

**Indian Institute of Information Technology Vadodara**  
**(Gandhinagar Campus)**  
**Design Project Report-2021**

on  
**E-Voting System(Blockchain Based)**

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***Abstract-*** E-voting has been utilized in differing structures since a long time with crucial benefits over paper based frameworks like expanded effectiveness and decreased mistakes..Security is the major concern in voting in any domain for maintaining a decentralized and unbiased manner. Blockchain can enhance security which can be combined with a voting system to get a fruitful outcome. This paper presents a work to use advantages of blockchain like cryptographic establishments and straight forwardness to accomplish a successful plan for e-casting a ballot. This paper shows in detail the use of a blockchain framework to conduct voting.Executing a blockchain-based application which works on the security and diminishes the expense of facilitating cross country political election.

I. INTRODUCTION

With the rise in Digital Media and increasing security concerns it has become a need to change our voting system from medieval to modern block-chain based online systems.In every democracy, the security of an election is a matter of national security. The computer security field has for a decade studied the possibilities of the electronic voting system[1].Blockchain is one of the rising advances with solid cryptographic establishments empowering applications to use these capacities to accomplish versatile security arrangements. A Blockchain takes after an information structure which keeps up with and shares every one of the exchanges being executed through its beginning. It is basically a distributed decentralized data set that keeps a total rundown of continually developing and developing information records obtained from unapproved controlling, altering and updating. Blockchain Center Metadata,

reference and comparable papers at core.ac.uk Given by UWL Repository Permits each client to associate with the organization, send new exchanges to it, check exchanges and make new blocks.

E-voting is cheaper than the original Ballet voting and requires less manpower. It also saves crucial time and with increasing Covid cases it will be safer if E-voting is held in the country rather than classic ballet voting.

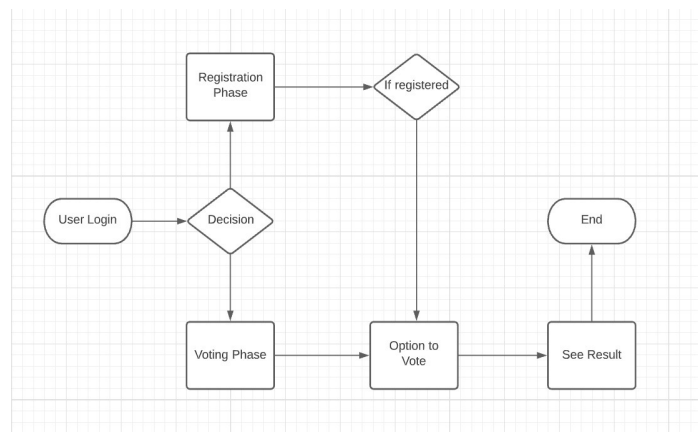
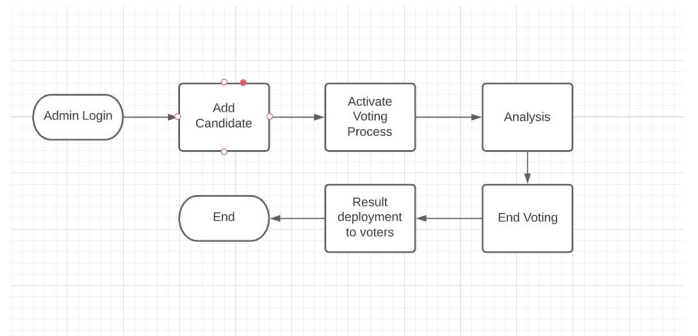
## II. LITERATURE SURVEY

To achieve a large number of turnout in the election process it is seen as converting the voting system from classic ballet system or Electronic-voting system to online. Due to this change even the citizens of the country residing outside their own country can vote and bring change in the democracy by taking part in the election process. But only 50-60% of the total population of India have access to the Internet[5].But by slowly and steadily changing these systems from offline to online these percentages can rise to a large number in India.

With the rise in Covid-19 and with the government implementing certain restrictions across the country, switching the voting system to a completely online phase considered a mammoth number of 912 million voters[6].

Observing these problems we saw blockchain as the solution to it.Blockchain is a new and emerging technology and it was difficult for us to work with it.There were many problems in implementing it.What we have created is just a prototype and it is for small scale voting process and for large scale voting process many changes would be required.The platform should be available across mobile and web.

## III. THE PRESENT INVESTING,DESIGNING AND IMPLEMENTATION



In this paper, we consider existing electronic voting systems, blockchain-based and evaluate their respective feasibility for implementing an e-voting system.In the following subsection we will start identifying the services to achieve our Goal.For implementing the blockchain we have used Ganache which is a local blockchain which can work on our own computer aside the main-net.

Ganache

ACCOUNTS

BLOCKS

TRANSACTIONS

CONTRACTS

EVENTS

LOGS

SEARCH FOR BLOCK NUMBERS OR TX HASHES

CURRENT BLOCK102

GAS PRICE2000000000

GAS LIMIT6721775

HARBONYMURGLACIER

NETWORK ID5777

RPC SERVERHTTP://127.0.0.1:7545

MINING STATUSAUTOMINING

WORKSPACELOUTISH-BEDROOM-DESIGN

SWITCH

MNEMONIC

tragic leg acoustic ostrich hill fiber borrow defense bamboo sadness train primary

HD PATH

m/44'/60'/0'/0'/account\_index

ADDRESS

0x5AF77E8609E14C4E0eAC26443E2c61eAd0b6B474

BALANCE

99.70 ETH

TX COUNT

76

INDEX

0

ADDRESS

0x234E8d9BA338f1F81B3229C834F1344948645388

BALANCE

99.99 ETH

TX COUNT

10

INDEX

1

ADDRESS

0xab830e883372887b971f71E8Fb09afC01A491253

BALANCE

99.99 ETH

TX COUNT

15

INDEX

2

ADDRESS

0xAd65D4cA7173F8910b2419758104a3253dfbd3Bc

BALANCE

100.00 ETH

TX COUNT

1

INDEX

3

ADDRESS

0xf24416B2E8B10858928b746DD5A124aEC8Dd9701

BALANCE

100.00 ETH

TX COUNT

0

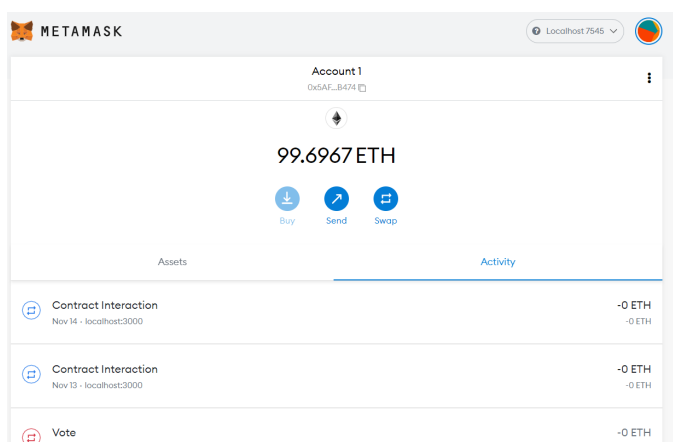
INDEX

4

The above given addresses are the required addresses to vote in the given voting-process.

- The first address is of the admin
- All the respective address below the admin is of the users,

This is the implementation of the blockchain. Now to interact with the blockchain we have used metamask. It is a medium to communicate with the block chain. It is a secure wallet and it also works with many other blockchain.



Now we have to write some contract to show how this blockchain would behave on giving a certain input. This behaviour is defined in Smart contracts which is written in solidity. It also defines the transaction mechanism of the blockchain. These are the codes for our smart contract.

```
// SPDX-License-Identifier: MIT
pragma solidity ^0.8.0;
contract Election{

    struct Candidate{
        uint id;
        string name;
        string party;
        string age;
        string description;
        string qualification;
        uint votecount;
    }

    uint public candidatesCount;
    mapping(uint=>Candidate) public candidates;
    mapping(address=>bool) public votedornot;
    address[] public voters;
    address public owner;
    string public phase;
    uint public accountindex = 0;

    event electionUpdates(uint _id);

    constructor(){
        owner = msg.sender;
        phase = 'Registration';
    }

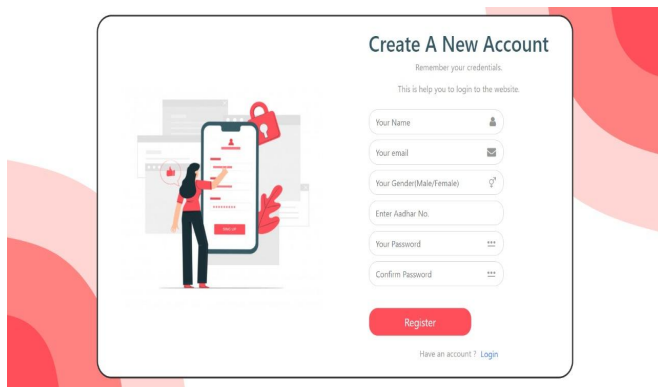
    modifier ownerModifier{
        require(msg.sender == owner,"only owner can add candidates");
        _;
    }
}
```

The following smart contract defines the candidate information and defines the required functions. While array is for the voters who are successfully registered.

```
function Vote(uint _id) public{
    require(!votedornot[msg.sender],"You Can Only Vote Once!!!");
    require(_id>=0 && _id<candidatesCount,"Invalid Candidate id");
    candidates[_id].votecount++;
    voters.push(msg.sender);
    votedornot[msg.sender]=true;
    emit electionUpdates(_id);
}
```

This snippet of code defines the main logic behind the voting and implementing it to the blockchain.

This is the website page for the user to register.



### Create A New Account

Remember your credentials.  
This is help you to login to the website.

Your Name

Your email

Your Gender(Male/Female)

Enter Aadhar No.

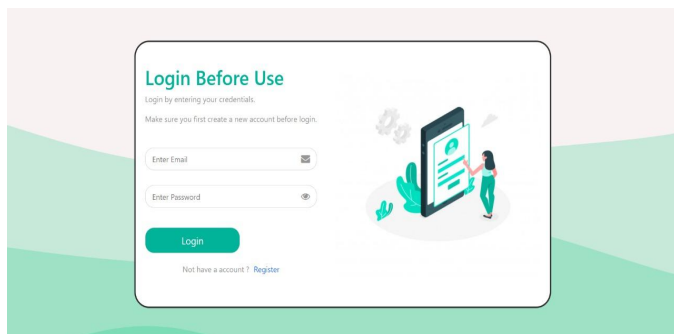
Your Password

Confirm Password

**Register**

Have an account? [Login](#)

Now this is the login-page for the registeredUser to login.



### Login Before Use

Login by entering your credentials.  
Make sure you first create a new account before login.

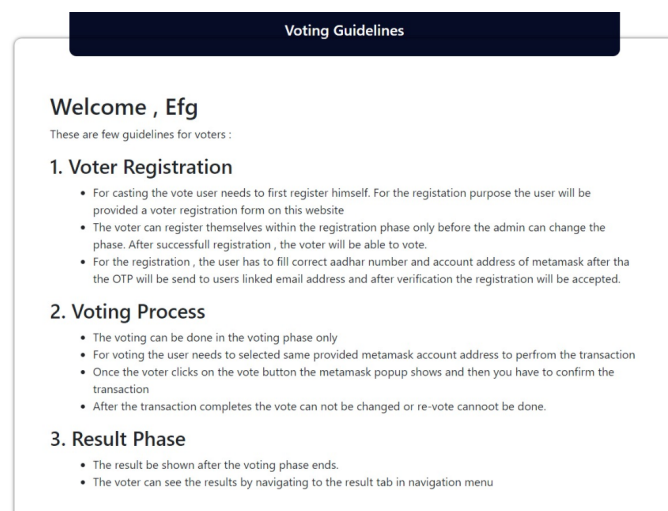
Enter Email

Enter Password

**Login**

Not have an account? [Register](#)

After this the User would be directed to the Guidelines for voting in detail:



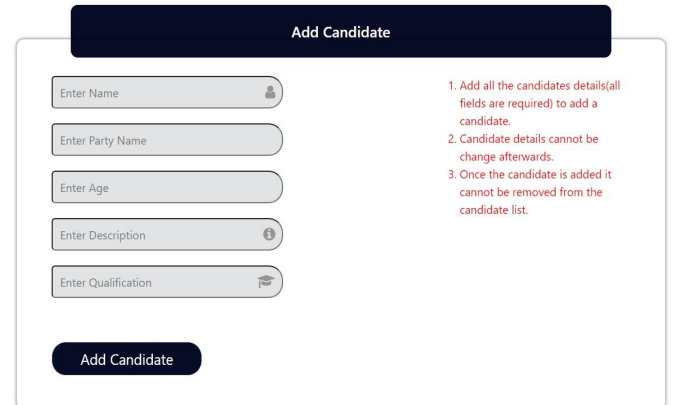
### Voting Guidelines

**Welcome , Efg**

These are few guidelines for voters :

- 1. Voter Registration**
  - For casting the vote user needs to first register himself. For the registration purpose the user will be provided a voter registration form on this website
  - The voter can register themselves within the registration phase only before the admin can change the phase. After successful registration , the voter will be able to vote.
  - For the registration , the user has to fill correct aadhar number and account address of metamask after the OTP will be send to users linked email address and after verification the registration will be accepted.
- 2. Voting Process**
  - The voting can be done in the voting phase only
  - For voting the user needs to selected same provided metamask account address to perform the transaction
  - Once the voter clicks on the vote button the metamask popup shows and then you have to confirm the transaction
  - After the transaction completes the vote can not be changed or re-vote cannot be done.
- 3. Result Phase**
  - The result be shown after the voting phase ends.
  - The voter can see the results by navigating to the result tab in navigation menu

Now switching to the admin account.After logging in using the admin Credentials admin will login to add the candidate for voting.



### Add Candidate

Enter Name

Enter Party Name

Enter Age

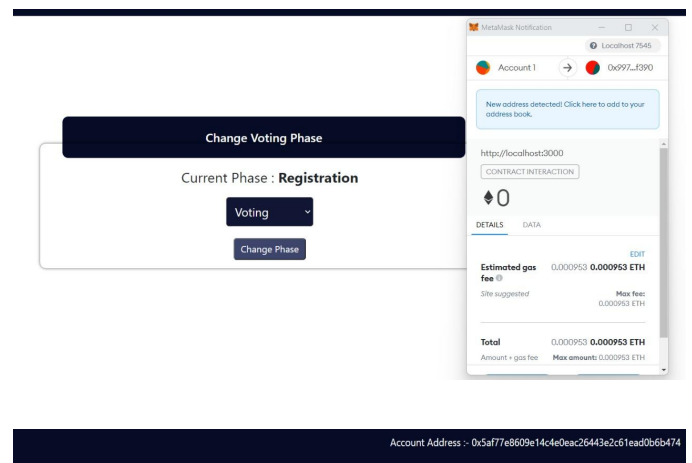
Enter Description

Enter Qualification

**Add Candidate**

1. Add all the candidates details(all fields are required) to add a candidate.
2. Candidate details cannot be change afterwards.
3. Once the candidate is added it cannot be removed from the candidate list.

Now for changing the phase to voting this is the page made using simple basic UI:



### Change Voting Phase

Current Phase : **Registration**

**Voting**

**Change Phase**

Metamask Notification

Account 1

New address detected! Click here to add to your address book.

http://localhost:3000

CONTRACT INTERACTION

DETAILS DATA

Estimated gas 0.000953 0.000953 ETH

Fee 0

Site suggested

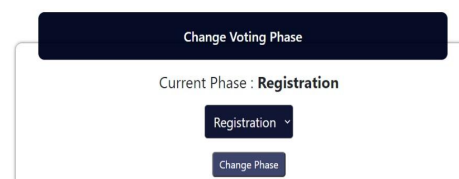
Max fee: 0.000953 ETH

Total 0.000953 0.000953 ETH

Amount + gas fee Max amount: 0.000953 ETH

Account Address :- 0x5af77e8609e14c4e0eac26443e2c61ead0b6b474

Now the user will vote on this page:



### Change Voting Phase

Current Phase : **Registration**

**Registration**

**Change Phase**

User Vote

PQR

this is description of pqr

Party : pqr

Age : 19

Qualification : b.tech

index :- 0

Vote

EFG

this is description of efg

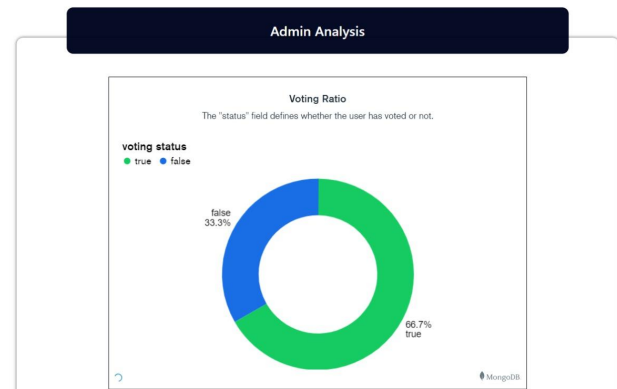
Party : efg-party

Age : 21

Qualification : b.tech-efg

index :- 1

Vote



To vote the following Metamask popup will open up and after confirming the required information the vote will be counted and the block will be added to our blockchain network.

User Vote

PQR

this is description of pqr

Party : pqr

Age : 19

Qualification : b.tech

index :- 0

Vote

EFG

this is description of efg

Party : efg-party

Age : 21

Qualification : b.tech-efg

index :- 1

Vote

Account 1 → 0x997J390

New address detected! Click here to add to your address book.

https://localhost:3000

0

DETAILS DATA

Estimated gas fee: 0.002353 0.002353 ETH

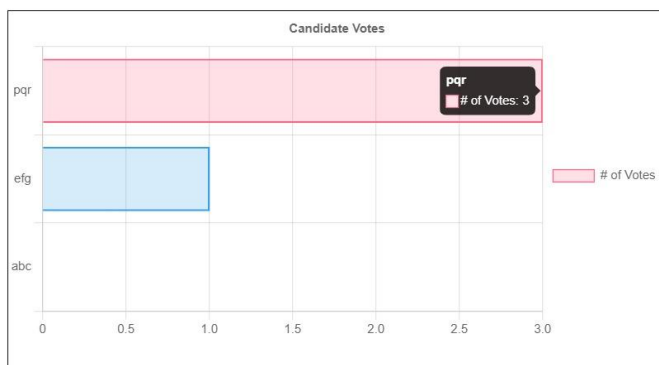
Max fee: 0.002353 ETH

#### IV. RESULTS AND DISCUSSIONS

The above implementation of e-voting with blockchain shows how voting can be held successfully and even cheaper and easier than that in the older times. This method is by far successful as it achieved the basic functionality of voting and thus adding required features of security and confidentiality.

This system will remain faultfree until anyone finds a loophole in it. The security can be further achieved by implementing facial recognition using AI and ML frameworks.

Now the admin will change the phase from voting to result and the user can see this on the result page on the site.



And the Outcome would be shown as follows:

#### V. CONCLUSIONS AND FUTURE WORK

The idea of shifting to an electronic voting system makes elections easier ,faster, cheaper and more reliable in this technological world . Electronic voting makes democracy stronger and the whole electoral process becomes fair with an increase in voter turnout. In this paper we have used blockchain based electronic voting which uses smart contracts to make the electoral process more safe and secure. Using an Ethereum private blockchain, it is possible to send hundreds of transactions per second onto the blockchain, utilizing every aspect of the smart contract to ease the load on the blockchain. Along with quicker results, fewer errors, better informed electors and reaching a younger demographic of first time or occasional voters, the electronic voting method has the potential to become the norm in an election[2].

It is just a prototype and this can be implemented for large scale and with coming times E-voting will be implemented in India in the coming years.

#### Acknowledgement

We would also like to thank our mentor Dr. Antriksh Goswami for providing us guidance in the correct direction, and also giving us knowledge in the new field. We are in debt to him it would not have been possible without him. He is extremely supportive.

#### REFERENCES.

[1] Schembra Allie. TOP-TO-BOTTOM REVIEW OF ELECTRONIC VOTING SYSTEMS CERTIFIED FOR USE IN CALIFORNIA ELECTIONS

[2] Hreiðarsson and Friðrik Þ. Blockchain-Based E-Voting System-”<https://skemman.is/bitstream/1946/31161/1/Research-Paper-BB-EVS.pdf>”

[3] MetaMask Docs: Introduction

[4] Ganache | Overview | Documentation.

[5] • Total internet users in India

[6] 2019 Indian general election