



ONLINE VOTING SYSTEM USING BLOCKCHAIN TECHNOLOGY

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Abstract

Voting is a fundamental privilege that all citizens have in a democracy, allowing them to select the future leaders of their country. It provides community members with the opportunity to express their opinions. It aids in their understanding of the value of citizenship. Online voting platforms are used to conduct votes and elections in a secure manner. As a digital platform, they eliminate the need to cast one's vote using paper or having to gather in person. They also prohibit voters from casting multiple ballots, preserving the validity of one's vote. The ability to vote from any location and on any internet-connected device enables the electronic voting system to increase user engagement. The blockchain is a newly developed, decentralized, and distributed technology with solid cryptographic underpinnings that have the potential to enhance numerous businesses in various ways. Here, a voting system based on blockchain will reduce voting fraud and streamline, secure, and improve the voting process. Face verification is used to identify a specific person, which will offer the user greater security and safety. The major goal of putting this idea into practice is to raise the voting rate in order to avoid false voting and relieve the voter of the need to travel to the polling location and also protect the user data from fraud.

Keywords: Blockchain, Decentralized, Face Verification, Security, Voting

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1. Introduction

1.1 Blockchain

A system that is un-hackable, open, and effective can be implemented with the aid of blockchain technology. The blockchain is the best tool for election systems because the information in blocks cannot be changed or deleted. [11] Blockchain technology is supported by a distributed network consisting of a variety of interconnected nodes. Each node has its own copy of the distributed ledger (information) that contains the total history of all transactions processed. The network is not under the authority of a single entity. The bulk of nodes will approve a transaction if they concur. This network permits users to stay anonymous. A basic analysis of blockchain technology (including sensible contracts) suggests that it is an appropriate basis for e-voting and furthermore, it might have the potential to revolutionize the systems. Blockchain systems are formed as decentralized networked systems of computers, which are used for validating and recording pure online transactions.

1.2 Smart Contracts

To speed up transactions, a set of rules called a smart contract is stored on the blockchain and executed automatically. [25] The purpose of a smart contract is to facilitate agreements between parties where each party is given priority and where agreements are carried out when the conditions of each party have been established. The lack of a middleman between the parties, along with the contract's inherent ability to execute, prevents the participation of any third party. Using the blockchain, a smart contract is a type of legal program.

1.3 Ethereum

Ethereum's objective is to serve as a substitute application for the development of open-source, decentralized applications. Ethereum does this by creating an abstract layer that serves as the basis for creating blockchain applications. Anybody may now express "smart contracts" and decentralized apps using the Ethereum platform, which allows them to create their own agreement standards. A record in Ethereum is a 20-byte address, and the state transition functions [10] presented a verified voting mechanism in which records In Ethereum, the state is formed up of what are known as "accounts."

multimodal biometrics systems is imparted together with the comparative analysis of biometric furtherance [2]. Ethereum does this by creating an abstract layer that serves as the basis for creating blockchain applications. The development of the Ethereum platform has made it possible for anybody to express "smart contracts" and decentralized apps in which they may create their own rules and justifications for ownership, exchange settings, and state transition settings, and the preceding block's hash is used to link each block to the one before it. A blockchain develops in this manner. The blockchain is encrypted and decentralized. Peer-to-peer networking is utilized. A shared ledger exists on this blockchain amongst network peers. Public and private keys are connected to each peer. All of the other peers in the network are aware of a peer's public key. A transaction has been submitted is not instantly added to the blockchain; instead, it is regarded as pending. There are some pending transactions for each peer in the network. This block of pending transactions is not yet part of the blockchain. In [4] the system performs well since a transaction takes less time than the suggested system, which lacks greater performance latency. [5] lengthy electoral procedure, as well as the grouping and aggregation of electoral ballots, are additional issues with paper-pin elections. In [6] designed a system that is handy to use and fulfilling the requirements of the voting system.[7] Each transaction inside the blockchain is validated by the consensus of a majority of the participants, which means that an activity cannot be considered without the permission of the majority network. In [8] A record in Ethereum is a 20-byte address, and the state transition functions are used to exchange values and data between the records. The state is made up of things called "accounts" in Ethereum. A nonce, a counter used to keep track of one-of-a-kind transactions, an account's "ether" balance, "contract code," and account "storage" make up an Ethereum account. An Ethereum Virtual Machine (EVM) is used by Ethereum nodes to store and process data. In [9], The country has been using the e-voting system since 2005, and in 2007 it became the first country in the world to lead in online voting. Since then, several organizations and countries, like the Austrian Federation of Students and Switzerland, have implemented a legally restricted online voting system. In this method, however, the election authority has the ability to read any vote.

Related work

Dr. S. Ravi et al. In [1] Has described a biometrics strategy that uses face, fingerprint, and iris recognition. To make the voting process more flexible and secure, It discusses the various biometrics unimodal systems' an online voting system with face verification has been limitations as well as authentication modalities and proposed. To avoid fake voting and protect the system their advantages and disadvantages. It is described how from being hacked, blockchain technology ensures that facial, fingerprint, and iris identification technologies the vote cast by the voter is immutable, and face have advanced. Subsequently, the stature of verification ensures that the vote is cast only by the

Proposed work

specific legitimate voter. For greater security, email verification with OTP will be implemented.

Consider two modules that will be finished in three phases for the suggested work plan. There are two modules:

1. The application's front-end
 2. Blockchain implementation on the backend using Solidity. Each of these components will be treated as a separate phase, with the remaining phase devoted to connecting and testing them.
- Phase 1: Covered the front-end module in this phase, where the development of the interactive

user interface for both the admin and the user, as well as face verification is done. A parallel study will be conducted on the deployment of Blockchain in a decentralized application.

• Phase 2: In this covered the back-end module, developing the Blockchain using the Ethereum framework, and transforming the system into a decentralized application in this step.

• Phase 3: The connection of two distinct modules, as well as platform testing, will be finished in this phase.

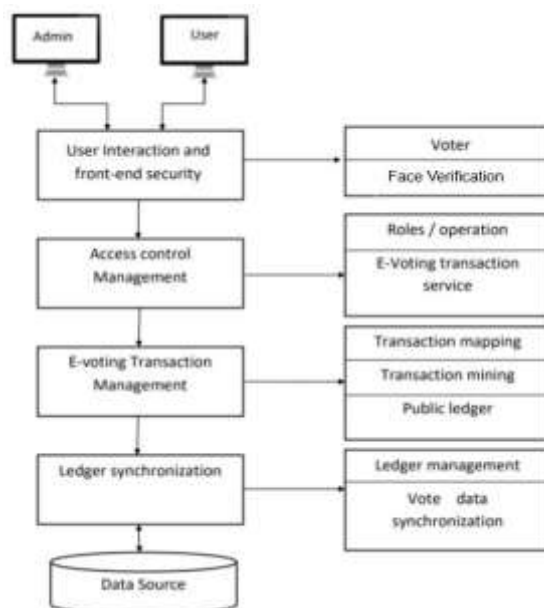


Fig 1. Flowchart

3. Results

The research work is [1] face verification of users for backdrops. The photographs are in JPEG or JPG format authentication and casting votes with blockchain and come in a variety of resolutions. Each pixel has a technology which increases more security of the 8-bit grayscale value between 0 and 255.

system and protects the overall election process from Face Recognition Module Metrics: -

fraud and hacking. In this part, the efficiency of the application was assessed, and suggested security checks. demonstrate experiments for face verification, for the purpose of validating the voter Face: The ResNet-34 model's performance is assessed using photos from the Georgia Tech Face Dataset. This

picture collection has 540 face pictures of 90 numerous individuals in varying settings, emotions, and

individuals in varying settings, emotions, and

1. Accuracy Score: 0.877640, corresponding to 87.7640%

2. Accuracy and Recall: The accuracy and recall for the face verification module are shown in the table.

	Precision	Recall	F1-score	Support
Micro average	0.88	0.88	0.88	88
Macro average	0.84	0.85	0.84	89
Weighted average	0.87	0.88	0.87	89

Table 1. Face Verification Module – Precision and Recall

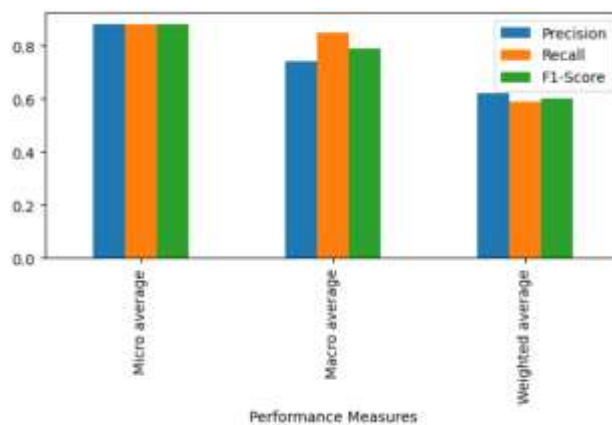


Fig 2. Performance Measures

When evaluated for faces with discrete feature vectors, User section has the following contents this system's face verification module performs admirably. It performs poorly when evaluated for faces with highly identical feature vectors, resulting in false positive results. As a result, the accuracy of our face recognition module is compromised.

Blockchain

A blockchain is a public ledger that is distributed, immutable, and indisputable. This innovative technology operates on four key levels:

- The ledger can be found in a variety of places: There is no single point of failure in the distributed ledger's upkeep.
- Distributed Control over who can add new transactions to the ledger.
- Any proposed "new block" to the ledger must refer to the prior version of the ledger, resulting in an immutable chain and prohibiting tampering with the integrity of earlier entries.

Attempts were made to create a user interface for the decentralized program that would make the voting process more convenient. A job that needs to be accomplished. The majority of this system is based on blockchain technology, which will be in charge of the dependable voting process.

Features of developed platforms are given below

Homepage

The homepage consists of two options:

- User: Needs to sign up first and then be able to login into the account
- Admin: from this admin can log in to their account.

Admin

Admin section has the following contents

- 1) Admin Login page
- 2) Admin Dashboard
- 3) Add Candidate Page
- 4) Create an Election Page
- 5) Candidate Details
- 6) Election details:

User

4. Conclusions

In this paper, an online voting method was introduced. The method assists in addressing the drawbacks of the present EVM-based voting system. The system prevents mistakes like a voter cast only once and then being unable to log in again to their account after the vote is cast, and it also confirms voter eligibility. It protects the integrity of the vote and is simple to use. The system is convenient to use from anywhere. The system consists of Voter id Verification along with Face verification which provides more security to the system as well as maintains user integrity. In the future, this technique may be enhanced by using 3D image recognition to accurately recognize the individual in the frame of a camera, eliminating the possibility of fraudulent verification of face patterns.[13] Additionally, the validation of fingerprint verification can be enhanced by incorporating Liveness detection examines the features of the finger to determine whether the input finger is real or fake. In the future, add voice-assistant features for people with disabilities so that they can cast votes easily.

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