

Biometric based Mobile Voting Application

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Abstract

With a population of more than one billion, India is the largest democracy in the world. Its electorate is more than 668 million people and includes 543 congressional districts. Each Indian citizen above 18 years of age is entitled to vote in elections to choose their leaders. The traditional method of voting involved paper ballot voting and at present Electronic Voting Machines (EVM) are employed. The goal of the mobile voting system research is to create a software that makes voting simple in all elections. This system aims to increase election security by using a fingerprint recognition algorithm for voter identity authentication. This allows all eligible voters to participate in the election from any place. There are some circumstances like COVID epidemic where a physical election is not feasible, and this model overcomes it. It helps to provide reliable, timely, and accurate election results. Voter ID, Aadhar ID and biometric system (fingerprint) are used by the website for user login.

Keywords: Democracy, Paper ballot, electronic voting machine, biometric system.

1. Introduction

Ancient Greece appears to have practised the oldest type of democracy since around 508 BC. In 1892, the United States received a patent for the first automated voting machine, and for nearly a century, it was the only nation using such technology. E-voting systems were first implemented in the 1980s in Brazil, India, the Netherlands, the Philippines, Russia, and

Venezuela. E casting a ballot isn't a panacea, yet when approximately carried out it is a very good apparatus for vote-based decisions. The electronic voting system also faced several insecurities like utilizing a default password for administration [1]. The machines were reported to make incorrect, unpredictable votes. There is also a risk of the commercial voting machine results are being changed by the company providing the machines or by a political party. The results of the elections may not be accurate with an Electronic Voting Machine (EVM).

The United States found that the electronic voting can possibly facilitate electoral fraud and also expensive. Yet, countries like India follows electronic voting system till today. India implemented electronic voting devices in 2004 for its parliamentary elections, with 380 million voters utilising more than 1 million voting machines [2]. Two government-owned defence equipment manufacturing companies, Bharat Electronics Limited (BEL) and Electronics Corporation of India Limited (ECIL), are responsible for the design and development of the Indian EVMs. Since from its development till today, this type of machines are being used in India.

As an evolution to the smart world, the online voting system can be an alternative to the current e-voting system. In Switzerland, Estonia, and other countries, as well as in Canada's municipal elections and the United States and France's party primaries, internet voting systems have become more and more popular. Subnational participatory budgeting methods, such as those in Brazil, France, the United States, Portugal, and Spain, have also made extensive use of internet voting. Online voting has faced heavy criticism on its security; however, the major problem of secret ballot exchange can be solved using it. End-to-end auditable voting systems are one suggestion for improving the security of online voting. These systems use encryption technology to let voters check that their votes have been correctly counted while protecting their privacy [5].

There is also a problem of duplicate casting of votes. The Mobile Voting System solves this issue by making use of the biometric (fingerprint) for user login and vote casting. The user information is stored in the database which is accessible only by the administrator.

2. Related Works

In numerous nations, the electronic voting system involving Global System for Mobile communication (GSM) has been utilized. When an individual cast a vote, a message is sent on

the modem through GSM. It contains the citizen's ID and proof, and then the system gets the decision of elector to vote against the competitor. The system provides a valuable feature to send their votes through the web by face, finger, recognizable proof and ID card data. Casting votes in the ballot is completed through the fingerprint. It then takes out the family members record structure dataset that is stored in the framework. A web casting ballot from both the individual and social perspective named NFS, shows the feasibility of several web casting methods that will be available in the future.

In short, remote voting system is divided into three types which are given below:

- **Vote Through Site:**

It gives convenience and reliability to electors; one could say that the polling of the voter can be done from any given site, and the vote counting technique would be both speedy and accurate. The huge benefit of this kind of casting is comfort and secure.

- **Booth Voting:**

In this kind of casting a vote, the voting machines are placed in the primary polling booth like schools, colleges, or other public places. The issue is the safety (authorities need to check them either by cameras or by visiting there).

- **Web Voting from Far Places:**

It appears to give the most comfort and participation to the voter to vote from the location where internet access is available.

By utilizing these voting types for election in the final voting day, the votes will be counted by the voters itself. It allows to count the votes in their district itself.

3. Proposed Work

The main goal of this research is to offer a safe online platform for conducting elections online from any location without any issues. The website can be used in both PC and in smart phones. The system is build using Python, JavaScript, HTML and CSS, and it has the following benefits:

1. The Python Django framework [6-13] is compatible with major operating systems and databases.
2. By using this, the web development process can be done faster.
3. Python provides robust security features and it is easy to use and implement.
4. The JavaScript and CSS is used to give the best user interface and experience.
5. Fingerprint recognition is also done using the python framework.

3.1 Flow Chart of the System:

The figure below (Fig. 1), depicts the flow of the proposed system.

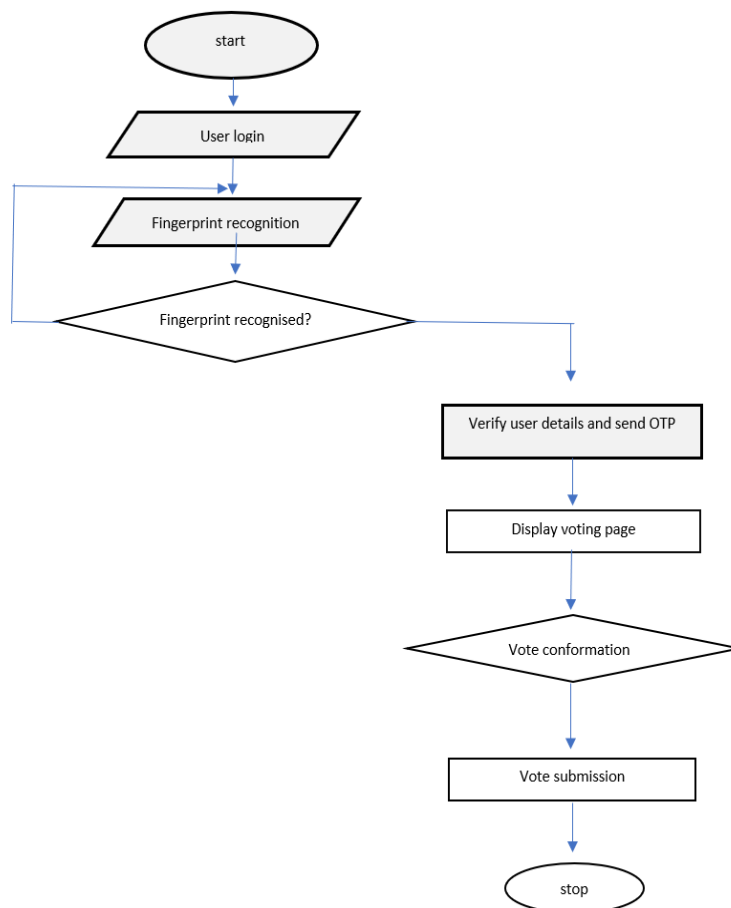


Figure 1. Flow Diagram of the Proposed Website

The major components of the proposed system are detailed below.

- **User Login:**

The user can log into the server using his/her voter ID, Aadhar number and date of birth. All the details given by the user is verified automatically by the software.

- **Fingerprint Recognition:**

The fingerprint recognition is a part of the user login page where the fingerprint is compared with the registered fingerprints in the Aadhar card of the individual. Using this, the false personation can be avoided.

- **Details Verification:**

For the verification and conformation of the user details, a one-time password is generated and sent to registered phone number of the user.

- **Voting Page:**

After successful login, the voting page displays the list of candidates. The user casts his/her vote to the preferred candidate. After casting the vote, once again a declaration is asked from the user. Once all the process is done, the voting page gets closed permanently for the particular user so that the vote cannot be changed in the future.

- **Administrator Works:**

The total votes casted in a day, total number of votes for each political parties individually are simultaneously updated in the database where the data is stored permanently. The administrator declares the results of the election with the help of this database. Also, the information is encrypted so that leakage of data is not possible.

The screenshots of the software are shown in Fig. 2 and Fig. 3.

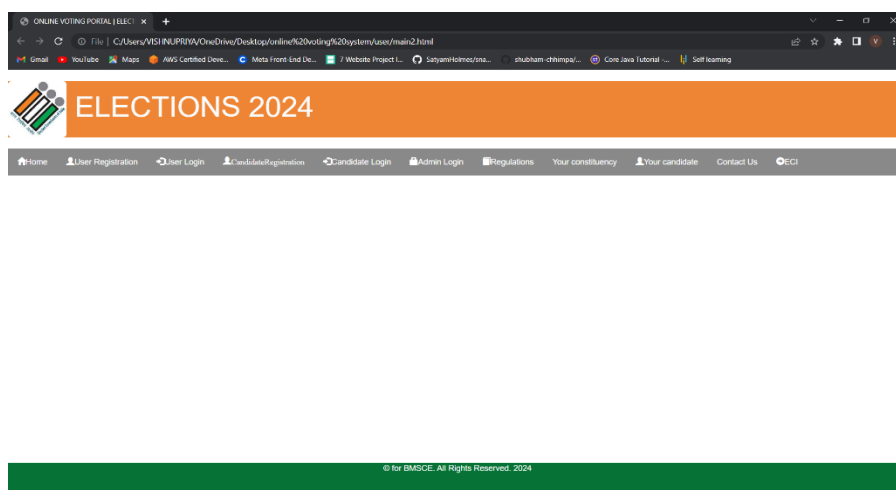


Figure 2. Home Page

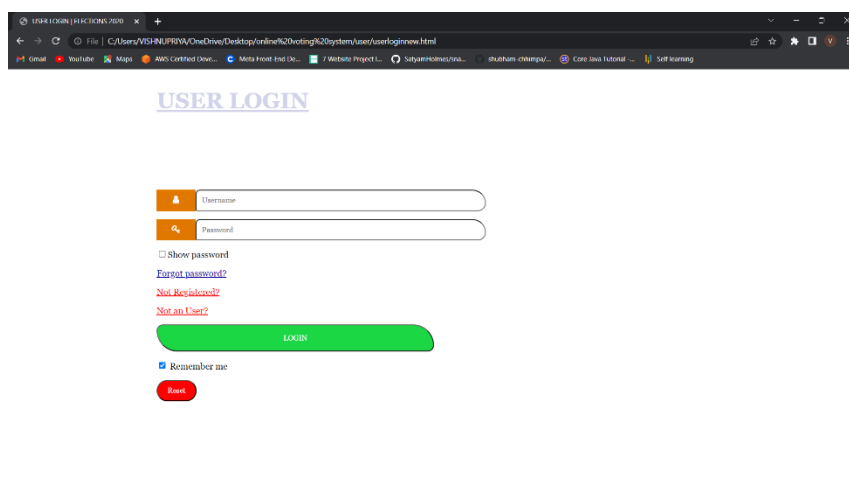


Figure 3. Login Page

3.2 Hardware Requirements:

- A mobile phone or a personal computer with internet connection.
- A fingerprint sensor should be connected to the personal computer or a mobile phone with fingerprint sensor.

The figures above demonstrate the view of the website. Fig.2 shows the home page with several tabs like user registration, user login, candidate login, admin login, etc. The

username and password for the portal will be the Aadhar number/voter ID and date of birth by default.

4. Results and Discussion

This study proposes a mobile voting system that makes use of fingerprint technology and user login address to offer a system that is simple to use, safe and protects cast ballots while also confirming the voter's ability to vote. This system also makes it simpler for many people, especially the elderly and people with disabilities, to access the voting process. Longer queues at polling places may be a disadvantage to certain voters and have an indirect impact on election results, while inefficient voting systems can have a direct impact on results by effectively changing voter choice. In this respect, the mobile voting method is successful in making the voting process more effective for smart phone users. Voting twice can lead to trouble. Voting and vote counting would be conducted much more quickly and accurately while also being more accessible.

In the future, if a moderate scanner is being used, the software will be able to determine whether the fingerprint being scanned is acceptable for encryption. To ensure that only authorized people are given permission to vote and not illegal people, the software will also check the false results of encrypted fingerprints for real-time voting processes. Additionally mobile identity will be used as an additional security.

The following bar graph (Fig. 4) shows the results of survey that was conducted among various colleges in Chennai to know the preferred mode of voting (mobile voting / electronic voting).

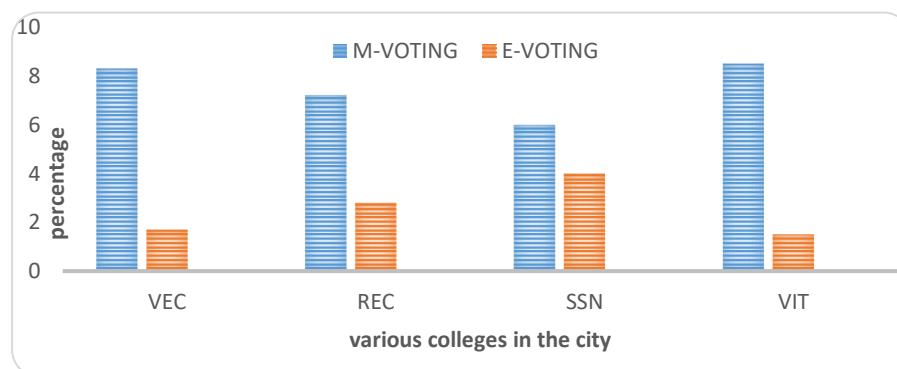


Figure 4. Survey Report

5. Conclusion

The voter's information will be managed by this mobile voting system, which will allow the voter to login and exercise his voting rights. All voting system functions will be included in the system. It offers the resources needed to track voter support for each party and tally the overall number of votes casted for each party. The election commission of India maintains a database that has all voter names and comprehensive voter information. Hence this software can be used in the future to conduct elections efficiently.

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Author's Biography

C. M. Nalayini is working as an Assistant Professor and has nearly 18 years of experience in teaching. She has published many research papers in International Journals, International Conference and National Conference. She has also published book chapters in Springer Book Series. She has given Computer Training to Government School Higher Secondary Students in Chennai. She has taken classes for Women Welfare SHG Group. She has authored books such as C- Programming and Programming and Data Structures-II. Her area of specialization is Network Security. <https://www.linkedin.com/in/c-m-nalayini-6a0875203/>

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