**KIBU ELECTRONIC VOTING SYSTEM**

Alex Okeyo Otieno

Malack Mongare

Dominic Chahasi

Samuel Kahindi

Alex Obure

Diana Masese

A system proposal presented to the Department of Information Technology in partial fulfilment of the requirement for the award of the Degree of Bachelor of Science in Information Technology of Kibabii University

March, 2019

**DECLARATION**

This system proposal is our original work prepared with no other than the indicated sources and support and has not been presented elsewhere for a degree or any other award.

Alex Okeyo Otieno

Malack Mongare

Dominic Chahasi

Samuel Kahindi

Alex Obure

Diana Masese

**APPROVAL**

The undersigned certify that they have read and hereby approve for acceptance of Kibabii University Information System proposed entitled Electronic Voting System

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Dr. Anselemo Peters

Department of IT

Kibabii University

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Mr. H Mabonga

Department of IT

Kibabii University

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Ms. H. Tsinale

Department of IT

Kibabii University

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**ABSTRACT**

This proposal provides information on design issues, build frames and testing methods of an Electronic voting system that facilitates user, candidate, Election Commission Officers to participate in voting. This voting system is highly secured, and its design is very simple, easy to use and also reliable. Its ethical in its design because it keeps the individuals vote secret, eligible by allowing only registered voters to vote with each such voter voting only once, verifiable which creates ability to trust the vote tallying process.

The scope and the justification are well elaborated. The project schedule is adhered to. The proposal meets both functional and non-functional requirements. It incorporates system requirements i.e. the hardware specifications and the software specifications. The objectives are well mapped to both the developers and the system level requirements. This is aided by the use of incremental model.

**TABLE OF CONTENTS**

[DECLARATION ii](#_Toc10451003)

[ABSTRACT iii](#_Toc10451004)

[TABLE OF CONTENTS iv](#_Toc10451005)

[LIST OF TABLES vi](#_Toc10451006)

[LIST OF FIGURES vii](#_Toc10451007)

[OPERATION DEFINITION OF TERMS viii](#_Toc10451009)

[CHAPTER ONE 1](#_Toc10451011)

[1.1 INTRODUCTION 1](#_Toc10451012)

[1.2 Problem Statement 1](#_Toc10451013)

[1.3 Purpose of the Project 1](#_Toc10451014)

[1.3.1Objectives 2](#_Toc10451015)

[1.3.1.1 Developers level objectives 2](#_Toc10451016)

[1.3.1.2 System level objectives 2](#_Toc10451017)

[1.4 Research Questions 2](#_Toc10451018)

[1.5 Basic Assumptions of study/project 2](#_Toc10451019)

[1.6 Justification 2](#_Toc10451020)

[1.7 Scope 3](#_Toc10451021)

[1.8 Significance of the project 3](#_Toc10451022)

[Kibabii University students expect a free and fair elections. 3](#_Toc10451023)

[1.9 Deliverables 3](#_Toc10451024)

[1.10 System Requirements 3](#_Toc10451025)

[1.10.1 Hardware 3](#_Toc10451026)

[1.10.2 Software 4](#_Toc10451027)

[1.10.3 Functional requirements 4](#_Toc10451028)

[1.10.3.1 Administrators module 4](#_Toc10451029)

[1.10.3.2 Student module 4](#_Toc10451030)

[1.10.4 Non Functional requirements 5](#_Toc10451031)

[CHAPTER TWO 6](#_Toc10451032)

[2.0 Literature Review 6](#_Toc10451033)

[2.1 Introduction 6](#_Toc10451034)

[2.2 Review of Relevant Literature and Opinion 6](#_Toc10451035)

[2.3 Re-Definition of Problem 7](#_Toc10451036)

[CHAPTER 3 8](#_Toc10451037)

[3.0 Methodology 8](#_Toc10451038)

[3.1 JUSTIFICATION OF METHODOLOGY 8](#_Toc10451039)

[References 9](#_Toc10451040)

[APPENDICES 10](#_Toc10451041)

[Appendix I: Schedule 10](#_Toc10451042)

[Appendix II: Budget 11](#_Toc10451043)

**LIST OF TABLES**

Table 1…………………………………………………………………………………………. 4

Table 2…………………………………………………………………………………………. 10

Table 3…………………………………………………………………………………………. 11

**LIST OF FIGURES**

Figure 1………………………………………………………………………………………….. 6

**OPERATION DEFINITION OF TERMS**

KEC : Kibabii University Electoral Commission

# 

# CHAPTER ONE

# 1.1 INTRODUCTION

Voting is one way of people exercising and expressing their democratic rights. Therefore, electronic voting system is one of the most viable means for people partaking this exercise. The system that exists currently in Kibabii University is totally paper based and manual that takes a lot of time and the University has to bear the financial expenses for this purpose. As a matter of fact, it consumes a lot of resources in terms of: the personnel required to handle the whole process, finances required to train the selected personnel and to print the ballot papers and more-so the finance required to pay the selected personnel. The system is dependent on good personnel and as a result the integrity, accuracy and credibility of the system is in doubt. We have decided to come up with an electronic voting system for the university so that we can at-least reduce on; the number of personnel required, cut the cost used during the election period, reduce the manual work that lead to data redundancy, favor the physically challenged students and increase on credibility and accuracy of the results. The Electronic voting system is going to work like the manual paper ballot whereby whenever a vote is casted, it will be difficult to identify which candidate the voter voted for. Therefore, we do recommend that the University should adopt this electronic system having in mind that the system will improve on the ways elections are conducted within the institution and that this system is one of the best system as it includes the latest technology.

# 1.2 Problem Statement

As the university is dependent on the manual system, it has its own disadvantages for instance the manual system has a lot of data redundancy, it is cost inefficiency, the level of accuracy and integrity is limited and it consumes a lot of time conducting the whole process hence the manual system is not fit for a great institution like Kibabii university. Adopting the electronic system can help improve on the voting process within the university.

# 1.3 Purpose of the Project

The main purpose of this project is to develop an electronic voting system that will enable Kibabii university students to cast their vote within the stipulated time.

**1.3.1Objectives**

1. To enable the student to cast their votes

**1.3.1.1 Developers level objectives**

1. To design system Front-End module that would be used to capture user inputs
2. To design System Back-End module for storing and retrieval of data
3. To link the Back-End module and the Front-End module
4. Test objectives 1,2,3 against user requirements and/or system objectives

**1.3.1.2 System level objectives**

1. To capture students’ details
2. To Generate reports of all registered candidates and voters
3. To carry out all mathematical computations regarding the elections

# 1.4 Research Questions

**Developers Level Research Questions**

1. How will you design front-end module that would be used to capture user inputs?
2. How will you design Back-End module for storing and retrieving data?
3. How will you link Back-end module and Front-End modules?

**System Level Research Questions**

1. How will the system capture student details?
2. How will the system generate reports of all registered candidates and voters?
3. How will the system carry out all mathematical computation regarding the election?

**1.5 Basic Assumptions of study/project**

The students are computer literate meaning they will be able to use the system without extensive training.

The computers and necessary requirements required to deploy the system are already available with the students.

## 

# 1.6 Justification

The present form of voting in general elections in Kibabii University is founded entirely on ballot paper based and largely manual voting procedures hence the proposed system will do away with the current manual system. The proposed system will cut the cost incurred during the election period and this involves the cost of purchasing ballot papers and the expenses incurred paying the required personnel. It will also help reduce data redundancy as all the data will be stored in a central database. It will improve on security as it will include audit trails. Credibility and accuracy of the votes will be improved to a great deal.

The proposed system is unique on its own as it involves great features like audit trails. Partial results will not be released during the voting period. Voters are unable to prove to a third party that they voted in a particular way.

# 1.7 Scope

The proposed system is to be used particularly by Kibabii university election commission body(KEC). The system is developed for Kibabii University students both the candidates and the voters. The system shall enable the students to cast their votes.

The whole project would take a duration of 7 months i.e. from requirement elicitation to deployment.

The budget is estimated at Ksh. **80500**

# 1.8 Significance of the project

## Kibabii University students expect a free and fair elections.

If the proposed electronic voting system is overlooked, then:

1. It can reduce the students trust on current system
2. This might pose a big loss to the institution financially and also in terms of organizational reputation.

Proper Election management is thus mandatory and that’s why an Electronic Voting System is proposed as the ultimate solution.

# 1.10 System Requirements

**1.10.1 Hardware**

Computer with the following Specifications:

Processor - Intel ® Core i3. Speed –2.0GHz or Faster.

500 GB hard disc.

Installed Memory – 2GB (RAM)

8GB USB Flash Disk AND 700MB CD

Speakers.

MODEM.

**1.10.2 Software**

Operating System - windows 7 and above.

DBMS (MySQL).

Java Net beans IDE.

MySQL Connector, Java.

Jar Files (rs2Xml.jar, jcalendar.jar, jTatoo.jar, jFreeChart.jar, etc.).

Install Creator.

Browser: Mozilla Firefox, chrome.

Microsoft Office Suite.

Navicat

**1.10.3 Functional requirements**

**1.10.3.1 Administrators module**

1. The System shall allow the Admin to register.
2. The System shall allow the Admin to login with username and password.
3. The System shall allow the Admin to view Votes cast
4. The System shall allow the Admin to view audit logs.
5. The System shall allow the Admin to View the results from the casted voted
6. The System shall allow the Admin to add and delete candidates.

**1.10.3.2 Student module**

1. The system shall allow students to register
2. The system shall allow students to login with username and password
3. The system shall allow the student to cast their vote

**1.10.4 Non Functional requirements**

1. The system may shall only allow registered students to cast their vote
2. The system shall allow students cast their vote within the stipulated time-frame

# 1.9 Project Schedule

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Activity  Description | October | November | December | January | February | March | April |
| * Problem identification * Concept paper submission |  |  |  |  |  |  |  |
| * Feasibility Study * System Analysis * Proposal Presentation |  |  |  |  |  |  |  |
| * System design * Database design * User Interface design |  |  |  |  |  |  |  |
| * System development * Coding |  |  |  |  |  |  |  |
| * System testing * Unit testing |  |  |  |  |  |  |  |
| * System implementation * Project presentation * Project documentation * Submission of documentation |  |  |  |  |  |  |  |

**Table 1**

# CHAPTER TWO

# 2.0 Literature Review

**2.1 Introduction**

We intend to review the current situation in the campus which will assist changing the voting system to a better one. Here will look at the current methods and technologies used during voting as well as the processes involved.

**Database Design Fundamentals**

Any successful database (DB) must accurately and precisely store data without mixing values or losing information--an obvious essential in managing election results data. To diminish the incidence of anomalies which reduce the accuracy of DB contents, computer science and engineering have established fundamental DB design precepts, including normalization.

Normalization is a methodology of DB design that creates proper relations, removes redundant data, promotes efficient use of disk space, and reduces the likelihood that accessing and manipulating data will result in anomalies. Normal form classification uses consecutive, progressive numerical titles (e.g., 1NF) to describe in shorthand whether a particular DB has satisfied the fundamental design precepts.If a DB design has not been normalized, the DB has been designed in a manner that fails to prevent avoidable errors and data corruption. For example, when the DB design causes storage of specific data in multiple locations or tables, updates to that data can cause anomalies to occur. Failure to update the specific data in every location virtually simultaneously causes inconsistencies in the data between the two locations (an update anomaly). Normalized DBs also create correct dependencies among data sets. Incorrect dependencies can create errors when data is added or deleted from the DB. (Ryan)

Networking

Traditional systems integrate redundant network communication with opportunities for individual initiative to assure that votes are reliably recorded and counted. They also make use of analog and digital measurement to count votes and provide guidance about the processing of voting information. Legacy systems continue to provide efficient and effective processing of voting information for simple choices in relatively small groups. However, developers of modern voting systems face the challenge of integrating knowledge about the expression of preferences and judgments with modern technology for collecting and counting votes in mass electorates (Urken, 2009)

**Electronic voting system**

This section presents a review of related works in the area of E voting system. It also highlights some gaps which are required to be filled up in this respect

Neumann et al (1993) gives a list of suggestions for "generic voting criteria" which suggests that a voting system should be so hard to tamper with and so resistant to failure that no commercial system is likely to ever meet the requirements, and developing a suitable custom system would be extremely difficult and prohibitively expensive.

Philip Klein et al (1995) presents a remote voting scheme that applies the technique of blinded signature to a voter's ballot so that it is impossible for anyone to trace the ballot back to the voter. They achieve the desired properties of privacy, universal verifiability, convenience and untraceability, but at the expense of receipt-freeness.

Gritzalis et al (2002) expresses that voting is a process at the heart of a democratic society. He therefore stressed that in recent democratic elections using voting machines have shown that the winning margins could be less than the error margins of the voting systems themselves, making

election an error prone task. Hence the use of electronic voting has the potential to reduce or remove unwanted human errors. In addition to its reliability, e-voting can handle multiple modalities such as voice assistance for handicap, and provide better scalability for large elections. He stated that e-voting is also an excellent mechanism that does not require geographically

proximity of the voters.

Kohno et al (2004) discusses on the criticism in the Direct Recording Electronic (DRE) voting systems in which they pointed out that due to various deficiencies and security vulnerabilities it has being widely criticized. Therefore they believe is that the software undergoes insufficient

scrutiny during qualification and certification; that DREs are especially vulnerable to various form of insider programmer attacks; and that DREs have no voter-verified audit trails paper or otherwise that could largely circumvent these problems. All of these criticisms of DREs apply directly to

SERVE as well.

Sarah et al (2008) reported about the comparison of efficiency of the DRE with the with traditional machines. (paper ballots, punch cards, and lever machines). Results indicate that there were little differences between the DRE and these older methods in efficiency or effectiveness. However, in terms of user satisfaction, the DRE was significantly better than the older methods.Paper ballots also perform well, but participants were much more satisfied with their experiences voting on the DRE. It indicates that there were little differences between DRE and traditional methods in efficiency.

**Biometrics**

Sonja Hof et al (2004) reported about biometric approaches to e-voting. There are different biometrics approaches i.e., fingerprint, iris, face,voice, signature, DNA analysis and multi biometric systems are discussed. He discussed about how biometrics concepts can be used in e-voting. It does not interact in any way with the biometric characteristics of the actual users,

authenticates the user with the help of user’s authentication certificate as present on the card.

**Security**

Security Criteria for Electronic Voting considers some basic criteria for confidentiality, integrity, availability, reliability, and assurance for computer systems involved in electronic voting. After an assessment of the realizability of those criteria, it concludes that,operationally, many of the criteria are inherently unsatisfiable with any meaningful assurance. (Neumann, September 20-23,1993)

In , (Rubin, December 2002)Rubin identifies the new risks brought about by introducing the state-of-the-art

technology into the election process, which may not be worth taking. The major security risks

identified include those at the voting platform – including malicious payload (attack programs,

remote administration and monitoring toolkits, etc.) and delivery mechanism (worms, viruses

and bugs, active content downloaded automatically, etc.) – and the communications

infrastructure – including (distributed) denial of service attack, DNS server attack, etc. He also

identifies security issues in social engineering and in using specialized devices

**2.3 Conclusion**

A voting system must be comprehensible to and usable by the entire voting population, regardless of age, infirmity, or disability. Providing accessibility to such a diverse population is an important engineering problem and one where, if other security is done well, electronic voting could be a great improvement over current paper systems. Flaws in any of these aspects of a voting system, however, can lead to indecisive or incorrect election results. Hence thus the need of Kibabii University Electronic Voting. It is done for the University voting purpose. All the candidates’ names of the different section will be displayed in the screen according to their post. Student has to just go and click the button to vote. Calculation of the vote is done automatically which can be viewed only to the Admin. The winners name will be shown in the screen and even the votes they have gained. So this system can be used for the college voting sake, where there will be complete security, and the time to count the votes will be saved, because of the automatic calculation.

# CHAPTER 3

# 3.0 Methodology

The proposed system shall be developed using an **Incremental Process Model** where each module shall be designed at a time and its functionality tested before starting another module.

F**igure1:** Incremental process model

Requirements

Design

Implementation and

Unit Testing

Integration and System

Testing

Operation

**3.1 JUSTIFICATION OF METHODOLOGY**

1. Generates working software quickly and early during the software life cycle.
2. This model is more flexible – less costly to change scope and requirements.
3. It is easier to test and debug during a smaller iteration.
4. In this model users can respond to each built.

# References

1. *Electronic voting and Counting -Development of the system.* (2005). Election ACT.
2. Neumann, P. G. (September 20-23,1993). Security Criteria for Electronic Voting.
3. Paul Lux. (n.d.). Data Normalization in Electronic Voting Systems: A County Perspective.
4. R.Storn. (n.d.). *Diffrential Evolution-a simple and efficient heuristic for global optimization over continuous spaces.*
5. Report of the National Workshop on Internet Voting:issues and Research Agenda. (2000).
6. Rubin, A. D. (December 2002). *Security Considerations for Remote Electronic Voting.* Communications.
7. Ryan, T. P. (n.d.). GEMS Tabulation Database Design Issues in Relation to Voting Systems Certification Standards.
8. Urken, A. B. (2009). Voting, Networks, and Communication.

# APPENDICES

## Appendix I: Schedule

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Activity  Description | October | November | December | January | February | March | April |
| * Problem identification * Concept paper submission |  |  |  |  |  |  |  |
| * Feasibility Study * System Analysis * Proposal Presentation |  |  |  |  |  |  |  |
| * System design * Database design * User Interface design |  |  |  |  |  |  |  |
| * System development * Coding |  |  |  |  |  |  |  |
| * System testing * Unit testing |  |  |  |  |  |  |  |
| * System implementation * Project presentation * Project documentation * Submission of documentation |  |  |  |  |  |  |  |

**Table 2**

## Appendix II: Budget

|  |  |  |
| --- | --- | --- |
| Item | Cost in Ksh | Function |
| Computer | 50000 | Host the entire system |
| Windows Operating System | 3000 | This is the system platform |
| Neatbeans 8.2 with JDK for Java, Install Creator | 6000 | Compile for coding, project builder |
| DBMS | 12000 | Contains mysql(DBMS) |
| HDD 80GB | 2500 | Backup Device |
| Microsoft Office Suit | 3000 | For creating slides, proposal and documentation |
| Printing(Concept paper, proposal and documentation) | 400 | Printing |
| Internet connectivity | 2500 | For Online Work |
| Miscellaneous | 1000 | For any eventuality |
| Total cost | 80400 |  |

**Table 3**