

A Mini Project Report on

# **BUILDING SECURE VOTING SYSTEM USING BLOCKCHAIN**

Submitted in Partial fulfilment for the  
degree of Bachelor of Technology in  
Computer Science and Technology

Submitted by

**Pooja Rathod(48)**

**Neha Tembhe(61)**

**Pradnya Sharma(76)**

Under the guidance of

**Prof.Kumud Wasnik**



**Usha Mittal Institute Of Technology**

**S.N.D.T. WOMEN'S UNIVERSITY**

**MUMBAI-400049**

**2023-2024**

**CERTIFICATE**

This is to certify that **Pooja Rathod, Neha Tembhe, Pradnya Sharma** has successfully completed minor project work on **Building Secure Voting System Using Blockchain** in the partial fulfillment for the bachelor's degree in **Computer Science and Technology** during the year 2023-24 as prescribed by SNDT Women's University.

**GUIDE**

PROF. KUMUD WASNIK

**H.O.D**

PROF. KUMUD WASNIK

**Principle**

DR.YOGESH NERKAR

**Examiner 1****Examiner 2**

# ACKNOWLEDGEMENT

We would like to express our sincere appreciation to everyone who gave their invaluable assistance and support in this project. We are highly indebted to Prof.Kumud Wasnik for her guidance and constant supervision as well as for providing necessary information regarding the project also for her support in this project. Without her help, this project would not have been possible.

We would also like to Thank our Head of Department Prof.Kumud Wasnik for her in-sights in shaping the direction and content of this report. We would also like to extend our gratitude to our classmates who provided valuable feedback and encouragement throughout the process.

Finally, we would like to express our appreciation to our families for their unwavering support and understanding during the long hours and late nights spent working on this project. Thank you all for your contributions, support, and encouragement. We are also thankful to the faculty and staff members of the Department of our individual parents and our friends for their constant support and help.

Pooja Rathod

Neha Tembhe

Pradnya Sharma

# ABSTRACT

Building voting using Ethereum blockchain is a secure, transparent and tamper-proof way of conducting online voting. It is a building application built on the Ethereum blockchain network, which allows participants to cast their votes and view the voting results without the need for intermediaries. In this system, votes are recorded on the blockchain, making it impossible for anyone to manipulate or alter the results.

The use of smart contracts ensures that the voting process is automated, transparent, and secure. The use of the blockchain technology and the implementation of a building system provide a reliable and cost-effective solution for conducting trustworthy and fair elections.

# Contents

<b>Abstract</b>	<b>iv</b>
<b>1 Introduction</b>	<b>viii</b>
1.1 Introduction to Blockchain . . . . .	viii
1.2 Building Voting Using Blockchain . . . . .	ix
1.3 Problem Statement . . . . .	x
<b>2 Literature Survey</b>	<b>xi</b>
<b>3 Existing System</b>	<b>xii</b>
3.1 Brief Explanation of existing system . . . . .	xii
3.2 Disadvantages of existing system . . . . .	xii
3.3 Proposed System . . . . .	xiv
3.4 Advantages of Proposed System . . . . .	xv
3.5 Objectives of the Proposed Research . . . . .	xv
3.6 System Architecture . . . . .	xvii
<b>4 Hardware And Software Requirement</b>	<b>xviii</b>
4.1 Hardware Requirements . . . . .	xviii
4.2 Software Requirements . . . . .	xix
<b>5 Implementation</b>	<b>xx</b>

<i>CONTENTS</i>	vi
<b>6 Applications</b>	<b>xxii</b>
<b>7 Future Scope</b>	<b>xxiv</b>
<b>References</b>	<b>xxv</b>

# List of Figures

2.1	Literature Survey . . . . .	xi
3.1	Level 0 Data Flow Diagram . . . . .	xiv
3.2	Level 1 Data Flow Diagram . . . . .	xiv
3.3	Level 2 Data Flow Diagram . . . . .	xv
3.4	System Architecture . . . . .	xvii
5.1	Login Page . . . . .	xx
5.2	Welcome for Voting . . . . .	xxi
5.3	Add Candidate and Define Voting Dates . . . . .	xxi

# Chapter 1

## Introduction

### 1.1 Introduction to Blockchain

Blockchain is a distributed digital ledger technology that allows participants in a network to share and validate transactions in a secure and transparent manner without the need for intermediaries. The technology is designed to be building, meaning that the data is stored on a network of computers instead of a central database. This makes it difficult to hack or manipulate the data, ensuring the integrity and security of the system. The blockchain technology gained popularity with the emergence of Bitcoin, which was the first building cryptocurrency. However, the technology has since been applied to various industries, including finance, supply chain management, healthcare, and voting, among others. Blockchain works by creating blocks of data that are linked together in a chain, hence the name blockchain. Each block contains a unique code, known as a hash, that is generated based on the contents of the block. This hash is then used to link the block to the previous one, forming a chain of blocks.

Blockchain is one of the emerging technologies with strong cryptographic foundations enabling applications to leverage these abilities to achieve resilient security solutions. A Blockchain resembles a data structure which maintains and shares all the transactions being executed



through its genesis. It is primarily a distributed building database that maintains a complete list of constantly germinating and growing data records secured from unauthorized manipulating, tampering and revision.

Once a block is added to the blockchain, it cannot be altered or deleted without the consensus of the network participants. This makes the technology immutable, ensuring that the data stored on the blockchain is tamper-proof and transparent. Overall, blockchain technology has the potential to revolutionize the way we store and share data, making it more secure, transparent, and accessible.

## **1.2 Building Voting Using Blockchain**

A building voting system built on the Ethereum blockchain has the potential to revolutionize the way we conduct elections. By leveraging the security, transparency, and immutability of blockchain technology, building voting systems can eliminate many of the challenges and risks associated with traditional voting systems.

In a building voting system, each voter has a unique digital identity, and their vote is recorded on the blockchain, ensuring that the vote is tamper-proof and cannot be altered. Building voting systems also eliminate the need for intermediaries, such as government agencies, to oversee the election process, making it more efficient and less susceptible to corruption or manipulation.

Furthermore, building voting systems can increase voter participation by allowing voters to cast their ballots from anywhere in the world, as long as they have an internet connection. This can lead to a more democratic and inclusive electoral process, with greater voter engagement and higher turnout. Overall, a building voting system using the Ethereum blockchain has the potential to bring significant benefits to the electoral process, making it more secure, transparent, and accessible to everyone.

## 1.3 Problem Statement

The current voting systems suffer from security vulnerabilities, lack of transparency, and trust issues. Election fraud, manipulation, and hacking are major concerns under mining the integrity of the democratic process. The innovation gap lies in improving the security, transparency, and trustworthiness of voting systems.

**Aim:-** building an voting system that satisfies the legal requirements of legislators has been a challenge for a long time. Distributed ledger technologies is an exciting technology world. Also aims to evaluate the application of blockchain as service to implement distributed electronic voting systems.

Ethereum provides solutions to these challenges, it's important to consider potential issues such as scalability and user education during the implementation of a blockchain-based voting system. Ongoing developments in the Ethereum ecosystem, including Ethereum 2.0, aim to address scalability concerns and enhance the overall performance of the platform.

# Chapter 2

## Literature Survey

Sr.no.	Paper Title	Authors	Observation	Limitation
1	A Survey of Blockchain Based on E-voting Systems Year:- Dec 2019	Yousif Osman Abuidris, Rajesh kumar and Wang Wenyoug	The paper compares security and privacy requirements of current blockchain-based e-voting systems.	The paper may oversimplify the advantages and challenges of blockchain e-voting, overlooking specific contexts, and might not account for recent developments, potentially lacking the latest information.
2	Survey on Voting System Using Blockchain Technology Year:- 04 April 2022	Mayur Shirsath, Mohit Zade, RiteshKumar Talke, Praful Wake and Maya P.Shelke	The project aims for a user-friendly blockchain e-voting system, prioritizing simplicity and accessibility for all users, irrespective of technical expertise.	Blockchain's potential for enhancing electronic voting faces resistance from stakeholders, including government agencies and the public, posing challenges to its widespread adoption.
3	A Survey on Smart Electronic Voting System Using Block-Chain Technology Year:- Jan 2021	Naina Nagesh Dhepe and DR.Pathan Mohd Shafi	The research aims to enhance electoral security by developing a transparent, secure voting machine through blockchain technology.	The paper outlines a system for India's electoral process, cautioning that its applicability may vary across countries due to differing implementation details and considerations in electoral systems.
4	A Systematic Literature Review and Meta-Analysis on Scalable Blockchain-Based Electronic Voting Systems Year:- Oct 2022	Uzma Jafar , Mohd Juzaidin Ab Aziz, Zarina Shukur and Hafiz Adnan Hussain	The research guides future studies to consider voting needs, merits, and drawbacks, providing scalable voting solutions' guidelines.	Blockchain security, while robust, faces risks from smart contract bugs and network attacks, necessitating stringent measures and audits, offering no absolute protection against malicious actors.
5	Blockchain based E-voting System Year:- 2022	Albin Benny, Aparna Ashok Kumar, Abdul Basit, Betina Cherian and Amol Kharat	The paper explores a transparent, secure e-voting system with cost-efficiency, employing blockchain and smart contracts via Ethereum's private blockchain.	Blockchain voting's implementation may face accessibility hurdles for specific demographics, and scalability issues, despite solutions like sharding, may affect efficiency in the electoral process.

Figure 2.1: Literature Survey

# Chapter 3

## Existing System

### 3.1 Brief Explanation of existing system

The existing voting system typically involves voters physically visiting a designated polling place to cast their vote on paper ballots. These ballots are then manually counted and recorded. Some countries also have electronic voting systems in place, which allow voters to cast their votes electronically through machines or the internet. However, electronic voting systems have faced criticism due to security concerns and potential vulnerabilities.

### 3.2 Disadvantages of existing system

1. **Lack of transparency:** In most voting systems, it's difficult for voters to know whether their vote was counted correctly, and for observers to ensure that the vote counting process is fair.
2. **Vulnerability to fraud:** Both paper ballots and electronic voting machines can be vulnerable to tampering, hacking and other types of fraud. This can be especially problematic when there is no paper trail or other way to audit the results.
3. **Slow results:** Counting paper ballots can be a time-consuming and labor-intensive process, which can delay the announcement of election results.

4. **Cost:** Running a traditional voting system can be expensive, requiring the hiring of poll workers, the purchase of voting machines or paper ballots, and the rental of polling places.
5. **Centralization:** Many traditional voting systems are centralized, meaning that they are controlled by a small number of authorities. This can create the potential for abuse of power or manipulation of the voting process.
6. **Limited Accessibility:** Some voting systems require voters to travel to specific polling places, which can be difficult or impossible for people with disabilities, limited mobility, or other challenges. This can result in voter disenfranchisement.

### 3.3 Proposed System

- **Level 0 data flow diagram**

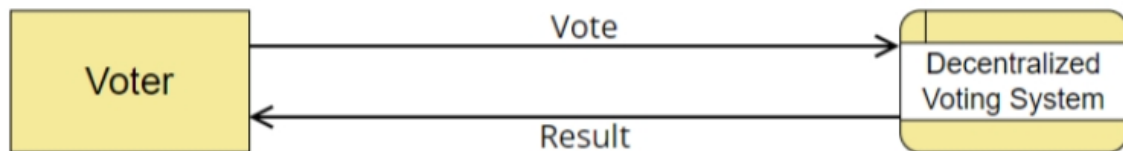


Figure 3.1: Level 0 Data Flow Diagram

- **Level 1 data flow diagram**

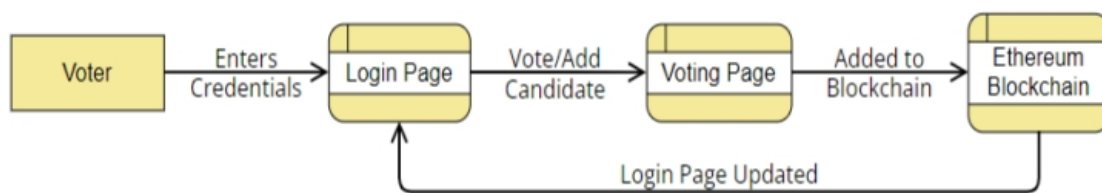


Figure 3.2: Level 1 Data Flow Diagram

The proposed building voting system using Ethereum blockchain aims to provide a transparent and tamper-proof solution for conducting elections. By leveraging smart contracts on the Ethereum network, the system enables secure and anonymous voting, while ensuring the integrity and immutability of the voting data. This would increase voter trust in the election process and reduce the risk of fraud or manipulation.

• **Level 2 data flow diagram**

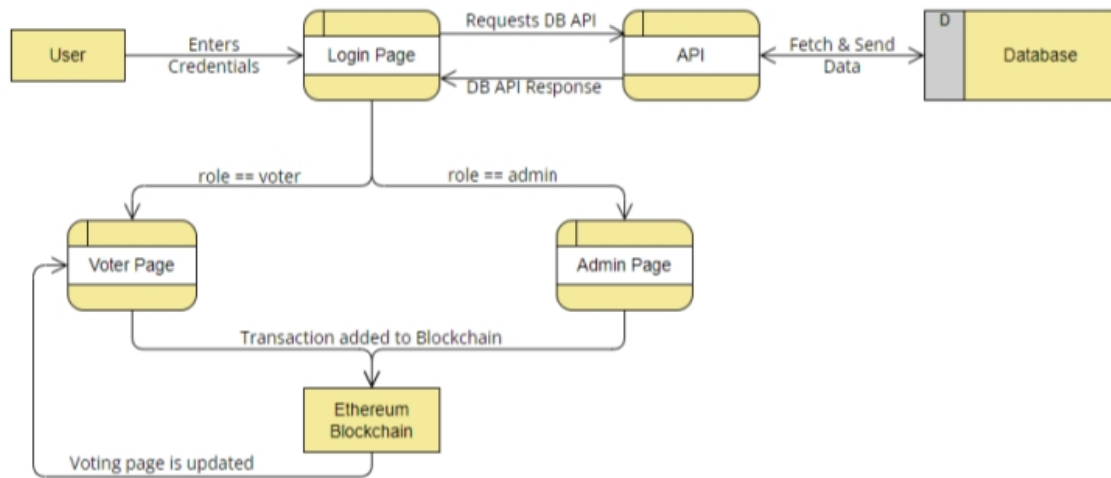


Figure 3.3: Level 2 Data Flow Diagram

### 3.4 Advantages of Proposed System

- Building ensures that no party controls the voting process.
- Transparency throughout the voting process.
- It is tamper proof.
- Voters can vote from any part of the world.
- This method of voting is cost effective.
- The results are provided in real time.

### 3.5 Objectives of the Proposed Research

1. **Security:** The proposed system aims to provide a secure platform for conducting elections, eliminating the possibility of tampering with votes, and ensuring that the election results are transparent and verifiable.

2. **Transparency:** The proposed system aims to provide complete transparency to the voters, allowing them to view the entire voting process, including the vote counting and results.
3. **Accessibility:** The proposed system aims to make the voting process more accessible to all eligible voters by eliminating the need for physical presence at a polling station, thus increasing voter turnout.
4. **Efficiency:** The system aims to increase the efficiency of the voting process by reducing the time and resources required to conduct elections. Since the system is automated and eliminates the need for intermediaries, it can significantly reduce the cost and time associated with traditional voting methods.
5. **Trust:** The proposed system aims to increase trust in the voting process by providing a transparent and tamper-proof mechanism for recording and tallying votes.



### 3.6 System Architecture

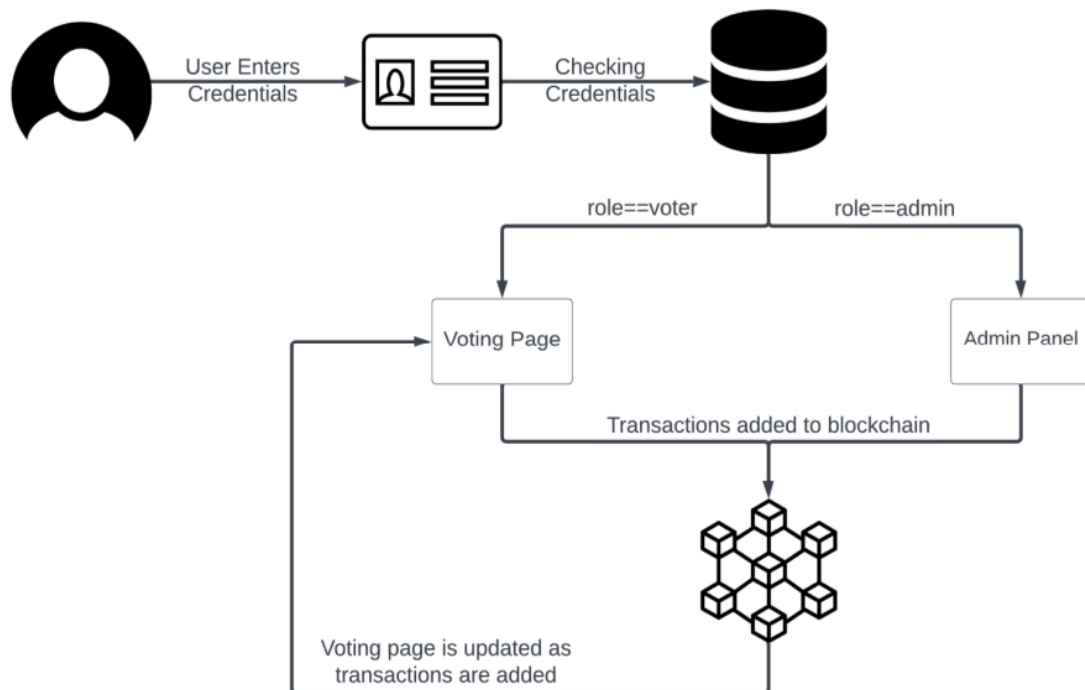


Figure 3.4: System Architecture

User enters the credentials (voter id password) and they are matched with the database. If the match is found user is either redirected to admin page or voter page as per their role corresponding to the credentials in the database. Once the admin is logged in he/she can start the voting process by adding candidates and defining dates. Voter can vote once the voting process has been started. Once the voter has voted the transaction is recorded to the blockchain and the voting page is updated with real-time votes.

# Chapter 4

## Hardware And Software Requirement

### Requirement Analysis

In order to effectively design and develop a system, it is important to understand and document the requirements of the system. The process of gathering and documenting the requirements of a system is known as requirement analysis. It helps to identify the goals of the system, the stakeholders and the constraints within which the system will be developed. The requirements serve as a blueprint for the development of the system and provide a reference point for testing and validation.

### 4.1 Hardware Requirements

1. **Processor** :– 2 GHz or more
2. **RAM** :– 4 GB or more
3. **Disk Space** :– 100 GB or more

## 4.2 Software Requirements

1. **Node.js** (version – 18.14.0)
2. **Web3.js** (version – 1.8.2)
3. **Truffle** (version – 5.7.6)
4. **Solidity** (version – 0.5.16)
5. **Ganache** (version – 7.7.3)
6. **Metamask**
7. **Python** (version – 3.9)
8. **FastAPI**
9. **MySQL Database** (port – 3306)
10. **OS Windows 10**

# Chapter 5

## Implementation

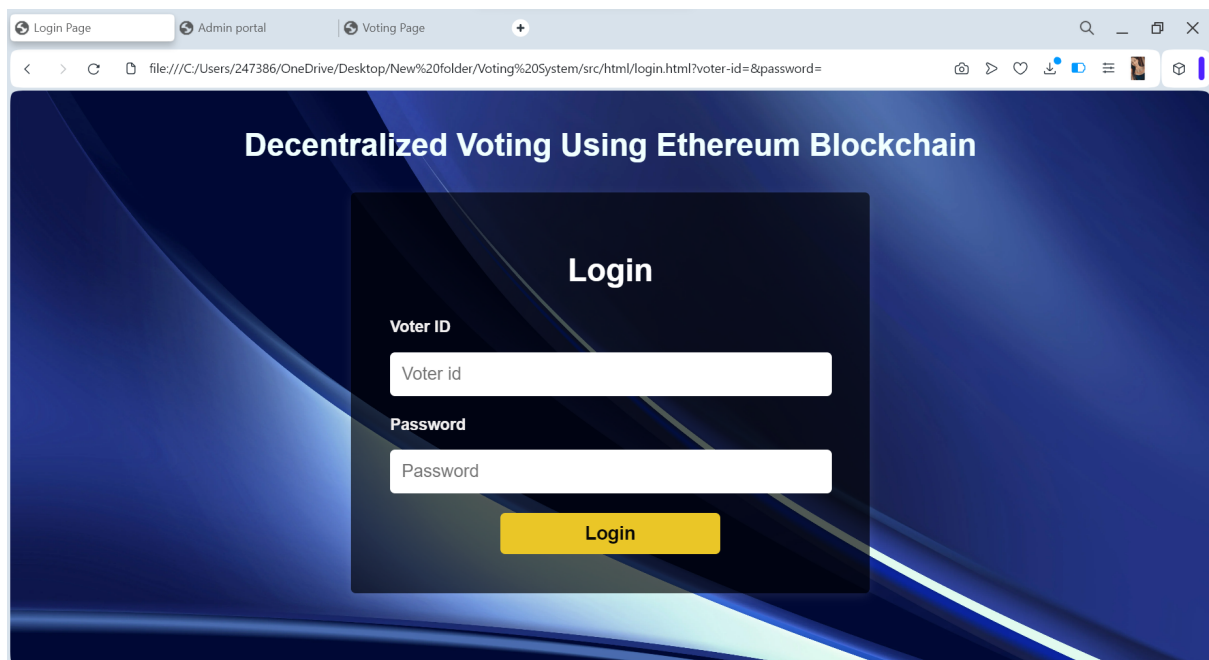


Figure 5.1: Login Page

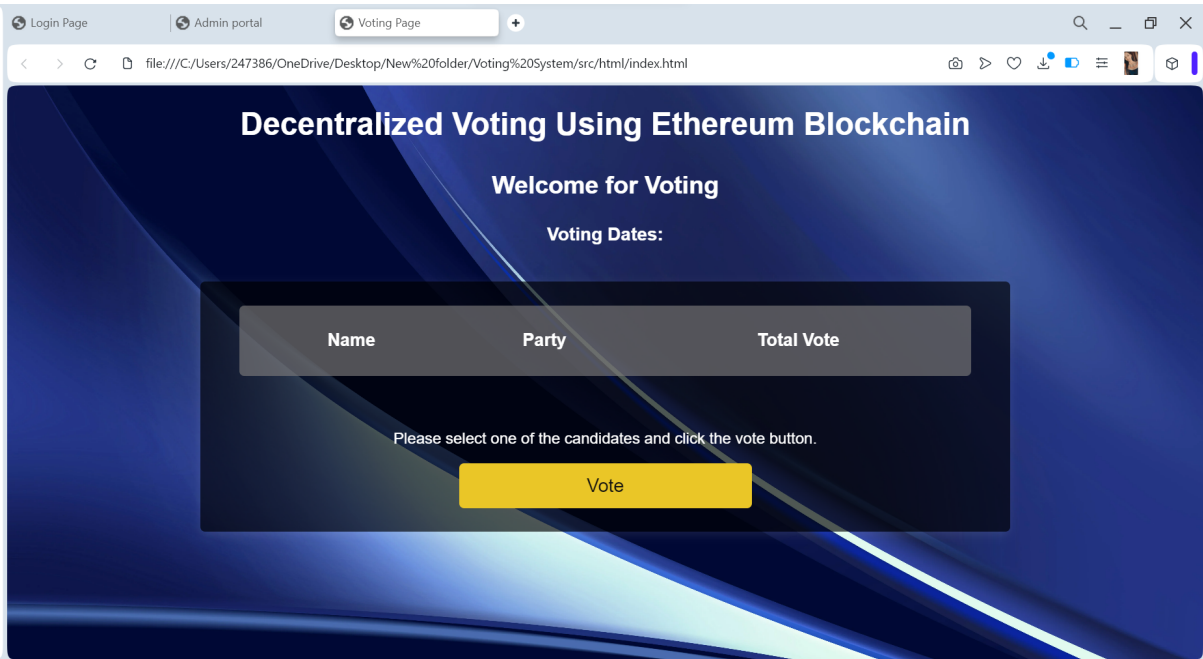


Figure 5.2: Welcome for Voting

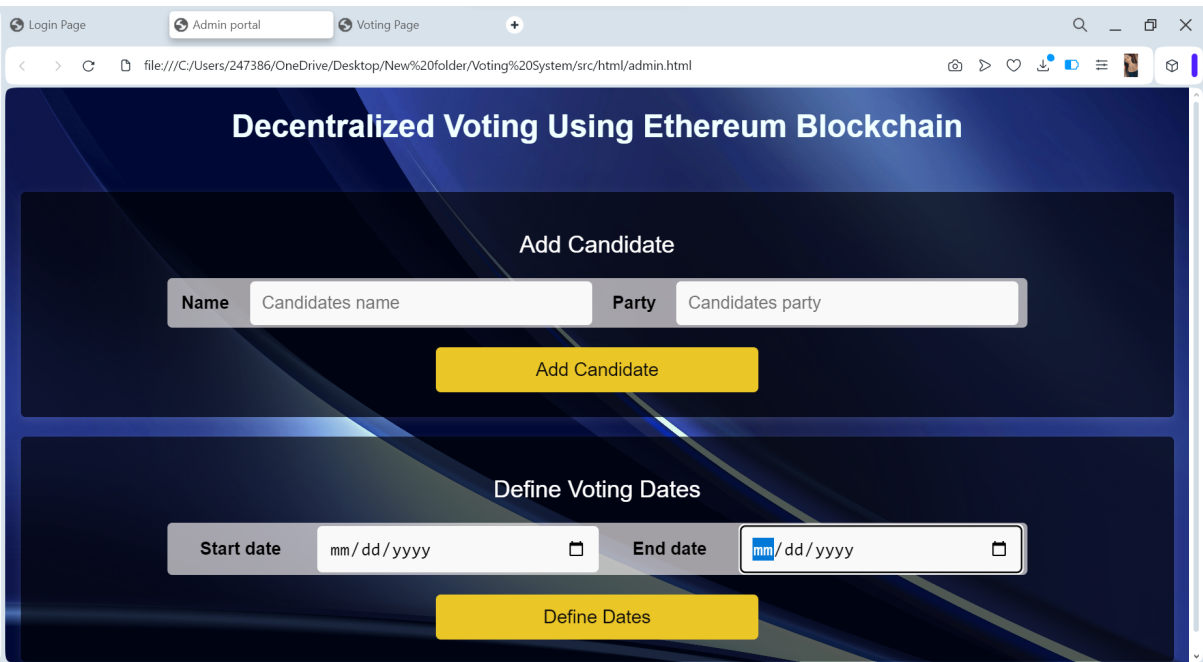


Figure 5.3: Add Candidate and Define Voting Dates

# Chapter 6

## Applications

The application of building a secure voting system using blockchain technology has several benefits and can be applied in various contexts:-

1. **Political Elections:** Implementing a blockchain-based voting system for political elections can increase transparency, reduce fraud, and improve the integrity of the electoral process. It can provide voters with a verifiable record of their votes and ensure that votes are accurately counted.
2. **Corporate Governance:** Companies can use blockchain-based voting systems for shareholder meetings and corporate governance processes. Shareholders can cast votes on important issues such as board elections, executive compensation, and corporate policies securely and transparently.
3. **Nonprofit Organizations:** Nonprofit organizations can use blockchain-based voting systems for decision-making processes such as board elections, project funding proposals, and policy decisions. This can increase participation among members and donors and improve the accountability of organizational leadership.
4. **Election Transparency:** Blockchain ensures transparency by providing a tamper-resistant and immutable ledger of all transactions. This transparency fosters trust among voters and stakeholders in the electoral process.

5. **Enhanced Security:** Blockchain's cryptographic features make it extremely difficult for unauthorized parties to tamper with or manipulate voting data. This enhances the security and integrity of the voting system, reducing the risk of fraud or hacking.
6. **Privacy Protection:** Blockchain enables the encryption of voting data, ensuring the privacy of individual voters while still maintaining the integrity of the overall voting process. This protects against voter coercion or intimidation.
7. **Accessibility:** A blockchain-based voting system can potentially increase accessibility by allowing voters to cast their ballots remotely via digital devices, thereby reducing barriers such as physical distance or mobility issues.
8. **Cost Efficiency:** Implementing a blockchain-based voting system can reduce costs associated with traditional paper-based voting methods, such as printing, transportation, and manual counting of ballots.

# Chapter 7

## Future Scope

- In future iterations, the decentralized voting system can be enhanced by implementing additional features such as real-time vote counting, secure voter identification mechanisms, advanced data analytics for voter insights, and integration with emerging technologies like artificial intelligence and biometrics.
- In continuation of this work, we are focused at improving the resistance of blockchain technology to ‘double spending’ problem which will translate as ‘double voting’ for e-voting systems.
- Although blockchain technology achieves significant success in detection of malleable change in a transaction however successful demonstration of such events have been achieve which motivates us to investigate it further.
- These enhancements will further enhance the efficiency, security, and accessibility of the voting process, making it more inclusive and trustworthy.
- In addition, the study’s external validity should be improved, which should be discussed in future research activities. Accordingly, we would also like to encourage researchers to make their effect on blockchain research taking into account a wide variety of factors, including underlying cryptography and its ecosystem limitations.



**References**

1. Jafar, U.; Ab Aziz, M.J.; Shukur, Z.; Hussain, H.A." A Systematic Literature Review and Meta-Analysis on Scalable Blockchain-Based Electronic Voting Systems. "Sensors 2022, 22, 7585. <https://doi.org/10.3390/s22197585>.Published: 6 October 2022.
2. VaibhavAnasune<sup>1</sup>,PradeepChoudhari<sup>2</sup>,MadhuraKelapure<sup>3</sup>,PranaliShirke<sup>4</sup> Prasad Halgaonkar<sup>5</sup>. Literature survey- Online Voting: Voting System Using Blockchain.Published: 06 June2019. [www.irjet.net](http://www.irjet.net).
3. Prof. Sangeeta Alagi<sup>1</sup>,Ms. Deepanjali Vikas Mahadik<sup>2</sup>, Mr. Akash Ranu Shinare<sup>3</sup>, Mr.Uday Ravindra Tambat<sup>4</sup>, Mr. Shubham Sanjay Waghmare<sup>5</sup>.“Survey on Online E-voting System Using Blockchain Technology”. Published: 04, April-2022.[ijariie.com](http://ijariie.com)
4. YOUSIF ABUIDRIS, RAJESH KUMAR, WANG WENYONG.A Survey of Blockchain Based on E-voting Systems . Published:December2019. <https://www.researchgate.net/publication/340081625>.
5. Mayur Shirsath , Mohit Zade , Riteshkumar Talke , Praful Wake , Maya P. Shelke, 2022, Survey on Voting System using Blockchain Technology, INTERNATIONAL JOURNAL OF ENGINEERING RESEARCH TECHNOLOGY (IJERT) Volume 11, Issue 04 (April 2022).
6. Albin Benny, Aparna Ashok Kumar, Abdul Basit, Betina Cherian and Amol Kharat Department of Computer Engineering, PCE, Navi Mumbai, India - 410206. (Published: 2020)Blockchain based E-voting System.