



A Proposal for Internet Voting System in Iraq

Yasmine M. Tabra

*College of Information Engineering
/Al-Nahrain University, Iraq- Baghdad*

Abstract— *Internet voting system can be a viable alternative for conducting an election and such a voting system must provide the same level of security as ordinary paper based elections. This paper deals with designing, building and testing an Iraqi internet voting system based on open list election where voters have some influence on the order in which a party's candidates are elected. This online voting system is highly secured, and its design is very simple, ease of use and also reliable. It also creates and manages voting and election details as all the voters must login by inserting their verified information and password, then select their favorable candidates to vote for. This will lead to increasing the voting percentage in Iraq. The system is designed using several programming languages such as (HTML, JavaScript, CSS, PHP, MySQL).*

Keywords— *Online voting, e-voting, open list, Iraqi voting system, HTML, JavaScript, CSS, PHP, MySQL.*

I. Introduction

One basic feature of democracy that cuts across all divides of people is the act of election. Democracy thus encourages individual freedom according to the rule of law, so that people may behave and express themselves as they choose. This not only gives people a chance to choose their leaders, but also to freely express their views on issues. [1] Internet Voting System is defined as a voting system, where voters can cast their vote over Internet and send the vote to the concern election authority or officer safely. Internet voting is intended as a service to the electorate, so that the voters might have more convenience to cast their vote. They can vote from anywhere in the world by any computer connected to the Internet. The implementation of this internet voting system requires various technical solutions to ensure accurate voter authentication, secrecy of the ballot and security. [2]

II. Voting System Types

In the recent years, voting equipment was widely adopted are divided into five types:

- A. Paper-based voting:** The voter gets a blank ballot and uses a pen or a marker to indicate which candidate to vote for. Hand-counted ballots is a time and labor consuming process, but it is easy to manufacture paper ballots and the ballots can be retained for verifying, this type is still the most common way to vote. [3]
- B. Lever voting machine:** Lever machine is peculiar equipment, and each lever is assigned for a corresponding candidate. The voter pulls the lever to poll for his favorite candidate. This kind of voting machine can count up the ballots automatically. Because its interface is not user-friendly enough, giving some training to voters is necessary. [2]
- C. Direct recording electronic voting machine:** This type, which is abbreviated to DRE, integrates with keyboard; touch screen, or buttons for the voter press to poll. Some of them lay in voting records and counting the votes is very quickly. But the other DRE without keep voting records are doubted about its accuracy. [4]
- D. Punch card:** The voter uses metallic hole-punch to punch a hole on the blank ballot. It can count votes automatically, but if the voter's perforation is incomplete, the result is probably determined wrongfully. [5]
- E. Optical voting machine:** After each voter fills a circle correspond to their favorite candidate on the blank ballot, this machine selects the darkest mark on each ballot for the vote then computes the total result. This kind of machine counts up ballots rapidly. However, if the voter fills over the circle, it will lead to the error result of optical-scan. [6]

III. Requirements for Internet Voting System

The basic requirements for the internet voting system are: [7]

A. Authorization and authentication

Authorization is like only eligible or legal person can vote. In elections Iraqi government requires a minimum age of 18 years old to cast their vote. It can be done by the trusted authority and this process can be done before the elections. Authentication is the process where the validation of the vote is checked at the time of casting the vote.

B. Mobility

This is one of the important factors in internet voting system; voter should be able to cast his vote from anywhere in the world, as long they have the required resources with them like internet, PC, etc. For this process authorization, authentication and some security features need to be implemented.

C. Flexibility

Voters should be able to use different types of devices like desktop, laptop, mobile phones and different networks like Ethernet, wireless and dial-up connections.

D. Count-ability

This process is again dependent on authentication and authorization. If these processes are implemented then count- ability accepts, and this is nothing but to see that only the valid votes are counted.

E. Anonymity

There should be no link between a particular vote and the person who cast the vote. In mandatory voting systems, the fact that the voter has cast a vote should also be recorded.

IV. Iraqi Election System

A. Voting System [8]

- Proportional representation system (governorate-based) for 318 of the 325 seats.
- The remaining 7 seats ("national compensatory seats") are allotted to the winning lists according to the proportion of seats they receive.
- At least 25% of the members of the parliament must be women.
- Voting is not compulsory.

B. Voters Qualification

- Iraqi citizenship
- age: at least 18 years
- Legally competent persons
- Registration on the voters' list

C. Candidate Qualification

1) Eligibility

- qualified voters
- Iraqi citizenship
- age: at least 30 years
- Possession of a high-school certificate.

2) Ineligibilities

- Persons covered by the de-Baathification law (the Accountability and Justice law, which restricts the political participation of high-ranking officials of the dissolved Baath Party);
- Persons convicted of a crime violating honor;
- Persons who have enriched themselves in an illegitimate manner at the expense of the homeland and public finance
- Persons who are members of the armed forces at the time of their nomination

V. System Design Description

The proposed system was implemented using several languages including: HTML (Hyper Text Markup Language), JavaScript, CSS (Cascaded Style Sheet) to create the registration forms and to build the website layouts. The other languages used are PHP and MYSQL, which create the system databases and store, edit and retrieve data from databases. The voting system designed based on open list voting; where voters can choose to give their votes to a specific political group or to a specific candidate.

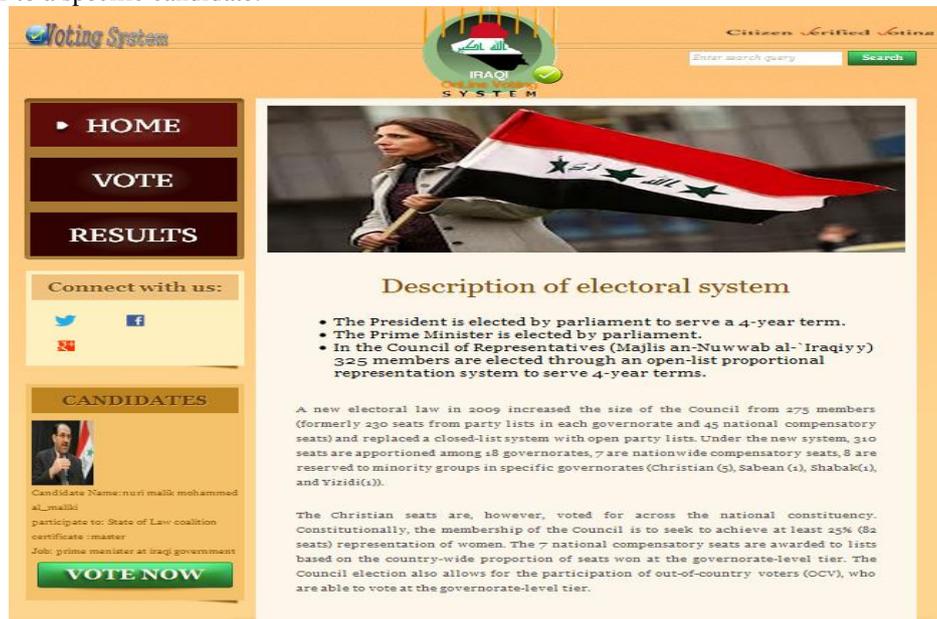
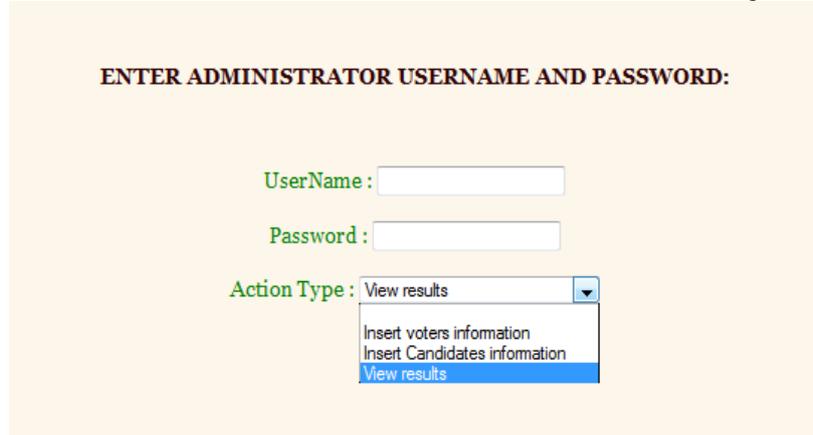


Fig. 1 Voting System Home Page

In the left partition of each page in the website; there is a small description for all candidates registered in the database. The website also contains links to the Facebook, Twitter of the Supreme Committee for Elections. The main part of the home page contains description of the voting process, the parliament total number of seats and the distribution of seats over the governorates and other important information about the responsibilities of the parliament members. Figure (1) shows the Internet Voting System home page.

System administrator accesses the system using username and password as in figure (2). All system databases are protected by password which only known by system administrator. The administrator is responsible for entering the voters and candidates information to the database. Also the administrator can view the voting results.



The image shows a login form titled "ENTER ADMINISTRATOR USERNAME AND PASSWORD:". It contains three input fields: "UserName:" with a text box, "Password:" with a text box, and "Action Type:" with a dropdown menu. The dropdown menu is open, showing three options: "View results" (highlighted in blue), "Insert voters information", and "Insert Candidates information".

Fig. 1 Administrator login form

The system generates a unique password (10 digits) to each voter, these passwords are passed to the voters in person, so that password not discovered.

All voters should be registered in the database before the election date. On the Election Day, voters will enter their information and password on the voters' registration form as show in figure (3), if the information is correct; the voters enter the form where they can select a specific political group or candidate to vote for as in figure (4), else if any incorrect information were added, the user will not be allowed to vote. The voter table contains fields marked when voter cast its vote, so that voters only allowed to vote once.



The image shows a registration form titled "Register to vote". Below the title is the instruction "FILL IN THE FOLLOWING FORM". The form contains several fields: "Voter Name" (three text boxes), "Last Name" (one text box), "Mother name" (three text boxes), "Birth Date" (three dropdown menus), "Governorate" (one dropdown menu), "Gender" (radio buttons for "Male" and "Female", with "Male" selected), "Nationality" (one text box), "Civil Status identification number" (one text box), "Citizenship Certificate No." (one text box), "Ration card number" (one text box), and "Secret code" (one text box). At the bottom are "Submit" and "Reset" buttons.

Fig. 3 Voters Registration Form

When the voter selects a specific candidate and click "VOTE NOW" as in figure (4), the vote will be added to the political group that the candidate participated to it.

SELECT POLITICAL GROUP OR CANDIDATES

POLITICAL GROUP NAME

- Iraqi National Movement (INM, Al-Iraqiya Coalition)
- State of Law coalition
- Iraqi National Alliance (INA)
- Kurdish Alliance (Kurdistania)
- Goran Movement
- Tawafiq Iraqi Front (Al-Tawafiq list)
- Iraq Unity coalition
- Al-Rafidian list
- Kurdistan Islamic Union
- Kurdish Islamic Party
- Chaldeo-Assyrian-Syriac Public
- Ayazei Movement for Reforming
- Representative of Shabak community
- Representative of Sabean community

LIST of Candidate NAMES

<input type="radio"/>		nuri malik mohammed al_maliki State of Law coalition prime menister at iraqi government
<input type="radio"/>		Ibrahim al Eshaiker al-Jafari State of Law coalition prime minister at iraqi government
<input type="radio"/>		Jalal a l Talabani Kurdish Alliance (Kurdistania) president at iraqi government
<input type="radio"/>		Hoshiyar mahmod mohammed Zebari Kurdish Alliance (Kurdistania) minister at iraqi government
<input type="radio"/>		osama abd alaziz alnugaify Iraqi National Movement (INM, Al-Iraqiya Coalition) president at iraqi parlement
<input type="radio"/>		Ayad hashim alawi alrubai Iraqi National Movement (INM, Al-Iraqiya Coalition) member at parlamanet
<input type="radio"/>		salih a a almutlik Iraqi National Movement (INM, Al-Iraqiya Coalition) president assistant at iraqi government
<input type="radio"/>		Rafi Hiyad al Issawi Iraqi National Movement (INM, Al-Iraqiya Coalition) minister at iraqi government
<input type="radio"/>		Ammar abd_alaziz muhsin al-Hakim Iraq Unity coalition Islamic Supreme Council at iraq

Fig. 4 Voting window

Candidates are approved and registered in the database before the election date. Checking the candidates' qualification to register is the responsibility of the Supreme Committee for Elections. The system administrator uses the form in figure (5) to insert the candidates' information to the database.

Fig. 5 Candidate Registration Page

VI. Results

The proposed voting system will count the total number of votes for each political group and candidate automatically. Below sample of the voting results, each political group has number of voters, the total number of votes represent the number of all the candidates participating to the group plus votes for the group itself. As shown in figure (6). Figure (7) represents sample of the candidates with their corresponding political groups and the number of votes to each candidate.

VOTING RESULTS	
POLITICAL GROUP NAME	VOTES NO
Iraqi National Movement (INM, Al-Iraqiya Coalition)	419
State of Law coalition	280
Iraqi National Alliance (INA)	76
Kurdish Alliance (Kurdistania)	164
Goran Movement	19
Tawafiq Iraqi Front (Al-Tawafiq list)	79
Iraq Unity coalition	127
Al-Rafidian list	65
Kurdistan Islamic Union	53
Kurdish Islamic Party	34
Chaldeo-Assyrian-Syriac Public	45
Ayazei Movement for Reforming	12
Representative of Shabak community	43
Representative of Sabeen community	14

Fig. 6 Voting Results for Political Groups

CANDIDATES NAME	POLITICAL GROUP	VOTES NO
nuri malik mohammed al_maliki	State of Law coalition	100
osama abd alaziz alnugaify	Iraqi National Movement (INM, Al-Iraqiya Coalition)	70
Ayad hashim alawi alrubai	Iraqi National Movement (INM, Al-Iraqiya Coalition)	99
salih a a almutlik	Iraqi National Movement (INM, Al-Iraqiya Coalition)	80
Rafi Hiyad al Issawi	Iraqi National Movement (INM, Al-Iraqiya Coalition)	70
Jalal a l Talabani	Kurdish Alliance (Kurdistania)	60
Hoshyar mahmod mohammed Zebari	Kurdish Alliance (Kurdistania)	55
Ibrahim al Eshaiker al-Jafari	State of Law coalition	90
Ammar abd_alaziz muhsin al-Hakim	Iraq Unity coalition	80

Fig. 7 Voting Results for sample of the Candidates

VII. Conclusion and Future Work

Our proposed system enables a voter to cast their vote through internet without going to voting booth and additionally registering themselves for voting in advance, proxy vote or double voting is not possible, fast to access, secure, easy to maintain all information of voting, highly efficient and flexible. Hence, by this the voting percentage will increase drastically. As the average percentage of voting is a less than 60%. Moreover voting fraud can be easily done in the present system. Also there is no chance of voter frauds and the money spent on security can be drastically decreased.

There a few challenges that must be overcome in order that their benefits may be fully realized. There is a challenge of voter's education. The electorate needs to be educated adequately on the use of online voting.

References

- [1] Abdul Aziz, "Online Election System, A proposed system for Pakistan", Institution of information technology, Department of Information Technology, August, 2011.
- [2] G.O. Ofori-Dwumfuo and E. Paatey, "The Design of an Electronic Voting System", Research Journal of Information Technology 3(2): 91-98, 2011, ISSN: 2041-3114.
- [3] Alexander Prosser, Robert Krimmer, "Electronic Voting in Europe Technology, Law, Politics and Society", Workshop of the ESF TED Programme together with GI and OCG, July, 7th – 9th, 2004.
- [4] Eric A. Fischer, Kevin J. Coleman, "The Direct Recording Electronic Voting Machine (DRE) Controversy: FAQs and Misperceptions", Congressional Research Service, the Library of Congress, December 2005.
- [5] Jung-Ying Lai, Chun-Fang Lin, Chung-Huang Yang, "Design and Implementation of an Electronic Voting System with Contactless IC Cards", Proceeding IAS '09 Proceedings of the 2009 Fifth International Conference on Information Assurance and Security, Volume 02, Pages 122-125, ISBN: 978-0-7695-3744-3, doi:10.1109/IAS.2009.337.
- [6] (May 2013), "Voting Equipment Information", Website of fairfaxcounty: <http://www.fairfaxcounty.gov/elections/winvote equip.htm>.
- [7] Chuan-Kun Wu; Sankaranarayana, R., "Internet voting: concerns and solutions", Cyber Worlds, 2002. Proceedings. First International Symposium on, 6-8 Nov.2002, Pages: 261 – 266.
- [8] (May, 2013) "ELECTORAL SYSTEM", inter-parliamentary union, council of representatives of Iraq. http://www.ipu.org/parline/reports/2151_B.htm.