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Biometrics Technology based Mobile Voting Machine

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Abstract— The Voting process is heart of democracy and India is largest democracy in the world where every citizen above 18 years has right to vote. For good democracy, a voting system should be correct, transparent and fully authentic. Biometrics technology is very advanced and more accurate in secure and feasible authentication to the voters. The proposed voting system is mainly for those people who are not capable to come to the voting booth. This electronic voting machine is more secured and better than exiting voting process. The advancement in wireless and web technologies given rise to the new applications in e-Government services such as online tax filing, license renewal, and benefits claims. The proposed work uses android mobile OS to develop an application and fingerprint supported biometric control information to make voting process more secure. Using android smart mobile device makes the system even more robust.

Keywords— Electronic Voting, Mobile Voting, Android, Open Source OS, Fingerprinting Technology.

I. INTRODUCTION

In India, voting is an important tool to collect and reflect people's opinions. So it must be more efficient, reliable, and secure. Elections in India are conducted almost exclusively using electronic voting machines developed by a pair of government-owned companies, the Electronics Corporation of India (ECIL) and Bharat Electronics Limited (BEL).India spends lot of money to improve their whole voting system to provide a better government to their citizens. Traditionally, voting is conducted in centralized or distributed places called voting booths. Voters go to voting booths and cast their votes under the supervision of authorized parties. Earlier in India, the voting process was mostly manual and paper based. In election a voter used ballot paper to cast his vote. This process is time consuming and very much prone to security, error and fraud. To overcome some of these issues, now a day paper based voting system was changed to electronic voting machine which is more secured. But still voters have to take tremendous effort to cast their ballots.[1][2]

What is Electronic Voting System? It is a system where the recording, casting or counting of votes in political elections and referendums involves information and communication technologies.[1][3]

Electronic voting machines cleared up lots of problems and barriers faced by the paper based voting process, but still people neglect that aspect of their civil right because the registration process is tedious and they have to take tremendous effort to cast their ballots. Voters have to go voting booths stand in long lingering line on the day of voting. Because of long lingering line, voting process which is actually few minutes process, takes whole day of people. For a variety of reasons, voters may be unable to attend voting booths physically, but need to vote remotely, for example, from home or while travelling abroad. Hence, there is great demand for remote voting procedures that are easy, transparent, and, most importantly secure. Another reason for the lack of participation within the voting process is that of security. In some cases political riots may occur because of different allegiance to the various political parties. Voters may not want to turn up at the polling station in fear that.

Voting for any social issue is essential for modern democratic societies now a day. So it is becoming very important to make the voting process more easy and efficient. In other hand the rapid development in operating system of the mobile phones gives rise to the application development on the large scale. This paper presents voting system on android mobile with biometrics authentication. The main reason behind the tremendous development in android application development is that the android is an open source operating system. It means that the developers can have customization rights. As well as the SDK provides tools to build and run android applications. The paper is divided in four parts. The first part describes the literature survey i.e. Indian Voting Machine. Then the further parts will describe about the proposed Android Mobile Voting architecture, System Development, Technical Specifications like advantages and disadvantages.

II. INDIAN VOTING MACHINES.

Electronic Voting Machines ("EVM") are being used in Indian General and State Elections to implement electronic voting in part from 1999 elections and in total since 2002 elections. The EVMs reduce the time in both casting a vote and declaring the results compared to the old paper ballot system. Indian voting machines use a two-piece system with

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a balloting unit presenting the voter with a button (momentary switch) for each choice connected by a cable to an electronic ballot box.

An EVM consists of two units:

- Control Unit
- Balloting Unit

Fig 1:Bollot unit(left), Controll unit(right)

Electronic voting process can be divided into different phases [3][4]:

A. Authentication: In this phase, voter authenticates by showing his or her voting card, this step is public and verified by the presiding officer. At the end of authentication process, presiding officer allow to voter to cast his or her vote.

B. Vote: The vote takes place in a protected booth where ballot unit is placed .This will enable the voter to cast his vote by pressing the blue button on the Balloting Unit against the candidate and symbol of his choice.

C. Vote counting: At the end of voting time, the control units are delivered to a counting center. In public view, an election official breaks a seal on the control unit and presses the RESULT I button, shown in Figure 1. The display on the control unit shows the number of votes received by each candidate and the results are then announced by election commission of India.

This EVM is a simple machine that can be operated easily by both the polling personnel and the voters. It cleared up lots of drawbacks and problems of the paper based voting process but still there are some major issues with this system. The security issue is the main concern of the electronic voting system. So far, there are still many classes of attacks which are tough to thwart completely. The EVMs operate on electricity service, and in India, there is many places where is no continuous power supply. Most serious one is,Indian EVMs are easily hackable. So It is the necessity to build the more secure and accurate voting machine.[4]

III. BIOMETICS TECHNOLOGY

A. What is Biometrics?

Biometrics is the science and technology of measuring and analyzing biological data. In information technology, biometrics refers to technologies that measure and analyze human body characteristics, such as DNA, fingerprints, eye retinas and irises, voice patterns, facial patterns and hand measurements, for authentication purposes.

B. How do biometric systems work?

Biometrics systems work by recording and comparing biometric characteristics. In many cases, characteristics are recorded as images, but for speaker recognition a waveform is recorded, and for signature recognition, time series data. For efficiency reasons, rather than using recorded characteristics directly, it is usual to extract identifying features from the samples and encode these features in a form that facilitates storage and comparison.[5]

C. Fingerprint recognition

Fingerprint recognition identifies people by using the impressions made by the minute ridge formations or patterns found on the fingertips. Finger printing takes an image of a person's fingertips and records its characteristics - whorls, arches, and loops are recorded along with patterns of ridges, furrows, and minutiae. Information is processed as an image and further encoded as a computer algorithm.

It is one of the most developed biometrics, with more history, research, and design. Since the information in the database is encoded with a mathematical algorithm, recreation of a fingerprint is extremely difficult on even a limited scale with most modern systems. In most cases no image of the fingerprint is actually created, only a set of data that can be used for comparison. Over the years fingerprint recognition has become one of the most widely used biometric technology with a number of civil and criminal automated fingerprint identification systems (AFIS) in use across the world.[6][7]

IV. PROPOSED ARCHITECTURE

Mobile technology has attained heights and the market trend is that every citizens of India will possess a mobile handset by the year 2020 (at cheaper rates of service.) When such a GSM is available why not using it for a time saving, cost effective, secured method of voting. [8][10]

In proposed system where the voting machine works on an embedded system with a memory unit kept at the main office. The machine can be used for normal voting and mobile voting also. The mobile users have to dial from registered phone number and follow the instructions using a password already provided. The machine is very useful and can be used for infinite users with very high security, as the main memory unit will be kept with the Central office, which makes the booth capturing virtually impossible.

For security and confidentiality of voter which cannot be altered, this proposed system uses Biometrics Technology and cryptography. Biometrics technology is an irrefutable verification or identification of a person by various

physiological characteristics, which cannot be transferred or copied.[6][7]

Elections in India are conducted by Election Commission of India. To explain the proposed Mobile Voting application, the Election Commission office should be maintain information of eligible voters and set of participants who tries to access the E-voting application which use the application available on Android smart phones. For the implementation of the application on the Android phones, it is assumed that every voter's device associated to its owner, through a validation database. Even though the system enables voters to poll their vote from anywhere, initially the voters should have to provide their voter id number to authenticate themselves and establish their user-ids.[1][2][3]

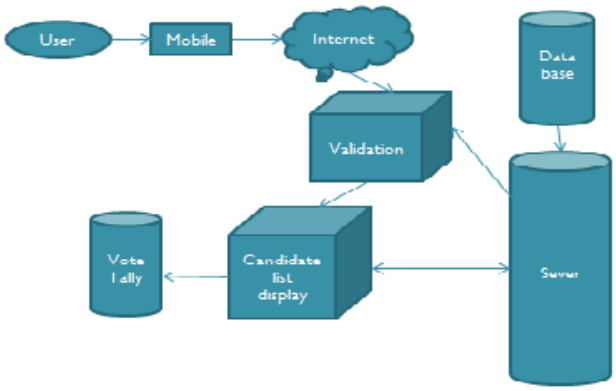


Fig.2 Architecture of Mobile Voting System

For the purpose of this research the smart phone must be compatible with the Android 3.0 Operating System. The mobile company will register the SIM and phone identity to the individual. Users will go to their constituency office to register their information in voter's list and get their fingerprints scanned along with the verification of residential addresses and other personal information. This information will be authenticated at the Authentication Centre. It is of most importance that the system should be highly secured. The biometric data, cryptography and the use of a secure socket layer technology will enforce the level of security needed. The Architecture of the proposed system and is shown in Fig.2.

With the Android 3.0 it offers all the tools developers need to create incredible visible in interaction experiences on the devices, which includes but not limited to: [9][11]

- Fast and easy to create great apps
- High-performance 2D and 3D graphics
- Enhancements for enterprise
- Compatibility with existing apps
- High security
- SQLite
- Large screen.
- High tech camera.

V. WORK FLOW

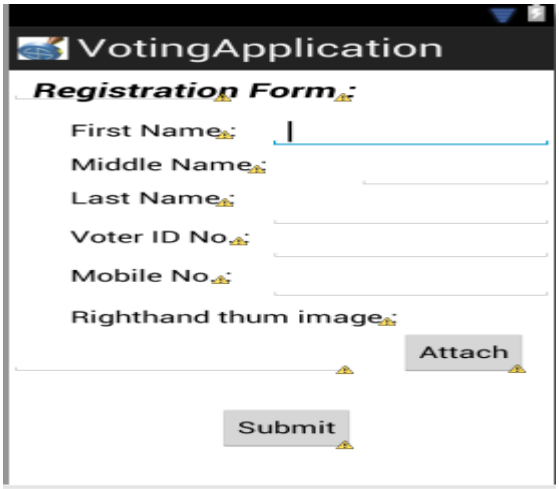
The structural outline process of mobile voting system is as below:

1. Voters and prospective voters will open the main menu page with two options, Registration and Voting Process.
2. If the user intends to Voting process from his mobile device then they he should register his mobile number by passing his information.
3. If user is authenticated and identified then he will get fingerprint image and URN(unique reference number) for login.
4. If the user have already registered and authenticated by his/her finger-print then they can login for voting process using their Finger-print image and URN.
5. The fingerprint information is encrypted and sent to the government server along with the voter's ID.
6. After authentication and identification, the candidates list will open and user can cast his vote.

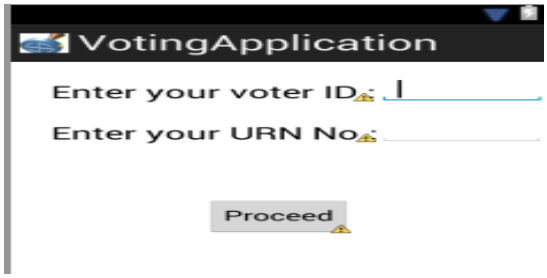
VI. ACTUAL RESULTS

Step 1: Press enter button on Welcome page then go to Instructions and Rules page. From that page user can go on Module page where he has to choose one of options.

2: If user is not registered user then he has to go registration option and fill the form as shown in below.



Step 3: If user is registered voter then he can directly go with voting process option where login window will display for identification and verification of user.

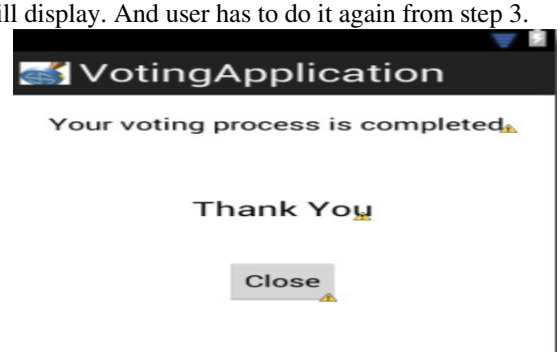


Step 4: If voter is verified then it will display candidate list, otherwise it will show failure message.

Step 5: Voter has to select only one candidate and give confirmation about his vote on confirmation window popup window.

Step 6: Control System will store this vote in Government database and block the user so that he can't vote again.

Step 7: If all this voting process did correctly then system will display thank you window, otherwise failure message will display. And user has to do it again from step 3.



VI. TECHNOLOGY REQIREMENTS

The most important requirements for e-voting can be characterized as:

- Eligible voter is authenticated by his/her unique characteristics.
- Eligible voters are not allowed to cast more than one vote.
- Votes are secret.
- Auditors can check whether all correct cast ballots participated in the computation of the final tally.
- Result of election should be secret until the end of an election.
- While voting is on, there should not be a method of knowing intermediate result that can affect the remaining voter's decisions.
- All valid votes must be counted correctly and the system outputs the final tally.
- It must be possible to repeat the computation of the final tally.

VII. CONCLUSSION

India is a constitutional democracy with a parliamentary system of government, and at the heart of the system is a voting. The main purpose of this paper to develop a time saving, cost effective, secure E-voting application on an android platform. The system in on Android smart phone which itself is a portable device so the system is portable.

Because of fingerprint recognition, proposed system is greatly improved. By using the biometric and password security the authentication process of system is highly secured. Which makes Voting process for users easy, time saving safe and secure. It will help to reduce bogus voting and vote repetition, means more transparency and fast results.

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