Department of Computer Science & Engineering
ABES Engineering College, Ghaziabad, UP

FINAL PROJECT PRESENTATION

B.Tech 4th Year / B

76

Mentor

Ms. Sandhya Avasthi

Team Details

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Online E-Voting System

"Decentralized E Voting with Smart Contracts"

Domain: Web Development & Cybersecurity

Problem Description

Large Number of Voters

India is second largest country in terms of Population with Multi – Party System. Conducting election is a quite large task in India that require Lakh of Crores so that Our Project enables to Conduct* elections online that reduces Amount Requires.
* Large Level

Improper Medium of Voting

In the recent times medium of voting is one of the major issues which includes conduction of free & fair election The most commonly medium of voting are:

Ballot paper

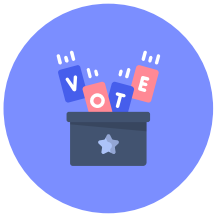
Ballot Paper requires large amount of paper consumption

Electronic Voting Machine

EVM Lacks People Trust

(i) Motivation

The motivation for taking the next step towards a more decentralized voting structure comes from having a huge increase in the number of people and entities that have a vested interest in a particular outcome.

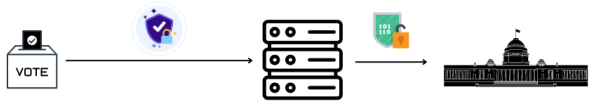


(ii) Project Objective

To develop a trustworthy Secure Electronic Voting Solution that hides drawbacks of traditional voting medium and should be cost effective and free from any types of amendments and are highly secure.

(iii) Scope of the Project

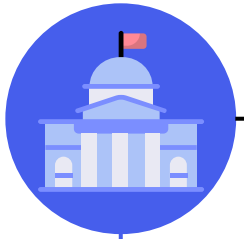
As you all know election like Govt. Elections, Polls, Society Elections plays a crucial role in judging a person based on the opinion of another person. In this case online election system are very useful with the help of this system users can cast their votes online which in immutable, highly secure and does not require additional setup and saves money too.



Traditional Voting System - EVM

Blockchain Voting System

Project Overview

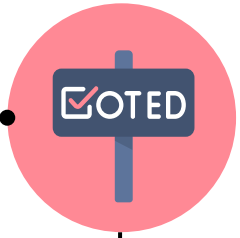


1

Admin Section

The Services available to admin are:

- Voter Addition and New Voter Form Approval
- Generate Voter Card
- Election Management
- Results Management



2

Voter Section

The Services available to user are:

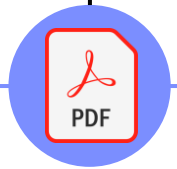
- New Voter Enrollment
- Election View
- Vote Cast
- Access Voter Card
- Complaints & Queries

Project Technical Features

Alerts

Alerts using Email as well as SMS

1



PDF Generation

This Project support PDF generation for Voter ID

2

Time Bound Session

Voter Section for Only 15mins

3

3- Tier Diagram

Separate Client Server Architecture

4

24 * 7

Available 24 * 7

5

Research Paper

A Secure Decentralized E-Voting with Blockchain
&
Smart Contracts

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Abstract— As with the advancement of modern digital society the Online trend is getting acceleration with this advancement certain security and authenticity issues has generated which can be overcome by using one of the latest and trending technology Blockchain and Smart Contracts. With the popularity of Crypto Currencies, Blockchain is also used for E-Voting Purposes. A democratic election is a pivotal act in any country which decides the future of that country for a particular term. Some of the old menas of voting like Ballot Paper and EVM (Electronic Voting Machine) has their drawback like transparency, low voter turn-out, votes tempering, and many more. As with the advancement of modern digital society, the online trend is getting accelerated, which further creates security and authenticity issues. The issues found in the Ballot system or EVM can be easily overcome by Blockchain technology and Smart Contracts. Electronic Voting powered by Blockchain & Smart Contracts takes the miles over these old menas of a voting system which securely delivers the results in less time and cost. With E-Voting using Blockchain costs can be reduced, the need for Polling stations and the use of resources like EVM, Ballot Paper can also reduce as well as security can also be enhanced by providing End to End Encryption and authenticity. This blockchain-powered e-voting can easily gain trust as the transaction is transparent, and immutable as well as not easily be changed once hosted due to smart contracts. The proposed method is a MERN-based web Application with lots of enhanced methods for authentication and authorization that can be achieved using OTP Verification and face verification. This voting data is stored in the form of a transaction stored in a Blockchain-based ledger through Smart Contracts to enhance security features.

Keywords— Blockchain, Electronic Voting, EVM, End to End Encryption, smart contracts, SHA

I. Introduction

Election plays an important role in a large Democratic country like India. In a country such as India where a large section of the marginalized population is illiterate or ignorant, election officials must read paper ballot signatures or thumb impressions to determine the legality of votes. Votes from vulnerable populations are effectively discarded because they are riddled with inaccuracies. EVM technology ensures that these groups vote in elections and that their ballots are counted correctly. But EVM has its challenge. That's why this issue arises which includes Votes Tempering, polling booth capture, EVM hacking, and votes Manipulation [1,2,3]. These problems were captured in the traditional way of voting and by the means of this advanced System, we tried to take meals over them. Online Voting is the latest trend comprised of the conduction of election or poll voting that makes the work of voting easier and fast.

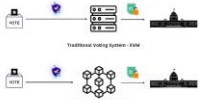
When utilized in elections, electronic voting methods must be legal, accurate, safe, and convenient. However, adoption may be hampered by potential issues with computerized voting systems. To solve these concerns, blockchain technology was developed, which includes decentralized nodes for electronic voting. It is used to create electronic voting systems due to the benefits of end-to-end verification. This system is an excellent solution for traditional electronic voting methods due to its distribution, non-repudiation, and security properties. This E-Voting powered by Blockchain enables to cast votes online with the power Blockchain which enhances the security, authenticity, and end-to-end encryption of voting records such that Nobody can change or temper the records[4,5]. These records are stored in a decentralized manner such that all the information is shared with each node connected in the network and if any changes occur in data that this information is shared with every node. Our Tool or Application enables Citizens to cast votes authorized by Admin without going to polling Booths which reduces election costs and increases voting percentage.

1.1 Problem Background

Elections are conducted from ancient times when kings were chosen by voting from the People and the Ministers of the King come to vote for a decision. But in the present time the two most commonly used mediums of voting are:

- Ballot Paper
- E V M (Electronic Voting Machine) Voting

The *Ballot Paper Mode of Election* has drawbacks like Votes Tampering/Manipulation, Polling Booth Capture, and requires physical presence and need large amounts of funds for the conduction of the election. On the other side, the *EVM Mode of Election* can be Hacked and tampered with easily due to this it does not gain voters' trust.



Traditional Voting System - EVM

Blockchain Voting System

Fig 1: Comparison b/w EVM and Blockchain Mode of Voting

After going through the drawbacks of old mediums of voting we proposed an E-Voting System which reduces these drawbacks.
The main objectives of this research are to make a step forward in direction of online voting by providing ways that compensate limitations of old voting mediums and provide an isolated way free from any type of dangers. As you all know elections like Govt. Elections, Polls, and Society Elections play a crucial role in judging a person based on the opinion of another person. In this case, online election systems are very useful with the help of this system users can cast their votes online which is immutable, highly secure and does not require additional setup, and saves money too.

II. Literature Review

A recent study discovered that the traditional voting procedure was not sanitary, raising questions about justice, and equality and the people's will not be sufficiently defined and comprehended in the structure of democracy [6-8]. Follow my vote is a Decentralized E-Voting using Blockchain System but it does not provide immediate results (provides results after 48hrs of completion of the election) Voters have no Unique ID Card to vote and it is costly and has no central authority and it has also a limitation i.e. Once votes are voted incorrectly then it is counted as Invalid and this process is called as "kill-switch" [9]. As per this Paper, a new hashing Algorithm was introduced which increases user security and it also introduces some concepts of Block-sealing and block creation.
New voting procedures have been developed by engineers around the globe that protect against fraud while maintaining the integrity of the voting process. New electronic voting methods and procedures have been made possible by technology, and these are crucial and have caused serious problems for the democratic system [9]. Compared to human polling, electronic voting increases the reliability of elections. Comparing it to conventional voting methods, it has improved the voting process's efficiency and integrity [10]. Electronic voting is often utilized in a range of decisions because it is flexible, simple to use, and inexpensive compared to general elections [11]. Despite this, modern electronic voting methods have limitations in terms of basic voting fairness, privacy, secrecy, anonymity, and transparency due to their susceptibility to abuse of power and manipulated details. A framework is suggested in this System which used hashing method [10]. In this paper, Security analysis has been done on real India EVM (Electronic Voting Machine). As per the result, EVM can be tempered in many ways such as tampering with software before CPU Manufactures that violate votes [11]. The proposed voting system has no requirements for Hardware usage thus eliminating the disadvantages of EVM.

III. Proposed Methodology

A system with high security and accessibility is proposed, that is a MongoDB, ExpressJS, ReactJS, NodeJS (MERN) Based Web Application where the Voter first Signs up itself using the Sign-Up Form. Registration is confirmed after OTP Verification through E-Mail. After Completing registration voter will receive Welcome Mail after that voter can login into their account as it is a first-time voter then the System will tell the voter for 1st Time Voter Registration the voter can fill it a registration form and submit it then the user will receive an Application ID once the ID is approved by Admin then Voter ID no is shown into its profile and Voter can also download their Voter Card.

The admin can also register a voter and approve a voter. Admin can create an election by choosing the candidates and a proper duration after the successful hosting of the election voter will receive an email telling them about the election and the proper timing of voting then voters can log in to their account and choose election and then voter. The voting process is verified using OTP over Email and Face Authentication.

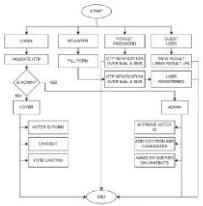
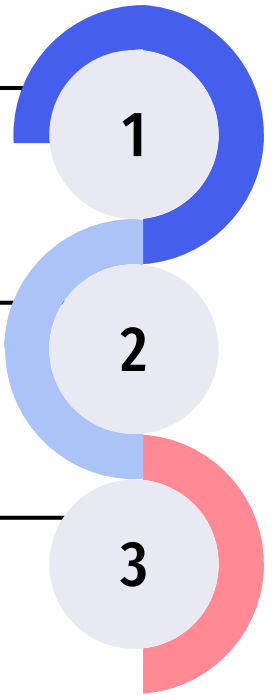


Fig 2: Flowchart with Functions

After Successful voting, Voter will receive a thank you mail from the System, and at the proper time of the vote all the voter information is kept secure i.e. The Voter Chosen Candidates are not stored in the database.
This Voting transaction is stored in the form of an immutable ledger known as Blockchain and with Smart Contracts.

+ 4 More Pages

(Published)



Research Paper Progress

Status

Published

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Organized at: Amity University, Noida

Publication Details

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DOI No.: 10.1109/Confluence56041.2023.10048871

Research Paper Publish Pages

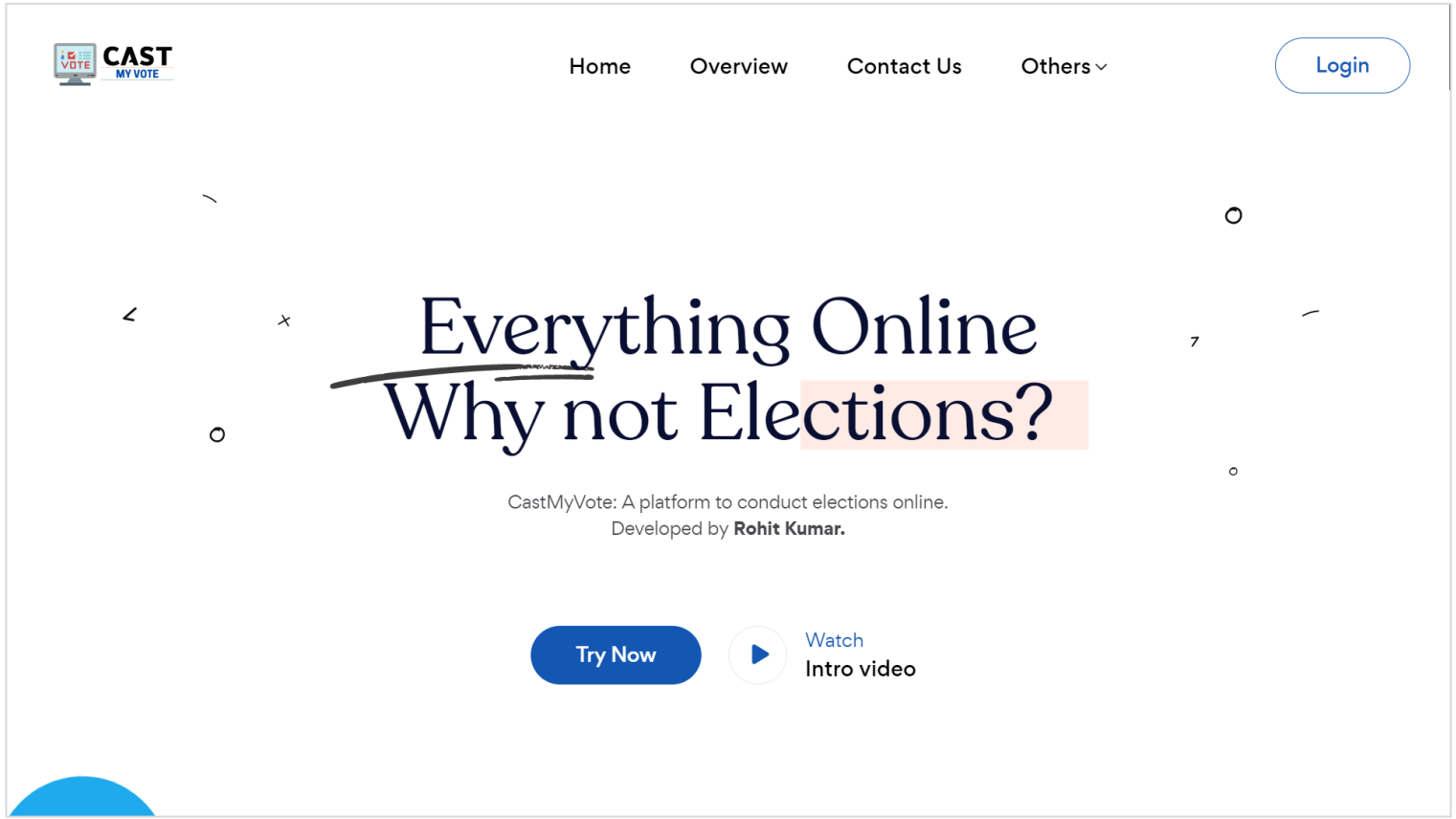
A Secure Decentralized E-Voting with Blockchain & Smart Contracts

Rohit Kumar ; Lavi Badwal ; Sandhya Avasthi ; Ayushi Prakash All Authors

Abstract:

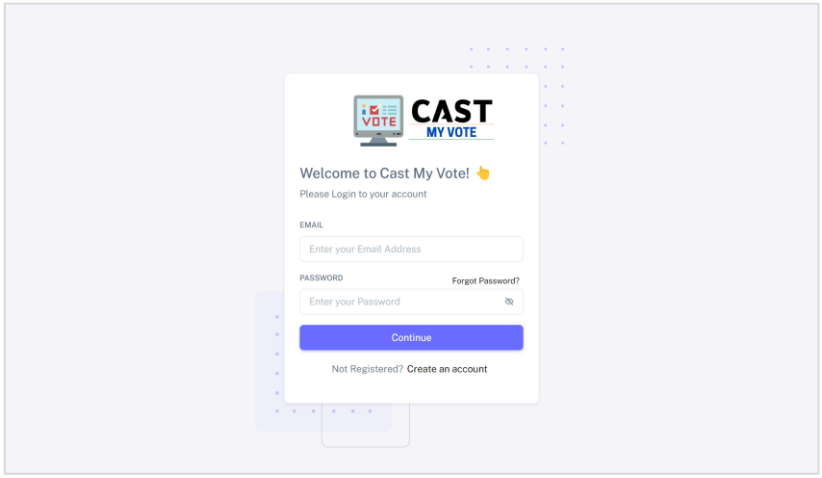
A democratic election is a crucial act in each nation, as it determines the country's future for a specific term. Some of the older voting methods, such as Ballot Paper and EVM (Electronic Voting Machine), have disadvantages such as lack of transparency,

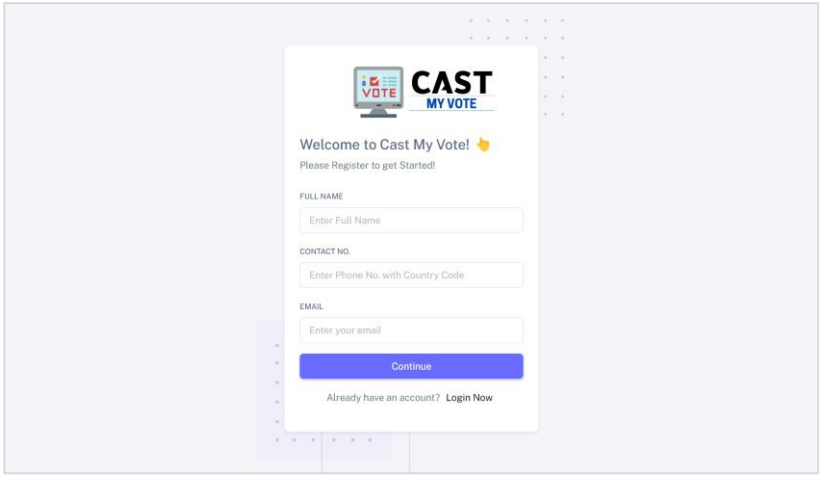
Snapshots (Landing Page)

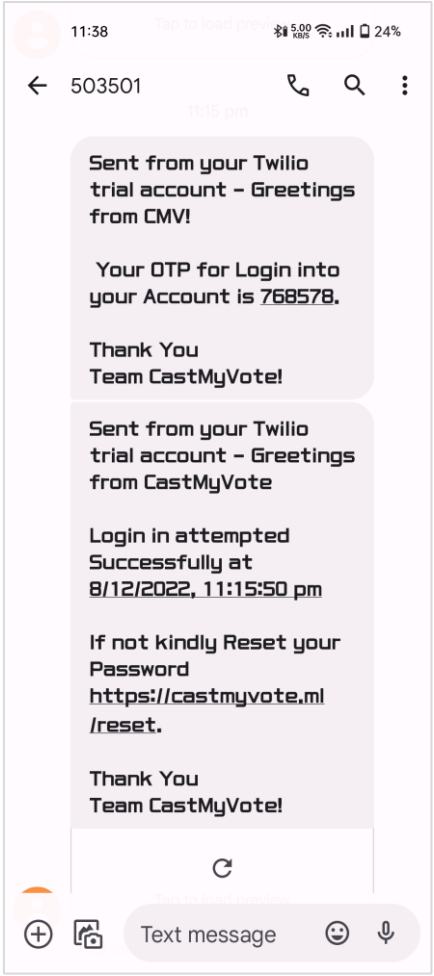


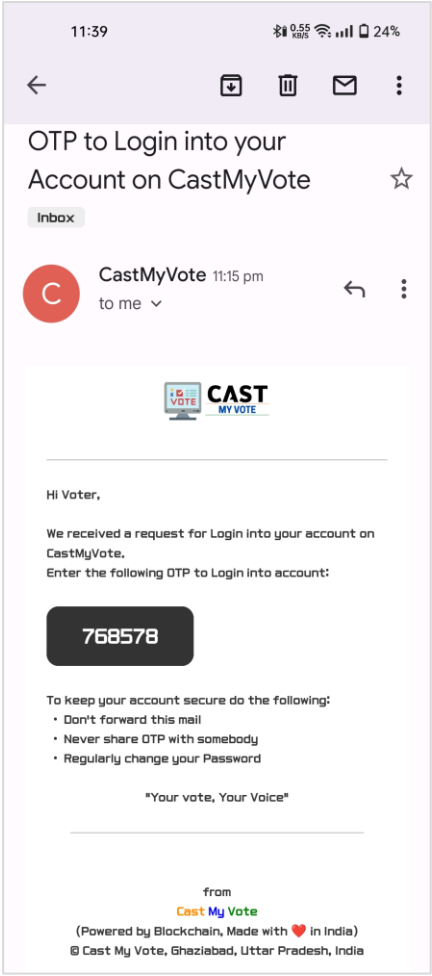
Snapshots (Home Page)

Snapshots (Auth Page)

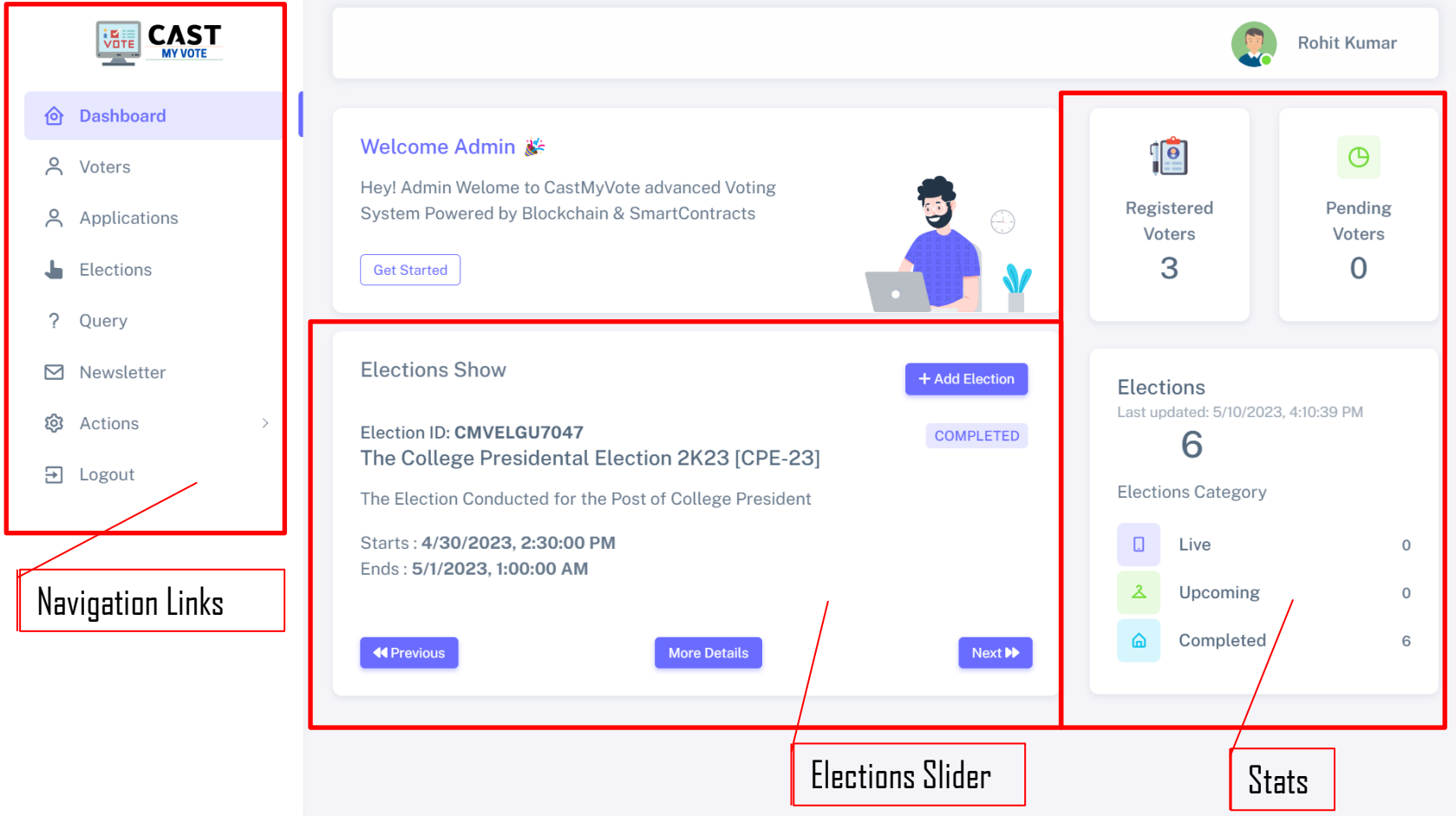








Snapshots (Admin)

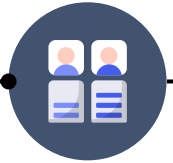


New Voter Registration

Signup by Voter

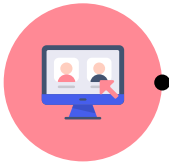
User can signup by using Name, Email, Phone and Password

OTP Validation



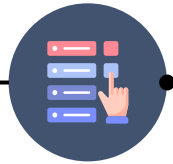
New Voter Registration

User can submit the form for New Voter



Vote Casting

After all User is allowed to cast their votes.



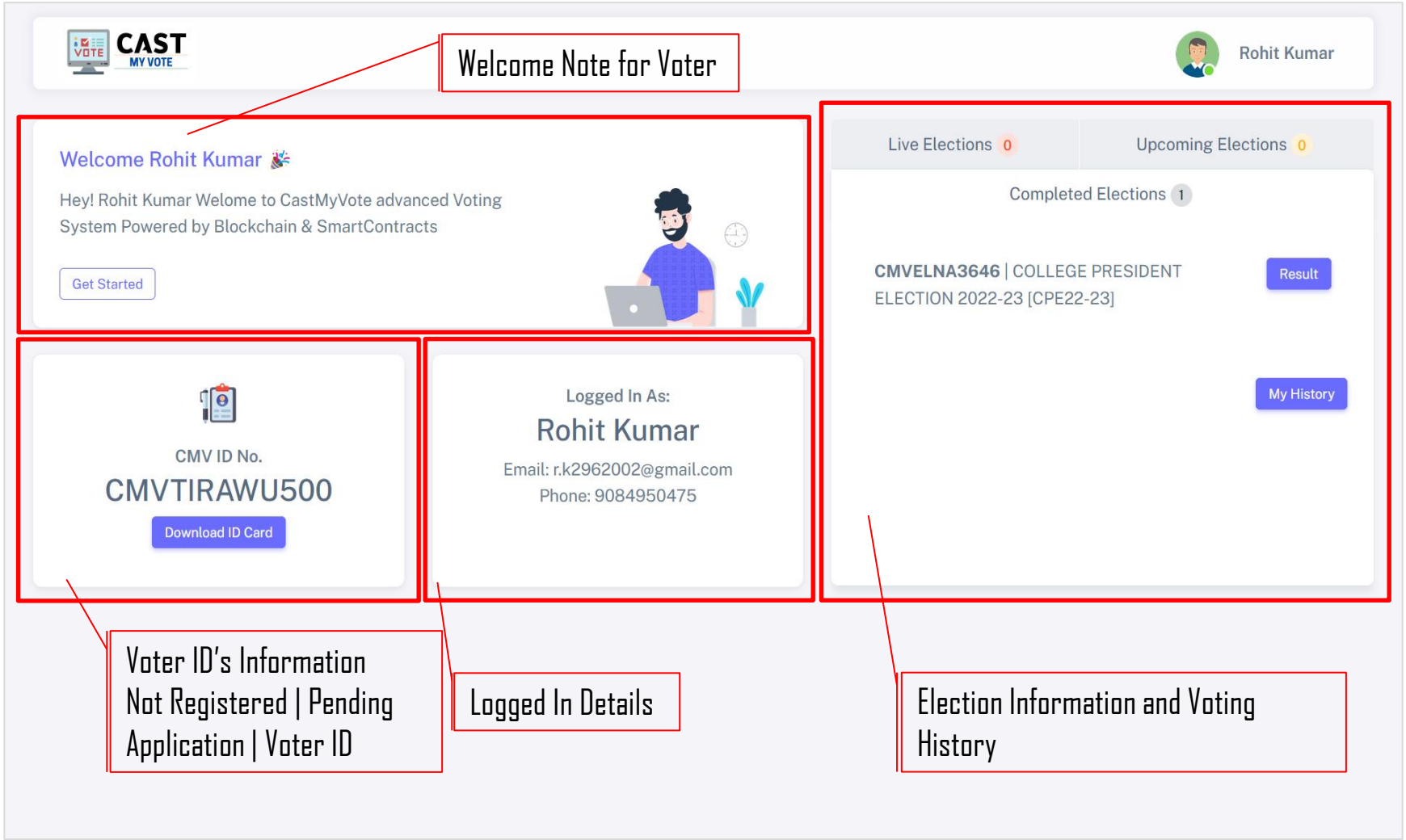
Voter ID Card Generation

Once Admin approve the Voter then Voter ID is generated and send to user over Email

Wait for Admin Approval

User can wait for Admin Approval

Snapshots (Voter)



Snapshots (Ballot)

CAST MY VOTE

Rohit Kumar

Home / Election / **CMVELNA3646**

CMVCDDA8361
Rohit Kumar
(RKP)

CMVCDWI8152
Lavi Badwal
(LBP)

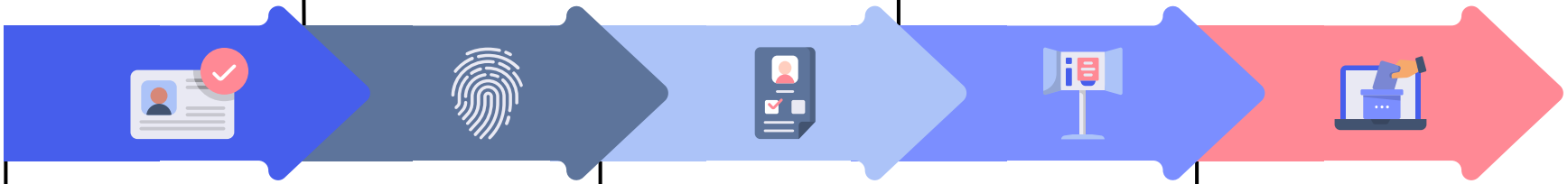
List of Candidates with
Election ID, Photo, Election Symbol, Name and Party Name

Election Details

Election Details

Election ID	CMVELNA3646
Election Details	COLLEGE PRESIDENT ELECTION 2022-23 [CPE22-23]
Description	ELECTION CONDUCTED FOR THE POST OF COLLEGE PRESIDENT FOR THE SESSION
Ends	12/16/2022, 11:59:00 PM

Voting Process for Voter



Login & Validate

Voter can first Login with OTP verification (OTP is shared over Email & Phone)

Check for Voter ID

Voter ID is checked if Voter has ID Card then permit vote else New Voter registartion

Choose Election

Voter can choose live election

Candidate Select

Voter Can choose candidate

Vote Submission

Vote can be submitted to database after submission.

Snapshots (Result)

CAST MY VOTE

Rohit Kumar

Home / Election / CMVELNA3646 / **Results**

Election Details

Election ID	CMVELNA3646
Election Details	COLLEGE PRESIDENT ELECTION 2022-23 [CPE22-23]
Description	ELECTION CONDUCTED FOR THE POST OF COLLEGE PRESIDENT FOR THE SESSION
Ends	12/14/2022, 11:59:00 PM

Winner

CMVCDDA8361
Rohit Kumar
(RKP)
Votes: 1

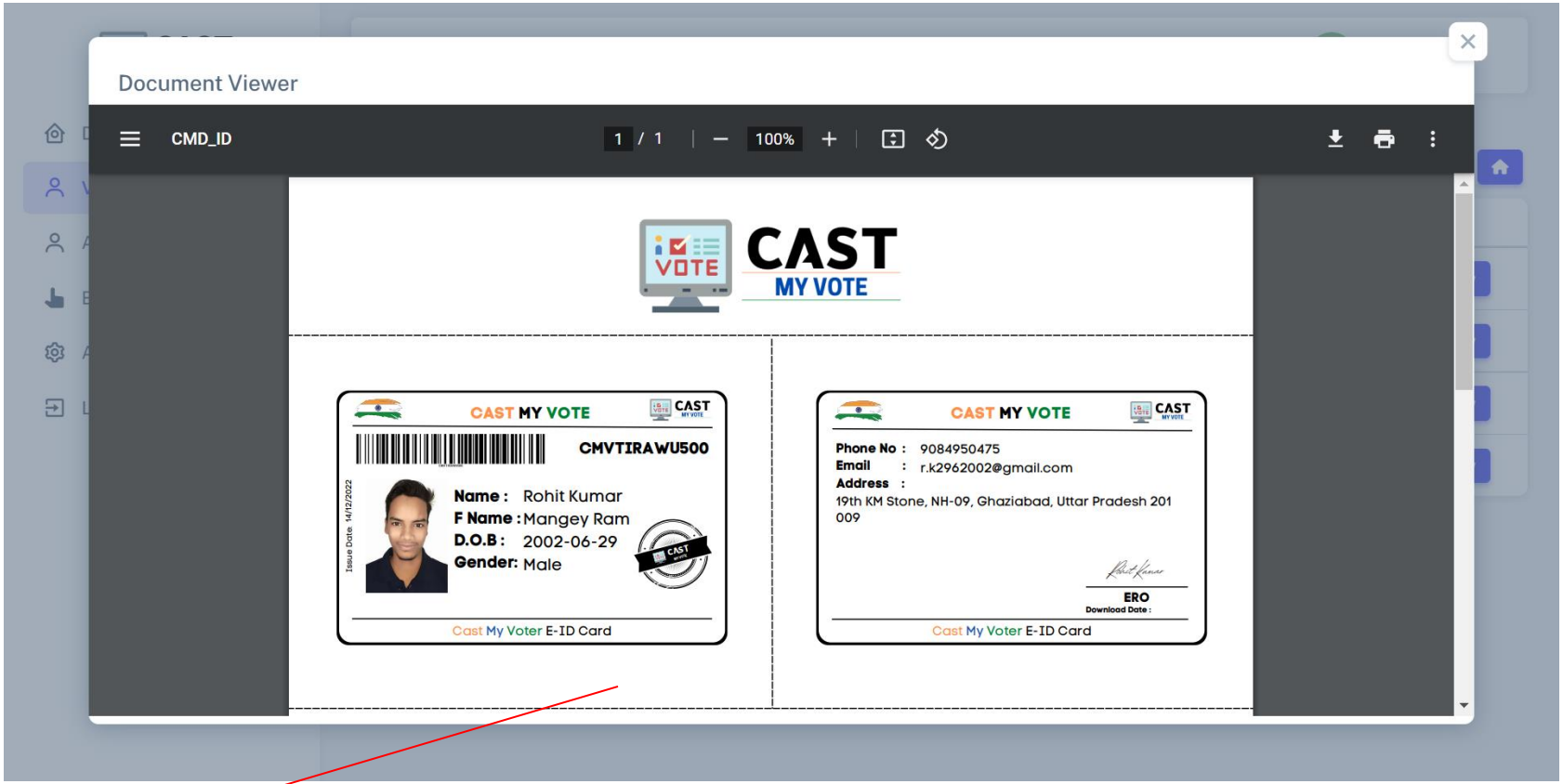
1 CMVCDDA8361
Rohit Kumar
(RKP)
Total Votes: 1

2 CMVCDWI8152
Lavi Badwal
(LBP)
Total Votes: 0

List of Candidates in Descending order on No of Votes

Election Information with Winner

Snapshots (Voter ID)



Voter ID Card generated after approval from Admin
Generated using PDF Lib pdf Library , Stored in AWS S3
Send over mail after generation and Available in user dashboard

Snapshots (Election Report)

CAST MY VOTE

- Dashboard
- Voters
- Applications
- Elections
- Query
- Newsletter
- Actions
- Logout

Home / Election / CMVELGU7047 / **Report**

CAST MY VOTE

Election Report

Election Information

Election ID	CMVELGU7047
Election Details	The College Presidental Election 2K23 [CPE-23]
Description	The Election Conducted for the Post of College President
Ends	5/1/2023, 1:00:00 AM

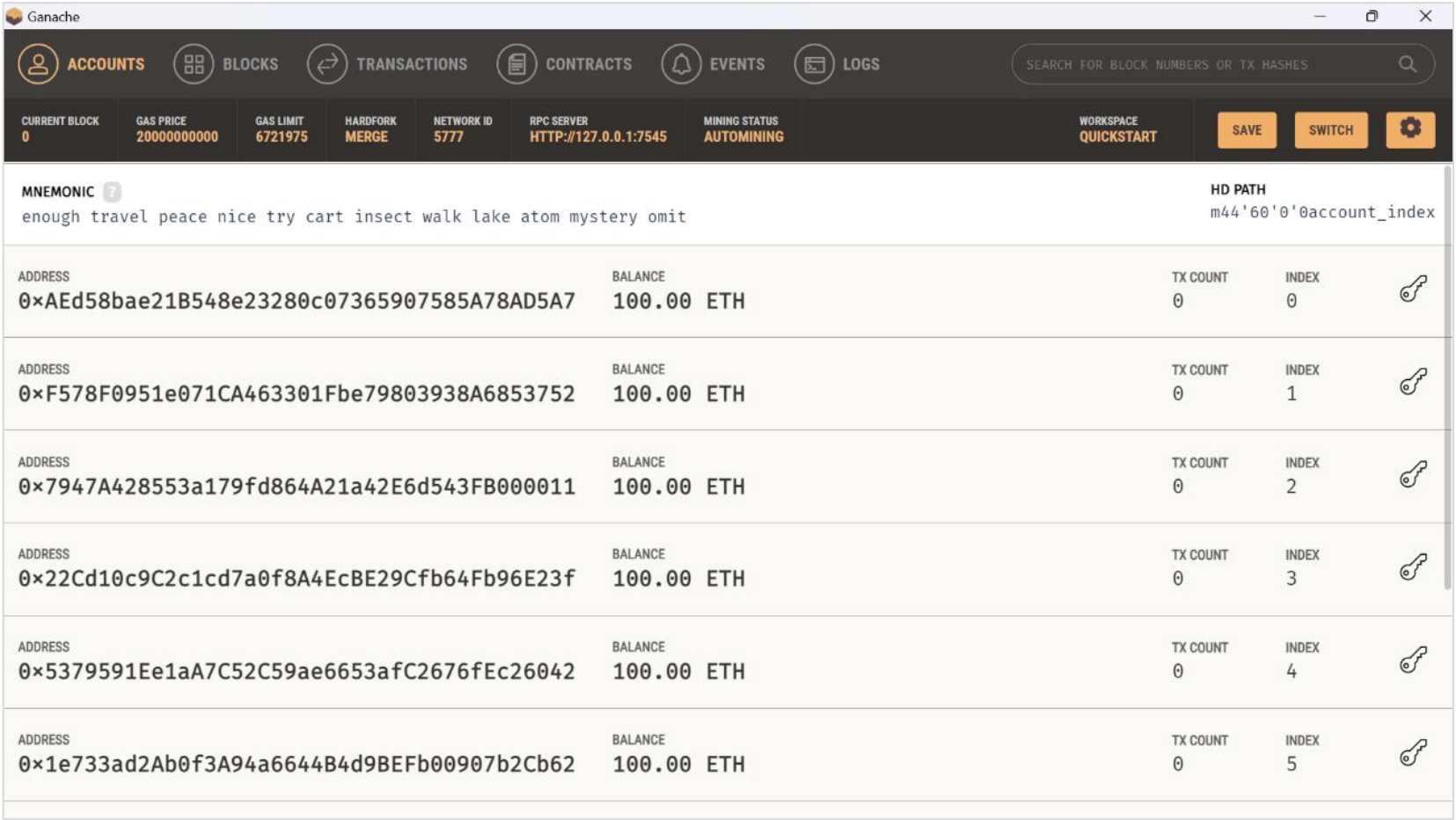
Election Details

Status	Completed
Starts	4/30/2023, 2:30:00 PM
Ends	5/1/2023, 1:00:00 AM
Total Votes	60

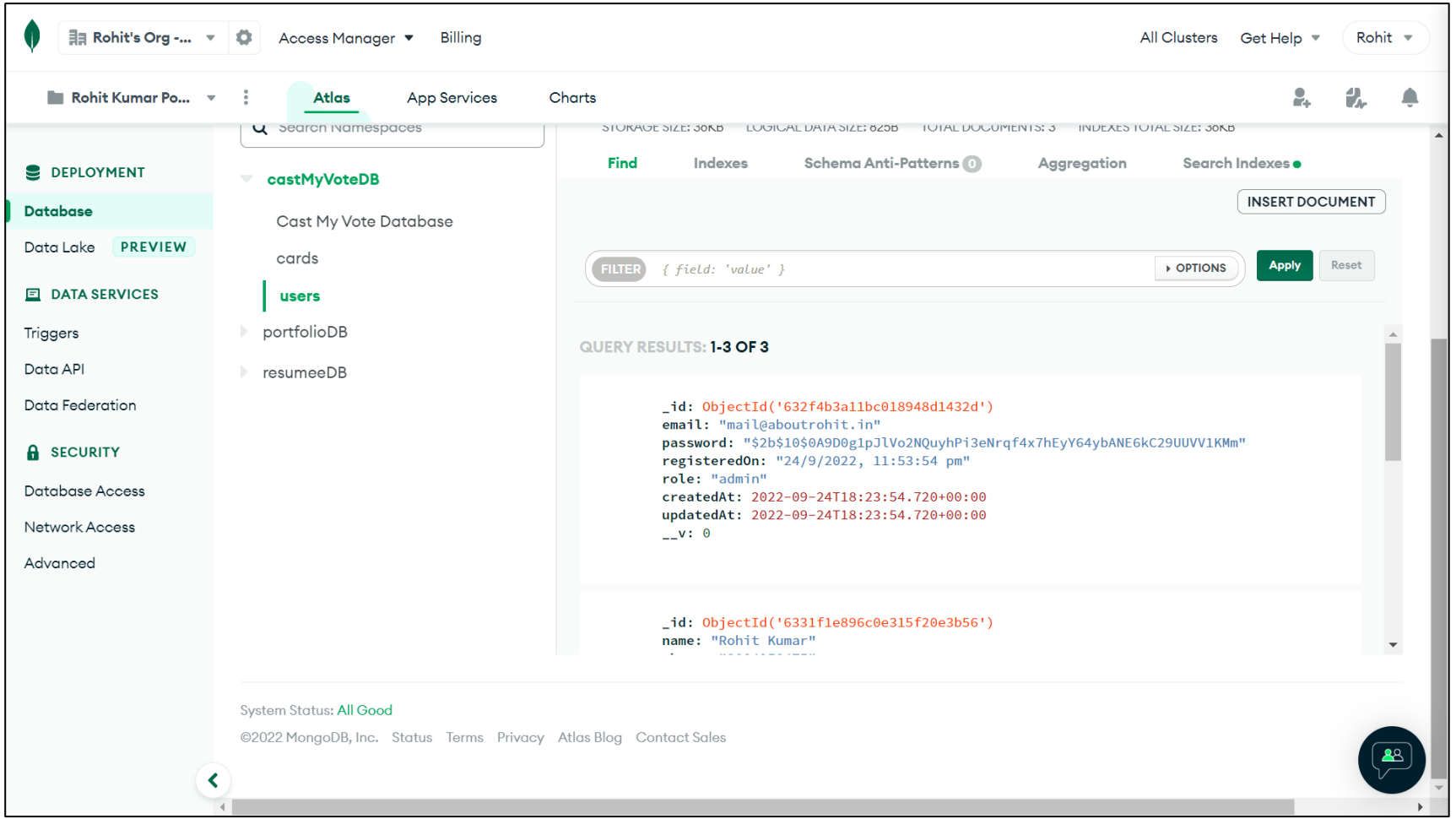
List of Candidates & Winner

S NO.	CANDIDATE ID	CANDIDATE NAME & PARTY	VOTES	PHOTO	SYMBOL
1 WINNER	CMVCDDA8361	Rohit Kumar (RKP)	5		
2	CMVCDWI8152	Lavi Badwal (LBP)	25		

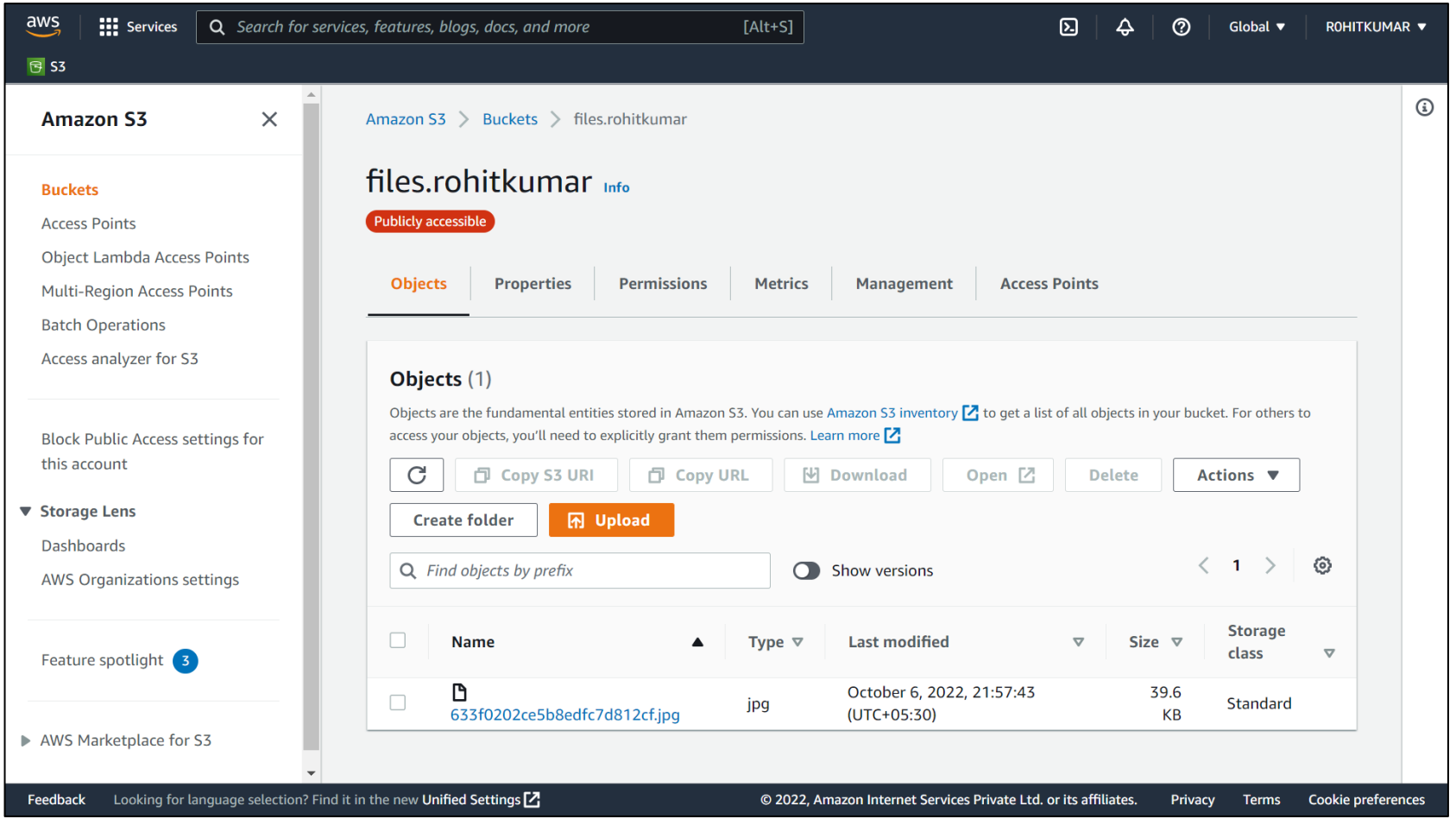
Snapshots (Ganache)



Snapshots (MongoDB)



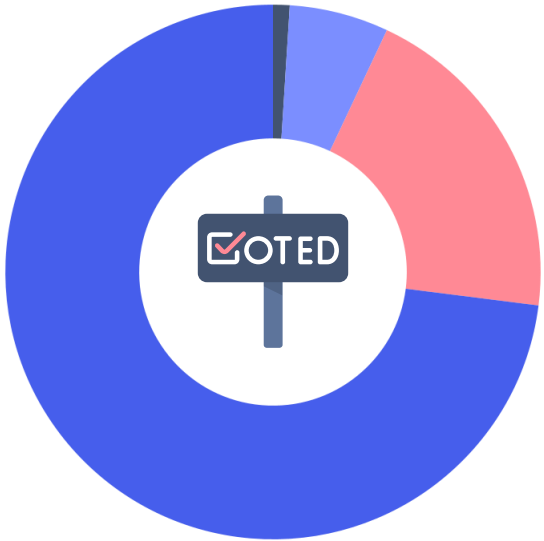
Snapshots (AWS S3)



Project Progress

Completed

- Setting Front-End & Back-End
- User & Admin Authentication with Email OTP
- New User Enrollment
- Profile Management
- Voter Approval
- Creation of Election
- Generation of Voter Card
- Results Management
- Hosting of Frontend and Backend



Yet to done

Updates based on Requirements

Related Previous Works

Parameter	Our Application	Follow my Vote	NSDL eVoting System	Pollice
Decentralized	✓	✓	×	✓
Specific Groups	×	×	✓	×
Immediate Result	✓	×	×	×
Voting ID	✓	×	×	×
Free	✓	×	×	×
Central Authority	✓	✓	✓	✓

Hardware Requitements

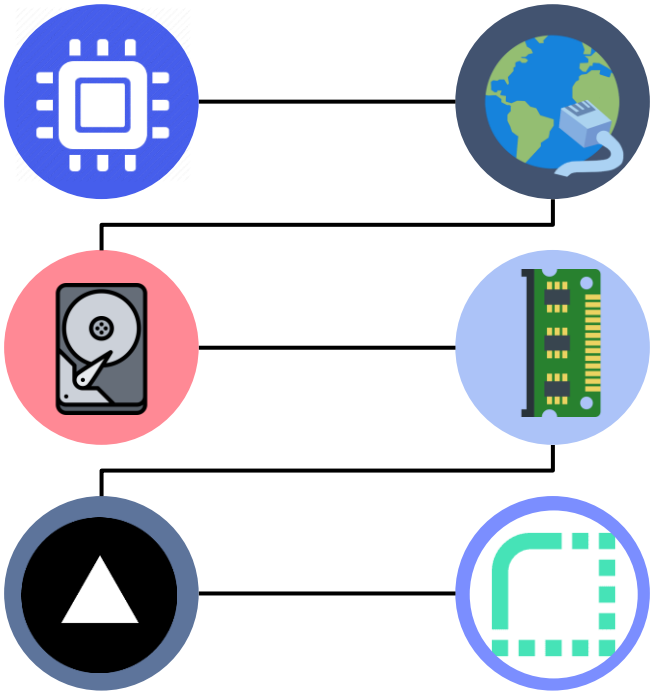
This Basic Hardware Required to develop and run this trustworthy system are:

Processor

Minimum 1.6 GHz; Recommended 2GHz or more

Internet Connection

Ethernet connection (LAN) OR a wireless adapter (Wi-Fi)



Hard Drive

Minimum 32 GB; Recommended 64 GB or more

Memory (RAM)

Minimum 1 GB; Recommended 4 GB or above

Frontend Hosting

Recommended Online Hosting like Vercel, Firebase, GitHub Pages, Firebase etc.

Backend Hosting

Recommended Online Server with NodeJS Environment like Localhost, Heroku, Cyclic etc.

Software Requirements

Operating System

OS X El Capitan (10.11+)
Windows 8.0, 8.1 and 10, 11
Linux (Debian): Ubuntu Desktop 16.04, Debian 9
Linux (Red Hat): Enterprise, CentOS 7

Web Browser

Latest version of Google Chrome, Microsoft Edge, Safari, Mozilla Firefox etc.

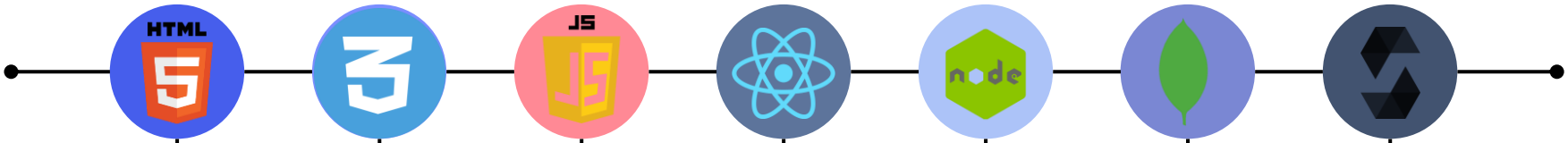
Code Editor

Recommend VS Code by Microsoft

Others

Git or GitHub Desktop
NodeJS Installed on System.

Tools & Technologies Used



HTML

For Structure of Web Pages required in Application

CSS & Bootstrap

To Design UI/UX of Application

JavaScript & jQuery

To add Behavior in Application

ReactJS

Frontend Framework using JavaScript

NodeJS & ExpressJS

Backend Framework using JavaScript

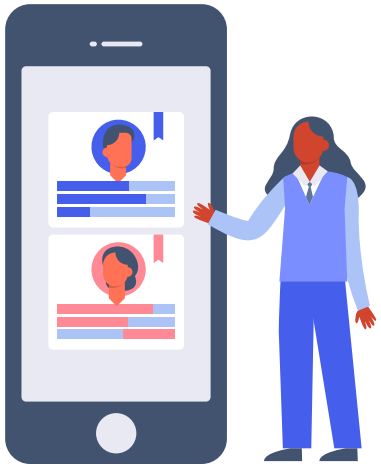
MongoDB & AWS S3

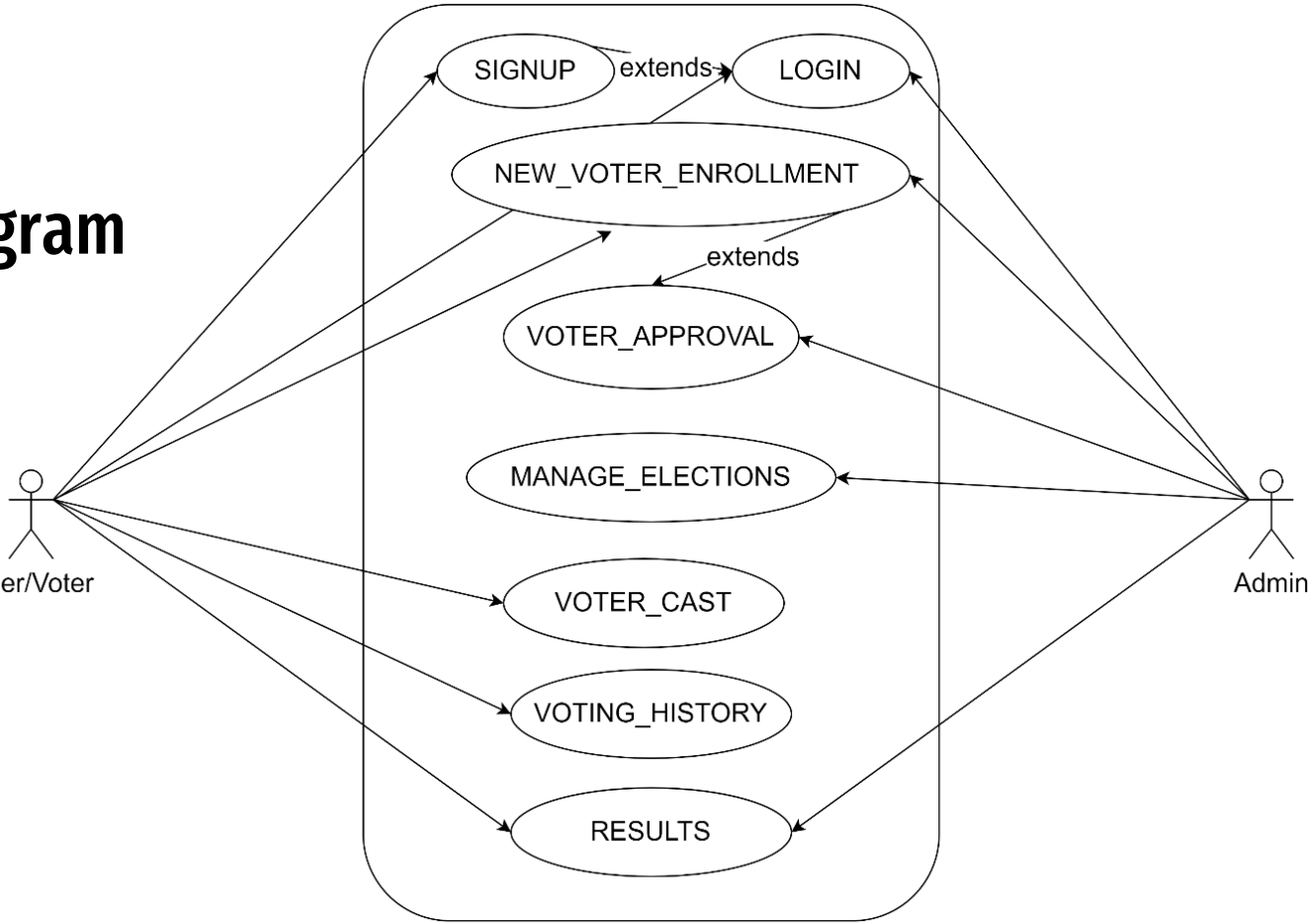
To store data and Files

Solidity

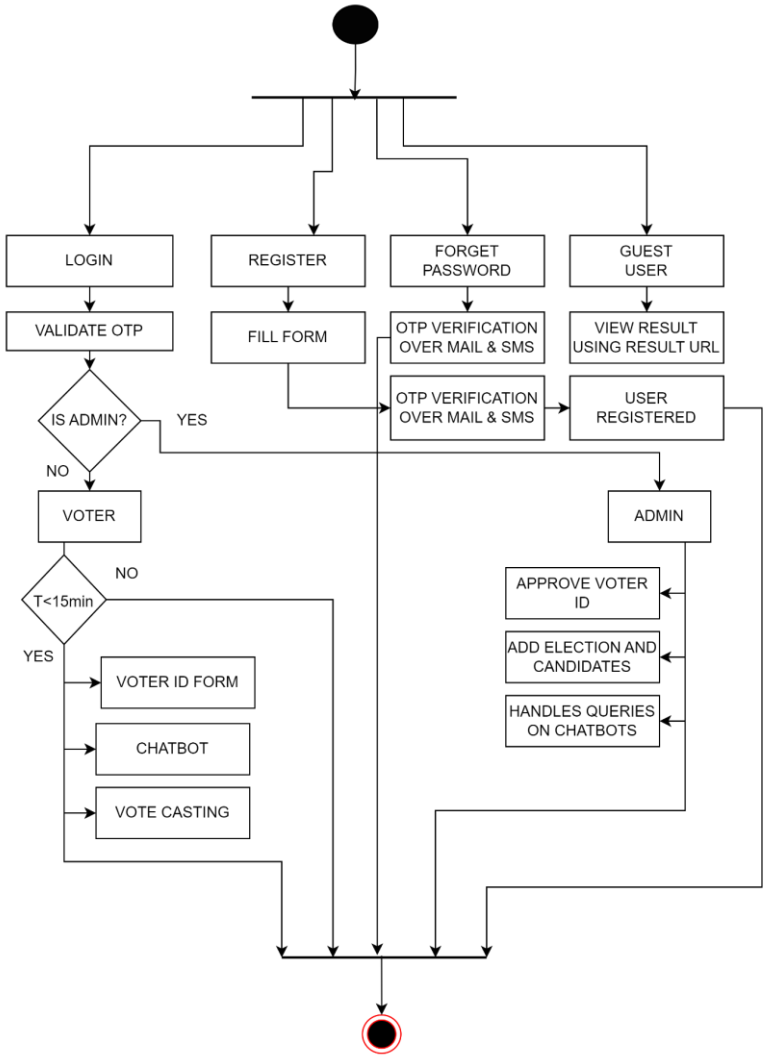
For developing Smart Contracts

Use Case Diagram





Activity Diagram



Stakeholders

eVoting Stakeholders

Election authority

It includes authority who has given task to conduct free & fair election. There may be other statutory bodies as well, such as the legislative institutions themselves, security organizations, or local governments that have some responsibility to support election preparations.

The Contestants

It includes person who may take direct part in the election which may be belong from a party as well as a group and the main reason to conducting election is to choose a good candidate among all contestants.

The Electorate or Voter

It includes the person who have right to votes. It also includes the election authority members as well as contestants. These have a certain eligibility criterion those who have passed that criteria will have the right to vote.

Deliverables

The main deliverables of this Project are:

To Implement a trust worthy E-Voting system where user can vote for their opinion

To discuss better way of conducting Elections online using Blockchain

To Implement Cryptographic techniques to prevent Publicity of users Voting Data

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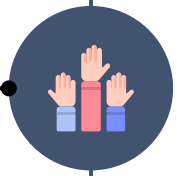

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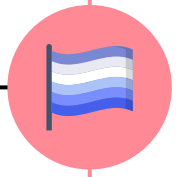

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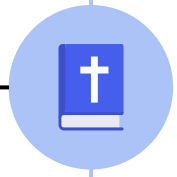

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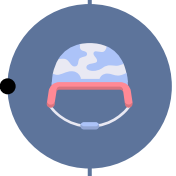

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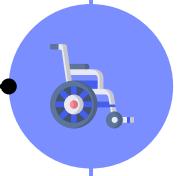

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Any Queries ?

Hosting Details

FrontEnd: Vercel
Backend: Render

Thanks
Rohit Kumar
&
Lavi Badwal

How to acess this?

https://castmyvote.ml