

FINAL YEAR PROJECT PROPOSAL

Public Voting System

Nick Day

n.day@lancaster.ac.uk

Supervisor: Dr Corina Sas

ABSTRACT

This report presents a proposal for a public voting system to be developed as part of the e-Campus project. This is an important area for development because the opinions of students are pivotal to the future of the university, and such a system can increase awareness of important matters. The aim of this project is to develop an interactive voting system with which users can participate using their mobile phone. The project will involve three phases: the development of a graphical front-end to the voting system; the development of a method of interaction with mobile phones, and the development of a web-based administration tool. The results from the proposed project will be an integrated system capable of receiving input from mobile phones, manipulating the received data and outputting it to users in a graphical form via plasma screens located around the university campus.

1. INTRODUCTION

A critical factor in running a university is that the needs and wants of students are catered for. Collecting the opinions of a such a large number of people is not an easy task. A new form of data collection needs to be developed in which large numbers of students can air their views on a range of matters of interest to the university.

"Campus is a place cut-off from the rest of the world... Students are disinterested and often blatantly unaware of what's going on around them..."

~ Graduate Student [1]

The rationale behind this work is to increase students interest in events happening around them – whether this be in the scope of a campus environment, the UK or worldwide – and in maintaining this interest to result in increased awareness of the “outside world”. The proposed system would accomplish this by publicising a range of events, while also asking for the opinions of students on these matters.

Over 75% of adults and 90% of young people currently own a mobile phone [2] and they are an essential part of student life. As they are so common they make an ideal medium for communication with a public voting system.

The proposed system will provide an attractive graphical front-end which acts as the main point of interaction with users and will be distributed on plasma screen located around campus. Users will be able to interact with the screen using their mobile phone. The topics on which users can vote can be edited by the student union using a web-based administration tool.

The system will be called *UniVote* and the URL *www.univote.co.uk* will be used to access any online elements of the project.

This report contains a further four sections. Section 2 gives further background information on technical aspects and structure of the system. Section 3 discusses development of the each stage of project and how such a system would be tested. Section 4 details the tasks required to complete the project, and a timescale to complete them in. Section 5 specifies the hardware and software resources required by this project. The final section lists the references used while writing this report.

2. BACKGROUND

This section evaluates methods of mobile-to-computer communication and discusses how they could be integrated in this project.

There are several possible ways that a mobile phone could be utilised: SMS (text messages), MMS (multimedia messages), WAP (wireless application protocol) and via a Bluetooth connection. As the target users of this system are students, cost is a major factor in deciding which system to use. All of the above communication methods are chargeable by mobile service providers, except Bluetooth.

Bluetooth is a wireless communication protocol with a client-server architecture. The device initiating the connection is the client, in this case the users' mobile phone; the server is the device receiving the connection, in this case the computer driving the plasma screen.

Unlike infrared, which is a point-to-point communication protocol, Bluetooth transmits and receives signals omni directionally, so line-of-sight between the client and server devices is not required. Bluetooth operates at a frequency band of 2.4 GHz, has a range of 30 feet and a data rate of 1 Mb/s. It is possible to implement Bluetooth as a multipoint communication medium, to allow multiple clients to simultaneously connect to a single server device. [3]

Bluetooth also integrates with Java for the development of wireless applications and is therefore the ideal communications protocol for this project.

3. THE PROPOSED PROJECT

The aim of this project is to develop an interactive voting system with which users can participate using their mobile phone.

The system shall be made up of the following four components:

1. Mobile client application
2. Server application
3. Database back-end and web-based administration tool
4. Graphical front-end

The system architecture is depicted in figure 1.



FIGURE 1 - SYSTEM ARCHITECTURE

3.1. Mobile client application

This will be written in J2ME and will have to be installed on compatible Java and Bluetooth-enabled mobile phones before they can take part in voting. It shall be compatible with as wide a range of phones as possible, with a variety of screen resolutions.

The easiest and most convenient way to distribute the application is OTA (over-the-air) via a WAP site. Although this also requires a WAP-capable mobile phone for installation, any

phone which is capable of running the application (i.e. is Java and Bluetooth-enabled) is highly likely to also have a WAP browser. The ideal solution to application distribution would be an SMS-gateway – the user could text GO to a specified number and receive a direct link (known as a ‘WAP push’) to download the software – however this introduces costs and complications which are beyond the scope of this project.

To install the application the user will have to point their phones WAP browser to *www.univote.co.uk*. They will be presented with a WAP page with a link to download the application, which will then be automatically installed on their phone and available through the “Applications” menu item (or equivalent).

The application itself will consist of a brief splash screen which is shown on startup, while the application attempts to connect to the Bluetooth connection managed by the server application. The user can only continue using the application if a server device is found in range of the mobile phone. Once the user is connected to the server, they are presented with a list of active questions to vote on. Brief instructions are also provided for new users.

3.2. Server application

The J2SE based server application acts as a ‘bridge’ between the other three components of the project. It ‘listens’ for incoming Bluetooth connections from mobile clients, and ‘serves’ a list of questions and possible votes to appear in the mobile client application. The list of questions and votes are retrieved from the database back-end at regular intervals, and updated when a new vote is cast. The application will also provide a status log of the actions taking place.

The server application will periodically parse data from a BBC News RSS feed, and save the results into the database back-end. This is used by the graphical front-end.

Each mobile phone that communicates with the server has its own unique address. This can be used to the projects advantage – it can prevent multiple votes on the same question by the same mobile phone, and a record of the number of votes cast by any mobile phone can be stored. This brings the possibility of the student union using this data to their advantage, perhaps introducing some sort of reward scheme for users who vote frequently, to act as an incentive for participation.

3.3. Database back-end and web-based administration tool

The database is powered by MySQL and is stored remotely on an Apache server at *www.univote.co.uk*. Storing the database remotely allows it to be updated online via a web-based interface, without physical access to the machine running the server application. This is an obvious advantage in a practical sense, especially if multiple machines are deployed around campus. The web-based administration tool will be written in PHP and will provide simple manipulation of the database to add, edit or delete questions.

3.4. Graphical front-end

This provides an eye-catching interface to attract users interest to the system, and will be developed using Macromedia Director.

A possible candidate for a design layout is shown in figure 2.

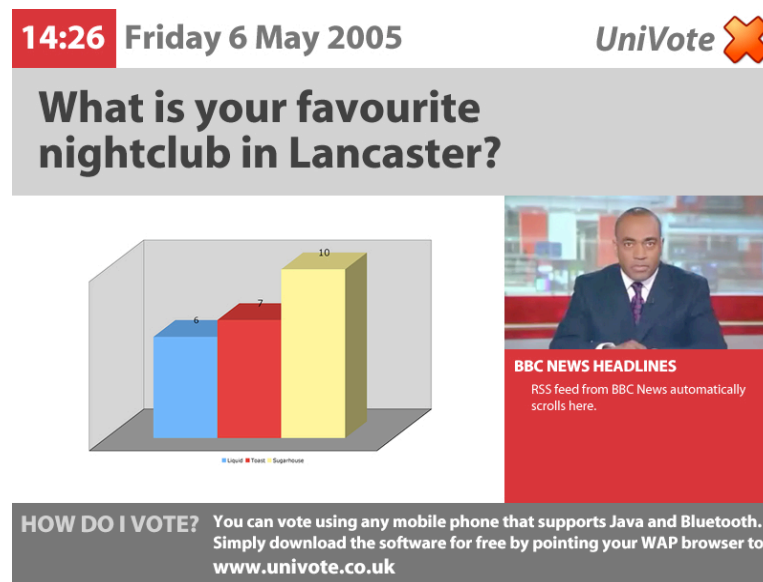


FIGURE 2 - SAMPLE LAYOUT

Director is an application used for creating multimedia presentations/applications in kiosk-oriented environment. [3] It allows a great level of customisation in layout, animation and multimedia content – a level of which isn't available in the Java Swing environment.

The front-end will rotate between active questions retrieved from the database back-end, which will update at regular intervals. A graph will show the current outcome of the voting. To keep users interested in interacting with the system, multimedia content will be provided in the form of RealVideo news feeds from BBC News, and scrolling news headlines, which are retrieved from the database back-end at periodic intervals.

Although the front-end could also be developed in Java, as part of the server application, this doesn't provide much flexibility in the layout of the design, or any possibility of animation or streaming video.

There is little point in developing an interactive voting system which is dull and uninformative, because many users will choose not to respond to it. The system has to come across as enjoyable and exciting to use – this is part of designing for fun. [5] This is something which Director can help me accomplish with the use of animation, video content and an attractive design.

3.5. Testing

Before the system is distributed campus-wide as part of the e-Campus project, it will have to be thoroughly tested.

The mobile client application shall be tested on a wide variety of mobile phones, preferably with a range of screen resolutions to ensure that all required information is easily visible on the screen.

Testing will need to be carried out in erroneous conditions, e.g. the mobile phone is not in range of a server, the database back-end is unavailable or there are no questions stored in the database.

4. PROGRAMME OF WORK

My work through this project can be broken up into the following sections, which is depicted in figure 3.

4.1. Experimentation

This involves testing the devices that are going to be used in the project, determining what they are capable of, and developing simple applications to pass messages between devices. Various technologies will need to be studied, including J2ME development, Bluetooth communication, and Director integration with a MySQL database. Decide the best way forward through the project.

4.2. Design

Create mock-up designs of both mobile and server applications. Decide on a design layout for the front-end.

4.3. Development

Development of the mobile and server applications, front-end, database and web-based administration tool to the testing stages. Carry out testing myself during development.

4.4. Testing

Test complete system on a small range of users to identify any final bugs. Interview users to gain their evaluation of the system.

4.5. Real-World Testing

Testing of the complete system in a real-world environment to users with no prior knowledge of how the system works.

4.6. Final Report

Write final report on the development of the system, and complete documentation on the website.

Task/Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Experimentation																				
Design																				
Development																				
Testing																				
Real-World Testing																				
Final Report																				

FIGURE 3 - GANTT CHART

5. RESOURCES

I will require the following hardware and software resources to complete this project.

- ◆ A Bluetooth-enabled computer running J2SE. This will be used for prototype development, and will run both the server application and graphical front-end. This computer must have Internet access for connection to the remote MySQL database back-end and video streams.
 - My development platform is an Apple PowerBook G4 with internal Bluetooth module, running Mac OS X 10.4.
- ◆ J2ME development environment. This allows me to simulate the execution of the mobile client application, without packaging the Java code into a MIDlet for distribution to a mobile phone. This is made up of MIDP for OS X, Apache Ant, and the X11 window system. [6]
- ◆ J2SE development environment. Used for developing the server application.
- ◆ A Java and Bluetooth-equipped mobile phone for testing of the mobile client application and testing of the overall system.
 - I will use a Nokia 6230.
- ◆ PhoneDirector. Allows me to upload the mobile client application to my mobile phone for testing, without the cost of continually distributing OTA (over-the-air) after each minor update. [7]
- ◆ Other mobile phones for further testing.
- ◆ Macromedia Director MX 2004 for development of the graphical front-end.

6. REFERENCES

The following documents and websites have been referred to whilst writing this report.

- [1] "MRes CDP 2005 – Planet Campus – Rationale"
<http://polo.lancs.ac.uk/mres/2005/Group1/rationale.htm>
- [2] "British Consumers Threaten 3G UK Success"
<http://www.3g.co.uk/PR/April2003/5161.htm>
- [3] Hopkins, B., Antony, R. (2003), *Bluetooth for Java*. Apress: The Author's Press
- [4] "Director MX 2004: At A Glance"
<http://www.macromedia.com/software/director/productinfo/overview>
- [5] Blythe, M., Overbeeke, K., Monk, A., Wright, P. (2003), *Funology: From Usability To Enjoyment*. Kluwer Academic Publishers
- [6] "Do-It-Yourself MIDP on Mac OS X"
<http://developers.sun.com/techttopics/mobility/midp/articles/osx>
- [7] "PhoneDirector for OS X"
<http://www.macmedia.sk/pd.htm>