E-VOTING DECENTRALIZED SYSTEM

A Project Report

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DECLARATION

I hereby declare that the project entitled "**E-VOTING**" submitted for the B. Tech. (CSE) degree is my original work and the project has not formed the basis for the award of any other degree, diploma, fellowship or any other similar titles.

Signature of the Students

Certified that above statement made by student is correct to the best of our knowledge and belief.

Date: **Head of Department**

ABSTRACT
Abstract: Electronic voting or e-voting has been used in varying forms since 1970s with fundamental benefits over paper based systems such as increased efficiency and reduced errors. However, there remain challenges to achieve wide spread adoption of such systems especially with respect to improving their resilience against potential faults. Blockchain is a disruptive technology of current era and promises to improve the overall resilience of e-voting systems. This paper presents an effort to leverage benefits of blockchain such as cryptographic foundations and transparency to achieve an effective scheme for evoting. The proposed scheme conforms to the fundamental requirements for e-voting schemes and achieves end-to-end verifiability. The paper presents details of the proposed e-voting scheme along with its implementation using Multichain platform. The paper presents in-depth evaluation of the scheme which successfully demonstrates its effectiveness to achieve an end-to-end verifiable e-voting scheme. Keywords: electronic voting, e-voting, blockchain, e-government, verifiable voting.

INTRODUCTION
Elections are fundamental pillar of a democratic system enabling the general public to express their views in the form of a vote. Due to their significance to our society, the election process should be transparent and reliable so as to ensure participants of its credibility. Within this context, the approach to voting has been an ever evolving domain. This evolution is primarily driven by the efforts to make the system secure, verifiable and transparent. In view of its significance, continuous efforts have been made to improve overall efficiency and resilience of the voting system. Electronic voting or e-voting has a profound role in this. Since its first use as punched-card ballots in 1960's, e-voting systems have achieved remarkable progress with its adaption using the internet technologies . However, evoting systems must adhere to specific benchmark parameters so as to facilitate its widespread adoption. These parameters include anonymity of the voter, integrity of the vote and non-repudiation among others.

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 decentralized database that maintains a complete list of constantly germinating and growing data records secured from unauthorized manipulating, tampering and revision.

Blockchain allows every user to connect to the network, send new transactions to it, verify transactions and create new blocks .Each block is assigned a cryptographic hash (which may also be treated as a finger print of the block) that remains valid as long as the data in the block is not altered. If any changes are made in the block, the cryptographic hash would change immediately indicating the change in the data which may be due to a malicious activity. Therefore, due to its strong foundations in cryptography, blockchain has been increasingly used to mitigate against unauthorized transactions across various domains.

Bitcoin remains the most distinguished application of blockchain however researchers are keen to explore the use of blockchain technology to facilitate applications across different domains leveraging benefits such as non-repudiation, integrity and anonymity. In this paper, we explore the use of blockchain to facilitate e-voting applications with the ability to assure voter anonymity, vote integrity and end-toverification. We believe e-voting can leverage from fundamental blockchain features such as selfcryptographic validation structure amount ransactions (through hashes) and public availability of distributed ledger of records. The blockchain technology can play key role in the domain of electronic voting due to inherent nature of preserving anonymity, maintaining decentralized and publicly distributed ledger of transactions across all the nodes. This makes blockchain and the

focus of our research is to investigate the key issues such as voter anonymity, vote confidentiality and end- to-end verification. These challenges form the foundation of an efficient voting system preserving the integrity of the voting process. In this paper, we present our efforts to explore the use of the blockchain technology to seek solutions to these challenges. In particular, our system is based on the Prêt à Voter approach and uses an open source blockchain platform, Multichain as the underlying technology to develop our system. In order to protect the anonymity and integrity of a vote, the system generates strong cryptographic hash for each vote transaction based on information specific to a voter. This hash is also communicated to the voter using encrypted channels to facilitate verification. The system therefore conforms with the fundamental requirements of an e-voting system .

The rest of the paper is organized as follows: the next section presents the requirements for an e-voting system as identified and explains how our proposed system fulfils them.The state-of-the-art with respect to e-voting and how we contribute to it followed by a detailed description of the system design in presents the implementation of our proposed system with Multichain and user interface along with evaluation of the system highlighting how it achieves the requirements presented in concludes the paper identifying current progress and plans for further work.

HISTORY OF BLOCKCHAIN

The blockchain technology was described in 1991 by the research scientist Stuart Haber and W. Scott Stornetta. They wanted to introduce a computationally practical solution for time-stamping digital documents so that they could not be backdated or tampered. They develop a system using the concept of cryptographically secured chain of blocks to store the time-stamped documents.

In 1992, Merkle Trees were incorporated into the design, which makes blockchain more efficient by allowing several documents to be collected into one block. Merkle Trees are used to create a 'secured chain of blocks.' It stored a series of data records, and each data records connected to the one before it. The newest record in this chain contains the history of the entire chain. However, this technology went unused, and the patent lapsed in 2004.

In 2004, computer scientist and cryptographic activist Hal Finney introduced a system called Reusable Proof Of Work(RPoW) as a prototype for digital cash. It was a significant early step in the history of cryptocurrencies. The RPoW system worked by receiving a non-exchangeable or a non-fungible Hashcash based proof of work token in return, created an RSA-signed token that further could be transferred from person to person.

RPoW solved the double-spending problem by keeping the ownership of tokens registered on a trusted server. This server was designed to allow users throughout the world to verify its correctness and integrity in real-time.

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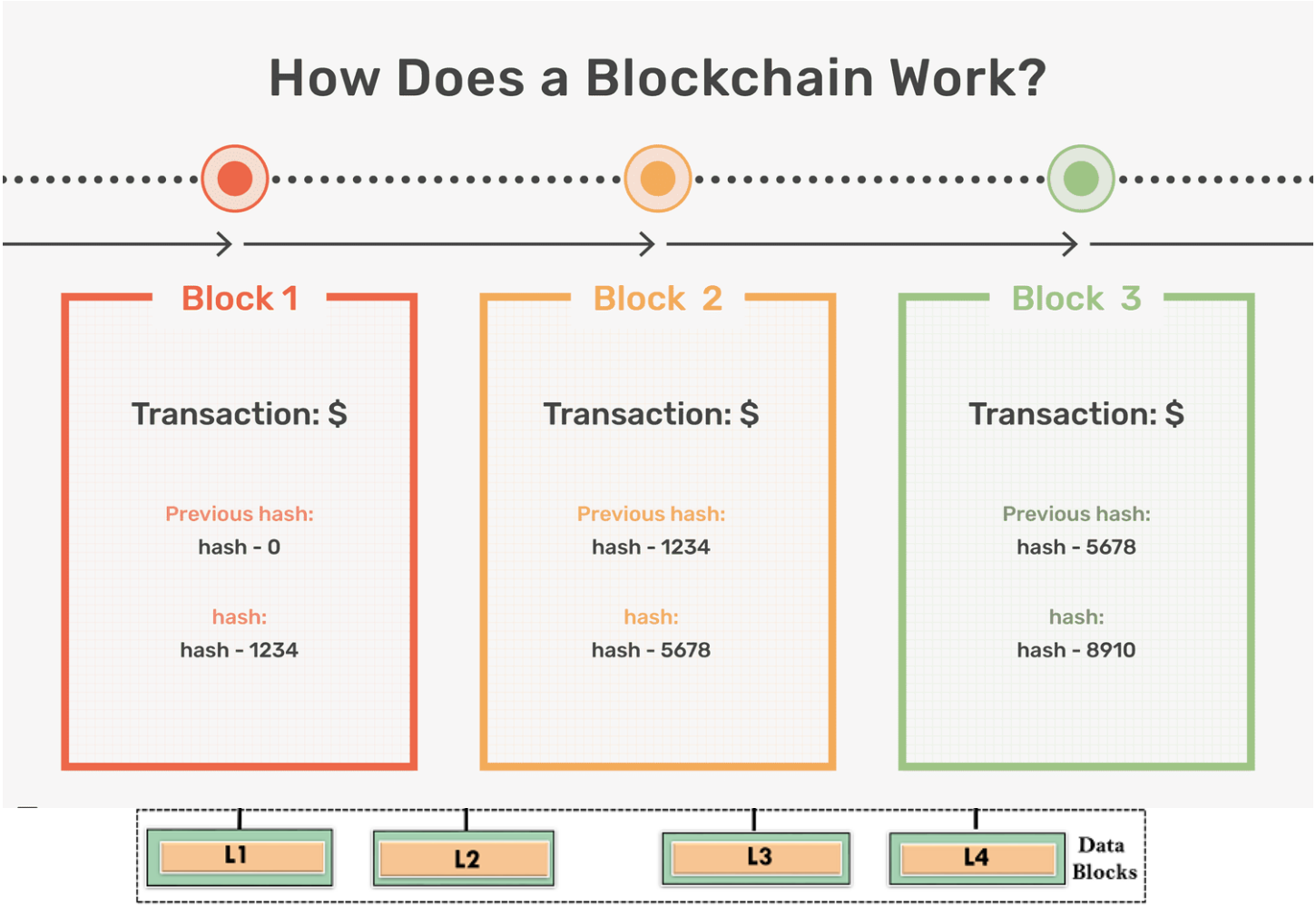

public ledger for all transactions in the cryptocurrency space. The evolution of blockchains has been steady and promising. The words block and chain were used separately in Satoshi Nakamoto's original paper but were eventually popularized as a single word, the Blockchain, by 2016. In recent time, the file size of cryptocurrency blockchain containing records of all transactions occurred on the network has grown from 20 GB to 100 GB.

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WHAT IS ETHEREUM SMART CONTRACT??

Smart contracts are the fundamental building blocks of Ethereum applications. They are computer programs

logical - following an if this then that structure. This means they behave exactly as programmed and cannot be changed.

Nick Szabo coined the term "smart contract". In 1994, he wrote an introduction to the concept and, in 1996, an exploration of what smart contracts could do.

Nick Szabo envisioned a digital marketplace built on these automatic, cryptographically secure processes. A place where transactions and business functions can happen trustlessly — without intermediaries. Smart contracts on Ethereum put this vision into practice.

What are contracts?

You're probably thinking: "I'm not a lawyer! Why would I care about contracts?". For most people, contracts bring to mind needlessly long terms and conditions agreements or boring legal documents.

Contracts are just agreements. That is, any form of agreement can be encapsulated within the conditions of a contract. Verbal agreements or pen-and-paper contracts are acceptable for many things, but they aren't without flaws.

Trust and contracts

One of the biggest problems with a traditional contract is the need for trusted individuals to follow through with the contract's outcomes.

Alice and Bob are having a bicycle race. Let's say Alice bets Bob $10 that she will win the race. Bob is confident he'll be the winner and agrees to the bet. In the end, Alice finishes the race well ahead of Bob and is the clear winner. But Bob refuses to pay out on the bet, claiming Alice must have cheated.

This silly example illustrates the problem with any non-smart agreement. Even if the conditions of the agreement get met (i.e. you are the winner of the race), you must still trust another person to fulfill the agreement (i.e. payout on the bet).

Smart contracts

Smart contracts digitize agreements by turning the terms of an agreement into computer code that automatically executes when the contract terms are met.

A digital vending machine

A simple metaphor for a smart contract is a vending machine, which works somewhat similarly to a smart contract - specific inputs guarantee predetermined outputs.

You select a product

The vending machine returns the amount required to purchase the product

You insert the correct amount

The vending machine verifies you have inserted the correct amount

The vending machine dispenses the product of choice

The vending machine will only dispense your desired product after all requirements are met. If you don't select a product or insert enough money, the vending machine won't give out your product.

Automatic execution

One of the most significant benefits smart contracts have over regular contracts is that the outcome is

automatically executed when the contract conditions are realized. There is no need to wait for a human to execute the result. In other words: smart contracts remove the need for trust.

For example, you could write a smart contract that holds funds in escrow for a child, allowing them to withdraw funds after a specific date. If they try to withdraw the funds before the specified date, the smart contract won't execute. Or, you could write a contract that automatically gives you a digital version of a car's title when you pay the dealer.

Predictable outcomes

The human factor is one of the biggest points of failure with traditional contracts. For example, two individual judges may interpret a traditional contract in different ways. Their interpretations could lead to different decisions getting made and disparate outcomes. Smart contracts remove the possibility of different interpretations. Instead, smart contracts execute precisely based on the conditions written within the contract's code. This precision means that given the same circumstances, the smart contract will produce the same result.

Public record

Smart contracts are also useful for audits and tracking. Since Ethereum smart contracts are on a public blockchain, anyone can instantly track asset transfers and other related information. You can check to see that someone sent money

to your address, for example.

Privacy protection

Smart contracts can also protect your privacy. Since Ethereum is a pseudonymous network (your transactions are tied publicly to a unique cryptographic address, not your identity), you can protect your privacy from observers.

Visible terms

Finally, like contracts, you can check what's in a smart contract before you sign it (or otherwise interact with it). Better yet, public transparency of the terms in the contract means that anyone can scrutinize it.

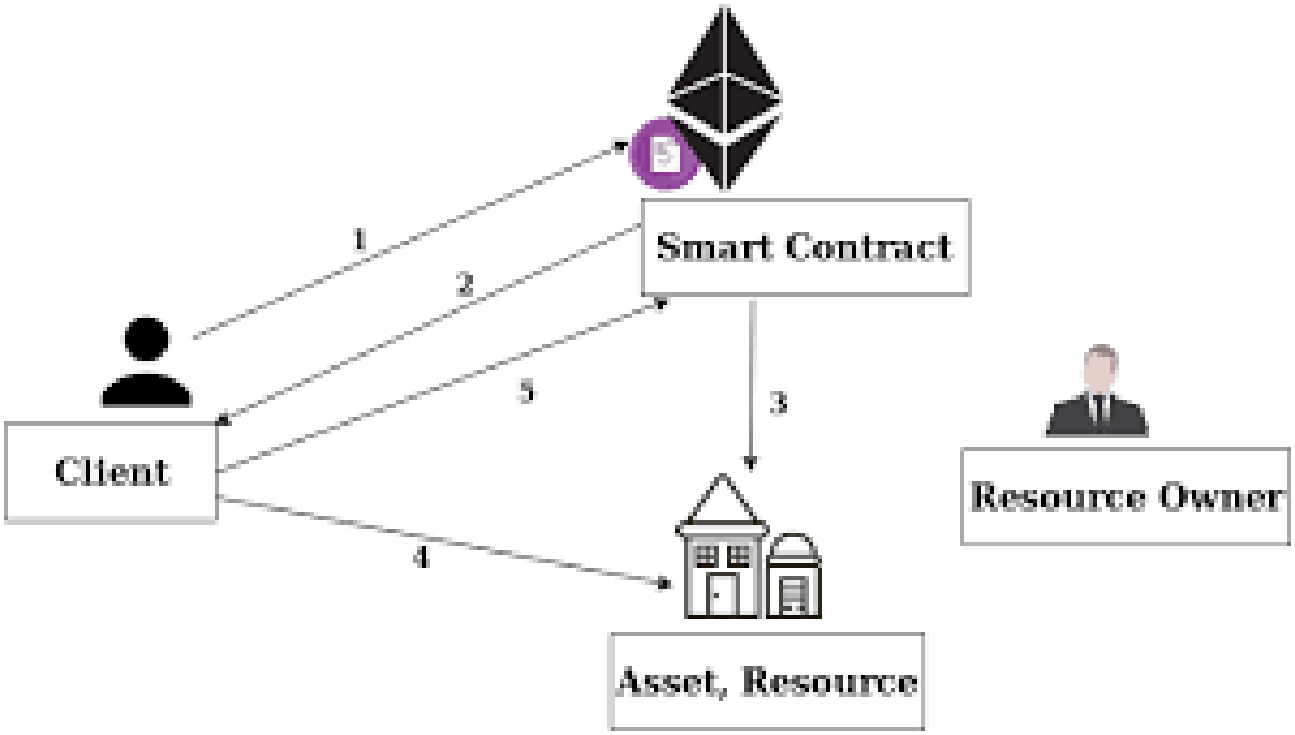
Smart contract use cases

So, smart contracts are computer programs that live on the blockchain. They can execute automatically. You can track their transactions, predict how they act and even use them pseudonymously. That's cool. But what are they good for? Well, smart contracts can do essentially anything that other computer programs do.

They can perform computations, create currency, store data, mint NFTs, send communications and even generate graphics. Here are some popular, real-world examples:

Data sharing between institutions is vital to effective clinical trials. With the support of smart contracts, professionals can seamlessly share data across the industry. Blockchain technology can also help with the authentication of the data to ensure it is accurate. This is a gamechanger for those trying to launch wide-reaching clinical trials. Smart contracts have many uses in the healthcare industry.

Smart contracts can run simple transactions, but blockchain technology also works well for detailed transactions with exchanges involving multiple parties. You can leverage a coding language like Solidity to craft transactions on the Ethereum Virtual Machine, Hedera and other platforms. After creating a smart contract, you can use it repeatedly and connect it to other transactions.



SMART CONTRACT

What Is Web 3.0 Technology?

it is anticipated that Web 3.0 will be:-

Open - Open-source software will be used to build content platforms.

Trustless - Everyone will use Zero Trust, and network protection will reach the edge.

Distributed - Interaction between devices, users, and services will be possible without a centralized authority's approval.

Blockchain technology will make it possible for users to communicate directly with one another throughout the

next stage of the internet. Users will communicate by becoming a part of a Decentralized Autonomous

Organization (DAO), a group that is run and owned by its community.

Data belonging to the user will be protected via a network of openly available smart contracts. These contracts will be stored in a blockchain, which a decentralized network that nodes will control.

The following are further Web 3 forecasts:

All transactions will be tracked on a distributed ledger that uses blockchain technology, and data transfers will be decentralized.

Smart contracts that are open to everyone will relieve people of the need to rely on a centralized organization (like a bank) to maintain data integrity.

The entertainment sector will significantly increase its revenue from the metaverse.

Blockchain technology will make it possible for consumers to instantly produce digital goods and non-fungible

tokens (NFTs), which will protect intellectual property and personally identifiable information (PII).

Users' data will be able to be profited from.

What Is Web 3.0?

Tim Berners-Lee, a developer who created the WWW or World Wide Web, originally referred to Web 3.0 as the Semantic Web and saw an intelligent, self-sufficient, and open Internet that employed AI and machine learning to function as a "global brain" and interpret content conceptually and contextually.

Due to technological constraints, such as how expensive and challenging it is to translate human language into machine understandable language, this idealized version didn't quite work out.

Following is a list of typical Web 3.0 traits:

The semantic web is a development in online technology that enables people to produce, share, and connect material through search and analysis. Instead of using numbers and keywords, it is centered on word understanding.

It uses machine learning and artificial intelligence. The final result is the formation of Web 3.0 to grow smarter and more receptive to user demands. If these ideas are paired with Natural Language Processing (NLP), the result is a computer that uses NLP.

It illustrates how the Internet of Things connects various devices and applications (IoT). This procedure is made possible by semantic metadata, allowing for the efficient exploitation of all available data. In addition, anyone can access the internet from anywhere at any time without a computer or other smart device.

It gives users a choice to interact in public or in private without exposing them to dangers through a third party, providing "trustless" data.

3-D graphics are used. In fact, this is already evident in e-commerce, virtual tours, and computer gaming.

It makes participation easier without requiring consent from a ruling entity. It's without authorization.

It is applicable to:

Metaverses: A limitless, virtual environment that is 3D-rendered

Blockchain video games adhere to the NFTs' ideals by enabling users to possess actual ownership of in-game resources.

Digital infrastructure and privacy: Zero-knowledge proofs and more secure personal data are used in this application.

Financial decentralization. Peer-to-peer digital financial transactions, smart contracts, and cryptocurrencies are examples of this use.

Autonomous decentralized organizations. Online communities are owned by the community.

What Is Web 2.0?

If Web 1.0 consisted of a small group of individuals producing material for a bigger audience, Web 2.0 consists of many individuals producing even more content for an expanding audience. Web 2.0 places more emphasis on participation and contribution than Web 1.0 did on reading.

User-Generated Content (UGC), usability, interaction, and enhanced connectivity with other systems and devices are the main focuses of this Internet form. In Web 2.0, the experience of the user is everything. As a result, this Web form was in charge of establishing social media, collaborations, and communities. Web 2.0 is therefore regarded as the dominant method of web interaction for the majority of users in today's world.

Web 2.0 is described as "the participative social Web," whereas Web 1.0 was referred to as "the read-only Web." With the incorporation of web browser technologies like JavaScript frameworks, Web 2.0 is an improved and expanded version of its predecessor.

The typical traits of Web 2.0 are broken down as follows:

It includes dynamic content that reacts to user input

It uses developed application programming interfaces (API)

It encourages self-use and allows forms of interaction like podcasting, social media, tagging, blogging, commenting, curating with RSS, social networking, and web content voting

It offers free information sorting, allowing users to retrieve and classify data collectively

It employs developed application programming interfaces (API)

It uses developed information; it is used by society as a whole and is not just specific communities.

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The Difference Between Web 1.0, Web 2.0, Web 3.0

- Web 1.0
- Web 2.0
- Web 3.0

Despite only providing limited information and little to no user interaction, it was the first and most reliable internet in the 1990s.

Because of developments in web technologies such as Javascript, HTML5, CSS3, etc., and Web 2.0 made the internet a lot more interactive.

Web 3.0 is the next break in the evolution of the Internet, allowing it to understand data in a human-like manner.

Before, there was no such thing as user pages or just commenting on articles.

Social networks and user-generated content production have flourished because data can now be distributed and shared.

It will use AI technology, Machine Learning, and Blockchain to provide users with smart applications.

Consumers struggled to locate valuable information in Online 1.0 since there were no algorithms to scan through websites.

Many web inventors, including the above-mentioned Jeffrey Zeldman, pioneered the set of technologies used in this internet era.

This will enable the intelligent creation and distribution of highly tailored content to every internet user.

Key Features of Web 3.0

Although Web 3.0 has not yet been given a formal definition, it does have several distinguishing characteristics:

Decentralization: A fundamental principle of Web 3.0. In Web 2.0, computers search for data that is kept at a fixed location, typically on a single server, using HTTP in the form of distinct web addresses. Information might be stored simultaneously in numerous locations and become decentralized with Web 3.0 since it would be found based on its content rather than a single location. This would give individuals more power by dismantling the enormous databases that internet goliaths like Meta and Google presently maintain.

With Web 3.0, users will be able to sell their own data through decentralized data networks, ensuring that they maintain ownership control. This data will be produced by various powerful computing resources, such as

mobile phones, desktop computers, appliances, automobiles, and sensors.

Decentralization and open source software-based Web 3.0 will also be trustless (i.e., participants will be able to interact directly without going via a trusted intermediary) and permissionless (meaning that each individual can access without any governing body's permission). This means that Web 3.0 applications—also known as dApps—will operate on blockchains, decentralized peer-to-peer networks, or a hybrid of the two —such decentralized apps are referred to as dApps.

Artificial intelligence (AI) and machine learning: With the help of the Semantic Web and natural language processing-based technologies, Web 3.0 will enable machines to comprehend information similarly to humans. Web 3.0 will also make use of machine learning, a subset of artificial intelligence (AI) that mimics human learning by using data and algorithms, gradually improving its accuracy. Instead of just targeted advertising, which makes up the majority of present efforts, these capabilities will result in faster and more relevant outcomes in a variety of fields like medical development and new materials.

Connectivity and ubiquity: With Web 3.0, content and information are more accessible across applications and with a growing number of commonplace devices connected to the internet. The Internet of Things is one such example.

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Layers of Web 3.0

Web 3.0 is propelled by four new layers of technological innovation:

Edge Computing - While web 2.0 changed currently commoditized personal computer technology in data centers, web 3.0 pushes the data center out to the edge (i.e. edge computing) and into our hands.

Decentralized Data Network - Users will own their data on web 3.0 since data is decentralized. Different data generators can sell or share their data without losing ownership or relying on intermediaries using decentralized data networks.

Artificial Intelligence and Machine Learning - Artificial intelligence and machine learning algorithms have advanced to the level that they can now make useful and occasionally life-saving predictions and acts.

Blockchain - Blockchain is a decentralized technology that uses smart contracts to execute transactions. These smart contracts define the semantics of a web 3.0 application. As a result, everyone who wants to develop a

blockchain application must use the shared state machine.

How Does Web 3.0 Work?

Your information is stored on your cryptocurrency notecase in web3. On web3, you'll interact with apps and communities through your wallet, and when you log off, you'll take your data with you. Since you are the owner of the data, you may theoretically choose whether to monetize it.

With our guiding principles established, we can start looking at how certain web3 development features are meant to accomplish these objectives.

Data ownership: When you use a platform like Facebook or YouTube, these businesses gather, own, and recoup your data. Your data is stored on your cryptocurrency wallet in web3. On web3, you'll interact with apps and communities through your wallet, and when you log off, you'll take your data with you. Since you are the owner of the data, you may theoretically choose whether to monetize it.

Pseudonymity: Privacy is a feature of your wallet, just as data ownership. Your wallet serves as your identification on web3, which makes it difficult to connect it to your actual identity. Therefore, even if someone can observe the activity of a wallet, they won't be able to identify your wallet. "My personal information is hidden, but my behavior is visible." It was quoted by Neuroth.

There are services that help customers connect to their cryptocurrency wallets used for illegal behavior.

However, your identity is concealed for daily use.

Although wallets increase the level of privacy for bitcoin transactions, privacy coins like Zcash and Monero give transactions total anonymity. Blockchains for privacy coins allow observers to track transactions, but they are unable to view the wallets involved.

Web3 will feature decentralized autonomous entities running apps (DAOs). As a result, decisions are no longer made by a centralized authority but rather by users who own governance tokens, which may be acquired by taking part in the maintenance of these decentralized programmes or by purchasing them.

In a typical corporation, the CEO is responsible for implementing changes approved by the shareholders. Token holders in a DAO can vote on modifications that, if approved, are immediately incorporated into the DAO's code via a smart contract. Everyone gets access to the source code of a DAO since they are democratized.

How Will Web 3.0 Change Our Lives?

Due to its decentralized nature, which is made possible by distributed ledger technology and smart contracts, Web 3.0 is intended to produce sustainable results. It also lowers costs by doing away with middlemen, manual mediation, and arbitration.

For everybody, Web 3.0 offers a much more individualized surfing experience. Websites will be able to automatically adjust to our device, location, and any accessibility needs we may have, and web apps will become far more receptive to our usage patterns.

We believe that the emergence of Web 3.0 will improve our lives for the following three reasons, which we believe are fairly appropriate:

1. A More Customized Browsing Process

There is no denying the ease of being able to quickly click through to a particular offer for something

actually need or desire and that you would have missed otherwise, regardless of how intrusive those advertisements may occasionally feel.

2. Improved search

As was already mentioned, using a search engine in natural language is highly effective. The benefits go far beyond the consumer as the learning curve virtually disappears, and businesses are increasingly able to optimize their websites for search engines in a more organic way as opposed to using complicated keyword techniques.

3. More Advanced App Interfaces

The multidimensional Web 3.0 will help more than just websites; it will also enable web apps to provide users with far richer experiences. Consider a mapping service like Google, which can now include route planning, lodging suggestions, and real-time traffic updates in addition to the fundamentals of location search. Simply put, in the Web 2.0 age, this was not feasible.

Key Applications of Web 3.0

With blockchain at its core, Web 3.0 makes it possible for an expanding range of new apps and services, such

as the following:

NFT: Non-fungible Tokens (NFTs) are tokens that are individually unique and are kept in a blockchain with a cryptographic hash.

DeFi: Decentralized blockchain technology is being utilized as the foundation for decentralized finance (DeFi), a new use case for Web 3.0 that allows for the provision of financial services beyond the constraints of conventional centralized banking infrastructure.

Cryptocurrency: A new universe of money that strives to be distinct from the traditional world of fiat cash is being created through Web 3.0 apps like cryptocurrencies like Bitcoin.

dApp: Decentralized applications (dApps) are programmes that run programmatically and are logged in an immutable ledger. They are built on top of the blockchain and use smart contracts to facilitate service delivery.

Chain-crossing bridges: In the Web 3.0 age, there are numerous blockchains, and cross-chain bridges provide some kind of connectivity between them.

DAOs: DAOs are poised to potentially take on the role of Web 3.0's governing bodies, offering some structure and decentralized governance.

Advantages and Disadvantages of Web 3.0

Advantages -

In terms of data security, end-users will benefit the most from data encryption.

Due to decentralized data storage, users will be able to access data in any situation. Users will receive multiple backups that will aid them if the server crashes.

Most blockchain systems are developed by non-profits, which provides an open-source blockchain platform that allows for collaborative design and development.

The data will be provided from any location and on any device.

Web 3.0 is useful for problem-solving and heavy knowledge-generation tasks.

Disadvantages -

To make the technology accessible to more people worldwide, the devices' capabilities and qualities will need

to be expanded.

Any websites built on web 1.0 technology will become obsolete once web 3.0 is fully implemented on the Internet.

Web 3.0 technology is more intelligent, efficient, and accessible than in previous generations. However, the technology isn't quite ready for general use.

With easier access to a user's information and reduced privacy thanks to web 3.0, reputation management will be more important than ever.

The Future of the Internet

The world is on its way to an Internet where people have complete control over their data and privacy while also allowing companies to exploit it (or not). All of this will be made possible by blockchain technology.

As a result, web 3.0 will hasten the fair and transparent use of user data, ranging from personalized search

results to cross-platform development tools and 3D graphics. The internet will become more immersive and engaging in the next years.

What are Web 3.0 tools?

AI, semantic web, and omnipresent qualities may all be taken into consideration when designing Web 3.0. The rationale for AI stems from the need to give users faster access to more accurate data. An artificial intelligence (AI)-powered website ought to be able to sort through the data and present the information it thinks a particular visitor will find useful. Given that the results are websites that users have chosen, social bookmarking as a search engine can yield superior outcomes to Google. However, humans are also capable of manipulating these outcomes. In order to provide outcomes comparable to social media and social bookmarking but without negative feedback, AI could be used to differentiate the true results from the fakes.

Virtual assistants, a component that is already becoming popular as an aspect integrated into a device or through third-party apps, will also be introduced by an artificially intelligent web.

The goal of the semantic web is to organize and store data in a way that can be used to teach a system what a given piece of information means. In order to create and distribute better content, a website should be able to comprehend the language in the same way humans comprehend. AI can process information into knowledge only if it comprehends the information.

2. Is Web 3.0 the future of the internet?

The Web 3.0 leverages AI, Machine Learning and blockchain technology. It is expected to achieve real-world communication. Individuals will own the data, and they will be compensated for the time they spend on the internet. This sounds futuristic, and the data and privacy of the users will increase with the blockchain technology. Thus if all goes well, Web 3.0 will be the future of the internet.

3. How do I create a Web 3.0 website?

First, you need to buy an NFT domain name. Next, you can make a website. The thing to remember is that the website needs to be made in one of the three ways: -

Use existing templates on website builders.

Host the website on an InterPlanetary File System Protocol or IPFS.

Redirect to an existing Web 3.0 Website.

4. Why is Web 3.0 important?

The following are a few crucial aspects of Web 3.0 that help define what the third generation of the web is expected to be all about: Decentralized: Web 3.0 will be decentralized in contrast to the past two generations of the web, which had heavily centralized governance and applications. A distributed method without a centralized authority will enable applications and services.

Blockchain-based: The development of decentralized applications and services is made possible by blockchain. In contrast to centralized database infrastructure, blockchain uses a distributed way to disseminate data and connections between services. In a decentralized environment, blockchain can also offer an immutable ledger of transactions and activities, assisting in the provision of verified authenticity.

Cryptocurrency-enabled: The use of cryptocurrencies, which primarily replaces the use of fiat money, is a key component of Web 3.0 services.

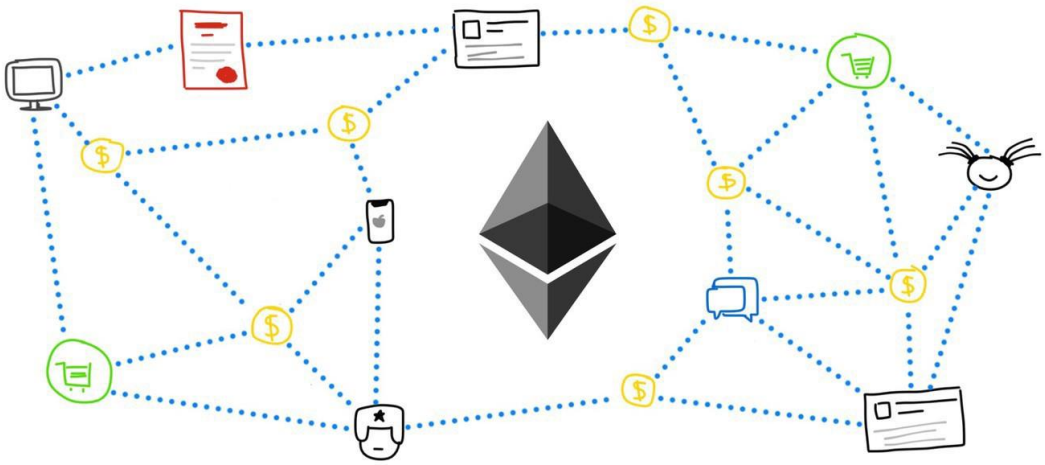
Artificially intelligent and autonomous: A key aspect of Web 3.0 is more automation overall, which will mostly be driven by AI.

E-VOTING BACKGROUND AND REQUIREMENTS

Electronic voting has been an area of research focus for many years by using computing machines and equipment for casting votes and producing high quality and precise results in accordance with the sentiments of the participating voters. Various attempts have been adopted in practice to support election process. Initially computer counting system allowed the voter to cast vote on papers. Later on, those cards went through the process of scanning and tallying at every polling cell on a central server . Direct Recording Electronic (DRE) voting systems were put in place later on which were admired and acknowledged greatly by the voters in-spite of the resistance from computer scientists. If the voting system is well understood by the voters, the system's usability can be increased remarkably. DRE systems in particular have gathered a lot of successes in bringing the voters to use this technology. These systems work more or less in the same way as any conventional election system does. In the case of DRE, a voter begins his journey by going to their polling place and get their token to vote where he utilizes his token at the voting terminal to vote for his candidate. When the candidate selection procedure is completed, DRE systems present the final selection to the voter before actually casting it (in case if the voter wants to change his opinion) and after the final selection, the ballot casting is completed .

More recently, distributed ledger technologies such as blockchain have been used to achieve e-voting systems primarily due to their advantages in terms of end-to-end verifiability. With properties such as anonymity, privacy protection and non-repudiation, blockchain is a very attractive alternative to contemporary e-voting systems. The research presented in.

this paper also attempts to leverage these properties of blockchain to achieve an efficient e-voting system. A detailed analysis of such systems is presented in the next section along with the identification of comparison with these approaches.



Smart contract in Ethereum network

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e-Voting Requirements and Compliance by the Proposed System

The generic requirements for a typical e-voting system have been defined. We present a brief description of each requirement along with an explanation of how the proposed system fulfils it.

Privacy - Keeping an individual's vote secret

The system leverages cryptographic properties of blockchain to achieve privacy of a voter. More specifically, as voter is registered into the system, a voter hash is generated by blockchain which is the unique identifier of a voter into the blockchain, and is protected from misuse due to collision resistance property of the cryptographic hash. Due to this, the traceability of a vote is also non-trivial thereby protecting the voter when under duress.

Eligibility - Allowing only registered voters to vote, with each such voter voting only once

All eligible users are required to register using unique identifiers such as government-issued documents to assert their eligibility. In addition to this, our system implements strong authentication mechanism using finger printing technology to assert that only authorized voters can access the system. Furthermore, the use of biometrics also enables the system to protect against double voting.

Receipt Freeness - Voters should be unable to prove to a third party that they voted in a particular way

The proposed system enables a voter to vote as per their choice and creates a cryptographic hash for each such event (transaction). This is important to achieve verifiability i.e. to verify if a certain vote was included in the count. However, possession of this hash does not allow to extract information about the way voter has voted.

onvenience - Voters must be able to vote easily, and everyone who is eligible must be able to vote

The system has been implemented using a user friendly web based interface with the voting process requiring minimal input from the user. For instance, fingerprinting is implemented for authentication mechanism to avoid the requirement to remember username/passwords. Furthermore, the overall process is integrated which enables the user to interact with it in a seamless manner.

Verifiability - The ability to trust the vote tallying process

Upon casting their vote successfully, a user is provided with their unique transaction ID in the form of a cryptographic hash. A user can use this transaction ID to track if their vote was included in the tallying process. However, this process does not enable a user to view how they voted.\

DECENTRALIZED VOTING SYSTEM

Blockchain is a technology that is rapidly gaining momentum in era of industry 4.0. With high security and transparency provisions, it is being widely used in supply chain management systems, healthcare, payments, business, IoT, voting systems, etc.

Why do we need it?

Current voting systems like ballot box voting or electronic voting suffer from various security threats such as DDoS attacks, polling booth capturing, vote alteration and manipulation, malware attacks, etc, and also require huge amounts of paperwork, human resources, and time. This creates a sense of distrust among existing systems.

Some of the disadvantages are:

Long Queues during elections.

Security Breaches like data leaks, vote tampering.

Lot of paperwork involved, hence less eco-friendly and time-consuming.

Difficult for differently-abled voters to reach polling booth.

Cost of expenditure on elections is high.

Solution:

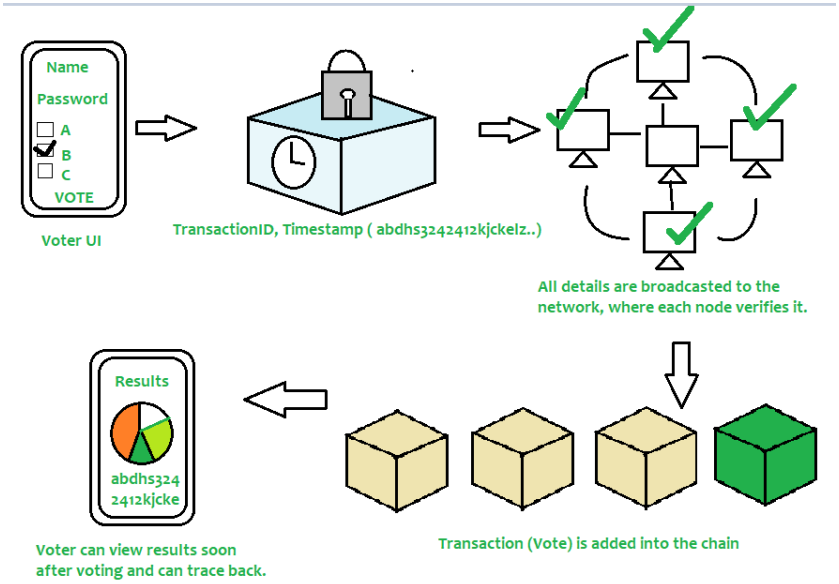
Using blockchain, voting process can be made more secure, transparent, immutable, and reliable. How? Let's take an example.

Suppose you are an eligible voter who goes to polling booth and cast vote using EVM (Electronic Voting Machine). But since it's a circuitry after all and if someone tampers with microchip, you may never know that did your vote reach to person for whom you voted or was diverted into another candidate's account?

Since there's no tracing back of your vote. But, if you use blockchain- it stores everything as a transaction that will be explained soon below; and hence gives you a receipt of your vote (in a form of a transaction ID) and you can use it to ensure that your vote has been counted securely.

Now suppose a digital voting system (website/app) has been launched to digitize process and all confidential data is stored on a single admin server/machine, if someone tries to hack it or snoop over it, he/she can change candidate's vote count- from 2 to 22! You may never know that hacker installs malware or performs clickjacking attacks to steal or negate your vote or simply attacks central server.

To avoid this, if system is integrated with blockchain- a special property called immutability protects system.



Consider SQL, PHP, or any other traditional database systems. You can insert, update, or delete votes. But in a blockchain you can just insert data but cannot update or delete. Hence when you insert something, it stays there forever and no one can manipulate it- Thus name immutable ledger.

But Building a blockchain system is not enough. It should be decentralized i.e if one server goes down or something happens on a particular node, other nodes can function normally and do not have to wait for victim node's recovery.

So list of advantages are listed below:

You can vote anytime/anywhere (During Pandemics like COVID-19 where it's impossible to hold elections

1.physically

2.Secure

3.Immutable

4.Faster

5.Transparent

Let's visualize process

It is always interesting to learn things if it's visually explained. Hence diagram given below explains how the blockchain voting works.

According to above diagram, voter needs to enter his/her credentials in order to vote. All data is then encrypted and stored as a transaction. This transaction is then broadcasted to every node in network, which in turn is then verified. If network approves transaction, it is stored in a block and added to chain. Note that once a block is

added into chain, it stays there forever and can't be updated. Users can now see results and also trace back transaction if they want.

Since current voting systems don't suffice to security needs of modern generation, there is a need to build a system that leverages security, convenience, and trust involved in voting process. Hence voting systems make use of Blockchain technology to add an extra layer of security and encourage people to vote from any time, anywhere without any hassle and makes voting process more cost-effective and time-saving. The focus of our research is to explore the exciting opportunities presented by blockchain technologies by investigating their application in diverse application domains. Within this context, this paper presents our efforts to develop an e-voting system by leveraging blockchain technology. To this end, our proposed scheme fulfils the specific requirements for e-voting as discussed and illustrated further in the following sections.

Access Control Management layer is envisaged to facilitate layer 1 and layer 3 by providing services required for these layers to achieve their expected functions. These services include roles definition, their respective access control policies and voting transaction definitions. The role definition and management provides core support for the access control functions implemented by layer 1 whereas the voting transaction definitions support the blockchain based transaction.

User Interaction and Front-end Security layer is responsible for interacting with a voter (to support vote casting functions) and the administrator (to support functions pertaining to administering the election process). It encapsulates two key functions i.e. authentication and authorization of the users (voters and administrators) to ensure that the access to the system is restricted to legitimate users in accordance with the predefined access control policies. A number of different methods can be applied to achieve this function ranging from basic username/password to more advanced such as fingerprinting or iris recognition. Therefore these are rendered specific to individual implementation of the proposed architecture. Overall, this layer serves as the first point of contact with the users and is responsible for validating user credentials as governed by the system-specific policies.

verifiability. The proposed system aims to achieve secure digital voting without compromising its usability. Within this context, the system is designed using a web-based interface to facilitate user engagement with measures such as finger printing to protect against double voting. With a clear need to administer the voters, constituencies and candidates for constituencies, a user-friendly administrator interface is implemented to enable ease of access. Furthermore, the system allows all voters equal rights of participation and develops a fair and healthy competition among all the candidates while keeping the anonymity of the voters preserved. The cryptographic hash of the transaction (ID) is emailed to the voter as a proof that the vote has been casted which may later on be tracked outside the premises of the constituency.

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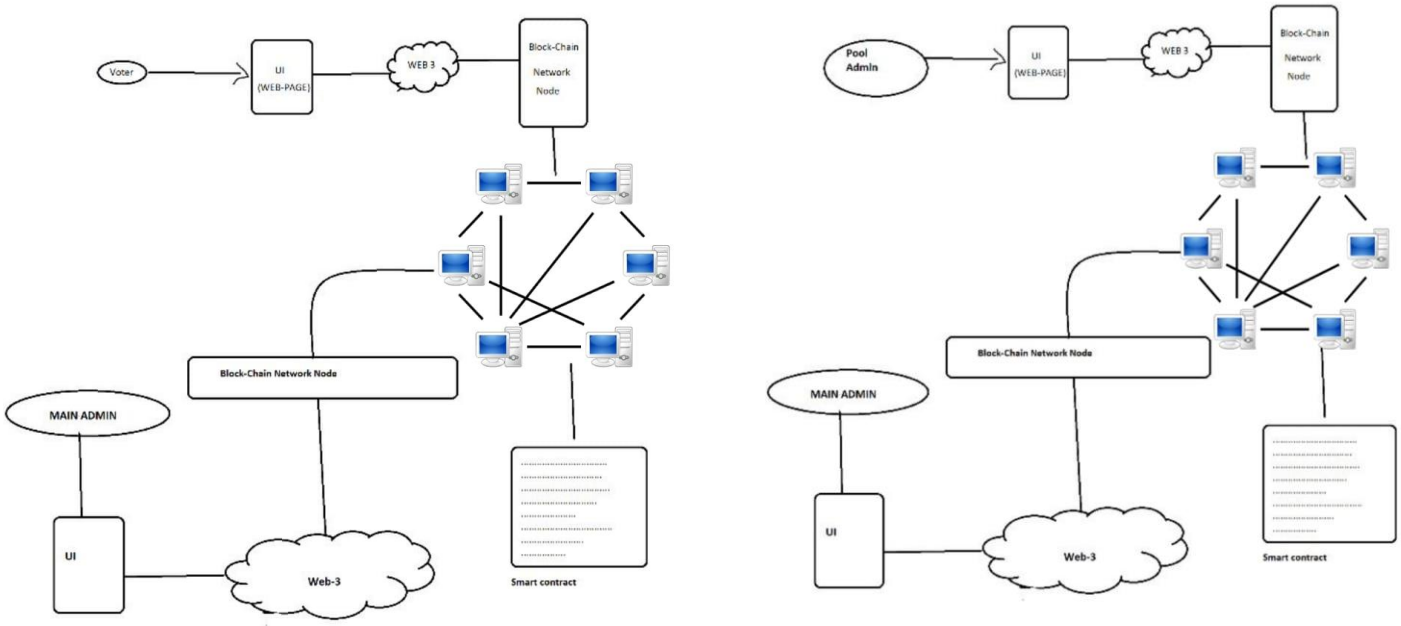
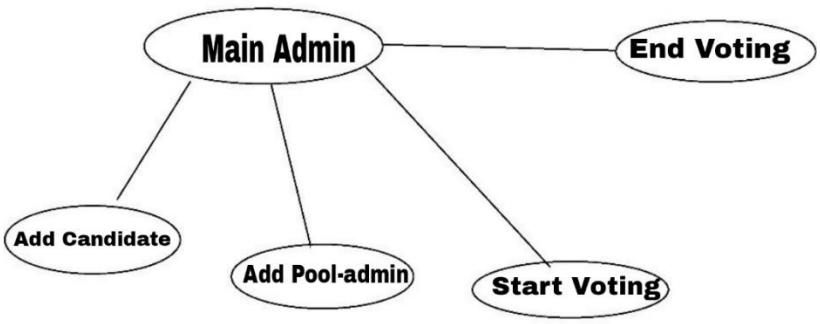
The analysis presented above highlights the performance of the proposed system with respect to the specific requirements of e-voting. It also highlights the significance of defining characteristics of blockchain and their profound role in achieving the cornerstones of an efficient e-voting system. Therefore, we believe the work presented here makes significant contribution to the existing knowledge with respect to the application of blockchain technology to achieve a secure digital voting system.

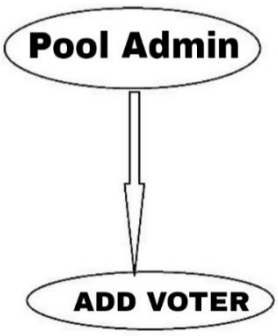
The existing approaches perform well for end-to-end verifiability without compromising the privacy of voters. In , authors presented the implementation of decentralized and self-tallying internet voting protocol over the



blockchain using Ethereum. Authors used the openvote (Chaum et al, 2008) e-voting approach as their baseline.

The focus of our research is to explore the exciting opportunities presented by blockchain technologies by investigating their application in diverse application domains. Within this context, this paper presents our efforts to develop an e-voting system by leveraging blockchain technology. To this end, our proposed scheme fulfils the specific requirements for e-voting as discussed and illustrated further in the following sections.





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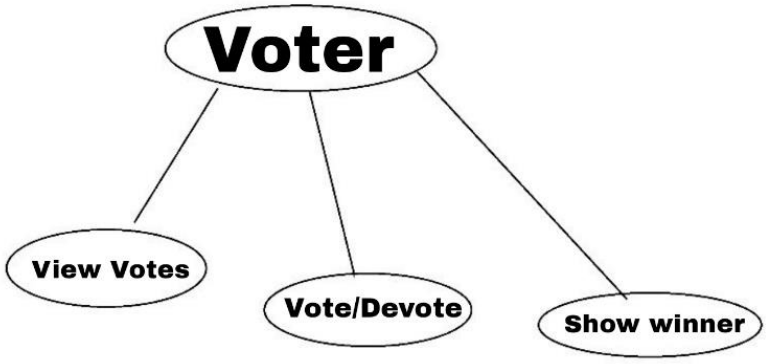

Use cases Diagram

The focus of our research is to explore the exciting opportunities presented by blockchain technologies by investigating their application in diverse application domains. Within this context, this paper presents our efforts to develop an e-voting system by leveraging blockchain technology. To this end, our proposed scheme fulfils the specific requirements for e-voting as discussed and illustrated further in the following sections.

PROPOSED SYSTEM DEISGN

The proposed e-voting system is based on the well-established Prêt à Voter e-voting approach identified in . The system has been designed to support a voting application in the real world environment taking into account specific requirements such as privacy, eligibility, convenience, receiptfreeness and countability and other things like such as a

verifiability. The proposed system aims to achieve secure digital voting without compromising its usability. Within this context, the system is designed using a web-based interface to facilitate user engagement with measures such as finger printing to protect against double voting. With a clear need to administer the voters, constituencies and candidates for constituencies, a user-friendly administrator interface is implemented to enable ease of access. Furthermore, the system allows all voters equal rights of participation and develops a fair and healthy competition among all the candidates while keeping the anonymity of the voters preserved. The cryptographic hash of the transaction (ID) is emailed to the voter as a proof that the vote has been casted which may later on be tracked outside the premises of the constituency.

Detailed Description of the Layered Approach

The proposed e-voting system architecture is presented in Fig. 1 and has been divided into several layers to achieve modular design. These layers are described below:

User Interaction and Front-end Security layer is responsible for interacting with a voter (to support vote casting functions) and the administrator (to support functions pertaining to administering the election process). It encapsulates two key functions i.e. authentication and authorization of the users (voters and administrators) to ensure that the access to the system is restricted to legitimate users in accordance with the predefined access control policies. A number of different methods can be applied to achieve this function ranging from basic username/password to more advanced such as fingerprinting or iris recognition. Therefore these are rendered specific to individual implementation of the proposed architecture. Overall, this layer serves as the first point of contact with the users and is responsible for validating user credentials as governed by the system-specific policies.

the voting transaction definitions support the blockchain based transaction mapping and mining performed at the layer 3. Overall, this layer enables a coherent function of the proposed system by providing the foundations required by individual layers.

e-Voting Transaction Management layer is the core layer of the architecture where the transaction for evoting constructed at Role Management / Transactions layer is mapped onto the blockchain transaction to be mined. This mapped transaction also contains the credentials provided by a voter at layer 1 for authentication. An example of such data can be the fingerprint of the voter. This data is then used to create the cryptographic hash and contributes towards creating the transaction ID. The verification of such credentials is envisioned to be achieved at User Interaction and Front-end Security layer (layer 1). A number of virtual instances of nodes are involved in the process of mining to get this transaction finally enter into the chain.

Ledger Synchronization layer synchronizes Multichain ledger with the local application specific database using one of the existing database technologies. Votes cast are recorded in the data tables at the backend of the database. Voters are able to track their votes using the unique identifier provided to them as soon as their vote is mined and added into the blockchain ledger. The security considerations of the votes are based on block- chain technology using cryptographic hashes to secure end-to-end communication. Voting results are also stored in the application's database with the view to facilitate auditing and any further operations at a later stage.

We now describe a typical interaction of a user with the proposed scheme based on our current implementation of the system. Typically, a voter logs into the system by providing his/her thumb impression. If the match is found, the voter is then presented with a list of available candidates with the option to cast vote against them. On the contrary, if the match is unsuccessful, any further access would be denied. This function is achieved using appropriate implementation of the authentication mechanism and predefined role based access control management. Furthermore, it is also envisioned that a voter is assigned to their specific constituency and this information is used to develop the list of candidates that a voter can vote for. The assignment of voter to a constituency is rendered an offline process and therefore out of scope of this research.

After a successful vote-cast, it is mined by multiple miners for validation following which valid and verified votes are added into public ledger. The security considerations of the votes are based on blockchain technology using cryptographic hashes to secure end-to-end verification. To this end, a successful vote cast is considered as a transaction within the blockchain of the voting application. Therefore, a vote cast is added as a new block (after successful mining) in the blockchain as well as being recorded in data tables at the backend of the database. The system ensures only one-person, one-vote (democracy) property of voting systems. This is achieved by using the voter's unique thumbprint, which is matched at the beginning of every voting attempt to prevent double voting. A transaction is generated as soon as the vote is mined by the miners which is unique for each vote. If the vote is found malicious it is rejected by miners.

After validation process, a notification is immediately sent to the voter through message or an email providing the above defined transaction id by which user can track his/her vote into the ledger. Although this functions as a notification to the voter however it does not enable any user to extract the information about how a specific voter voted thereby achieving privacy of a voter. It is important here to note that cryptographic hash for a voter is the unique hash of voter by which voter is known in the blockchain. This property facilitates achieving verifiability of the overall voting process. Furthermore, this id is hidden and no one can view it even a system operator cannot view this hash therefore achieving privacy of individual voters.

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The Future of Blockchain Technology in 2022

At the end of 2021, the global cryptocurrency market cap reached $3 trillion – an all-time high. Cryptocurrencies like Bitcoin and Ethereum are underpinned by blockchain technology. The adoption of blockchain, and the technology and products it supports, will continue to impact business operations dramatically.

But blockchain technology is much more than a system for securely transferring cryptocurrencies. Outside of finance, it can be used in applications including healthcare, insurance, voting, welfare benefits, gambling, and artist royalties. With the technology already impacting business and society on many levels, the global economy is preparing for the blockchain revolution. If 'revolution' sounds dramatic, consider that eight of the world's 10 largest companies are building an array of products incorporating blockchain.

Any industry or organization involved in the recording and overseeing of transactions of any kind stands to benefit from moving its operations onto a blockchain-based platform. Take a look at the following predictions of how blockchain technology will influence various sectors of the global landscape.

1) How blockchain technology can disrupt financial services

One area predicted to continue evolving with blockchain technology is cross-border payments. These recent developments are leading transformation on this front:

IBM's Blockchain World Wire – This blockchain-enabled conduit used the Stellar protocol and allowed for banks to clear and settle cross-border payments almost immediately. The World Wire API integrated into banks' payment systems, with World Wire then converting the digital asset into currency, completing the transaction. In light of the COVID-19 pandemic, IBM ceased running the network and made the code open source, inviting the development community to build on their learnings.

Paystack – Paystack creates payment infrastructures and connects payment processors with each other with the goal of making it quicker and easier to facilitate online payments. In October 2020, financial services company Stripe acquired Paystack for $200 million. The service expanded to South Africa in May 2021, by which point it was powering 50 percent of online payments in Nigeria, where it was founded. And in September, it became the first Nigerian payment gateway to become an Apple Pay partner, opening it up to 380 million users across.

Ripple and Pyypl – San Francisco-based software vendor Ripple has been specializing in global real-time payments, based on blockchain technology, since 2014. They recently partnered with Dubai-based technology company Pyypl, which has created a blockchain-based platform offering non-bank financial services via smartphone. Because the platform doesn't require the pre-funding needed in traditional cross-border payments, where additional funds must be kept in the user's bank account, this should help increase the liquidity of companies that use it.

AZA Finance – This company uses blockchain technology for small businesses to send and collect payments to and from Africa. By converting the relevant fiat currencies into stablecoins rather than U.S. dollars when trading, AZA says it can reduce reliance on a dollar-dominated system, trade during banking holidays, and increase trade efficiency.

Blockchain technology has applications outside of payments too. Below are additional examples of fintech innovations using blockchain.

Securrency – This is a trading platform for cryptocurrencies and any kind of asset. It is exchanged through Securrency tokens, which allows cryptos to be traded outside of their dedicated exchanges.

ABRA – This global app and cryptocurrency wallet allows you to buy, invest, and store up to 100 cryptocurrencies. The company recently raised $55 million in funding to help develop a comprehensive product range to help people manage their money.

Numerai – This company aims to build an open-source hedge fund by sending encrypted datasets to thousands of decentralized quantitative analysts, who build predictive models. The best are rewarded with Numerai's token and used to create a trading meta-model.

Bloom – This startup is applying blockchain to credit scoring by building a protocol that manages risk, identity, and credit scoring.

If you want to learn more about cryptocurrencies, UCT offers the Blockchain and Digital Currency: The Future of Money online short course. This six-week program reveals how crypto assets are set to shape the future of the financial industry, while imparting a practical working knowledge of blockchain and cryptocurrency assets.

Also focusing on cryptocurrencies is the SDA Bocconi School of Management's Bitcoin and Blockchain Program. This five-week online course explores the technical pillars that underpin these technologies, and is ideally suited to individuals driven to remain relevant by upskilling to address this new business need.

2) Adopting blockchain technology in business

Blockchain technology has huge implications for business, with the main drivers for adoption being higher revenue, lower costs, and more efficient use of time. Examples of how blockchain is being adopted by corporate companies include:

ConsenSys Quorum – Originally developed by JP Morgan, Quorum is an enterprise-grade service that helps companies grow and manage large-scale blockchain networks.

LVMH – The luxury goods company is tracking goods and fighting counterfeiting through blockchain. It has registered more than 10 million products on a platform created in conjunction with Prada and Cartier.

MediaChain – This blockchain database was acquired by Spotify to manage copyrights and royalty payments, and resolve rights holder issues.

3) Application of blockchain in the legal field

In law, blockchain technology can be used to create smart contracts, as well as validate ownership documents such as title deeds. If used to validate, authenticate, and secure courtroom evidence, blockchain could improve efficiency in the criminal justice system.

Smart contracts are digital contracts that uphold the nature of a legal contract. The terms of the contract are written in code and automatically executed when the agreed conditions have been met, without the need for any involvement or intermediary. When this happens, the blockchain is updated, and only parties with permissions can see the results.

Some states in the U.S. have begun to permit the use of smart contracts in certain legal contexts. These include Arizona, where parties can create enforceable legal agreements through smart contracts, and California, where marriage licenses can be issued via blockchain.

4) The use of blockchain in real estate

Real estate transactions are usually expensive, paperwork-heavy, and require the assistance of agents. Blockchain has the potential to ease the process of finding and buying real estate through tokenization, using digital real estate tokens to represent physical assets. This would:

Ease transfer between buyer and seller by cutting out the need for a middleman

Provide irrefutable proof of ownership via a distributed digital ledger

Facilitate smaller real estate investments, as a token can be divided in the same way as a bitcoin

Improve market security and transparency because every transaction is processed and approved by others

Examples of real estate using blockchain technology include Deedcoin, which connects real estate agents with home buyers and reduces commission to 1 percent, and Harbor, which enables the tokenization of private securities, REITs, land titles, and land registry records.

5) Improving logistics and supply chain through blockchain

Supply chains – the links between the creation and distribution of goods – have always been disrupted by innovation. Today's supply chains are extremely complex, threading multiple continents, including huge numbers of invoices and payments, involving myriad entities, and potentially extending over months.

Due to this complexity, blockchain is an attractive means to transform the supply chain and logistics industry. When goods are transferred to a new step in the supply chain, the process can be logged securely and permanently, creating an immutable, auditable history from its point of origin to that of sale.

Below are some examples of innovative logistics and supply chain-focused blockchain applications:

TradeLens – Developed by IBM, this blockchain solution for logistics and supply chain provides transparency and improved efficiency through blockchain, offering a holistic view of shipment data and documents. More than half the world's container ships are registered on the platform, and in 2020 it processed 1 billion shipments.

Provenance – Consumers are increasingly demanding transparency regarding the products they purchase to ensure the ethical sourcing and production of products. Provenance uses blockchain to prove chain-of-custody and certification of supply chains.

Honeywell – The U.S. conglomerate has partnered with iTRACE and SecureMarking to secure, track, and trace its aerospace parts throughout the world. It does so using laser-etching and invisible ink on the parts, encoding this information onto a blockchain ledger for digital authenticity.

De Beers – De Beers mines, trades, and markets more than 30% of the world's supply of diamonds. The company uses a blockchain ledger to trace diamonds from the mine to the customer purchase, and helps confirm diamonds are free from conflict.

6) **Healthcare innovations through blockchain technology**

Blockchain's open yet highly secure nature makes it a natural fit for improving healthcare. Patient information, for example, can be stored in an incorruptible, decentralized, and transparent database, making it safe but accessible to patients and healthcare practitioners alike.

Other primary applications for blockchain in healthcare include:

1.Protection of healthcare data

2.Personal health record data management

3.Point-of-care genomics management

4.Electronics health records data management

5.These are some innovative blockchain applications in this space:

MedicalChain – Offers a blockchain solution to create a user-centric digital health record that can be shared with doctors easily. All information is recorded in an auditable, secure, and transparent format.

Guardtime – This company is helping healthcare organizations and governments implement blockchain in their cybersecurity systems to keep essential data secure.

Curisium – This blockchain platform is designed to streamline rebate negotiation and contract management through the use of innovative digital contracts.30

Robomed – This platform uses telemedicine sessions, chatbots, and wearable devices to collect patient data, recording it on blockchain so it can be shared securely with healthcare professionals.31

The MediLedger Project – Initially launched by Chronicled in 2019, the MediLedger Project aims to improve the track-and-trace capabilities for prescription medicine. Built to meet the requirements set out by the U.S. Drug Supply Chain Security Act (DSCSA), the blockchain healthcare project meets the legal requirements as well as supporting the operational needs of the pharmaceutical supply industry.

The impact of blockchain innovation on business

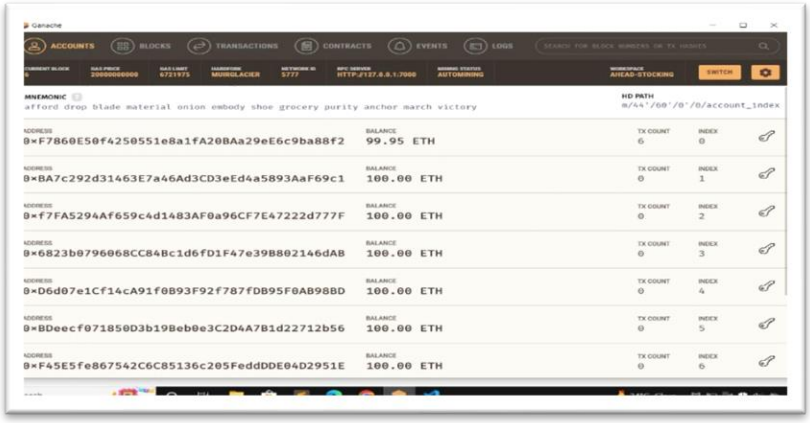
The tools and platforms described are just a few examples of how blockchain technology has been applied in various industries. This highlights the implications this technology will have for businesses, trade, and entire economies and how important it is for business leaders, tradespeople, and decision-makers to become familiar with the technology.

Deloitte's 2021 Global Blockchain Survey found that 81 percent of business leaders believed blockchain was broadly scalable and had achieved mainstream adoption.33 Blockchain skills have become one of the most sought-after proficiencies in the world, with the demand increasing by 59 percent from the end of 2020 to the beginning of 2021.

The MIT Sloan School of Management Blockchain Technologies: Business Innovation and Application online

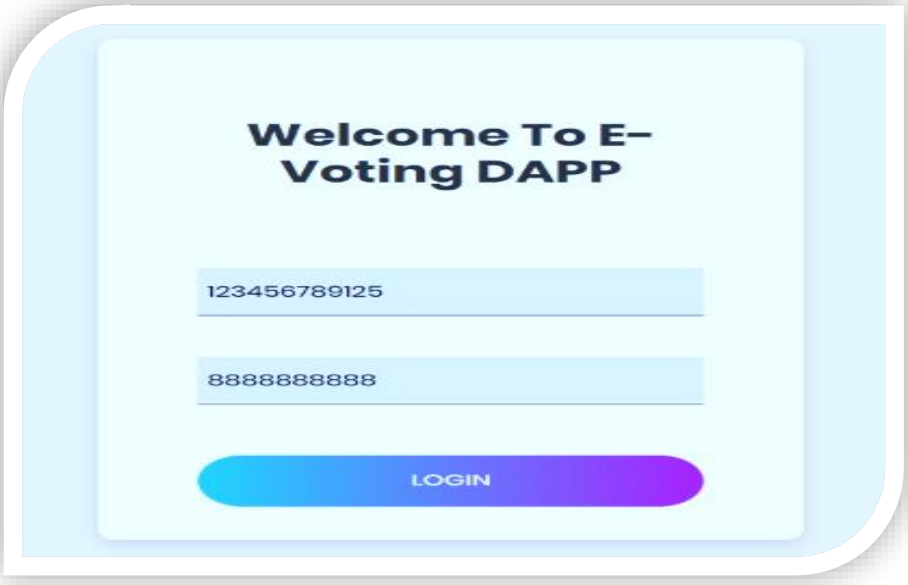
short course helps professionals develop these skills. This six-week program takes a fundamental look at how blockchain is impacting business and economics, while teaching students how to use blockchain technology to create greater organizational innovation and efficiency. Learn more about what you can expect on the course.

Screenshots:



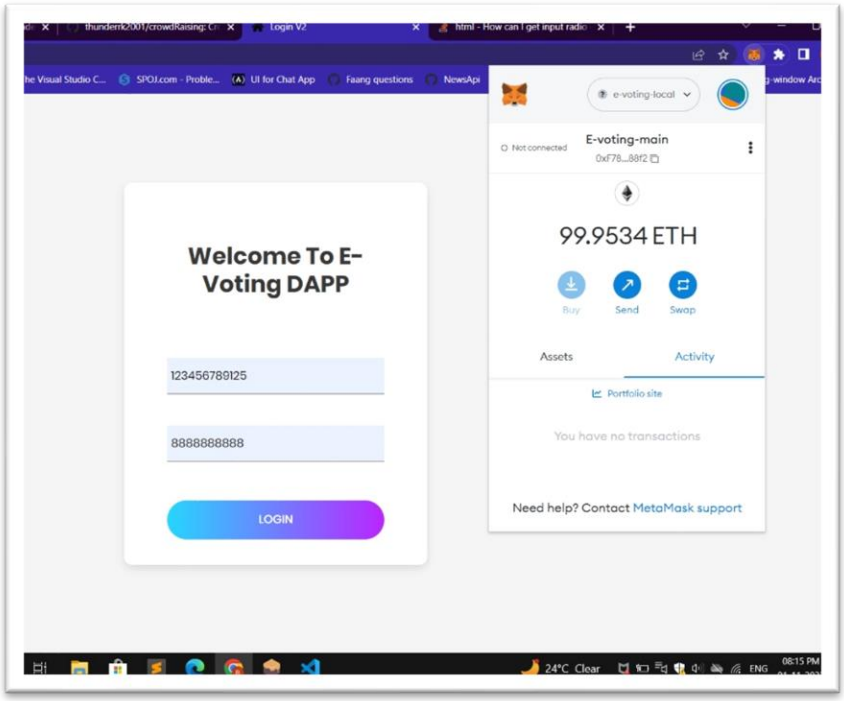
1.Deploy on ganache

Smart contract is deployed on ganache. Ganache is a tool where we can deploy our Ethereum Smart contract for testing purpose on local block chain or test net before deploy on main-net. Ganache is actually a component of the Truffle Suite framework along with the other components, Truffle and Drizzle. Truffle serves as the development environment, testing framework and asset pipeline based on the Ethereum Virtual Machine. On the other hand.



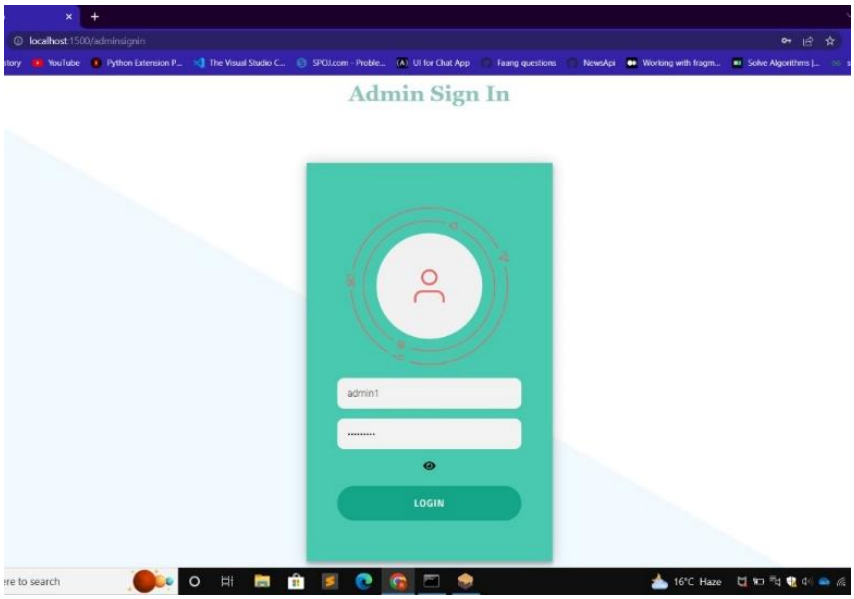
2.log in page

Login page for voters where user id and private key(password) is required for authentication. After authentication voter will allow to access the voting system and all feature of e-voting. User id and password is given to only those user(voter) which are registered by Govt. or authorized organization.



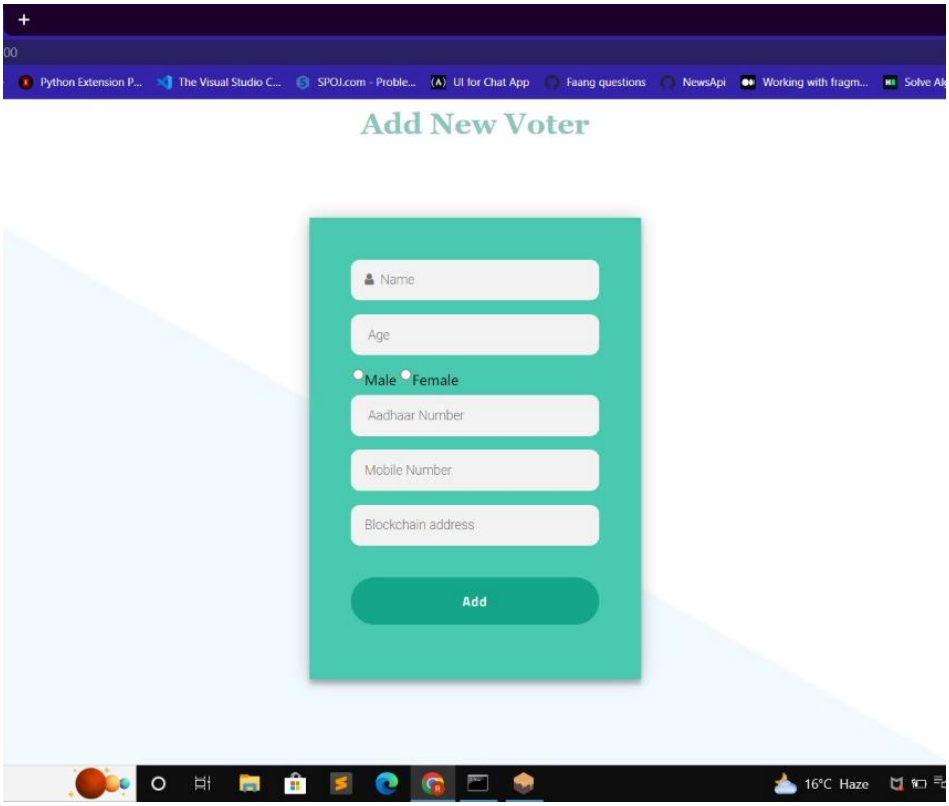
3. Demat account of user

Every voter required demat account for accessing blockchain based application. If any voter want to vote a candidate through Ethereum smart contract then user must have demat account. Here in this picture a demart account of voter is showed.



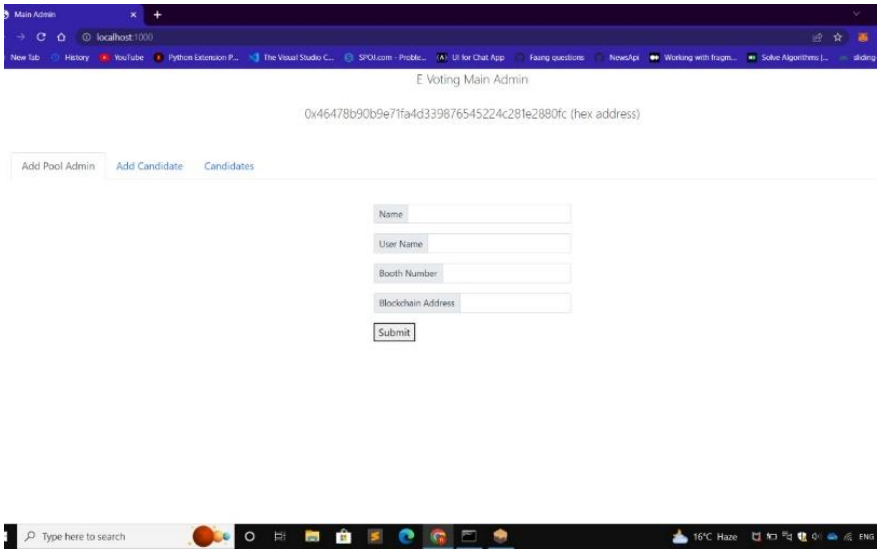
4. Admin sign in page

Admin required sign in before access the feature of our DAAP (include user-name and password). No one exept admin will allow to access admins feature. Without user-name and password admin will not able to sign-in.



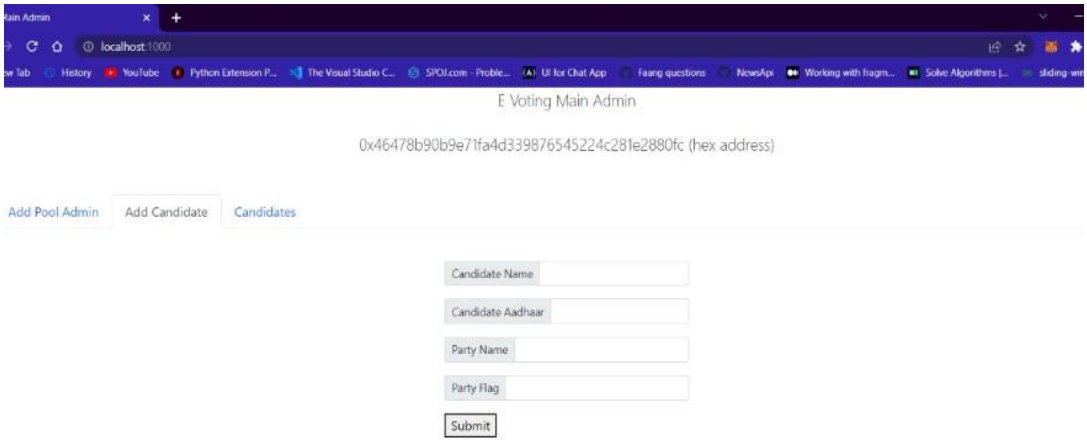
5.Add new voter portal

Only Pool admin will allow to take information from new voter and register them. After successfully registration voter will get user name and password for login. Here we take information like Name, age, gender , adhaar-number, mobile-number and demat account address.



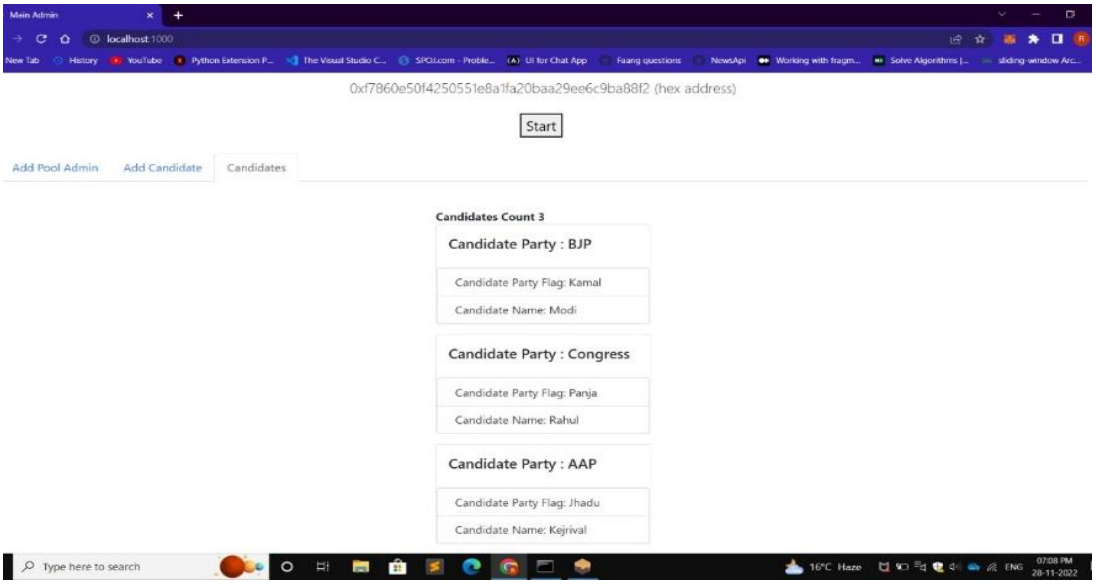
6.Add pool admin Portal

This portal is only for main admin. Only main admin can register pool admin and give them id and password. No one have authority to log in through Main Admin Or Pool Admin until or unless they have permission.



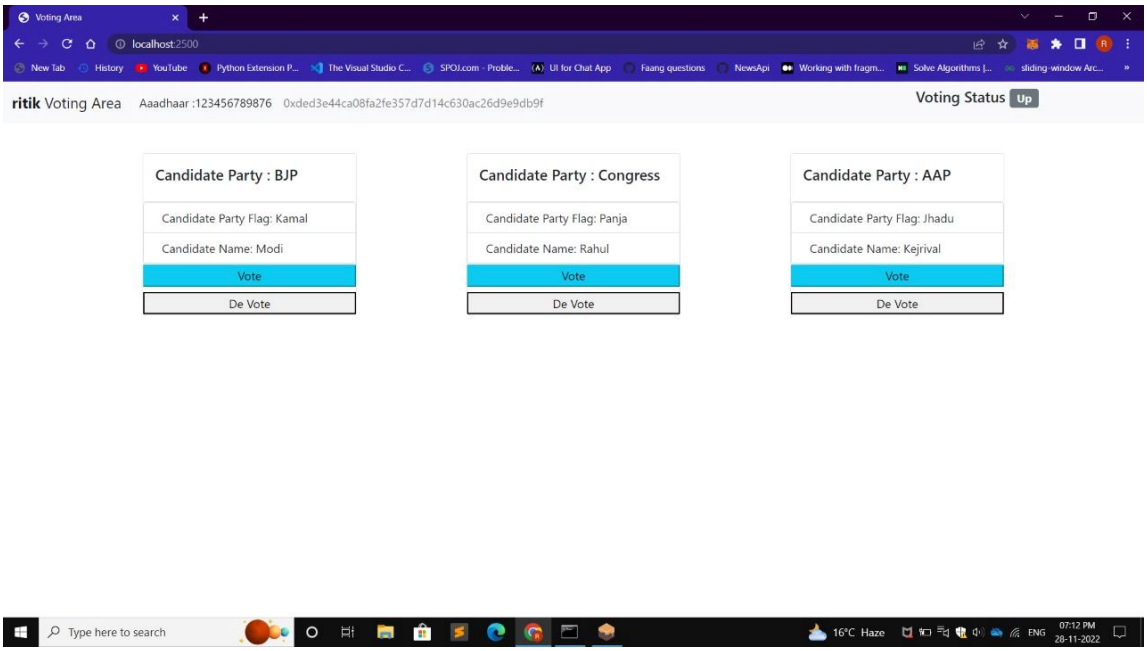
7.Add candidate page

Only pool admin has authority to add candidates. No one other than pool admin can add candidates. Pool admin check all dacuments and verify the identity before add new candidate.



8.Infomation of all candidates

This portal shows the information of all register candidates. This page is only for pool admin and Main admin. No one other than admin can view or access this page.



9.Voting page

Here all eligible voters can vote and choose the candidate. After voting the candidate with highest count of vote declare as winner and every one can see the winner after ending of the vote.