Andrea Theu *et al*, International Journal of Computer Science and Mobile Applications,
Vol.4 Issue. 11, November- 2016, pg. 1-12 **ISSN: 2321-8363**
Impact Factor: 4.123

A Real Time, Dynamic and Extensible Information Map for Lusaka City

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Abstract: Modern technologies have made it possible for amateur news applications and related journalistic applications (blogs, social networks, collaborative publishing) to capture news faster and in larger amounts than any other news systems. These technologies (e.g. smart phones) can take pictures, record audios and videos and have access to the internet. However location of specific and desired news items from this large amount of news is very difficult. Poor organization of this information results in a limiting rather than an improvement of the news application. The project attempts to alleviate this problem by organizing the news around a map with the help of a mapping service. Therefore the application created is an integration of an amateur news application with a web mapping service. The geographical dimension added to the application by the mapping system will improve the capture of proximal and timely news and will improve searching. Also in order to aid news discovery, the application has a recommender system where users can get recommendations about news items which might be of interest to them.

Keywords: Amateur News, Citizen Journalism, Lusaka City, gatekeepers.

1. Introduction

Modern technologies have made it possible for amateur news applications and related journalistic applications (blogs, social networks, collaborative publishing) to capture news faster and in larger amounts than any other news systems. However location of specific and desired news items from this large amount of news is very difficult. Poor organization of this information results in a limiting rather than an improvement of the news application. The project attempts to alleviate this problem by organizing the news around a map with the help of a mapping service. The geographical dimension added to the application by the mapping system improves the capture of proximal and timely news and improves searching.

1.1. Motivation and Significance

News consumption and production has not yet taken advantage of the full potential of the technologies available. Numerous technologies (e.g. smart phones) can take pictures, record audios and videos and have access to the internet. Let's say a newsworthy event occurs and Mr. A takes footage of it. Applications such as Facebook or Twitter only allow sharing information to the people Mr. A is connected to like friends on Facebook or followers on Twitter. If Mr. A desires to share that with the general public how can he do that effectively?

An application whose goal is to answer the previous question is needed. Every strategy employed to solve the problem will have its own strengths and weakness. Traditional news applications are good at sharing news that is relevant to a large section of the population with a high accuracy. They fail at disseminating news relevant to a few individuals and have been beaten in the time it takes to report the events by apps such Facebook and Twitter

The project's strategy is to organize news around a map with the help of a mapping service (i.e. Google maps).The strength of the strategy is that the geographical dimension added to the application by the mapping system will improve the capture and searching of proximal[1] (a geographical location relevant to the individual, for example the home location) and timely news.

1.2. Scope

Lusaka city is the geographical region that is focused on .In this area, local news will be presented according to where it has happened or a relevant location. There will be a facility for users to comment on the news items and therefore interact with one another concerning the news items. Users will have facilities to search for items according to their geographical context, time and other attributes of the items with the results presented on the map. Authorized users will be allowed to update information and put new items on the map.

There will be a facility that recommends news to the user. This is done to increase the applications ability to deliver the content that the each individual user is likely to be interested in. These recommendations are based on the user's history, geographical location and other relevant information (Manolopoulos Y., Symeonidis P., Papadimitriou A., 2011). Lastly users will have a facility to obtain navigation directions to places and news locations that interest them.

1.3. Problem Statement

Modern technologies have made it possible for amateur news applications and related journalistic applications (blogs, social networks) to capture news faster and in larger amounts than any other news systems. However location of specific and desired news items from this large amount of news is very difficult. Poor organization of this information results in a limiting rather than an improvement of the news application.

1.3.1. Research Question

Can combining an amateur news application with a web mapping service produce a news system for Lusaka city that improves the capture of proximal and timely news and improves searching?

1.3.2. Hypothesis

Amateur news applications using modern technologies can capture timely news while presenting the news on a mapping service can improve searching and access to proximal news.

1.4. Aim and Objectives

1.4.1. Aim

To create and evaluate a combination of an amateur news application with a web mapping service.

1.4.2. Objectives

1. Review relevant applications.

Activities: Read literature on map based applications and news applications. Use websites for selected applications and also their applications on mobile phone (android devices).

Deliverables: Section of the report

2. Develop the Functional specification.

Activities: Interview potential system users. Analyze requirements. Develop specification

Deliverables: Functional specification

3. Design and implement the system.

Activities: Create a system design. Implement the design.

Deliverables: Use case diagrams, Class diagrams, Sequence diagrams, State diagrams, data model, and then the complete system (the web based application and the mobile application)

4. Test and evaluate the system

Activities: testing of application by users. Analyze test results .Review of project processes and product.

Deliverables: section of the report

5. Complete final report.

Activities: prepare final report

Deliverables: Final project report

1.5. Organization

This document is organized into 5 sections. The current section makes the introductory section. It gives the necessary groundwork for the direction of this thesis.

Section 2 is the literature review and related works. Review on relevant technologies is done and 3 similar products to the one created are reviewed.

Section 3 is the Methodology. It contains the software artefacts that are created in the process of structured software engineering. These are the requirements, Design and the implementation

Section 4 is the Testing and Results. A description of the testing strategies employed and the results obtained is given.

Section 5 is the Discussion and Conclusion. The results obtained are analyzed and they are further related to the aims and objectives in this section then references and a brief author biographyfollows.

2. Literature Review and Related Works

2.1. Literature Review

Citizen journalism is when public citizens play an active role in the process of collecting, reporting, analyzing, and disseminating news and information (Bowman, Willis C., 2003). The potential of citizen journalism (i.e. amateur news) has been extensively researched and confirmed (Stuart A., 2007). Social networking used together with cellular phones has already proven that this concept is very powerful (Krajicek D.J., 2012). Furthermore the concept of citizen journalism has been fully realized in South Korea where all OhMyNews is the leading online local news site. Its motto is "every citizen is a reporter". Citizen journalism also follows the general web trend of the transition from information consumption to applications that support user participation in content creation (O'Reilly T., 2005). That is consumers become prosumers (i.e. also produce) (Fisher F., 2009).

The amateur news systems discussed above can produce very large amounts of news. However organization and searching of this data becomes a difficult task. How does one find specific and desired news items from this large repository? Traditional media (BBC, CNN) employ gatekeepers to as a solution to this problem (Bruns A., 2009). Of the large amount of news gathered gatekeepers select what will be presented and what will not be presented and thus stream down the news to an appropriate size. This approach has its advantages and disadvantages (Roberts C., 2005). One of the disadvantages that few people decided what millions want to read or hear about.

When gatekeepers are absent individual consumers will need to browse through this large amount of content (Shoemaker P., Johnson P., 2010). A range of approaches, algorithms and techniques have been suggested from simple ones to very complex ones (Rennison E., 1994), (Hangzai L., 2007), (Ozkan D., Duygulu P., 2006). This project proposes a relatively simple approach. The approach is to arrange news on a map by location using a modern geographical mapping system (Google maps). This will improve the capture and searching of timely and proximal news.

Geographical mapping systems have been extensively used to organize and visualize data (Roth R.E., Ross K. S., 2009). They have been used in "playful" systems to very critical applications (Heyman M., Sheesley D., 2008), (Mcconchie A. L., 2008)]. Google maps are one such mapping system. In addition to maps and route planning it also offers a business locator (MILLER, C. C., 2006). There are over 2000 map mashups that use Google maps (Pietroniro E., Fichter D., 2007). The famous pioneer (Wong J., Hong J., 2008) of mashups is HousingMaps which advertises houses by location in the U.S.A. (Google, 2005). Zhappening (Venivi, 2015) and Foursquare (Crowley D., Selvadurai N., 2008) are such types of applications but they focus on the "playful" check in and where you can find desired goods and services.

The proposed system can be divided into two parts. These are the web mapping service and the data to be overlaid on the maps. Many web mapping services exist. However few contain appreciable information about developing countries (i.e. Zambia). Open Street Maps is a good option as a mapping service since it is open source and has few restrictions. However it is not detailed for the Zambian region. Consequently, Google maps were chosen. Google maps now have their JavaScript Map API version 3 for the web (browser) (Google, 2016). It also has android map API version 2 for mobile devices running the android OS (phones and tablets) (Google, 2016). It places some restrictions on the free use of both APIs mentioned above.

The data to be overlaid on the maps comes from the users on PC browsers and mobile phones. All major browsers support the technology requirements of the system to be developed. They all support JavaScript and AJAX which is what Google maps API version 3 uses. The mobile operating system to be used is the Android OS (Google, 2016). Any version above 2.2 will suffice. Its advantages are that it is an open source OS. It is platform independent and many manufacturers support it (Cashmore P., 2005).. It is also very easy to distribute applications on it in comparison with other mobile operating systems. It also has a freely available Android Development kit.

Consequently the project builds the proposed system using the technologies which have been discussed above. It integrates together a citizen journalist application with Google maps creating a whole new experience.

2.2. Related Works

2.2.1. Foursquare

Foursquare is a global location-based social networking website for mobile devices, such as smartphones. Users "check in" at venues using a mobile website, text messaging or a device-specific application by selecting from a list of venues the application locates nearby. Location is based on GPS hardware in the mobile device or network location provided by the application. Each check-in awards the user points and sometimes badges. Using this information the application can make recommendations about which places a particular user should visit. The check in system allows the owner of a venue (e.g. shop owner) to make personal deals (e.g. discount on a price) with a particular user. A snapshot of Foursquare on figure 1.

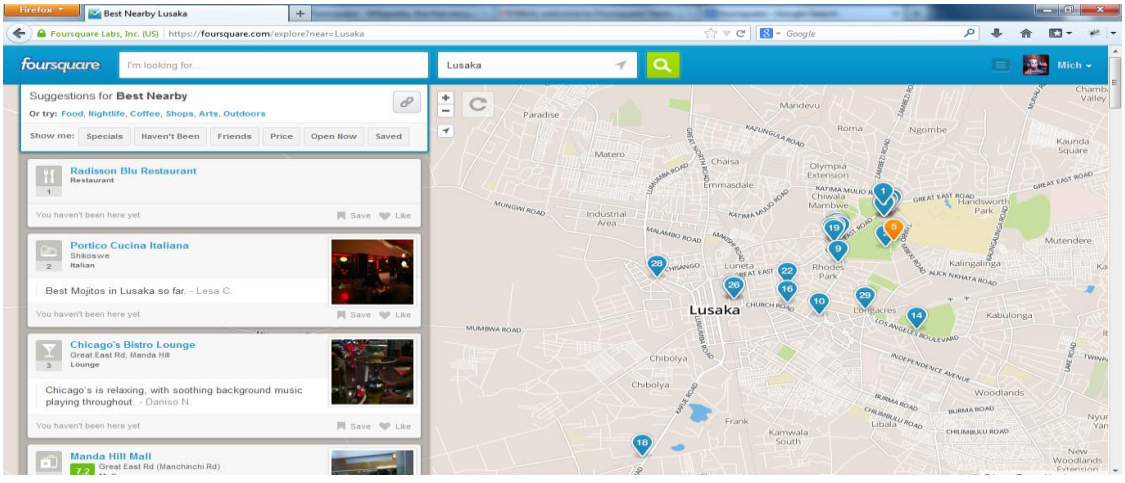

Figure 1: Foursquare

2.2.2. Zaplaces

Zaplaces aims to improve the discovery of businesses. In their own words "At Zaplaces we seek to help people discover places as well as to provide businesses with a web presence."(Venivi, 2015). It currently focuses on Lusaka in Zambia but it has officially indicated that the expansion is to include Africa as well. It is run by Venivi limited that is a startup in Lusaka. A snapshot of Zaplaces on figure 2.

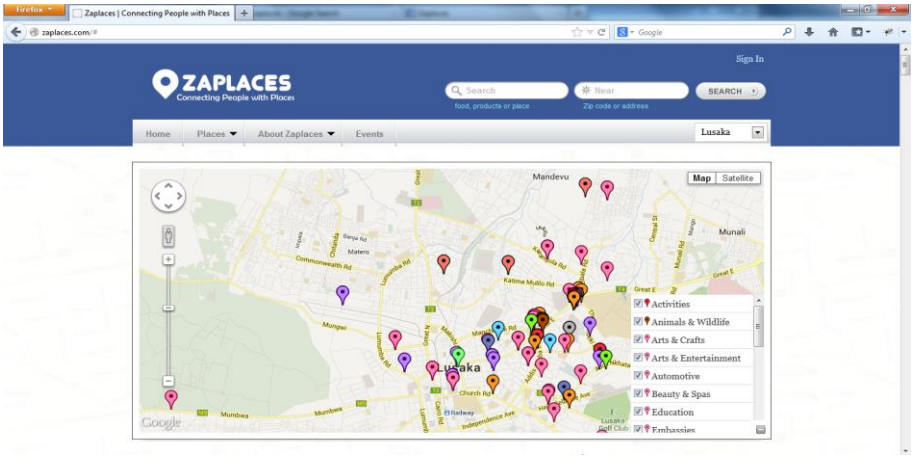

Figure 2: Zaplaces

2.2.3. Zhappening

It is for all the activities and events on your smartphone. It is a mobile social network for events and happenings in Zambia. If we interpret happenings and events to be "news" then zhappenning is very similar to this project. However differences remain. The project has a search component, recommendation component and navigation component. Zhappening does not have these at this point in time. Zhappening has a wall and other components that are not included in this project. There are more differences. However, Zhappening is still in its early stages and is expected to change as it grows. Therefore the facts stated above may soon become invalid. It is run by Venivi limited that is a startup in Lusaka. A snapshot of Zaplaces on figure 3 and figure 4.

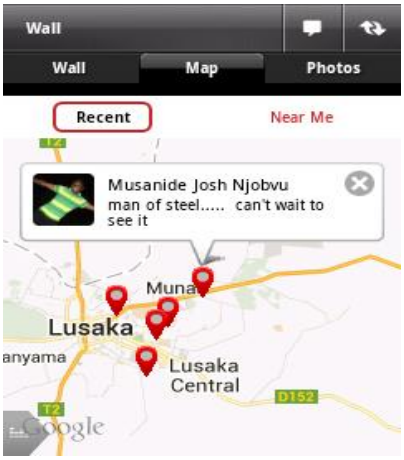

Figure 3: Zaplaces

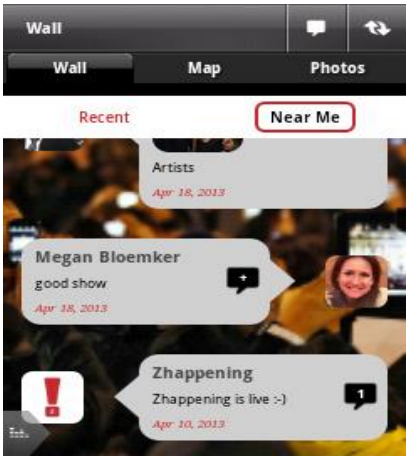

Figure 4: Zaplaces

3. METHODOLOGY

Good software engineering of complex projects requires the use of scientifically sound software Engineering Methodology. This section contains those methodologies that were employed in this project and also includes some of the artifacts that were produced as a result of those processes.

3.1. System Requirements

1. The system must allow registered users to input news items on the map on both the website and the android application
2. The system must allow users (both registered and unregistered) to view the news items that have been previously input on the map. This is both for the website and the android application
3. The system must allow users (both registered and unregistered) to search for specific news items or groups of related news items using the provided search functionality. The results should be displayed on the map. This is both for the website and the android application
4. The system must recommend news items to users (both registered and unregistered) .The results should be displayed on the map. The recommendations should be more personalized for registered users. This is both for the website and the android application
5. The system must allow users (both registered and unregistered) to get navigation directions to locations where news items have been posted .The resultant navigation should be displayed on the map. This is both for the website and the android application
6. The system must allow registered users to comment and interact over the items posted on the map. This is both for the website and the android application
7. The system must be easy to use and not require a steep learning curve.

3.2. System Design

The System is designed in a client server paradigm that is common for web applications. The Object-based architectural style is used for the general component design.The overview of the software architecture is shown in figure 5.

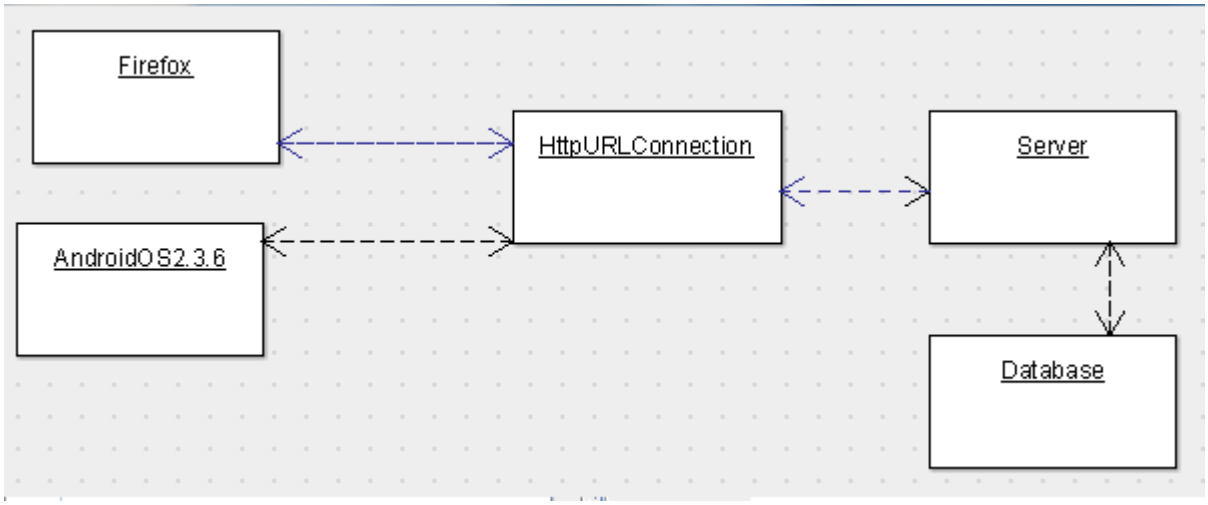

Figure 5: Software architecture

Firefox stands for a standard browser and the minimum required android operating system is also shown as version 2.3.6. The hardware deployment scheme is shown in Figure 6

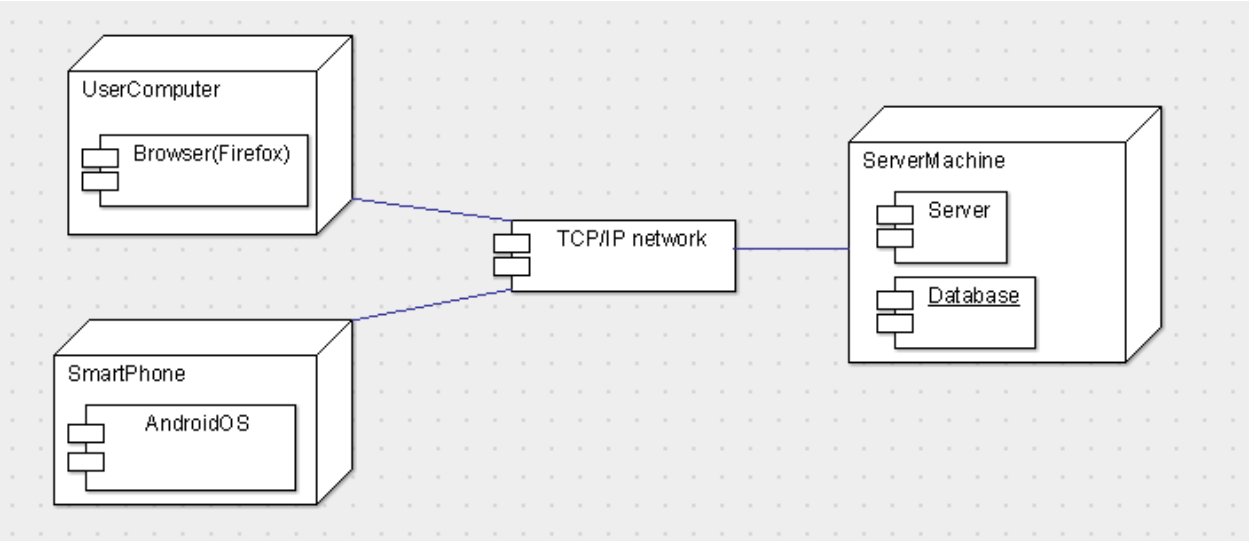

Figure 6: Hardware

So here we need at least 3 different machines for this configuration to work. The smart phone, user(client) machine all connnect to the server machine over a TCP/IP network. The minimum requirements of the individual machines is provided later. The data model is shown in Figure 7.

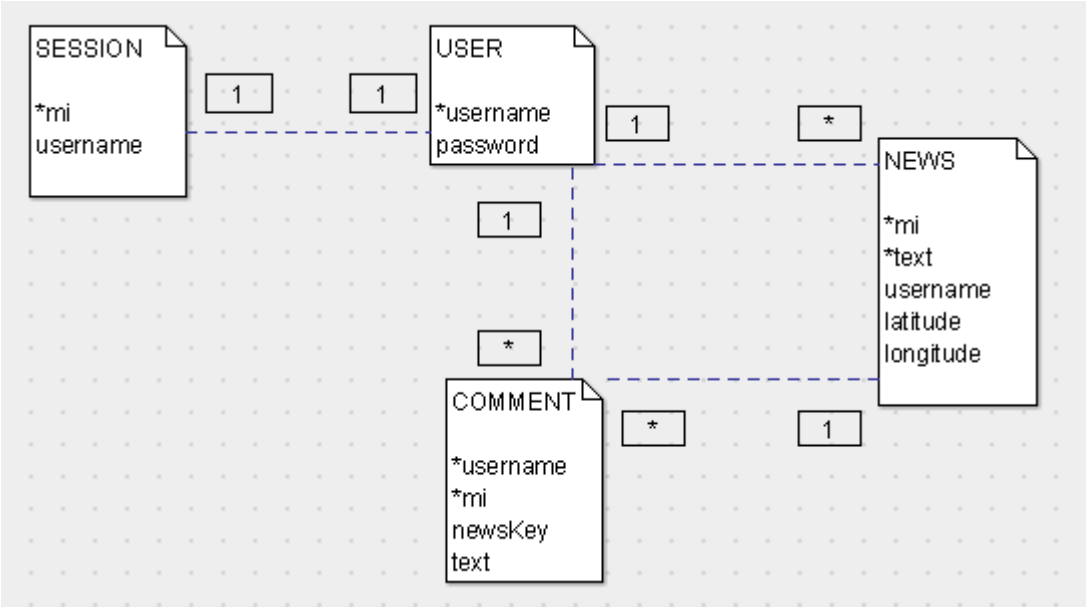

Figure 7: Data model

The small boxes beside the rectangles represent the multiplicities of relationships. The "*mi" implies that this should be unique key such that it can be a primary key or at least an alternate key. Explanation of the obscure data item is as follows

mi – a unique value for use in identification(preceded by *)

longitude – the longitudinal location of a news item on the map

latitude – the latitudinal location of a news item on the map

4. Testing and Results

Screen shots of the implemented system are given below. It is a technical fulfilment of the given system requirements, aims and objectives of this project. The website component is shown in figure 8.

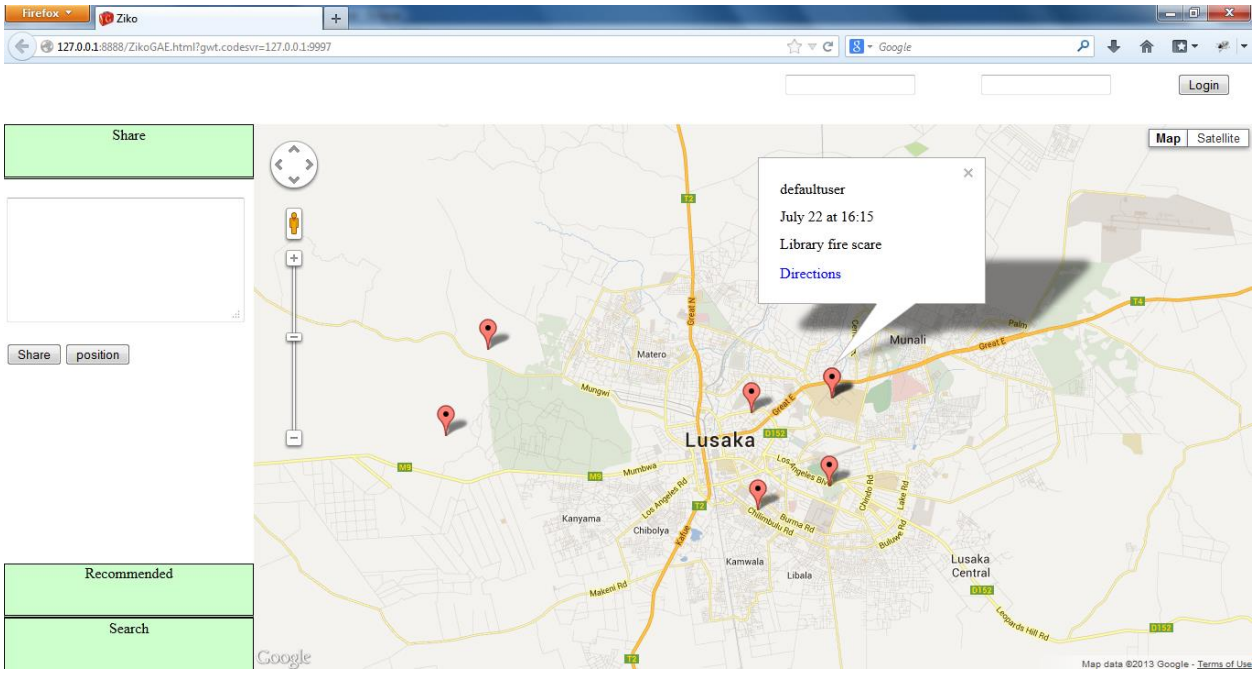

Figure 8: Website component

Here we show an example news item that was posted by a "default user". We have the share section that is used to input news items. The recommended section is used to give recommendations. The search section is used to search for news items using the given text input. The android screenshots are shown in figures 9 and 10.

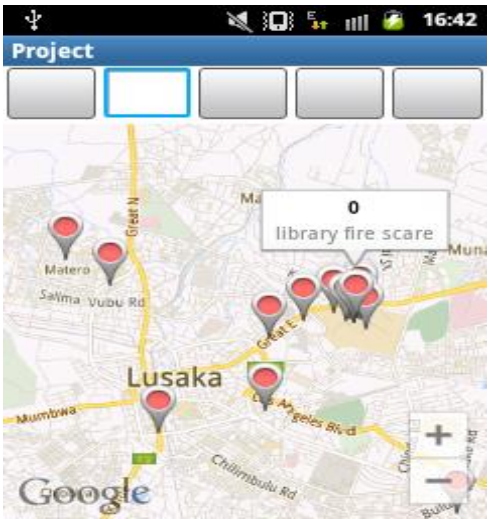

Figure 9: Android screenshots

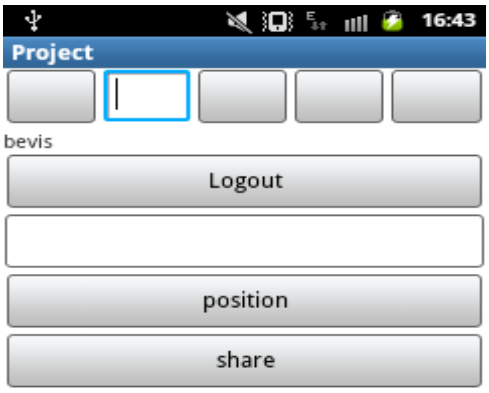

Figure 10: Android screenshots

Here we show an example news item that was posted on figure 9. It is the same item as in the above website component. The section used to search for news items is that small section above in figure 9. Figure 10 shows the section that is used to input news items and to login and logout.

5. Discussion and Conclusion

These are the methodologies that were employed and some of the artefacts that were produced as a product of those processes. The system was well implemented and all the objectives were achieved. Future works will involve the inclusion of videos and photos.

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A Brief Author Biography

Andirea Theu - am a Lecturer and a Researcher. I have both Bachelors and Masters in Information Systems and Technology. I have been lecturing both undergraduate and postgraduate students for five (5) years now. I have supervised eight (10) final year projects. I am teaching both undergraduate and postgraduate courses such as Database, Operating system, Computer Architecture, Computer graphics, Programming Languages Design and Implementation, Human Computer Interaction, Computer Networks and Information Security. My thesis at master's level was third best in the Department and I was awarded a certificate of achievement. My research interests are Mobile Computing, Information Security, Computer Networks, Computer graphics and Human Computer Interaction. I have done a number of consultations with different companies. I believe that there is nothing impossible in life and I have always wanted to develop something new in life. I really want to contribute new knowledge to the scientific world.

Martin C. Phiri - Russian educated from 2001 to 2007 at Vladimir State University. I have a master's degree in information systems and a bachelor degree in computer science. My research interests are databases and information systems particularly data mining. I also have interests in robotics using EV3.

