

ONLINE VOTING SYSTEM USING ADVANCE BIOMETRIC VERIFICATION

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Abstract: There are few things that bring us together as an election does. We stand in election, we vote in election in fact our democracy rely on election. The fundamental idea is that the politicians are given mandate in election who can take decisions on behalf of us. Therefore, the process of electing a representative or a group of people is known as voting. There are various ways to collect the votes such as ballot voting, postal voting, online voting and electronic voting.

In this report we are basically focusing on online voting method by keeping its security in mind and incorporating biometric techniques to enhance and increase the reliability on online voting system. We all are familiar with Electronic Voting Machines, where our vote gets registered electronically and we don't need to use ballot paper to vote in election. This report aims to describe about electoral system which is completely unbiased, automated and online. This will help to ease the voting process, increase security and reduce the counting time.

Keywords: Online voting, Iris scanner, EVM, biometric.

I. INTRODUCTION

Instant runoff voting or ballot voting, was invented by an American Professor named W. R Ware around 1870 who was working at Massachusetts Institute of Technology. The first government election to use IRV was held in 1870 in Queensland, Australia. India follows this method known as first-past-the-post (FPTP) in which voters indicates on a ballot the candidate of their choice, and the candidate who receives the most votes wins. This method is also known as “winners takes all” as there is only one winner with the highest number of votes.

This unique single voting method becomes easy to implement and handle online as there is only one vote by each candidate. But at the same time implementing this constrains needs more efforts and secure ways to make it available online by keeping all the threats in mind. Voting is very effective way to reveal opinion about an issue or subject from a group of people Based on the promise of greater efficiency, better scalability, faster speed, lower cost, and for convenience, voting has been shifted from manual paper-based processing to automatic electronic-based processing. The term “electronic voting” characteristically depicts to the use of some electronic means in voting and ensures the security, reliability, guarantee and transparency. These days a wide number of applications are used for voting in various scenarios such as student body elections, shareholder meetings, and passing of legislation in parliament. It may be the most important, influential and widespread use of voting which is used in national elections and speaking of national elections there are 204 countries in the world about them 120+ nation follows democratic or hybrid democratic method so electoral system is the heart of these nations.

II. EVM: ELECTRONIC VOTING MACHINE

Electronic voting system is abbreviated as EVM and it is widely used in Indian election. EVMs are manufactured by Bharat Electronics Limited and Electronic Corporation of India which are situated in Bangalore and Hyderabad respectively. EVMs are powered by 6 volt ordinary alkaline battery and this unique design enables EVMs to operate throughout the country without and any hindrance as several parts of India face power shortage or erratic power supply.

An EVM basically consist of two units, ballot unit and control unit and they are joined by a five meter cable. The balloting unit is responsible for voting as it contains labelled buttons indicating various party name and symbols. The voter is responsible for pressing a single button of their choice to cast the vote. As soon as a particular button is pressed by a voter, the vote is recorded and the machine gets locked for that particular candidate. Even if he/she presses the button several times, the system will record the vote only once. This is how Electronic Voting Machine ensures the principle of “One person one vote”.

The control unit controls the balloting unit. The EVM has a controller which contains the operating system and it is etched permanently in silicon at the time of manufacturing. No one can change the programming not even the manufacturer once the controller is manufactured and hence it secures the code. An EMV can record a maximum of 3840 votes and it can cater up to 64 candidates. If the number of candidates exceeds 64 then the conventional ballot paper voting method is used.

III. DRAWBACKS OF EVM

The electronic voting machine used in elections is susceptible to damage which may result in loss of data.

The electronic voting machine used in our country does not have the mechanism by which the voters can verify their identity before casting the votes. This may lead to fake votes and identity theft.

EVM does not generate a confirmation slip for the candidate as a result the criminal or hacker can manipulate the vote. If the machines can generate a slip, people can easily verify whether the numbers of votes captured via EVMs are in line with the slips received by the voter.

EVMs are designed to cater only 64 candidates at a time. If the number exceeds 64 then they have to switch to the traditional ballot paper voting technique.

IV. ONLINE VOTING SYSTEM

As we are moving from mechanical to digital era things which were once done physically can now be done digitally without any manual efforts like paying bills, ordering food, buying stuffs, booking cabs and so on. And hence the concept of ballot paper voting can be replaced by online voting where votes can be casted digitally and can be verified easily. Online voting has a huge scope in India and can make a wide impact on our youth. This can encourage more number of youths to participate in elections as it will provide a better voting system with features such as correctness, comfort, flexibility, privacy, verifiability and mobility.

A. ONLINE VOTING USING IRIS SCANNER

Online voting system can be implemented only when a person or the voter can be uniquely identified and this task can be performed with the help of a biometric system. Biometric verification means evaluating the identity of a person with the help of their biological traits such as fingerprints, voice, retina and iris and so on. The biological traits of a person vary from one another and no two people can have the same fingerprint composition or retina pattern and therefore it can be incorporated in our online voting system to make it more secure and fraud proof.

As fingerprint scanners are getting popular, they are widely used in different sectors such as banking, office, mobile, laptops and voting system due to its simplicity and effectiveness but it has a few drawbacks. We practically leave our fingerprints on everything we touch and it can be easily collected for illegal use. Fingerprint scanner also does not take into consideration when a person changes physically and sometimes it leads to false rejection if the scanning is not done properly due to sweat, dust or wound.

But on the other hand Iris Biometric promises to deliver a level of uniqueness that other biometric system cannot match.

B. IRIS BIOMETRIC

The highly randomized or unique appearance of iris makes it suitable for biometric verification. It is exceptionally accurate because of the following reasons:-

- It contains data-rich physical structure.
- Genetic independence.
- Does not change with time.
- Physically protected by cornea (a transparent window).

Iris image can be converted into a numeric code and this conversion is essential to use iris image as a verification method. This method was developed by John Daugman and with the help of this code iris can be compared easily. To compute iris code, the system requires good quality image in which the user's pupils are in focus and properly positioned.

1. Architecture of Iris System

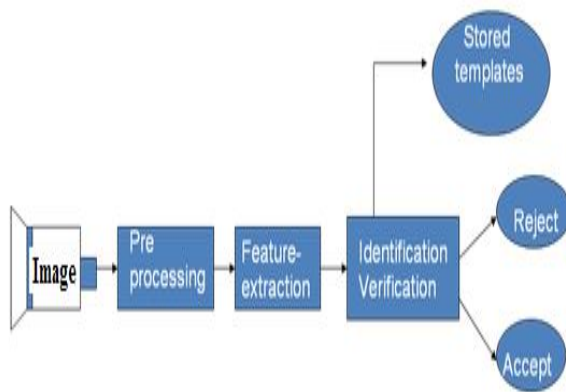


Fig 1 Architecture of iris system

The iris verification system is divided into mainly four blocks – high quality image of the pupil is taken, then pre processing is done to normalize and localize the iris pattern which is followed by feature extraction and finally identification is done by comparing the template with the templates stored in the database to grant or reject a request.

i. Pre-processing

The obtained image contains some useless part along with the iris such as eyelid, pupil and reflection which is not useful in determining the iris code. Therefore to analyse the iris the original image needs to be pre-processed. This pre-processing can be done in the following steps:

ii. Iris Localization

Iris localization is used to detect iris boundaries that are iris's inner and outer boundaries. This can be done with the help of Daugman's Integro-differential Operator for localization. Daugman's algorithm is based on this intergro-differential operator to find iris and pupil contour.

iii. Normalization

Daugman's normalization technique is used to transform a localized iris texture from Cartesian to polar coordinates. This method is capable of compensating unwanted variations of eye from camera due to the distance of eye from camera (scale) or position of eye from the camera (translation).

iv. Enhancement

Enhancement is also a part of pre-processing the acquired image. In this process Histogram Equalization is used to enhance the image in order to get proper intensity.

v. Feature Extraction

Feature extraction is an important process where two dimensional images are converted into a set of mathematical parameters. The iris contains unique features such as freckles, coronas; stripes etc and these features are collectively referred to as iris texture. These features are extracted and iris code is generated with the help of following algorithm:-

To create iris code feature extracted image is divided into 16 vertical blocks.

Step 1. Normalized image is of size 64X512. Divide the normalized iris image into basic cell region where each region has 64 (rows) x32(cols) pixel size for generation of iris code.

Step 2. We have to convert the 16 bit values into 16 bit binary values by considering the threshold as mean from each block.

Step 3. If the pixel value is greater than the threshold value make it 1 else go to Step 4.

Step 4. Make it 0.

Hence by following the above steps we can get the 16 bit binary iris code for biometric verification. This binary code is further stored in database as templates for comparison and identification.

vi. Pattern Matching

In pattern matching process the newly acquired pattern is matched against the database entry to evaluate the goodness of match between the pattern and database entry. If the pattern is matched successfully then the verification is accepted else it is rejected.

C. BLOCK DIAGRAM OF ONLINE VOTING SYSTEM USING IRIS VERIFICATION

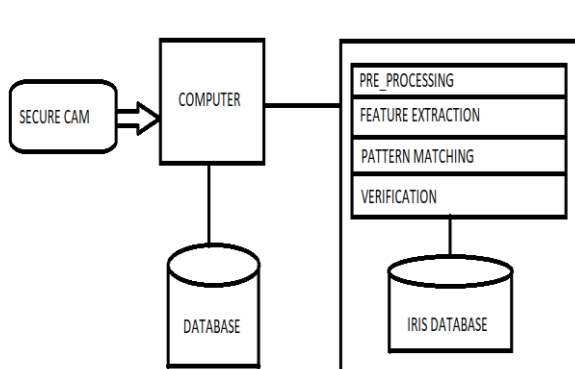


Fig 2 Block diagram of online voting system

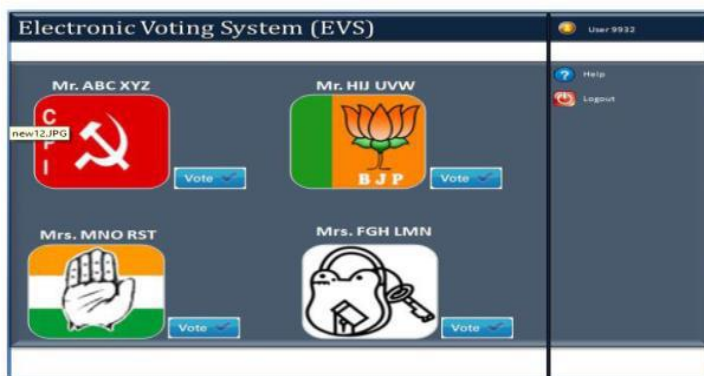
Online voting system basically consists of four elements – A secure camera for capturing high quality images of the eye. It contains a computer system for facilitating the voting process which is connected to a database to store the number of votes and candidate information. It is also responsible for processing the image, converting into iris code and comparing it with the stored template in the iris database for verification.

A. IRIS MATCHING



Fig 3 Iris matching authentication page

In this process of online voting system, the user scans their eye with the help of secure camera. Then that image is pre processed to remove the unwanted parts of the eyes such as eyelid, eyelash etc and to locate the exact iris. After that features are extracted and this two dimensional image is converted into a mathematical code. This code or template is then compared with the template stored in the iris database to verify the authentic user. Once the iris pattern is matched, access is granted to the user to proceed for the voting process.

B. VOTING PAGE**Fig 4 Voting page**

After successful login the authenticated user is allowed to vote only once for their respective choice of party and candidate without any interference, trouble or fear. It ensures the integrity of the user and prevents invalid or fake voting via biometric authentication.

CONCLUSION

Online voting system has a huge potential in future as every activity which was once done physically are done virtually as a result even voting method will revolutionize to meet the needs of future voters provided it is secure and reliable. And to create a secure system we have proposed a model of online voting via iris verification.

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