Mobile Voting Using Finger Print Authentication

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Abstract—In today's world due to advance technology and rapid growth of mobile technology the old voting methods can be changed to the advanced technology. The Mobile voting system provides an convenient, easy and efficient way to vote. This guarantees a safe and efficient way of voting. This research paper provides the specification and requirements for Mobile Voting which is on Android platform. Mobile voting means voting from an android device. The Android is used to develop the application.

Keywords—mobile; voting; digital voting; one time password(otp)

I. INTRODUCTION

In India after every 5 years election of government is held. Voters are expected to be come to voting booth and give their vote by standing in long queue to simplify the process of voting and allowing voter to vote by sitting at home with simple fingerprint verification. The paper done is mainly concentrates on simplifying the way voting is held in India. With the vast population and many smart phone users our android application can be used sophistically for voting purpose by just registering on application and using it to vote. The voting/polling process by registered voters in India is very cumbersome. So many cases of missing data in the voter registration files have been reported. There are also scenarios where unregistered voters flock in the polling centers as "Dead Voters" to participate in the voting process. Even after voting, malicious clerks and officers-in-charge of a polling station end up playing with the results figures. This results in the release of wrong results leading to cases of post election violence .The application will be developed in Android operating system. The main reason of selecting Android because it is open source. The advantage of Android system is that it can get customized rights for developers. This paper will be describing the basic idea of mobile voting its advantages and disadvantages.

A. Significance of study

The main purposes of Android Application include:

- Provision of improved voting services to the voters through fast, timely and convenient voting.

- Reduction of the costs incurred by the Indian Electoral Commission during voting time in paying the very many clerks employed for the sake of the success of the manual system.

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- Check to ensure that the members who are registered are the only ones to vote. Cases of "Dead People" voting are also minimized.

- Online voting system Using Android will require being very precise or cost cutting to produce an effective election management system.

- Therefore crucial points that this emphasizes on are listed below.

i. Require less number of staff during the election.

ii. This system is a lot easier to independently moderate the elections and subsequently reinforce its transparency and fairness.

iii. Less capital, less effort, and less labor intensive, as the primary cost and effort will focus primarily on creating, managing, and running a secure online portal.

iv. Increased number of voters as individual will find it easier and more convenient to vote, especially those abroad.

B. Objectives of the paper

The specific objectives of the paper include:

- Reviewing the existing/current voting process or approach in India;

- Coming up with an automated voting system in India;

- Implementing a an automated/online voting system;

- Validating the system to ensure that only legible voters are allowed to vote.

C. Justification

The paper shall reduce the time spend making long queues at the polling stations during voting. It shall also enable the voters to vote from any part of the globe as explained since this is an online application available on the internet. Cases of vote miscounts shall also be solved since at the backend of this system resides a well developed database using MYSQL that can provide the correct data once it's correctly queried. Since the voting process shall be open as early as possible, the voters shall have ample time to decide when and whom to vote for.

D. Scope of Study

It is focused on studying the existing system of voting in India and to make sure that the peoples vote is counts, for fairness in the elective positions. This is also will produce:

- Less effort and less labor intensive, as the primary cost and focus primary on creating, managing, and running a secure web voting portal.

- Increasing number of voters as individuals will find it easier and more convenient to vote, especially those abroad.

E. Limitation of study

Time factor was the greatest barrier to the successful completion of this exercise since it had to be done within the semester. I also had financial constraints since all the activities involved were self-sponsored. The time that is been consumed and the resources often times runs into expensive papers. With all this, security is compromised because of the inability of all the human factors to provide efficient security needed for robust operation of the system. The full potential of getting the citizen to express their democratic rights is not being realized because persons find it tiresome and time consuming, first to enumerate (register for voting) and then to stand in long lines to vote on election. In some areas persons are fearful of their lives and forced influence voting. The counting of ballots can also be rigged and very much time consuming and often times results are not tallied quickly enough. Tallied results seem uncertain and the credibility of the calculation is often times questioned. Semi-technological systems had solved some of these issues but create access to more problems such as persons breaking through the system to vote multiple times because of lack of strong security. The proposed system addressed these challenges which brings the application of Biometric i.e. Fingerprint towards voting from the mobile device where people can vote to any party of their choice from anywhere and also Registration can be done over the internet from mobile device itself except for registering the fingerprint where you have to visit the electoral office

II. LITERATURE REVIEW

A. Paper based Voting.

The voter gets a blank ballot and use a pen or a marker to indicate he want to vote for which candidate. Hand-counted ballots is a time and labor consuming process, but it is easy to manufacture paper ballots and the ballots can be retained for verifying, this type is still the most common way to vote. Appropriate training will have to be provided for the staff members in charge of polling duty. During the day of polling, the concerned staff members are required to be present half hour prior to the opening of the polling booth/station to check that all arrangements have been done correctly. After voting, the counting of ballots will be looked after by another group of officers. With all these steps, groups and procedures that are involved, the process can prove to be tedious, error prone and costly. Some introduction of technology currently in the Jamaican system, however, makes the process semi manual, but this is far from what could be really accomplished by a fully ICT driven process. The semi manual process only allows the government to store voters' information on a database, which can be retrieved on a computer on the election date to facilitate faster searches.

B. Lever Voting Machine.

Lever machine is peculiar equipment, and each lever is assigned for a corresponding candidate. The voter pulls the lever to poll for his favorite candidate. This kind of voting machine can count up the ballots automatically. Because its interface is not user-friendly enough, giving some training to voters is necessary.

C. Direct Recording Electronic Voting Machine.

This type, which is abbreviated to DRE, integrates with keyboard; touch screen, or buttons for the voter press to poll. Some of them lay in voting records and counting the votes is very quickly. But the other DRE without keep voting records are doubted about its accuracy. A direct-recording electronic (DRE) voting machine records votes by means of a ballot display provided with mechanical or electro-optical components that can be activated by the voter - typically buttons or a touch screen; that processes data with computer software; and that records voting data and ballot images in memory components. After the election, it produces a tabulation of the voting data stored in a removable memory component and as printed copy. The system may also provide a means for transmitting individual ballots or vote totals to a central location for consolidating and reporting results from precincts at the central location.

D. Punch Card.

The voter uses metallic hole-punch to punch a hole on the blank ballot. It can count votes automatically, but if the voter's perforation is incomplete, the result is probably determined wrongfully. A voting system includes the practices and associated documentation used to identify system components and versions of such components; to test the system during its development and maintenance; to maintain records of system errors or defects; to determine specific changes made after initial certification; and to make available any materials to the voter (such as notices, instructions, forms, or paper ballots). Traditionally, a voting machine has been defined by the mechanism the system uses to cast votes and further categorized by the location where the system tabulates the votes.

E. Optical Voting Machine

After each voter fills a circle correspond to their favorite candidate on the blank ballot, this machine selects the darkest mark on each ballot for the vote then computes the total result. This kind of machine counts up ballots rapidly. However, if the voter fills over the circle, it will lead to the error result of optical-scan. An advantage of these systems is that the voters don't have to learn to use a voting machine. Physically able voters can simply use pen and paper to mark their intent. Some disabled voters could use a machine to print a voted ballot, which can then be fed into the optical scanner along with all the other ballots, thus preserving the secrecy of their ballot. Optical scan voting systems can allow for manual recounting of ballots. Statistically relevant recounting can serve as a tool to detect or deter malfunction or fraud. Once an error in the counting process is suspected a full recount can determine the proper results. An advantage compared to DRE voting machines is that even if the optical scanner fails, voters can still fill out their paper ballot, and leave it to be scanned when the machine is fixed or replaced with a spare. This also allow many more people to simultaneously vote than would be the case with fully computerized voting.

F. Smart Card Voting

With the use of the smart cards and kiosk there was a significant leap in voting technology, as persons were able to vote within their own comfort zone or that was the intension. The need for the various human security bodies was eliminated.

However, everyone who is eligible to vote would have to have a pre-program smart card. The voting Kiosk is where all the action is located. To start, the voter must place the voter token into the slot. The voting kiosk will seize this token until the voter has successfully voted. After the token has been seized, the kiosk will verify that this token is valid authentic, this is done by looking at the RV signed token, timestamp and the polling site id. This system however, has flaws on security aspect and voters could vote multiple times. In addition, persons may have to stand in long queue to cast their votes. Taking the above aspects into consideration, we here propose a Biometric authenticated Mobile voting system for Jamaica in the first instance, which would use authentication using Fingerprint and voting using the mobile device id i.e. IMEI number, as main security mechanisms. Now before going into the details of this proposed system, we would briefly review security schemes that would be used for mobile voting.

III. SYSTEM SPECIFICATION

A. Proposed System

The Online Voting should:

- Be able to display all registered voters in the database to the SYSTEM ADMIN(s) as per their access rights and privileges.

- Have a user-friendly interface and user guides understandable by people of average computer skills.

- Be robust enough so that users do not corrupt it in the event of voting.

- Be able to handle multiple users at the same time and with the same efficiency, this will cater for the large and ever growing population of voters.

B. Requirement Specification

A system should meet the following requirements for it to run the MOBILE VOTING SYSTEM:

- Web browsers: Mozilla Firefox, Google chrome, Opera and Internet Explorer, MYSQL DBMS, Wamp Server, Macromedia Dreamweaver 8, Programming language such as JAVA and XML.

- Smart phone running on android or any third party android emulator.

- Windows OS Xp, Windows Vista or Windows 7. At least 2.0 GHz Processor speed, At least 40 GB Hard Disk Capacity and 512 RAM.

C. Functional Requirements

- Secure storage and retrieval of voters' details from the database.
- Enable secure login of voters, that is to say non-legitimate voters should never be allowed to login to the tool, these include the under aged and non nationals.
- Maintaining and manipulating records in database through functions like edit, delete, and view.
- Validate and verify input and output data.

IV. VOTING ON ANDROID

A. Difination about system users.

To explain the system proposed by methodology, two types of users were defined. set of participants who tries to access the E-voting application and set of eligible voters which use

the application available on smart phones. For the implementation of the application on the smart phones, it was assumed that every device is associated to its owner, through a validation database.

B. Application Design

1) Flow Chart
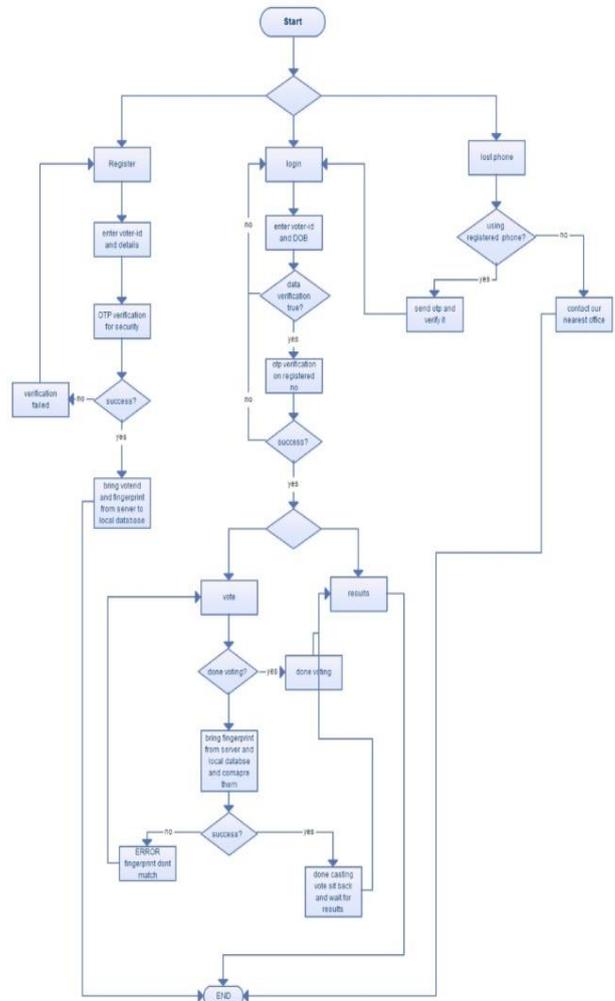
Fig.1

The Flow chart of the mobile voting shows the sequential flow of how the data passes from one activity to another. It starts from Registration, Login and Forgot password .The Fig 2 shows the initial screen when the application starts. It has the login form, registration and forgot password and then continues.

- Register: - This option is used when the user is first registering through the application. It will take them to a registration screen

- Login:-This option allows us to log us in for voting.

- Forgot Password:-This allows us to change the password when we have lost or forgotten the password.

- Result Activity:- The task of voter registration is strictly preserved for the system administrator. Therefore if you are logged in as a mere user/voter, you don't have this privilege, therefore, the registration page link is disabled for you

- OTP Activity: - The task of OTP(one time password) is to send an mail on the registered mail after logging in the account, so that we can cast vote only after we are authorized to do so by the otp.otp sends us an random message on our email ie an random number and then we can insert the number to vote.

- Home Activity:- Each user once logged in, it means you are a legitimate user of the system. You are therefore given the privilege to visit the voting activity where you are introduced to the aspirants for a given post before casting your vote.

- Voting Activity: - After voting, a voter is allowed to check the results by visiting the results page.
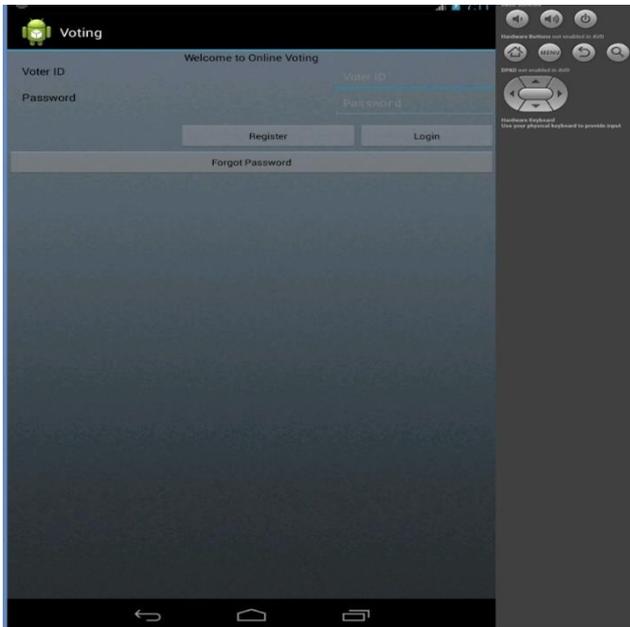

Fig.3

Fig.2

After Login the home activity is shown in Fig 3,were different options like cast vote, result change password will be shown for voting will be show. In Fig 4 after selecting the cast vote option an otp(one time password) will be generated and then it will be send to our email which we register during registration. After entering the otp the Fig 5 which has list of parties will be displayed as shown below.
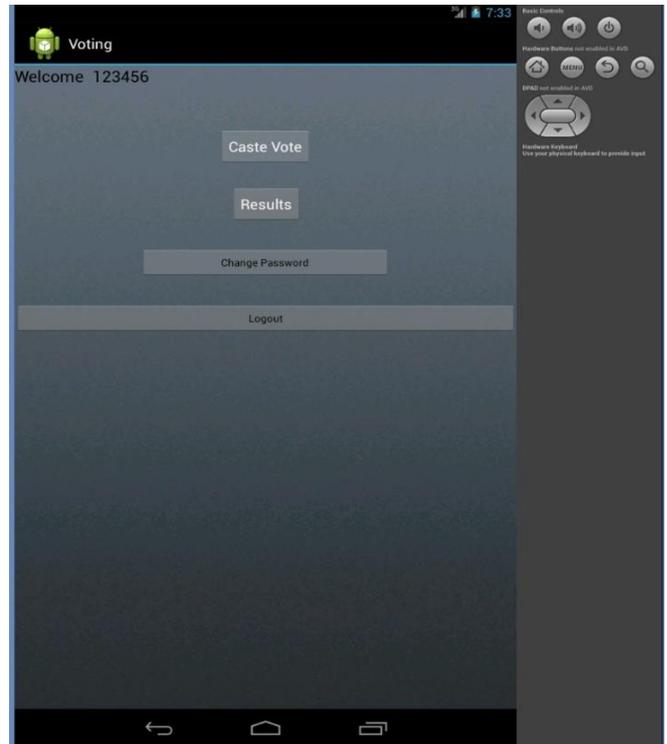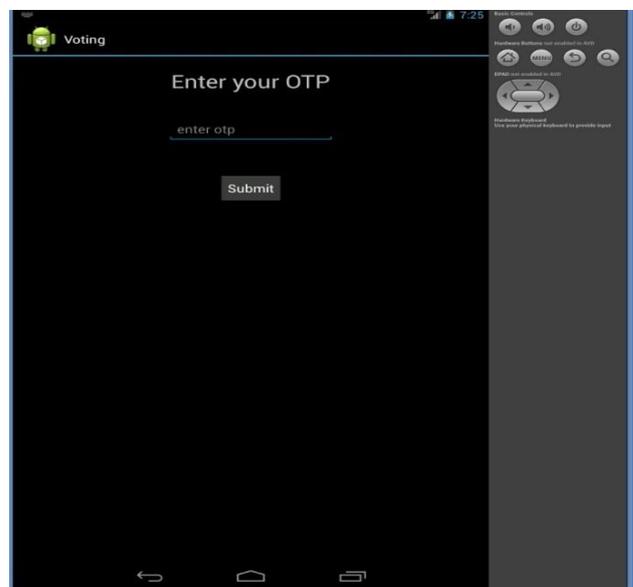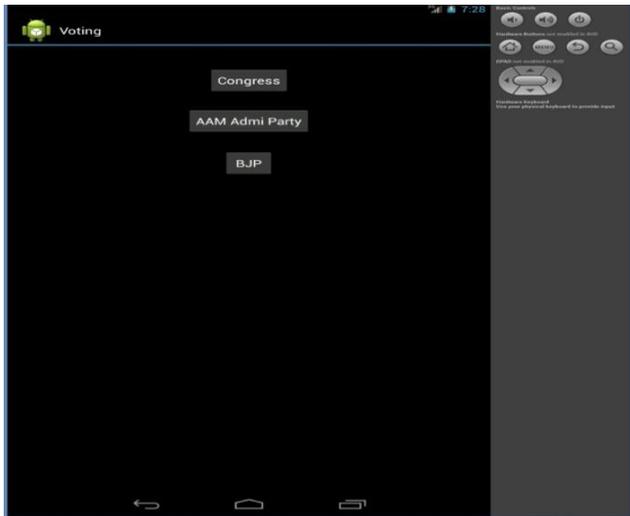

Fig.4

Fig.5

C. Database

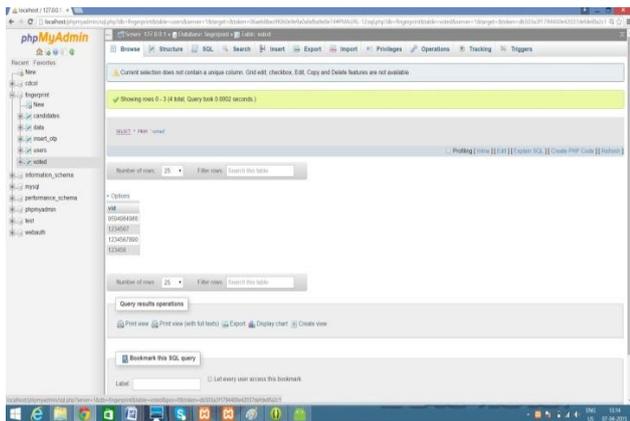The Fig 6 shows the database page for voters registration

Fig 6.

D. Database Tables

The database tables shows the design of the database it consists following field.

- User Table:The table holds records of registered users/voters with their respective preferred usernames and passwords.Thecontacts:{uid,unique_id,vid,phone,email,encrypted_password,salt,created_at,image}ofvoters/users.

Table 1:- Table structure for table registration details

Field	Type	Null	Default
Uid	Int (10)	No	Auto
Unique_id	Varchar (15)	No	
Vid	Varchar (15)	No	
phone	Varchar (15)	No	
Email	Varchar (50)	No	
Encryped_password	varchar (15)	No	
Created_at	Varchar (20)	No	
Image	Varchar (40)	No	

- Data Table: That holds records of the candidate, its id and the path where image is stored.

Table 2:-Table structure for table data

Field	Type	Null	Default
Vid	Varchar (25)	No	
image	Varchar (15)	No	

- Candidates:This table contains party of candidate and their count of vote

Table3.3.4:-Table structure for table candidates

Field	Type	Null	Default
name	varchar(25)	No	
Count	Varchar(25)	No	

E. Finger Print matching:-

The MOBILE VOTING USING FINGERPRINT AUTHENTICATION was developed as an online information system to offer users convenient access to the voter register. Several tools used during implementation include the following[4]:

- Minutiae Algorithm:- Fingerprints are the most used biometrics technique for personal identification. There are two main applications involving fingerprints: fingerprint verification and fingerprint identification While the purpose of fingerprint verification is to verify the identity of a person, the goal of fingerprint identification is to establish the identity of a person. In the past three decades, automatic fingerprint verification is being more widely than other techniques of biometrics such as face identification and signature identification. Usually associated with criminal identification, now has become more popular in civilian applications, such as financial security or access control. Many fingerprint identification methods have appeared in literature over the years. The most popular matching approach for fingerprint identification is usually based on lower-level features determined by singularities in finger ridge patterns called minutiae. In general, the two most prominent used features are ridge ending and ridge bifurcation. More complex fingerprint features can be expressed as a combination of these two basic features. Minutiae matching essentially consist of finding the best alignment between the template (set of minutiae in the database) and a subset of minutiae in the input fingerprint, through a geometric transformation.
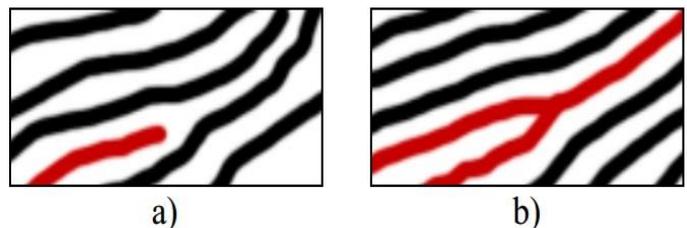

Fig 7. a) ridge ending and b) bifurcation

- Minutiae Extraction:- Typically each detected $m_i=(x_i,y_i,\Theta_i,t_i)$

❖ x_i, y_i - are coordinates of the minutiae point,

❖ θ_i - is minutiae direction typically obtained from local ridge orientation,

❖ t_i - is type of the minutiae point (ridge ending or ridge bifurcation),

❖ The position of the minutiae point is at the tip of the ridge or the valley and the direction is computed to the X axis
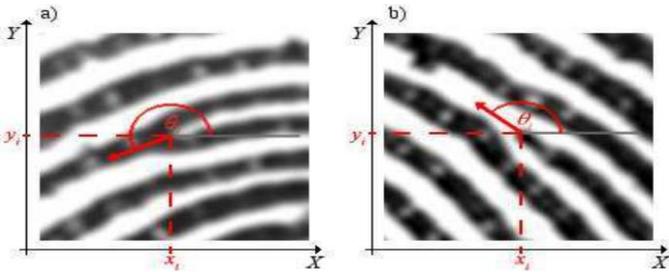

Fig 8. Parameters of minutiae a) bifurcation and b) ridge ending type.

V. CONCLUSION AND RECOMMENDATION

The main aspect behind MOBILE VOTING SYSTEM is that it enabled us to bring out the new ideas that were sustained within us for many for many days. This paper offers the voters to cast easily through internet. Vote counting is also made easy by the MOBILE VOTING SYSTEM since it's just a matter of querying the database. MOBILE VOTING SYSTEM is used by a number of countries today. Developing a good system is critical to the success of the system to prevent system failures and to gain wide acceptance as the best method available. A good MOBILE VOTING SYSTEM system requires ten characteristics which this system already has In analyzing, designing, implementing, and maintaining standards, we considered these characteristics as the foundation. These standards were made national. MOBILE VOTING SYSTEM will be an inexpensive, and less time consuming method once a system exhibiting national standards and the above mentioned characteristics is implemented.

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