
**Fig 4: Voting Page**

People can cast their vote to candidate who participated in election.



**Fig 5: Verification Page**

Admin can approve the registered people for voting.



**Fig 6: Results Page**

This is the result page of system where winner is declared.

#### V. LIMITATIONS

Users must use a secure device to cast their vote. Even this system give guarantee of security and privacy hackers can cast or alter a vote by using malicious software. We are using blockchain technology and so one of the main drawbacks is that we can't change a vote in case of mistake happen by user itself. Means user can vote only once.

## VI. CONCLUSION

We have designed a decentralized voting system using a blockchain technology. Electronic voting machine have its own limitation. By using a blockchain technology, we can overcome it. We ensure a security and individual privacy of the user and it also follow the transparency. In this system user can vote easily from any secure device by connecting it to the internet and the system can be expected to be at least 99% reliable in terms of protection and accuracy of the voting process and results.

## VII. FUTURE SCOPE

This implementation has been put through its paces on a virtual client. It may be tested in the future on the Ethereum test net with many accounts. The possibility of a blockchain-based voting system for large-scale elections should be investigated in future research. The system may be used for a specific use case, and measurements can be made to see if the calculations are accurate. For greater speed and security, synchronization and consensus methods can be debated and improved.

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