ONLINE VOTING USING BLUETOOTH ENABLED MOBILE PHONE

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Abstract

In the ever changing world of computing in mobile, traditional ways of doing survey has been greatly overtaken by mobile voting. Traditional methods of carrying out surveys is tedious and time consuming ,while mobile voting emerges as a new and exciting form of getting feedback effectively and efficiently. Mobile voting can be done by the use of wireless technologies. Thisstudy examines the application of an interactive voting system with mobile. The system uses the Bluetooth technology to cast votes from bluetooth enabled mobile phones and display instant results of votes graphically. The case study stresses on the motivation for this type of paperless, pollution free system which conforms to the "Mauritius Ile Durable" project. It also describes the design framework of the system and the main functionalities that were implemented. The case study also highlights the different stages throughout the development process, starting from the design, and implementation until the testing of the system. It focuses on important issues in order to provide a secure, high performance and easy to use system. The study ends with an evaluation of the practical implementation of this type of system.

1. INTRODUCTION

The popularity of the mobile voting technology is increasing worldwide, however it is relatively unfamiliar in the public. Government has invested massively in the ICT sector over the past few years. The Government's vision was to make ICT as the fifth pillar of the economy and transform Government into a regional hub. Nowadays almost every one owns and using a mobile phone. Thus with the increase in mobile phones, the probability to reach people through their mobile phones is higher. In this study, the focus is to provide Government a system where they can voice out their opinions about governmentrelated issues. This can be done by allowing the public to participate in voting using their mobile phones. The rationale behind is to sever ties with the paper and pencil voting and at the same time provide accurate, rich and faster information for deeper insight which was not feasible with the traditional methods. Several studies have been done on this type of voting systems.

2. SYSTEM ARCHITECTURE

According to research done, Nick Day (Nick Day, 2010) proposed a system for users to vote using their mobile phones. The system architecture consisted of:

Mobile client application Server application Database back-end and web-based administration tool Graphical front-end Based on this proposed architecture and recommendations given, the interactive Bluetooth public voting system was modeled. Modeling of the system required several design considerations in term of:

Performance:

Mobile phones have limited resources such asmemory, processing power and screen size. The mobile client would therefore be a light-weight application

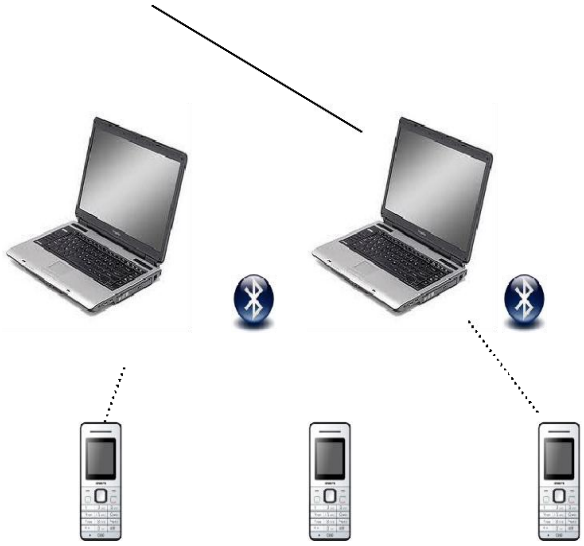
Access Points: The Government covers a very large area and it was important to make use of access points where peoples can connect to the server and download the questions. Bluetooth-enabled devices (laptops) were chosen to act as access points which were all connected to a LAN.

Throughput: Bluetooth-enabled devices can only accept seven connections at a time, adequate number of access points have to be provided to accommodate for a maximum number of peoples.

Security: Wireless signal could be intercepted and therefore, encryption mechanisms were considered for the Bluetooth communication.

Web Administration site 1

Data Server



The architecture of the proposed system consists of the web server, database server, web administration site, access points and mobile client application. The web server is connected to the database server and it hosts the web administration site. Through the web administration site, survey questions are created and stored into the database. Public use their mobile phones to connect to the web server. Through the web Administration site, they can download the survey questions from the database. Connection is done using Bluetooth and Access Points are placed at various locations on the campus to allow students to connect anywhere on the campus using the Bluetooth. The access points are connected to the wired LAN of the campus. Laptops act as Access Points in various locations and all transactions done by students on their mobile are sent to the web server and recorded on the database.

3. IMPLEMENTATION AND TESTING

The mobile phone application was developed on Java ME platform which allowed the application to run on all java enabled phones. For the development of the web administration site EasyPHP was used which include the scripting language PHP, the web server Apache, and the SQL server MySQL. The server application was developed using Java SE platform. It will be run on different Bluetooth enabled laptops connected to a LAN which will act as access points to retrieve the votes of student. The Graphical Front End has been developed using PHP and will display dynamic information in the form of a bar chart. The system was implemented as four different modules:

The web administration site: The web administration site will be used to manage groups and questions.

The server application: The server applicationwill only be seen by the main user and system administrators. It outputs a

log of all the events happening with the date and time stamp to each activity.

The client application: To perform the voting. The graphical front end: To display the results.

The Universal Unique Identifier (UUID) was used to uniquely identify a service which is provided by the server. The url begins with btspp://localhost: , which is required if a Bluetooth serial port profile is used (Oracle–Base, 2011). Encryption is set to true in order to send data securely. The local device class will provide access to and control of the local Bluetooth device. The discovery agent class provides method to set the local device into a discoverable mode.

The GIAC mode was used which stands for General/Unlimited Inquiry Access Code (GIAC).

Since the Java SE does not have any JSR 82 (Java Api for Bluetooth), it is important to import a JSR 82 library in order to develop the Bluetooth server. Bluecove which is an open source java library for Bluetooth has been used to develop the server application (Bluecove, 2011). Since the system will be running on different PCs, Easyphp need to be configured to allow remote access to the central server.The system was tested in UOM with thirty students. The client application was sent manually to all students via Bluetooth. Two laptops were connected to a secure network, one running the apache server and the other one running the Bluetooth server. It is not necessary that the laptops should run only the one application. Both the web administration site and the Bluetooth server can be run on a single laptop.

The system was tested for concurrency in order to allow both system administrators and people to use the system at the same time. In the first scenario, two laptops were connected to a LAN. Performance testing was carried out in order to determine the speed of the system. In this phase the time taken to perform a particular operation is considered. Four servers were run and four people used their mobile phones trying to establish a connection to the server

It can be deduced that when the client mobile is near to the server it will take less time to search for the server. This is apparently true for any communication technology and the results matched our expectations. However, we also observed that with the increase in distance together with the increase in the number of client applications, the total time taken to search and download questions were increased by an average of 3 seconds. With the same number of questions, the time taken to download them was constant irrespective of the distance between the client and the server. The only variable that caused the increase in the time taken was the time to search the questions. This could be explained by the fact that additional time is required for the client to discover the server before the connection is established.

Based on the results obtained, the limitations of the system are as follows:

It can be forecasted that approximately 55seconds will be taken if a total of 7 clients are connecting to the server simultaneously. The total time taken to search and download questions is higher when the number of client applications keeps on increasing

A stress testing was also performed to know how many connections can take place at the same time. Based on tests performed, up to four client applications were able to connect to each server. However, when the fifth one was trying to establish a connection to a server, a message was displayed on the client application saying that the server cannot be found. Ten mobiles phones were used and the result was the same for the other client devices trying to establish a connection after four connections have been made.

Additional tests need to be performed in order to determine the parameters which could be fine-tuned to optimise the system.

4. EVALUATION

The objective of the system was to build an integrated system capable of sending questions to mobile phones, receiving votes from mobile phones, manipulating the received data and outputting it to users in a graphical form.

5. CONCLUSION

The proposed system offers an integrated package where questions can be added by system administrators, voted by the students and real time results are displayed in a graphical format.

The main drawback of the system is that one server can accept only one connection at a time. This is so because the RFCOMM protocol can only accept one session at a time. The Bluetooth stack blocks the connection when a client is connected and can only accept another connection when the client application is closed. Several servers should be run manually to cater for other incoming communications. This step of running several servers is quite cumbersome.

The client application was distributed individually to peoples when testing was performed. It was found that to be very time consuming to send each person the application. WAP could have been considered as a method for distribution of the application (WAP,2000). However a large majority of people do not have WAP support in their mobile phones according to evaluation result obtained.

6. REFERENCES

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