An Efficacious Online Voting System

Ashutosh Ghildiyal[1] and Shoeb Jamal[2]

[1]Department of Information Technology College of Technology, GBPUAT, Pantnagar
[2]Department of Computer Engineering College of Technology, GBPUAT, Pantnagar
E-mail: [1]ghildiyal.ashutosh@yahoo.com, [2]shoeb1493@gmail.com

Abstract—*In this paper, we introduce an online voting system which can improve the low voting percentages in hilly regions of India due to its topographical condition and high rate of rural to urban migration (Uttarakhand in particular). This paper introduces the idea of Selective Online Voters. Online voting facility should be given to only two sections in a state - interstate migrants and individuals living in remote areas of the state (like hilly regions of Uttarakhand) which are not yet connected by metal roads.*

1. INTRODUCTION

Online voting or *i-voting* is an ambitious field of research. Many models had been designed and even claim that they are executable. Such a model may be implementable (in a state with less number of eligible voters) but it is practically impossible to implement such a model in a nation of more than one billion population (out of which more than 60% come under the category of eligible voter). This facility to vote online should be given to only those individuals who are not able to vote because they are not living or present in their respective constituencies. Such individuals can be categorized in two sections - interstate migrants and individuals living in remote areas of our country (like hilly regions of Uttarakhand) which are not yet connected through metal roads. The idea of online voting seems revolutionary but it has a lot of security and other issues. Traditional voting system is not effective under above mentioned situations. Under such circumstances the concept of online voting can be introduced. If it is possible to maintain a secure and strong connection in an area, one can easily setup an online polling booth. These online booths are both efficacious and easy to manage. Voters do not have to wait in long queues in such cases because these booths have multiple computer systems (like a cyber café with one controlling admin) and can thus manage larger number of voters. Implementation of such an idea will also reduce the cases of booth capturing, tampering with e-voting machines, ballot stuffing, misreporting of votes, destruction or invalidation of voting ballots and other types of electoral f raud.

Quick and accurate counting of votes are some of its additional benefits. Most of us have this idea about online voting that one should be able to vote from any part of the country by this system. It is very difficult to successfully establish such a system because chances of counterfeit and security breach is quiet high in such a system. The installation of a "facial recognition mechanism" (suggested in many online voting systems) is practically impossible. Therefore, online polling booth is the best alternative which we have, with our limited availability of resources.

1.1. Problem Background

A lot of research work has been submitted in order to augment and make online voting system potent. Still there is a huge gap between such researches and a real-world solution to the problem. The use of extravagant technology for voter's identification (like biometric machines and facial recognition) seems quiet unrealistic. Problems like software attacks, voter authentication and auditability (verification and validation of software on remote voting device) have to be resolved in order to develop a secure and reliable online voting system.

1.2. Problem Statement

Online voting system is easy to use, beneficial and can improve the low voting percentages of a state. Still it has its flaws like its dependency on high speed internet, software failure, voter authentication and the lack of knowledge (about computers) among voters.

1.3. Research Objective and Need

The main objective of this paper is to increase the low voting percentages in some parts of our country by implementing online voting system. States with high rate of rural-urban migration and unavailability of well-established metal road network are the prime patrons of such a service. Uttarakhand is such an example. *According to the 2011 Planning Commission report, 5,000 villages (almost 58 percent of villages) in Uttarakhand remain cut off from proper roads. Here are some facts and figures which support the need of online voting system in Uttarakhand (and other states with similar circumstances).*

The voter turnout percentage in Lok Sabha elections (2009) and in Assembly elections (2012) was 53.96% and 67.22% respectively.

It is not that government is not trying to improve this percentage. Polling stations were being setup in the rural regions of the state but the limited time period (for which booths are placed) and the geography of the region resulted in the low turnout of the voters (especially in the rural regions).Though the voter's turnout in 2012 elections was 67.22%, districts like Chamoli and Tehri Garhwal saw a turnout of less than 60% (and these districts have more than 89% polling stations in their rural regions).
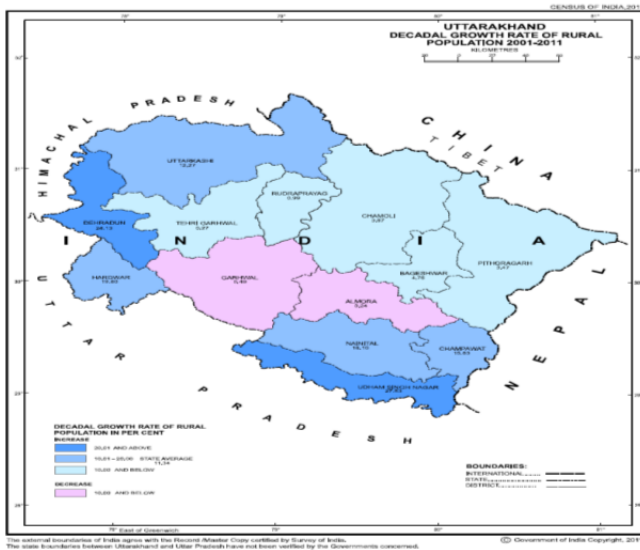
"A map showing low population growth in hilly regions due to migration."

Urban= 39.9%

Rural= 11.59%

According to the KAABP survey report, the major reasons for this low turnout are as follows:

1. Temporary migration for Seasonal work

2. High floating population in Urban Areas.

3. Distance from the polling booths.

Though these regions come under the category of rural area, literacy rate in these regions is quiet high which increases the chances of a successful online voting venture (Literacy rate in districts like Chamoli and Pauri Garhwal is more than 82%).

1.4. Salient Features

Some key features of the paper are as follows:

Selective Online Voters: The service of online voting will be given to only a few users who meet a certain criteria.
UID: A unique identification number generated with the help of the data provided by the user will be given to them.
E-SMS, E-MAILS, OTP: E-SMS and E-MAILS will be used in order to inform the voters about their nearest polling station and to send them other relevant information. OTP's will be used in order to conduct voting in a forgery free environment.

2. METHODOLOGY

This paper introduces the idea of Selective Online Voters. Voters which come under the category of online voters (interstate migrants or remote area dwellers) will be asked to register online. They will be asked to present a document which makes them an eligible candidate for online voting. At the time of registration they will be asked to enter their name, names of their mother and father, their personal mobile number or email-id, area pin code to which they belong and the area pin code of their current address (in case of migrants) and their Adhaar Card Number. The initials of their name, their parents' first name and the pin code of their area will be used to generate a unique identification number. Along with this they have to collect an identification card from the election commissioner office. The card will have their photograph, UID and other basic details. A separate voting list will be generated for i-voters and they will not be allowed to vote offline. There will be two types of i-voting cards - **Inter State Migrant Online Voting Card** (ISMOVC) and **Remote Area Resident Online Voting Card** (RAROVC). Online voters will receive an e-mail or an e-sms two days before the election mentioning the location of Online Polling Booth in the city where they are living. The ISMOVC will only be valid on the day of the elections. The RAROVC, however, will remain valid for two consecutive days since it is quite difficult to travel in remote areas (especially in hilly regions). Once the voters reach the polling booth, they will be asked to show their id-card. After the authentication procedure, booth officials will update their database and will process the request to generate an OTP (One Time Password), which will be sent to the voter's registered mobile number by an e-sms and will work as a password during the login process. The users will enter their UID and OTP and a screen will be displayed in front of them mentioning the name of the candidates and their respective parties. After the entire procedure is completed, voters will receive an e-sms or e-mail mentioning the successful cast of vote.
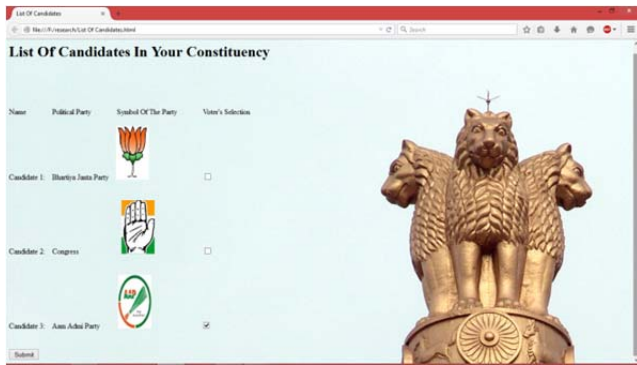

Fig. 1: Log In Window

Fig. 2: List of Candidates

2.1. Registration Procedure

Registration can be done online on the Election Commissioner Office's website. An attested copy of the document proving one's eligibility for online voting has to scanned and uploaded on the website. The document will be verified and after a few days an e-sms or an e-mail will be sent to the users asking them to initiate the registration procedure. The document submitted by the users will have to be uploaded under a particular category – Inter State Migrant or Remote Area Resident. Users will be asked to enter the details at the time of the registration. The fields which the users will have to fill are shown in the Fig. below.
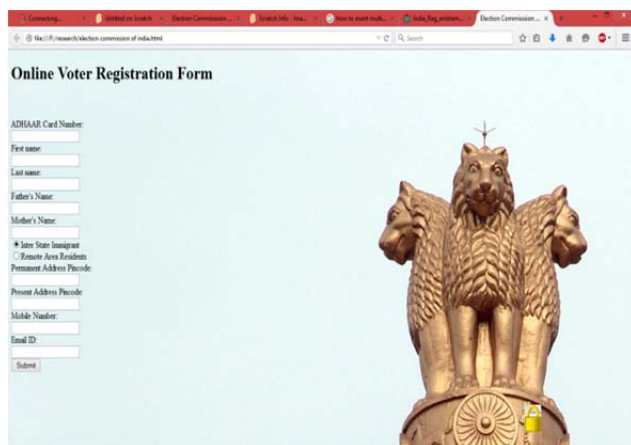
2.2. UID Generation

The UID will be generated from the data entered by the users at the time of registration. The UID will be of twelve digits for an Inter State Migrant and of ten digits for a Remote Area Resident.

These UIDs will be generated by an algorithm:

- The first four digits of the UID will be generated using the initials of the user's name. The letters from A to Z will be represented by numbers from 01 to 26. Example, for Anuj Ghildial, the first four digits will be 0107.

- Next four digits will represent the first letter of the user's parents' first name (father's name and then mother's name).

- Example, suppose if the user's parents' first names are Harish and Vimla, the next four digits will be 0822.

- The ninth and tenth digits of the UID will be the last two digits of the area pin code of which the user is a constituent (permanent address).

- Example, if the pin code of the user's permanent address is 443715, the ninth and tenth digits will be 15.

- The eleventh and twelfth digits will be included only in the case of inter-state migrants and they will be the last two digits of the area pin code of the migrant's current location (present address).

- Example, if the area pin code of the current address of the user is 248121, the last two digits of the UID will be 21.

This algorithm will almost remove the possibility of two identical UID number.

2.3. Database Management and Online Voter

ID Cards

Users will be asked to enter their Adhaar Card Number at the time of registration. All the fields from Adhaar Card Database will be linked to the database of the Online Voters (since Adhaar card database is quiet reliable as it involves both biometric impression and retina scan of each individual).

Two types of online voter card will be generated - Inter State Migrant Online Voting Card (ISMOVC) and Remote Area Resident Online Voting Card (RAROVC). These voter cards will have users' recent (at most four years old) photograph along with their UID and other relevant details. These cards will have to be renewed well before the elections.
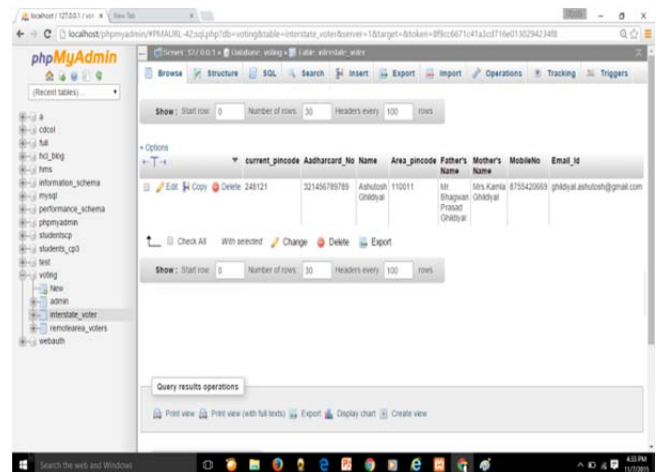

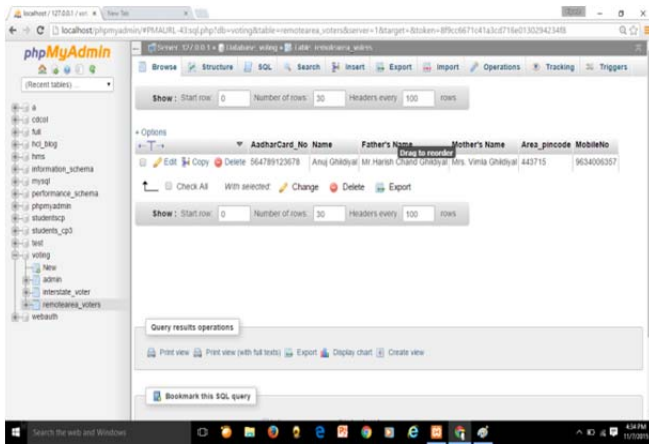**Fig. 3.1: Database of Inter State Migrants**
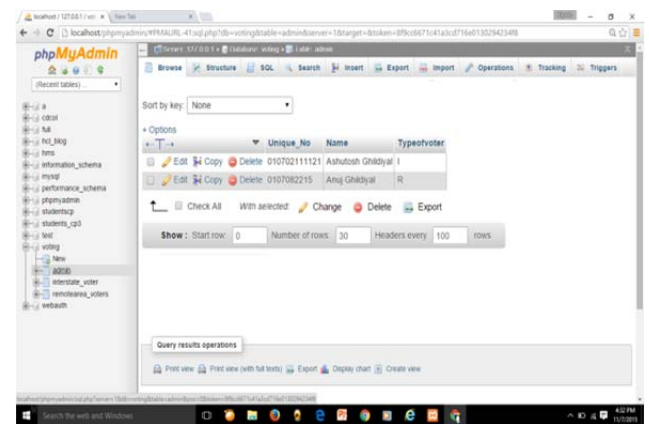
Fig. 3.2: Database of Remote Area Voters

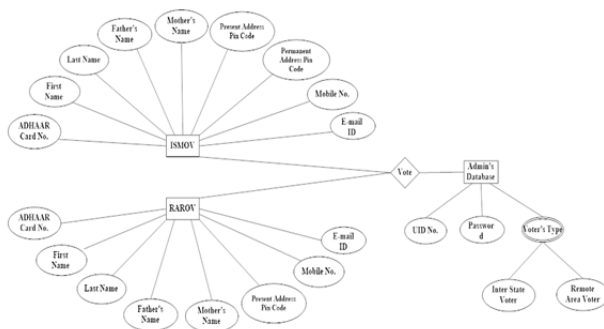**Fig. 3.3: Central Database**

Fig. 4: E-R Diagram of Online Voting System

3. RESULT

This system of online voting promises a significant increase in the voting percentages in hilly or remote regions of India. States like Uttarakhand which are facing high rate of rural-urban migration can implement this model to increase their voter's turnout in elections. According to KAABP survey report, out of every 100 voters, 15 voters said that accessibility is the main reason behind low voting percentages in their respective areas. Out of every 100 people, who were eligible

but were not able to cast their vote, 28 were not able to do so because they were either residing in some other part of their state or in some other state. Another survey was conducted among the voters who did cast their vote but someone from their family was not able to cast his/her vote. Out of every 100 such people, 35 were not able to do so because they were either employed out of station or they did not know the location of the pooling booth or, in some cases, the polling booth was too far from their location.

If we are able to implement this model successfully, voting percentage of Uttarakhand can be approximately increased by 10 percent. The population of eligible voters in this state was 67,86,394 by January 2014. After the successful implementation of this model, approximately 6,78,639 more people will be able to participate in the elections.

4. CONCLUSION

Selective Online Voting System has the capability to increase accuracy and efficiency of the entire election procedure. It possess balanced involvement from both human and machine which makes it more safe and secure from all its predecessors. This model can also be used by soldiers guarding Indian Borders to cast their vote. State, City and District level elections can also be involved at a later stage. Along with the Inter State Migrants, Intra State Migrants (in states with large geographical area) can also be provided with the facility to vote online and increase the voting percentage.

This project can first be implemented in some parts of the state. The success of the model in those areas will determine the effectiveness of this model.

REFERENCES

[1] Alexander. Stakeholders: Who is your system for? IEEE: Computing and Control Engineering, 14(1):22{26, April 2003}.

[2] Almyta Systems, Point of Sale Systems. http://systems.almyta.com/Point_of_Sale_,Software.asp. Accessed on 20th October 2008.

[3] S. W. Ambler, Process Patterns: Building Large. Scale Systems Using Object Technology, Cambridge University Press, 1998.

[4] M. Andrews and J. A. Whittaker, How to Break Web Software: Functional and Security Testing of Web Applications and Web Servers. Addiso, Wesley, 2006.

[5] Java-2 Complete Reference - Patrick Haughton.

[6] Java Servlet Programming - O'Reilly.

[7] Pure JavaScript- Jason Gilliam,-R.Allen Wyke.

[8] HTML completes - BPB publications.

[9] Java Server Programming - Apress publication.

[10] Office of Chief Electoral Officer,Uttarakhand. SVEEP PLAN FOR LOKSABHA ELECTION-2014.

[11] K. P. Kaliyamurthie1, R. Udayakumar2, D. Parameswari3 and S. N. Mugunthan4. Highly Secured Online Voting System over Network

[12] Peter Grunawalt. Why are Cities the Only Place for Dreams? Outmigration of Youths From Rural Uttarakhand.