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Philippines Smart App Voting System a Mobile Voting System

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Abstract— Philippines is a democratic country. Voting is a practice of democracy for the last decades up to present. The country has been using the popular paper-based and PCOS machine (Precinct-Count Optical Scanners) voting system manufactured by Smartmatic which have some issues from the previous national election until now. Like signal loss from provinces, data traffic, PCOS failure to transmit poll data from 18,000 precincts, unsecured data transfer for tallying votes specifically removing memory card from the PCOS machine that is possible for swapping, misplacement of shaded candidates making it unreadable, and paper jam. Filipino’s are fond of technology and gadgets. Most of all households have their own mobile devices. This research intends to maximize the usage of mobile phones and make it more useful for the betterment of the country.

Keywords— Ballot; COMELEC; Data traffic; Mobile Phones; PCOS; Vote Buying; Flying Voters; Voting; Network Service Provider; Sim Card; SMS; SmartMatic;

I. INTRODUCTION

Most of the people vote to select the rightful candidate that they believe or trust, hoping that this candidate will make a difference and help the country to progress. Vote tallying always have security issues making most of the results unreliable. Cheating in any form on the election is very well known in the country like vote buying, flying voters (e.g. using the name of a dead person, using other’s voter’s name), ballot switching, riot during election, and political dynasty. When there is an election, there is a blackout in the nation. The current PCOS machine voting system is not efficient due to the long preparation of printing the ballots and unsecured transfer of data for tallying of votes.

A. Background of the Study

The people are given the right to vote freely and cast the votes according to their beliefs. The main goal of mobile application voting system is to eliminate the long queue in the precincts, paper ballots, vote interruption due to power lost, unsecured data transfer, violence in actual voting area, and mass requirement of manpower for vote process. As experienced by the researchers, a system in Singapore is great to adapt in the country. And that is, the registration of sim card per mobile user. Once a person purchased a SIM (Subscriber Identity Module) card it will be registered using the passport number. If the SIM card we used is registered per person then we can take that advantage in many ways. Like avoid frauds, theft, and other crimes. Since the major requirement to vote is the individual to be registered, the voters ID and the SIM card will be the unique identifier for the registration to be able to vote on the mobile application. Voter’s registration will be open on the designated dates set by the COMELEC (Commission on Election). Renewal of the registration is required every year to ensure that the person is still residing in the country and not deceased. Mobile voting is through internet connection or data network. This technology will be efficient and reliable.

B. Conceptual Framework

The conceptual framework shows how will be the process of the application. In Figure 1.0, the user will get to know how the project functions and operates.

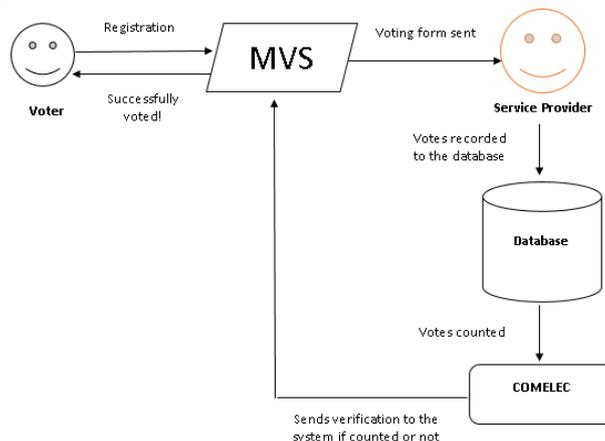


Fig. 1.0 Conceptual Framework

The illustration in *Figure 1.0* shows the process of the mobile voting system that a person needs to register to verify its eligibility and store the information to the database. One vote is allowed on the registered mobile phone per selected officials. Thus, duplicate entries are not allowed.

C. Significance of the Study

From traditional into modern era, technology had changed our lives. Making people crave in latest technology. Devices and gadgets are used for entertainment and as fashion trend. These devices can be more productive and useful. Mobile phones are used for communication (e.g messaging/SMS, call, social media sites), games, and internet browsing. In the Philippines and other countries, mobile phones are the easiest and least expensive devices. These devices are hand carry, reasonably priced and commonly used at present. The mobile phone offers communication to friends, family, and connect to internet access around the globe. Mostly anybody has their own mobile phones. The substantial mobile phone users present an idea on the researchers the possibility of the usage of the mobile device in an important matter like election.

D. Statement of the Problem

Specifically the existing voting system has the following problems:

- 1.) Existence of flying voters;
- 2.) Unsecured transfer of data;
- 3.) Time consuming printing of ballots;
- 4.) Limited space accommodation for voters in the assigned precincts and clusters for election;
- 5.) Not accurate vote tallying;

E. Objectives of the Study

There are two types of objectives. The general objective which aims to replace the current PCOS voting process to make it more reliable and efficient. The specific objectives which discusses the several improvements from the current voting system.

General Objective

The main goal of the project is to create a reliable and efficient voting system that suits the answer of voting process in the Philippines and give the voters the options to select which candidate to vote during national elections without queuing and verify if they are valid voters in a barangay or community.

Specific Objectives

The project aims for the following:

- 1.) To register the person's SIM card per mobile device;
- 2.) To cast a vote by mobile phone;
- 3.) To secure the voter's selection of candidates;
- 4.) To have an easy way of voting process and avoid unnecessary queues;
- 5.) To provide an easy way to renew registration;

F. Scope and Limitation

The coverage of the study is that it will include the voter's online registration, renewal, and voting process. For logging in, voters ID number is the username and password will be set by the user. A valid Voters ID and also the mobile number per person will be used to register, through this all the details of voter are saved in database. It will act as the main security to the voting system. The system will also generate a verification code for security purposes. Air time balance (load balance) is required in order to vote.

The limitation of the study is the strong presence of the network service provider and also a very good internet connection on the day of the national election.

II. REVIEW OF RELATED STUDIES AND LITERATURE

In this chapter, it includes relevant unpublished studies and published articles. It consists of four categories such as Foreign Studies, Local Studies, Foreign Literature and Local Literature.

A. Foreign Studies

The New Belgian E-Voting System by Carlos Vegas Gonzales – this system was developed using a Smartmatic LED 17 inches touch screen device. The user will be scanned for identity verification using a barcode and fingerprint scanner, the user will then vote using the LED and later generate the printed output to be submitted to the ballot box. [1]

Alarm Press: SMS Broadcast System by Bryan Adams Layosa – this system is used for the purpose of school announcements and reminders for the students. This eliminates the use of bulletin boards, posters and sticky notes for preparing message for the students. The administrator sends a message using the system and specified students receives the message in a form of Short Message System (SMS). [2]

SMS Voting System by Maribeth Arado et Al – This research is about automated election using Short Message System (SMS). Users cast vote through mobile phones sending SMS of their selected candidates and final form to the server. The committee receives the vote form through SMS and generates the report of the tally made from the election. [3]

B. Local Studies

University Voting System of the Polytechnic University of the Philippines - a system used during Supreme Council Election. This system is built and developed for the enhancement of the voting process and for the satisfaction of the voters during election. The offered features of the system are efficiency, reliability, security and accuracy. The system serves as an upgrade from the manual process to automated process of election. The students use computers to vote instead of using papers. [4]

SMS Voting System by Michelle Ann M. Bautista, Lucille P. Miano and Rachel V. Bernados – This system functions like a normal short messaging system (SMS), but the voter needs to be verified using a fingerprint texture sensor. The user will vote and send the voting form through sms after the verification using fingerprint scanner. [5]

C. Foreign Literature

Mobile Voting System by Abdooz (2013, 04) Mobile Technology is most imperative on the current era. It can get upgraded data utilizing cell phones. Such gadget can be utilized for individual and business exchanges. Besides, cell phones usefulness has developed massively. These days, it can be utilized for an assortment of purposes like to find puts much like a GPS, to peruse standardized tags, to play recreations, to search the Internet, to know climate reports, to vote, thus considerably more.

Significantly the most important uses are the voice calls, video calls and Short Messaging System (SMS). Currently various models of mobile phones have come out in the market and each one having special advantages over the others. The SMS or message facility is important in the mobile device. It allows the sender to send messages from one mobile to another mobiles device. Most business establishments advertise through print media like the newspapers, magazines, pamphlets, brochures, and so much more. It also makes use of the radio to promote their product and services. [6]

D. Local Literature

The Voice of the Philippines Voting System – this TV program shows a voting process that is somehow related to the proposed project. The voting system in the TV show includes a text/SMS messaging to vote on the desired contestant. The automated voting for the contestant shows relevance to the proposed project. [7]

Online Banking Applications – nowadays, National and Local Banks follow the technology trend. Almost all the banks have upgraded the existing system into a more efficient and convenient way for the users. Following the trend, banks developed mobile applications for the users to have convenient way in accessing one’s account. The creation of mobile apps based from the existing project is the primary relevance in this study. The proposed project is a mobile app based on the existing voting process of the Philippines. [8]

Election experts still doubt PCOS machines' credibility as 2016 polls loom - Decision specialists still uncertainty PCOS machines' believability as 2016 surveys loom Manila – After two computerized surveys in 2010 and 2013, specialists and backers for solid and genuine races on Monday communicated question on the validity of the Precinct Counting Optical Scan (PCOS) supplied by Smartmatic Philippines, taking note of that significant shields are not yet in place. Professor Nelson Celis, representative of Automated Election System Watch (AESWatch), said that while there is undoubtedly on the voting itself, they are restless about the limit of the units to steadfastly mirror the votes cast in light of the fact that the PCOS machines are not dependable, as seen, he said, in the Philippine experience. "There is no issue with voting, in the perspective of AESwatch; the unavoidable issue is about the association. We accept not all votes cast were reflected. In light of the data we assembled in the 2010 and 2013 races, the machines were not that dependable," according to Celis. [9]

III. RESEARCH DESIGN

The illustrations in Figure 2.0 and 2.1 show the process of the Philippines Smart App Voting System.

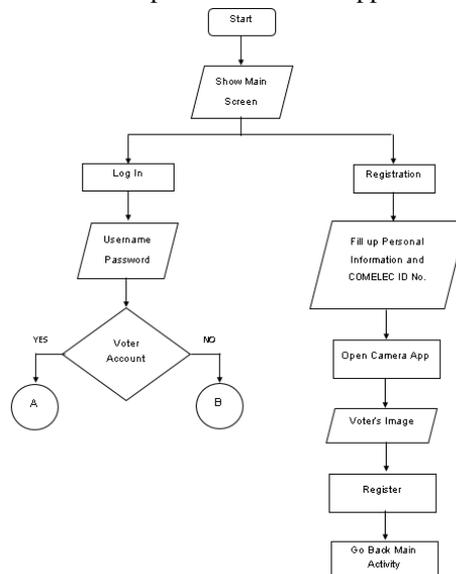


Fig. 2.0 Flow Chart Diagram

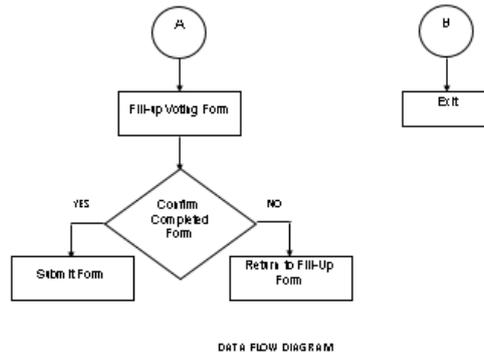


Fig. 2.1 Flow Chart Diagram

The illustration in *Figures 2.0 and 2.1* shows the process of the research design.

A. Methods Used in Developing the Software Product

In this section, the researchers discuss all the methods that will be used to develop the application.

B. Project Design

The database will be created in SQLite and the User Interface (UI) will be created using Visual Studio with Xamarin platform.

The Admin can view or manage the system, print information or create a login ID using this application which is much easier than the manual process.

C. System Introduction

The mobile voting system is an application intended for Philippines voting process which will use a mobile phone as a medium then through mobile data or wireless Ethernet connection for a more easily and convenient way to vote.

Visual Studio Platform will be used to create the voting system. SQLite for database and Adobe Photoshop for editing the Graphical User Interface (GUI) of the system.

D. Fabrication or Development Procedure

The Spiral Model was first described by Barrt Boehm in his 1986 paper, “*A Spiral Model of Software Development and Enhancement*”. Based on the Spiral Model, the researchers will use it as a guide on the research project. The four phases used are Gather Information, Analysis and Design, Coding and Development, and Testing and Evaluation.

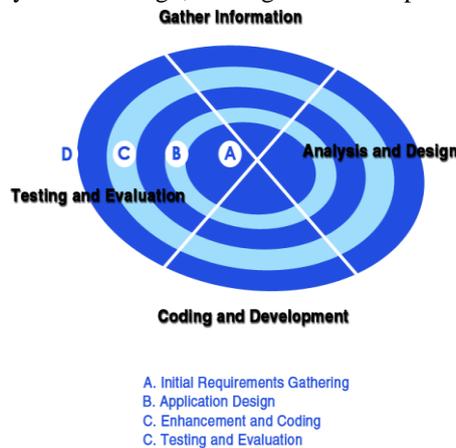


Fig. 3.0 Spiral Model

The researchers selected this model because the said application is considered as a medium to high-risk project. Also, the users are unsure of needs, requirements are complex and this system is a new product line.

Gather Information this phase ensures that the beneficiary requirements are satisfied throughout a system's life cycle. The researchers start by stating the proposed problem first, then gather the data needed for documentation and program, create diagrams and output of the system and then design and code the system program.

In **Analysis and Design**, which is the feasibility study, it targets to address the need of the user. It analyzes the cost brought by the implementation of the new application.

In **Coding and Development**, the researchers will use the Visual Studio with Xamarin Platform, SQLite for database and Adobe Photoshop with Adobe Illustrator for the GUI design. The researchers will create a simple and clean design to provide a user-friendly interface.

In **Testing and Evaluation**, the system must be tested in order to eliminate errors and bugs. The researchers will make different stages of testing and invite different types of users for evaluation of the project.

E. Software Design and Development

The software will be designed and developed by the process of solving the problem defined during the development of the software by planning the appropriate solution. It will also determine the information of the Hierarchical Input Process Output Design (HIPO), user interface and the operational environment consist of the software and hardware system.

The illustration in Figure 3.1 shows the Hierarchical Input Process Output (HIPO) of the project as the guide in developing the research project.

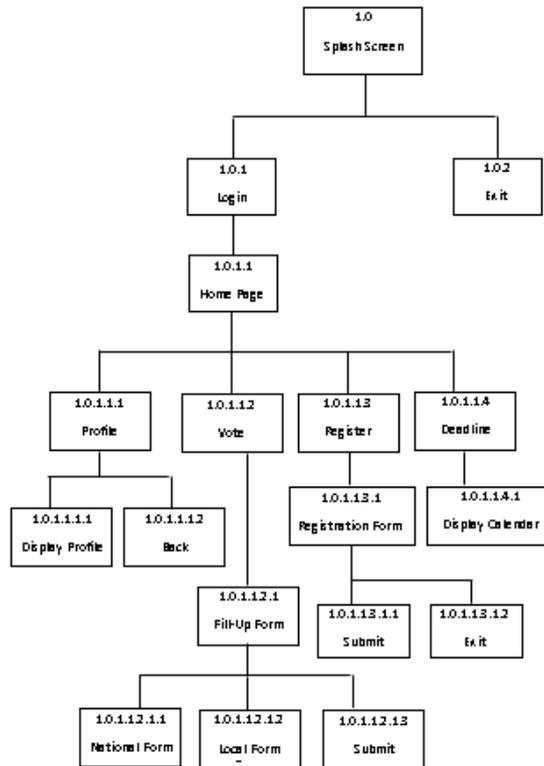


Fig. 3.1 Hierarchical Input Process Output (HIPO)

Software System Interface

The user interface design will be the interaction of the user as simple and efficient as possible in terms of casting votes for the National and Local Elections. The system will operate on a mobile device with Android and iOS operating system. Higher version of the said mobile operating systems will still be compatible. Adobe Photoshop and Adobe Illustrator CS5 will be the tools for the development of the system application in terms of buttons and graphical user interface (GUI). Visual Studio with Xamarin will be for the development environment of the system application. Adobe Flash CS5 for as the animations.

SQLite will be the database of this application, the database will be compatible for both Android and iOS devices.

User Interface Design

The researchers came up with a preview of the application. A simple screen shots of the Graphical User Interface was made in order to see the preview of the mobile application.



Fig. 4.1 Home Page



Fig. 4.2 Registration Form



Fig. 4.3 Profile Page



Fig. 4.4 Voting

Hardware System Interface

The minimum requirement for hardware specifications for the installation of this system application will be a Smartphone with 1Ghz Processor, 512MB Ram, 4GB Internal Storage, Android version Ice Cream Sandwich 4.0 for Android devices; and 1Ghz Apple A4 Chipset, 512MB Ram, 8GB Internal Storage, iOS version 6.0 for Apple Devices. The smartphone should have a WiFi connection or Data Connection for connectivity between user and server.

IV. SUMMARY

The researchers had observed that there is a need of the application since people nowadays adapt to the current trends in technology. The information age is more advanced that people use mobile devices every day. The system will help users to vote in a less hassle way.

V. CONCLUSION

The researchers concludes that the proposed application will be having a great significant in today's technology. This will be a very efficient way in conducting national and local elections. The system will also help the government reduce costs, crimes and identity fraud in conducting election. People do not need to go to the precinct or wait for hours in order to vote. The mobile voting system is the solution for these problems.

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