

A New M-voting System for COVID-19 Special Situation in Iraq

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Abstract—Voting is the important procedure in different countries worldwide and is essential to any consensus-dependent society [1]. Especially in the context of COVID pandemic where people stays home, such systems are very relevant today. Elections can happen for different reasons, involving choosing leaders, finishing political problems, choosing a substantial government, etc. [2]. The phenomenal using of Information Technology in the process of election is quickly earning momentum. This growth in voting systems indicated to as e-voting comes with more benefits than the voting system based on paper. While there are many efforts in different parts of world regarding implementations and trials for electronic voting, there are not many researches regarding this in Asia Minor, especially Iraq. It can be noted that Iraq has several regions with difficult access and where sometime it is difficult to collect votes in the traditional way because of access reasons and post-war conditions. We want to fill this gap through the research presented in this paper. In this paper we describe an application for m-voting targeting the specific conditions of Iraq in the COVID situation. In the current society, the application of which we are talking about, can also be seen as a significant help for a numerous amount of countries during the pandemic of COVID-19. The application is based on Mobile technology. We choose mobile technology motivated by the fact that although people do not have computers, almost everyone has a mobile phone in Iraq. Moreover, the usefulness of mobiles can represent a proper way for people with disabilities to execute their legal right to vote for the future of their country.

Keywords—voting; Voter; data server; application server; COVID-19.

I. INTRODUCTION

Voting is an important procedure in different countries worldwide and is essential to any consensus-based society [1]. Especially in the context of COVID pandemic where people stays home, such systems are very relevant today. Elections can happen for different reasons, involving choosing leaders, finishing political problems, choosing a substantial government, etc. [2]. In the current society, the application of which we are talking about can also be seen as a significant help for numerous amount of countries during the pandemic of COVID-19. Having the possibility to vote using a mobile phone reduces the necessary physical contact between voters

and organizers and prevents the spreading of the virus. The prevention is the result from not having to touch items which were touched by another human being who can be infected without even knowing. All the things above, represent the medical usefulness of this application.

The first utilize of the systems of the e-voting was in 1960s when the systems of punched card were used especially in USA where such systems were widespread. The voting system depended on optical scan lets a computer to compute citizen's votes on a voting process. One of the popular systems is internet voting systems. It has been utilized for elections of government and plebiscites in the Switzerland, Estonia, United Kingdom, also in Canadian elections and the United States [3].

The phenomenal using of Information Technology in the process of election is quickly earning momentum. This growth in voting systems indicated to as e-voting comes with more benefits than the voting system based on paper [4].

Mobile phones are affordable, portable, and recently in wide-spread use. This offering direct and fast connection to family, friends, entertainment, information, and resources anywhere and everywhere. This fast-growing of mobile phone subscribers in world and the massive base of mobile phones users [5] in Iraq which they 36,527,353 subscribers in 2018 according to the Iraqi communications and media commission [6] presents a great opportunity to extend the reach of public elections and public services in specific to each citizen, particularly in the remote areas [7].

As noted above m-voting is a new trend especially good for regions with difficult accessibility. While there are many efforts in different parts of world regarding implementations and trials for electronic voting, there are not many researches regarding this in Asia Minor, especially Iraq. It can be noted that Iraq has several regions with difficult access and where sometime it is difficult to collect votes in the traditional way because of access reasons and post-war conditions. The application is based on Mobile technology. We choose mobile technology motivated by the fact that although people do not have computers, almost everyone has a mobile phone in Iraq. Taking into consideration the severe situation the world is facing right now due to the pandemic with COVID-19 virus,

we can say that this kind of application is very useful for various societies. In this way, people will limit the physical contact and prevent the virus of spreading.

The paper is organised as follows. In the next section we present a literature review. After that we describe the application and at the end we draw the conclusions.

II. LITERATURE REVIEW

With the advanced growth in mobile technologies worldwide today, the usual voting process can be changed to a newer and efficient method called m-voting. M-voting system offers an effective, convenient and easy way to vote to eradicate the drawbacks of traditional approach [8].

➤ Benefits of m-voting [9]

Mobile phones show some the unique characteristics that distinguish them from online medium. These ubiquitous devices are portable, affordable and in widespread utilized today, this phenomenon exhibits instant resources and connection entertainment all around the world from anywhere, at any time. We can summarize the Benefits of M-Voting:

- Promises an increase in participation and offers voters more options.
- Reduced logistical and administrative costs.
- Casting and counting votes is much faster and more accurate.
- Greater accessibility for the old and disabled people.

Different solutions to m-voting problems have been introduced in the research literature. Most perform some form of the utility function, which handles aspects of m-voting.

In 2013, O.P. Kogeda and N. Mpekoa, have designed and developed an m-voting system for South Africa. They developed the system by using ASP.NET and C# for frontend and backend respectively. They used a Relational Database Management System (MySQL Server 2008) for storing data [5].

In 2019, T. P. Abayomi-Zannu and T. F. Barka have proposed a system for m-voting in Nigeria. The system uses blockchain to secure the votes which are stored collected and multi-factor authentication to authenticate the Voters before they give their votes [1].

In 2011, Mohamed TALAAT has published an invention titled “Use of GSM networks for national level location-based mobile voting/ polling system”. The invention offers a solution of full national level location-based mobile voting/polling (LBMVP) which covers the entire GSM networks of a country to offer access to all residents, and it’s connected in real-time to a central database platform [10].

We notice from the presented literature review related to m-voting that this is a recent trend, and there is a place for more research in this area. There are not many researches regarding this in Iraq. We want to fill this gap through the research presented in this paper.

III. M-VOTING SYSTEM FOR IRAQ ENVIRONMENT

We propose a prototype of Android application that can installed on mobile phones of users, simple, with restricted

pictures or graphics suitable also for cheap mobile devices - adapted for the simple phones types of people from Iraq. Bellow we present the initial architecture (figure 1) and prototype implementation. In the current paper we exhibit the main ingredients of the system, respectively: application for users on Android, backend and database components.

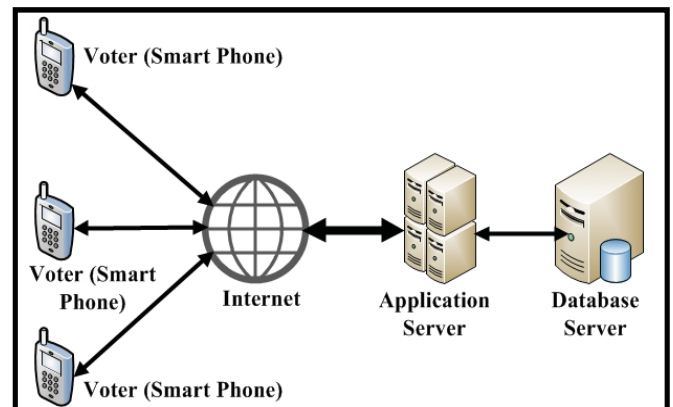


Fig. 1. M-Voting system based on internet Architecture

The architecture contains the components:

1. **Android Application:** Android application is used to send a vote through m-voting system. It has a simple user interface for being able to be used by cheap devices (suitable for all classes of people from Iraq). It implements functionalities such as registration of users, login, e-voting, etc.
2. **Backend Component:** the application server is made in PHP and interconnected with the mobile application. It is based on REST services and assures the transfer of information between mobile application and the database. It implements also several functionalities such as block-chain for security, fingerprint recognition. Current version supports the registration, login, voting and other functionalities related to the main-stream e-voting system. Next version will implement the blockchain security and fingerprint recognition.
3. **Database Component** is based on a MySQL database and store information related to user, voting, fingerprints, etc.

Current implementation has as security measures authorized logins of users, encryption of messages. This is going to be enhanced through the use of blockchain and fingerprint recognition in the next version of the paper.

IV. IMPLEMENTATION

The M-Voting application has been built based on the Android Studio, PHP- Restful Services for the BackEnd Component and MySQL database. (Figure 3) shows the main logic for the *Voter* using to the *m-voting* application. After the *Voter* has successful registered, the *Voter* enters his/her information (*Username* and *Password*); after that the login subroutine (Figure 4) will check the operations as follows: the loop will check the information entered by the *Voter* with the data already stored in information database. If the check operation is successful, then *Voter* can choose the candidates according to candidates name and picture and give his vote.

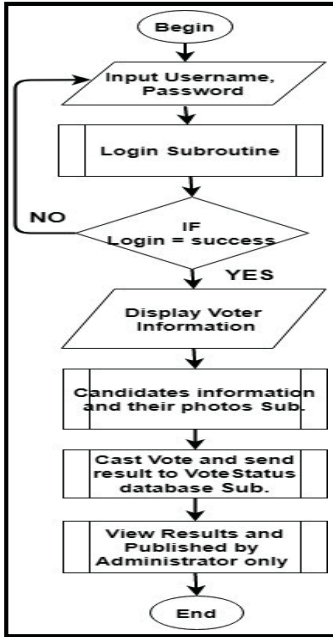


Fig. 3. Flowchart for M-Voting

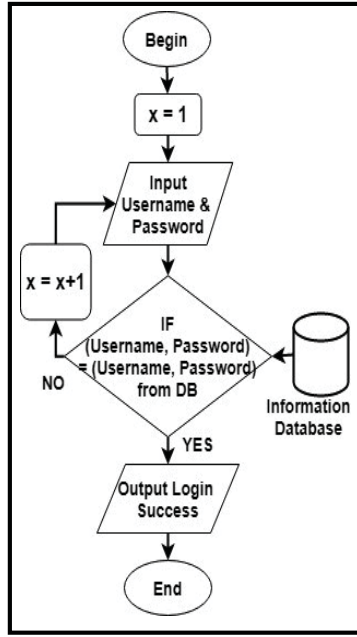


Fig. 4. Flowchart for Login

A. Android Application - Design Class diagram

For a better understanding of the system's structure below we present the diagram of classes for Android phone

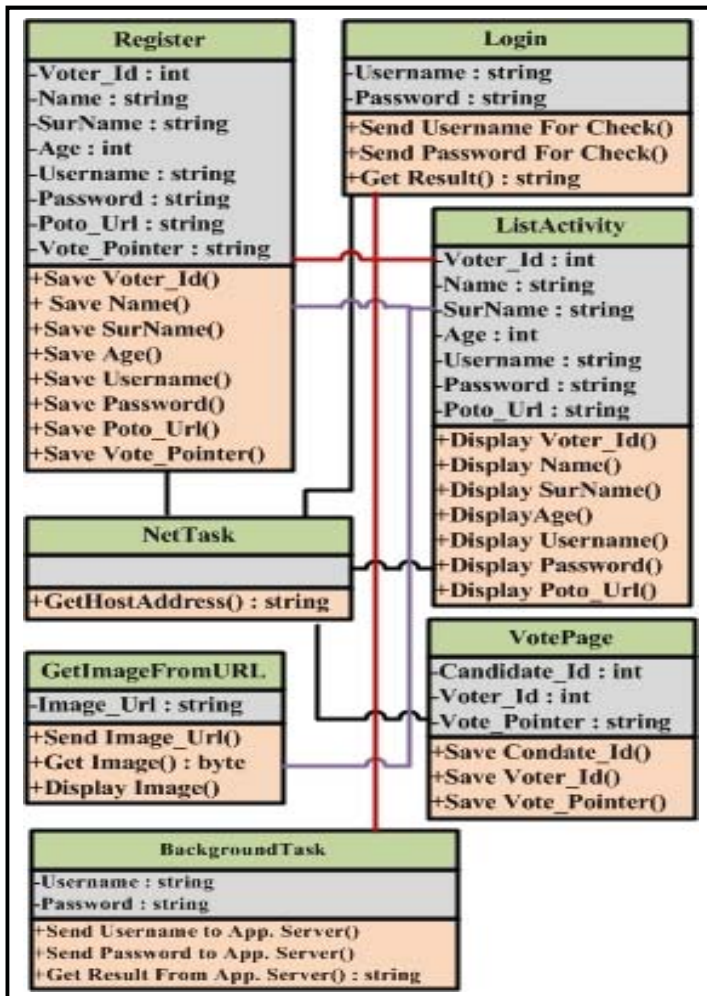


Fig.5. M-Voting Design Class Diagram

Figure 5 illustrates the design class diagram. **First**, the Voter enters his/her information to *Information Database* by *Register Class* which interacts with *NetTask* (Class to get *Host Address*), *BackgroundTask* (Class to send data to *BackEnd Component* and receive information) and *GetImageFromURL* (Class to send *Image URL* – class that works with voter and candidates images). **Second**, *Voter* can login to the system and enter *Username* and *Password* through *Login Class* and send them to *BackEnd Component* by classes (*NetTask* and *Background*). If successful login, *Voter* can display his/her information (*ID*, *Name*, *SurName*, *Age* and *Photo_Url*) through classes (*ListActivity*, *NetTask*, *Background* and *GetImageFromURL*). **Third**, after the *Voter* check of his/her data, *Voter* can see the candidates and cast vote by *VotePage* class.

B. BackEnd Component

Current Backend component is based on a *Restful API* that implements functions as, Put, Get, etc. Implementation is done in PHP. Further functionalities include usage of *BlockChain* and fingerprint recognition. Bellow a fragment of code from *PHP BackEnd Component*.

The figure below illustrates the connection with *Information database*: if it is connecting with database, it will return "Connect OK"; if it isn't connecting with database, it will return "Connect Field".

```

<? php
  Sdb_name = "Information";
  Smysql_username = "root";
  Smysql_password = "";
  Sserver_name = "localhost";
  Sconn = mysqli_connect(Sserver_name,
  Smysql_username, Smysql_password,
  Sdb_name);
  if(Sconn) {
    echo "Connect OK"; }
  else {
    echo "Connect Field"; }
?>

```

C. Database Component

The design of tables of the database is given in the following figure. Current database design is simple. It will be extended by storing information about the Fingerprint and Blockchain.

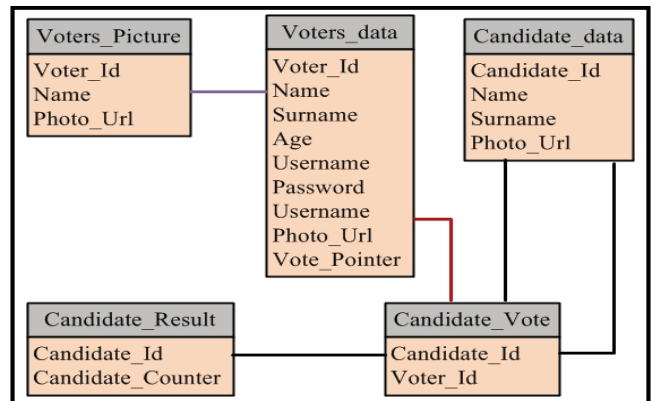


Fig. 6. M-Voting tables of database

D. Usage of the Application

The application of the m-voting board has the following main pages:

- **Main Page:** It displays the m-voting application with 2 options (Voting Operation and Registration).
- **Registration Page:** Voter introduces his or her data.
- **Login Page:** It displays the login section and Result section for Admin only.
- **Voter Page:** It displays the Voter Information if Ok go to Cast Vote.
- **Voting Page:** It displays the list of Elects with them names and pictures.
- **Result Page:** It displays the Result of Voting which is only seeing by administrator.

In the figures below, as the law of Iraq does not permit this, we did not put figures of politicians in the Voting Page but pictures of football players. However the functionality can be well understood.

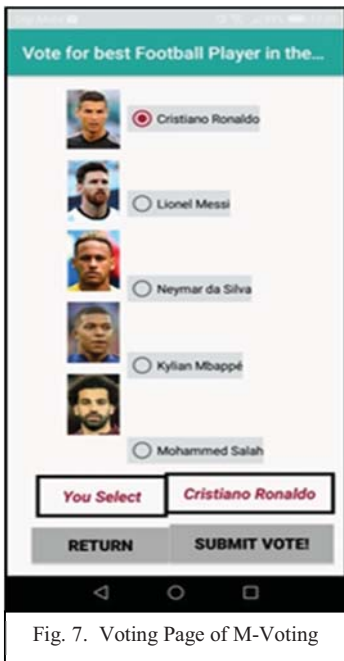


Fig. 7. Voting Page of M-Voting

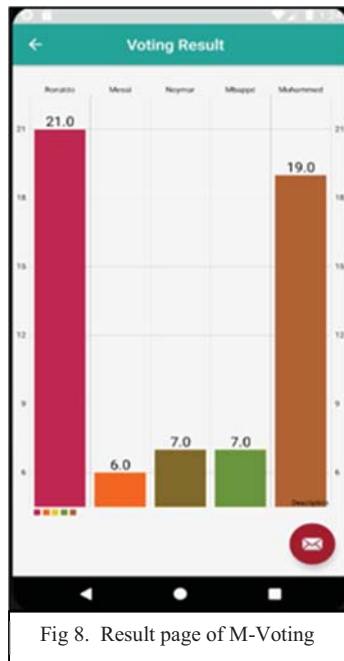


Fig 8. Result page of M-Voting

V. CONCLUSIONS

In this paper we present the m-voting System which is an Android application for voting management. Voting is an important procedure in different countries worldwide and is essential to any consensus-dependent society [1]. Elections can happen for different reasons, involving choosing leaders, finishing political problems, choosing a substantial government, etc. [2].

The phenomenal using of Information Technology in the process of election is quickly earning momentum. This growth in voting systems indicated to as e-voting comes with more benefits than the voting system based on paper.

While there are many efforts in different parts of world regarding implementations and trials for electronic voting, there are not many researches regarding this in Asia Minor,

especially Iraq. It can be noted that Iraq has several regions with difficult access and where sometime it is difficult to collect votes in the traditional way because of access reasons and post-war conditions. We want to fill this gap through the research presented in this paper. In this paper we describe an application for M-voting targeting the specific conditions of Iraq. The application is based on Mobile technology. We choose mobile technology motivated by the fact that although people do not have computers, almost everyone has a mobile phone in Iraq. This application can be used not only in Iraq, it can be useful by people whose health situation does not allow them to present themselves at the vote. Besides that, it can represent a good help for the countries in which the current worldwide pandemic of COVID-19, is impeding with the standard organization of the voting process.

Having the possibility to vote using a mobile phone reduces the necessary physical contact between voters and organizers and prevents the spreading of the virus. The prevention is the result from not having to touch items which were touched by another human being who can be infected without even knowing. All the things above, represent the medical usefulness of this application.

In this paper we present implementation details regarding of the initial prototype of *m-voting* system. We described the *Android application*, *Backend the Server* and the *Database*. Further developments include the incorporation of *BlockChain* and *Fingerprint* recognition.

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