POST-MORTEM

WIRELESS SPEAKER MODULE

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1.0 Introduction

The following documentation describes the post-mortem of the SoundHub project. High-level functionality of our proof-of-concept model and accompanying firmware and software will be highlighted. A comparison between the estimated schedule and costs will be compared to the actual schedule and costs incurred. In addition, a section describing the resulting group dynamics and individual reflections on the project will be provided. All meeting minutes will be in Appendix A at the end of this document.

1.1 Project Background

The SoundHub is the next revolutionary step in wireless speaker technology. Designed to be sleek and discreet, it allows existing wired speakers to attain wireless freedom by streaming music from other devices to it. Furthermore by utilizing modern Wi-Fi protocols, multiple speakers connected to separate SoundHub devices can be streamed to at the same time. With SoundHub, rooms or entire homes can have access to streamed audio content, with full control through your handheld devices or computers.

The goal is to produce a slim and discreet speaker attachment that will allow music streaming through Wi-Fi, while maintaining a price point much lower than existing competition. This product will allow users to gain the benefits of wireless streaming without having to upgrade their entire audio system. Figure 1 shows an artist's rendering of how the SoundHub will look along with an audio system.

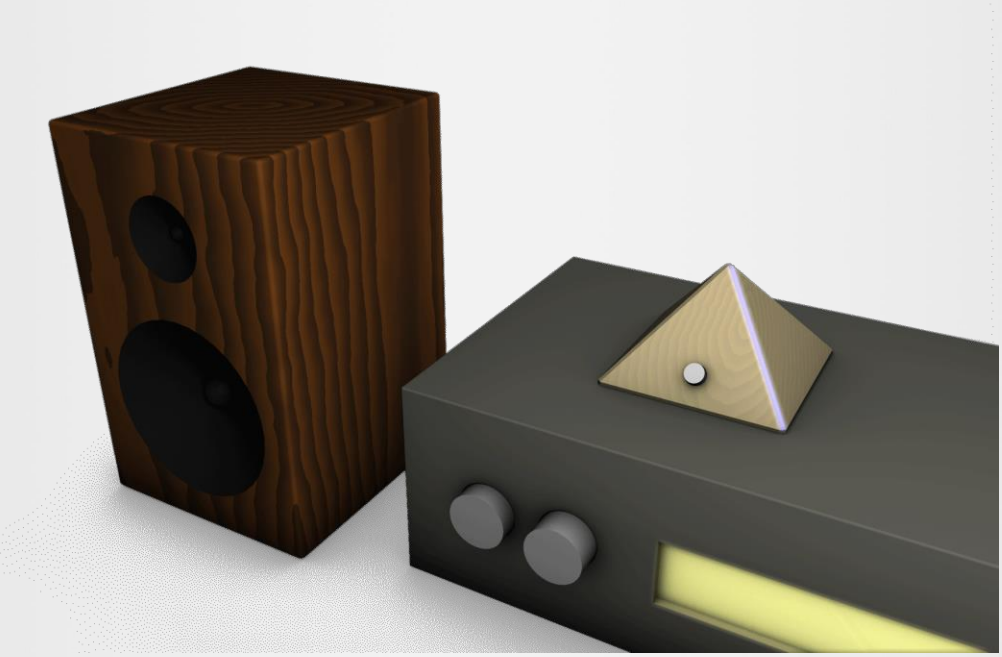

Figure 1: Artist's SoundHub Rendering

With user-friendliness in mind, the SoundHub requires minimal setup and has intuitive user controls. The setup requires the SoundHub to be connected to the user's speakers and will use a Wi-Fi network. Once connected to the network the mobile device will be able to find and wirelessly stream music to the SoundHub.

2.0 Product Design Process

2.1 Hardware Design

In the early stages of the project, the Arimus team decided that designing an entire PCB complete with Wi-Fi RF chip, microprocessor, and DAC circuitry would be much too ambitious for a four month project. As evaluation hardware, the Wandboard [1], for Wi-Fi development had already been purchased, we decided to focus on one specific application and built a high-performance DAC.

As the electrical signals outputting from the 3.5mm line-out jack of the Wandboard already pass through the DAC of the all-purpose audio codec SGTL5000, we decided to utilize the Wandboard's digital audio output SPDIF instead. This means an additional decoder board, utilizing the DIR9001 SPDIF to I2S converter [2] would be required before feeding in the I2S signals into the PCM1794A DAC [3].

With our end result, we have a fully functional decoder/DAC system receiving optical input and outputting stereo music through a line out 3.5mm jack. Additionally, a rotary encoder has been used for a volume knob, and we have implemented a line in switch enabling the user to toggle between two sources of input. . See Figure 2 below for our fully functioning decoder/DAC system, and Figure 3 for the volume knob on the enclosure.

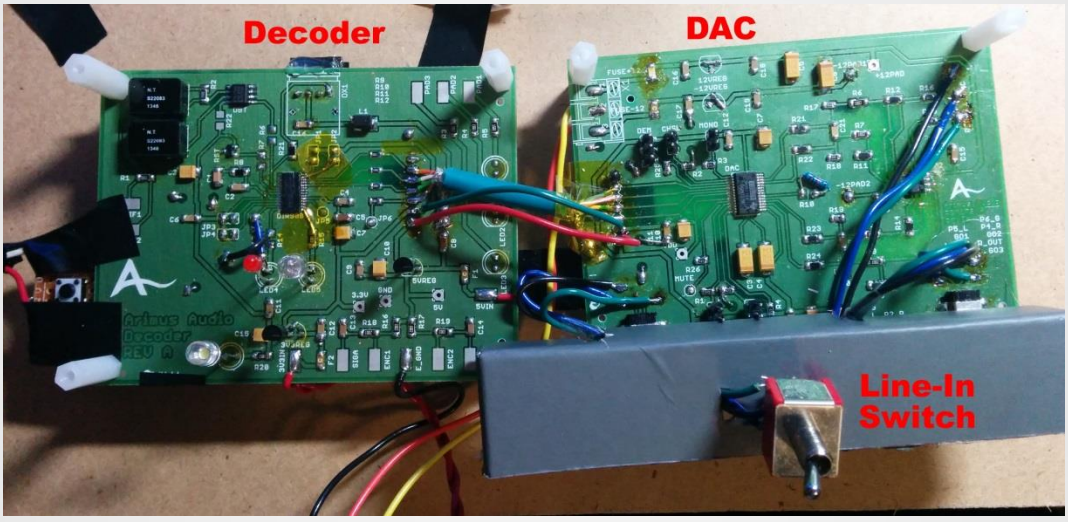

Figure 2: Decoder & DAC System

Figure 3: Volume Knob & Enclosure Case

2.1.1 Problems encountered in hardware development

After we finished soldering all the parts on the hardware audio codec, we were not able to get any audio output with the SPDIF input from Wandboard. Initially we were unaware of the faulty SPDIF connection on the development board, we spent about 2 weeks debugging out hardware audio codec. All voltage levels were correct and connectivity tests suggested nothing was shorted. As there were no obvious points of failure, unit tests were conducted by isolating and testing sections of circuit components. During this process, the soldering pads for decoder chip were accidentally lifted while replacing decoder chip. Using extremely fine wires, the signals of the lifted pads were soldered directly to the chip. Following this, we tried testing the SPDIF audio from a PS3 instead, which worked correctly and produced amplified music output without any noticeable defects or noise. This led us to the discovery that our WandBoard had incorrect circuitry connection for SPDIF output with the data line and power line swapped. From performing research, we found that future revisions of the Wandboard had this corrected, but we had an early revision. Using precision soldering, the power and data lines were swapped back on the Wandboard's SPDIF port and now works correctly with our system.

2.2 Firmware Design and Challenges

Issues that were encountered during Firmware Development of the SoundHub were mainly categorized into the following:

- Wireless network and connectivity
- SDK compatibility and compilation
- Linux audio driver and mixer
- Playback rate and quality
- External peripherals support
- Porting the SoundHub software to ARM platform

Faced with the task of designing a system to wirelessly streaming music we quickly focused into an embedded Linux solution. Working with a higher level operating system allowed us to abstract the difficult networking problems and build upon existing open source solutions. Had we built from a bare bones system it is unlikely we would have been able to get the project as far as we did in four months. The relaxed requirement on the boot up time was a point of contention in the functional specification. So we made sure to improve this by configuring our own Linux image to be stripped of all unnecessary functions and have an optimized start-up sequence.

A major issue that was recognized early on in the development cycle was the implementation of SoundHub in a home wireless network and connectivity. This means that SoundHub, as a standalone product will have recognize a set of SSIDs and the associated connection method. The challenge was to develop a suitable method of achieving this connectivity without the need of a secondary input device or UI. WiFi Protected Setup (WPS) [4] was chosen and unfortunately the driver to the wireless chip on the development board is proprietary and thus an alternative chip/adapter and drivers were needed.

Researching the transport protocol took much longer than expected, which ended up cutting into development time. We ended up implementing our app using the AllJoyn Audio Framework for streaming audio discovery and message passing [5]. Having adopted the Alljoyn SDK, we were able to focus on developing the Application layer and not having to worry about coding the low level network layers like the Physical and Data-Link layer of the OSI model. This was a major step forward in providing a stable basis for SoundHub's key features. However learning and developing on a completely new framework and using the SDK proved difficult. Not to mention that as the framework was not fully completed we ran into many bugs and compatibility issues along the way. Compiling and debugging the just the framework system took longer than anticipated and ultimately delaying internal firmware schedule by approximately a week. This was ultimately resolved by hacking the building process and sequentially building individual components.

Audio quality is perceptual and has an individually unique definition. This quality from a technical standpoint relies on a lot of criteria like audio format, audio specification, and the supporting hardware. Various hardware drivers and mixers will affect the playback of the music on the hardware system. Therefore time was spent on discovering and working with various mixers and audio drivers. The audio format was selected based on providing a CD quality audio with no compression as a standard for SoundHub. Working with this specific format and the associating libraries proved difficult as initially the music would be played fast forwarded. This problem was due to a playback rate being set too fast and the transfer buffer being overrun.

The software development and testing was performed on a x86 architecture. The time and effort in porting the project over to an ARM architecture was overwhelming and unexpectedly challenging. Issues arise with the libraries used, the Alljoyn architecture implementation, and the drivers used on the ARM based system. The workflow between the two architectural platforms consisted of a mix of cross compiling and compiling directly on the WandBoard. To transfer code we set up a repository online

which was cloned onto all developers working machines as well as their development boards. This way all systems were always in sync.

We have several peripherals to the WandBoard which are connected to the GPIO ports. These include the status LEDs the WPS/reset button and the rotary encoder. These are controlled using the GPIO exposed in the sysfs. When developing the rotary encoder algorithm, we found that the values did not appear to be reading correctly. Our assumption was this may be due to the delay caused by context switching between user space and kernel space between reading the two GPIO pins. So a custom cross compiled kernel driver was developed with an interrupt on the rising edge of one GPIO, which would immediately read the other GPIO. This however did not change the behaviour. At this point we realized that the hardware RC lowpass method of debouncing the rotary encoder was not sufficient. So a software method of debouncing the rotary encoder was developed to make the rotary encoder functional.

2.3 Software Design Challenges

The original plan for software component was to adopt an Alljoyn Audio Framework pre-built open source Android app and enables interaction with firmware developed Alljoyn on Linux platform. This way the end users would be able to use their Android mobile devices to wirelessly streaming music to the SoundHub system. The chosen Android app named “Musydra” is one of the Alljoyn Peer-2-Peer App Challenge winner which allows music streaming between Android phones on the identical Wi-Fi network [6]. Ideally the adopted app should be able to easily be modified to be compatible with the Linux platform.

However the software developing team has no previous experience in Android SDK and “Musydra” itself was not completely finished. The software developers spent about one month and half to get familiar with Android developing environment and tried to compile the source code of “Musydra”. Problems arose one by one as the compilation process goes on. The major challenge is that some software libraries were missing in the source codes and was not mentioned anywhere in the documentation. The software developers spent a long time to figure out the compilation problem and sadly the compiled Android app failed to be compatible with the Alljoyn audio system on Linux platform. The second approach was attempted which was to work on the original Alljoyn Audio Android sample app. Although the sample app ran successfully without crashing, unfortunately it was not able to connect to Linux platform. The final decision is to demonstrate the concept of wireless streaming on mobile devices on the identical Wi-Fi network as a separate component from the hardware/firmware SoundHub system.

3.0 Financials

Our current financial total is reportedly very similar to the Written Progress Report drafted on March 24th, 2014. We have not made any large purchases since that date, and have accrued most of the enclosure materials without additional cost. The actual costs are compared in Table 1 below:

Table 1: Project Estimated and Actual Costs

Item	Estimated Cost	Actual Cost	Difference
Evaluation Boards	$300	$228.86	+$71.14
Test Speakers	$40	$23.28	+$16.72
Major Components (IC's, Transformers, etc.)	$171	$331.17	-$160.17
Minor Components (Resistors, Capacitors, etc.)	$150	$173.85	-$23.85
Soldering Tools and PCB Etching Materials	No Estimate	$106.27	-$106.27
Enclosure	$50	-	+$50.00
Shipping (15%)	$114	$31.36	+$82.64
Contingency (20%)	$152	-	+$152.00
PCB Manufacturing	$150	$199.93	-$49.93
Totals	**$1127**	**$1094.72**	**+$32.28**

The only future purchases we expect to make are additional enclosure materials and tools (if required), and food for the final demonstration of our project on April 14th, 2014. Our team was able to stay within budget for the project, though we have only acquired $500 of funding from the ESSEF [7]. We intend on applying to the Wighton fund [8] to help cover some of the projects expenses, and any outstanding costs will be evenly split amongst the team.

4.0 Schedule

While we planned for additional time for testing and integration, most design and development tasks took longer than expected. Documentation was always completed on time but due to its hard deadlines, other tasks were delayed and pushed back. The timeline in Figure X below illustrates the estimated and actual schedule for the project tasks:

Table 2 shows the workload distribution matrix which shows team members relative effort across the various areas of the project. The effort has been assigned a value on the scale of High, Medium and Low depending on each group member's reflection of how much time and effort they put into each task category.

Table 2: Workload Distribution Matrix

	Sherman Siu	Scott Malfesi	George Chang	Dongkai Miao	David Yin
Documentation	**High**	**High**	**High**	**High**	**High**
Administration	Medium	Low	Low	Low	**High**
Financials / Funding	**High**	Low	Low	Low	**High**
Parts Purchasing	**High**	Medium	Low	**High**	Low
Hardware Design and Development	**High**	Medium	Low	**High**	Low
Firmware Design and Development	Low	**High**	**High**	Low	Low
Android Development	Low	Low	**High**	Medium	**High**
Graphic Design	Low	**High**	Medium	**High**	Medium
Enclosure	**High**	Low	**High**	**High**	Medium

5.0 Team Dynamics

The Arimus Audio team is a group formed amongst friends, some which have previously collaborated in previous classes and projects. Hence, the already forged relationships allow for more openness between members, and contact beyond the project alone. Strengths and weaknesses are also already known given the experience members have working with each other in the past, and can be addressed early on in the project.

Contrasting personality types have shifted members into varying roles, some of which have been noted below:

Sherman Siu	**Scott Malfesi**	**George Chang**	**Dongkai Miao**	**David Yin**
Initiator Leader	Listener Specialist	Devil's Advocate Facilitator	Critic Specialist	Supporter Mediator

There have been minor instances of miscommunication between members which have resulted in minor setback in time or progress. Our team quickly utilized group instant messaging (WhatsApp) to reduce miscommunication. Through the term, the team has been meeting on a regular basis for development and to discuss progress and goals. These meetings typically took place at the SFU Burnaby mountain campus and at Sherman's house. Just as the documentation often has broken into Firmware, Hardware and Software sections, the work was also divided and the group split into subgroups. This way we would have the chance to focus and become experts in our area rather than all generalists.

Individual Reflection - Sherman Siu

The making of the SoundHub is the most ambitious, arduous, yet rewarding projecting I have undertaken in my undergraduate career. It has been an enlightening experience working with a larger team of 5 members, and watching the various talents develop throughout the project. I am proud to have developed a product in a team from start to finish, and be able to demo the SoundHub and its streaming capabilities.

As CEO of the Arimus Audio team, it has granted me the opportunity to develop my leadership skills, and utilize them to keep the team moving forward. I feel like my goal is to make things happen, and if they don't to always have a contingency plan to mitigate the delay or setbacks that will inevitably occur. I've meticulously looked ahead a couple steps, and learned how difficult it is to accurately plan a project schedule, its budget, and the feasibility of the project's goals. Originally, we had planned an extremely complex hardware design, and over time realized it went way beyond the scope for our project. We had planned many weeks for integration and testing knowing it's a possibility that the design process may take much longer than expected. I am glad for that buffer of time as it was certainly difficult getting a finished product in the end.

As a member of the hardware team, I worked closely with Dongkai creating a decoder/DAC system that would be accompanying our evaluation board. We looked at many community designs, datasheets, picked and purchased parts together after we constructed our schematics and layout designs in EAGLE PCB. I've learned a lot about PCB design, using PCB design software, and how to make our own PCB using the toner transfer method. While our homemade board was insufficient for our project, it was still a valuable learning experience. I have read over 20 different datasheets this semester in search for the correct parts for our design, and done tens of hours of soldering and rework on our custom PCBs and the Wandboard. While I already have experience soldering small surface mount parts from my previous co-op position, it has been quite a challenge utilizing the limited equipment and resources offered by the school. Also, the equipment in Lab 1 picks up ridiculously large amounts of noise from its surroundings, making it impossible to perform precise measurements needed for our system.

Team miscommunication has occasionally been an issue as none of us have worked in such large teams for large projects. Also, members are divided into teams and inter-team communication needs to be very clear as we don't know a lot about each other's parts. Still, the team has matured over the months and refined our communication tactics and overall teamwork level.

Overall, it's been a great experience working with the Arimus Audio team. I wish all the best to my teammates in their future endeavours.

Individual Reflection - Scott Malfesi

Through my undergraduate degree I have seen the importance of open design projects. Instead of using this project as an excuse to play with fun technology, I wanted to use the chance to fully think out and design a product that I actually want. The aim was to come out of the course with a product that I could conceivably start a company with

We formed the team as a group of friends and I feel this gave us an advantage of already having good communication and we didn't mind spending very late nights with each other. Even as we all brought diverse viewpoints to problems there was little contention through the project. I am privileged to have had the opportunity to work with this group of intelligent and well-rounded people.

In the design phases I find that it is my natural tendency to push the project towards ever more ambitious goals. Getting to the final stages of the project I am thankful that my team members were able to reign me in to focus on setting more realistic goals. Through the project I learned how valuable detailed contingency plans for every module can be.
My responsibility during the project was to lead the firmware development especially relating to operating system and hardware integration. This gave me the chance to learn about setting up boot loaders, compiling Linux kernels, developing device drivers, and setting up the many parts which Linux can be customized. In addition I took responsibility for setting up our build system, and handling the repository management. I also was support roll on networking portion of the firmware and worked closely with George to implement the AllJoyn framework and debug its many problems.

If I were to do another project like this I would start the implementation earlier. Thankfully we had the foresight to think about design early but the really time consuming part is always implementation whereas design will just take as much time as you let it. I also wish we had the chance to mess around with our development boards earlier and learn their capabilities better before trying to set our design goals. After in depth research to find the most suitable development board, several interesting features of our project still had to be dropped and we had to develop an extra SPDIF decoder board. This was simply due to our development board not being ideal to the project. I also would not develop using the AllJoyn framework again as too much time was wasted debugging other peoples' code, porting the framework to platforms it was not meant for and trying to integrate its different systems. Rather I would aim to use frameworks which have been more thoroughly tested and shown to be stable. This would leave much more time for the interesting part of implementing our own design.

Overall I think we have been successful. We learned a lot in taking a project from the glimmer of an idea, through rigorous specification to a functional model. While there have been setbacks and challenges, this has only added to the experience. In the end, we have developed a fully thought out product that I really would like to have in my home.

Individual Reflection - George Chang

Starting from the planning stages to the working demos, we have had an exhausting yet rewarding experience. Being one of the key milestone courses in undergraduate studies, ENSC 440 has provided me with the opportunity of collaborating with four talented and individually strong partners to work on a project that is capable of showing our creativity, technical prowess, problem solving, teamwork, and communication skills all in a span of four months. I am grateful to the team of Arimus Audio members, Sherman, David, Scott, and Dongkai for their efforts and support that they have given and put into this project. A special thanks goes out to family, friends, professors, and TAs for providing both moral and technical support in completing this project.

With the title of CIO in this team, I was constantly providing technical insight and analysis into the products that our competitors have, providing new innovations and possible techniques and new standards that would benefit the team. Ultimately settling on a chosen development platform. I was assigned as the network lead in charge of the underlying firmware/software to SoundHub's wireless streaming with the support of fellow member Scott who also oversees the development. I am on the other hand the support of Scott in porting the SoundHub software and working with the firmware on our evaluation hardware. I also play support to the Android development lead, David, where we both worked on creating an Android app as a front end to SoundHub. Through this unique lead and support roles, we were able to help each other and provide both suggestions and technical knowledge. In terms of hardware, indirect supports were given to their respective leads, Dongkai and Sherman as we all work towards a unified solution to SoundHub. This has all been a learning experience that really promotes teamwork. Arguments and biased opinions will arise throughout the project, but having good communication skills between team members will reduce the friction and will allow a more efficient working environment. This is a phrases that summarizes one of the most valuable skills that I have strengthened in this course.

I have had the opportunity in this project to work with two different types of SDKs and framework development platforms, Android and Alljoyn. Both of these proved difficult in implementing and integrating with each other. Although many challenges were presented throughout the course of the SoundHub's software development, we managed to work through them all. The Android and Alljoyn architecture learned throughout the compiling and debugging helped out when we try to integrate the two together. Many of the key features in the SoundHub involve in depth working knowledge of the network topology and having researched into the possible alternatives strengthened my networking knowledge. One thing that I would have done differently was to research my topics more thoroughly before the project. Mistakes in decision making and judgements are very costly and if more preparation was done before the project, it would have yielded a more mature product.

Overall this has been a very valuable experience and the skills learned and mistakes are to be kept in mind so that the next time I will be able to better handle a similar problem or situation.

Individual Reflection - Dongkai Miao

A fantastic experience that promoted me with an interesting project and encouraging team interaction, that is how I would describe the experience I had in group Arimus Audio. It has been my privilege to work with these amazing engineers, Sherman, Scott, George and David, who are passionate about their work.

My main responsibility in this audio project is to design the hardware audio codec and ensuring it functionality and high quality performance. As an analog hardware specialist, I am responsible to use my knowledge in analog hardware to direct the research and development of the hardware portion of our project. I worked closely with our excellent hardware support Sherman Siu over the course of building our customized hardware audio codec and its associated testing and debugging. Throughout the research and development of the hardware audio codec, I have learnt a lot about how digital audio signal is processed into Hi-Fi audio, general knowledge in mixed digital/ analog signal and tips in PCB design. Thanks to this experience, now I have gained a great interests in hardware DIY and electronic application design.

There are few setbacks throughout the development of the hardware audio codec. One of and the most challenging difficulty we had was the quality of the analog circuitry. There are many factors involved in producing a good analog design, such as proper routing, material selection for data transmission and overall signal integrity. I was shocked how much interference I had when working with electronics in Mega-hertz frequency. Each part of the layout needs to be well thought out to handle these artifacts properly. Also, every single potential failure point needs to be considered during the debugging phase. In the beginning I over-relied on the SDPIF out from our development board. I wasn't able to produce any output with our hardware codec when receiving digital input from the development board. My mind was narrowed down to just our hardware piece. It was after 2 week of fruitless testing we discovered that the problem was from our development board. If I have thought this problem at the beginning, I could save us for at least 2 weeks of time.

Aside from technical responsibility, I was able to improve on mood management. I tend to blame myself whenever I made mistakes. I blamed myself for the entire night after I broke the decoder pad. But then I realized being sad about mistakes wouldn't bring me to anywhere, having a positive mind in learning from mistake is what I should do. Then I started changing my perspective to what I have learnt rather than what mistakes I have made. As a result, my productivity got improved and things started getting better and better.

Last but not the least, I have to give my thanks to all my team members in supporting me throughout the entire semester. Nobody blamed me on damaging the board, instead, they kindly encouraged me to keep debugging. Their encouragement had become part of my project motivation, I couldn't ask for more. In addition, special thanks to Sherman's family in supporting us with workplace and food.

Individual Reflection - David Yin

Throughout the developing cycle of the capstone project, I had the chance to work as part of the Team Arimus Audio to create a proof-of-concept model of wireless streaming speaker attachment. Having witnessed the formation of our model from brainstorming project ideas to designing and implementing a functional system, I familiarized myself to the stages of general project development and processes required for integrate a working system. The different necessary documents required to record the different stages of the product development cycle is also something new to my knowledge. In addition, the capstone project heavily trained our team working skills and scheduling practices that helped developing team dynamics.

In the early planning stage, I was assigned to the software portion of the project where I am responsible for developing the Alljoyn Audio Framework on the Android platform. Considering the technical skills required for my contributions and having no prior experience with Android development, I had to learn how to use Java and learn about the fundamentals of Android development. In addition, the adopted open source Android app “Musydra” is not well prepared and additional efforts was put in in order to compile the source. Although the final version of compiled code did not interact with the Alljoyn on the Linux platform, I have gained sufficient amount of knowledge on GUI and structural design of an Android application which will definitely going to help in my future career.

From this project, I also learned that the integration process between each components should occur as early as possible. Early communication between each components will ensure compatibility at an earlier development stage and allowing extra time for future iterations and refinements. In our case the Android component was unable to interact with Linux platform not only because the software component itself was a challenge, but also because the integration did not occur early enough to have extra time for code adjustments. Time management during the project development cycle is also a crucial on an individual and team basis. We experienced surprising challenges as a team as well as an individual.

All in all, our entire team was extremely fruitful to see our working proof-of-concept model finally completed. Even though the project could be improved if more time is permitted, the functioning model is well attractive and feasible in the market. The working proof-of-concept model could potentially lead to commercial products if sufficient amount of investments are provided. Looking back to sleepless nights and endless documentations, the time and effort we spent on was totally worth it. Each of us gained significant amount of technical as well as interpersonal skills throughout the semester. The project would never come into one piece without my teammates’ contribution and I am proud to be a member of Team Arimus Audio.

6.0 Conclusions

As we progressed through the SoundHub project and learned the limitations of our evaluation hardware, we've gone through some major scope changes. However, we have successfully our main priorities of the system featuring one to many streaming, and built a functional high-performance DAC system with SPDIF (optical signal) decoding.

As the SoundHub is currently a proof-of-concept model, further research and design is required to bring it to a prototype level. Only then will the Arimus Audio team have a better estimate of the retail pricing of the SoundHub and compare it competitively with the target market competition. The team is still in discussion on the future of the SoundHub project.

7.0 References

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Appendix A: Meeting Minutes

ENSC 440: Interactive Wireless Speakers Project
Meeting Minutes
Date: July 21, 2013
Time: 2:40 PM
Location: Lougheed Town Centre, Starbucks

Attendees:

George Chang, Max Miao, Scott Malfesi, Sherman Siu

Minutes:

Agenda:

- Subversion
- Project Management
- Communication Tools (ie. Whatsapp)
- Project introduction, discussion and verdict

Meeting Key points:

- 12 ideas on the google doc list thus far: 15 minute discussion initially for each
- Person in charge of idea gives an intro and attempts to spark interest for other members
- Discuss purpose, skills required, feasibility, vote of interest on each
- Voting of interest rubric:

  1 – Do NOT want to do this project
  2 – Disinterested
  3 – Neutral
  4 – Interested
  5 – Want to do this project

Idea Proposal and Vote of Interests:

- The complete list of ideas, descriptions and links are attached to the end of this meeting minuite. The vote of interest that was concluded by this meeting are also included.

Communications:

Subversion:

- Mercurial – Setup the platform for everyone for future ease of access
- TortouseHg was recommanded, SourceTree was mentioned as well
- Scott has experience with it, George has also used it before

Project Management:

- Redmine – Gantt Charts, Project support, Calendar, SCM integration (Mercurial)

- Microsoft Visio

Communication Tools:

- Google Hangout
- Whatsapp – Max still needs to download and install, Sherman invites Max to group after
- Skype

Proposal Documentation:

- System Overview, Flow Charts, Budget & Funding, Schedule, Company Profile, Sources
- *Jeffrey: Always bring entire document to TA before due date so they can have a look.*

To Do:

- Individual research on the selected projects in all aspects. Present findings for next meeting
- Last chance for members to propose new ideas.

Next Meeting: July 28th, 2013

The next meeting has been set on July 28th, 2013 at Lougheed Town Centre, Starbucks by the front entrance, above the food court. The time for the meet is at 12:30 PM

Adjourn:

The meeting adjourned at 5:45 pm.

Respectfully submitted,

Sherman Siu

List of Project Proposal, Descritpion, Thoughts and Vote of Interest:

Textbook Tablet
- Simpler than an ipad, geared towards educational purposes
- Less like an e-reader, add writing functionality
- Homework assigned on it?
- take some of the ideas from http://gizmodo.com/5365299/courier-first-details-of-microsofts-secret-tablet in terms of ui
- build off of linux or android

Purpose: simplified tablet for students to read textbooks easily, low cost, market to education
Core: Textbooks, displays large pdfs
Extras: Worksheets, highlighting, annotating
Simpler the better: USB, Charging
Practically a software project (that can be slapped onto other hardware)

Making the tablet: CPU, Touchscreen Display
How does display work? Touchscreen drivers find online? (Open Source)

Skills required:
Mechanical Assembly (soldering, etc)
Operating System Knowledge
Large amounts of programming and GUI work

Feasibility:
Ambitious, but doable
Probably start early on this project

Voting:
George – 3.5
Max – 3.5
Scott – 4.5
Sherman – 3
Total – 14.5

Vehicle with interior building 3D mapping

- use multiple camera, sensors etc?
- model including measurements, doors, stitch images together
- automate the vehicle to discover the area
- iphone or frontend application to view map
- (afterthought) sounds like a Roomba with a camera

Purpose: Automated way to map the interiors of buildings
Create a floorplan and virtual walkthrough (images, or 3D)
Police and fire department must map schools and figure out where safety equipment is
Implement the system into a mall directory?
Real Estate

Note: Combine this with quadcopter?

Skills required:
Hardware – Sensors, Cameras, CPU
Software – Image procession, automation, control systems, handling large data sets, would be cool if we had a front end

Feasibility:
Difficult – May need more people

Voting:
George – 1
Max – 4
Scott – 5
Sherman – 2
Total – 12

Conclusion: Too many projects in one
Quadcopter sensors is a project
Image processing and walkthrough is a project

Physical NFC Enabled Identity Key.
-Using a storage identity key to enable access to "dummy" computers
- the idea is a physical key that works with dummy terminals that enables service or rights.
- small storage device that is used as a portable compute
- a physical digital memory key that enables service/identification/login/credential
- found this on kickstarter: http://www.kickstarter.com/projects/myidkey/myidkey-passwords-at-the-tip-of-your-finger?ref=category

Purpose – USB key, plug and play device that enables services
Original purpose – plug it in, dummy computer, gives you credentials
A key that identifies you for you, and provides a service for you
Can use it to pay for money? Make reservations?

Skills required: mostly software, fingerprint biometric sensor

Feasibility:
Hardware is not hard, mostly a software project (integration)

Purpose needs to be defined further. The more people that use it, the more successful it is.

Vote:
George – 3
Max – 2.5
Scott – 2
Sherman – 1
Total – 8.5

This idea can be integrated into other ones.

Use some RF (like wifi) to detect actions for home automation
- see http://www.geekosystem.com/wi-fi-motion-control/
-wisee technology found on engadget http://www.engadget.com/2013/06/05/wisee-gesture-control/

Purpose: Use RF signal to sense motion (bounces back)
Do specific gestures to turn on/off stuff
Essential you are the remote

Skills:
Wifi source, MATLAB, Signals Analysis

People have already done this before. At least we know it's possible.

Feasability:

Basically done, no votes.

Camera Stabilizer
- hand held video cameras tend to be shaky especially when you zoom
- using accelerometers, gyroscopes, motors, counterweights and digital methods
- sony did neat in camera stabilization http://www.youtube.com/watch?v=i5CpOYEi1u0
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http://www.youtube.com/watch?v=fkVXhaJs-_E
- nokia new phone lumia 1020, 41MP camera does oversampling and also floating lense stabalization http://www.extremetech.com/computing/161117-nokia-lumia-1020-41-glorious-megapixels-of-back-illuminated-image-stabilized-magic

Purpose: to solve camera instability (shaky camera when zoomed in)
Built in system inside the camera
Control Systems, Image Processing

Skills: Optics
Requires a lot of precision, custom parts possibly?

Feasibility
Very high chance to fail, but the project is simple

Vote
George – 2.5
Max – 2.5
Scott – 4
Sherman – 3
Total – 12

Augmented reality system
- goggles similar to I oculus rift http://www.oculusvr.com/ (goggles with small lcd screens)
- system of cameras / sonar or lasers to scan around to create ar
- perhaps have markers to know where to put the virtual obj
- accelerometers a gyro in case scan isn't fast enough (cache scene and rotate move to match movements)
- probably need fpga to do parallel processing
- uses cases: police, firefighting, military training. Gaming. to be awesome!!
- (projected virtual image that we get to walk around and see) . a virtual table for example???
- something like google glass ????

Purpose: Grab something and build onto it, put cameras/sensors on top of it, and overlay
Train firefighters/doctors, entertainment purposes (paintball, laser tag)

Hardware – two camera, somehow carry a computer on you (manage graphics, video streams, etc), GPU, CPU, accelerometer, gyroscope, GPS/location tracking?

Problems: Locate surfaces on which you can overlay stuff onto, movement
Identify planes, image creation

Vote:
George – 3.5
Max - 4
Scott - 4
Sherman – 4
Total – 15.5

RFID tag locator
Handheld (possibly mountable) device that emits high freq RF signals to find lost items
Passive tag

Project mostly about optimization as the purpose is simple
Feasibility is high, but not as interesting
May need to look into buying components that can perform such functions

Vote:
George: 4
Sherman: 4
Max: 3
Scott: 2.5

Total: 13.5

Action Tracking wristband/ tag/ clothing: The internet of things
- tracks movement. for fitness.
- Mobile call integration, voice control,
- Minimalistic feel, gesture control using Bluetooth ?
- We can talk about its functions and design
- Either Bluetooth, 3.5 mm headphone jack, mini usb, or nfc sync ?
- Software dev on android can use android beam for nfc communications :D
- Slogan: why take out your phone when it's on your wrist for those little things of life
- i think Broadcom produces low power Bluetooth 4.0 + nfc + wifi IC or something

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Sherm: I've also seen a wristband on kickstarter that lights up diff colors when you get emails, missed calls, etc. (Of course you can set the colors and notifications)
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Wristband with embedded ICs
Biometrics sensing using a writst band
Mobile notificiations on the wirst
Bluetooth, NFC, wifi
Medical/fitness purposes?
All depends on the application we want to do

Feasibility:
Hardware, not too difficult
Software, depends on application

Voting:
George - 5
Max - 4
Scott – 3.5
Sherman – 5
Total - 17.5

Wireless Speakers

- Airplay or other stream rtsp, bluetooth (if the bandwidth is large enough)
- detect which room you are in (or distance from speakers) to decide which speakers to play the music out of so that the music follows you around

-Make a blackbox product that connects to a wired speaker
-Connects to your phone/audio device via wifi/Bluetooth to play music
-Audio device (phone) can emit wifi hotspot?
Walking through rooms, speaker strength is based on audio device proxim

Feasibility:
Hardware may include amp, DAC, input and output ports, wireless communications chip
Software, depends on application, most likely an app on a mobile device.

Voting: not concluded.

ENSC 440: Interactive Wireless Speakers Project
Meeting Minutes
Date: July 28, 2013
Time: 12:30 PM
Location: Lougheed Town Centre, Starbucks

Attendees:

George Chang, Max Miao, Scott Malfesi, Sherman Siu

Minutes:

Agenda:

- Narrow down possible projects (spend 15 minutes on each one again to convince other attendees)
- Vote and pick a project

Meeting Key points:

- Narrowed down to 3 topics:
  1. Autonomous building interior mapping vehicle (AIMV)
  2. Heart monitoring wristband (HMW)
  3. Wireless speaker adapter (WSA)

- Voting conducted by choice of preference listed from desired to least desired topic for the 440 project
- Oculus Rift w/ camera project down-voted for difficulty, project too ambitious for our timeline
- Decided not to use RedMined due to inexperience, will continue using Mercurial and BitBucket

Voting Results:

- George: HMW, WSA, AIMV
- Max: AIMV, HMW, WSA
- Scott: AIMV WSA, HMW
- Sherman: WSA, HMW, AIMV
- Perfect tie between all voting results, spent another 1-2 hours discussing which idea should be pursued. Decided on WSA tentatively

To Do:

- Do personal research on products/research in the market (Airplay, etc)
- Scott: Set up Bitbucket

- Rest of us: Join the repository

Next Week's Agenda:

- Discuss found research
- Narrow down the features on our device and further define the scope
- Look into proposal, function spec sheet, etc and assign approximate due dates

Next Meeting: Aug 4th, 2013

The next meeting has been set on Augest 4th, 2013 at Metrotown Blenz Coffee shop by the bus loop. The time for the meet is set at 12:00 PM

Adjourn:

The meeting adjourned at 6:06 pm.

Respectfully submitted,

Sherman Siu

List of Project Proposal, Descritpion, Thoughts and Vote of Interest:

Textbook Tablet
- Simpler than an ipad, geared towards educational purposes
- Less like an e-reader, add writing functionality
- Homework assigned on it?
- take some of the ideas from http://gizmodo.com/5365299/courier-first-details-of-microsofts-secret-tablet in terms of ui
- build off of linux or android

Purpose: simplified tablet for students to read textbooks easily, low cost, market to education
Core: Textbooks, displays large pdfs
Extras: Worksheets, highlighting, annotating
Simpler the better: USB, Charging
Practically a software project (that can be slapped onto other hardware)

Making the tablet: CPU, Touchscreen Display
How does display work? Touchscreen drivers find online? (Open Source)

Skills required:
Mechanical Assembly (soldering, etc)
Operating System Knowledge
Large amounts of programming and GUI work

Feasibility:
Ambitious, but doable
Probably start early on this project

Voting:
George – 3.5
Max – 3.5
Scott – 4.5
Sherman – 3
Total – 14.5

Vehicle with interior building 3D mapping

- use multiple camera, sensors etc?
- model including measurements, doors, stitch images together
- automate the vehicle to discover the area
- iphone or frontend application to view map
- (afterthought) sounds like a Roomba with a camera

Purpose: Automated way to map the interiors of buildings
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Walking through rooms, speaker strength is based on audio device proxim

Feasibility:
Hardware may include amp, DAC, input and output ports, wireless communications chip
Software, depends on application, most likely an app on a mobile device.

Voting: All attendees agreed to this idea proposal and will perform research on its feasibility

ENSC 440: Interactive Wireless Speakers Project
Meeting Minutes
Date: August 4, 2013
Time: 12:00 PM
Location: Metrotown Blenz Coffee shop

Attendees:

George Chang, Max Miao, Scott Malfesi, Sherman Siu

Minutes:

Agenda:

- Review found research
- Discuss product features, rank on priority
- Look at proposal, functional spec sheet, & other documentation required for course
- Make tentative due dates for proposal (and possibly other docs)

Meeting Summary:

- Tortoise Hg and Bitbucket repo set up, all 4 of us (minus David) connected to it
- Uploaded minutes so far to repo
- Went to Best Buy, researched and investigated with on the market Bluetooth speakers, some have wifi
- Found Sonos 3 and Sonos 5, able to play two different songs to two different speakers from the same device (HTC phone), price point, $300+
- Generally speakers very expensive if wifi/airplay built in, Bluetooth speakers are cheaper
- Field tested demo Bluetooth speakers and found that the range to be 30 m. interference found with objects placed in between.

Functional Specs:

P1 – required
P2 – preferable but optional
P3 – stretch goals (icing on the cake)

P1 – receives Wi-Fi/Bluetooth encoded music signals from a media device (phone, etc)
P1 – decodes received signals from digital to analog and plays through connected speakers
P1 – powered by an external power supply
P1 – status lights (power, input control)
P1 – a UART/JTAG/SERIAL port for debugging purposes
*P1 – front end app for single speaker volume control (esp for Wi-Fi)

P2 – proximity detection feature (1 speaker)

P2 – multiple speaker setup in Wi-Fi/BT network
P2 – power amp (15Watts)
P2 – front end: multiple speaker control
P2 – multiple transfer protocols compatibility

P3 – proximity detection feature (multiple speakers)
P3 – multiple phones inputting to multiple speakers in same network
P3 – front end: Song Scheduling/Queuing, streaming directly (music player)
P3 – mood lights (see Nexus Q ring)
P3 – optical, RCA, other outputs besides 3.5mm
P3 – have an additional 3.5mm jack (line in and line out) and a switch to choose
P3 – self sustained wireless signal, (master and slave), one signal transmitter, multiple receivers

Action Items:

- Proposal – September 30st (Noon)
- Member Positions (CEO, COO, CFO, etc)
- Look into Wifi/BT standards, other protocols
- Digital to Analog Converter (chip search)
- Processor (type, power)
- Look into iPhone/Android App Development (but after)
- Look into sources of funding

- **Sherman: GANTT Chart**
- **Max: Company Name, Logo Design**

Next Meeting: Aug 12th? (informal)

- Max is back Sept 1st
- David is back Sept 3rd
- George Co-op begins Sept 3rd

Arrange Skype Meeting between all 5 members sometime after Max goes to China.
Update tentative videoconference scheduled with David on Aug 23rd night Vancouver time (24th morning China)

Adjourn:

The meeting adjourned at 8:12 pm.

Respectfully submitted,

Sherman Siu

ENSC 440: Interactive Wireless Speakers Project
Meeting Minutes
Date: September 9th, 2013
Time: 19:00 PM
Location: George's lab in ASB

Attendees:

George Chang, Max Miao, Scott Malfesi, Sherman Siu, David Yin

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Minutes:

Agenda:

Brief David on situation

Product Scope and Requirements

Meeting Key points:

Things decided upon

- 3.5mm times 2, one for input one for output
- Watch out for large unexpected input from pc
- Music proximity feature
- Wifi decided
- Accept wireless stream and play the signal
- Being able to control each individual speaker from the user end (be more descriptive)
- Discrete power source

Must	Main Feature	Nice Feature
Power	Proximity	Mimo
Wifi	App- ios,android, desktp	Digital input/output
Accept stream	amp	Audio data
Playing music	Status indication	
Serial debug	volume	

Starting this week setup weekly meetings to update progress

Action Items (Tentative Due Dates):

- Proposal – September 30st (Noon)
- Member Positions (CEO, COO, CFO, etc)
- Look into Wifi/BT standards, other protocols
- Digital to Analog Converter (chip search)
- Processor (type, power)
- Company, product, feature names
- Look into iPhone/Android App Development (but after)
- Look into sources of funding

Next Meeting: Monday Sep.16th, 2013

Adjourn:

The meeting adjourned at 22:00 pm.

Respectfully submitted,

David Yin

ENSC 440: Interactive Wireless Speakers Project
Meeting Minutes
Date: September 16th, 2013
Time: 19:30 PM
Location: George's lab in ASB

Attendees:

George Chang, Max Miao, Scott Malfesi, Sherman Siu, David Yin

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Agenda:

Project Preparation

- Proposal

Meeting Summary:

Mainly discussed the proposal structure and topics

- Separate proposal text and graphics
-

Text	Graphics
Letter of transmittal	Logo
Executive Summary	Functional flowchart
Introduction	Page formatting/ letterhead
Product Summary	Gantt Chart / Milestone chart
• Features	Product diagram
• Platforms	Marketing Figures – Final product rendering
Budget	User's case – how it works figure
Team Description	
Schedule	
Market / Competition	

Action Items:

- Everyone should start to contribute on proposal sections

Next Meeting: Monday Sep.23rd, 2013

Respectfully submitted,

David Yin

ENSC 440: Interactive Wireless Speakers Project
Meeting Minutes
Date: September 23, 2013
Time: 7:20 PM
Location: SFU ASB

Attendees:

George Chang, Max Miao, Scott Malfesi, Sherman Siu, David Yin

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Minutes:

Agenda:

- Refined executive summary (Combined George and Sherman's parts)
- Researched budget and set an estimated total cost
- Discussed concept of a feature name, one that refers to "music always playing around you" for future references
- Discussed physical enclosure
    - Pyramid structure, band of leds/lights

Next Meeting:

- Gather to construct product summary
- More name discussion
- Budget refining
- Executive summary to be finished
- Intro to be written
- Team descriptions to be written individually and combined during meeting

Next Meeting: Monday Sep.30th, 2013

Adjourn:

The meeting adjourned at 11 pm.

Respectfully submitted,

Sherman Siu

ENSC 440: Interactive Wireless Speakers Project
Meeting Minutes
Date: September 30th, 2013
Time: 19:30 PM
Location: Virtual meeting through Skype

Attendees:

George Chang, Max Miao, Scott Malfesi, Sherman Siu, David Yin

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Agenda:

Project Proposal Progress Update

Meeting Summary:

- Discussed general issues regarding the proposal
- Went over some section and the details were revised
- Virtual meeting are not as effective as reality meetings, people are generally being distracted

Action Items:

- Everyone should continue to work on the missing sections such Marketing/ competition, product summary, and project scheduel

Next Meeting: Monday Oct.7th, 2013

Adjourn:

The meeting adjourned at 21:00 pm.

Respectfully submitted,

David Yin

ENSC 440: Interactive Wireless Speakers Project
Meeting Minutes
Date: Oct 9th, 2013, originally planned Oct.7th
Time: 19:30 PM
Location: George's lab in ASB

Attendees:

George Chang, Max Miao, Scott Malfesi, Sherman Siu, David Yin

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Agenda:

Project Proposal Progress Update
Hardware research

Meeting Summary:

- Scott mentioned "RoomFlow" for the feature name that describes music that flows with the user, depending on user's position
- Max research on hardware components for integrated circuitry, concluded that we are unable to build our own Wi-Fi module, and suggested to build PCB that connect all modules
- Sherman and George filled most of the proposal, including executive summary, budget, and introduction sections
- Continuing working on proposal together
- Revising on parts which were finished
- Spent time to discuss company name, but didn't make a conclusion
- Preliminary research on evaluation board, drafted a list of basic required functions

Action Items:

- Everyone should continue to work on the missing sections such Marketing/ competition, product summary, and project schedule
- More research on the evaluation boards, list candidate products for purchasing

Next Meeting: Monday Oct.21st, 2013 – midterm week meeting cancelled

Adjourn:

The meeting adjourned at 22:00 pm.

Respectfully submitted,

David Yin

ENSC 440: Interactive Wireless Speakers Project
Meeting Minutes
Date: Oct 21st, 2013
Time: 19:30 PM
Location: George's lab in ASB

Attendees:

George Chang, Max Miao, Scott Malfesi, Sherman Siu, David Yin

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Agenda:

Finishing up proposal text draft

Visual aspect of the proposal

Hardware Research

Meeting Summary:

- Finished most of the proposal text, carefully went over the document together to check for grammar and typos, still need to work on the conclusion section
- Brainstormed on the visual aspect of the proposal
    - Need to demonstrate how product works
    - 3D rendering of enclosure
    - Title page
    - Page layout
- Max discussed the results about evaluation board research
- found the price range for a single board with desired functions varies between $100 ~ $300
- Decided to purchase two evaluation boards for parallel development
- Scott shared the information on wireless streaming protocols such as Airplay and DLNA
- Issues with Wi-Fi password, potential solutions would be pre-feed the password into the embedded system or use WPS one button setup

Action Items:

- Complete proposal text, purchase evaluation boards

Next Meeting: Monday Oct.28th, 2013

Adjourn:

The meeting adjourned at 22:00 pm.

Respectfully submitted,

David Yin

ENSC 440: Interactive Wireless Speakers Project
Meeting Minutes
Date: Oct 28th, 2013
Time: 20:00 PM
Location: George's lab in ASB

Attendees:

George Chang, Max Miao, Scott Malfesi, Sherman Siu, David Yin

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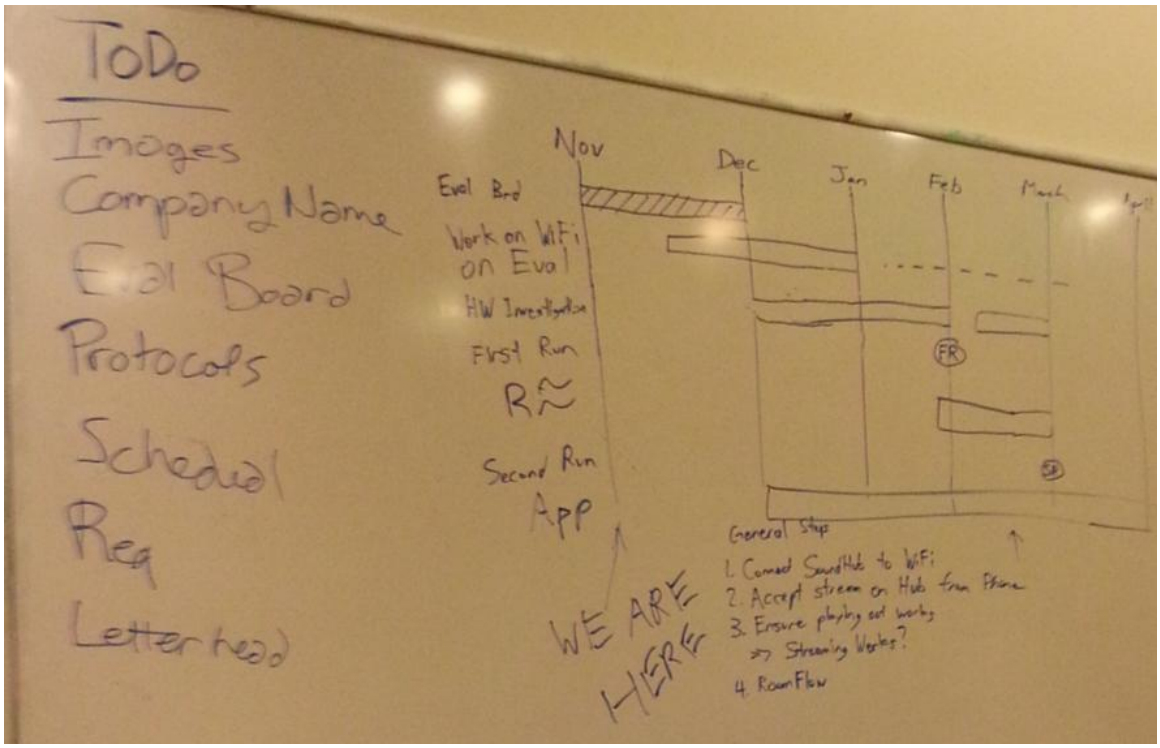
Agenda:

- Proposal Images
- Company name
- Evaluation board
- Wireless Protocols
- Schedule
- Requirements

Meeting Summary:

- Discussed project schedule for the next 5 months, listed milestones for the project
    - Constructed basic Gann Chart (see picture)
    - Put mobile app on hold since it's not first priority



- Completed Proposal text, lower its priority and focusing on hardware purchasing
- Max and Scott updated list of evaluation boards comparison
- Discussion on Evaluation Board requirements

		Devkit 8600 $228	Wandboard $117	Sitara module
Required	Wifi	Yes	Yes	
	Linux	Yes	Yes	no
	3.5 mm audio	Yes	Yes	yes
	HDA	Yes	Yes	
Like	Open source	No	yes	
	Community		yes	
	storage			

Action Items:

- Research sitara module
- Email Wolfsan and TI for possible free sample
- Purchase evaluation board
- Research suitable DAC chips

Next Meeting: Monday Nov.4th, 2013

Adjourn:

The meeting adjourned at 22:00 pm.

Respectfully submitted,

David Yin

ENSC 440: Interactive Wireless Speakers Project
Meeting Minutes
Date: Nov 4th, 2013
Time: 20:00 PM
Location: George's lab in ASB

Attendees:

George Chang, Max Miao, Scott Malfesi, Sherman Siu, David Yin

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Agenda:

- Evaluation Board Selection
  - Boards purchasing
  - Free sample boards

Meeting Summary:

- Sherman brought lots of hardware accessories: Wi-Fi antenna, RS-232 usb cable, mini-HDMI cable for project use
- Company name decided
  - Decided on Arimus over Allegro
  - (3 votes vs. 2 votes)
  - Company logo

- Decided to choose Wandboard as our evaluation board, purchasing the board
  - Registered on four Eval Board sites: Digikey, Mouser, AVNET, Future Electronics
  - With id: arimus.audio@gmail.com
  - Password: sfusdsmg
  - Phone: 604 671 2087
  - Shipping address:
  - 13711 International Place Suite 200 Richmond BC V6V 2Z8
  - Billing Address:
  - 117 Cranberry Court Port Moody BC V3H 0C4

Action Items:

- Identify all requirements
- Split up tasks and assign to everyone
- Prepare SD cards for evaluation board system
- Email Wolfsan and TI for possible free sample

Next Meeting: Monday Nov.11th, 2013

Adjourn:

The meeting adjourned at 22:30 pm.

Respectfully submitted,

David Yin

ENSC 440: Interactive Wireless Speakers Project
Meeting Minutes
Date: Nov 11th, 2013
Time: 14:00 PM
Location: George's lab in ASB, Jeffrey's place

Attendees:

George Chang, Max Miao, Scott Malfesi, Sherman Siu, David Yin

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Agenda:

Wandboard Testing

Meeting Summary:

- Received Wandboard from seller
- Played around with WangBoard, successfully load image OS Yocto
    - Went to Jeffery's place and tried to connect board to HDMI capable monitor and successfully load Yocto system and virtual keyboard available
    - Successfully connected to Wi-Fi without password, unable to connect to password protected Wi-Fi networks
    - Tried to youtube, doesn't have flash support
    - Bluetooth component worked, successfully transferred files to other cellphones
    - Microphone worked, successfully recorded voice
    - Tried to play music, when both HDMI and headphone are connected, music will only play from HDMI, if the HDMI is plugged off the music will be paused, continue the music then the headphone will play
    - Ubunto also worked
    - Special Thanks to Jeffery for his kindly sharing monitor, keyboard, mouse

Action Items:

- Identify all requirements
- Split up tasks and assign to everyone
- Prepare SD cards for evaluation board system

Next Meeting: Monday Nov.18th, 2013

Adjourn:

The meeting adjourned at 15:30 pm.

Respectfully submitted,

David Yin

ENSC 440: Interactive Wireless Speakers Project
Meeting Minutes
Date: Nov 18th, 2013
Time: 20:00 PM
Location: George's lab in ASB

Attendees:

George Chang, Max Miao, Scott Malfesi, Sherman Siu, David Yin

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Agenda:

- Role discussion
- Functional specs
- Class Schedule

Meeting Summary:

- Class schedule discussion next term
    - SS ENSC 452
    - SM ENSC 452
    - GC co-op
    - DM PHYS 421 and elective
    - DY ENSC 406 and 498, possibly one physics
- Discussed the possibilities of roles, George suggested to follow Professor's requirement: 5 major roles and 5 supports roles assigned to each person. Each of us take one major role and one support role
- Hardware
    - **4** Power management
    - **5** analog audio, digital (board layout), DAC, AMP
- Software
    - **2** OS & Drivers
    - **3** Applications (functions & networking)
        - **a** Networking
        - **b** App development
- **1** Documentation (ppt, funding, analysis) & schematics

- 1 L: David S: Sherman
- 2 L: Scott S: David
- 3 a L: George S: Scott
- 3 b L: Sherman S: David, max
- 4 L: Sherman S: max
- 5 L: max S: George

- Shared final exam schedules
    - SM Dec 9th to 15th
    - DY Dec 9th to 13th
    - MM Dec 20th
    - SS Dec 20th , 27th to 2nd skiing
    - GC working

Action Items:

- Functional Specs Documentation
- Research on firmware/software solutions of wireless streaming protocols

Next Meeting: Monday Nov.25th, 2013

Adjourn:

The meeting adjourned at 22:30 pm.

Respectfully submitted,

David Yin

ENSC 440: Interactive Wireless Speakers Project
Meeting Minutes
Date: Nov 25th, 2013
Time: 20:00 PM
Location: George's lab in ASB

Attendees:

George Chang, Max Miao, Scott Malfesi, Sherman Siu, David Yin

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Agenda:

- Proposal title page
- Functional specs
- Meeting schedule in December

Meeting Summary:

- Everyone wrote peer recommendation letter for George to take capstone project during Co-op
- Tried to connect Wandboard to desktop in George's lab through serial port
    - Scott suggested initializing the serial port by adding a file on SD card
    - However monitor doesn't have HDMI port, unable to visualize the boot
- Decided to meet up on once on Dec. 21st or 22nd, since final exams are approaching

- General issues with RoomFlow
    - soundhub placed far in the room while another soundhub placed next to the wall in the neighbour room, music will play in the neighbour room
    - WPS Wi-Fi Protected Setup

Action Items:

- Functional Specs Documentation

Next Meeting: Monday Dec.21st or 22nd, 2013

Adjourn:

The meeting adjourned at 22:00 pm.

Respectfully submitted,

David Yin

ENSC 440: Interactive Wireless Speakers Project
Meeting Minutes
Date: Jan 10th, 2014
Time: 20:00 PM
Location: George's lab in ASB

Attendees:

George Chang, Max Miao, Scott Malfesi, Sherman Siu, David Yin

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Agenda:

- Recent Dues
- Updates from December

Meeting Summary:

- Setting up new meeting schedules for the semester, decided to meet every Monday
- George successfully enrolled into ENSC 440
- Sherman brought two pairs of speakers for testing
- Serial cable problem solved, problem caused by wrong type of cables
- Recent dues: project proposal
    - Colors and fonts
    - Wanted to edit letterhead and templates to enrich the page presenting (Max)
    - Revise proposal make sure its consistent
    - Market reference
    - Title page
    - Individual rule within the company
    - Don't want work prototype, use feasibility
    - Get proposal done by Thursday so TA can go over
    - Gantt chart 70% done
- Sherman suggested doing 1 PCB run only due to time constraints
    - Cut funding since 1 run only
- Developing ideas
- Focusing on one to one streaming through wi-fi (George)
- Getting apps from: magic play, Qualcomm Allplay Alljoyn, XBMC, wced Wi-Fi (licensed to apple)
- George & Scott: having a master hub that connects to router which controls all slave hubs, then router talks to source to get position and decide which hub to play from

Action Items:

- David will be gone from Jan 15th to 19th, apply for funding varies sources
- Sunday on the 19th will be discussion on final minutes proposal and massive on functional spec

Next Meeting: Monday Jan.13th, 2014

Adjourn:

The meeting adjourned at 22:00 pm.

Respectfully submitted,

David Yin

ENSC 440: Interactive Wireless Speakers Project
Meeting Minutes
Date: Jan 13th, 2014
Time: 20:00 PM
Location: George's lab in ASB

Attendees:

George Chang, Max Miao, Scott Malfesi, Sherman Siu, David Yin

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Agenda:

- Proposal visual aspects
- Project Funding

Meeting Summary:

- Max created and uploaded the title page for proposal
- ESSEF funding
    - Gather signature
    - David and Sherman take care of funding
    - Need to know whiton funding deadline
    - Check part available in the funding library

- Proposal Gantt chart issues
    - PCB feasibility
    - Need by end of Feb.
    - Alternative plan - protoboard
    - Problem with soldering

- Progress issues
    - Moving forward
    - One to one stream, monitor mode, if not work, then set PCB primary and set room flow low priority

Action Items:

- More proposal revision

Next Meeting: Monday Jan.20th, 2014

Adjourn:

The meeting adjourned at 22:00 pm.

Respectfully submitted,

David Yin

ENSC 440: Interactive Wireless Speakers Project
Meeting Minutes
Date: Jan 20th, 2014
Time: 20:00 PM
Location: George's lab in ASB

Attendees:

George Chang, Scott Malfesi, Sherman Siu, David Yin

Agenda:

- Hardware deliverable change
- Handing in proposal

Meeting Summary:

- Sherman updated hardware component will be changed to customized DAC system since the original plan is too ambitious
- No deadline on apply for Wighton fund, can be applied after the project is done
- Proposal final revision, submission
- David will be in charge of Android development
- Machine shop training registration
- Setup weekend work day on Saturday or Sunday to work on the project together

Action Items:

- ESSEF funding application due this Thursday
- Start hardware research, amp, DAC

Next Meeting: Monday Jan.27th, 2014

Adjourn:

The meeting adjourned at 22:00 pm.

Respectfully submitted,

David Yin

ENSC 440: Interactive Wireless Speakers Project
Meeting Minutes
Date: Jan 27th, 2014
Time: 20:00 PM
Location: Virtual meeting on Google Hangout

Attendees:

George Chang, Max Miao, Scott Malfesi, Sherman Siu, David Yin

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Agenda:

- Prepare for ESSEF funding presentation on the next day
- Functional Speciation
- Alljoyn Streaming Protocol tested

Meeting Summary:

- Alljoyn Protocol Tests on 4 phones connected to Scott's Wi-Fi in Sherman's room
    - 1 source (nexus 5)and 3 syncs (1 note2, 2 nexus5)
    - Slave phones need to caching the music library before play, otherwise music lags
    - if the songs are fully loaded, all the phones will play in sync and have unnoticeable lag
- Max listed possibly DAC choices, need to consider price, performance, and compatibility issues
- Started on functional spec
    - letter of transmittal
    - general requirements
- Presentation slides prepared for ESSEF
    - Project description, functionality and scope, cost breakdown and implementation schedule
- New weekly meeting schedule changed to Wednesday

Action Items:

- Rehearsal for ESSEF presentation happening on tomorrow
- Functional Spec

Next Meeting: Monday Feb.5th, 2014

Respectfully submitted,

David Yin

ENSC 440: Interactive Wireless Speakers Project
Meeting Minutes
Date: Feb 5th, 2014
Time: 20:00 PM
Location: George's lab in ASB and Skype

Attendees:

George Chang, Max Miao, Scott Malfesi, Sherman Siu, David Yin (Through Skype)

Agenda:

- Functional Specification
- Hardware components purchasing

Meeting Summary:

- Working on functional spec, organize requirements, outline test plan
- DAC discussion
    - Voltage leveler between codec (1.5 – 3.3V) and TDA 1543 (5V)
    - Max put them on spread sheet
    - Focusing on 4 companies: Wolfson, Cirrus Logic, Texas Instruments, Analog Devices
    - List of DAC comparisons on Google Drive
- Prepare for purchasing list by Feb. 16th, 2014
- Source code discussion
    - Android app, source code Alljoyn , Don't touch it until Linux is finished
- February schedule planning
    - Functional specification
    - Order hardware DAC, enclosure parts
    - Picture of development plan

Action Items:

- Functional Specification – test plans, detailed requirements

Next Meeting: Monday Feb.12th, 2014

Adjourn:

The meeting adjourned at 22:00 pm.

Respectfully submitted,

David Yin

ENSC 440: Interactive Wireless Speakers Project
Meeting Minutes
Date: Feb 13th, 2014, originally planned Feb. 12th
Time: 15:00 PM
Location: ASB Lab 1 Sunny Room

Attendees:

George Chang (virtually connected), Max Miao, Scott Malfesi, Sherman Siu, David Yin

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Agenda:

- Functional Specifications
- Hardware components purchasing
- Updates from Firmware

Meeting Summary:

- Scott and George achieved internal source sink transmission on Linux platform, but music played been fast forwarded
- David write Thank you letter to fund sponsor
- Deciding on parts – reference design requires multiple sets of parts per circuitry, might increase hardware budgets
    - Need 6 AMPs ($1~4) per DAC ($12 ~ 16) for volume control, also need deferential op (~$10)
- Hardware discussion
    - How does Line in work – transistor network or slide switch, choosing metal rocker
    - Volume control – potentiometer or change gain of op-amp, have not decided yet
- Functional spec
    - Working on requirements, test plans, and functional justifications

Action Items:

- Functional Specification revision
- Hardware purchasing

Next Meeting: Undecided, Nothing to update after functional spec is due and Midterm week is coming after

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Respectfully submitted,

David Yin

ENSC 440: Interactive Wireless Speakers Project
Meeting Minutes
Date: Feb 26th, 2014
Time: 20:00 PM
Location: George's lab in ASB

Attendees:

George Chang, Max Miao, Scott Malfesi, Sherman Siu, David Yin

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Agenda:

- March Schedule
- Update from each components

Meeting Summary:

- Mar.6th oral progress 3:00 to 3:15, Design specification due on Mar.13th
- Firmware
  - Sample code compiled on wandboard Linux Tuesday night Scott and George
- Software
  - David need compile source (app) code on android SDK
  - Drop android app if didn't get Android work
- Hardware
  - Received shipping from hardware parts order
  - Sherman schematic DAC tos-link and SPDIF >> no 12V power >> use voltage regulators
  - Dropped TI reference design for op-amp stage, now plan B doing power design
  - Max solely ordered new parts includes bridge rectifier, didn't save his schematic vcc vdd vcc vdd encoder gpio

Action Items:

- Starting Design specification
- Hardware – Finish schematic and layout files, etching PCB boards
- Firmware – solve fast forwarding playing speed problem, rotary encoder, status lights
- Software – compile source code on Android platform

Next Meeting: Monday Mar.5th, 2014

Adjourn:

The meeting adjourned at 22:00 pm.

Respectfully submitted,

David Yin

ENSC 440: Interactive Wireless Speakers Project
Meeting Minutes
Date: Mar 5th, 2014
Time: 20:00 PM
Location: George's lab in ASB

Attendees:

George Chang, Scott Malfesi, Sherman Siu, David Yin

Agenda:

- Oral presentation preparation
- Components Updates

Meeting Summary:

- Prepare for oral progress
    - A brief overview of the project
    - The status of your project with respect to the original timeline, budget, and scope
    - The overall progress since the 1st week of classes
    - Problems to be resolved and tasks remaining to be completed;
    - What is Plan B if Plan A doesn't work out
    - A brief summary
- Firmware:
    - Computer to computer streaming, having problems with cross compiling, fast-forward issues
- Software:
    - Learning java and android SDK, compile source code by Mar. 16th
- Hardware:
    - Make purchase list for 3rd round
    - Schematics is done, need to do layout and etch on board
    - Research on etch process and ironing, prepare to etch our own PCB

Action Items:

- Design Specification
- Hardware – Finish layout files, etching PCB boards
- Firmware – solve fast forwarding playing speed problem, rotary encoder, status lights
- Software – compile source code on Android platform

Next Meeting: Monday Mar.12th, 2014

Adjourn:

The meeting adjourned at 23:00 pm.

Respectfully submitted,

David Yin

ENSC 440: Interactive Wireless Speakers Project
Meeting Minutes
Date: Mar 12th, 2014
Time: 20:00 PM
Location: ASB Pit

Attendees:

George Chang, Scott Malfesi, Max Miao, Sherman Siu, David Yin

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Agenda:

- Design Specification
- Components Updates

Meeting Summary:

- Everyone is working together on the design specification
    - Finishing up draft on all sections: hardware, firmware, and software design justifications and test plans, relating all designs to the functional requirements mentioned in the functional specification
- Components updates
- Hardware
    - Max got layout files ready, however the etching process did not went as expected
    - Going for the alternative plan which is to sending files to PCB manufactures for fabrication, will cost around $200 for two sets of PCBs
- Firmware
    - Alljoyn worked on Wandboard, however still having fast forward playing issues
- Software
    - Working on Alljoyn (Musydra) source code, try to compile

Action Items:

- Wrapping up Design Specification
- Hardware – Sending files to manufactures for fabricating
- Firmware – solve fast forwarding playing speed problem, rotary encoder, status lights
- Software – compile source code on Android platform

Next Meeting: Monday Mar.19th, 2014

Respectfully submitted,

David Yin

ENSC 440: Interactive Wireless Speakers Project
Meeting Minutes
Date: Mar 19th, 2014
Time: 20:00 PM
Location: ASB Lab 1

Attendees:

George Chang, Scott Malfesi, Max Miao, Sherman Siu, David Yin

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Agenda:

- Components Updates
- Written Progress

Meeting Summary:

- Hardware
  - PCB fabricated
  - David pickup the boards at Omni, Sherman soldered volume knob onto SPDIF decoder
- Software
  - David has alljoyn (Musydra) source code compiled on android, however still having problem with streaming
- Firmware
  - Tested older version of Musydra with Linux platform for compability, did not work well.
- Written Progress
  - Sherman finished the financial part, still need to fill up other parts

Action Items:

- Written progress
- Hardware – Solder all components and test outputs
- Firmware – solve fast forwarding playing speed problem, rotary encoder, status lights
- Software – Trying decompile older version of codes to get source codes

Next Meeting: Monday Mar.26th, 2014

Adjourn:

The meeting adjourned at 23:00 pm.

Respectfully submitted,

David Yin

ENSC 440: Interactive Wireless Speakers Project
Meeting Minutes
Date: Mar 26th, 2014
Time: 20:00 PM
Location: ASB Pit

Attendees:

George Chang, Scott Malfesi, Max Miao Sherman Siu, David Yin

Agenda:

- Components Updates

Meeting Summary:

- Written Progress finished
- Hardware
    - Unable to get any output from the PCB, only has noise, tried shielded cable and still not working
- Firmware
    - Working on fast forwarding playing speed problem
- Software
    - Still trying to figure out the problem

Action Items:

- Hardware – Find the problem that causes noise
- Firmware – solve fast forwarding playing speed problem, rotary encoder, status lights
- Software – Obtain source code for older version Musydra

Next Meeting: Monday Apr.2th, 2014

Adjourn:

The meeting adjourned at 23:00 pm.

Respectfully submitted,

David Yin

ENSC 440: Interactive Wireless Speakers Project
Meeting Minutes
Date: Apr 2nd, 2014
Time: 20:00 PM
Location: Phone conversation

Attendees:

George Chang, Scott Malfesi, Max Miao, Sherman Siu, David Yin

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Agenda:

- Components Updates

Meeting Summary:

- Hardware
  - PCB worked, able to decode signals and play it through DAC system
- Firmware
  - Solved fast forward playing problem music now plays at normal speed
- Software
  - De-compilation of source code was successful, able to make GUI level changes while allowing streaming through Android platform

Action Items:

- Integration test on hardware and firmware
- Firmware need to work on rotary encoder and status light
- Software need to solve compatibility issues with Linux platform

Next Meeting: Monday Apr. 9th, 2014

Adjourn:

The meeting adjourned at 23:00 pm.

Respectfully submitted,

David Yin

ENSC 440: Interactive Wireless Speakers Project
Meeting Minutes
Date: Apr 9th, 2014
Time: 20:00 PM
Location: ASB Lab 1 Sunny Room

Attendees:

George Chang, Scott Malfesi, Max Miao, Sherman Siu, David Yin

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Agenda:

- Components Updates
- Enclosure design
- Preparation for final demo/presentation

Meeting Summary:

- Hardware and firmware successfully integrated, able to stream music wirelessly through Wi-Fi and decoded and through DAC system to output music
- Software
- Compatibility with Linux is still unable to solve
- If unable to solve the problem will demo android component separately
- Firmware
- Working together with software team to solve compatibility problem
- Working on rotary encoder and status light
- Max strongly recommended to build an enclosure
    - Will buy wood boards and acrylics to build enclosure
- Set Work Freeze day on Apr.11th, everything should be stopped by then and work on the final documentation i.e. post-mortem, presentation slides

Action Items:

- Building enclosure
- Firmware need to work on rotary encoder and status light
- Software need to solve compatibility issues with Linux platform

Next Meeting: Sunday Apr. 13th, 2014

Adjourn:

The meeting adjourned at 23:00 pm.

Respectfully submitted,

David Yin

ENSC 440: Interactive Wireless Speakers Project
Meeting Minutes
Date: Apr 13th, 2014
Time: 09:00 AM
Location: Sherman's house

Attendees:

George Chang, Scott Malfesi, Max Miao, Sherman Siu, David Yin

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Agenda:

- Final Wrap-up
- Preparation for final demo/presentation

Meeting Summary:

- Firmware rotary encoder and status light worked
- Software component will demo separately
- Enclosure built, placed the wandboard and SPDIF decoder inside
- Finishing up the post mortem and final presentation slides
- Rehearse on the final presentation

Action Items:

- Sleep well, be prepared for the presentation
- Buy donuts

Adjourn:

The meeting adjourned at 23:00 pm.

Respectfully submitted,

David Yin