Implementation of Intelligent Polling System Using GSM Mobile
Monali R. Dave, Jai Karan Singh, Mukesh Tiwari, Dr. Anubhuti Khare

Abstract — An E-voting, Electronic voting systems, also known as Personal Response Systems (PRS), Audience Response Systems (ARS) or classroom communication systems (CCS) use handsets as transmitter if the person is within the range of receiver or uses GSM Mobile Equipment (ME) to reply from anywhere. To minimize the disadvantages of generic e-voting, we propose a method in which a voter, who has wireless certificate issued in advance, uses its own GSM Mobile phone without a special registration for a vote. In this paper, a polling scheme using GSM mobile technology is presented as the most basic application of GSM based Personal Response System, which allows a voter to cast his vote in simple and convenient way without the limit of time and location. By integrating an electronic voting scheme with the GSM infrastructure.

Index Terms — Personal Response System (PRS), E-voting, GSM Technology, Mobile Equipment (ME), Confidentiality.

I. INTRODUCTION

In democratic societies, voting is an important tool to collect and re-act people’s opinions. 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. The votes are then counted manually once the election has finished. With the rapid development of computer technology and cryptographic methods, electronic voting systems can be employed that replace the incident and most importantly error-prone human Component. To increase the efficiency and accuracy of voting procedures, computerized voting systems were developed to help collecting and counting the votes. These include Lever Voting Machines, Punched Cards for Voting, Optical Mark-Sense Scanners and Direct Recording Electronic (DRE) voting systems.

The term “e-voting” is defined as any voting method where the voter’s intention is expressed or collected by electronic means. E-Voting has been performed recently in some nations and regions. In an e-voting by touch screen, a voter directly selects candidates or the vote content appeared on a screen as the finger. This voting with fast counting time has also a problem that voters go to the polling place. In the meantime, an e-voting using internet has no inconvenience that voters should visit the voting booth. However, this voting is executed just in the environment with internet accessible computer.

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 traveling abroad. Hence, there is great demand for remote voting procedures that are easy, transparent, and, most importantly, secure.

In this paper, we Endeavour to improve mobility and address security problems of remote voting procedures and systems. We present an electronic voting scheme using GSM. With more than one billion users, the GSM authentication infrastructure is the most widely deployed authentication mechanism by far. We make use of this well-designed GSM authentication infrastructure to improve mobility and security of mobile voting procedures.

An e-voting system that allows a voter to be identified using a wireless certificate without additionally registering when a user votes using his mobile terminal such as a cellular phone. We also present a method that ensures the anonymity of voter and the confidentiality of vote content. By our mobile voting system, a voter can cast his vote more easily and conveniently than the existing e-voting using internet, within the scheduled time period anywhere even when a voter is not able to access internet on a voting day. Our proposal can be applied not only to presidential election but also to any votes such as a national assembly election or a local election.

Here is the Percentage of Voting From 1952 to 2004 of Lok sabha Election:

<table>
<thead>
<tr>
<th>Year</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>First</td>
<td>1952</td>
</tr>
<tr>
<td>Second</td>
<td>1957</td>
</tr>
<tr>
<td>Third</td>
<td>1962</td>
</tr>
<tr>
<td>Fourth</td>
<td>1967</td>
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<tr>
<td>Fifth</td>
<td>1971</td>
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<tr>
<td>Sixth</td>
<td>1977</td>
</tr>
<tr>
<td>Seventh</td>
<td>1980</td>
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<tr>
<td>Eight</td>
<td>1984</td>
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<tr>
<td>Ninth</td>
<td>1989</td>
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<td>Tenth</td>
<td>1991</td>
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<tr>
<td>Eleventh</td>
<td>1998</td>
</tr>
<tr>
<td>Twelfth</td>
<td>1999</td>
</tr>
<tr>
<td>Thirteen</td>
<td>2004</td>
</tr>
</tbody>
</table>

Here we can see that average voting rate is approximately 50 to 60 percentages.
Consider the case if any one registered voter in his/her home state that is Goa, If he need to register himself in Bangalore he need to prove that he is a resident there. However, he lives as a paying guest; he has no proof of residence, so registering himself in Bangalore is not an option. Importantly he is not acquainted with the political scenario there and so even if he had an opportunity to vote he would not know whom to vote for, except make a choice along party lines, that too the national ones only, most of us people from outside the State hardly know the regional parties. So in effect, he would be able to make the best choice if he was to vote in Goa.

Metropolitan cities consists of millions of people, from all parts of the country, a large majority of them are a floating population like above case , working one state but with no political id entity. Therefore, there is need of remote voting system to increase the voting rate.

1.1 ADVANTAGES OF GSM SMS VOTING TO THE POLLING SYSTEM

A. Reduced costs:
Instead of having thousands of polling stations scattered all over the country which will involve enormous logistics to is deployed deploy, the only ‘polling stations' will be one counting center per service provider where the election polling software system, this makes it easier to monitor.

B. Increased participation and voting options:
People can vote from home or offices so no need of public holiday to enable people vote. Participation will be higher because people do not have to leave their home and stand on long endless queues. Participation will generally be higher than ever before. Many people do not vote just because of the stress involved.

C. Reduced Risk:
The risks associated with road travel such as road traffic accidents and late arrival of electoral resources due to unforeseen delays during deployment of polling stations will be avoided.

D. Reduced time Consumption:
Due to its electronic nature, the results of the Poling will be available immediately after voting with the GSM sms voting.

E. Greater speed and accuracy placing and tallying votes:
Possibility of rigging will be very low as compared with the ballot box system. The reasons are:
1) Every political office candidate will be allocated a number eg. NCP candidate: sms to 3005, BJP: sms to 5604, Congress: sms to 1009 etc.
2) An electronic voters' register (which is a primary requirement for the GSM sms system) will be used to control the rigging. Every voter will also register a particular GSM phone number in which he would use for voting during the elections.
3) To vote, voters will type their registration number as a sms message eg. 00030611 and send to the number of their candidate of choice. To confirm the vote, the voter will receive a confirmation message from the Counting Station that their votes have been received. This is the voting receipt.
4) During registration voters who don't have phones can register with designated handsets to be provided by service providers or use numbers of well known friends. Once a number is used, it cannot be changed until after the voting exercise.
5) Possibility of multiple voting is not possible since voter registration number must match the GSM number used.

F. Provide Equal Opportunity:
Best of all, this process will guarantee that a new generation of political leaders will emerge at last. Since it will provide an equal opportunity for all the political parties.

II. BACKGROUND

GSM is a synonym for Global System for Mobile Communication. It is a digital wireless network standard widely used in European and Asian countries. It provides a common set of compatible services and capabilities to all GSM mobile users. The services and security features to subscribers are subscriber identity confidentiality, subscriber identity authentication, user data confidentiality on physical connections, connectionless user data confidentiality and signaling information element confidentiality. They are summarized as follows:

A. Subscriber Identity Confidentiality:
It is the property that the subscriber’s real identity remains secret by protecting his International Mobile Subscriber Identity (IMSI), which is an internal subscriber identity used only by the network, and using only temporary identities for visited networks.

B. Subscriber Identity Authentication:
It is the property that ensures that the mobile subscriber who is accessing the network or using the service is the one claimed. This feature is to protect the network against unauthorized use.

C. Data Confidentiality:
It is the property that the user information and signaling data is not disclosed to unauthorized individuals, entities or processes. This feature is to ensure the privacy of the user information.

In this paper, communication between the mobile equipment and the GSM network uses standard GSM technology. Hence GSM security features apply.
III. GSM BASED INTELLIGENT POLLING SYSTEM

Fig. 1 shows the Block Diagram of Intelligent Polling System Using GSM System. It contains GSM Modem M10, a 16 bit Microcontroller ATMEGA162, which having two serial port one for GSM Modem and other for PC, Prolific PL2303, which is used for Communication & Interface between USART based serial port of microcontroller and USB port of computer. And a 16×2 Character LCD is used to display message.

IV. OPERATION OF GSM BASED INTELLIGENT POLLING SYSTEM (IPS)

Fig. 2 shows the GSM Receiver Module, which receives votes from each voter in terms of SMS. Each voter has unique mobile id, like a voter id, that identify the voter’s identity. Election committee provides mobile id. The voter who uses mobile can caste their votes through GSM. For this purpose the information of candidates are predefined to voter’s modem has own number that is known to every voter. When voter caste their votes on the Election Day, for this purpose voter send a message to GSM, which contains voter’s mobile id and the candidate’s id which he wants to vote. GSM modem will receive the votes, which is coming from voters’ mobile equipment (ME).

GSM modem will send receive message to the microcontroller. Microcontroller will keep the database For all valid voters id. Microcontrollers receive the message from a GSM modem and compare the voter id of the message from its own database Basis of comparison it gives following conclusion ‘This is valid voter id’, if this is valid voter id than it checks that the any votes from this id is received or not if votes from the same id is received by microcontroller than that is discarded by microcontroller and send acknowledge massage ‘Voting is already done’ returns to voters mobile.

If this is invalid voter id than microcontroller discard the vote, and send acknowledge message ‘unsuccessful voting’, return to voters mobile.

Fig. 3 shows the flow chart of GSM based IPS system which works as follows: For example, a voter has id 033 he cast the vote for a candidate which serial id is 02 than he will send a message to GSM modem that is (033 02 919981360643).
If vote received by voter id is first time than it checks the candidate id and increment the counter for candidate, for whom he votes. And send this vote to the personal computer. Microcontroller will send acknowledge massage ‘successful voting’ return back to voters mobile.

VI. RESULT OF SIMULATION IN VISUAL BASIC
The above Fig-4 shows the form 1 created in visual basic. Here after entering the port, file for three candidates are created .As voters vote from their GSM Mobile Equipment (ME), for validate votes counter of that particular candidate will increase. Then by pressing the graph we get the result of all three candidates as in form 2 as shown in Fig-5

Figure 4 Form1 created in Visual Basic

The below Fig. 5 shows the GSM Graph of five State after Polling with GSM having Three Candidates. .Here, the response shows the percentage voting done in favour of all three candidates,within five different states. The Result of five State indicates that 100% voting is achieved with GSM Mobile Technology,which is shown in graphical manner.And this five state result is compared with reference of 100% in last column.

Fig.5 Simulation result in visual basic

VII. CONCLUSION AND FUTURE WORK
This paper details the requirements, design and implementation of a generic e-voting technique using GSM Mobile System as a most basic application of GSM Based Personal Response System, where voters can cast their votes anytime, anywhere by using a GSM Mobile Equipment (ME). Our proposal enables a voter to cast his vote using a ME without additionally registering himself for voting in advance and going to a polling place. Here the Mobile service provider authentication infrastructure is used to provide voter authentication and improve voter mobility. Authentication is always a difficult requirement to fulfill for remote voting schemes, most of which apply a public-key based signature scheme for voter authentication. In our scheme, we are using the existing authentication infrastructure. Our scheme also enhances the security and provides more mobility and convenience to voters. Where the voters’ privacy is protected. In addition, proxy vote or double voting is not possible. Any entities except for an e-voting device cannot know the voting result. However, further work is needed to address the importance that we place in the trust on the Authentication Center (AC). In future work, we will discuss more on end-user device (ME) and application security. In this paper, our concern is to present e-voting system using a Mobile Equipment (ME) and to explain its process as a basic application of GSM based Personal Response System. In which voter does not need to go to polling booth to cast their votes.

ACKNOWLEDGEMENT
I would like to thank Shri Satya Sai Institute of Science and Technology and the Department of Electronics and communication engineering for taking the time to discuss and demonstrate the GSM based PRS technology with me. Also, thanks to Prof. Mukesh Tiwari , HOD of Electronics and Communication engineering Department & Prof. JaiKaran, Electronics and Communication engineering Department & Dr. Anubhuti Khare, of Electronics and Communication engineering Department, UIT, R.G.P.V., Bhopal for providing very helpful comments on this paper.

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