AN INTERACTIVE WEB BASED MAP

A CASE STUDY OF KAMPALA INTERNATIONAL UNIVERSITY

BY

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DECLARATION

I Musisi Ivan Arthur a student of Kampala International University do declare that this work contained in this proposal has never been presented to any other university or institution for the fulfillment of the award of bachelor of Information technology.

Signature: .....

Date: .....

APPROVAL

This is to satisfy that this work has been done under supervision and that it is now read for submission as approved by;

Signature:.....

Date:.....

LIST OF ACRONYMS

GUI	-	Graphic User Interface
GIS	-	Geographic Information System
OS	-	Operating System
IT	-	Information technology
PHP	-	Hypertext processor
HTML	-	Hypertext Markup Language

TABLE OFCONTENTS

DECLARATION ..... *ii*
APPROVAL ..... *iii*
LIST OF ACRONYMS ..... *iv*

CHAPTER ONE 1

0.1 Introduction *1*
1.1 Background information *1*
1.2 Statement of the problem *1*
1.3 Purpose *1*
1.4 Objectives *1*
1.5 Research questions *2*
1.7 Significance of the study *2*
1.8 Scope *2*
1.8.1 Geographical scope *2*
CHAPTER TWO 4
2.0INTRODUCTION 4
2.1 RELATED LITRATURE *4*
2.1.3 Problems with using web maps *6*
CHAPTER THREE *8*
METHODOLOGY *8*
3.0 Introduction *8*
3.1 Area of research *8*
3.2 Target population *8*
3.3 Research design *8*
3.4 Data collection *9*
3.5 Research tools/instrument *9*
3.5.1 Investigation *9*
3.5.2 Interviews *9*
3.5.3 Observation *10*
3.5.4 Questionnaire *10*
3.6 System analysis and design *10*
3.7 Weakness of the current system *11*
3.8 Requirement analysis *11*
3.8.1 System requirements *11*
3.8.2 Software requirements *12*
3.9 Design technique/tool *13*
3.9.1 Context diagram of the system *13*
3.9.3 Non functional requirements *14*

3.9.4 Physical design *14*
Fig 3.0 Campus Web map *15*
CHAPTER FOUR *16*
SYSTEM IMPLEMENTATION *16*
4.0. Introduction *16*
4.1. Tools used in the implementation include; *16*
4.2 Sample codes *17*
4.3 System testing and maintenance *19*
4.3.1 Unit and integration testing *19*
4.3.2 System testing *20*
Fig 4.0 Home page *20*
Fig 4.1 Map in Right zoom *21*
Fig 4.2 Out zoom *21*
4.3.3 System maintenance *22*
4.4 Conversion strategies and security issues *22*
CHAPTER FIVE *23*
RESULTS, RECOMMENDATION AND CONCLUSION *23*
5.0 Introduction *23*
5.1 Results; *23*
5.2 Limitation *24*
5.3 Recommendation and future studies. *24*
Conclusion *25*
REFERENCES *26*
APPENDIX I *28*
APPENDIX II *29*
APPENDIX III *30*
QUESTIONAIRES *30*

CHAPTER ONE

01. Introduction

1.1 Background information

Web mapping is the process of designing, implementing, generating and delivering maps on the World Wide Web and its product. Web maps are often a presentation media in web Geographical Information System and web maps are increasingly gaining analytical capabilities. A special case of web maps are mobile maps, displayed on mobile computing devices, such as mobile phones, smart phones, PDAs, GPS and other devices. If the maps on these devices are displayed by a mobile web browser or web user agent, they can be regarded as mobile web maps. If the mobile web maps also display context and location sensitive information, such as points of interest, the term Location-based services is frequently used (www.wikipedia.com)Z

1.2 Statement of the problem

About 2,000 students are admitted at KIU every semester; these students find it challenging to find their way around campus like locating their lecture rooms, respective offices among others. Hence there is need to provide personnel such as new students, visitors either the staff with an accessible web map that will help guide them around campus.

1.3 Purpose

The purpose of the study is to develop web map that will help students and other visitors develop their wayfinding knowledge way around the Campus by simply login onto the University web site. This can be done using Mobile phone, laptops or desktop computer connected to internet.

1.4 Objectives

- To investigate and gather information on how different personnel locate facilities on and off campus.
- Design and publish a web based map for the University main campus for different personnel to access online.
- To test and validate the efficiency of system usability.

1.5 Research questions

Has the University ever tried to come up with Web based map, if Yes, what were the outcomes?

How will a Web Based Map assist different personnel on and off campus?

Will the University be able to test the efficiency of the system?

1.7 Significance of the study

This project will serve to provide a guiding tool for personnel with interest either on or off campus; the project will have the following advantages;

- It enable personnel access the University premises through the internet.
- It enables first time visitors easily allocate respective offices or facilities on campus premises.
- It will reduce the administration's efforts on locating new students to their lecture rooms.

1.8 Scope

1.8.1 Geographical scope

The research will conducted at Kampala International University main campus at Kansanga, located in the southeastern part of Kampala, Uganda's capital and largest city.

It was chosen because we the researchers are students of Kampala International University and I have easy assess to information at campus.

1.8.2 System scope

The system will deal New and old students, visitors and with employee's like security guards, lecturers, cleaners, cooks, administrators' activities on and off campus and how they are able to carryout these activities in terms of finding their way around campus.

DEFINITION OF KEY WORDS

Campus University grounds

Lecturer An academic literate that teaches university students.

Personnel This can be a worker, recruit, staff, person, human resources or students

Web map Is a Web-based service on the Internet that provides maps for users to search and browse spatial information, such as place locations and routes.

CHAPTER TWO

LITERATURE REVIEW

2.0 INTRODUCTION

A literature review is a body of information that aims to review the critical points of current knowledge on a particular phenomenal. This section presents a critical analysis of documented evidence and ideas from other works that are relevant to the project, Cooper, H. (1998).

2.1 RELATED LITRATURE

2.1.1 Web map usability

According to Kraak (2001)., Web maps have become popular on the Web due to their convenience, low cost, and dynamic characteristics. However, due to limitations on resolution and display size, the usability of web maps depends heavily on the user interface design in addition to the map itself.

You, Chen, & Lee (2006) who conducted a study on map design, which investigated the usability factors in a wayfinding map. In the study, a simulated map and environment (a park) were used to test the participants' performance and satisfaction. Results of the research show that maps with a perspective view and figurative landmarks provided better usability and higher subjective satisfaction.

Chen, You, Liu, & Lin (2006) also conducted a pilot study on the search performance of operation interfaces. Significant difference was found between the two zoom modes. Based on these findings, this paper reports a further investigation on the part of operation interfaces. The operation interface consists of a set of objects that users can manipulate with a mouse or other input devices to activate map functions, such as zooming and panning, to control the map display in the frame. Interface designs and their use methods on a web map could be used for specific map operations. The methods of use include mouse manipulation, such as clicking and dragging. Although web maps work in web browsers with a graphic user interface, they are quite different

from general web pages or computer applications. The special functions required to manipulate maps make the interface complicated and difficult to learn. To make matters worse, web maps employ various interfaces, and therefore users must learn a different interface style with each web map. Without such difficulties, web maps would be much more popular nowadays.

2.1.2 Motivation theories

Siegel & White (1975) proposed, web maps are a useful tool to help people find target locations or proper routes and is a good aid to wayfinding problem-solving. Such, wayfinding knowledge is acquired through 3 stages: (a) landmark information: understanding of the key landmarks; (b) route among landmarks: landmarks as decision points; and (c) holistic spatial relationship: to form a cognitive map. As web maps are supposed to help people develop their wayfinding knowledge, interface designs should reinforce the use of web maps for better wayfinding performance and experience.

As Harrower & Sheesley (2005) wrote, although millions of map users pan and zoom every day, few studies have been done to understand how panning and zooming should be designed to improve the usability of web maps. They thereby proposed a conceptual framework for evaluating both functionality and efficiency of pan/zoom functions. The conclusion is that no single pan or zoom method is both highly capable and highly efficient. A pan/zoom design is better only for particular users and tasks.

The elements of usability proposed by Nelson (1993) were used as criteria of usability in this study. They are (a) efficiency, (b) learnability, (c) memorability, (d) error rate, and (e) satisfaction. When considering the web map interface for efficiency of use, Fitts' law can be used as a basic guideline for designing an interface to deal with time and distance factors. Fitts' law models the relationship between movement time, distance, and accuracy for people engaged in rapid aimed movements (Soukoreff & MacKenzie, 2004). It is a model of human movement, predicting the time required to rapidly move from a starting position to a final target area as a function of the distance to the target and the size of the target (Fitts, 1954). It can be applied both in the physical world and on computers.

According to Fitts' law, the movement will be faster when only a short distance is needed to manipulate the mouse to complete the operations of a function. Therefore, in theory, all controls should be put close to each other for efficiency. In a web map, for example, all pan buttons for different directions should be put together for quick pan operations. Similarly, zooming with original map center can be used again and again quickly, because it is not necessary to move the mouse. The design of a web map interface is a trade-off between efficiency and learnability. In the zoom/pan example, Fitts' law provides the fundamental understanding about the efficiency of layout and use of web map interfaces. Norman's principle of mapping and conceptual model is a good guideline for designing interfaces that are easier to learn and remember. However, the use of larger and more closely placed buttons cannot always prove to match natural mapping. In many applications, the principles end up conflicting with each other. The designers then need to find an appropriate solution for resolving the conflict.

In addition to improving the performance of operation on computer displays, web map interfaces should also help people develop wayfinding knowledge. Although spatial cognition operates differently in manipulable (small scale) space and in geographic (large scale) space, people can interact with GIS or maps as if the geographic space is manipulable (Mark, 1995). Wayfinding knowledge develops from small scale to large scale, and as much of the literature has noted, it develops from landmark to route between landmarks to holistic spatial relationship (Siegel & White, 1975). Following good design concepts, the conceptual model of operation should match the physical space users manipulate. The interface of web maps can provide a manipulable context or objects to use in developing wayfinding knowledge for larger spaces. For example, not only maps, but the interface itself, can be a manipulable miniature world for users to touch, drag, rotate, and open. The cognition of scale, distance, and direction may be acquired from computer displays as from geographic space.

2.1.3 Problems with using web maps

There are many new technologies and interfaces being applied to spatial information systems, such as web maps, but the basic foundation of interactive interface of spatial information systems is still not established, especially for beginners (Cartwright, Crampton, Gartner, Miller, Mitchell,

Siekierska, & Wood, 2001). Although the geographic information system (GIS) has been frequently taken as an example of direct manipulation in the field of human-computer interaction (Shneiderman, & Plaisant, 2005), no standards exist for map operation. Although web maps may be based upon the same technological structure, each web map service provider develops its own interface style. Consequently, an occasional user trying a web map usually would have to learn the map system's specific operation interface - such as the meanings of the icons, the layout arrangement, and the methods of function use. If the user switches to another map system, he/she would likely face an unfamiliar operation interface. Unlike the Microsoft Windows OS or compatible software, most web maps do not have a common graphical user interface (GUI), vocabulary, or syntax. For example, in the Windows OS, mouse operations, such as click, double click, and drag, are defined clearly (Microsoft, 1999). However, their extension to the operation of web maps is usually not guaranteed.

According to Van Elzakker (2001). A web map is a simplified GIS for non-expert end-users. The tasks that an end-user performs on a web map are usually simpler than those that an expert performs on a general GIS. He proposed modes of using web maps as: to explore, to analyze, to synthesize, and to present. However, most data processing, analyzing, and authoring functions are not available for web maps, because the main function of web maps is to present spatial information. Only some basic functions, such as zooming and panning, are available for users to browse the contents of such web maps.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

Methodology of the study will cover the investigation, analysis, designs, implementations, ıctivities, inter-tasks, methods to be used, developments and operational tasks in project. It will explain the processes involved by which the researcher will use to carry out research.

3.1 Area of research

The organization that was studied is Kampala International University, a government owned Hospital found in Kampala district (Uganda). This institute was chosen because its size has grown very fast and the manual system of allocating different personnel at campus that is currently used has become inefficient. The interactive web map zoom for allow the user zoom in and out , a pan which allow the user move the map all size to get a clearer view. The area cover by the map include campus buildings, facilities and compound.

3.2 Target population

The population that was studied includes: Staff: the Administrators, lecturers, cleaners, engineers were interviewed. A total of 30 students and 20 visitors also were interviewed. Information that was collected from them was how they measure the growth rate of the university, and their future expectations about the university.

3.3 Research design

The researchers used random sampling to select respondents from the students and visitors, however for the staff it was by virtue of the positions that they hold. In each of the departments, at least one respondent was taken and interview was the main data collection tool that was used.

30 students of the previously suggested 20 were interviewed. This was because at the time the research was conducted student were in examinations.

3.4 Data collection

Data was gathered from the sample given above. The major techniques were interviews with limited questionnaires and document review. The choice of the method depended on the information needed and the time available for the various respondents. For Staff, interviews were used exclusively, for Administrators, both interviews and document analysis were used, and for the rest of the respondents, questionnaires were used exclusively. Interviews were conducted one on one where as for those that used questionnaires, they were given one week to complete the documents. After the period of time, the researchers collected the documents that were later taken for analysis.

3.5 Research tools/instrument

The tools that were used to collect information are interview guide that accounted for 47%, questionnaire that accounted for 3.5, document analysis accounted for 20% where as observation that was used least accounted for 10% of the study.

3.5.1 Investigation

Here I looked at ways in which to acquire the information to be used in the design and implementation of my system. The following finding methods were used throughtout the scope of the project to accomplish the study objectives.

3.5.2 Interviews

These involve the physical talk between one or more people from the area of study. The researcher interviewed the stakeholders of the university including staff, students and visitors of the university to find out their views on the ongoing system and more so to get more

equirements. The method was chosen as one of the more useful method in getting first hand information about the system because it was a face to face interaction with the respondent. The following were noted: Staff- Administrators stated that when they want allocate someone to a certain office or building they find it hard doing the verbal directing and cleaners also find it hard distributing work amongst them selves verbally. Students especially new students find it hard to allocate facilities on campus since its so large and they have no way to start and the same applies to the visitors

3.5.3 Observation

I observed that when monitoring the status of the by which new students allocated to different facilities i.e. orientation which is tiresome and sometimes which is done within limited time. A visitor had to move person to person asking for direction to a particular office which made them tiresome to the extent that some had to give up and go back.

3.5.4 Questionnaire

Aggregate simple question were designed on a peace of paper and given to the selected staff members from different departments. These questions were answered privately and returned individually which also helped to visualized and imaged the whole skeletal representation of the system.

3.6 System analysis and design

System analysis and design is associated with all the aspects of software development activities. It covers the entire development process from planning all the way through implementation, maintenance and evolution. It has included all the actions used to produce the online monitoring system.

4.3.3 System maintenance

To keep the system functioning at an acceptable level, proper maintenance will be needed. The system is likely to need frequent updating in order to match with the changing environment of user requirements. Correct errors that were not discovered during testing and adopt evolution of the software and hardware platform it will be running on. All this shall be done in system maintenance.

4.4 Conversion strategies and security issues

Conversion strategies

The system is to be implemented by Kampala International University if it realizes funds. This will include conversion from the old system to the new system. The conversion strategies, which may be adopted, are:

i. Direct conversion. This will involve switching from the old system to the new system at once. This will be done the university through it marketing department by creating awareness of the availability of the Campus web map on the university website especially to the new applicants.

ii. Parallel conversion. This will involve running both the old and new system simultaneously while comparing the results and as time goes on, decisions shall be made on wheter to go on with this new system or remain using their old system. However, this shall be possible only if there is enough resources to run both the old and the new system.

CHAPTER FIVE

RESULTS, RECOMMENDATION AND CONCLUSION

5.0 Introduction

This chapter tends to assess and evaluate the system, summarizes the research in order to make the system meet the already set goals in a better way. This chapter alos explains the problems that were encountered when carrying out the research and gives the recommendation and conclusion of the research.

The following were achieved during the study;

- The researcher first identified the problem that existed and then proposed a new system, he then carried out a study of the current system using data collection techniques like interviews and reading the observation. The interview question used can be found from the appendix of this report.
- The research made an evolution of the existing system by studying the current of information.
- The weaknesses of the existing system were identified which the researcher analyzed and the requirements were determined that lead to the design of the new system.

5.1 Results;

- The system displays a map for the university campus.
- The users can magnify the map using the zoom function into to get a clearer look.
- The users can move the map in all directions especially if its in zoom mode using the pan function.

- It allows the administrators to update, and add details to the web page

5.2 Limitation

During the survey some problems were encountered and these include;-

The whole exercise was very expensive in terms of cost due to the fact that it involved transport to the site of study. The cost of printing and binding the report was also high.

Some people to whom the methods of collecting data was targeted could not give all the information that was required from them because some thought probably that it was a wastage of time to indulge and engage themselves with question while others were just stubborn and selfish

The exercise was bore some and monotonous to us, this was just because we visited the same place several times for the collection of data and information. This was due to the fact that the schedules that were made and given were intended to meet the stack holders individually and separately at a specific time intervals.

This was overcome by comprehensive and exhaustively meets those groups for a reasonable amount of time so that I try to minimize the frequency of meeting the particular groups for information.

There was also a problem of limited money to support me throughout the project hence hindering finishing everything in the required time. Some respondents for example the staff unwilling to answer as they took me for a spy.

5.3 Recommendation and future studies.

The system should be installed and implemented in parallel with the old system so as to minimize work flow interruptions and insures a smooth transition to reduce a erroneous work.

Users should be trained to use the system in order to yield optimal benefit out it.

5.4 Conclusion

This project interactive web based map is able to show all the in-lets and out-lets, facilities, and buildings of the campus. It has the ability to pan and zoom the web map the can be assessed on the university website. The success of the software has entirely been attributed to the interest and dedication of the researcher which preceded the reflected high levels of skills in the system, object and interface design methodology that have furnished the successfulness of the implementation and testing. In addition therefore, the system has progressively met the user requirements and to a greater extent solved university's existed problems, which included hardships in way finding, facility and building allocation.

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APPENDIX I

PROJECT PLAN AND SCHEDULE

A project is a sequence of unique and connected activities having one goal and purpose and that must be completed by a specific time, within a budget and according to specification. A plan will help us accomplish a number of tasks at specified periods of time.

TASK	DESCRIPTION	DURATION	
Investigation	Identification of problems and alternatives and possible solutions	1/3/2011	22/3/2011
Analysis	Problem definition and understanding of it using collected data	24/3/2011	12/4/2011
Design	Define and design inputs, outputs, processes, and controls	15/4/2011	30/4/2011
Development	Coding, testing and debugging, acquire software and hardware	2/5/2011	26/5/2011
Implementation	Covert hardware/software directly, phased, pilot or parallel	28/5/2011	5/6/2011
Maintenance	Audit system and evaluate system periodically	After every 2 months	

APPENDIX II

Budget

Item	**Cost (shs)**
a) Hardware requirements	
2.4G Hz Intel Pentium 4 computer with 512Mb of RAM.	500,000
17-inch LCD display.	300,000
A standard Logitech 3-button mouse.	10,000
Printer	100,000
Cabinet	200,000
UPS	150,000
UTL Modem	200,000
b) Software requirements	
Windows XP and higher versions of OS	150,000
c) Other expenses	
Printing	120,000
Typing	100,000
Transport	300,000
Binding	10,000
Photocopying	30,000

APPENDIX III

QUESTIONAIRES

Interview questions

A: Non-staff members.

1. Do you find any difficulties in finding your way around campus?

.....

.....

2. What are some of those difficulties?

.....

.....

3. What do you think can be done to solve those problems?

.....

.....

B. Staff

1. What system do you use to allocate different personnel to different facilities?

.....

.....

2. What problems do you find in such a system?

.....

.....

3. How best do you hope to solve those problems?

.....

.....

4. If a system was to be built what capabilities would you like it to accommodate?

.....

.....