U-Vote: A Secure Multi-Purpose Voting Platform using Smartphone

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Abstract- The voting frameworks are a vital apparatus for any association and foundation. There are different devices and methods utilized for voting, for example, conventional voting framework or paper ticket voting framework, e-voting framework or electronic voting framework, site voting framework, sms and missed call voting framework. In this framework, a client can make their own voting environment for casting a ballot. Doing as such, this framework can be utilized for an assortment of situations. The framework tries to present a Voting System, which utilizes Android, Web and Cloud based administrations like Google Analytics. The framework incorporates an android application that will allow the voter to cast his or her vote from any remote area utilizing cell phone or wireless or any gadget supporting Android OS and having a front camera. The framework proposed being multi-reason can likewise be utilized for legislative decision making the entire voting process adaptable and smooth. The framework conveys a voting system that gives better execution, security, exactness and unwavering quality to the whole Election process.

Keywords- *Facial Recognition, API, Encryption,Cloud Computing*

I. INTRODUCTION

In present days, it's of prime significance to give security to any sort of information and it turns out to be significantly critical when we require such information for voting. Voting framework is the foundation of any establishment may it be an organization or any corporate association and for the legislature. So the primary concern is to make this backbone protected and secure from outer dangers[1].

A voting framework is just effective when a greater part of a population takes part in the voting process. To do as such, we need to make the voting framework available to individuals without making them to end up in a particular place. Remembering every one of these worries, a few frameworks and thoughts have been executed and been proposed throughout the years. The essential objective of the thought proposed here is to execute a framework which will enable more voters to make their choice remotely which will decrease time utilization. Subsequently, it will support an ever increasing number of individuals to take an interest in voting process.

II.   EXISTING SYSTEM

There have been several changes in the voting system over a period of years. Variety of voting systems, have been adopted by different establishments in order to meet their voting necessities, making it quick and safe in all the possible means. Traditional voting systems used paper and stamp for the process of voting. This was broadly utilized in many parts of the world.

Later e-voting system, otherwise called electronic voting system, came into existence and replaced the conventional paper based voting system. It used an electronic device known as Electronic Voting Machine(EVM) to store and count the votes. In present this system is used by Indian Government for governmental elections.These days, we can likewise discover voting system that can be used through the web browser, known as website voting system. In which all the working of the voting system is carried out on the browser accessing the website.

In reality shows, the collection of votes is done by means of Short Message Service (sms) or by giving missed calls. The content present in the sms or the number on which the missed call is given is unique for different candidates. Also in many private institutions like housing societies, offices, schools and colleges, voting for a particular post is conducted either using paper ballot, by show of hands or by the use of e-mail.

Problems faced by existing systems[2-4]
- In paper ballot voting, at a time only one voter can vote which consumes more time. It also leads to wastage of paper.
- The system based on EVM is very expensive as the cost of EVM is very high.
- Countries using traditional voting systems face the problem of low voting percentage.
- Missed call and sms based voting becomes difficult to manage when the number of candidates for election are more.
- The voting done by show of hands lacks confidentiality.
- The existing systems are vulnerable to vote tampering and hence are less secure.

III.   PROPOSED SYSTEM

The system that we propose essentially centers around voting platform. As the quantities of cell phone clients

are rising exponentially, we may state that a large portion of the total populace will possess a cell phone. So we propose a framework which will work on cell phones utilizing the facial recognition service.

In the proposed framework, a client can make their own, one of a kind, voting environment. Doing as such, the framework can be utilized for an assortment of situations. For example, election being directed for any foundation, government legislatives, gathering votes to choose the individual from a board of trustees. This makes the framework adaptable. By enciphering the vote's information at the voter's end and deciphering them to display the results which is sent to the local administrator, which in turn, makes the platform secure.

The proposed system inculcates a different method of voting which is priority based voting where the user will have to list the candidates as per his preference, rather than selecting only one candidate.

IV.   DESIGN OF THE SYSTEM

The design of the proposed framework is ordered into two segments. The primary segment is totally committed for legislative elections of India. The second segment enables customized voting that can be utilized for leading decisions in private establishments, housing societies, workplaces, schools and universities and so forth.
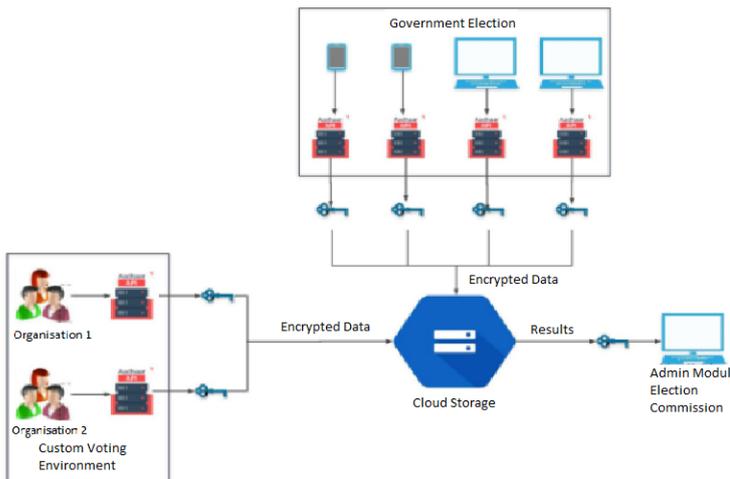

Fig. 1 Proposed System Architecture

Legislative Elections

The user should register with the application giving a user-id and password. One month prior to the day of elections the user should register himself giving his/her aadhaar number and authentication will be done utilizing facial recognition so as to make him/her eligible for vote. Amid the registration, the user will be allotted a time slot to vote upon the arrival of elections. On the day of elections, the voter should login utilizing the same user-id and password and furthermore the aadhaar number, authentication will be done utilizing the facial recognition. Once the authentication is done, the user will be provided with a list of candidates of his/her constituency. He/She would now be able to vote for the desired candidate. The result will be declared in numeric form or as outline or pie diagram.

Custom Elections

The framework likewise empowers the client to make local voting ballots. In this feature, any client can make a voting poll may it be for a college election, for organization or for small government bodies etc. The client who makes the local voting poll will be the local administrator of that poll. The local administrator will at that point be given a unique arbitrary number which will be communicated to the voters. The specifics of the voting and the votes will be determined and appeared to the local administrator in type of diagram or pie outline.

Once the votes are submitted by the user, it will be encrypted using some enciphering technique (example: Advanced Encryption Standard (AES)) which will only be visible to the local admin in the decrypted format.

The system basically comprises of three stages:
i. Voting Ballot Creation Stage
ii. Voter Voting Stage
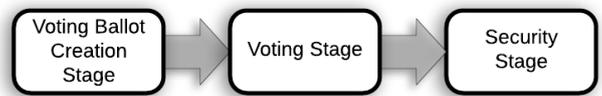iii. Security Stage

Fig. 2 Stages of multi-purpose online voting system using smartphones

Stage 1: Voting Ballot Creation Stage

Here the client who wants to make a voting poll will be the local administrator. The voting poll can be for any reason may it be for small scale administrative body decisions, taking votes to choose who will end up being the General Secretary (GS) of the college or to choose the advisory group individuals. The local administrator, on clicking "make new voting ballot choice", should enter the required fields, for example, title of the voting poll, description of the voting poll, number of candidates participating in the election, their contact details. After all the information is put away in the framework's database, local administrator will be given one unique serial number – room id which will be communicated to the voters and utilized by them to enter the voting page.
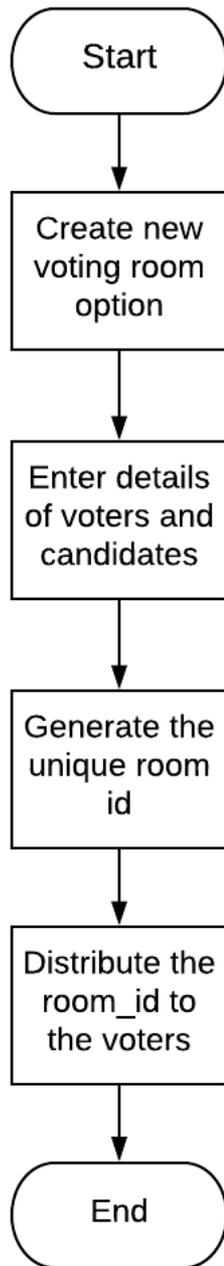
Fig 3 Voting Ballot Creation Stage

Fig 4 Voter Voting Stage

Stage 2: Voting Stage

In this stage, the voters needs to enter the room id which was communicated to them by the local administrator preceding the voting. Once the id is entered, the client has to go through the authentication stage which is aadhaar based facial verification. On successful authentication the client enters the voting page and can cast his vote. As the vote gets recorded in the database the voter will receive an acknowledgement and not be permitted to vote again
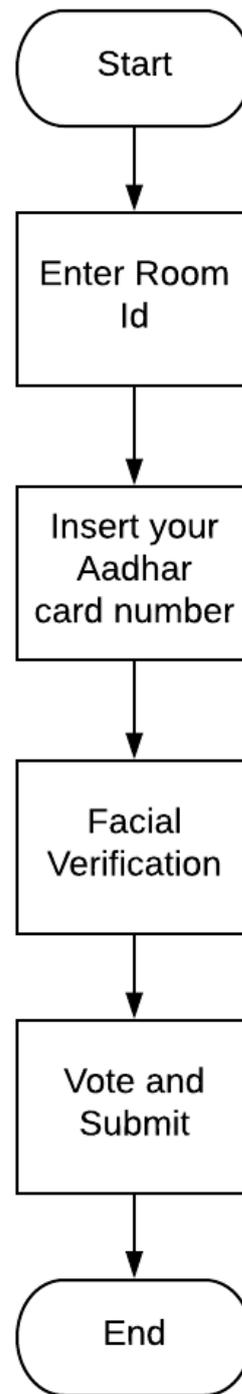
Stage 3: Security Stage

Security is the most important aspect of a voting system. The votes submitted by the user will be first encrypted using an encryption technique such as Advanced Encryption Standard(AES). This enciphered vote data will be stored in the database of the system. While retrieving the enciphered data, first the vote will be decrypted. Once the votes are decrypted, it can be used to compute and find the total number of votes given per candidate. This computed data is presented to the local administrators in the form of a graph or a pie chart.
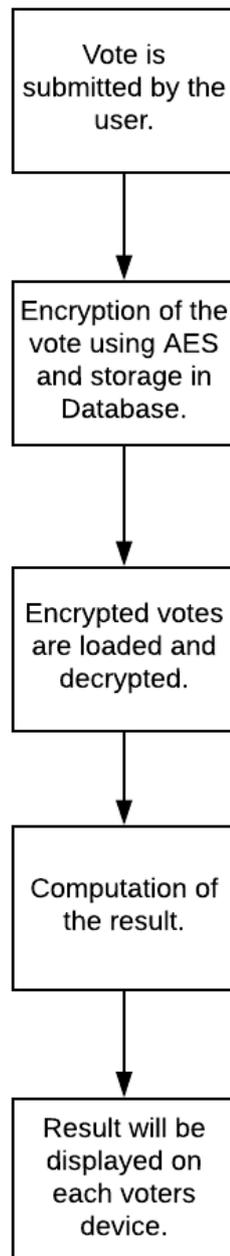
Fig 5 Security Stage

V.   METHODOLOGY

The system is based on Android Operating System. The application is being developed using Android Studio software. The application provides two features. First one is totally dedicated for governmental elections. In this section, during registration whether the voter is recognized citizen of India is checked by authenticating him using aadhaar details. We will be using a facial verification API that will directly verify the face with the one saved in the Aadhaar Database. This in turn ensures that the person registering is the person himself. The application takes aadhaar number and captures live picture of the voter registering himself. It calls the API using HTTP request and passes the captured picture and the aadhaar number as parameters. This is done using Volley or Retrofit library of Android. The API verifies the sent picture with the Aadhaar database. It returns the result in the JSON format. The received JSON file is parsed to get the result of

the authentication. Once the user is authenticated, the user will be allowed to vote.
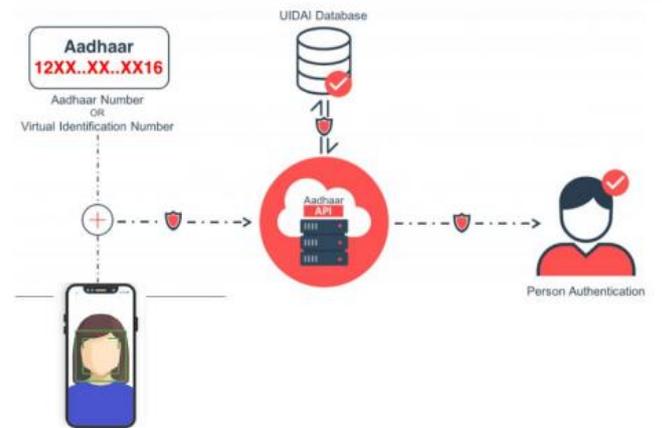

Fig. 6 Aadhaar Authentication API

The voting method used is priority voting. In this method, the voter will have to rank 5 candidates from the list of candidates according to his/her preference. Each candidate is assigned a score as follows: 4 points are assigned to candidates ranked first, 3 points are assigned to candidates ranked second, 2 points are assigned to candidates ranked third, 1 point to a candidate ranked fourth and 0 points to candidate ranked last. The total score of a candidate A is calculated as:

$$\text{Score of A} = 5*\{i| \text{ i voters ranks A first}\}+$$
$$4*\{i| \text{ i voters ranks A first}\}+$$
$$3*\{i| \text{ i voters ranks A second}\}+$$
$$2*\{i| \text{ i voters ranks A third}\}+$$
$$1*\{i| \text{ i voters ranks A fourth}\}+$$
$$0*\{i| \text{ i voters ranks A last}\}.$$

The candidate with the highest score will be the winner[5].

The votes are encrypted using Advanced Encryption Standard(AES) algorithm. AES is a block cipher which has a block size of 128 bits. Its key size is of 128, 192, or 256 bits[6]. To manage the keys Google Cloud KMS, a cloud-hosted key management service is used. The encrypted votes are stored in Firebase. Firebase Realtime database is a loud facilitated database developed for Android, IOS and web applications.

The second feature of the system enables the user to create customized environment for voting. The authentication process, voting method, encryption technique and database remains same as mentioned above.
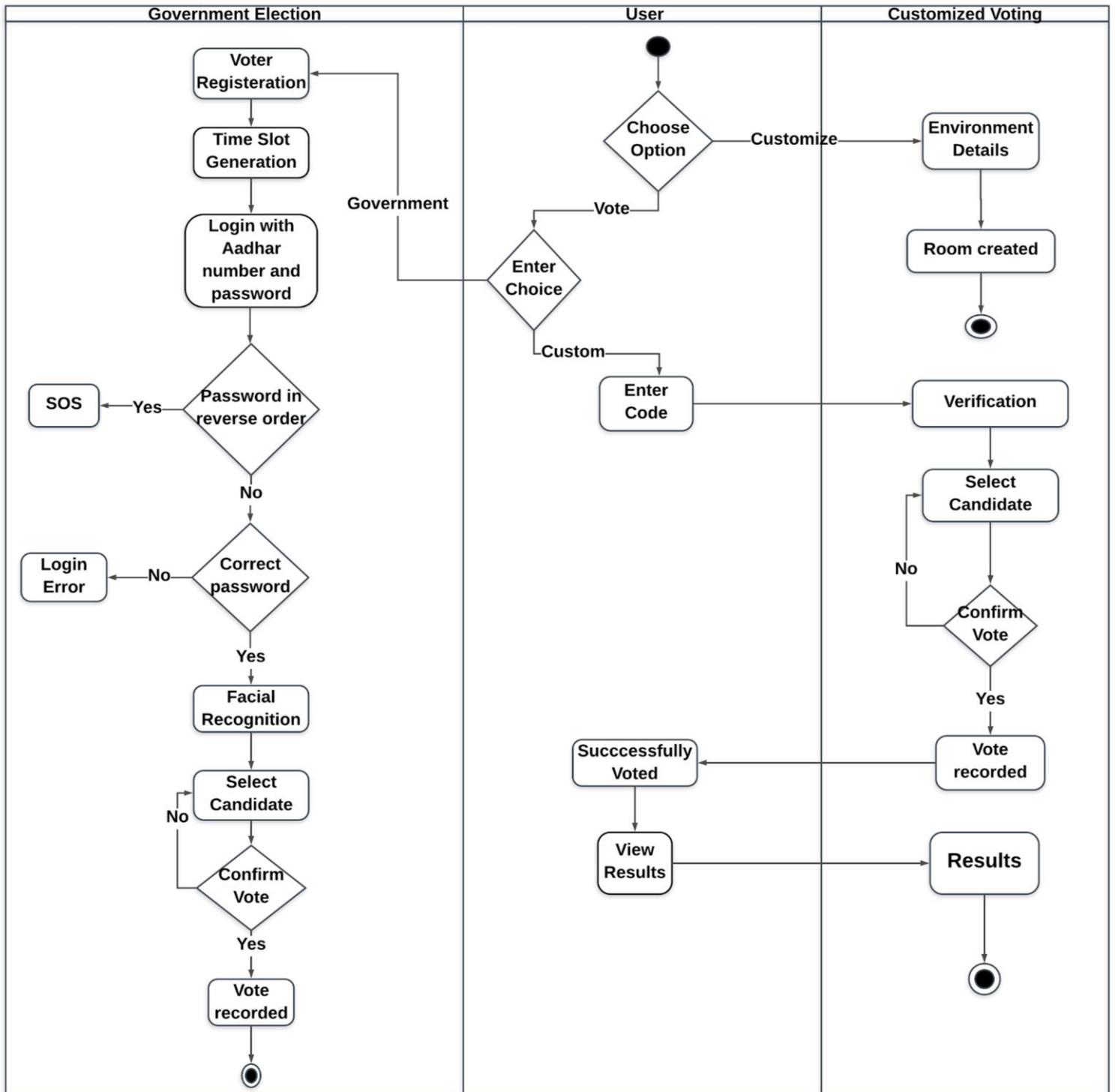
Fig 7 Activity Diagram

VI. CONCLUSION

This system successfully introduces a new design of E-voting application utilizing Android Platform. The system provides solace and security to the voters. It is believed that the lengthy process of voting, the measure of expenses, time and energy that is wasted due to the current system will be nullified due to this application. The system concisely explains the design and working of this application, which delivers remote voting capacity, precision, greater protection, great interface and reliability towards the entire election process. The use of modern technologies like face recognition utilizing template matching mechanism, OTP generation

ensures that the application uses latest advances in technology and in this manner gives better performance.This application is a modest effort to make the entire election process more efficient. However, there is a scope for future adjustment.

VII. REFERENCES

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