Computer Science Honours 2012
Project - Research Proposal

Mitchell Hedges

2nd March 2012

1. Principle Investigator

Mitchell Lawrence Hedges

18A Hare Street

Grahamstown

mitchhedges@gmail.com

Project supervisor

Professor Richard Foss

Head of Department - Computer Science

Rhodes University

r.foss@ru.ac.za

2. Project title

Discovering and controlling distributed audio devices from a Graphical User Interface (GUI)

3. Problem definition

Sound control is highly important as there are many venues that have distributed audio devices which all need to be controlled independently. There is currently a system made by Harman Pro called System Architect which allows graphical layout of devices, but this system has a few downsides which will be discussed later on. This research is aimed at the ease of use of a graphical sound system. After an in-depth analysis of the System Architect software, the development will take place in order to try and create a new and improved version of this software by using later software as well as protocols, such as the AES (Audio Engineering Society) X170 stack, for the controlling of these devices. This also aims to make the interface more user friendly by using 3D imaging software or an exact blueprint of the venue in order to control the devices.

4. Description of the system

The system that will be developed for this project will ultimately be able to control the audio devices through an easily usable GUI in which the audio devices will be discovered and placed around a venue. This venue that has been chosen will be a hotel, as hotels have a lot of distributed audio throughout their layout which is not too complicated and cluttered (such as a theatre). The venue for the system will have to be drawn up by the user in software such as Google Sketchup, which is simple to use considering its functionality as well as availability. The other main component that the user will interact with will be a program written in visual C++ on a windows platform, which will be responsible for the linking of the audio devices through the X170 stack.

5. Approach to development

The approach that will be used to develop this system will fall under the following incremental steps

5.1 Background research and primary approach

A lot of research will have to take place before the system can even begin to be developed. Due to the fact that this system is prototyping a better version of System Architect, there will have to be a lot of in-depth research done to compare the two. The first stage will be to analyse system architect. This program will be used thoroughly throughout the research to depict its advantages/disadvantages to the average user. This system uses an older sound control protocol called HiQnet [1] which will also be looked at and analysed to see what the difference is between it and the X170 which is a newer protocol, as well as the one used in this system. The X170 will then have to be researched and thoroughly understood before development takes place. The reason for this is that it needs to link to the visual C++ application, which links to the GUI in order for functionality. Google Sketchup will be the number one tool for implementing a GUI for this system so the scope of this software must be analysed. This software will be pushed to its full capabilities with its underlying programming features in order to test whether it is capable of interacting with the main application as well as the X170 stack successfully. The equipment for sound

control requires various amplifiers as well as speakers. This can be bypassed by using a network simulation of the devices which will be done for the first step of development. There is currently an accessible version of this in the form of a previous honours students project which will be used for the simulation.

5.2 Secondary approaches

The connection made between visual C++ and X170 devices can be done with no problems as long as several rules are followed. The only potential problem would be the link made between Google Sketchup and the C++ application. As stated above, Sketchup will be pushed as far as it can go in order to connect to the C++ application. If this is not possible at all, then a layout of the venue will have to be provided and embedded within the C++ application in order to place the audio devices around the venue as the user wishes.

5.3 Previous Work

There has been previous work done by honours students at rhodes university in this field. The networking simulation platform was created by Fred Otten which is what shall be used in testing the networking capabilities for the system. The connection between the XFN protocol and the GUI was done by Shane Haw, in a project entitled "The X170 Protocol as a vehicle for sound control". Both of these projects will be looked at and collaborated with this system.

5.4 Testing

Once there is a working version of the system, it will be tested thoroughly using different setups simulated throughout the venue. The system will be tried in different situations and any bugs or problems found will be taken note of.

5.5. Review

Once the system has been tested, any minor bugs will be fixed and any required changes will be made. The systems functionality will be analysed to then see where it compares with the other sound control software mentioned above. Other factors such as network efficiency may be taken into consideration

in this step as large venues have a lot of communication between their sound devices.

5.6. Implementation

Due to the fact that most of this system will be developed and tested by using network simulation, it is most likely that it will not be implemented. Further extension of this project may be possible in order to implement it in future when it is out of its prototype stages and has a reliable working stage.

6. Requirements

Hardware

- Mobile computer in order to take to the venue to map the layout using the software

- A camera will possibly be used to aid with the design

- Sound hardware and amplifiers may be tested using this simulation; however this is not necessary as the simulation will most likely be used

Software

- Access to the X170 stack

- Google Sketchup

- Microsoft Visual Studio 2010

- Windows(Platform)

- Adobe Photoshop (for the secondary approach in the case that Google Sketchup cannot be used)

- Network Simulator

7. Proposed Timeline

Date	Event
6th March	First oral presentation
5th - 10th April	Visit and map out venue for project
10th April	Be able to connect ruby from Sketchup to the Visual C++ API
30th April	Complete literature review
28th May	Literature review and Plan of Action due in.
4th June	Examinations begin
15th June	Examinations end
16th - 20th July	Fieldtrip
24th/31st July & 7th August	Second oral presentations
30th July	Complete analysis of System Architect and X170 stack
14th August	Begin main programming component
29th-31st October	Third oral presentations
2nd November	**PROJECT DUE**
5th November	Website due
21st/22nd November	Final research oral examinations

8. Deliverables

A working prototype of the system mentioned above will be handed in along with the relevant documentation. There will be other documentation such as a poster and thesis that will also be handed in with the project. The thesis will include all the relevant information about the project as well as the X170 stack which will be used in order to build the project.

Bibliography

[1] Online, 2007. Available from: `http://www.akg.com/site/products/ powerslave,id,948,pid,948,nodeid,2,_language,EN.html`.