

# Automated Teller Machine (ATM) acting as Electronic Voting Machine (EVM)

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**Abstract:** Election commission still uses manual system during election for vote casting in this modern age of digitalization. In all types of Elections (Presidential\Parliamentary) elections it is consider introducing Electronic voting machines (EVM) though EVM is not entirely automated and has many limitations. Automatically casted votes will be counted simultaneously of the voting process and result will be displayed. The suggested system built based on modifies the ATM's (Automated Teller Machine) system to work as EVM (Electronic Voting Machine) during the elections dates. One of the main benefits using ATMs as EVM is to facilitate the election process for everyone. Also using ATMs as EVM will save the time for all voters and will eliminate the waste your time in the long queue for regular election process. Any voter needs only to hit for the nearest ATM in his\her location and then using his\her Bank Credit Card inserting it into the ATM chooses the option "election". Choose the candidate you need to vote for. And that's all for the election process which is more easy and simple than regular election process. There are many management advantages using the suggested system of elections like eliminating fraudulent activities, corruptions, ensuring security, transparency, fairness, accuracy, trustworthy and keeping backup trails of voting system. In future IOT can be implemented to send election report etc.

**Keywords:** Elections, ATM, EVM, Bank Credit Card.

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## I. Introduction

EVM is used during elections for the purpose of collecting and counting the votes casted by the common people. This machine actually replaces the traditional way of collecting votes through boxes consisting of voting papers. This method is called as paper ballot. Slowly, this system has changed or altered into a new technical and mechanical system which uses electronic voting machines in order to avoid misconceptions. Even though this voting machine is fast and accurate, this system needs more manpower and also it is not much more reliable. To increase the reliability of the voting, many algorithms have been introduced [1], [2], and [3].

Electronic voting (also known as e-voting) refers to voting using electronic means to either aid or take care of the chores of casting and counting votes. Depending on the particular implementation, e-voting may use stand-alone electronic voting machines (also called EVM) or computers connected to the Internet. It may encompass a range of Internet services, from basic transmission of tabulated results to full-function online voting through common connectable household devices. A worthy e-voting system must perform most of these tasks while complying with a set of standards established by regulatory bodies, and must also be capable to deal successfully with strong requirements associated with security, accuracy, integrity, swiftness, privacy, audibility, accessibility, cost-effectiveness, scalability and Ecological sustainability[4], [5], and [6].

How could a nation that put a man on the moon and a computer in every car still be voting with punch cards, and pens? We vote as we still live in the 19th century. With no doubts ATM will do a great job in this task. ATM touch-screen or keyed displays could easily be adapted for balloting purposes. Special credit-card-like voting cards and PINs linked to Social Security numbers could be issued to identify voters. ATMs often had cameras and other security devices already installed. And the machines themselves were rugged, reliable and ubiquitous, which could potentially save billions in equipment costs [7], [8], and [9].

## II. Suggested System Objectives

By implementing and applying the suggested system, many advantages will be gained and considered as benefits like:

- It can save a lot of time for voters, instead of leaving work or home for going to the specific place to vote they can go to the nearest ATM machine and use it.
- Saving up to millions of dollars.

- As well as that the ATM machines cannot be easily hacked because of its owned secured system.
- It can ease the voting operation from crowds and accidents, sorting and organizing and also saving the money taken by the people doing this job.
- Avoid the fake votes and manipulation.

### **III. General constraints for the system**

The nations face some very real problems with its election system. These problems can be classified into two types.

#### **3.1 Problems related to the voter (Citizen)**

A lot of people do not go to the elections because of the far distances (Geographical problem) between the places where they live and their place of election. Also another voter doesn't go because they do not really care and make the elections seem very difficult, even if not so difficult. There are employees and business owners who do not have the time to go to the polls and see that they are losing their time because overcrowding in the polling commissions. They believe that giving staff leave for all elections is detrimental to the business. Employees also insist on this leave even if they are not interested in the elections but take it as a day of rest.

Another issue which is the personal protection: Because sometimes in some polling commissions, some violence occurs because of overcrowding, unrest (stress) or because of some supporters of some candidates. It is possible to reducing in the privacy of the citizen. Voter problems can be summarized as: The geographical problem, Crowdedness, Lack of interest, Occupational (lack of free time), and Personal safety.

#### **3.2 Problems related to the Society and Governmental economy**

One of the most highlighted issues that will be solved by implementing the suggested system is reducing the cost of the election process. The country suffers from paralysis in many government jobs or at least less production in public and private businesses, especially those that have a primary role in elections such as educational and judicial institutions. Education also stops because the government uses schools as polling stations and supervisors are teachers. Now the country only can use the ATM machines for elections and proceed in the daily work life.

### **IV. Suggested System Requirements**

#### **4.1 User Requirements**

User requirement concerned with security, such as a statement limiting access to authorized users, such as the need to include user authentication facilities in the system.

#### **4.2 Domain Requirements**

The ATM will have an always online system and a backup local database to ensure the votes aren't lost.

#### **4.3 Functional Requirements**

- The ATM and EVM are in the idle state when there is no operation.
- ATM card reader determines the account number from the entered card.
- The User is prompted to enter a PIN after a card is entered.
- A menu is displayed to the User with the three options: Bank system, Voting system and Exit.
- EVM system turns on in voting case.
- A menu is displayed to the User with the candidates' names.
- The User is prompted to choose.
- The system counts the vote for chosen candidates.
- The EVM back to the idle state.
- The transactions can be cancelled at any prompt by pressing the cancel button.
- ATM deletes EVM system from the menu of this user.
- The ATM can withhold a bank card.

#### 4.4 Non- Functional Requirements

Figure 1 shows the Non-functional requirements for the ATM to EVM system.

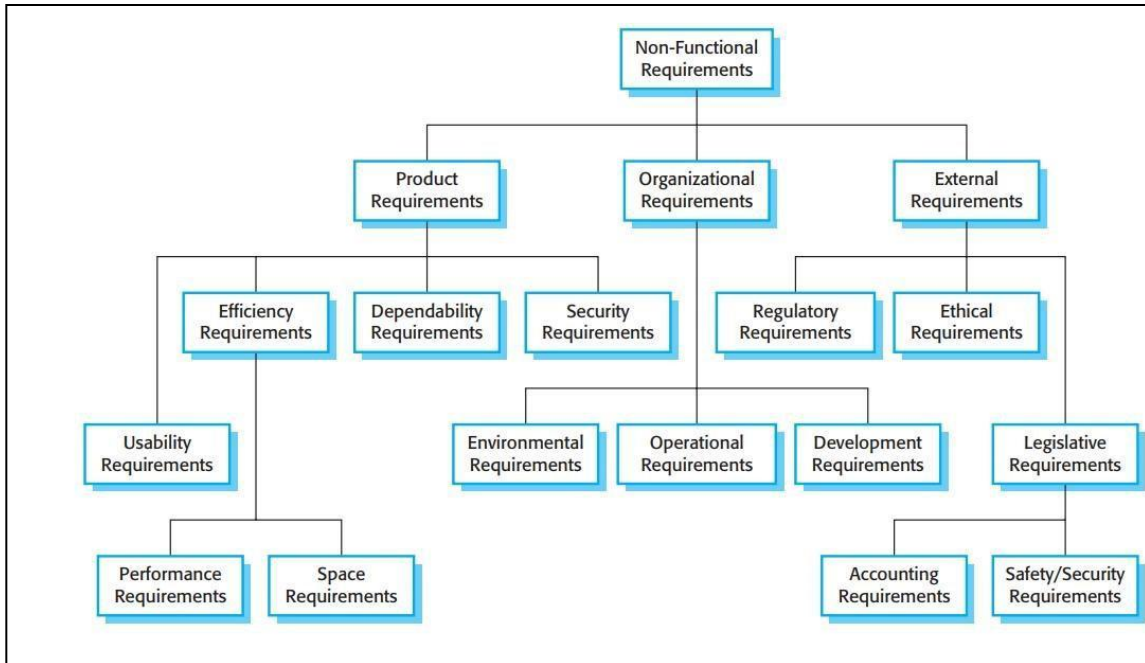


Fig. 1 Non-function requirements for the ATM to EVM system

### V. System design

#### 5.1 Entity Relationship Diagram

Figure 2 shows the Entity relationship diagram for the ATM to EVM system.

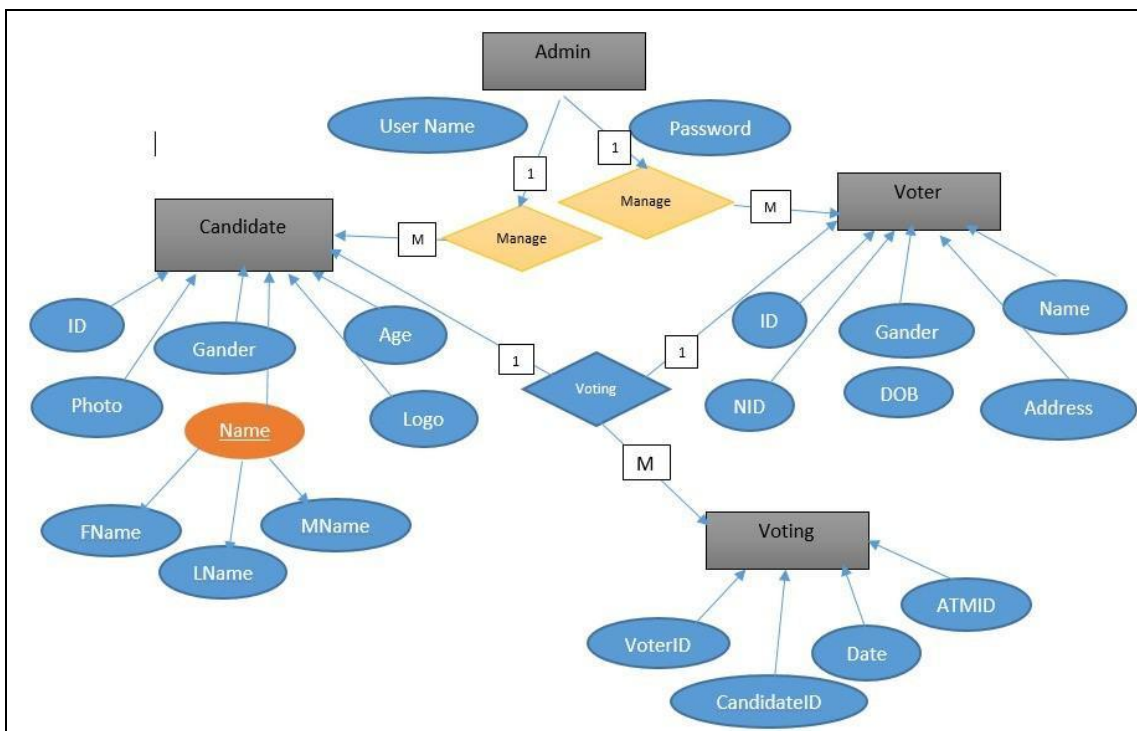


Fig. 2 Entity relationship diagram for the ATM to EVM system

### 5.2 Database structural design

Figure 3 shows the Database schema for the ATM to EVM system.

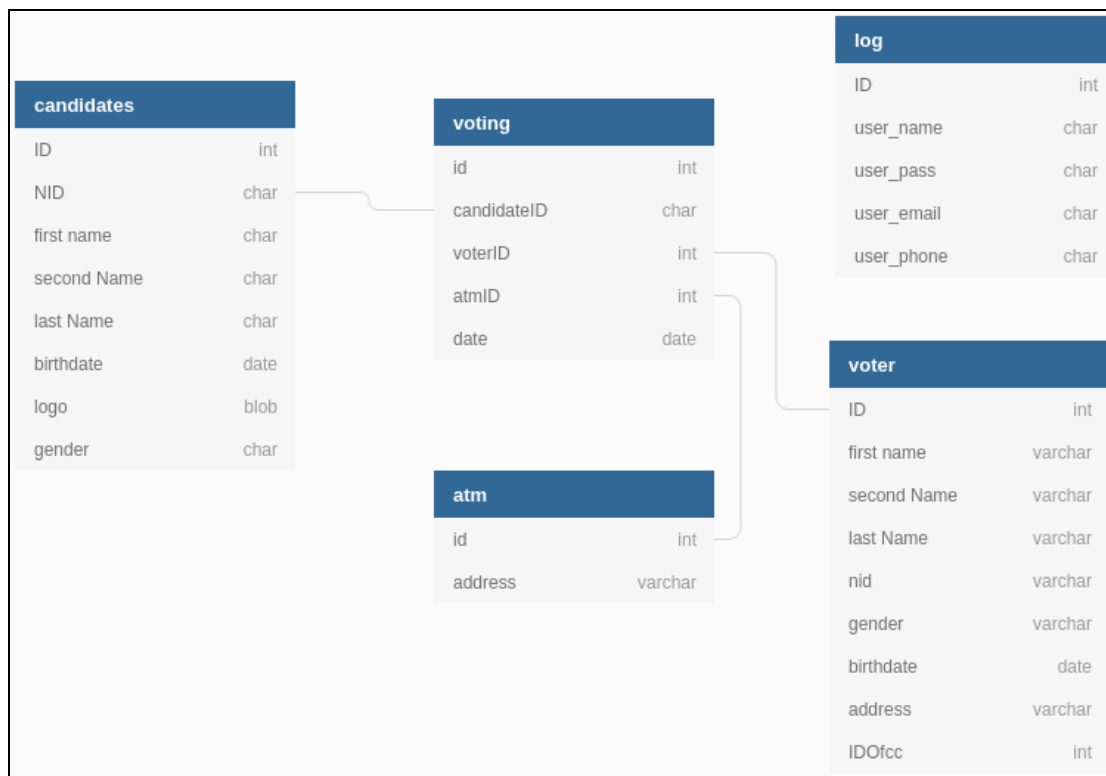


Fig. 3 Database Schema for the ATM to EVM system

### 5.3 Use-case Diagram

Figure 4 shows the Use-case diagram for the ATM to EVM system.

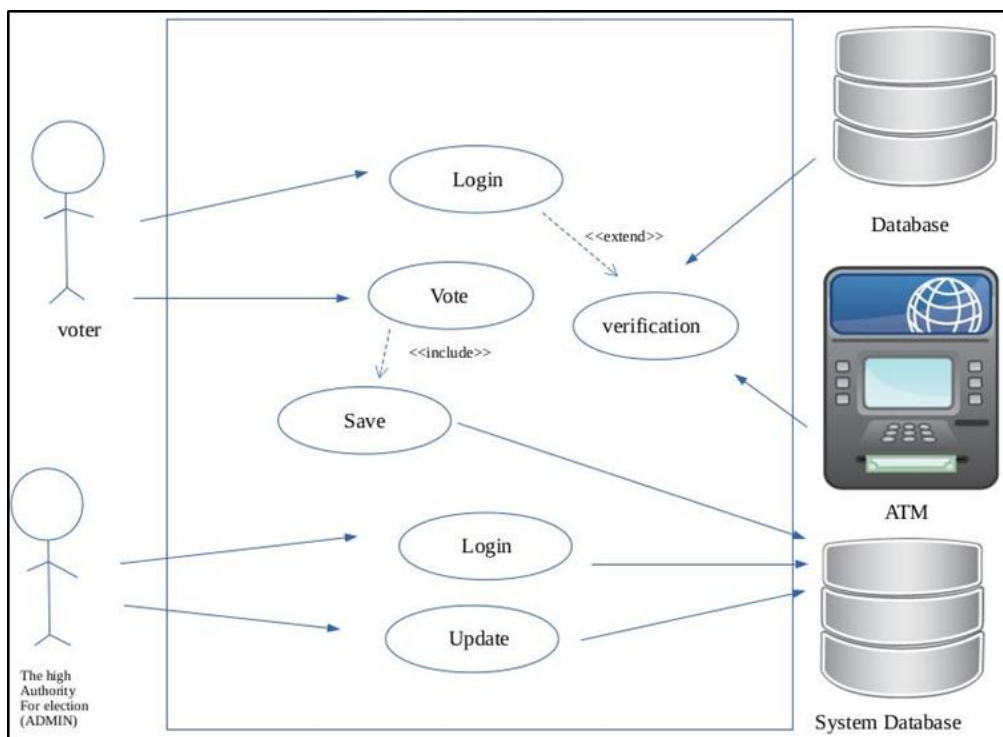
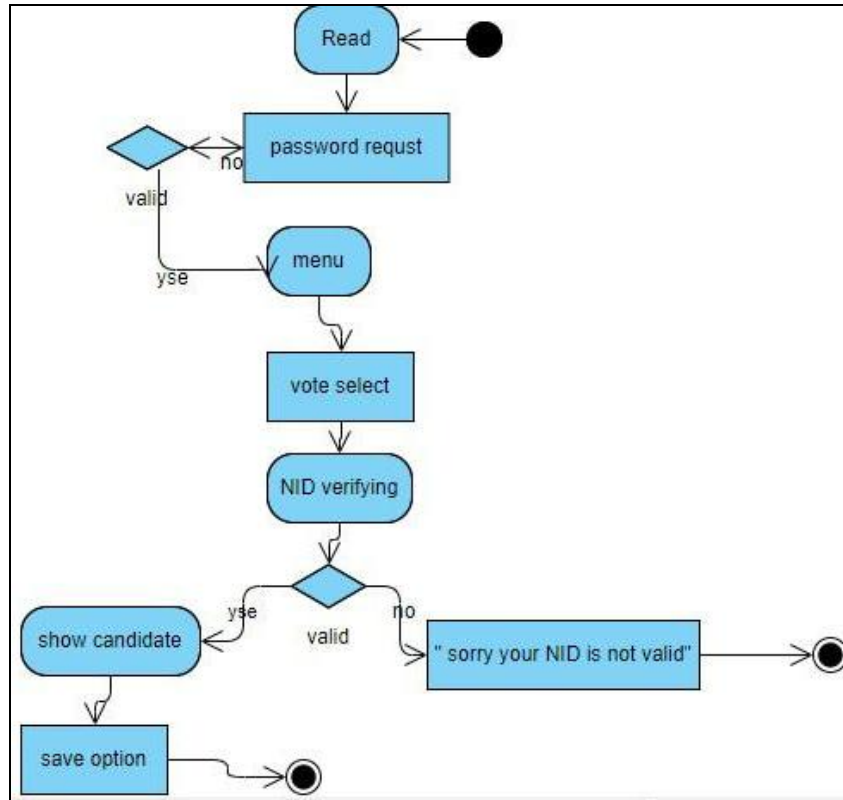


Fig. 4 Use-Case diagram for the ATM to EVM system

**5.4 Activity diagram for the system**

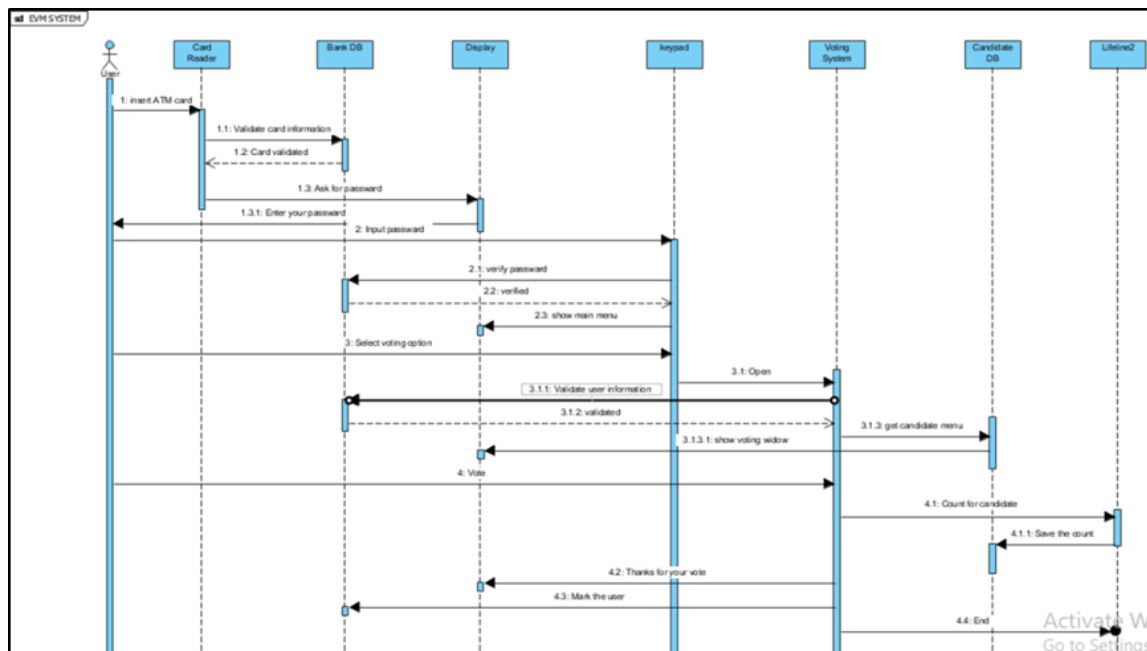
Figure 5 shows the Activity diagram for the ATM to EVM system.



**Fig. 5** Activity diagram for ATM to EVM system

**5.5 Sequence diagram for the system**

Figure 6 shows the Sequence diagram for the ATM to EVM system.



**Fig. 6** Sequence diagram for the ATM to EVM system

## VI. Experimental and Practical work

### 6.1 User Characteristics

- Voter: System user at the ATM side.
- Admin: IT of National Elections Commission: Supervisors, develop in the system in respect of the constitution of election.

### 6.2 User Interface for the voter

Figure 7 shows the User Interface (Welcome Page) for the ATM to EVM system.



Fig. 7 User Interface (Welcome Page) for the ATM to EVM system

Figure 8 shows the User ID Login for the ATM to EVM system.



Fig. 8 User ID Login for the ATM to EVM system

Figure 9 shows the User PIN code Login for the ATM to EVM system.

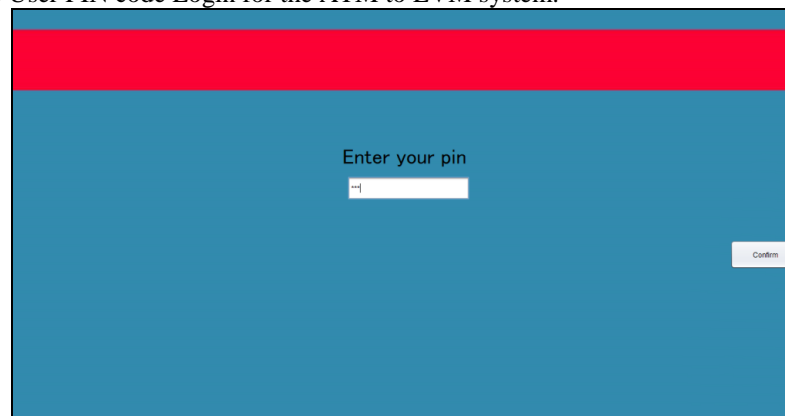
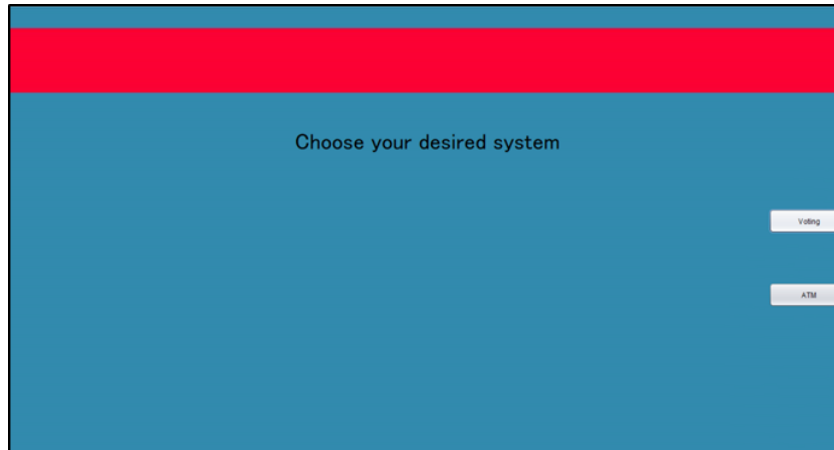


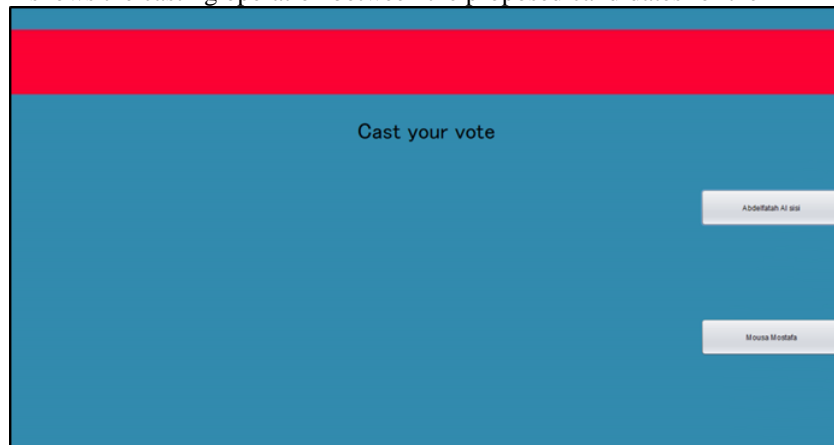
Fig. 9 User PIN code Login for the ATM to EVM system

Figure 10 shows the selecting operation between the two proposed systems for the ATM to EVM system.



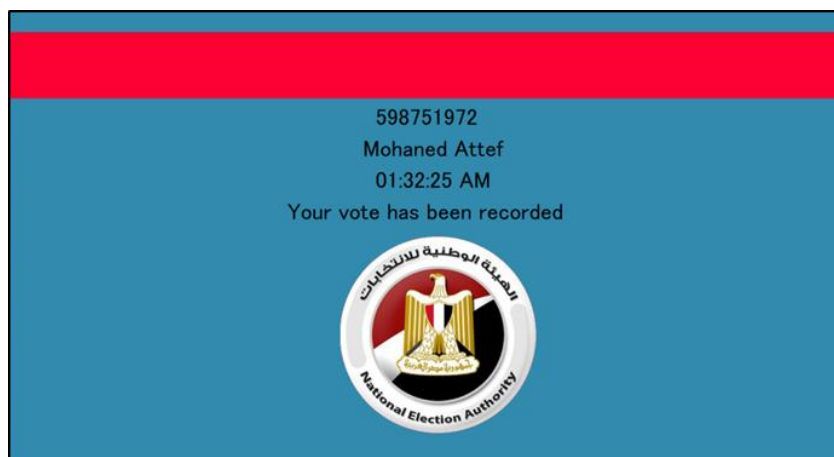
**Fig. 10** Selection between ATM and Voting operation for the ATM to EVM system

Figure 11 shows the casting operation between the proposed candidates for the ATM to EVM system.



**Fig. 11** Selection between the candidates for the ATM to EVM system

Figure 12 shows the Confirmation of the Voting Process for the ATM to EVM system.



**Fig. 12** Confirmation of the Voting Process for the ATM to EVM system

### 6.3 User Interface for the admin

Admin login: The admin should have a user name and password to login. Figure 13 shows the Admin Login Page for the ATM to EVM system.



**Fig. 13** User Interface Admin Login Page (Welcome Page) for the ATM to EVM system

The Admin can change the password, Add candidates and watch the voting updated process diagram. Figure 14 shows the admin permissions page for the ATM to EVM system.



**Fig. 14** User Interface Admin permissions Page for the ATM to EVM system

The Admin can Add candidate information, Update candidate information and delete candidate information. Figure 15 shows the admin adding candidate's page and editing the candidate's information for the ATM to EVM system. Figure 16 shows the admin watching the voting chart page for the ATM to EVM system.



**Fig. 15** User Interface admin adding candidate's page and editing the candidate's information for the ATM to EVM system



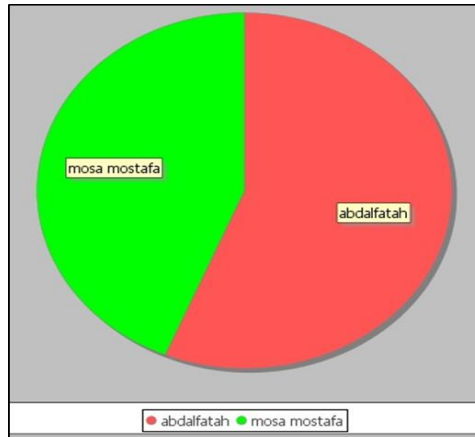


Fig. 16 User Interface Admin voting chart Page for the ATM to EVM system

## VII. System Testing

### 7.1 Testing for the User Interface

- **Case I**

If the user tries to vote again the system should handle this problem by showing a message to the user indicating “you already voted”. Figure 17 shows the case I interrupt process for the User Interface.

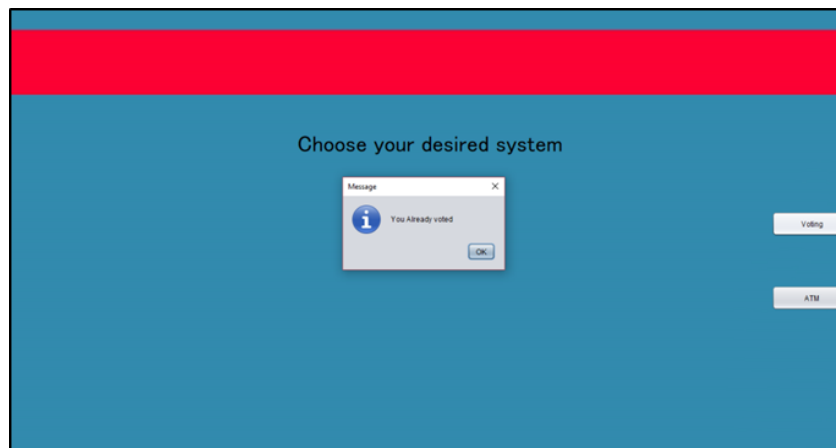


Fig. 17 User Interface Test Case I for the ATM to EVM system

- **Case II**

If the user has no rights to vote tried and by force tried to vote, the system should handle this problem by showing message to the user “you have no rights to vote”. Figure 18 shows the case II interrupt process for the User Interface.

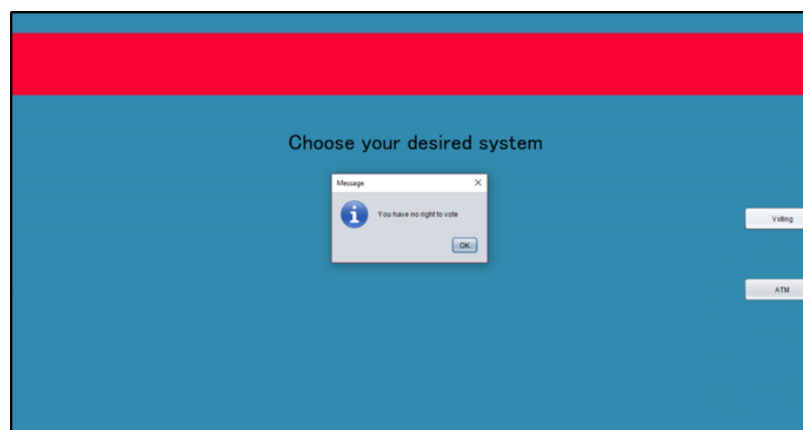


Fig. 18 User Interface Test Case II for the ATM to EVM system

- **Case III**

If the user entered wrong pin, the system should handle this problem by showing message to the user “Wrong pin”. Figure 19 shows the case III interrupt process for the User Interface.

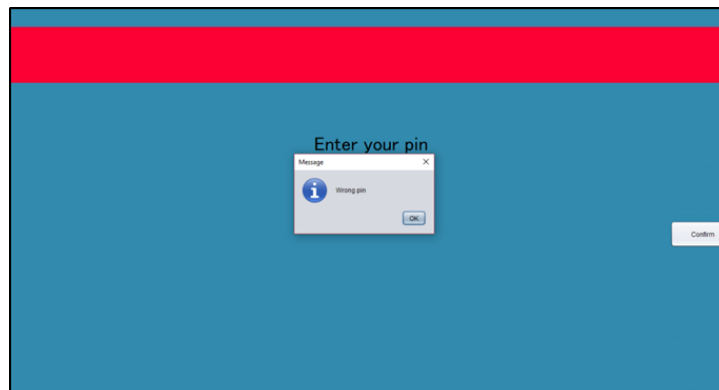


Fig. 19 User Interface Test Case III for the ATM to EVM system

### 7.2 Testing for the Admin interface

- **Case I**

If the Admin entered wrong pin or wrong user name the system, should handle this problem by showing message to the Admin “incorrect Login”. Figure 20 shows the case I interrupt process for the Admin Interface.



Fig. 20 Admin Interface Test Case I for the ATM to EVM system

- **Case II**

If the Admin didn't enter the pin or user name, the system should handle this problem by showing message to the Admin “Empty fields detected!”. Figure 21 shows the case II interrupt process for the Admin Interface.

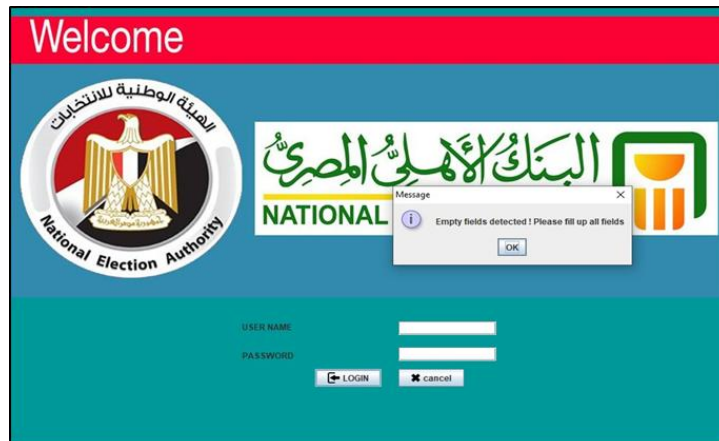


Fig. 21 Admin Interface Test Case II for the ATM to EVM system

- **Case III**

If the Admin didn't enter all the information needed in all the required, the system should handle this problem by showing message to the Admin "Empty fields detected! Please fill up all the fields". Figure 22 shows the case III interrupt process for the Admin Interface.

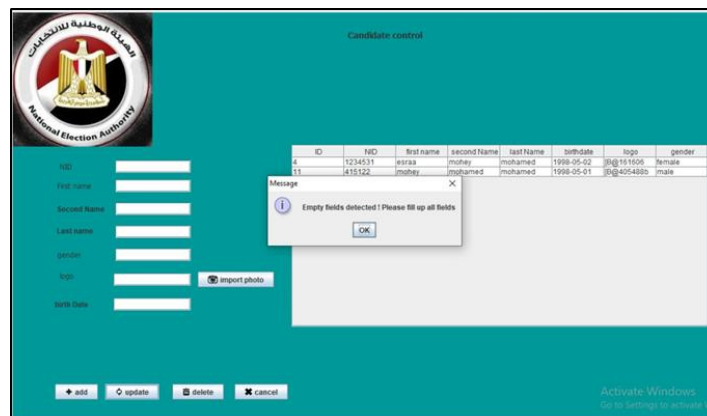


Fig. 22 Admin Interface Test Case III for the ATM to EVM system

### VIII. Conclusion

Elections are unique. They change the fate of nations, influence participation and activism in politics, and deeply affect the lives and attitudes of citizens. Electrons demonstrate a clear importance for our society- not only must election systems work; the people must believe that they work of the debate surrounding electronic voting. At times, it seems even that the ethics are the most important factor of discussion influencing technical concerns. Basis of the democratic country is to help in free and fair way of conducting elections. Despite concerns about Electronic Voting Machines, however, companies continue to develop them and countries continue to adopt them at amazing speed. The introduced systems aimed to use the ATM machines as the EVM machines. The introduced systems gained many advantages like keeping up with the recent technologies, saving money and time, protecting people from some issues happened sometimes in front of election commissions. As well as that the ATM machines cannot be easily hacked because of its secured system. It can ease the voting operation from crowds and accidents, sorting and organizing and we can save the salaries that people take for doing this job. It can also avoid the fake votes and manipulation.

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### References

- [1]. Hemavathi. R, Roopa A E, "Automated Biometric-EVM Implemented Using Lab-View," International Journal of Trend in International Journal of Trend in Scientific Research and Development (IJTSRD) Research and Development (IJTSRD), ISSN No: 2456 - 6470 | Volume - 2 | Issue - 6 | Sep- Oct 2018.
- [2]. Anandaraj , S, Anish R, Devakumar P., "Secured Electronic Voting Machine using Biometric" , IEEE Sponsored 2nd Conference on Innovations in Information, Embedded and Communication systems (ICIIECS) 2015.
- [3]. M d. Mahbob Karin, Nabila Shahnaz Khan, "A Proposed Frame work For Biometric Electronic Voting System" , IEEE International Conference on Telecommunications and photonics(ICTP) 2017.
- [4]. Devendra Vijay Naik, " Smart Wireless Authenticating Voting Machine," IEEE ICCSP 2015 conference.
- [5]. Aree Ali Mohammed, Ramyar Abdolrahman Timour, "Efficient E-voting Android Based System," International Journal of Advanced Research in Computer Science and Software Engineering, ISSN: 2277 128X, Volume 3, Issue 11, November 2013.
- [6]. A.S. Belenky and R.C. Larson, "To Queue or not to Queue?," OR/MS 27, October 2013, pp. 30-34.
- [7]. R. Krimmer (ed.), Electronic Voting, Proceedings of the 2nd International Workshop, Gesellschaft für Informatik, Bonn, Köllen Druck+Verlag GmbH, Bonn, October 2013.
- [8]. FERAS A. HAZIEMEH, MUTAZ KH. KHAZAALAH, KHAIRALL M. AL-TALAFHA, "NEW APPLIED E-VOTING SYSTEM," Journal of Theoretical and Applied Information technology, ISSN: 1992-8645, E-ISSN: 1817-3195, Vol. 25, No. 2, March 2011.
- [9]. Sumit Kumar, Darshini N, Sudhanshu Saxena, Hemavathi P, Ananya, "VOTEETH: AN E-VOTING SYSTEM USING BLOCKCHAIN," International Research Journal of Computer Science (IRJCS) ISSN: 2393-9842, Issue 06, Volume 6 (June 2019)
- [10]. Yi Liu and Qi Wang, "An E-voting Protocol Based on Blockchain", Published in IACR Cryptology e-Print Archive, 2017.
- [11]. Nir Kshetri and Jeffrey Voas, "Blockchain-Enabled E-Voting", IEEE Software Vol.35 Issue 4, 2018.

- [12]. Freya Sheer Hardwick, Apostolos Gioulis, Raja Naeem Akram, and Konstantinos Markantonakis, "E-Voting with Blockchain: An E-Voting Protocol with Decentralization and Voter Privacy", ISG-SCC, 2018.
- [13]. Sanjay Kumar, Ekta Walia, "ANALYSIS OF ELECTRONIC VOTING SYSTEM IN VARIOUS COUNTRIES," International Journal on Computer Science and Engineering (IJCSSE), ISSN: 0975-3397, Vol. 3 No. 5 May 2011.
- [14]. "Audit of AEC'S electronics voting machine for blind and vision impaired voters", Technical Report by Australian Electoral Commission, 23 August 2007.
- [15]. Sarah P. Everett, Kristen K. Greene, Michael D. Byrne, Dan S. Wallach, Kyle Derr, Daniel Sandler and Ted Torous, "Electronic Voting Machines versus Traditional Methods: Improved Preference, Similar Performance", in the Proceedings of Measuring, Business, and Voting, Florence, Italy, April 5-10, 2008.
- [16]. Idongesit E Eteng, Ugochi D Ahunanya, Paul U. Umoren, "An Online Voting System for Colleges and Universities: A Case Study of National Association of Science Students (NASS), University of Calabar," Computing and Information Systems Journal, Vol 22, No 2, 2018.
- [17]. Amankona, E. and Paatey, E. (2009). Online Voting Systems. Graduation Project, Wisconsin International University College, Ghana.
- [18]. Idike A. N. (2014). Democracy and the Electoral Process in Nigeria: Problems and Prospects of the E-Voting Option, Asian Journal of Humanities and Social Sciences (AJHSS), Vol. 2, Issue 2, pp 133-141. Available online at [www.ajhss.org](http://www.ajhss.org) [Accessed: 10 Apr 2015].
- [19]. Quist, S. C., Amagate. L. K., Dickson, D. Conceptual design of e-voting System for Academic Institution (2016). International Journal for Innovation Education and Research. Vol. 4, No 12. pp 96-108.
- [20]. Sabo A., Siti J. & Rozita B. (2015) Issues and challenges of transition to e-voting Technology in Nigeria. Public Policy and Administration Research. Vol 5, pp 95-102.
- [21]. Suleiman, A. T. & Gwani, Y. J. (2015). Mobile Electronic Voting System: Increasing Voter Participation. JORIND, Vol. 13, ISSN 15968303. Available online at <http://www.transcampus.org/JORINDV13DEC2015/Jorind%20Vol13%20No2%20Dec%20Chapter31.pdf>

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