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A Two-Phase Authentication Mechanism for E-voting in India

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ABSTRACT: *It has always been an exhausting mission for the election commission to carry out free and fair polls in our country which is the largest democracy in the world. It requires a large amount of money to ensure that the elections are riot free. But, nowadays, it is frequent for some forces to spoil in rigging which may eventually lead to a result contrary to the actual verdict given by the people. As, security is a heart of e-voting process, therefore the necessity of designing a secure e-voting process is very important. In this paper, a two-phase authentication mechanism is proposed which uses both unique identification number (i.e. AADHAR number) along with One Time Password (OTP) send on registered mobile number. At the time of voting in the elections, the voter authentication can be done through both aadhar number as well as registered mobile number. If the aadhar number and mobile number of the voter match with the database, then the person is allowed to cast their vote. Transparency is additional advantage for the above system. Proposed mechanism enhances the accuracy and speed of the process. This method is helpful in eliminating invalid voters, makes counting easier, faster and accurate.*

Keywords: *Aadhar number, IOT, UID, Cloud computing, OTP, E-voting.*

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I. INTRODUCTION

Nowadays in India, at the time of voting peoples face many problems, like they need to travel to their native place, they need to spend money for travelling (as voting is a free of cost thing), due to this various health related problems they face and finally mental stress due to all this. Also, in case of Government, they need to keep all the ballots safe before voting, need to provide a live electricity supply until voting is completed, need to keep security guards at polling stations, and keeping ballots safe after voting. Finally counting of votes from different machines, adding them together, keeping data secrete and displaying of result. All these things are very costly, lengthy, time consuming, health and mental affecting. To minimize or to clear all these problems we have proposed a two-phase authentication mechanism for E-voting based on Aadhar number along with OTP on registered mobile number.

As a pre-poll procedure, a database consisting of the Aadhar number of all the eligible voters is created. In the first phase, the proposed mechanism uses Aadhar number as UID for voter recognition as the UID of every human being has a unique number. After verifying the Aadhar number, an OTP will be sent to registered mobile number for second level of authentication. As the user completes the two-phase authentication process, he/she may cast their vote. Thus, it would have an edge over the present-day voting systems. But in case the Aadhar number doesn't match with the records of the database or in case of repetition, access to cast a vote is denied or the vote gets rejected. Also, the police station nearby to the election poll booth is informed about the identity of the imposter. Since the E-voting process is carried out over cloud server, so transparency among various parties is also maintained. The result is instant and counting is completed finally at the main host itself. The overall cost for conducting elections gets reduced and so does the maintenance cost of the systems.

The paper is organized as follow. Section 1 presents the introduction of E-voting mechanism, Section 2 presents the existing research works carried out by various researchers on E-voting, Section 3 presents the proposed work along with the E-voting component diagram. This section involves the various sub-section. Advantages of proposed E-voting system are discussed in Section 4. Section 5 discusses the current work along with limitation. Finally, Section 6 concludes the paper.

II. LITERATURE REVIEW

To overcome the limitations of traditional voting in India, a new technique based on Internet of Things (IoT) is proposed [1]. The main idea of Biometric Voting System using IOT prevents the rigging and reduce the manpower cost. The User can place only finger on fingerprint scanner and raspberry pi collect that finger image and send it to cloud including GPS location of polling station. A distributed Voting system using IOT is proposed which uses biometric identity for voting [2]. This model replaces the traditional EVMs with IoT

enabled Voting Terminals. Limitations of the model are that this requires the one stage election procedure. Or at least both the pooling stations should have the voting on the same day. It discussed about the polling of votes only.

An Advanced Electronic Voting Machine using Internet of Things (IOT) is proposed which uses fingerprint in order to provide a high performance with high security to the voting system [3] [4]. An IOT Based E-Voting System based on UID is proposed [5]. In this, fingerprint based electronic voting system has been designed to prevent rigging up to the maximum extent. In this system, fingerprint module is incorporated to register the fingerprint of every voter and at the time of voting one must show his finger at the fingerprint module to cast his vote. Although this project enable's a voter to give his/her vote and avoid proxy vote or double voting in a secure environment, still it has the complexity and redundancy of maintaining the voter's personal information over cloud. Also, it is inappropriate for handicapped voter's [5].

A new applied e-voting system is proposed which uses web services to connect to a database of voting system and stresses importance on data security by means of cryptography [6]. It introduces electronic voting system, that have security context or known as e-trusted voting system. In their study, a prototype is built on the basis of secured and trusted framework for electronic voting. The System allows the voters to participate by using username and password. Voter can enter the system and votes on the existing text during election date and the voter can see the result after the end of election date. The concept of getting the fingerprint impression of a voter which is entered as input to the system is presented which is then compared with the available data in the database [7]. If the particular pattern matches with anyone on the available record, access to cast a vote is granted. Then the result is instantaneous and counting is done via IOT.

A secured electronic voting machine using unique identification number i.e. aadhar number has been developed [8]. To provide additional security along with the aadhar number biometric identification is used. At the time of voting in the elections, the voter authentication can be done through biometric pattern. If the biometric information of the voter matches the database of the aadhar then the person is allowed to cast their vote.

A Public key encryption e-voting system is proposed with the primary objective that the system ensures reliability, privacy and security of the protocol and convenient voting process to users [9]. Proposed system was abridged into three parts: access control process to limit access to a system or to any other source. Secondly, voting process performed by encrypting voter's electronic ballot. Finally, organize the final result through deciphering the received encrypted information. The System is more efficient than other E-Voting systems, since voters can vote from their devices without extra cost and effort, and encryption ensures the security. A pseudo random number is generated using the OTP principle, is used by the voter for authentication purpose while casting the vote.

A secure internet voting system is proposed based on digital signatures and cryptography approach and the system will be suitable for corporate company having their offices in diverse cities. The proposed system includes three different phases - registration phase, authentication voting phase and counting phase involving parties, the voter, voting server and voting authority. The system is for registering vote casted in a corporate election where user has to login via username and password. [10]

It has been analysed that most of the researchers uses fingerprint-based authentication mechanism for authorization of valid voter. A few researchers use aadhar number-based authentication mechanism for voting. Also, in existing work, the voter is unable to cast their vote from their mobile to avoid the problem of travelling from one place to another place for voting. The focus of existing work includes both the voter perspective and the candidate perspective.

To solve the above issues, we have proposed a two-phase authentication mechanism based on aadhar number as well as registered mobile number for e-voting. The proposed mechanism allows only those users who have valid aaddhar number along with registered mobile number is eligible to vote. Once the voter has voted, next time he is unable to vote for second time during that election process due to a flag variable. The system is secure, trustworthy, able to identify valid voters, and protect against cross voting or proxy voting from same user. Also, the system provides the count of those users who have/have not voted to determine the percentage of voting.

III. PROPOSED TWO-PHASE E-VOTING MECHANISM

The proposed mechanism involves various components to interact with the E- voting system as shown in Figure 1. These components are voter, candidate, Voting database, GPS module and Election commission. As the proposed mechanism involves two phase e-voting mechanism. Figure 2 shows the detailed working mechanism of proposed two phase E-voting along with its sub components.

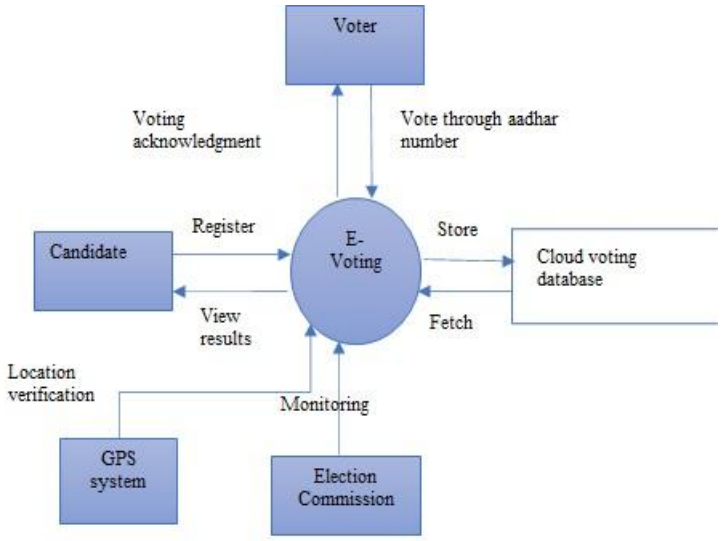

Figure 1. Components of E-Voting System

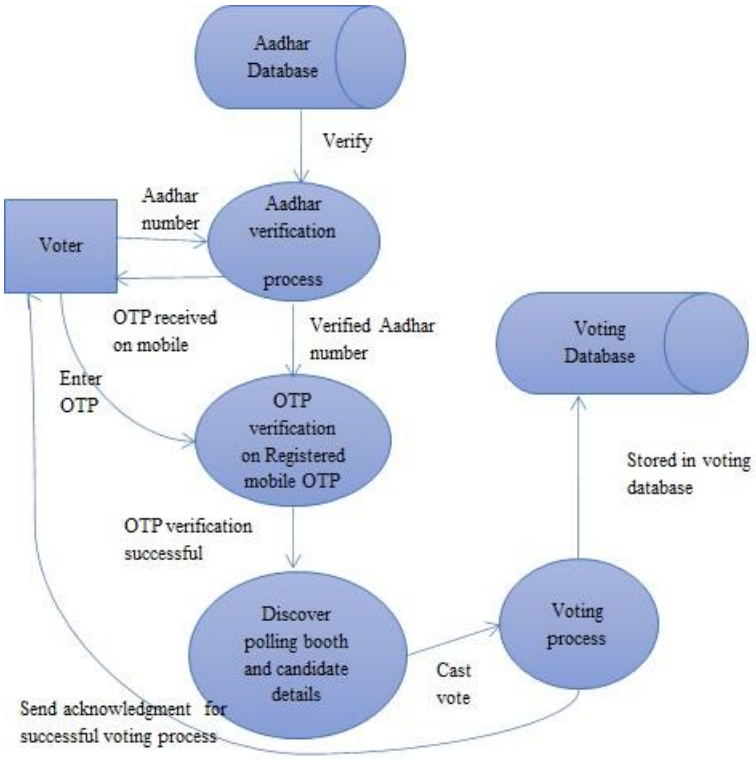

Figure 2. Two Phase E-Voting Mechanism

3.1 Election commission

As we all know that election commission is the authority in India which is responsible for overall voting process. Therefore, in our proposed mechanism, election commission is an important component under which whole election process is carried out. The election commission is responsible for monitoring of cloud database, conduction of smooth conduction of election process, counting of votes, generation of voting result and verification of voters and candidates.

3.2 Cloud Voting Database

Data related to voter such as Unique Identification (UID), finger print data, GPS location data all these kind of data is stored in cloud database. This data is used for authenticating voter. In database voters count also stored i.e. how many voters have casted their votes and form which area. The storing of data can be maintained for long period of time. This database also maintained the record of all voters who performed successfully

voting along with a flag variable. This flag variable is set to 1 for every successful vote, otherwise, it will be 0. The purpose of this flag variable is to avoid cross voting or proxy voting by voter.

1.3 GPS Module

GPS module provides the GPS location of current voting pool to cloud. In cloud voter list can be searched based on GPS location.

3.4 Voter

As we all know that voter is an important entity in the voting process who votes to elect a candidate for a particular post. Figure 3 shows the sequence of activities performed by voter during voting process. User enters his/her aadhar number on the particular website/mobile app. If the voter has already casted his/her vote then a message appeared for already voted. Otherwise, an OTP will be sent to the registered mobile number linked with Aadhar card. Voter has to input the OTP for verification on the website or mobileapp. If verified successfully, it fetches the voter list based on GPS location and then checks in that voter list whether he/she is belonging from that location. A list of candidates is displayed area wise. The voter can select and vote to desired candidate in his/her area. Once selected the desired candidate, the voter submit his/her vote. An acknowledgment is sent to registered mobile number regarding successful voting process. At the same time, a record is also maintained at cloud database for every successful voter along with a flag variable set to 1. Otherwise, it will be 0 in voting database. If, in case a voter again tried to perform cross voting/ proxy voting then he/she is not able to perform the voting second due to flag variable.

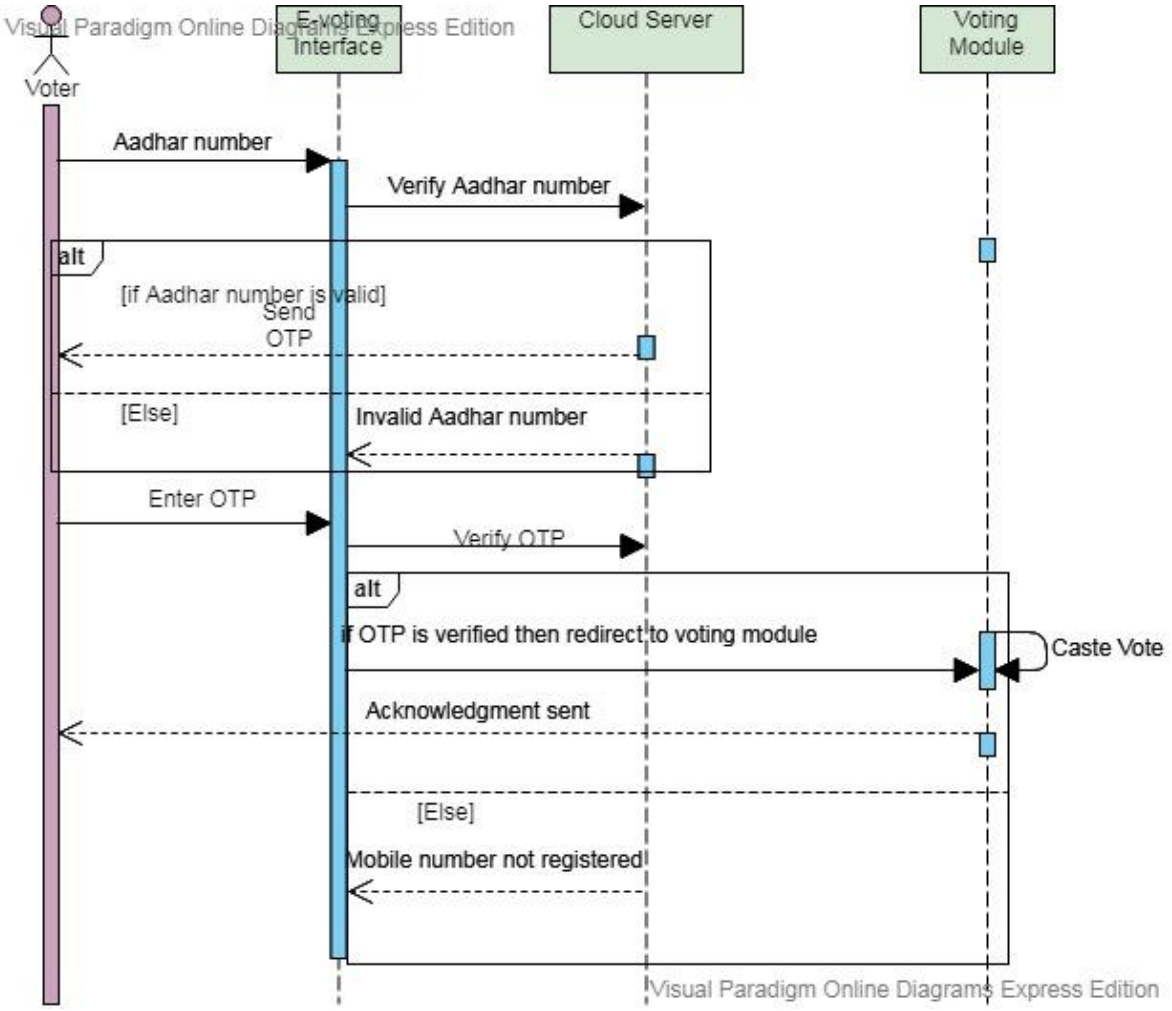

Figure 3. Sequence of operation performed by voter

3.5 Candidate

The candidate has to first register and fill an enrolment form to show his/her candidature and provide necessary details to verify his candidature. It is mandatory for a candidate to belong to a place from where he/she is applying for candidature ship. Now the candidate is able to view the whole voting along with the list of

candidate in particular area from which he/she belongs. He has his own dashboard to view the election result and list of candidates applied as candidate. Figure 4 shows the flow of operations performed by voting module.

IV. ADVANTAGES OF PROPOSED MECHANISM

- As soon as the voter voted for a candidate, a hit count is generated in candidates' account.
- An efficient searching mechanism is adopted to search for how many voters have voted to particular candidate in his/her area.
- Able to quickly generate the report of total number of voters for each candidate.
- Minimal chances of fraud from voter as well as candidate side.
- Voting data as well as identity of voter is secure as the whole voting data is maintained over cloud.
- Voter can vote from anywhere as it solves the problems of those voters who are unable to go(handicapped voters), outside of their voting place etc.
- Illiterate people can also use this system more friendlily.
- Cost is less, because human interventions are less in the system.
- Due to real time approach counting of votes could be done at the same time while voting.
- Time taken to cast vote is less.
- A flag variable is maintained in voting database to avoid cross voting.
- The overall system installation is effortless.
- Increasing voting percentage.
- Reduced man power.
- It also reduces cost for the voter to reach his native polling station if he is staying away.

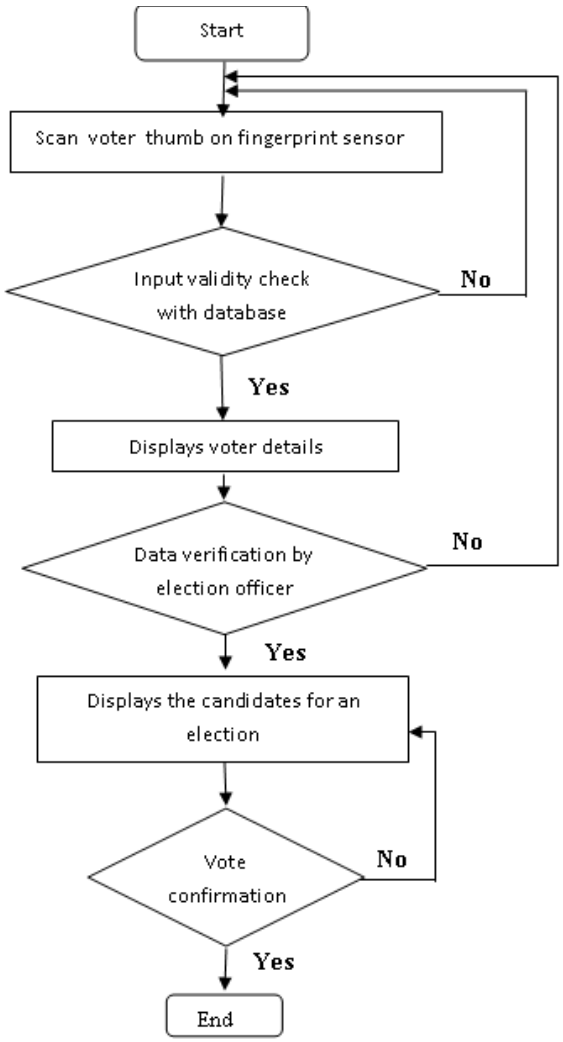

Figure 4. Voting process performed by voting module

V. DISCUSSION

In India, still there are various shortcomings in current election process such as voter has to go to polling booth, lack of voting acknowledgment etc. Most of the things are done manually due to which voters faces many problems. Therefore, in this paper we try to resolve those issues as with traditional system by proposing a two phase authentication mechanism based on aadhar number and registered mobile number. Along with various advantages of proposed mechanism, there are certain dependency exist.To successfully implement the proposed mechanism, higher internet speed is required which is one of the major limitation with the proposed work. Lower internet speed can slow down the process of voting. Also, the voter can get frustrated which may leads to leave the voting process meanwhile. Other limitation with the proposed work is that the system is highly dependent on the use of smart phone/keypad phone through which voter can get the OTP to continue e-voting. Without smart phone/keypad phone, the voter would not be able to cast their votes.

VI. CONCLUSION

In this paper, a two-phase authentication mechanism is proposed based on aadhar number as well as registered mobile number for e-voting. This paper enable's a voter to give his/her vote over the internet from anywhere in India and avoid proxy vote or double voting. The proposed mechanism overcomes all the drawback of traditional voting system such as rigging, fraud votes, and voter authentication mistakes. Aadhar number of every person is unique and hence proposed mechanism completely reduces the chance of invalid vote. Illiterate people can also use this system more friendlily. This system affords additional security by allowing voter to vote only once by imparting unique identification along with registered mobile number. By using the concept of flag variable, the proposed mechanism is able to avoid double voting or cross voting by the same voter. This system avoids fraudulent voting and illegal practices during the elections which is the key issue in the traditional voting system. This system provides transparency in the counting process. The advantages of this system are economic, faster tabulation of results, improved accessibility, greater accuracy, and lower risk of human and mechanical errors. Database consisting of the details like age, biometric of the people should be updated every time before election. Information about the casted vote can be sent to the voter through the messaging system. It is highly efficient and reliable due to use of Aadhar number with registered mobile number to reduce or remove unwanted human error. Our future work involves making the system user friendly by providing audio output to be used for illiterate voters.

REFERENCES

[1]. Pavan Yejare et al.,"IOT : A novel strategy for Biometric Voting system," International Journal of Electrical, Electronics and Computer Systems (IJEECS), 2017, Vol. 5, Issue 2, ISSN (Online): 2347-2820.

[2]. Channakeshava RN, "Distributed Voting System Using IOT," International Journal of Innovative Research in Computer and Communication Engineering, 2017, Vol.5, Special Issue 2.

[3]. Ms S. & Mr.Ashwin C., "Advanced Secure Voting System with IoT," International Journal Of Engineering And Computer Science, 2016.

[4]. Shubham J. Devgirikar et al., "Advanced Electronic Voting Machine using Internet of Things (IOT)," 2nd National Conference Recent Innovations in Science and Engineering(NC-RISE17), 2017, Vol. 5, Issue 9, pp. 83-85, ISSN: 2321-8169.

[5]. Prof. Swati Gawhale et al., "IOT Based E-Voting System," International Journal for Research in Applied Science & Engineering Technology (IJRASET), 2017, Vol. 5 Issue 5, pp. 1064-1067, ISSN: 2321-9653.

[6]. Feras A. Haziemeh, Mutaz Kh. Khazaaleh And Khairall M. Al-Talafha ,"New applied e-Voting system," Journal of Theoretical and Applied Information Technology, 2011, Vol. 25, No. 2, pp. 88-97.

[7]. J. Deepika, S. Kalaiselvi, S. Mahalakshmi and S. A. Shifani, "Smart electronic voting system based on biometrie identification-survey," Third International Conference on Science Technology Engineering & Management (ICONSTEM), Chennai, 2017, pp. 939-942.

[8]. Miss. Nikalje Dipti et al., "Iot Based Advanced E-Voting System," International Journal for Research Trends and Innovation(IJRTI), 2019, Vol 4, Issue 4, ISSN: 2456-3315.

[9]. V. Sahaya Sakila, Debin Jose, Abhijith K P, Adith R Babu, "Secure Online E-voting Protocol Based on Voters Authentication," International Journal of Innovative Technology and Exploring Engineering (IJITEE), Volume-9, Issue-1, November 2019, ISSN: 2278-3075.

[10]. Jagdish B. Chakole, P. R. Pardhi, "The Design of Web Based Secure Internet Voting System for Corporate Election," International Journal of Science and Research (IJSR), India, Volume 2 Issue 7, July 2013, Online ISSN: 2319-7064.