Project Synopsis
on

ONLINE VOTING SYSTEM
Project ID – PCS24-23

Submitted as a part of course curriculum for

**Bachelor of Technology
in
Computer Science**

Submitted by

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DECLARATION

We hereby declare that this submission is our work and that, to the best of our knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree or diploma of the university or other institute of higher learning, except where due acknowledgement has been made in the text.

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CERTIFICATE

This is to certify that Project Report entitled "Online Voting System" which is submitted by Aditya Aggarwal, Ashish Kumar Gupta, Saurabh Pundir in partial fulfilment of the requirement for the award of degree B. Tech. in Department of Computer Science of Dr A.P.J. Abdul Kalam Technical University, Lucknow is a record of the candidates own work carried out by them under my supervision. The matter embodied in this report is original and has not been submitted for the award of any other degree.

Date: **Supervisor Signature**

                                                                               Mr.Akash Goel

                                                                               (Assistant Professor)

ACKNOWLEDGEMENT

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Last but not the least, we acknowledge our friends for their contribution to the completion of the project.

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ABSTRACT

Building a secure electronic voting system that offers the fairness and privacy of current voting schemes, while providing the transparency and flexibility offered by electronic systems has been a challenge for a long time. In this work-in-progress paper, we evaluate an application of blockchain as a service to implement distributed electronic voting systems. The paper proposes a novel electronic voting system based on blockchain that addresses some of the limitations in existing systems and evaluates some of the popular blockchain frameworks for the purpose of constructing a blockchain-based e-voting system In particular, we evaluate the potential of distributed ledger technologies through the description of a case study; namely, the process of an election, and the implementation of a blockchain-based application, which improves the security and decreases the cost of hosting a nationwide election.

This technology will improve the trust of voters that there action is secure.

Introduction

6.1. Introduction

In this project we will be developing a blockchain based e-voting system. electronic voting systems that enable voters to vote at their convenience using a mobile phone, computer or any other electronic device. Still, none of these technologies have been incorporated on a larger scale due to inherent security threats/concerns that these systems might pose to the integrity of the voting process.

Benefits of blockchain based e-voting system to customers.

- Fairness and privacy

- faster

- transparent

- immutable

6.2. Problem Statement

Our problem statement in simple words would be like:
- A model which will help in doing voting and elections.
- This model will ensure end to end encryption and privacy of the voter.
- After voting there is no chance of any discrepancy and other things and if changes are made then it'll be known.

6.3. Objective

Our objective is to provide a Digital Voting System which will do the following:
- Allowing only registered voters to vote, with each such voter voting only once.
- Keeping an individual's vote.
- Voters will be able to vote easily, and everyone who is eligible must be able to vote.
- The ability to trust the vote tallying process

6.4. Scope

After discussion with the team and with our guide, we can consider the scope of this project as follows:

- We can use this system in future elections and voting.
- It will be easy, fast and low-cost approach to implement i.e., Economically good.

Literature Review

Sl. No.	Title of the Paper with Author(s) Name	Journal/Conference	Year of Publication	Highlights
1	Blockchain and the Future of the Internet: A Comprehensive Review By- Jon Crowcroft	**Journal**	**2020**	Blockchain is challenging the status quo of the central trust infrastructure currently prevalent in the Internet towards a design principle that is underscored by decentralization, transparency, and trusted auditability. In ideal terms, blockchain advocates a decentralized, transparent, and more democratic version of the Internet. Essentially being a trusted and decentralized database, blockchain finds its applications in fields as varied as the energy sector, forestry, fisheries, mining, material recycling, air pollution monitoring, supply chain management, and their associated operations. In this paper, we present a survey of blockchain-based network applications. Our goal is to cover the evolution of blockchain-based systems that are trying to bring in a renaissance in the existing, mostly centralized, space of network applications. While re-imagining the space with blockchain, we highlight various common challenges, pitfalls, and shortcomings that can occur. Our aim is to make this work as a guiding reference manual for someone interested in shifting towards a blockchain-based solution for one's existing use case or automating one from the ground up.
2	User-Perceived Privacy in Blockchain By- Simin Ghesmati, Walid Fdhila and Edgar Weippl	**Journal**	**2020**	This paper studies users' privacy perceptions of UTXO-based blockchains such as Bitcoin. In particular, it elaborates – based on interviews and questionnaires – on a mental model of employing privacypreserving techniques for blockchain transactions. Furthermore, it evaluates users' awareness of blockchain privacy issues and examines their preferences towards existing privacy-enhancing solutions, i.e., add-on techniques to Bitcoin versus built-in techniques in privacy coins. Using Bitcoin as an example, we shed light on existing discrepancies between users'

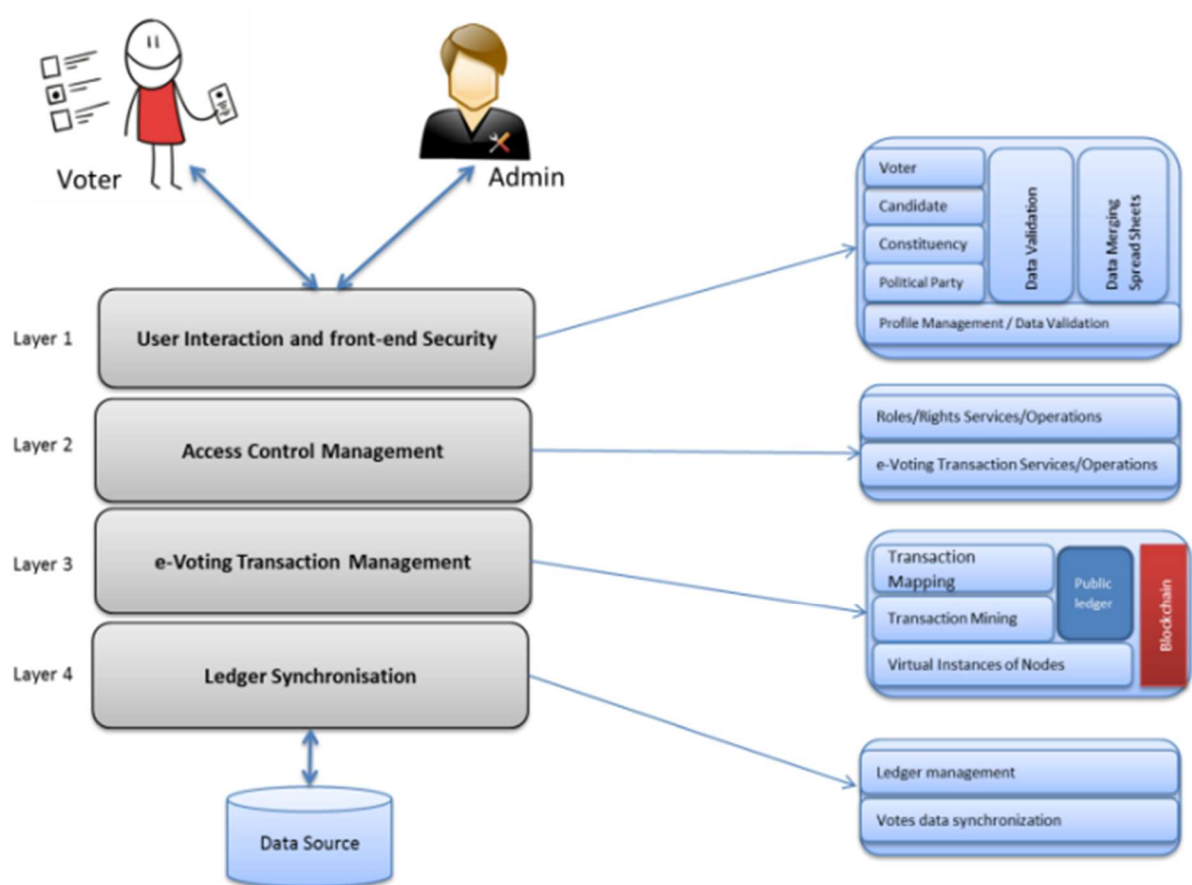|				privacy perceptions and preferences as well as current implementations.
3	Blockchain Technology and its Impact on the Global Economy By- Dr. Burcu Sakız and Prof. Dr. Ayşen Hiç	**Journal**	**2019**	The world's most valuable resource is no longer oil, but data. Smartphones and the internet have made data abundant, ubiquitous and far more valuable. Modern algorithms can predict when a customer tends to buy, a car needs servicing, or a person is at risk of a disease. Meanwhile, artificial intelligence techniques extract more value from data. As individuals accumulate information which transforms into knowledge, entrepreneurs will want to use and/or share that knowledge. It is the sharing of knowledge that needs a decentralized, autonomous mechanism so that knowledge can be shared fairly amongst all peoples of the world, not just within corporations. Blockchain technology gives us that mechanism. Blockchain is one of a kind decentralized technology and it is distributed as well as decentralized ledger. Blockchain is the answer to a lot of obstacles the world has to go through today. Before today, nobody could think of transferring money from one account to another safely without any financial institution in the middle, like a bank. Blockchain technology presents a radical and disruptive new way of conducting all manner of transactions over the Internet. The advent of Bitcoin and the blockchain has brought a lot of change to the world of finance even the world economy was formerly run using fiat currencies. Introducing the blockchain environment will actually enhance the economics because in blockchain, all transactions are recorded right from the manufacturer to the buyer. This paper explores the emerging landscape for blockchain technology focusing on the economics.
4	Blockchain Research, Practice and Policy: Applications, Benefits, Limitations, Emerging Research Themes and Research Agenda By-	**Journal**	**2018**	The blockchain has received significant attention from technology focussed researchers, highlighting its perceived impact and emerging disruption potential, but has been slow to engender any significant momentum within the Information Systems (IS) and Information Management (IM) literature. This study approaches the subject through an IS/IM lens developing the key themes

	Laurie Hughes, Yogesh K. Dwivedi, Santosh K Misra, Nriprenda Rana			from the blockchain based research via a comprehensive review. This analysis of the body of literature highlights that although few commercial grade blockchain applications currently exist, the technology demonstrates significant potential to benefit a number of industry wide use cases. This study expands on this point articulating through each of the key themes to develop a detailed narrative on the numerous potential blockchain applications and future direction of the technology, whilst discussing the many barriers to adoption. The study asserts that blockchain technology has the potential to contribute to a number of the UN Sustainability Development Goals and engender widespread change within a number of established industries and practices.
5	Bitcoin: A Peer-to-Peer Electronic Cash System By- Satoshi Nakamoto	**Journal**	**2020**	A purely peer-to-peer version of electronic cash would allow online payments to be sent directly from one party to another without going through a financial institution. Digital signatures provide part of the solution, but the main benefits are lost if a trusted third party is still required to prevent double spending. We propose a solution to the double-spending problem using a peer-to-peer network. The network timestamps transactions by hashing them into an ongoing chain of hash-based proof-of-work, forming a record that cannot be changed without redoing the proof-of-work. The longest chain not only serves as proof of the sequence of events witnessed, but proof that it came from the largest pool of CPU power. As long as a majority of CPU power is controlled by nodes that are not cooperating to attack the network, they'll generate the longest chain and outpace attackers. The network itself requires minimal structure. Messages are broadcast on a best effort basis, and nodes can leave and rejoin the network at will, accepting the longest proof-of-work chain as proof of what happened while they were gone
6	Blockchain technology in the energy sector: A systematic review of	**Journal**	**2021**	Blockchain technology is one of the most famous emerging technologies in present time. It has gained the interest of so many people in very short time. Just like it has drawn attention of every

	challenges and opportunities By Merlinda Andoni, Valentin Robu, David Flynn, Simone Abram			domain, it has also been compared with the other technologies on basis of energy consumption and effect on the earth. Blockchain is much more efficient and less energy consuming than other conventional technologies. It has the potential to bring significant changes and innovation. This study reviews 140 blockchain research projects and startups from which they have constructed a map of the potential and relevance of blockchain technology for energy applications. These initiatives were systematically classified into different groups according to the field of activity, implementation platform. Opportunities, potential challenges and limitations for several use cases are discussed, ranging from emerging peer-to-peer (P2P) energy trading and Internet of Things (IoT) applications, to decentralized marketplaces, electric vehicle charging and e-mobility. The paper ends with a discussion of challenges and market barriers the technology needs to overcome to get past the hype phase, prove its commercial viability and finally be adopted in the mainstream.
7	Machine Translation using Semantic Web Technologies By Diego	**Journal**	**2018**	A large number of machine translation approaches have recently been developed to facilitate the fluid migration of content across languages. However, the literature suggests that many obstacles must still be dealt to achieve better automatic translations.
8	An Overview of Blockchain Technology: Architecture, Consensus, and Future Trends By Zibin Zheng1, Shaoan Xie1, Hongning Dai2, Xiangping	**Journal**	**2017**	Blockchain has received extensive attentions recently. Blockchain serves as an immutable ledger which allows transactions take place in a decentralized manner which makes it very useful. Blockchain-based applications are growing up, covering numerous fields including financial services, reputation system and Internet of Things (IoT), and so on. However, there are still many challenges of blockchain technology such as scalability and security problems waiting to be overcome. This paper presents a comprehensive overview on blockchain technology. They provide an overview of blockchain architecture first and compare some typical algorithms used in different

				blockchains. After that they have shown some challenges in the way of blockchain. And they have showed the future trends of blockchain.
9	Blockchain in the Field of Intellectual Property By Blockchain in the Field of Intellectual Property	**Journal**	**2018**	With the continuous development and application of the blockchain technology, academic and commercial circles are constantly exploring the research directions and practical applications of blockchains. In this paper, we focus on the related research and applications of. blockchain technology in the field of intellectual property, analyze the academic research and commercial application in this direction, and try to provide a new feasible direction for the research and development of the. blockchain in the next stage
10	Literature Review of Blockchain Technology By Ashish Sharma & Dinesh Bhuriya	**Journal**	**2019**	Blockchain is another innovation with solid ramifications for the eventual fate of how we trade data and money as a comprehensively organized society. It is new to the point that there is moderately minimal scholastic work done on it, yet this is evolving rapidly. For this writing survey, we have started by gathering an example of principally peer-inspected sources, and additionally an educational diagram of articles from different channels. Our determination of articles enables us to give an agent perspective of three essential points. In the first place, a portion of the essential current themes being talked about with respect to blockchain innovation. Second, the agent classifications of said points. Third, the potential fate of blockchain improvement alongside its effect on society and innovation.

PROPOSED METHODOLOGY

8.1 Flowchart

Voter

Admin

Layer 1 — User Interaction and front-end Security

Layer 2 — Access Control Management

Layer 3 — e-Voting Transaction Management

Layer 4 — Ledger Synchronisation

Data Source

Voter
Candidate
Constituency
Political Party

Data Validation

Data Merging Spread Sheets

Profile Management / Data Validation

Roles/Rights Services/Operations

e-Voting Transaction Services/Operations

Transaction Mapping

Transaction Mining

Virtual Instances of Nodes

Public ledger

Blockchain

Ledger management

Votes data synchronization

8.2 Algorithm Used

Detailed Description of the Layered Approach

The proposed e-voting system architecture 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. Several 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.

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 provide core support for the access control functions implemented by layer 1 whereas 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 e-voting 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.

CONCLUSION

Electronic voting has been used in varying forms since 1970s with fundamental benefits over paper-based systems such as increased efficiency and reduced errors. With the extraordinary growth in the use of blockchain technologies, several initiatives have been made to explore the feasibility of using blockchain to aid an effective solution to e-voting. This paper has presented one such effort which leverages benefits of blockchain such as cryptographic foundations and transparency to achieve an effective solution to e-voting. The proposed approach has been implemented with Multichain and in- depth evaluation of approach highlights its effectiveness with respect to achieving fundamental requirements for an e-voting scheme.

To this end, we believe an effective model to establish trustworthy provenance for e-voting systems will be crucial to achieve an end-to-end verifiable e-voting scheme. The work to achieve this is underway in the form of an additional provenance layer to aid the existing blockchain based infrastructure.

REFERENCES

1. https://www.researchgate.net/publication/325096329_Secure_Digital_Voting_System_Based_on_Blockchain_Technology
2. https://www.researchgate.net/publication/331730251_Blockchain_And_The_Future_of_the_Internet_A_Comprehensive_Review
3. https://www.usenix.org/system/files/soups2022-poster61_ghesmati_abstract_final.pdf
4. https://www.researchgate.net/publication/345386992_Blockchain_Technology_and_its_Impact_on_the_Global_Economy#:~:text=Blockchain%20technology%20gives%20us%20that,has%20to%20go%20through%20today.
5. https://www.sciencedirect.com/science/article/pii/S0268401219302014
6. https://bitcoin.org/bitcoin.pdf
7. https://www.sciencedirect.com/science/article/pii/S1319157822000891
8. https://www.sciencedirect.com/science/article/pii/S1570826818300301
9. https://ieeexplore.ieee.org/document/8029379
10. https://www.researchgate.net/publication/331004486_A_Summary_of_Research_on_Blockchain_in_the_Field_of_Intellectual_Property
11. http://ijrar.com/upload_issue/ijrar_issue_20542993.pdf
12. https://ieeexplore.ieee.org/document/8457919
13. https://core.ac.uk/download/pdf/155779036.pdf