



Post Mortem

SimpleHome

A Home Automation System

Project Team:

Curtis Meerkerk
Daniel Quon
Ekta Sachdev
Kara Imhof
Meghan Lui
Nas Makkiya

Primary Contact:

Curtis Meerkerk
cmeerker@sfu.ca

Submitted to:

Andrew Rawicz - ENSC 440W
Steve Whitmore - ENSC 305W
School of Engineering Science
Simon Fraser University

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Introduction

The goal of the SimpleHome project is to take regular household fixtures and intelligently automate the functions which they perform. Simple, Efficient, Inexpensive and Secure: these are the four core values which give our product a distinct edge over competing home automation solutions. The @HOME team believes that our SimpleHome hub will meet the needs of both the rapidly expanding smart-home market and the growing need for in-home assistive devices for the aging populace.

This report reflects on the experiences collected by the @HOME team during the development of the SimpleHome product; especially focusing on the challenges faced in designing SimpleHome; comparing between the projected timeline and costs, and the actual result; how the team divided work; some personal reflections from each team member; and @HOME's recommendations regarding SimpleHome and other 305W/440W classes.

High Level Description

The controlling gears of this system lie in the SimpleHome Hub, which serves as a medium between the user commands and the actual devices being operated in the household. The SimpleHome Hub is equipped with wireless communication tools which allow it to serve as the medium between the remote user and the peripheral devices placed in the house. Additionally, the Wi-Fi capabilities of the Hub, allows user data to be backed up on the user-accessible data server. The BeagleBone Black is a low-cost single-board computer, which serves as the control-center in the SimpleHome Hub design.

In designing the SimpleHome system it was challenging to find peripherals to use with the system as retail smart home systems typically work on a proprietary protocol or a closed source API. So in the spirit of modularity we divided the task of connecting with the existing products and designing our own. The choice was made early on to connect with existing ZigBee products being the more open of the proprietary protocols. The design of our own peripheral devices is to show the potential of this project to control the lighting and temperature of the house in a simple and inexpensive way.

The SimpleHome system user will communicate with the system and control peripherals through a web-based graphical interface, accessed from a personal computer or



smart handheld device on an Android platform. The GUI website is hosted on a web server accessible through the Internet.

The user interface was built and designed using Meteor, a JavaScript framework integrated with MongoDB. The database acts as our centralized platform to store and synchronize peripheral information. As such, the user interface and BeagleBone Black are subscribed to the database in order to allow the user to control the BeagleBone Black.

Comparisons

A simplified table of our projected cost breakdown as stated in our proposal is shown in the following table.

Item	Description	Qty.	Cost Estimate (\$)		
			Unit	Subtotal	Total
1	BeagleBone Black Board RevC	2	80.00	160.00	160.00
2	TI WL1835MOD Wifi with chip antenna	1	50.00	50.00	50.00
3	Xbee Module	2	17.00	34.00	34.00
4	ZigBee HomeAutomation Gateway	1	49.00	49.00	49.00
5	3D Printed Hub Case	1	10.00	10.00	10.00
6	GE Link Bulb	1	25.00	25.00	25.00
7	Electrical Test Board	1	51.75	51.75	51.75
8	Relay Switch Module	1	15.50	15.50	15.50
9	Temperature Sensor Module	1	16.75	16.75	14.75
10	Alarm Module	1	16.75	16.75	16.75
11	Automated Blinds	1	116.75	116.75	116.75
12	Automated Sprinkler Valve	1	46.75	46.75	46.75
13	Smart Device	1	127.75	127.75	127.75
14	Thermostat	1	100.00	100.00	100.00
15	Termination and Connection Hardware	1	12.00	12.00	12.00
				subtotal	830.00
				10% Shipping	83.00
				20% Contingency	166.00
				Total Estimated Cost	1079.00

Figure 1: Project Proposal Costs

The actual costs and funding we received are displayed in Table 2. Due to time constraints we were not able to add the alarm module or smart device and is thus not listed in the actual budget. We were able to save money on the electrical test boards and sprinkler valve utilizing various materials that we found in our own homes. The discrepancy between the projected and actual costs were minimal, and we were fortunate enough to receive funding from the IEEE Canadian Foundation and ESSEF.



We have \$381.00 remaining that will be returned to ESSEF to fund future capstone or individual engineering projects.

Item	Description	Amount (\$)
EXPENSES		
1	BeagleBone Black and Accessories	218.00
2	Zigbee Peripheral	283.00
3	Test Boards	7.00
4	Switch Peripheral	30.50
5	Temperature Sensor Peripheral	36.50
6	Automated Blinds	137.00
7	Thermostat Peripheral	183.00
8	Engineering Journals	40.00
9	Application Costs for Funding	27.00
10	Presentation Setup	27.00
Total Costs		989.00
FUNDING		
11	IEEE Canadian Foundation	820.00
12	ESSEF	550.00
Total Funding		1370.00
Remaining Total		381.00

Figure 2: Actual Project Costs and Funding

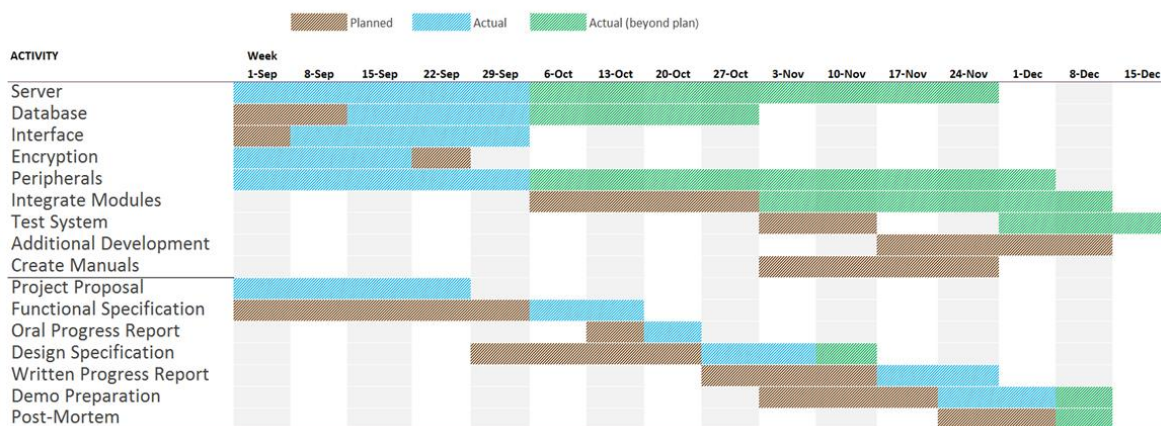


Figure 3: SimpleHome Timeline



Figure 3, compares the projected timeline of SimpleHome to the actual results. In summary, the brown areas were the planned timelines and the blue are what it actually took to complete each task. whereas the green is also "actual time" but is when we went over the planned schedule. Since the Server, Database and Peripherals modules of development took more time than expected we were forced to remove additional development and creating manuals from our project scope. Since we are unprepared, as a team, for how much each person individually did not have time to work on documentation as time progressed documents were written in shorter time periods than expected.

Reflecting on the experience from a financial and schedule perspective, @HOME came in under budget and set ambitious technical work deadlines. Furthermore, SimpleHome was still able to be finish with a complete and thorough demonstration by December 14, 2015.

Problems and Challenges

We had many problems and challenges that impacted our final scope and design. Initially with our ambitious timeline, we were going to implement an alarm system and a RF door lock, but we quickly found out that was not possible with our timeline. In addition, we were going to integrate a Honeywell thermostat that uses the ZigBee protocol. Which due to a proprietary API and the complexity of hacking it we were unable to incorporate it into our system as we had originally hoped.

We originally chose to use a Wi-Fi Cape to provide wireless connectivity to our SimpleHome Hub, however, we encountered multiple difficulties when trying to implement this aspect to our Hub. The initial issues began with getting the driver for the WL1835 chip on the cape working with the QNX OS. Despite getting tremendous help from the developers at QNX, we eventually made the choice to switch to Linux distribution as our host operating system. This turned out to be a bigger source of challenges, as by the time we made this conscious decision, the cape manufacturers were trying to phase out the cape we had bought. This led to a wild goose-hunt to track down the relevant source code to deploy the driver to run Wi-Fi capabilities provided by the cape. Unfortunately, we had less than a month until our demo day, and integration was most certainly a higher priority than attempting to make a single component work. Therefore, we chose to use the Ethernet functionality provided, by default, by the BeagleBone Black and connect to the home router.



Before the start of the term, we had segregated the work-load amongst individual team members. Everyone was assigned tasks but were provided with the freedom to use whichever software or tools they preferred. The problem arose, when it was time to integrate each individual's independent work into our overall system. For example, the ease-of-use of the Meteor platform depends on being able to download and run the Meteor software on the microcontroller. We managed to overlook that running the Meteor software is only possible on x86 machines. Since the BeagleBone Black has an ARM processor, we had to delve deeper into examples available online to figure out an easier approach to make the Meteor system work.

Team Organization

The SimpleHome team was organized roughly based on our prior experience while maximizing the amount we individually would learn and dividing the amount of technical work each member would have. Due to the modular nature of the SimpleHome, @HOME created a matrix organizational structure where one or two people would be responsible for a large task. One of the most difficult team challenges was finding time to meet as a group as everyone had differing class/work schedules. The only class in common with all team members was Capstone itself. Also as a team, we had difficulty finding technical work fitting and expanding on each person's skill set. As a result, some members were given responsibilities that they had no prior knowledge in. To resolve these issues, we either worked alone or in smaller groups to complete parts of the SimpleHome. In addition, constant communication on a group chat helped to unite the group when all members could not be physically present and get assistance when needed from other members. In the end we were able to assign each member a technical section toward completing SimpleHome.

The following table summarizes how the @HOME team worked together to complete SimpleHome. The sections are divided into three sections: Technical (in blue), Documentation (in green) and Other (in grey). Please note, in the Documentation section a 'XX' represents that that person was responsible for the particular document getting finished.



Figure 4: SimpleHome Work Breakdown

	Curtis	Daniel	Ekta	Kara	Meghan	Nas
Server			XX		X	
Interface	X	XX	X		XX	
Encryption		X				XX
Peripheral Devices				XX	X	XX
Integration		XX	XX		X	X
Funding Proposals			X	X	XX	
Project Proposal	X	XX	X	X	X	X
Functional Specification	X	X	X	X	X	XX
Design Specification	XX	X	XX	X	X	X
Written Progress Report	X		X	XX		
Demo Preparation	XX	X	X	X	XX	XX
Post-Mortem	X	X	X	XX	X	X
Administrative				XX		
Finance					XX	

Legend	
XX	Major role in completing task
X	Minor role in completing task

To summarize, we all took a fair and even load of documentation work with each team member working equally hard to complete. Our technical work was more difficult to balance as some sections were harder to complete than others. With weekly meetings and coming into the 440W/305W course with a solid plan of action toward dividing work @HOME was able to minimize problems among group members.



Personal Reflections

As SimpleHome is a very modular product each person ended up facing their own technical challenges to resolve. Therefore, in their personal reflection each team member will mention what they felt was their most difficult technical challenge, along with their contribution to the project and what they learned from the experience.

Curtis Meerkerk

I had a running start on the term having researched and planned out what I thought would make a competitive home automation startup. This led to the focus on simplicity and keeping the system costs low and also directed us to target the elderly and disabled as they could take full advantage of this system. At this point I wrote a brief design specification for what I thought was an ideal home automation system based on my research and set four main values for us to incorporate: simple, smart, energy efficient and secure. As the project progressed and the more information we gathered as a group we were able to refine and implement many of the ideas of the original design spec and find a balance between features and cost. A couple examples are implementing position detection using RFID was discussed but would double the cost of the system or implementing a camera peephole for a door answering system.

As for the projects I took on in September I had put together a test board which contained all the components of a living room's electrical on a board and started talking with Nas about how to design the peripherals to automate the board. Then in October and November I was focused on documentation and coordinating the work. During this time I worked on testing a few algorithms for the machine learning component, gave direction on the peripherals, and made sure that there were enough people and progress on the critical path parts of the development helping where I could. In December we wanted to try and revive the android app component that Kara and Daniel had worked on so I spent the last couple weeks trying to get an app running while finishing my machine learning project. Building the android app proved to be a challenge as Android Studio had several issues with missing libraries and I had no knowledge of the API so making changes would often result in everything crashing. In the end I did create a simple login app though since it did not have any tcp functionality so it did not add anything to the project and was therefore not presented.



The main challenge for me early on was dividing the work in a fair and productive manner. I think this went fairly well, however, in organizing projects and technical components for others I was not as focused on finding and working on tasks of my own. This led to my components of the project not being as polished as I would have liked. The time constraints due to other classes and only having four months to complete the project meant that the project was not able to reach its full potential. With that being said I am proud of what the group accomplished and grateful to have a great group that worked very hard and slept to little this semester.

- Ekta did a superb job taking on the critical path part of the project and was very reliable
- Kara kept me on task in meetings which I am very grateful for and kept all our documents in order
- Daniel and Meghan did a good job with the website and even better with integration and zigbee respectively
- Nas he has some room to grow in documentation but most of all I will miss discussing circuits and designs for peripherals every week

Daniel Quon

In the beginning I did not know much about anything I have been doing for the past 4 months, but I definitely learned a lot about home automation and website development which included Meteor. Although this learning did not come without challenges along the way. These challenges included, website development with Meteor, reading a json file into the database, porting our website into an android app, and also connecting the BeagleBone black/ SimpleHome Hub with the database and website.

One of my main roles was the website and database. Although Meghan mostly did the front end, I still needed to know little bit about it to do the backend. Meteor was surprisingly easy to work with specially without having no previous experience in web development at all. In addition, we were planning on connecting the database with the hub by sending and receiving json files that contained the information for our hub. Since Meteor has a built in MongoDB database, understanding how this database worked within Meteor was an added challenge throughout our project and as a result we ended up changing the way the SimpleHome Hub communicated with the database. I overcame the lack of knowledge with website development, troubles with the database and specifically with Meteor, with online tutorials, forums and examples of



how Meteor has been used. After all of this, I can say I know a lot more about Meteor's JavaScript framework and in general website development as a whole.

As Meteor has said in their documents, it is simple to port your meteor project into a working mobile app. At first this seemed easy, but as we first designed our website to be a website rather than an app, it turned out to not appear like how we wanted and was not user friendly at all. As a result, we decided to switch back to our original plan of creating our own custom android app. I did however work on improving the website as I noticed many flaws with our current design, therefore worked with what Meghan had as a base of the user interface and improved upon it, while she was busy working on the ZigBee light bulb.

Lastly was integrating with the BeagleBone Black/SimpleHome Hub. After I had completed my part, many changes still had to be made to incorporate the communication with the database and hub. Since Ekta's Wi-Fi cape wasn't working, we had to find a way to connect the Hub to internet so that it can connect to the website. Since we are unable to tap into SFU's internet via wire, I had to come up with a solution to bridge the Wi-Fi, but was very unreliable. In addition, integrating Meteor with the BeagleBone Black was a tough challenge. After being without a solution, and finding a bunch of solutions, we came up with a solution. Truly I have learned the importance of a diagram. After drawing out how both DDP and IO sockets work we finally figured out that DDP was our solution.

Having only worked with one of the members of our group before I did not know what to expect or how we were going to get along with each other. Now fast forward past many problems and challenges, I am happy that we were able to all come together and complete our project.

Ekta Sachdev

Being a perfectionist by nature, the Capstone Project experience definitely helped me understand that prioritizing my tasks is a more important job than spending months trying to make one task operate flawlessly. Even though our group started working on the project during the summer months, the integration phase kept us busy until the last day! In hindsight, one of the most vital things I would suggest to all students who plan to take this course in the future is: bank on everyone's strengths. One of the most important mistakes we made as a group was to assign people things which they had no experience in. The idea was to ensure people learnt more from this course, but most of our development and integration phases would have reduced substantially if I was



assigned something I had experience with. It is great that I got an opportunity to learn about Meteor, DDP, JavaScript and shell-scripting over the course of few weeks, but I would have personally preferred to start off with probably Android development, as that's something I would have loved to do, since I have experience with that.

As an individual working on this system, there were a list of personal challenges I had to face and overcome:

1. Getting the Wi-Fi functionality up and running on the SimpleHome Hub landed up taking a significant amount of my development time. Between switching operating systems and getting the resources to deploy the relevant drivers, crucial development and integration time slots were compromised.
2. The importance of collaborating with team members is, oftentimes, undermined. This project taught me about the necessity to always have a team member around to play devil's advocate. Having another set of hands working on the same tasks and asking questions, helps to achieve bigger milestones in the development phases.
3. Our group didn't have the whole picture clearly thought out when we started working on the project seven months ago. This led to individual choices for the software being used to complete individual tasks. The lack of the forethought ensured that when it came to integrating the system, all the in capabilities of various software showed up. This lack of "end goal direction" caused the integration phase to be especially time-consuming and challenging.

As senior engineering science students, we all have the technical skills to make things operate according the design requirements. In the most challenging scenarios, it always seems easier to just give up on your ideas, but one of the most important things I take away from Capstone is that as long as you stand your ground and are willing to put every effort to make things work, nothing can stop you from achieving your goals. Asking for help and researching is key to building a system of such high complexity.

Kara Imhof

As a course 305W/440W is useful and necessary. I am extremely glad that I had a team by April 2015 and was passing around ideas and starting work before September. Prior to the start of the Capstone semester we were able to decide on a project idea, start



our project proposal and obtain funding from IEEE. Without this this early start I may have lost my mind from stress.

A large part of my work included dealing with the administrative work related to developing SimpleHome. Although simple in concept keeping track of meetings, the project timeline and team updates took a large part of my time. Scheduling was one of the most difficult tasks to do, other than Capstone as a team we had no class in common among us. This made meeting in person challenging. Although as a team we were productive when sitting beside each other working, we could rarely do so. Group dynamics, was another learning curve for me. As I am a pro-active person starting work early and completing it a little at a time other group members work on things last minute. This stressed me out at the beginning of the project and I am not sure if I have improved in how to deal with it. Furthermore, I was surprised at how often challenges would come up stalling my technical work.

I experienced a variety of mechanical, electrical and software tasks to complete the automatic blinds. Mechanically, I had to build a frame for the blinds, that was sturdy and could come apart once the project was finished. Also I had to figure out how to connect my motor the drive shaft of the blinds in such a way that the torque from the motor would turn the blinds.

Electronically, I had to deal with finding power sources to use when I was not at school. I had to build my circuits and check that the more delicate electronics were not damaged when the motor had to draw a large current. Although I had a great source from the website "Instructables" I still had to change and adjust the results to match what we wanted the blinds to do. I can now say I have soldered to prospective employers but I will still mention that I am not very good at it.

On the software side, I got to learn to use an Arduino to start my program off then when we switched to a Wi-Fi chip I got to experience new challenges in debugging and porting content to a different format. I do regret not continuing to working on the Android App but at the start of the semester I started learning about it then as things picked up I got caught up in doing other things. This forced my team to have to revisit the issue at the end of the semester when we had even less time to try and make a specialized Android App. By the end of this project, I have been exposed to a wide variety of skills that I can use in further projects or my career.



Meghan Lui

My Capstone experience overall was very positive, I was able to develop skills and solve real world problems outside of a classroom and textbook driven learning. Individually, I was able to work on a variety of different tasks on our project, including our front end website design and implementation of the ZigBee protocol onto our hub. Although, at times, our group disagreed and debated on a number of topics, this only strengthened the end result of our product and I am grateful to have had the opportunity to work with each person on my team.

The first technical aspect I worked on in our project was the website design. I had little experience designing websites and spent a large amount of time researching and looking into implementation of a Meteor framework website before beginning to code. This worked to my advantage since I found various library packages available for Meteor that automated and simplified the task of designing a user interface with linked pages and reactive buttons. Once the website was up and running, I was also able to work on the database side of Meteor, "MongoDB". One of the advantages of utilizing Meteor was that integrating the front and back end was as simple as calling a function on the front end to subscribe to the back end. Since integration is one of the most time consuming tasks in a project, we were able to reduce time spent on website to database integration significantly.

During the last month of the project, I had the opportunity to work on integrating the ZigBee Home Automation protocol into our hub. Technically, this was an enormous challenge for myself, as I am not knowledgeable or familiar with data communication and wireless protocols. I found myself quickly overwhelmed with the amount of work I assumed there was in implementing ZigBee, and deliberately expressed my concerns to the team during our weekly meetings. However, I found that taking a step back and approaching a problem from a different perspective ultimately led to my success implementing ZigBee. That is, instead of immediately trying to implement the ZigBee integrated GE Link Bulb with our hub, I decided to allocate time to understand how the protocol worked, look into the software or tools available to us, and created a simple network to send commands across. Once this was implemented, setting up a network and sending commands to the GE Link Bulb became a very simple task. I also learned that continuously voicing my concerns does little to solve a problem; acting on your concerns and having a positive outlook is a better choice.

Although our team's project was successfully implemented, that did not mean that we did not face a number of significant challenges throughout the semester. One of the



biggest challenges we had was finding a time to meet as a group, since we all had busy schedules outside of school. This was frustrating, but we were still able to pull everything together by splitting into smaller teams and using other means of communication, including skype calls and WhatsApp Messenger. Working efficiently and prioritizing tasks to meet our short deadlines ultimately led to our project success.

Nas Makkiya

Having real world experience quite a bit with this project, I was able to keep some of the expectations grounded in reality, however, this project has taught me to have backup plans on my backup plans, which is very rewarding, as it takes the pressure off. My advice to future students, be realistic, do not underestimate the time tasks take, and always stay positive.

When I first started, the first thing I decided to do is to create an SVN server to have everyone's code, and schematic consolidated into one place, that turned out to be the best idea ever, as no one had to look around for code, or schematics, and lose time.

I faced a number of challenges, including but not limited to:

1. Making a circuit that had components that couldn't fit inside a light switch box, so I had to redo the whole thing using a TRIAC circuit, which was more compact, cheaper, and consumes less power
2. After trying to implement my solution for the UDP Discovery, the FW started crashing on me, and I had no idea what the issue was, I had to download the source code for the entire FW, and go through it to find out what was happening, I ended up just eliminating some modules that I wasn't using, since they take up memory, and it started working.
3. Integrating an off the shelf thermostat turned out to be a hassle since the developers had locked the API, and I wasn't able to get it, unless I buy it, which was expensive, so I was not able to implement it.

However, after all said and done, this was an eye opening experience, I learned quite a bit about working in a project which has multiple parts from different fields of the tech industry, it has given me a unique overview about the challenges that startup companies face. It also gave me the chance to learn quite a bit about network programming, which is something I have wanted to learn for quite a bit of time. Lastly, when I first started this semester, I had absolutely no knowledge of Solidworks, so I



decided to learn that so I can build the box, and the SSR models, which later I can 3D print. That was a delight to learn, and I feel gave me an invaluable skill for the future.

Conclusion

By the final presentation, @Home was able to create a website that connects to a central hub which controls a light switch, an outlet and automates blinds. In the future our group as a whole will not continue further development into our product. Certain members of our team may continue to work on certain elements and improve upon them and possibly bring one of our peripherals into the market, but the entire project will probably not. It was an interesting experience for all, but we understand that the market for this product is very small at this period in time, and a lot of additional development will need to be done to put this product on the market. Overall we are proud of what we were able to accomplish in just 4 months and are satisfied with our final product that we presented. We look forward to seeing other products similar to ours in the market that will improve the lifestyle for the elderly and physically disabled.

Appendix

We had over 20 recorded meetings during the development of our SimpleHome. As required we will include several samples of our meeting minutes. Please note that informal team meetings started in team meetings started in late April 2015. Should you wish to review more meeting notes contact our COO Kara Imhof (kimhof@sfu.ca).

-----*Meeting Minutes*-----

Objective: Tie-up any loose ends before school starts

Date: Wed Sept. 2

Location: In Person at SFU

Time: 6:00 PM Vancouver Time

Estimated Meeting Length: 120min

Note Taker: Kara

Attendees: Meghan via Skype, everyone else in person

Time Start: 6:16

PREPARATION FOR MEETING

Person	Tasks
Curtis	- Costs and References



Ekta	<ul style="list-style-type: none">- Add conclusion to IEEE Proposal [add in by 9th]- Email Andrew about Wighton Fund
Daniel	<ul style="list-style-type: none">- Website stuff
Meghan	<ul style="list-style-type: none">- web stuff
Kara	<ul style="list-style-type: none">- renewability look into ENSC 406 final document for sources
Nas	<ul style="list-style-type: none">- Sources for where to buy hardware [for next couple of weeks; ongoing]- Hardware stuff- Inquire about Telus Funding (source: Andrew)
EVERYONE	<ul style="list-style-type: none">- Work end of summer goals- Functional Spec

AGENDA ITEMS (Item/Responsibility/Due Date)

Point form and include sources if possible

Old Items

1. Has everyone read the agenda? Are there items to add/change? [<1 min]
2. Round Table Question: What documents should the group have open? [<1 min]
3. Nas: Updates for Andrew and Telus Funding:
No reply TELUS funding
Andrew is ok with large group
4. IEEE Proposal: Was there any trouble in preparing to or submitting it? Anything to watch out for when submitting other documents?
Submit at least 1 day before due so that we are sure that it is ok.
Leave work on google until last minute to formatting
5. List of Parts Available to Borrow/ESSS Funds Update:

So the parts list can be viewed here:

<https://www.dropbox.com/s/6xdnlquij0akj8p/ESSEF%20Parts%20Database.xlsx?dl=0>

Also, in regards to your other email about the project grant funded by ESSS; that is still in progress and applications will become available sometime in mid-September. More information will be provided then as well.

Thank you for your patience,



Shahira A Azhar
ESSEF Director

Curtis, Nas and Ekta to look into what parts we might want to borrow (let group know in two weeks)

New Items

6. Have we met our end of summer goals? [see "Wed, July 15, 6:00 pm (Vancouver Time)" for previous discussion]

Phase 1: Design
<i>Started: May 2015 - Complete by: September 2015</i>
Deliverables- Proposal, Tentative Teacher approval of Project,
Designs for Server and Interface developed

Individual Tasks:

Ekta: Have a PoC Server

- not working at the moment as no Linux access to Linux (school, home)

- Everyone get a bootable Linux (Kara, Daniel, Meghan?)

Curtis: Method of power switching (moved to Nas) and communicating with server (Wi-Fi)

Meghan: IEEE Proposal Submitted

Nas: Hardware List, Encryption,

Question: Of the modules mentioned in the IEEE Proposal how many are already built? what is the remaining work needed on them?

- Light-switch finished

- Multipurpose device (for testing)

Daniel: -learn language(JavaScript)

-Come up with a mock-up website: draw it out.

-Main thing: learning the libraries (such as meteor). Library contains stuff done for user, we just need to know how to implement it.

- Given 3 weeks to have a 'real' (at least 1 page) website working.

- Refer to Dan's rough sketch in /Ideas/Webpage idea.png

Item: Order Parts for 2 Test Servers

Ekta to order an almost duplicate of the BBB that we already have (Ethernet if we can't find Wi-Fi cape)



NOTE: In the Capstone folder we have several themed documents that have been grouped together into folders. Budget documents have their own folder and the other proposals and application docs have been moved to the "Submission" folder

7. Go to <http://doodle.com/gfx34nkwmgi3gk45> and put in times when available
 - i. Alternate face to face chats at SFU with Skype [Y/N]?
N- face to face as much as possible

When working on project can work in the Lab 1 in the soldier stations

NOTE: For each month we should expect at least one meeting to be 1+hours.

NOTE: At the end of every meeting we decide if we will meet in the next week or not.

8. Does everyone have an Engineering Journal [Y/N]?
Walmart - pre-numbered "Blueline" accounting/accountants notebook
Kara is going to check Walmart tomorrow
9. Start preparation for Capstone Class Proposal, ESSS Proposal?
Capstone Class Proposal,
Curtis' image, Kara's Timeline, Meghan's budget, "elderly" rebase to proposal - Nas,
Last formatting - Ekta
ESSS Proposal
waiting until form is released

Functional Specification:

All write half a page for overview each section (rough)

Kara will brave Andrew with asking about reliability and sustainability

-due 3 weeks

10. What purchases do we need to make?
see Ekta: BBB, 2 ZigBee home automation,
Curtis: testing board setup
Nas: Peripheral stuff from eBay
EVERYONE: KEEP YOUR RECEIPTS
[2 weeks for purchases to be done]
see #8: engineering journals

11. What are the next set of Project Milestones (Due by end of September)?

Submit: ESSS Proposal (25/09/2015?), Capstone Class Proposal (28/09/2015), Wighton Fund

Finish Second Draft of: Functional Spec (19/10/2015),

~~**Have Started First Draft of:** Design Spec (09/11/2015), Oral Progress Report (late October)~~

Test Meeting: Everyone comes with working toys and we try them out



Interface (Website and APP): 2 pages working (home page, showing raw data)

Peripheral Devices: firmware written

Hub: ZigBee and Wi-Fi ready to go

Timeline: look at where we are at and where we need to go, decide on the nice to haves

NOTE: The Fall course outline has been posted at:

http://www2.ensc.sfu.ca/~whitmore/courses/ensc305/pdf%20files/305W_Outline_Fall_2015.pdf
and the Timeline has been adjusted

12. Other Comments or Questions?

Curtis: Testing Board (need somewhere to store on campus eventually)

to make something smart we often need a position. Nas: we can sonic sensors, RFID
get locker in Lab 1 with combo lock

Meghan:

Ekta:

Daniel: get locker in Lab 1 with combo lock

Nas: ask Ash about storing in the lab

Kara:

Conclusion

13. What is each person's task for the next meeting? [5 min]

Person	Tasks
Curtis	<ul style="list-style-type: none"> - look into ESSS List of Parts Available to Borrow - FINISH overview image - create a testing board setup (low on the priority list) - get locker in Lab 1 with combo lock
Ekta	<ul style="list-style-type: none"> - Get BSP posted (from Foundry27) and email Mark for updated BSP - Order parts - look into ESSS List of Parts Available to Borrow - get ZigBee and Wi-Fi ready to go (in progress)
Daniel	<ul style="list-style-type: none"> - get Linux on home computer - have a 'real' (at least 1 page) website working (3 weeks) - get locker in Lab 1 with combo lock
Meghan	<ul style="list-style-type: none"> - UI functional spec budget



	<ul style="list-style-type: none"> - get Linux on home computer
Kara	<ul style="list-style-type: none"> - get Linux on home computer - Buy 5 engineering journals “accounting” - brave Andrew with asking about reliability and sustainability (after next next meeting) - Add the ‘elderly’ rebase to the Proposal - <i>Next meeting: book library rooms for next couple of months</i>
Nas	<ul style="list-style-type: none"> - RFID Location Research - Ask Ash for storage - Writing FW Plan-Done - Start purchasing - Look into a Linux Live Disk-Done - look into ESSS List of Parts Available to Borrow - Peripheral Devices: write firmware (in progress)
EVERYONE	<ul style="list-style-type: none"> - Complete doodle with days you can meet, next meeting we will decide when everyone wants to meet. - Functional Specification: write a half a page for overview of each section

14. When is the next meeting? [1 min]

Friday, September 11 after 440W class (i.e. 4:30pm) we decide when the next meeting is

15. Meeting Finished at 7:32 pm at/on [SFU/Skype]



-----Meeting Minutes-----

Objective: ESSS Proposal is due one week from today

Date: Fri Sept. 11

Location: In Person at SFU

Time: 4:30 Vancouver Time

Estimated Meeting Length: 30min

PREPARATION FOR MEETING

*Nothing Required as this is a short meeting

AGENDA ITEMS (Item/Responsibility/Due Date)

Old Items

1. Has everyone read the agenda? Are there items to add/change? [<1 min]
2. Documents to have Open: [<1 min]
ESSEF PROPOSAL FORM
Re:ESSEF Student Endowment Funding Applications (EMAIL in SFU Connect)
ESSEF Categories.pdf

New Items

3. **The Proposal is due via email on Sunday September 20 and a hard copy by Sept 22.** There are two sections still remaining to be filled.

Funding Category (See <http://www.esss.ca/>)

Category C – Class

- Projects that originate from an Engineering Science class or a special projects laboratory
- Rating Criteria: originality, usability, team oriented
- 25% of the total available funding will be allocated to Category C

Cost Breakdown

4. Who will be the main contact? [Please note that the designated award recipient must be enrolled in at least 9 credit hours and have a CPGA of at least 2.00.]
5. The **Social and Educational Benefits** needs to be rewritten to include our Educational benefits.
6. *[In addition to the application, applicants will be required to give a brief 5-minute presentation of their application focusing on the cost breakdowns and answer 5*



minutes of questions at the end.] Who will be in charge of helping the rest of the group understand the budget? And work should be done in making the presentation.

7. How to commit to SVN?

Conclusion

8. When is the next meeting and the following further meetings? [5 min]

	Mon 7			Tue 8				Wed 9					Thu 10			Fri 11					
	11:30-12:30	1:30-2:30	4:30-5:30	10:30-11:30	1:30-2:30	2:30-3:30	3:30-4:30	10:30-11:30	1:30-2:30	4:30-5:30	5:30-6:30	6:30-7:30	7:30-8:30	10:30-11:30	11:30-12:30	12:30-1:30	1:30-2:30	2:30-3:30	4:30-5:30	5:30-6:30	6:30-7:30
Kara																					
Curtis																					
Daniel																					
Meghan																					
Ekta																					
Nas																					
	5	5	4	4	4	4	4	4	5	5	5	5	5	4	4	4	4	4	6	5	5



-----Meeting Minutes-----

Objective: Updates on Progress Date: Fri Sept. 18	Location: In Person at SFU Time: 4:30 PM Vancouver Time Estimated Meeting Length: 60min
--	---

Note Taker: Kara

Attendees: Everyone but Curtis
as he is at UBC

Time Start: 4:28pm

PREPARATION FOR MEETING

Person	Tasks
Curtis	<ul style="list-style-type: none"> - look into ESSS List of Parts Available to Borrow - FINISH overview image (NOT DONE) - create a testing board setup (low on the priority list) - get locker in Lab 1 with combo lock -Done
Ekta	<ul style="list-style-type: none"> - Get BSP posted (from Foundry27) and email Mark for updated BSP -Done - Order parts -Done - look into ESSS List of Parts Available to Borrow -Done (SVN list) - get ZigBee and Wi-Fi ready to go (in progress)
Daniel	<ul style="list-style-type: none"> - get Linux on home computer -Done - have a 'real' (at least 1 page) website working (NOT DONE) - get locker in Lab 1 with combo lock -Done
Meghan	<ul style="list-style-type: none"> - UI functional spec budget (?) - get Linux on home computer (?) - have a 'real' (at least 1 page) website working -Done
Kara	<ul style="list-style-type: none"> - get Linux on home computer (NOT DONE) - Nas putting on a flash drive - ask Andrew with asking about reliability and sustainability (NOT DONE) - book library rooms -now meeting outside 440 classroom instead
Nas	<ul style="list-style-type: none"> - Sources for where to buy hardware [for next couple of weeks; ongoing] - RFID Location Research - Ask Ash for storage -Done - Writing FW plan -Done - Start purchasing (in progress) - Look into a Linux Live Disk -Done - look into ESSS List of Parts Available to Borrow -Done - Peripheral Devices: write firmware (in progress)
EVERYONE	<ul style="list-style-type: none"> - Functional Spec (NEXT WEEKS MEETING OBJECTIVE)



AGENDA ITEMS

Old Items

1. List of Parts Available to Borrow/ESSS Funds Update
We need to email services@sfu.ca to get the parts - Ekta -Done
2. What purchases do we need to make?
All Done for the time being [remove from future agendas]
3. What is left for Capstone Class Proposal, ESSS Proposal?
 - a. Capstone Class Proposal
Curtis' image -due by Wed [Kara will chase down if not there]
Meghan "Shipping" -due by Mon
Ekta "Market Image" -due by Mon
Daniel - check proposal against rubric -due by Wed
The Proposal is now a downloadable MS Word doc
 - b. ESSEF Proposal
Expenses - Nas
Curtis - Signature via email
Other signatures on a piece of paper
Kara - edit, submit, etc.
 - c. Telus Proposal
Submitted by end of meeting

New Items

4. Website: 1 page working? [Daniel/Meghan]
Yes, but not 'pretty'
5. Test Meeting (everyone comes with working toys and we try them out) next week?
Moved to October 2
Next week meeting objective: Submit Proposal and write Functional Spec
6. Other Comments or Questions?
Android App is now a priority 1 work
RFID [Nas]
yes, go ahead and pursue
Solidworks design will be required (later)
priority 2 work

Conclusion

7. When is the next meeting? [1 min]
September 25 4:30pm and we are splitting into two teams of 3 for technical work which need to meet during the week also.
 - Team 1 - Nas, Curtis, Ekta



- focus on the peripherals, connections and hub
- Team 2 - Daniel, Meghan, Kara
 - focus on the website and app

During Friday afternoon meetings one person from each group lets the others know their progress

8. Meeting Finished at 5:23 pm at/on [SFU/Skype]



-----Meeting Minutes-----

Objective: Finish Proposal and Discuss Functional Spec Date: Fri Sept. 25 , Tuesday Sept. 22	Location: In Person at SFU Time: 4:30 PM <i>Estimated Meeting Length: 40min</i>
--	---

Note Taker:
From Kara's notebook

Attendees:
Entire Group

Time Start:
6:30PM

PREPARATION FOR MEETING

Person	Tasks
Curtis	- FINISH overview image
Ekta	- get ZigBee and Wi-Fi ready to go - Ekta "Market Image"
Daniel	- have a 'real' website working - check Proposal against rubric
Meghan	- UI functional spec budget - "Shipping" - get Linux on home computer
Kara	- get Linux on home computer - ask Andrew with asking about reliability and sustainability - learn about Android App development (in progress)
Nas	- Peripheral Devices: write firmware
EVERYONE	- Functional Spec

AGENDA ITEMS

Old Items

1. What is left to do on the Class Proposal?
Daniel write conclusion, Ekta ---, Meghan add shipping, Curtis
2. Updates: Website
One page working so far
3. Updates: App
Having trouble getting Android sdk to work, check out how Bootlegger able to create app



4. Updates: Connections
Nas and Daniel to work on Datadump
5. Functional Spec
EVERYONE NEEDS TO WORK ON

New Items

6. RFID: do we need to do solidworks?
Any other questions/comments?

Design Spec images:

- CAD for BBB box
- CAD for Security system
- how 3 things interface
- Android App look

Conclusion

7. What is each person's task for the next meeting? [5 min]

Person	Tasks
Curtis	-
Ekta	- Wi-Fi and ZigBee working on BBB
Daniel	- Database - Submit Proposal
Meghan	- Website
Kara	- App
Nas	- Peripherals - Solidworks
EVERYONE	- Functional Spec

8. When is the next meeting? [1 min]
Friday October 2 -> TESTING DAY
9. Meeting Finished at 7:10 pm



Meeting Notes

Objective: TESTING DAY Date: -Thursday October 2	Location: In Person at SFU Time: 5:30 pm <i>Estimated Meeting Length: 120min</i>
---	--

Note Taker:
Kara

Attendees:
Everyone

Time Start:
5:20pm

PREPARATION FOR MEETING

Person	Tasks	Person	Tasks
Curtis	- FINISH overview image	Meghan	- get Linux on home computer - Website
Ekta	- get ZigBee and Wi-Fi ready to go	Kara	- get Linux on home computer - ask Andrew - reliability and sustainability - learn about Android App development
Daniel	- Database - Submit Proposal	Nas	- Peripherals - Solidworks
EVERYONE	- Functional Spec		

AGENDA ITEMS

Test Meeting Items:

1. Results of the meeting:

Nas and Curtis need to upload receipts

We want a +/- budget from Meghan

Daniel -database having trouble in jsm

->Discussed how the database information could be run -> See Kara's Eng Journal or Daniel's Notes

Low priority - accessibility features for the APP

Meghan -> 2 links to text based pages created, waiting to see sign-in and interaction with data in the "secure area" of website

By October 16, have everything working.. i.e data shows up on the website and the peripherals are able to 'talk' to the BBB



Old Items

2. Functional Spec

*This is now Priority 1 for everyone -> you work is due on WEDNESDAY

Kara-> safety

Curtis -> Block diagram & executive summary

Meghan and Daniel -> look into website & related standards

Nas -> peripherals & related standards

Ekta -> HW/System & related standards

New Items

3. Other questions/comments

Ekta -> Curtis will help you with soldering to the serial port of BBB

Everyone once you settle on a design for your part -> document it since we need it for the Design Spec

Curtis -> bigger stuff needs to be ordered

Kara and Daniel -> once your sections complete you many get put on helping implement the machine learning, using Matlab.

APPLY to APEGBC for Funding -> due October 16

Ekta will start it and ask for help if she needs it

Conclusion

4. What is each person's task for the next meeting? [5 min]

Curtis	<ul style="list-style-type: none"> - ordered parts - Func Spec ->Block diagram & executive summary - help Ekta with soldering to the serial port of BBB
Ekta	<ul style="list-style-type: none"> - APPLY to APEGBC for Funding -> due October 16 - get Curtis' help with soldering to the serial port of BBB - Func Spec -> HW/System & related standards - By Oct 16 ->peripherals are able to 'talk' to the BBB
Daniel	<ul style="list-style-type: none"> - Func Spec: look into website & related standards - database needs to be up and running by Oct 16
Meghan	<ul style="list-style-type: none"> - Website: sign-in and interaction with data in the "secure area" of website - due Oct 16 - Func Spec: look into website & related standards - Update +/- budget of current costs
Kara	<ul style="list-style-type: none"> - Func Spec: safety - Get an Android device



Nas	<ul style="list-style-type: none">- Funct Spec: peripherals & related standards then Edit- upload receipts
-----	---

5. When is the next meeting? [1 min]
October 15 (I think ?)
6. Do we need to book a room?
Yes
7. Meeting Finished at 7:00 pm



Meeting Notes

Objective: Func Spec Date:- Wednesday October 14	Location: In Person at SFU Time: 5:30 pm
---	---

Note Taker:
From Kara's Notebook

Attendees:
Nas ill and unable to attend

Time Start:
4:30

PREPARATION FOR MEETING

Person	Tasks	Person	Tasks
Curtis	->Func Spec: Block diagram & executive summary ->help Ekta with soldering to the serial port of BBB ->ordered parts	Meghan	->Website secure area is ready ->Func Spec: look into website & related standards
Ekta	->get ZigBee and Wi-Fi ready to go ->apply to APEGBC for Funding ->Func Spec: HW/System & related standards	Kara	->Android App of website is ready
Daniel	->Database is ready to go	Nas	->Peripherals ->Review Functional Specifications
EVERYONE	->Functional Spec -> By October 16, have everything working.. i.e data shows up on the website and the peripherals are able to 'talk' to the BBB		

AGENDA ITEMS

Old Items

1. Functional Spec



Curtis - Replace image

Backend work moved to Design Spec

Move front end image of user interface to overview section

Each person must do a grammar check on their own section and on the section after yours

Ekta - look up and add processor lifespan

The team has gone thru the rubric and verified what sections we need to work on (source of ideas -> weak)

Nas - Peripherals need a table of power/voltage/current requirements in a black box format

Ekta - BBB needs a table of power/voltage/current requirements in a black box format

Meghan - check out Meteor's Standards

Kara - aim for market cradle-to-cradle

Content due by Friday 2:30pm and grammar due by Sunday

Test Meeting Items:

Name	DONE	INPROGRESS	NEED HELP!
Ekta	Breaking her OS ->sent an email for help	WIFI - test setup (due end of month)	ZigBee ->given to Meghan Send & Receive /Pickle data ->Nas
Daniel	JSAM file is now reading and displaying data in console	Query for code not working yet Integrate with Meghan this week (login page)	Not needed yet
Curtis		Machine learning co-ordinating automated pumps	
Meghan	Web Page shows graph Templates for login page, control page,	Moved to helping out with firmware	
Kara		check out "phone gap"	

New Items

2. NEW MEETING TIME for Group ~every week
Friday 2:30 -> short
3. Other questions/comments
 - *We need to figure out how we are going to poll for information
 - Demo day email sent out (DEC 14, 7, 10)



4. When is the next meeting? [1 min]
Oct 16, 2:30pm
5. Do we need to book a room?
NO MORE ROOM BOOKING
6. Meeting Finished at 5:32 pm



Meeting Notes

Objective: Updates and Start Design Spec Date: Friday October 23	Location: In Person at SFU Time: 2:30 pm
---	---

Note Taker:
Kara

Attendees:
Whole Team

Time Start:
2:30pm

PREPARATION FOR MEETING

Person	Tasks	Person	Tasks
<i>Curtis</i>	->Machine learning co-ordinating ->automated pumps	<i>Meghan</i>	->ZigBee
<i>Ekta</i>	->WIFI - test setup (due end of month)	<i>Kara</i>	->check out "phone gap" -> blinds peripheral
<i>Daniel</i>	->Database is ready to go	<i>Nas</i>	->Send & Receive /Pickle data
<i>EVERYONE</i>	->		

AGENDA ITEMS

Oct 28 Due!

Team Member Updates:

Name	DONE	INPROGRESS	NEED HELP!
Ekta	parts borrowed from ESSS	OS is buggy - cannot access Wifi Cape	
Daniel		-light switch design in solidworks	How to get data to send to database ->server
Curtis		-> water pumps -> idea of how to do machine learning ->needs data to start	
Meghan		-> ZigBee	need McroSD



		->FINISH WEBSITE (28th) -> Design Spec website	
Kara	Bough electronic and mechanical components	Putting together frame and motor controls for blinds (5 days) OPEN Up Code for work -> create schematic for blinds try to do introduction	How to access programs TUESDAY - everything
Nas	purchases made (temp sensor, hall effect sensor, ..)	->power outlet design solidworks (near complete) -> lightswitch due 31st -> create host website (domain name)	->thermostat (documents read)

New Items

1. Design Specification - Topics and who is writing them and when due?

Curtis is editor

Due NOV 9 -> two weeks

See What's App and email for each person's breaking down

First Draft due Oct 31 before the meeting

Cad Drawings, Schematics, 1 paragraph explaining your part

There is a SVN of CAD -> BBB

HUB Casing ->in Sustainability and Safety, Reliability

Thingiverse.com

TEST PLAN - figure out how your component will be demonstrated on DEMO day and how you will say it works (1 paragraph).

2. Other questions/comments

November 9 Nas will not be meeting

We would like to print a board as we have extra money

3. When is the next meeting? [1 min]

October 30, 2015 2:30pm

4. Meeting Finished at 3:26 pm



Meeting Notes

Objective: Updates and Design Spec Date: Friday October 30	Location: In Person at SFU Time: 2:30 pm
---	---

Note Taker:
Kara

Attendees:
Whole Team

Time Start:
2:30pm

PREPARATION FOR MEETING

Person	Tasks
EVERYONE	Rough Work of Design Spec Up Complete sections for 28

AGENDA ITEMS

Team Member Updates:

Meghan- to borrow MicroSD from Nas

Daniel and Nas to upload Server

Ekta -LED, Thermostat, starting with really on boards

Curtis - machine code -in progress, mapped out how he wants it to work with light and temp sensor

Nas- solidworks model for wall wart is complete

Meghan - testing lightbulb this weekend, upload database

New Items

1. Other questions/comments
*1 week before demo have everything functioning
Discussed wall mounting of BBB
2. When is the next meeting? [1 min]
Nov 6, 2015 2:30pm
3. Meeting Finished at 3:00 pm



Meeting Notes

Objective: Design Spec & Updates Date: Friday Nov 6	Location: In Person at SFU Time: 2:30 pm
--	---

Note Taker:
Kara

Attendees:
Everyone

Time Start:

PREPARATION FOR MEETING

Person	Tasks
EVERYONE	Complete Design Spec Sections

AGENDA ITEMS

Team Member Updates:

Name	DONE	INPROGRESS	NEED HELP!
Ekta	No Progress	GET Laptop (with Ubuntu) from Nas	
Daniel		Need FTP to copy onto server Integration -some bugs Working on Understanding code (1 week)	
Curtis	Found Dataset	Design Spec edits	
Meghan	Func done on Website Solidworks done -> may update	Graph from Database info ZigBee	
Kara	- all Mechanical parts fit together 'roughly' - all parts work on a breadboard - Design Spec sections	- electrical/connections - Put together and test this weekend, Buy mini breadboard and remake circuit	start Wifi next week
Nas	LightSwitch - working	TO DO: FTP for Daniel To fit into a box get temp sensor into box	



Old Items

1. Design Specification

Incorporate Sustainability and Safety in each test section

Make a test plan table -> everyone do their own

Three Links on top of Design Spec

Kara - test plan ->NAS ask for help to unit test, condense blinds section

Ekta - needs diagrams, add in test plan

Meghan - Test Plan to add, rename to match Functional Spec

Daniel - work with Ekta to system testing

CURVED EDGES

New Items

2. Discuss Functional Spec Grading

'Figure' introduction questions ->Ekta send email

3. Who are you inviting to the Demo on December 14, 2-3

Kara - parents, Liz, Tommy,

4. Other questions/comments

5. When is the next meeting? [1 min]

What's App -Mon, Wed

Nov 13, 2015

6. Meeting Finished at 3:12 pm



Meeting Notes

Objective: T -minus 3 weeks Date: Friday Nov 20	Location: In Person at SFU Time: 2:30 pm
--	---

Note Taker:
Kara -> see images

Attendees:
Everyone

Time Start:

AGENDA ITEMS

Team Member Updates:

Old Items

1. Who are you inviting to the Demo on December 14, 2-3

New Items

2. WiFi Solution!!
may have a solution on Saturday,
3. Written Progress Report -due ____
Meghan writing the Expenditures - paragraph form please.
Introduction - Nas?
Conclusion - Nas/Daniel?
4. Team meetup dates
Sunday work on Capstone - Integration (12 - 3) Kara, Daniel, Meghan
Nov 28 for 6 hours
December 5 for
5. Presentation Plan
6. Other questions/comments
7. When is the next meeting? [1 min]
8. Meeting Finished at ____ pm



-----Meeting Minutes-----

FRIDAY NOVEMBER 27, 2015

Online Meeting

1. What time will you arrive and stay to in Saturday (4-5 hours)

Name	Arrival (~hr.)	Departure (~hr.)
Kara	10	4
Meghan	11	4
Ekta	10	6
Curtis	11	4
Daniel	10	4
Nas	11	4

2. What will get done on Saturday.

- > Progress Report ✓ (Last edits before leaving)
- > control between one peripheral and BBB ✓ (Saturday 4:42pm)
- > communication between database and BBB
- > blinds will be ready work work as a black box - peripheral ✓ (Saturday 1:00pm)
- > ZigBee communication between the 2 dongles

1. What might get done on Saturday

- > control between one TWO and BBB ✓ (Saturday 4:42pm)
- > ZigBee communication between 1 dongle and the GE Link bulb - assuming the GE Link bulb is compatible (by next Friday)
- > Port ZigBee to Hub - Linux Gateway software should be useful here (by end of next week)
- > Script to automate Hub to look for wi-fi peripherals once Hub is powered up



-----Meeting Minutes-----

Friday December 4, 2015

2:30pm

SFU

Daniel's House ->1980 Cliff Ave. Burnaby

10:30am to 4:30pm

Curtis & Ekta

Meghan

Nas and Kara

Nas' Car -> stuff not being used

Kara has cameras

Sunday December 5 -> 10am to 4pm

Time: Thursday, December 10, 2015, 3:30:00 PM - 5:30:00 PM GMT -08:00 US/Canada Pacific

Post Mortem -> Kara

Movie Editing -> Nas

PowerPoint ->