

A Simple, Secure and Cost Effective Online Electoral System

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1. Abstract

Due to socio economic problem people are running out of their native places for education, employment etc. It results to miss the constitutional rights of casting vote from other part of the country to their constituency. Election commission of India is not proposing online electoral system because it may results in many misuses like unfair election, insecure voting etc. It is also practically infeasible because of it is expensive and problem with many people are not computer literate. These are the biggest challenges to successful implement and use online electoral system. This paper describes a practical feasible idea which meets all the requirements as pointed out. This electoral system will work with the collaboration of online banking system. This online electoral system can be widely used worldwide in all country.

2. Introduction

Many Indians can't cast their votes because they stay far from their home town where their names are listed in electoral list, due to various reasons and which can never be avoided. Though people want to cast their vote but can't do so as India has no provision for its citizens to cast their vote from other places. Practically it is not feasible to have manual electoral system all across the country due to such a large population.

Here an **online electoral system** is being described which is practically feasible and meets all the criteria like

- Free and Fair election
- Comparatively inexpensive and less infrastructure overhead
- Secure voting
- Practically implementable for all kind of voter irrespective of literacy and socio economic background.

3. Technique

Here a technique is described in association with banks. The reason for associating banks with online electoral system will be described in the subsequent section. This section will cover the technique. There are three important phase associate with online electoral system.

- Generation of user id and passwords
- Registration for voting
- Casting of votes

Generation of user id and password: Each voter staying outside their native state for any purpose will have to first get a voting user id and password from a bank located in the place where their name is listed in the electoral list. The Voter must have an account in the respective bank to get a voting user id and password. In case a voter doesn't have an account in the respective bank, she/he has to open a bank account to get the voter user id and password. Banks shall have provision to open an account without any charge with zero balance. The Voter must produce the relevant documents like voter id card, address proof, date of birth proof, photograph, documents to justify reasons for staying away from home like offer letter of company, joining letter and identity card from institute etc. Once a bank is satisfied with all the documents, it can start generating a user id and password. A Bank can issue Id and password only if the user has not created his user id and

password before in that bank or any other bank, by looking in the common data base of the government as shown in figure 1. This is to avoid multiple users Id for an individual. Once the user id and password gets generated, a record will be maintained in the common database.

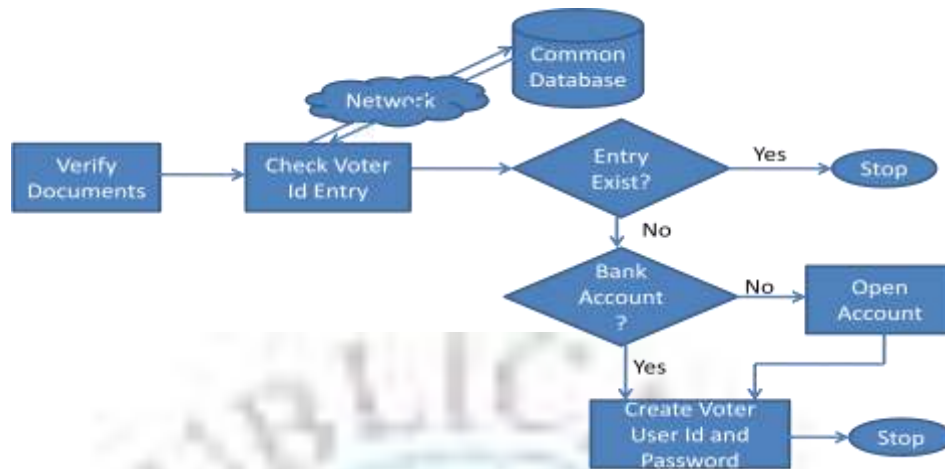


Figure 1: Generation of user id and password

Voter Registration: Once the election commission announces the election date, the voter may register to cast their vote. The Voter can register his vote online. There must be some minimum criteria based on account activities like transaction etc. For example a voter must have salary account in case he/she is an employee or when there are minimum 5 transaction and total minimum transaction of INR 10000(Ten thousands only) in past one year. This is to avoid misuse by creating a dummy account and let others to use their account. Voters can register to select the zone where he/she is comfortable to cast the vote. In case a person is working in a company, organization or studying in a college, the voter has to select their respective company, organization or college as a polling center or automatically it will get selected based on the information in common database. In case a person is not familiar with how to operate the computer/internet; he can go to the bank and can register for voting. Once the registrations get over, the person who is not familiar with how to operate a computer/internet will receive a secure voting user id, password and bank branch where he/she can cast their vote through postal or can personally collect from bank from where s/ he has registered. To have a fair election without any fear the password and user id will be in form of bar code which can be scanned by a bar code scanner. This is to avoid illegal voting.

Casting of votes: As described above that there are three types of voters

- Computer literate voter working in a company having polling center
- Computer literate voters not working in any company, organization or studying in institute having polling center
- Computer illiterate voters

Here all the techniques are described to enable the voters to cast their vote respectively.

Computer literate voter working in a company having polling center: The computer literate voter working in a company, organization or studying in Institute College has to cast their vote in their company, organization and institute only. The Company, organization or institute has to take the responsibility to make sure that all its employees or students are willing to cast their vote should cast their vote here only. There will be separate rooms/systems where a voter can cast his vote. Proper security must be arranged by the company to give complete privacy. To cast the vote, a voter has to first login into their online bank through banking user id and password. Once logged in to the bank, there will be an option to cast vote. Figure 2 shows the voting process for this kind of voters.

Computer literate voters not working in any company, organization or studying in institute having polling center: These voters have to go to the respective bank branch with online bank login id, password, voter login id, password, voter ID card and relevant documents as required. The Bank should first verify the voter and only then allow the voter to cast

their vote if found suitable. The Voter will be provided with a computer terminal and complete privacy. The Voter will have to first login into his bank then cast his vote by login into the voting section by using the voting user id and password. Figure 2 also shows the voting process for this kind of voters.

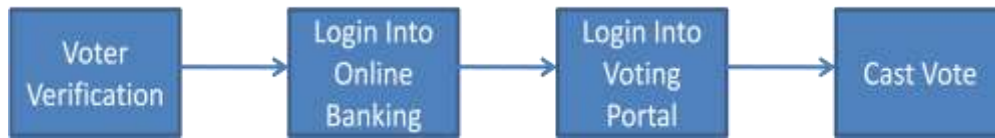


Figure 2: Vote casting process for computer literate voters

Computer illiterate voters: These voters have to go to the respective bank branch with voter login id, password, voter ID card and relevant documents if required. The Bank will first verify the voter and only then allow them to cast their vote if found suitable. The Voter will be assisted by polling officers/bank staff. Polling officer will verify the voter user id and password which are in barcode through scanning. Once the scanning is completed they will allow the voter to cast the vote. The Voter will be provided with a terminal having all the option of the candidates with their names and symbol. The Voter has to select one of the options and press. Once the voting is complete the voter can hear a beep and see the symbol selected on the screen. Figure 3 shows the voting process for this kind of voters.



Figure 3: Vote casting process for computer illiterate voters

4. Meeting Requirement of voting

Major concern of online electoral system is that how the requirement will be met. All the concern related to voting and how this system takes them into account is explained below.

- **Free and Fair Election:** It is very important that in order to maintain fair election one has to assure that only the right person is casting his/her vote. As it was explained a voter can cast vote only when logged into the online banking system. As it was mentioned that person who has active account (with some condition) can only cast vote online, and generally people doesn't share online banking login details with others except family members. Another problem could be that people generally share their online banking password with the immediate family members etc. As people can cast their vote either in bank or in the respective company, organization, institute etc after proper verification. It is also mandatory that proper privacy will be maintain for the system used for voting, so no chances of this type of miss use.
- **Comparatively inexpensive and infrastructure overhead:** This system can be implemented within the existing system where we already have all kind of experts. For example bank, organization, institutes etc are well equipped with computer system, internet, well computer trained people etc. Bank also has online banking facilities. There will not be a big overhead to implement this system. One important advantage of this system will be is that it will make the relation among the common man, the government and the company, organization, institute, bank etc much stronger. As each voter will be associated with an account number, definitely banks will have profit in terms of increasing customers. One important point is that when government is taking help of school teachers and other staff from government organization for various activities like for census, election and other activities why not can take help of company, organization, institute etc. Another important point is that there will not be any problem for the bank or company to provide this facility to own people/staff. Here it is not the case that some outsider will come and will cast his/her vote. All the company and bank will accept this responsibility happily and all will feel proud to serve the nation.
- **Secure Voting System:** Now all banking and online trading website are working in a secure manner, so we can say that this system is secure and safe to use. As Banks are involved in this, and most people trust on online banking system so that no chances of breach of security.

- **Simple terminal to select option for computer illiterate people:** Simple terminals can be used to select a candidate. A snapshot of the proposed terminal is shown in the figure 4. It will have display screen to display the candidate's name and symbol. A Press button will be associated with each screen to select that particular option. This terminal can be used to display limited number of name at a time (e.g.15 in this picture). In case of the number of contestant are more than number of display screen a button "Next" or "Prev" can be used to go to next set of candidates' name and symbol. The advantage of this kind of terminal is that no separate terminal is required for all constituencies. It will also avoid cascading of number of terminal in case number of candidate contested is more than number of screen in a terminal like cascading of EVM machines.



Figure 4: Simple terminal to select option for computer illiterate people

Once the voter's one time voter user id and password get scanned, automatically this terminal will be updated with the candidate option of the constituency. The Press button can also be replaced by a touch screen technique. In this a voter has to touch the display screen only. This type of terminal can be used to replace the currently using EVM machine to avoid cascading. It will reduce the cost and overhead.

5. Miscellaneous Issues

This is a very complex system in term of security, implementation and fulfills all requirements to maintain free and fair election. This section described only the top level details. The micro level details are described in **Frequently asked Questions** (FAQs) section to make it more interactive.

6. Conclusion

The idea described in this paper could be very useful and execution can be started in very short time duration. This can be very useful for all the democratic country where there is no online electoral system and also for those where online electoral system is very expensive and not robust.

Frequently Asked Questions

1. What will happen in case parents or other close relative stays with his/her son/daughter or any other close relative?

Ans. See, here the most important is that how to maximize the voting percentage. In case someone staying outside because of he/she stays with his/her son/daughter or any other close relative, they can open an account on behalf of close relative with proper authentication. Restricting for online voting for all is that it will be very difficult to handle by the bank to such a large number of voters. If bank agrees, there will not be any problem to allow all to have online voting facility.

2. What will happen in case a person doesn't fulfill minimum criteria to maintain account as active?

Ans. If a person did not maintain minimum criteria for the account, he/she must give some valid reason and can register for voting on behalf of a person having an active account.

3. What will happen in case someone wants to cast his vote online but does not want to open an account?

Ans. This question is as similar as someone wants to cast his/her vote but does not want to go to polling booth and be in queue. To use fundamental rights one has to put some effort and it is everyone's responsibility.

4. What will happen in case a voter registered for vote but due to some urgency he/she needs to visit his/her native during polls?

Ans. In case due to some emergency someone needs to go to native, first he/she has to de register from online voting. After that he/she need to contact bank. Bank will send this report to local authority.

Note: Sufficient time is must (1-2 week) for these activities.

5. Why a person working in a company/organization or studying in an institute can only cast his vote from company no outsiders are allowed?

Ans. There could be a big overhead to allow outsider due to company policy and security. It is not easy task to handle outsider and company will not entertain this. If company agrees, there is no issue in allowing outsiders.

6. What will happen in case a voter is working in a very small company where there is not infrastructure available for online voting?

Ans. In this case person can chose bank polling booth and can cast vote in bank.

7. In case numbers of voters are comparatively lesser in a particular region, does companies etc involvement are required?

Ans. No. If the numbers of voters are lesser and banks can handle the voting, no need to involve companies and others. Companies and others of a particular region will involve only when banks are not able to handle all voter of that region.

8. Will NRI be able to cast vote online?

Ans. Yes, as banks are spread all over the world. NRI can cast vote from the bank of respective country. But this depends on the bank and respective country, weather allowing or not and giving proper security in case needed.

9. What will happen in case the system which is allotted for vote gets crashed?

Ans. This question is as similar as what will happen in case EVM machine doesn't work. Few spare systems have to maintain to handle any issue with system.

10. How to make sure that a person working in a company/organization or studying in an institute, will caste only his/her vote?

Ans. This is a very important question. For this, one need to make sure that a person can login using his/her login id and password. Face detection technique can be used to check that whether a right person is login into system or not. As now a day's camera is embedded with all laptop/computer, a face detection technique can be easily used. When person will go to cast his/her vote camera will detect voter's face. Voter's face will be verified with a database either in system itself or from a common database through network. After successful verification voter will be allowed login into system. Biometric and more advance video surveillance technology can be used to avoid any type of misuse.

11. How facial or biometric database will be maintained to protect from any forgery?

Ans. Facial and biometric information can be collected at the time of applying for online electoral system in bank. If take a simple example of Tirupati (famous temple in Andhra Pradesh) darshanam, all visitors give their facial and biometric information and it takes max of 1 min.

12. How to maintain privacy at voting place?

Ans. There are two ways to maintain privacy. First, security (company or government) can be arranged to make sure that no two people can go to voting place. This can be an expensive process and also sometimes breach security policy. For example if security provided from internal organizer, they may allow to do any kind of malfunction.

Alternate and best and inexpensive solution is Video Surveillance Technology. This is as similar as video security camera with video surveillance. Now a day's these types of camera are easily available in a market and also economical.

To give more robust security one can use both security by person and video surveillance camera.

13. How to protect in case voting terminal wouldn't allow right voting.

Ans. This can happen by installing software which can allow to run only the software related to online voting like online voting web portal, input from keyboard when only required etc. It shall not allow any other program to run.

There can be other solution by making a system particularly meant for online voting only. This system will be embedded with a keyboard, a voting keyboard terminal (in case for computer illiterate voter in bank), a network cable, camera etc. The entire external device must be permanently attached. All the input port of this system must be disabled and can be enabled by authorized person to install voting related software. Based on the price of tablet, the maximum cost of this type of device will come within Rs. 10K each and can be economically feasible as it is only one time expenditure.

Note: I am not very much expert in this, but I just proposed top level view. If you are expert in this domain, I request to give your suggestion on this.

14. How to verify that a voter selected an option is transmitted through internet without any error or without any trapping in network.

Ans. A verification technique can be used to verify this. A simple technique is that keep the log at the terminal and verify this with the actual database in case some suspension in later point of time. Log must be taken in the encrypted form so that secrecy must be maintained. Proper action can be taken to protect from hacking of system, online data, transmission of data through network etc.

Note: I am not very much expert in this, but I just proposed top level view. If you are expert in this domain, I request to give your suggestion on this.

15. Any simple mechanism so that any party/candidate can't attack on the terminal or in transmission network to manipulate the actual vote in favor of their own party/candidate?

Ans. There are very strong mechanisms like SSL, TLS are used for secure transfer through internet. One simple technique can be used to prevent from manipulating the actual vote in favor of a particular party/candidate as follows.

An unique one-to-one mapping of from list of candidate contesting to list of candidate contesting can be maintained in common database corresponding to each voter and same to be given to each voter registered via internet for computer literate voter and printed on paper for computer illiterate voter or by printed on paper for all voters which can be collected from bank. Secrecy must be maintained while distributing this one-to-one mapping information. The use of this mapping is described by this example. Let's assume a mapping is provided for as shown in Figure 5.



Figure 5: A sample one-to-one mapping of five contesting candidates

Assume a voter wants to cast a vote in favor of candidate4. As candidate4 is mapped to candidate1, the voter has to select option Candidate1. At the final database the selected option will be changed by the reverse mapping by looking into the entry in database corresponding to the voter. From this technique no one will be able to know how to modify the data to cast a vote in favor of a particular party/candidate.

Note: This is just a simple way to describe the mechanism. One can add more complexity to make it robust.

16. How to make sure that a voter can caste his/her vote from the place where he has mentioned during registration?

Ans. Once a voter registered for vote it will maintain in database. The system used in for voting will have a unique machine id and IP address. A person can only login into system if matches with the system id and IP address maintain in the database.

17. Is it necessary to have online voting schedule at same time as normal voting schedule?

Ans. No. As election happens in multiple phases, online voting schedule can be different from normal voting. It will be also easy to handle by having different voting schedule for online voting.

18. In case online voting schedule is different from normal voting schedule, how it will make sure that a person will not cast his/her vote from online as well as from native?

Ans. It was mentioned that a person has to register for the online voting before the actual voting schedule. Once a person gets registered, for online voting, his/her name will be automatically removed from normal electoral database. The electoral list which be distributed to each polling booth will be printed only once online voting registration get over. In this way it will avoid any duplicity in voting.

19. Instead of Bank why not there can be an independent body that will take care of voting process?

Ans. So far online electoral system is not introduced because it is expensive to meet all requirements. It's not economical to have polling booth in each division of City and in panchayat with computer, internet etc. There is also a main problem that people staying outside are not distributed equally. Let's say if few outsiders are staying in a town or city, it is not practically feasible to avai a polling booth for them. As banks already exist and in every small town and now a day's all banks are online. It will be easy to handle online electoral process by bank.

20. Along with bank are there any other bodies who can also work together for voter registration etc?

Ans. Any government body spread across the India having the minimum facilities like computer, interment etc and having expertise in dealing with common people in mass number can also work together with bank in case bank is not able to handle large number of voters. Best example of this kind of body is post office which is spread all across the country and having similar infrastructure as bank and expertise in dealing with common man in each day activities. Other similar body can also work together with banks.

21. Why bank will take all these overhead?

Ans. There are two important points for this answer.

- As government is using school and other organization for census, election and other government activities, why not bank. As banks are also part of our society, it is their social and moral responsibility to serve our country.
- It's not a benefit only for government but also to bank. Huge number of people staying outside due to various purposes(Don't have exact figure but from base on 2001 census it can be approximate 4-5% of total electoral. Please give me exact numbers in case have with you). It will help to increase number of customer of a bank. As it was told

that account must be active, definitely there will be huge number of transaction and balance to be maintain in these account and bank will have huge profit.

22. Why company/organization, educational institute etc will take this overhead?

Ans. There are two important points for this answer.

- Similar to first point of previous question.
- Company/organization, educational institutes etc try to give as much as facility to their own people. If company etc will provide this facility it will add an extra benefit to their people and people will be happier. This will result into meeting better results.

23. What will be total cost for banks to setup system for online voting?

Ans. Let's understand this with example of State Bank of India. SBI has total thirteen thousands(13000) branches all across the world. If a single setup which include a computer, surveillance camera, scanner, voting terminal (for illiterate people) etc, total cost will be max 30-35 thousands. It results in a total cost of $13000 \times (30-35) = \text{Rs. } 39-45 \text{ crore}$, which is very much affordable by government and very minimal compared to total parliamentary election budget of year 2009 which was Rs. 1120 crore. As banks already have computer and other equipment, it may reduce to Rs. 15-20 crore only. This is only one time investment.

24. What will be overall overhead for a company, organization, educational institute etc to setup a polling booth to allow their employee to caste vote?

Ans. One has to manage a small place to setup a system (government may provide a system) and 1-2 person at time of polling. This is a negligible expense for a company, organization, educational institute and suitable for poll. Our country is very strong in economy and can easily bear all these expenditure. In worst case if government doesn't have fund, can request to companies, organization, and institute etc to manage their own and I think, they will be agree to strengthen our democratic system and this cost is negligible for them.

25. What will be the minimum time required to start functioning online electoral system?

Ans. It depends on how fast government is taking steps. If it work in proper way, 6-8 month time is sufficient to implement this system after proper evaluation and testing.

26. Will unique identity number (UID) scheme be useful to robust this online electoral system?

Ans. Yes. This will be very useful and robust for verification of right voter and database to get right information about voter.

27. What is total expenditure of online election with respect to normal election?

Ans. If take the example of parliamentary election 2009, total budget sanctioned was Rs. 1120 crore and total number of electoral was 71.4 crore. If government will pay Rs. 50 crore to SBI which is approx 50% profit of SBI in year 2009-10(Please correct me if I am wrong), Bank will happily manage all these work. Extra expenditure of 15-20 crore can be added for other purposes. Therefore total budget of Rs. 65-70 crore is required for one time parliamentary election.

28. There may be chances of some activities by the party worker outside the bank, company, organization, institute etc premises and may result in security issue and may interfere in their normal operations. How they will be tackled?

Ans. Government must be given proper protection to avoid all these activities. One important points is that bank, company, organization, institution etc lay in some town area near the vicinity of police station where chances of wrong activities are less like happen in rural, villages, naxalite area etc and also comparatively easy to handle this kind of situation. Another important thing that company, organization; educational institute may have their own big campus where no outsiders are allowed. This can be easily handled by giving minimum protection. If take a rough estimation of total number of bank, company, organization, institutes etc all across the India which suits as a polling booth, will come within 1-2 lacs(Sorry, I don't have exact figure. If you have please give us the number). I think few lacs of police/force man are fair enough to handle any wrong activities. My opinion is that no party worker can gather nearby any polling booth etc and interfere in their normal work function. No concept of polling booth agent for online voting system.

29. What is the evaluation process of this online electoral system?

Ans. various steps to be followed for the evaluation at top level

- This will be spread over many people across the India, through social website, forum, mail chain, personal visiting/contact etc and will try to get maximum feedback. We will go through all the feedback and will incorporate relevant feedback.
- After incorporating all the feedback will take the opinion of various companies, organization, educational institute etc and banks.
- We will also meanwhile discuss this technique with many expert technocrats, bureaucrats, politician and social worker and will take their suggestion and opinion.

30. Will company, organization, institution etc involve in case of by election or election of a small state?

Ans. Involvement of company will depend only in case banks will not able to handle large number of voters. Involvement of company, organization, institution etc will depend on the statistics. In case number of outside voters staying in a city/town is reasonably less and bank can easily handle even in case of parliamentary election, bank will take care. Company may not come into picture in case banks are ready to handle all voters in single phase polling or may be in multiple phases.

31. A voter wants to caste his/her vote online but not having booth in his/her company, organization, institute etc. In this case to cast a vote one must have to take a day off. Will he/she get a day off?

Ans. This is a similar question like one want to cast his vote but doesn't want to go to polling booth and stand in queue. As a responsible person can manage a day or half day off in case wants to use his/her fundamental rights. As we manage time for our personal work and family, therefore one has to manage time for the nation. This is the responsibility of each citizen. It is up to company, organization, institute etc. to give a day/half day/few hour off or may compensate with weekend.

32. The list of companies, organization, educational institutes etc is large. Will all of these have a polling booth?

Ans. No. Only those will be used to have a polling booth having sufficient infrastructure like space, security, system requirement etc and fair number of voters.

33. How you will approach to election commission to take forward this project?

Ans. Once this will get evaluated, we will reach to election commission through proper channel with the all kind of details, statistical data and feedback received from all.

34. How much my feedback is important to robust this online electoral system?

Ans. Your feedback is very important to take it forward. Evaluation is the most important and it can be evaluated properly when many people will think about this and find the loophole and will do analysis on practically feasibility of this system.

35. Can I be the active member to promote this online electoral system? If yes, then how?

Ans. You can take steps to find the more and more comments and spread it across the people. You can send your detail to us for voluntarily help this activity. We welcome you to take participate in any form.
