

IVRS and DTMF based Voting System

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Abstract: A Voting System will be developed where a person can vote using a cell phone. A phone connected to the voting system, will decode the DTMF pulses sent by another phone (mobile/landline) belonging to the voter. There will be two databases, 1st will keep record of voter's information and 2nd will about the electing parties. The voter will call the number assigned to the IVRS voting system, which will instruct the user how to proceed further. Then the voter will enter his/her password. If he/she is authenticated then he/she will be allowed to vote. If the person has already voted then his record will be updated as "voted" in the database. An Admin will log into the system and begin the system. After the voting time period is over, reports will be generated showing the results of election, which will be seen by the admin.

Keywords: Interactive Voice Response, Dual Tone Multi Frequency.

I. Introduction

Optical-scan machines, Punch cards, mechanical lever are some of the recent voting schemes that have replaced the earlier method of counting hands. Characteristics of Electronic voting systems are different from the traditional voting scheme, and improved features of voting system are also provided over traditional voting system such as accuracy, convenience, flexibility, privacy, verifiability and mobility. In spite of these advantages this scheme suffers from various drawbacks such as Time consuming, large volume of pure work is consumed, Machines get damaged due to lack of attention, Due to Mass update simultaneous updation of many items is not allowed by users. Proposed Voting System overcomes these drawbacks. Such a system enables a voter to by use his/her voting rights from anywhere in the country respectively. Votes can be casted by the voter from anywhere in the country without visiting to voting booths, in highly secured manner. This system increases the percentage of voting and makes voting fearless of violence.

India is a democratic country, our government follows voting system for betterment of the country. Voting and development go hand in hand. Now a days if a person wants to vote, he/she needs to go at the voting booth and stand in a queue until the turn arrives. This process is quiet tedious and time consuming. So we are developing a voting system with the help of which people can easily vote directly from their Phone, being present anywhere in the world. Just by pressing few digits from a phone your vote can be counted. The voter will be assigned a voter id and password using which he/she can vote. To prevent bogus voting, a system will be kept at voting booth which will check the status of the voter. If the status is "voted" then he/she will not be allowed to vote again. Security is preserved in a way that, once the admin has logged in, even he cannot stop the system or make any changes to it until the time period is completed.

Presently, the IVR systems are developed and deployed with an information database at the back-end. End users are made available with the information over the interface of simple key presses using a pre-defined menu structure to answer the queries of users. The pre-defined menu structure and the information extracted from the database remains fixed throughout the life-time of an IVR system and, manual intervention is required if any changes are to be made. A unique contextual value is given by the Information provided by the IVR system. The dynamic nature of context is ignored by the fixed menu structure and provides information that the developer might have envisioned at the beginning of the system. It can be understood well by taking the example of an Indian Railway IVR system, the menu structure to access information remains fixed throughout the year and all the users are offered by the same interface, thus not considering the contextual factors like, caller abilities to interact with the system etc.

II. Existing System

In these recent years online voting has been an active area of research, efforts to develop real world solutions have just begun posing several new challenges today. Recent reports have shown concern about the use of insecure Internet, well documented cases of incorrect implementations and the resulting security Breaches. In order to create public trust in online voting, these challenges and concerns have to be resolved.

A voting system is a method by which voters make a choice between options, often in an election. Some rules are enforced to ensure that valid voting is done and the votes are counted properly to yield a final result. The three basic families of voting system are: Majority, proportional representation and semi-

proportional. All the voting systems within a same family tend to produce same results. At places like United Kingdom, Switzerland Internet voting systems have used for elections.

Voting (manual): In our country the actual process of casting ballots is referred as voting. For the purpose of inspection a voter/person who is eligible for voting goes to the polling station where his name is registered and shows his voter identification card to the polling agent. Depending on the (unique) voter registration number on the card, the official/agent looks up the name of the voter respectively. Once it is made sure that the voter hasn't cast any vote, he/she selects a candidate of choice on the given ballot box in an enclosed space by pressing the button against the candidate's name/sign. Then that person's middle finger of left hand is marked with indelible ink which proves that he/she has casted vote. He is then expected to leave the polling center.

Online voting system:-

Online Voting are simple and easy to use. Manual efforts are reduced and bulk of information can easily be handled. There are some drawbacks with this system, voter is expected to be familiar with the internet, software failure is possible, insecure access of internet etc. Multi-user environment support by the system is expected. Automated System, also concrete security features like creating users and assigning privileges to users of the system should be provided. Keeping the track of all the detailed descriptions of the client and the details of services offered by the client organization is also a part of such a system. Irrespective of the time, Various outputs (reports) should be available. Large volumes of data (i.e. large database support) is necessary for the system to handle.

III. Proposed System

Gas booking system is the latest system which is using this IVR technology. But this System has a drawback that, a specific phone number was used for registration and it is mandatory that by using only that number one can call for booking. Incase if that cell phone is not available for booking, any other number could not be used. The proposed system eliminates the need of using a specific cell number, instead one can vote using any phone. Even a landline can be using for voting purpose. The existing voting system needs a person to be physically present at the location where the voting process is carried out, which is usually not possible for everyone. This drawback needs to be resolved so that public should cast their vote in secure and convenient way

GUI designed will be quiet simple and easy to understand. This is software that can be used by people to vote in an election. All the user must do is login and click on his favorable candidates to register his vote.. Proposed voting system is a voting system by which any Voter can use his/her voting rights from anywhere in country. This voting system contains: a) Voter's information in database. b) Voter's Names with ID and password. c) Voter's vote in a database. d) Generation of graphs and reports on the basis of votes.

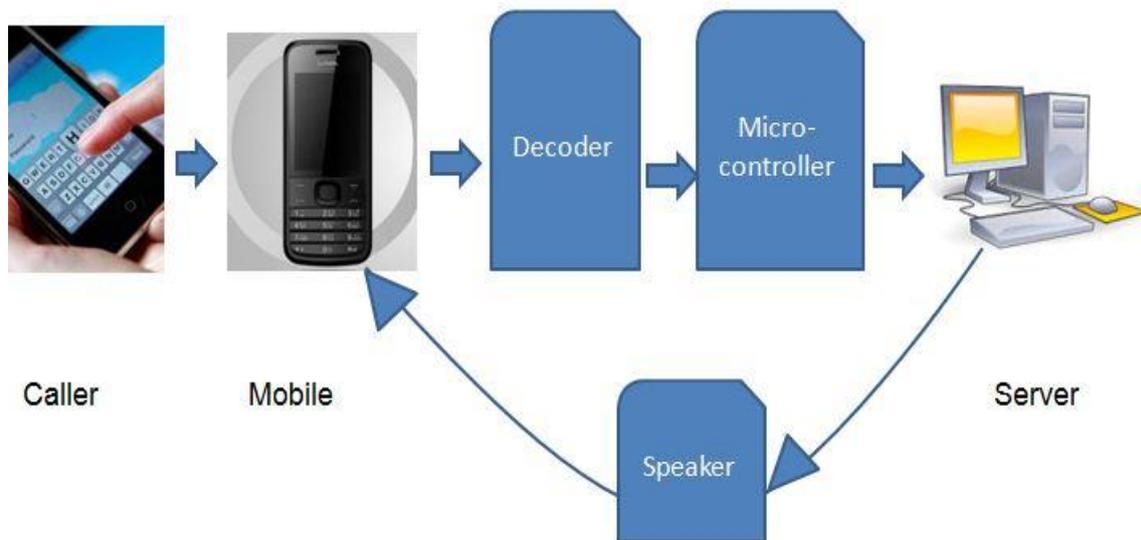


Fig 2. Working/Architecture of the System

The architecture can be summarized as follows:

1. Mobile Phone: This is Caller's/Voter's cell phone, from which he/she will call on another phone (which is having IVRS System) so that the person can vote. The Caller will call on the phone having IVRS System.

2. IVRS DTMF System: This is the other phone on which the call will be received. This phone is based on 2 technologies, namely: IVRS and DTMF.

IVRS- Interactive Voice Response System, which instructs the user how to proceed for the voting process.

In simpler terms IVR can be stated as a voice based system that is accessible through any phone (Mobile or landline). Interactive Voice Response System is largely used in industries for call automation and hence provides better services to customers, thus making it convenient for users. One of the biggest benefit of using IVR is that, it is easier to use when compared to the Internet, because a person needs to have certain skills and knowledge to use Internet. IVR enables interactivity for active communication, while traditional information media like Television or Radio, communication is passive.

This technology has not been utilized to its full potential in spite of significant work to improve the interaction with the IVR systems. A large amount of the work in this area is confined to studying a group of Users and proposing a system solution that is unanimous. All callers are handled in the same way regardless of their knowledge, experience, navigation skills and willingness to use the automated system by common system solution. It is known to us that every individual has a unique set of properties that differentiate him/her from the other individuals, and the same holds true for the caller of a voice based application respectively. But a human operator is preferred over IVR because he is capable of handling these intricacies in a better way.

Example: After the call is answered, 1st it will ask you for language selection like Press 1 for English, Press 2 for Hindi, Press 3 for Marathi etc. Then it will ask you to select the Electing party, e.g. Press 1 for Narendra Modi of BJP, 2 for Sonia Gandhi of Congress, 3 for Arvind Kejriwal of AAP etc.

This way the voting procedure will be completed.

DTMF - Dual Tone Multi Frequency.

A signaling system for identifying the keys or numbers dialed on a **DTMF keypad** is a way of defining **DTMF** in simpler terms. A pulse dialing scheme or loop disconnect signaling was used for the earlier telephone systems, which was later replaced by multi frequency (MF) dialing. DTMF generates two tones, one is low tone and other is high tone. It is therefore a multi-frequency tone dialing system which is used by the push button keypads in telephone and mobile sets to identify which number or key was pressed by the caller/user. The long distance signaling of dialed numbers in voice frequency range over telephone lines is benefitted by DTMF. The need of telecom operator between the caller and the callee is eliminated here, while telephone switching centers evolved automated dialing

Suppose we select English Language by Pressing 1, so a Tone will be generated which is called Dual Tone Multi Frequency. This signal/tone needs to be passed from the voter's phone to the IVRS phone (on which the person has called). First the Signal will be sent to our service Provider (Switching Centre), and then it gets switched to another Service Provider and from there to our Phone.

Example:- If I am an Airtel user and called on an Idea phone, so first it will go to Airtel's switching Center, then Idea's Switching Center and from there to our phone.

3. Decoder:

The job of decoder is to detect the dial tone from a telephone line and decode the keypad pressed on the remote telephone respectively. The dial tone which we heard when we pick up the phone set is call Dual Tone Multi-Frequency. The name dual tone was given because the tone that we heard over the phone is actually made up of two distinct frequency tones. The DTMF tone is a form of one way communication between the dialer and the telephone exchange. Two things namely :- The tone generator and the tone decoder consist of a complete communication.

The signal/tone which is received from Caller's phone is Analog, but digital signal is needed for detection of the dialed numbers. We need to give the data to the server in Digital form. Decoder converts the Analog signal to Binary.

Example: If we Press 1, then we will get a binary signal-0001 in 4 digit binary because we have 12 digits in any phone.

Every digit has a separate code.

4. Microcontroller:

ATMega is the AMTEL microcontroller on which Arduino UNO is based. This ATmega328 microcontroller operates at 5 V with 2 Kb of RAM. 32 Kb of flash memory is required for storing programs. The clock speed is 16 MHz, by which 30,000 lines of C code is executed per second.

It converts the **Binary** signal to **Digital** Signal. Here finally the receiving Database will recognize that the digit “1” was being pressed and it will do the working according to number 1, means it will select English language for the user.

5. Server:

This system consists of a server back-end which is responsible for maintaining necessary data structures and authenticates users. On behalf of client the GUI at the server’s end enables to create polls. User’s can vote using the GUI at their end after connecting to server in order to authenticate themselves. It is a Data Base server which keeps the record of all users who have voted, so as to avoid double voting.

6. Speakers:

Speakers are used so that the voice from IVRS phone is audible to the user. As stated earlier, a caller will vote using the voting id and password, the database will recognize to which region the person belongs and according to the specific region the database will provide with the list of candidates standing for election from that region. The last 4 digits of Adhar Card can be used as password. After selecting a specific number the system will say Press “*” to Confirm and press “#” to go back. So incase if we have by mistake selected a some other number by mistake then we have a chance to go back. But once we have confirmed, then we cannot go back and our voted will be confirmed. The person’s status will be marked as “voted”.



Fig. 2 Voting booth to Server

To avoid bogus (double) voting, a system will be kept at voting booth also which will check the status of the person in the database. If the person has already voted through phone and is again trying to vote from voting booth then this won’t be permitted. If the person’s status is “voted”, then the system will say “Thank You for voting, your voting has already being done”.

IV. Features Of System

Our system will have some new features mentioned as below so as to overcome the issues of the existing systems.

- 1. Location Independent** – One can vote from being present anywhere in the world. This system eliminates the drawback of being Present at the particular place where the voting process is being carried out. It does not require a person to go at the voting booth and vote. Even if the person is not present in the same country for which the elections are being carried out, still he/she can vote just by pressing few digits from a phone.
- 2. Time Independent** – A person can vote at any time which is convenient for him within the voting hours. It will take him/her very less time to complete with the voting process, as this system does not require us to go at the voting booth and stand in a queue.
- 3. Secured System** – The system uses a unique user-id and password for every person so it is highly secure. Also Once the Admin has logged in, even he himself cannot stop the system in between or make any changes to the system until the time is over, so it enhances the security greatly.
- 4. Result in Bar Graphs** – Once the voting period is over, the result of the elections will be displayed automatically in the bar graphs and Pie charts. The graphs will be shown region wise and also overall results of the elections. This makes convenient to determine the results quickly by a glance.

V. Modules

1. Voter’s Registration –

Prior to voting, a voter/user needs to register himself. So the system consists of a register form where the voter’s can register themselves. All the voters need to provide their basic information for this purpose. The entire registered information is collected and stored in respective database. This actually identifies if the voter is eligible to vote or not. The person who satisfies the needs/requirements specified can only be considered as eligible. For instance if a person is above 18 years of age and is the citizen of respective country is permitted to

vote. It is the responsibility and authority of the Election Commission officer to accept eligible user, otherwise he/she has right to reject their registration of that person.

The election commission keeps the record of all such information. The voter can now Login with his unique USERNAME and PASSWORD generated through the registration process. In short this module maintains the details of Voter like Voters name, Voter-id and password as a proof for the identification of Voter.

2 .Candidate's Registration-

The same process of registration is necessary for Candidate also. Even a candidate needs to register himself for becoming a part of voting system. A candidate can see and also edit his/her profile after registration. It is very important for keeping a record of this information.

This module maintains the information of candidate such as Name, the Region to which he/she belongs the Name of Electing party which is being supported by him/her

3. Interfacing with Hardware - 2 devices are used as hardware namely:-

i) Decoder- This device converts the Analog signal which is being received from the phone to the Binary signal. We will use MT8870 Decoder for this purpose.

ii) Microcontroller –This device converts the **Binary signal to digital** signal.

Arduino Microcontroller will be used for this system. Arduino can be used to develop interactive objects, taking inputs from a variety of switches or sensors and controlling a variety of lights, motors and other physical outputs. IC used will be ATMegha 328.

The coding will be done for this IC.

4. Text to Speech – IVR's get information from databases, convert to voice, and speaks it back to the caller.

Whichever digit is being pressed by the voter through his/her phone for the selection purpose will be converted into speech by the speaker. The voice is audible to the voter through Speaker.

5. Generation of Reports- Reports will be generated at the termination of voting period. It will describe the details and results of the voting done.

6. Plotting of Graphs- Graphs will be plotted based on the result of voting. The graphs will be plotted showing the results region wise and also overall results of the country.

VI. Conclusion

This new method of voting enables a voter to cast his/her vote through a phone without going to voting booth. It also eliminates the advance need for user to register himself/herself for voting process. Double/Bogus voting is not possible, faster access, higher degree of security, ease of maintaining all the information of voting, highly efficient and flexibility are the advantages of this system. This will increase the percentage of voting. Any kind of human error can be removed/eliminated by using such a system. Reliability and scalability for large elections go hand in hand here. Such a voting system is also an excellent mechanism because physical presence of the voter is not mandatory.

Thus we conclude that the voting system which will be developed is quiet convenient and easy to use for the user. Such a system is comital for our country today, where electing a proper person is very essential.

This takes the advantage of being location independent, time independent and security. This way the people who were not able to vote due to any of the reasons will be now easily voting by using this system. It will prove to be very beneficial and advantageous for our country in future.

Acknowledgement

We wish to thank the Department of Information Technology of MET BKC IOE College Nasik for providing the materials and their support during the course of this work.

References

Journal Papers:

- [1]. Ankit Anand, Pallavi Divya, An Efficient Online Voting System, International Journal of Modern Engineering Research (IJMER) www.ijmer.com Vol.2, Issue.4, July-Aug. 2012 pp-2631-2634.
- [2]. G.O. Ofori-Dwumfuo and E. Paatey Methodist University College, Ghana, The Design of an Electronic Voting System, Research Journal of Information Technology 3(2): 91-98, 2011 ISSN: 2041-3114.
- [3]. Kosuke Hashizumea, Tuan Phung-Duc, Shoji Kasaharaa and Yutaka Takahashia, Queueing Analysis of Internet-Based Call Centers with Interactive Voice Response and Redial, 2012 IEEE 17th International Workshop on Computer Aided Modeling and Design of Communication Links and Networks (CAMAD).
- [4]. <http://www.polar-electric.com/DTMF/Index.html>
- [5]. <http://www.engineersgarage.com/tutorials/dtmf-dual-tone-multiple-frequency>
- [6]. http://en.wikipedia.org/wiki/Dual-tone_multi-frequency_signaling