

## Online E-Voting System

<sup>1</sup>Dr. P. Suresh Kumar, <sup>2</sup>Rachamalla Swetha, <sup>3</sup>Pendela Shravya, <sup>4</sup>Golla Sravani

<sup>1</sup>Department of Electronics and Communication Engineering, BRECW

<sup>2,3,4</sup>B.Tech Students, Department of Electronics and Communication Engineering, BRECW

### Abstract

*This paper enhances the online voting system by integrating thumb, face, and Aadhaar validation, ensuring secure and fraud-resistant voting. It proposes a shift from India's cumbersome offline system to a streamlined approach, enabling remote voting via two-step authentication using face recognition and OTP. Voters can also vote offline if preferred and verify their vote allocation. The system can support voting outside designated constituencies, simplifies tallying, and ensures quick result announcements by the Election Commission of India. Proposed system is more advance compare to the state of art e-voting systems. Proposed method provides higher security as it uses multi-level authentication than one stage authentication. Python programming and Django framework has been used for designing the proposed model.*

*Keywords: Online E-Voting system, Aadhar, Face, Thumb.*

### 1-INTRODUCTION

Online voting system is an electronic solution that allows citizens to exercise their voting franchise at any place. By adopting the features of the new technologies, it eliminates the physical implication of voting by polls station, but instead presents an efficient manner of voting. Compared to traditional systems, online voting is fast in election and result declaration, thus there is little difficulty in vote casting and less discouragement of voters. The main goal of online voting system is to eliminate variance and make the whole electoral process secure, fast and transparent. This Africa developed invention

aims at overcoming key challenges that are associated with physical and ICT-based voting systems like time intensity, extensive human resource demands, and possibility of fraud[1].

Thereby the various technologies such as face recognition, OTP authentication, centralized databases ensure the identity as well as the privacy of the election process. For voter identification, the online voting system to use the biometric technologies hence enhancing the security of the system. Biometric verification operates in two modes: enrolment- Here biometric data is stored in association with the voter's identity, recognition- here stored data is matched with the current input. The structure of fingerprints, iris or face, which are used in biometric data, cannot be replicated and therefore fraud-proof. These measures increase security and guarantee free and fair election [2].

Techniques used in the current elections comprise such mechanisms as electronic voting machines-and paper-voting equipment, all of which are exhaustive to operate. They demand a huge man power for voter authentication, movement and counting of EVMs, which involves higher chances of rigging. In conflict affected areas these systems are even more vulnerable. In this regard, more efficient and secure is an online voting system with no possibility for frauds, manipulations or any kind of interference. Online voting helps to reduce the complexity of conducting an election since participation can be done remotely without exposing the details of the result counting[3].

It eliminated paperwork, shortens the period of announcing the result, and increases the credibility

of the system. Insofar as the protection of voters' anonymity, and the impossibility of rigging the results, the online voting is a step forward toward a more secure and transparent democracy for India. Specifically, the necessary cooperation with the authorities, such as NADRA or the Election Commission, integrates the potential of the system to provide accurate voter registration and their identification during the election process for obtaining a stable and efficient election outcome[4]. In [5] Proposed a smart voting system using deep learning to offer efficient security in voting process, especially in avoiding frauds and effective validation of voters. Proposed a conceptual design of a university level e-voting using blockchain based, to enforce transparency, data integrity and secure election processes. In [6] They proposed an iris-detection-based authentication system that can make voting secure, applying distinctive eye pattern on evaluations to check the frauds while identifying the voters. In [7] Suggested the cloud-based online voting system promoting high scalability and accessibility to increase the voter turnout with increased security.

Proposed an online voting system [8] comprising three-factor authentication (password, biometric, and OTP) to enhance physical access to votes at the time of voting. raud and ensuring seamless voter validation. Developed a conceptual blockchain architecture for university-level e-voting, ensuring transparency, data immutability, and secure election processes [2]. In [3] Introduced an iris-detection-based authentication system for secure voting, leveraging unique eye patterns to prevent fraud and strengthen voter identification. In [4] Proposed a cloud-based online voting system aimed at scalability and accessibility, enhancing voter participation while maintaining data security. Presented an online voting system [5] utilizing three-step verification (password, biometric, and

OTP) to bolster voter identity verification and prevent unauthorized access. Voter authentication was discussed and the reliability and accuracy of fingerprint recognition was considered and recommended for use because fingerprints are unique to the owner[6]. Suggested an online voting with Aadhaar number for India, [7] incorporating biometric identification for voters' credibility and multiple voting prevention. on reducing fraud and ensuring seamless voter validation. Developed a conceptual blockchain architecture for university-level e-voting, ensuring transparency, data immutability, and secure election processes [2].

In [7] Introduced an iris-detection-based authentication system for secure voting, leveraging unique eye patterns to prevent fraud and strengthen voter identification. In [4] Proposed a cloud-based online voting system aimed at scalability and accessibility, enhancing voter participation while maintaining data security. Presented an online voting system [5] utilizing three-step verification (password, biometric, and OTP) to bolster voter identity verification and prevent unauthorized access. Discussed fingerprint recognition for voter authentication, emphasizing the uniqueness of fingerprints to enhance the accuracy and security of the voting system[6]. Proposed an Aadhaar-based online voting system for India, [8] integrating biometric ID verification to ensure voter authenticity and eliminate duplicate voting. Examined electronic voting technologies, and discussed their weaknesses, along with recommendations that could help enhance EV-related security and protect the elections. [9]

## 2-LITERATURE SURVEY

In our country, there are two methods we are allowed to use in voting, that is the paper ballot and the electronic voting machines. Sometimes people are involved in election fraud by doubled voting in

support of their most loved party which is taboo. To counter this we require a improved voting system. This paper suggests a new way: first, voters sign in and authenticate themselves through the facial recognition system and a PIN code. After that, an admin acknowledges the votes by entering a different one-time password in the system. This to the extent that this two-step process constitutes a major hinderance to people who wish to engage in acts of cheating. To check people's faces, we are using Local Binary Patterns and Convolutional Neural Network Technology. This new system makes the voting more secure and prevents cheating more effectively than the conventional methods. The following is the advantage of this new systematic.[1]

Digitalization has a lot of advantages especially, having large meetings in this pandemic situation. E-voting seems more feasible involving devices such as laptop, cellular phones, eliminates Errors and fraudulence usually seen with manual counting of votes. Further, and just as importantly, applications also save costs and infrastructural demands needed for the elections. This paper demonstrates design and implementation of an e-voting application specially designed for university elections with major concern in the encrypted functionalities and verification by using block chain. Using UML diagrams, the architecture has been formalized so that it can be repeated; initial actions necessary to implement the architecture are shown to indicate that the process can work. [2]

India is still the largest democracy in the word that practices election through either secret ballot voting or through electronic voting machines which are expensive, time consuming and cumbersome. In order to case problems like inadequate confirmation of votes and vote cloning, a biometric electoral authentication system is suggested. This system enables the user to input his iris scan and check this input with the rest of the images in the database

linked to the Aadhar database. The system proposed here also prevent(s) two people from voting and that only people sue has been registered are allowed to vote through the method of iris-based authentication. This approach improves the voting system's performance and efficiency as well as reduces dummy voters, targeting the system's strengths. In turn, iris scanning is conducted and matched against the stored data present in the database by employing Daughman's algorithms for identification. [3]

This research seeks to fill this gap to change the current voting system from manual voting to online voting for health, measurable practices and improved convenience. It is aimed to provide an online voting system with features that provides an indication of the policies of particular political parties, so that people can make proper decision. The new change of online voting allows people to easily participate by voting from any area that is connected to the Internet. Such a system has been designed and implemented by the author of this paper using Microsoft Azure Cloud Platform as a cloud platform, MS SQL Server 2012 as back-end SQL database, and C# as a programming language. [4]

Voting systems form the center of democratic nations and although current, manual procedures are prevalent in India, they are highly time consuming and need a huge number of people to work. In response to this, a move to online voting is suggested which will remove the physical aspect while improving the positive factors for a voter. There is some potential with online voting However the questions of security and authenticity still remain. To ensure the credibility and standard of the entire voting process, our study proposes a three-factor authentication mechanism, which includes face recognition, Aadhaar and voter card. [5]

Fingerprint scan as a form of biometric is one of the most common means of confirming system access,

instead of keys or other small accessory devices. The following paper aims at expanding on the system security and recognition accuracy with the help of new developments in the field of fingerprint-based biometrics. Scholars introduce a normalization framework for integrating fingerprints acquired from different sources. Issues include how to defend against attacks on user interfaces and format databases and do this with high security and accuracy. Further studies should focus on recognition accuracy in the conditions of low illumination and other difficulties and also consider new directions in the development of the problem. [6]

The current paper presents a new online voting solution for the Indian election. The system ensures greater security since the voter is required to enter his/her high-security password to have their vote record accepted in the main database of the Election Commission of India. Further, voters can ensure whether they want that vote has gone to that particular candidate or that party. The voting is made convenient as it can be conducted from any place including outside the specified constituency, and the process of counting votes is also simplified, and the Election Commissioner of India can announce the

results in a short period of time. [7]

### 3-PROPOSED METHOD

The proposed method for thumb, face, and Aadhar validation for online voting involves a multi-step authentication process to ensure the authenticity of voters. First, users are required to authenticate their identity using their thumb impression. Next, facial recognition technology is employed to verify the user's face against stored images.

Finally, Aadhar card validation is used to cross-reference the voter's details with the Aadhar database. By combining these three layers of authentication, the proposed method aims to enhance the security and integrity of the online voting process, mitigating the risks associated with fraudulent voting activities.

This project consists of following modules

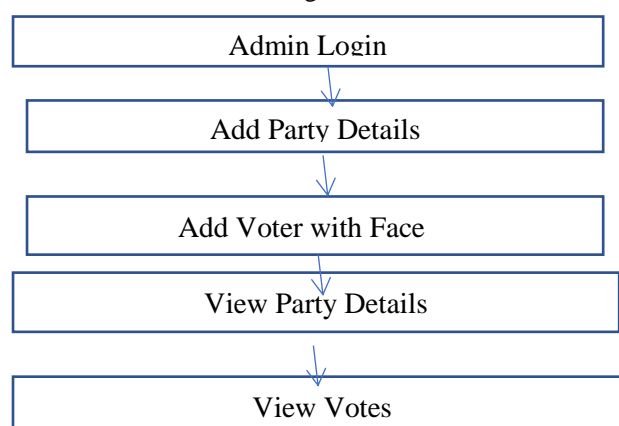
a) Admin Module

b) User Module

admin module has more authorities compared to user module. User side more authentications will be applied to avoid the unauthorized person access. Proposed method consider high level multi authentication for e-voting.

#### 3.1 Admin Login:

Admin module block diagram is shown below ,



**Fig.3.1 Block Diagram of Admin Module Functions**

admin can login to system using username and

password as 'admin and admin'.

**Add Party Details:** after login admin will add candidate and party details with their party symbol images

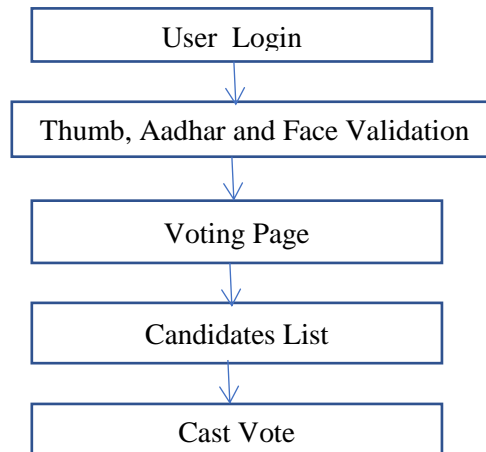
**Add Voter with Face:** admin will add voter details by taking input as AADHAR number, thumb image and then from webcam will capture face and then save all user details in database

**View Party Details:** any time admin can view all available party details.

**View Votes:** admin can view all votes count received by candidates.

### 3.2 User Login:

User module detailed functionality is shown as below,



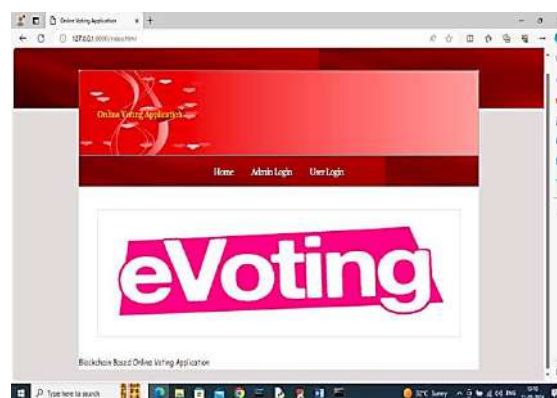
**Fig. 3.2 Block Diagram of User Module Functions**

user can login to system using username and password given by admin and then need to upload thumb image. If thumb and login details match then system will forward user to web cam where user has to show his AADHAR number and once AADHAR number validates with database then user will

forward to another page. User can click on ‘Cast Vote’ link to navigate to another web cam where he has to capture face and once face validate then user will be showing list of candidates and can vote desired candidate.

## 4-RESULT ANALYSIS

In the proposed application thumb, face and AADHAR validation for online e voting system is designed.



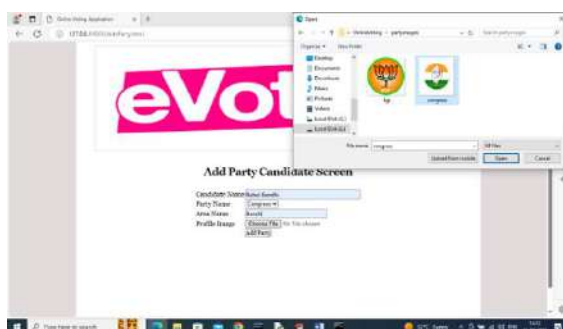
**Fig.4.1 Home Page of Proposed Application**

Proposed application home page is accessed in local server. The obtained page is prepared using HTML.



**Fig.4.2 Admin can Add Party Details and Voter Details**

In above screen admin can click on 'Add Party Details' link to get below page



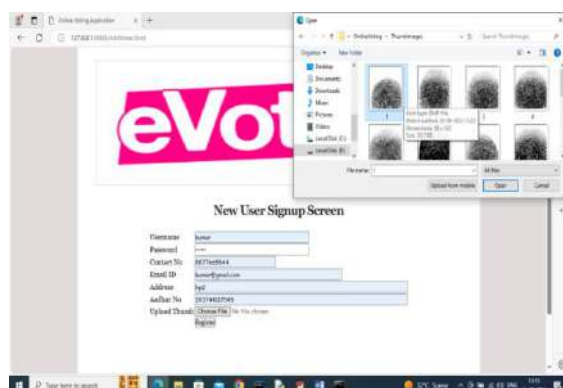
**Fig.4.5 Admin Adding Party**

In above screen admin adding party and candidate details along with image and then click on 'Submit' button to get below page



**Fig.4.6 Candidate Details Added**

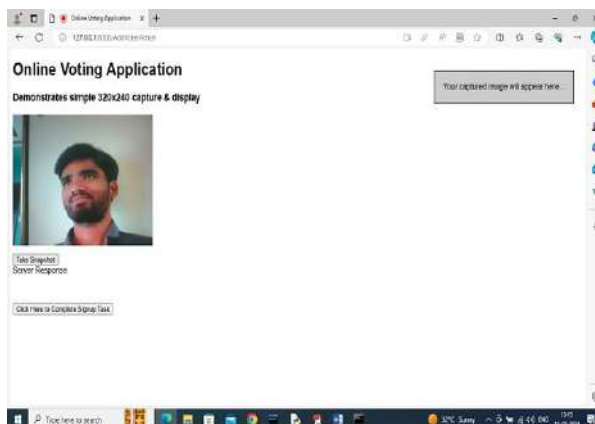
In above screen candidate details added and similarly you can add other candidates and now click on 'Add Voter with Face' link to get below page





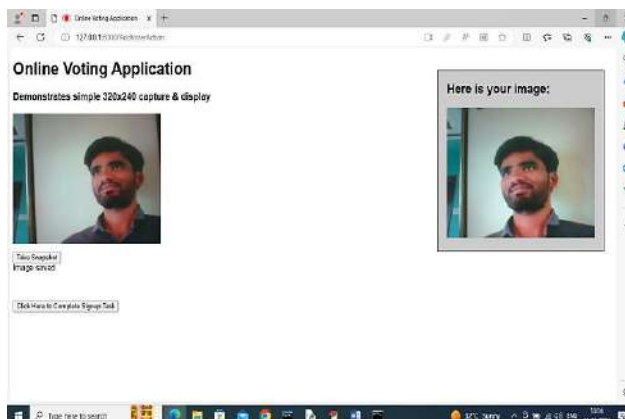
**Fig.4.7 Admin Will Enter All Voter Details**

In above screen admin will enter all voter details along with AADHAR number and thumb image and then press ‘Register’ button to add voter details and get below page to capture face



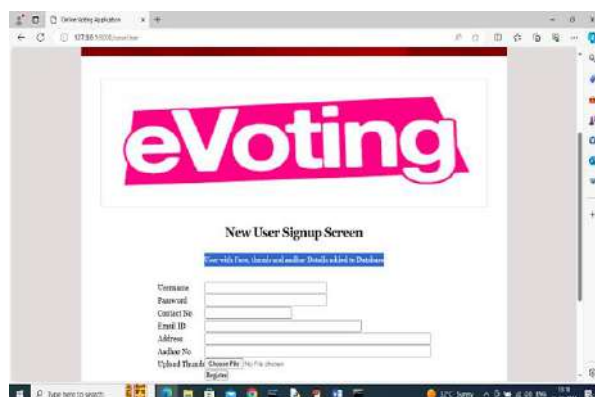
**Fig.4.8 Person Image on Webcam**

In above screen showing person image on webcam and then click on ‘Take Snapshot’ button to capture face and get below page



**Fig.4.9 Face Detected from Captured Image**

In above screen face captured and now click on ‘Click Here to Complete Signup Task’ button to complete adding voter details and get below page



**Fig.4.10 User with Face, AADHAR And Thumb Details Added**

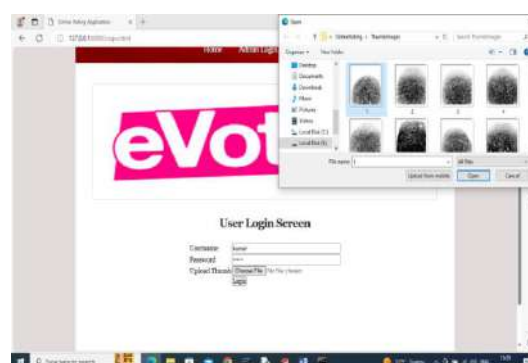
In above screen in blue color text can see user with Face, AADHAR and thumb details added to database. Similarly with clear faces you can add many voters to database and now click on ‘View Party’ Details link to get below

page



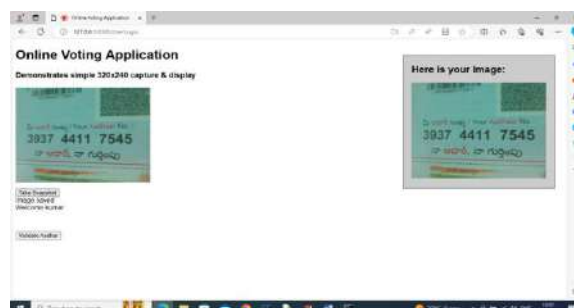
**Fig.4.11 Admin Can View List of All Available Candidate**

In above screen admin can view list of all available candidate details and now logout and as voter to cast vote



**Fig.4.12 User Login Page**

In above screen user is login with username, password and thumb image and then press button to get below webcam to capture AADHAR number and get below page



**Fig.4.13 Webcam Show the AADHAR Number Clearly**

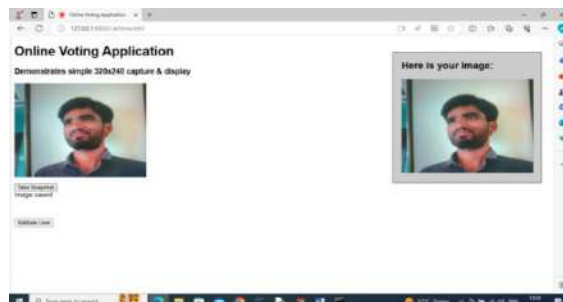
In above screen in webcam show the AADHAR number clearly and then click on 'Take Snapshot' button to check number is coming clearly in image which you can see in right side panel and then click on 'Validate User' button to get below page



**Fig.4.14 blue text can see AADHAR validated successfully**

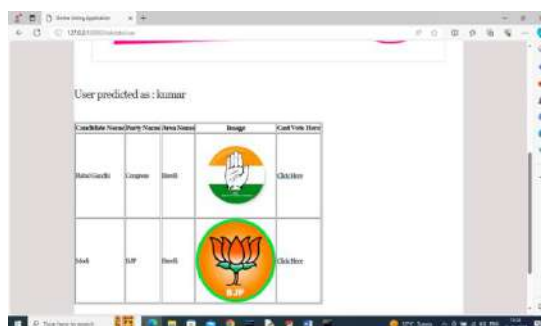


In above screen in blue text can see AADHAR validated successfully and now click on ‘Cat Your Vote’ link to get below webcam for face validation



**Fig.4.15 Take Snapshot**

In above screen showing person face and then click on ‘Take Snapshot’ button to take face image and then click on ‘Validate User’ button to validate face and if face validate then will get below page



**Fig.4.16 User is Predicted as ‘Kumar’**

In above screen can see from face, AADHAR and thumb user is predicted as ‘Kumar’ and now can click on ‘Click Here’ link beside desired candidate name to cast vote and get below page



**Fig.4.17 vote accepted for candidate Rahul Gandhi**

In above screen can see vote accepted for candidate Rahul Gandhi and similarly you can vote with any registered user. Now logout and login as admin to view vote count



**Fig.4.18 admin can view count of votes**

In above screen admin can view count of votes received by each candidate.

So above are the screens for online voting using thumb, Aadhar and face.

### 5-CONCLUSION

In this paper enhances the security and leads to sound outcome of the election. Biometrics like thumb and face recognition and Aadhar validation further augment the voter verification and effectively minimizes the pertinacious performances. The details of these performances are stated below: Therefore, this multiple- layered approach not only increases not only the effectiveness and precision of the voting system but also the voters' confidence in the fairness and openness of the election. In general, the inclusion of these authentication measures is a sign of desire to guarantee free, fair, and secure elections in the digital age.

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