TRUE SIGHT

ABSOLUTE VISION SYSTEMS

POST MORTEM FOR REAL-TIME 3D LASER SCANNING DEVICE

PROJECT TEAM

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1. Introduction

The document describes the general system overview of the TrueSight system. We also compare the initial and actual schedule and budget along with describing the team environment within the Absolute Visions team. In addition, problems, challenges and personal reflections from each of the team members is covered.

2. Project Background

TrueSight, by Absolute Vision Systems, is a real time laser mapping system intended to enhance and supplement human vision in low visibility environments. TrueSight is a helmet-mounted device which grabs IR depth data and projects this information into the user's field of view in real time. Our goal at Absolute Vision Systems is to create a unique visual system which is a robust and simple-to-use solution for emergency response teams. TrueSight improves efficiency for first responders in low visibility environments while simultaneously reducing the risk they take.

3. System Overview

A top level functional block diagram of the TrueSight system is shown in Figure 1**.** The TrueSight product is based on three main components: the Jetson TK1 embedded computer, the LCD HUD, and the Kinect v2 sensor.

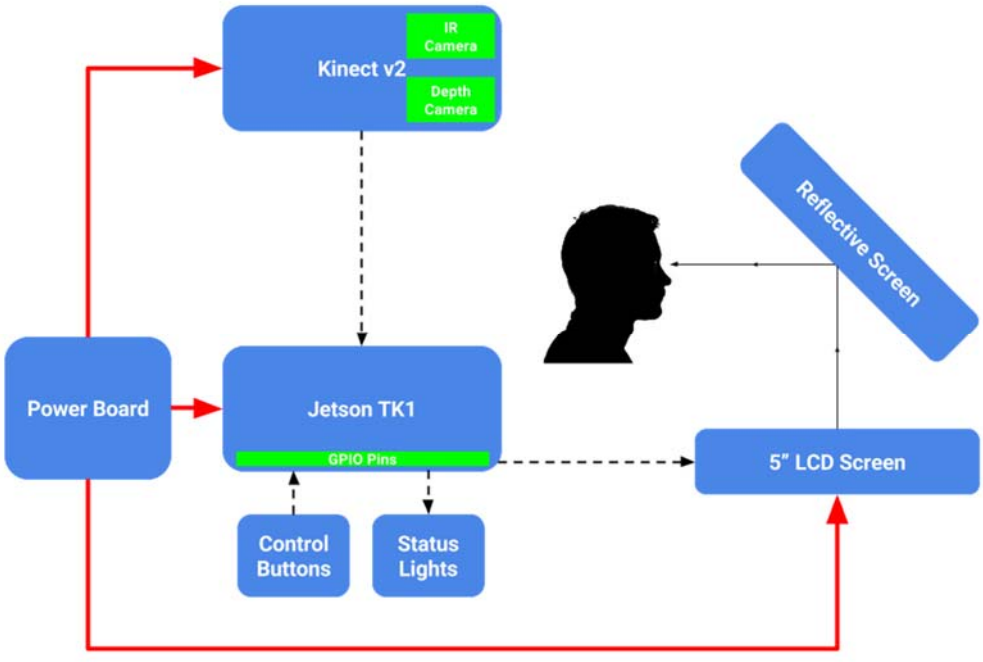


Figure 1 System Top Level Overview

Labeled in Figure 2, the Jetson TK1 embedded computer system, is used for functionality control via switches, processing incoming image data, and sending images to the display system. It also has a clamp-like mounting system, which would be attached to a firefighter's oxygen tank. The box enclosure contains both the Jetson TK1 and the Power PCB, which powers various modules. The LCD Display HUD, which takes processed images from the embedded computer and reflect them into the user's field of view. The display system is mounted on a helmet, with the display in front of the user's eyes. The Kinect V2 sensor's purpose is to capture depth and IR data from the surrounding environment. The sensor unit is also mounted on the user's helmet. Each of these components work in harmony to create a unique visual experience for the user. We initially envisioned making our own laser scanner with servo motors and a laser diode with an optimal wavelength to see through smoke, but we decided to go with the Kinect because it allowed for quick prototyping and it has existing software libraries.

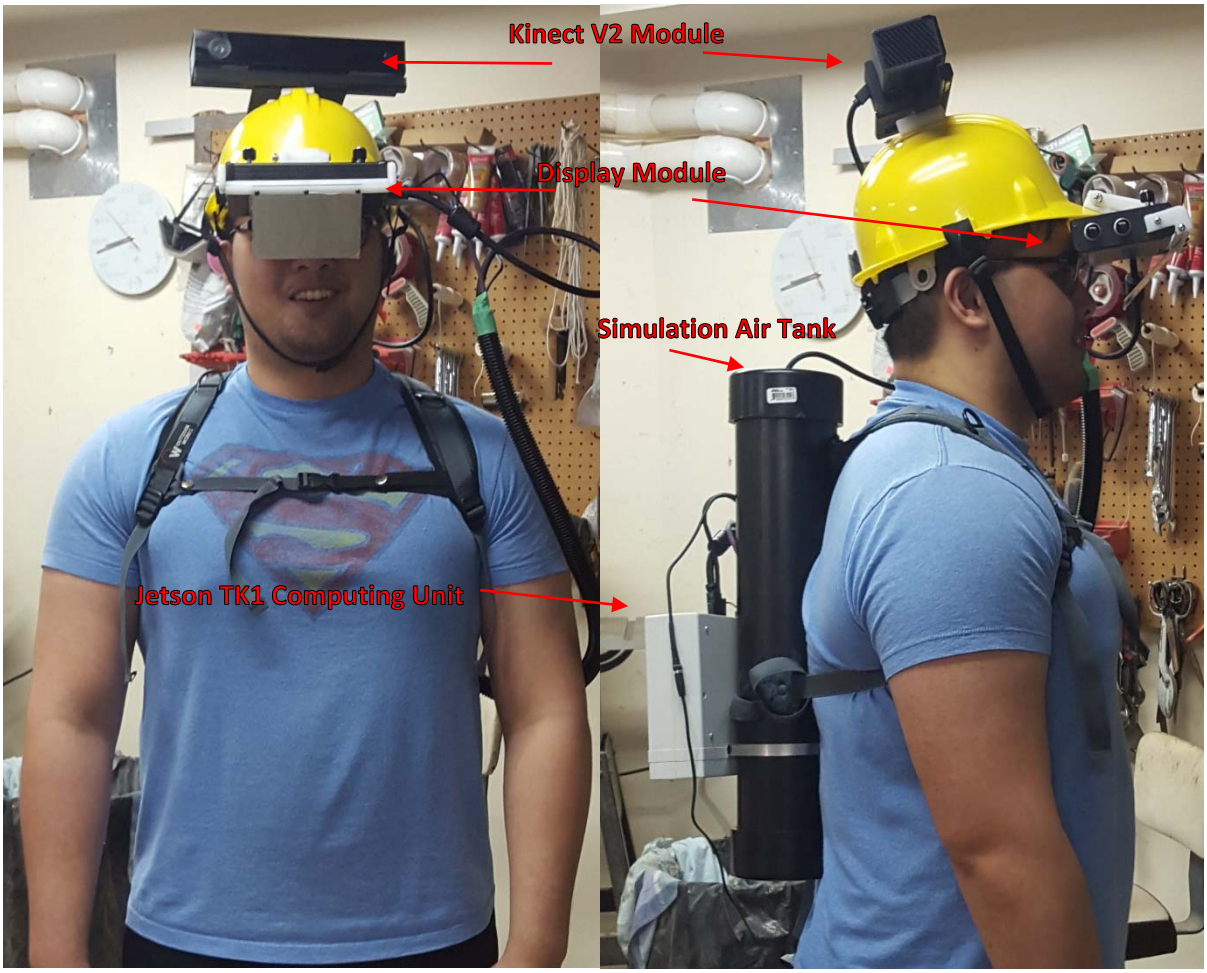


Figure 2 TrueSight System

4. Bill of Materials

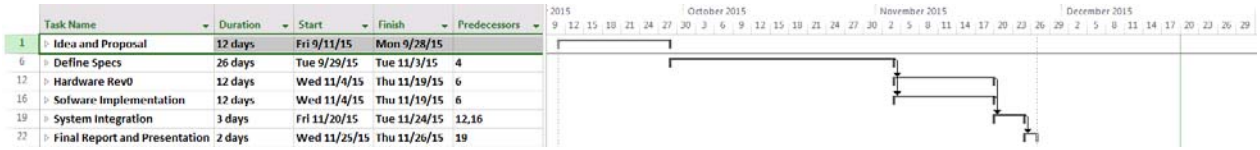
We initially started with a budget of $665 and spent $1351.37 on the project. A total of $500 of the expenditures have been covered by the ESSEF Endowment Fund and the remaining amount has been covered by the group members of Absolute Vision Systems. Our budget was significantly underestimated due to the following factors - the PCB manufacturing costs/electrical components, the display/projector, and shipping costs. Initially we chose to use a pico-projector system, but eventually decided against it in favor of a LCD screen, which increased the cost significantly. Also, we eventually decided to create our own PCB to power each subsystem. In doing so, TrueSight will only require one power source, reducing the system's weight. In the future, we need to take into account shipping, duties, and taxes, as this increased the budget significantly. Table 1 compares our initial estimated costs with our current budget.

Table 1 Estimated Vs Actual Budget

Equipment	**Estimated Cost ($)**	**Actual Cost ($)**
Kinect V2	$150	$179.19
Nvidia Jetson TK1 Dev. Board	$200	$271.02
Kinect USB Adapter	$60	$68.20
HW8G3 Pico-engine	$30	N/A
Projector PCB	$50	N/A
Adafruit LED Screen	-	$167.14
Helmet with Visor	$50	$0.00
Materials for Mechanical structure	$50	$101.50
Miscellaneous electrical components	$50	$38.98
Batteries & charger	$25	$154.49
Power PCB	-	$141.00
Power PCB Components	-	$229.85
Total Cost	$665	$1351.37

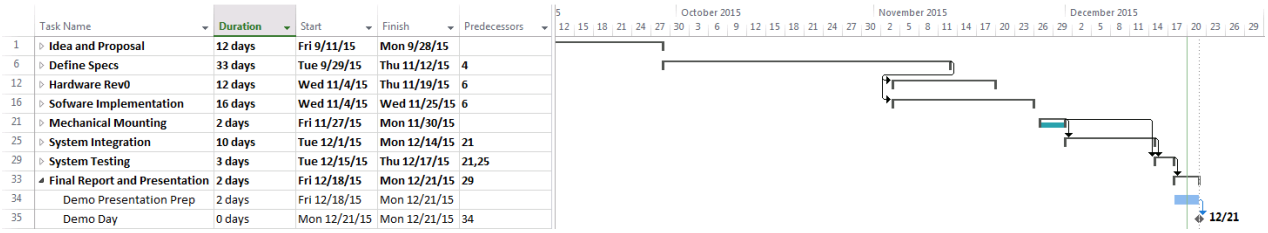
5. Schedule

Throughout the entire project we were conscious of the tight schedule that we needed to keep to. In the initial proposed schedule, we optimistically aimed for a completion date of November 26. However in the system integration step we ran into unexpected issues relating to the I^2C communication and Kinect power control circuitry. It became evident that to isolate the problem between hardware and software consumed most of the time on our schedule, the issues were quickly resolved once we identified the root cause. We also omitted to schedule time for mechanically mounting the system. This is because we grouped it with hardware design phase due to initial assumption that we didn't need a power management system. After we had the oral progress report with the TA, we saw that having the power management system was essential to our project. Designing and developing the power management system consumed most of the time for hardware development, and delayed our schedule for mechanical construction of the project.



	Task Name	Duration	Start	Finish	Predecessors
1	Idea and Proposal	12 days	Fri 9/11/15	Mon 9/28/15	
6	Define Specs	26 days	Tue 9/29/15	Tue 11/3/15	4
12	Hardware Rev0	12 days	Wed 11/4/15	Thu 11/19/15	6
16	Sofware Implementation	12 days	Wed 11/4/15	Thu 11/19/15	6
19	System Integration	3 days	Fri 11/20/15	Tue 11/24/15	12,16
22	Final Report and Presentation	2 days	Wed 11/25/15	Thu 11/26/15	19

Figure 3 Proposed Project Schedule



	Task Name	Duration	Start	Finish	Predecessors
1	Idea and Proposal	12 days	Fri 9/11/15	Mon 9/28/15	
6	Define Specs	33 days	Tue 9/29/15	Thu 11/12/15	4
12	Hardware Rev0	12 days	Wed 11/4/15	Thu 11/19/15	6
16	Sofware Implementation	16 days	Wed 11/4/15	Wed 11/25/15	6
21	Mechanical Mounting	2 days	Fri 11/27/15	Mon 11/30/15	
25	System Integration	10 days	Tue 12/1/15	Mon 12/14/15	21
29	System Testing	3 days	Tue 12/15/15	Thu 12/17/15	21,25
33	Final Report and Presentation	2 days	Fri 12/18/15	Mon 12/21/15	29
34	Demo Presentation Prep	2 days	Fri 12/18/15	Mon 12/21/15	
35	Demo Day	0 days	Mon 12/21/15	Mon 12/21/15	34

Figure 4 Actual Project Schedule

6. Challenges and Problems

6.1 Hardware

Hardware design had its fair share of problems over the span of the four month project. Early on, part selection was difficult as our requirements for each subsystem on the power PCB were extremely strict and demanding. Therefore, instead of designing our own a buck-boost converter circuitry, we found a product which performed a similar function and used the same IC implementation for our system.

Another issue was with design oversight and time management. We decided to get our board design out to the manufacturer as fast as possible to minimize the delay to the schedule as manufacturing takes a full week. In the haste we missed the voltage limits of the 0402 package for the bypass capacitors we used. This made soldering trickier as we had to purchase 0603 sized capacitors, but our hardware team had the skills to solder the 0603 package on to the 0402 sized pads.

Another issue we had was with the 5V USB. We were able to successfully design our 5V rail using a switching IC. The 5V rail was able to provide power to the 3.3V, 1.8V subsystems. However when we connected the display screen to the Jetson, there was an obvious screen and backlight flicker and the IC started to overheat due to the massive demand of current. We opted to use the Jetson's USB OTG to avoid massive PCB rework.

We also had an issue with the Kinect 12V IC. We wrongly assumed that the regulator would prevent the output voltage from passing through if the IC was not switching. However, this was not the case as the output is always active with the input voltage having a slight drop over the inductor and diode. We had to implement an additional circuit to switch on and off the output voltage with the GPIO pin on the Jetson.

Lastly we encountered an I^2C issue towards the end of the project. On the hardware side, the I^2C ports our header that was originally connected to stop working and was not addressing properly. To address this issue, we hardwired the power PCB I^2C lines to a different I^2C bus on the Jetson.

6.2 Software

On the software side, many problems arose over the 4 month project. Early on, one of the main issues was the low range on the edge detected image. The edge detected image was using the depth camera as a filter source, and changing the source to infrared significantly increased the distance and clarity of the image. Later on during implementation, we had trouble operating the Jetson TK1 as a single-application, embedded device. The Jetson TK1 comes with a semi-standard Ubuntu install with a desktop GUI, but we disabled this so that our TrueSight application would start-up automatically. We also had issues with setting up the I^2C interface throughout our project. These issues ranged from simple misconfigurations to a suspected broken I^2C bus on our Jetson. We were able to use a different I^2C bus. Some features were not implemented such as geometric transformation on the image. This meant our edge detected image does not perfectly outline the objects in the user's field of view - things are slightly off without significant calibration and positioning of the Kinect sensor.

7. Team Dynamics

The team was organized to take advantage of the wide variety of skills and specializations of each team member. Each member has work experience in fields such as software, hardware, and testing. Everyone took on tasks which highlighted their experience and skills, and each member contributed both on developing and testing different portions of the overall system. The team had several meetings through skype, as well as in person, to organize our thoughts and progress on the project. Most documentation was done through Google Docs, which helped us simultaneously work on the documentation from different locations. Throughout the semester there have been no conflicts, and the group has been motivated and dedicated to creating a successful project

8. Individual Reflection

Don Labayo

During the past four months, I have been working as CEO of Absolute Vision Systems and Hardware Designer on the True Sight platform. My main role as CEO was managing our team and finalizing our product's functionality. As hardware designer, I was in charge of PCB schematics, layout, and communicating with manufacturing. Being able to use the knowledge accumulated throughout my undergraduate career, on a large scale project, has been a gratifying and enjoyable experience. Together, with my group of close friends, we have proudly developed a prototype that we find exciting and has plenty of potential.

As the CEO, my main responsibilities were managing teams and finalizing product functionality. I organized our group members into separate teams which best utilized their area of expertise and allowed them to dictate their own milestones. I would frequently sit in with the software team to familiarize myself with the ongoing processes and to get a high level understanding of the software component. This hands off approach allowed for the organic development of each component. In the event of product functionality disputes, as the CEO, I had final say on the direction of the development. This was a trickier issue as you need a good understanding and intend use of the product.

As a member of the hardware team, I worked closely with Samson on the schematic and layout of our power PCB. My co-op experiences as a hardware engineer really prepared me for the level of design knowledge required to design our PCB. Using Altium designer, we split up the schematic design between ourselves. Working in parallel we were able to double check each other's design and catch one another's mistakes. Having more experience with layout, I was in charge of layout, while Samson performed the majority of the soldering. PCB design was not without problems however. We learned that the recommended layout in datasheets are not to be trusted 100% of the time. Unique issues rear their ugly heads with each project and require you to use creative problem solving in lieu of ordering a revised board. The design process was very gratifying as we were able to create and design something from the ground up.

Donning the mantle of leadership was surprisingly simple. I suppose this is due to our close knit team members, who have been working together since our first semester at SFU. Communication between team members have formed long ago. We are very comfortable with each other's work habits and have learned to work around them and/or adjust our own as to not impede each other's work. This is why I had enough confidence as CEO to leave development of each piece to each of my friends.

Overall I found the experience to be very rewarding and enjoyable. I gained leadership skills, scheduling, and time management skills. In the future I will be better organized with component creation and better analyze recommended circuits. I am proud to have developed the TrueSight with my friends and I couldn't imagine completing a project of this scale with any other goons.

Curtis Rietchel

These past four months have been have been a very enjoyable experience working on the TrueSight project. What I enjoyed most was working with my close friends/teammates. I can see how groups could have trouble communicating and interacting with each other. Working with my friends, I felt that we could more comfortably communicate, which is such a key factor in the success of a large scale project. With good communication and knowledge of my teammates skills, we easily split up roles which best suited our skills and technical experience gained through co-op.

My role on the team was mostly on the software side, as well as machining/manufacturing the hardware and mechanical components. My experience as an I&V engineer made it so much easier to understand and work in the Linux environment - which all our software was based off of. Although I have a good fundamentals of the Linux environment, this project has significantly increased my Linux ability and general understanding of how each component of a system works and communicates. Technically, a big challenge for me was to design and create enclosures and components which hold the project together. I initially underestimated the time it would take to create each part and piece. Things that I assumed would take me 30 minutes ended up taking me several days; for example when I made the display mounting system.

I feel that the reason our project and team worked so well together is that we all enjoyed and were interested in initial concept and idea. Working towards your own goal is so much more rewarding and exciting than working on an assignment or lab a professor has created for you. I believe my whole team had similar motivation, which is another reason we worked so well together. This project has also given me a small taste of what creating your own startup company could be like which entertained my imagination and opened possibilities for my future. Along with the skills I have gained, I can see myself creating and inventing things that could be sold, rather than working towards someone else's goal.

None of this could not have been done without our strong team mentality. Everyone has worked extremely hard and added valuable knowledge and skills to the project. This project has been an awesome experience both technically and interpersonally, and I feel that it has been one of the highlights of my engineering undergrad experience.

Tomasz Szajner

The past 4 months I have spent working on TrueSight with my team members have been a tremendous learning experience. ENSC 440 is the most important course in our curriculum as it completely embodies the engineering student experience: ambitious ideas, mind-boggling debugging, and last-minute heroics. I wouldn't have wanted to work with any other group members, as I have been working with these guys since my first semester at SFU. This is most time-consuming project I have had at SFU, and our group spirit has alleviated the stress and occasional feelings of impending doom.

My role in the project was to develop the software for the TrueSight system and fine-tune the embedded computer operating system to fit our functional specifications. I had seen many projects

using the Microsoft Kinect, both at SFU and on the web, and was happy to use the Kinect as its open source community was well established. The fact that I was able to make an application I am proud of by leveraging open source libraries is very motivating, as I have my eye on some ideas I'd like to work on in the future when I get my life back. I also enjoyed playing around in Linux with its various tools and configurations, as I am 4 months closer on my path to being a Linux guru. Although debugging these low-level interfaces kept me up at night, I learned that persistence and calmness is necessary to solve these issues. In terms of regrets and reflections, I wish that I was able to plan and organize my work tasks better. We started off working on the software organically and on our own pace, and this worked great for the first 2 months, as we were feeling fresh and motivated. However, we eventually got burnt out towards the last month, and because we were nearly finished our specifications, we didn't push hard enough to give us time to polish the software and fine-tune prototype. I also wished I put more weight on the mechanical design, as its timely completion was necessary for prototype fine-tuning. Not giving the mechanical part of our project more ownership is was a clear mistake.

I enjoyed working with my friends in a company-like environment. We had no inter-personal conflicts, as we were always able to figure out issues in a calm manner and have a good laugh at the end of the day. Working in parallel with our hardware team was an interesting experience, as we bounced around ideas based on our functional specifications and how to meet them. Reflecting back, I wished we did a better job of planning our tasks, as well as keeping discipline in meeting our milestones.

Overall, I thoroughly enjoyed working on my Capstone project with my friends. I'm proud of my teammates for the hard work they put in and the hours they sacrificed to get our TrueSight system working. ENSC 440 has been an exceptional experience in my SFU career, and I am happy to share these 4 months with my group members, as well as thankful to my family and friends for their support.

Samson Tam

As the CTO of Absolute Vision Systems on the TrueSight project I was responsible for overseeing the selection of components and integration to the final product. Searching and selecting the correct technologies to use for our implementation was completed quickly at the beginning of the project. I had to work through ensuring that each subsystem was able to communicate with each other as well was providing information to the various engineers that were responsible for implementing and creating the final product.

Through researching the vast amount of available technologies for both capturing 3-D data and HUD projection displays I was able to apply my prior knowledge from courses that I had completed to choose the best system. I learned the importance of balancing performance, costs and ease of implementation. Choosing system that can be easily adapted for our purpose was key to prototyping the complete project in the short time of 4 months. Careful consideration was taken when we decided to design and build our own PCB for power delivery and connecting the various parts of the system together. I was able to apply my experience of designing voltage regulating circuits and user input detection solutions. By diagnosing through the various problems that came up as we implemented the PCB I gained much

valuable experience understanding and fixing subsystems like GPIO control and I^2C addressing and communication.

Working in a group of my closest friends in the engineering program allowed for easy communication and understanding. We knew each person's strengths and areas of expertise and was able to create teams focusing on software, electrical hardware, mechanical mounting and administrative and business operations. While we had dedicated teams concentrated on the various areas of focus of the project we still worked together and shared our knowledge where possible. While our group worked together extremely well, we had some struggles towards the end of the project in tackling some of the last minute problems and missing components. We needed to work on different parts of the system at the same time which meant that some members had to work at different locations and at times we would be missing a part of the system or some information that a team member had.

Working on this project provided me with many learning opportunities in all areas of product development and management. Scheduling and time management was a new skill that I quickly gained while planning and working on the project. For future projects I hope to better review and analyze the electrical circuitry to ensure that it meets the necessary performance requirements. I hope to better schedule the implementation of the project to ensure that there are no stalls waiting for components to be completed. I am looking forward to working on our next project with this group of talented and hardworking individuals.

Jim Tu

During the four month of capstone project, starting from idea generation, to design, to development. The team and I have grown together since the beginning of the project. Starting with 22 unique ideas during idea generation, narrow down to one idea that each members of the group are excited to work on. I believe what I learned from this experience is how to collaborate and utilize skillsets from each group members efficiently.

My primary role in the team as the COO was to organize the weekly team meetings, manage the team dynamics, and planning on utilize the existing resources to focus on different parts of the project.

At the design phase, I have learned how to combine the creativity of each members and decide on design decisions as a whole during the team meetings. During the software development phase, I have the first-hand experience on programming OpenCV on Linux. We ran into small bug with the display unit where it does not clear the previous position, when we calibrate the x-y positions, I have utilize the knowledge I learned from ENSC488 while programming OpenGL, and found the solution that there are similar resolution between the two programming language.

My secondary role in software development was to help with our main programmer troubleshoot and debug problems we faced with the display script. We were able to source some of our program scripts from GitHub, and we have to reprogramming it to tailor fit to our project. I have learn much on how

Kinect communicates with the TK1 Nvidia Dev kit. With all the documentation provided by the OpenCV, we have built a wealth of knowledge on the software and hardware integration.

My auxiliary role in the team is market research for our project, see how feasible it will be if we decide to bring the project to market. I have interviewed local fire fighters to discuss the features of our project, how TrueSight can add value to their existing work process, and what features they would like to see implemented. Interview with the fire fighters was immensely helpful, after all they are the intended end users.

Overall, I believe we have a fantastic team, and I enjoy working with the group that is all passionate about bringing the TrueSight to fruition.

9. Work Distribution

Table 2 TrueSight Project Work Distribution

	Don	Jim	Samson	Tomasz	Curtis
Hardware Design	**High**	**Low**	**High**	**Low**	**Low**
Software Design	**Low**	**Med**	**Low**	**High**	**High**
Mechanical Design	**Med**	**Low**	**Med**	**Med**	**High**
Assembly and Implementation	**Med**	**High**	**Med**	**Med**	**High**
Team Management	**Med**	**High**	**Med**	**Med**	**Med**
Business & Market Research	**Low**	**High**	**Low**	**Low**	**Med**
Documentation	**High**	**Med**	**High**	**High**	**High**

10. Conclusion

Over the course of this project, we have created a unique visual aid, which could potentially provide assistance to emergency response teams. Our product meets most of our desired functional specifications, being both useful in low visibility situations while simultaneously being portable. Having said this, there are several improvements that could be made to the system. A big feature would be fixing the focus on the display screen, reducing weight and size of the system, and utilizing a different sensor such as a forward looking infrared or thermal camera.

TJSDC Inc.

AGENDA

Sept 11, 2015
4:30-5:30 PM
TASK 2 Corridor

Purpose of Meeting: To brainstorm project ideas in the prelimiary stage for the Capstone Project.

Items for Discussion:

- **Ideas pending approval for next meeting.**
- **Discussion on project development challenges.**
- **Next Meeting Date**
- **Other Business**

TJSDC Inc.

MINUTES

Sept 11, 2015
4:30-5:30
TASK 2 Corridor

Present: Jim Tu, Tomasz Szajner, Samson Timothy Tam, Don Rafael Prades Labayo, Curtis Criag Rietchel
Absent: None.

Purpose of Meeting: To brainstorm project ideas in the preliminary stage for the Capstone Project.

Minutes:

A. Group Discussion About Project Ideas:

1. **Ideas pending Approval for the ideas on next meeting:**

- Fire Detection Drones: use thermal sensor to detect and alert forest fire prevention authorities to local heat spots. Initial scouting, GPS updates.
- Smell sensors, collect and re-emitted smells.
- Snow board turns.
- Radar Cruise Control
- Camera 3D radio mapping.
- Infrared Thermal Imagining.
- Attach LIDAR for topology measurement.
- Expensive Monitoring Device, humidity, temperature, UV, sunlight, vibration, Oxgen Level .

2. **Discussion on project development challenges :**

- Fire Detection Drones will be divided to three parts of development phase:

1. Thermal Sensor:
   No RT data for live fires: http://cwfis.cfs.nrcan.gc.ca/background/faq/fm3
2. Communications : data collection. How to send long range. GPS
3. Flight: Use existing flight framework, don't need to re-invent the wheel.

B. Next Meeting Date

The next meeting was arranged for Sept 14, 2015 after 4PM. Meet up in the ASB Atrium first.

C. Other Business
Next meeting: define some project roles, communication methods, data sharing location, deadlines.

Meeting was adjourned early at 5:30 PM.

TJSDC Inc.

AGENDA

Sept 14, 2015
7:00-8:30 PM
Skype Call

Purpose of Meeting: To add to the brainstorm ideas for the Capstone Projet.

Items for Discussion:

- **Appending more ideas to the Capstone project.**
- **Discussion on project development challenges.**
- **Next Meeting Date**
- **Other Business**

TJSDC Inc.

MINUTES

Sept 11, 2015
4:30-5:30
TASK 2 Corridor

Present: Jim Tu, Tomasz Szajner, Samson Timothy Tam, Don Rafael Prades Labayo, Curtis Criag Rietchel
Absent: None.

Purpose of Meeting: To brainstorm project ideas in the preliminary stage for the Capstone Project.

Minutes:

A. Group Discussion About Project Ideas:

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C. Other Business
Next meeting: define some project roles, communication methods, data sharing location, deadlines.

Meeting was adjourned early at 5:30 PM.

TJSDC Inc.

AGENDA

Sept 15, 2015
7:30-9:00 PM
Skype Call

Purpose of Meeting: To add to the brainstorm ideas for the Capstone Projet.

Items for Discussion:

- **Rank the previous discussed ideas.**
- **Revisit Discussion on project development & challenges**
- **Project Deadlines**
- **Team Roles**
- **Proposal Write Up**
- **Next meeting Date**
- **Other Business**

TJSDC Inc.

MINUTES

Sept 15, 2015
7:30-9:00 PM
Skype Call

Present: Jim Tu, Tomasz Szajner, Samson Timothy Tam, Don Rafael Prades Labayo, Curtis Criag Rietchel
Absent: None.
Purpose of Meeting: To add to the brainstorm ideas for the Capstone Project.

Minutes:

A. Group Discussion About Project Ideas:

1. Rank the previous discussed ideas:

An excel sheet has produced on Google Drive : https://goo.gl/9zj6Nc
Rank from scale of 0~5 on the project you willing to work on.
Highlighted are the top 15/22 selected based on favourableness of the project:

- Fire Detection Drones:
  >Add carbon dioxide monitor, wind direction can determine the location of the fire.
  >Communication System: Multiple drones relay message system, therefore extend the range of communication when no radio towers / Satellite present. (Similar to relay system for WiFi)
- Avalanche Detection : Snow thermally insulates heat, use radar to penetrate blankets of snow.
- Information Projection : Project info to googols, windshield etc;
- Radar Dynamic Data System : Measure distance around vehicles.
- Thermal Imaging / Terrain Mapping : for Ski Googols to see through snow
- Smart Doorbell : Facial recognition, Voicemail, intruder alert, masked person, database lookup + fingerprint, Facebook Integrated.
- Smart Parking Lot : metal/pressure detection for empty parking slot. Existing with Camera.
- Smart Phone Charger: Doesnt just charge fast but also tries to extend batt life by slow charging when you dont need fast.
- Exercise Analysis : Form analysis for workouts, image tracking, to correct bad forms.
- Recycling Device : One slot to dispose all garbage, compose sorting, hand sanitizer.
- Sanitation Device : Wash bottom of shoes for guests. UV lights. Buff/Shine for Storage.
- Smart Fridge : Bar code products, list of inventory, automatic shop orders.
- Smart Shower-head : Adjust temperature / water pressure. Saves water. See Nebia.
- Snow Drying : For snow gears, wearables. Heat dry / brush off the moisture.
- Health Screening : Remote stethoscope, none penetrative blood analysis.
- Body Temp Regulator : Heat Remover, Ventilation, Electric Heating.
- Wine Cellar Monitor: Monitor humidity, temperature, UV, sunlight, vibration, Oxgen Level
- Topology Mapping : Topology Mapping
- Camera 3D radio mapping: Use radio waves to Map 3D enviroment, color, & other info. without optics
- Digital Olfactory Receptor / Emitter: Smell sensors, collect and re-emitted smells.

2. Revisit Discussion on project development & challenges :

- We are essentially doing rapid prototyping : Narrow down to a specific idea, from broad ideas.
- Consider level of difficulty with limited time & resources.

- Meet more frequent, less time consuming. SCRUMS meeting, AGILE development. 3x/Week Skype preferable.

B. Project Deadlines Sept

1. Proposal Deadline Sept 28
2. Create Gantt Chart Look for previous report in fall.
    a. **ACTION ITEM:** Samson to prepare project template with milestones
3. ESSEF Proposal Form Sept 20, Sunday.
    Electronic copy & physical copy.
    Form : https://drive.google.com/open?id=0BzwnsUf2koW6eENmclcyMjZxb0k

    Category : https://drive.google.com/open?id=0BzwnsUf2koW6VHBxeHk1ODE5MlE

4. ESSEF Presentation Jan 20.

C. Project Roles: Discuss later on in the project.

1. **[COO] Adminstrative : Meeting Minutes, Contacts, Planning & Logitistics**
2. **[CFO] Finance : Accounting, Funding, Resource Planning.**
3. **[CTO] Technology :**
    A. Hardware Assembly
    B. Software Development
    C. Technical Write-Up
4. **[CMO] Marketing : Optional**

D. Documentation write up [Move to Friday Discussion]

1. **(intial Proposal)**
2. **Proposal Rubric**
3. **Proposal Content :**
    Letter of transmittal
    Title page
    Executive summary
    T of C, (L of F, Glossary)
    Introduction (include high level graphic)
    Explanation of key elements of proposal
    Analysis of need and market
    Budget (include expenses and income)
    Time schedule (both Gantt and Milestone charts)
    Description of team (or resumes as appendix)
    Conclusion References

E. Next Meeting Date

The next meeting was arranged for Sept 16, 2015 after 7:00PM. Skype Call/ In Person.

C. Other Business

Next meeting: produce gnatt chart, hard deadlines, Figure Company Name.

Meeting was adjourned at 9:08 PM by limit meeting time to 1.5 hour max.

TJSDC Inc.

AGENDA

Sept 16, 2015
7:00-7:30 PM
Skype Call

Purpose of Meeting: To examine our top 4 ideas for the Capstone Project.

Items for Discussion:

- **Look Over Ideas with Professor Andrew Rawics.**
- **Project Deadline Sept**
- **Next meeting Date**
- **Other Business**

TJSDC Inc.

MINUTES

Sept 16, 2015
7:00-7:30 PM
Skype Call

Present: Jim Tu, Tomasz Szajner, Samson Timothy Tam, Don Rafael Prades Labayo, Curtis Criag Rietchel
Absent: None.
Purpose of Meeting: To examine our top 4 ideas for the Capstone Project.
Minutes:

A. Group Discussion About Project Ideas:

1. Look Over Ideas with Professor Andrew Rawics:

Tomaz, Curtis, Don went to see the professor to discuss the group's top 4 ideas:

- Fire Detection Drones:
  Prof : The drone's flight control has to be automated, otherwise it lost its purpose to exist.
  Use sonar for low visiblitity enviroment.
  TA : Consider the project too low level, when just combining bunch of senors with drones.
  Don : Radio frequency waves is sufficent for long range communications.
  and we should focus on one drone first as the bare minimum.

- Thermal Imaging / Terrain Mapping : for Ski goggles to see through snow .
  Prof : Too much realtime data to process, if is something slow pace is more adequate.
  Group : the group collectively decide that a firefighter mask would be a fusion of the Ski goggle idea and fire dection drone idea. Similarly use sonar mapping feed back to user, contour edges, see vitictims under blanket of smoke. Or any low visibility enviroment. ie. deep see weilding.

- Topology Mapping : mapping the Terrain
  Prof : Use laser or optical system to map the terrain.
  Samson : Consider a similar technology with speed detector.

B. Project Deadlines Sept

1. Proposal Deadline Sept 28
2. Create Gantt Chart by look for previous report in fall.
   a. **ACTION ITEM:** Samson to prepare project template with milestones.
   b. **ACTION ITEM:** Research feasibility of the ideas as a group.
3. ESSEF Proposal Form Sept 20, Sunday.
   Electronic copy & physical copy.
   Form : https://drive.google.com/open?id=0BzwnsUf2koW6eENmclcyMjZxb0k
   Category : https://drive.google.com/open?id=0BzwnsUf2koW6VHBxeHk1ODE5MlE

C. Next Meeting Date

The next meeting was arranged for Sept 17, 2015 after 8:00PM. Skype Call/ In Person.

D. Other Business

Next meeting: Creative enviroment, produce gnatt chart, hard deadlines, figure Company Name.

Meeting was adjourned at 7:30 PM by limit meeting time to 0.5 hour max, just a quick update meeting.

TJSDC Inc.

AGENDA

Sept 24, 2015
7:30-8:00 PM
Skype Call

Purpose of Meeting: To assign tasks to individual for the Capstone Project.

Items for Discussion:

- **Proposal Division**
- **Project Deadlines**
- **After Hour Discussion - Project Expansion.**
- **Next Meeting Date**
- **Other Business**

TJSDC Inc.

MINUTES

Sept 24, 2015
7:30-8:00 PM
Skype Call

Present: Jim Tu, Tomasz Szajner, Samson Timothy Tam, Don Rafael Prades Labayo, Curtis Criag Rietchel
Absent: None.
Purpose of Meeting: To assign tasks to individual for the Project Proposl.
Minutes:

A. Group Discussion About Project Ideas:

1. **Proposal Division:**

- **Project Proposal 10%**
- **Proposal Rubric**
- **Proposal Content Breakdown :**

1. **Letter of transmittal [Curtis]**
2. **Title page [Curtis]**
3. **Executive summary [Don]**
4. **T of C, (L of F, Glossary) [Curtis]**
5. **Introduction (include high level graphic) [Curtis]**
6. **Scope/Risks/Benefits [Tomas]**
7. **Market/Competition/[Jim] Research Rationale [Samson]**
8. **Company Details [Group]**
   8.1 Company Name [Group]
   8.2 Product Name [Group]
   8.3 Logo [Don]
9. **Project Planning [Samson]**
10. **Budget (include expenses and income) [Group]**
    > Add Kinect.
11. **Conclusion References [Group]**

B. Project Deadlines

Proposal Deadline Sept 28. Review Proposal late night Saturday Setp 26.
Finish editing by Sunday Sept 27 .

C. After Hour - Project Expansion:

- Have display module running in parallel with data storage module
- Records data in both space & time: timestamp, 3D co-ordinates, GPS.
- Have External Hard-drive as storage, or Wifi Router to simulate "Cloud" enviroment
- Playback Module (Software) to retrace time & space, replay when and where it scanned.
- Covert 3D mapping to a 2D birds eye view, video playback or Image snapshot.
- Mobility - Light weight. Shape. Streamlined Design.
- Power - Compact Battery. Thermal Safety
- Refer to previous project :
  http://www2.ensc.sfu.ca/~whitmore/courses/ensc305/projects/2012/14prop.pdf

C. Next Meeting Date

The next meeting was arranged for Sept 25, 2015 at 7:00PM. In Person. TASC2 Hangar.

D. Other Business

Next meeting suggestion: Make work enviroment fun , while still get work done in time.
Increase productivity, while encourage creativity.

Meeting was adjourned at 8:00 PM by limit meeting time to 0.5 hour max, just a quick update meeting.

Abosult Vison Systems.

AGENDA

Oct 02, 2015
7:00-8:00 PM
Skype Call

Purpose of Meeting: To discussion functional specifications of the design.

Items for Discussion:

- **Group Discussion About Project Specifications**
- **Define Group Task**
- **Review Schedule**
- **Purchase of Goods**
- **Official Company Name & Product Name**

Abosult Vison Systems.

MINUTES

Oct 02, 2015
7:00-8:00 PM
Skype Call

Present: Jim Tu, Samson Timothy Tam, Don Rafael Prades Labayo,
Curtis Criag Rietchel Tomasz Szajner.
Absent: None
Purpose of Meeting: To discussion functional specifications of the design.

Minutes:

A. Group Discussion About Project Specifications:

1. Costs
    a. what is reasonable for a fire department
2. Sustainability : Recyclability
3. Safety
    a. Works in the environment
        i. no explosions/leaking of chemicals/emission
4. [Display]
    i. Real Time Display
    ii. Display in front of user without impeding vision
    Consider HUD for the helment visor.
    iii. Display Resolution : able to distinguish objects and people
5. [Visibility] See through smoke/dark, low visibility
6. [Portablility]
    a. [Mobility] - Size(mountable on helmet, fits inside small pouch - attached to air tank?, Light weight (put on helmet without affect movement/strain). Shape. Streamlined Design.
7. [Power Consuption] how to sustain battery life for more than 30min?
8. [Durability]
    a. water resistant, slightly flame resistant, bump/knock resistant
9. [Controls]
10. [Range to Measure]
    a. able to see inside a household room
11. [Xtra Features]Data Collection/Storage??
    a. store depth/IR/visible video for replaying for training
12. [Xtra Features]mapping/back tracking
    a. to rebuild a map for firefighters to escape/build map for other firefighters to navigate
13. [Xtra Features]Data Analysis
    a. wireframe
    b. outlining / contouring objects

B. Group Task: .

1. Revisit Design
2. Determine functional specification
3. Determine design specification
4. Parts to Purchase
5. Keep track of receipts
6. When to start build it ?
7. Team Division:
    1. Display/Power Unit
    2. Image capture/software
    3. Mechanicals Integration.

C. Review Schedule

See full map :
https://docs.google.com/spreadsheets/d/1XmIR-gwRC3pCJsvCFIRB-ZMV8o8fujbgJXBz0m7E6LQ/edit#gid=1800669865

Deliverables	34%	Sep-20	Dec-4
ESSEF Soft Copy	100%	Sep-20	Sep-20
ESSEF Hard Copy & Presentation	100%	Sep-21	Sep-22
Project Proposal	100%	Sep-23	Sep-28
Functional Specifications	10%	Sep-29	Oct-19
Oral Progress Report	0%	Oct-20	Oct-31
Design Specifications	0%	Nov-1	Nov-9

Development Phase	27%	Sep-5	Dec-3
Planning	100%	Sep-5	Sep-20
Design	60%	Sep-21	Oct-5
Development (Software & Hardware)	0%	Oct-6	Oct-30
Integration	0%	Oct-31	Nov-20
Prototype Testing	0%	Nov-21	Nov-30
Prototype Fine Tune	0%	Dec-1	Dec-3

Events			
BCIT Meetups	0%	Oct-9	Oct-9
UBC Meetups	0%	Oct-16	Oct-16

D. Purchase of Goods.

Curtis (CFO) will in charge of keeping the receipts for everyone's purchase, then we divide the cost up across the group.

Product Name	**Product Specs**	**Cost of Goods**
NVIDIA JETSON TK1 DEVELOPMENT KIT	Tegra K1 SOC, Kepler GPU w/ 192 Cores, NVIDIA 4-Plus-1 quad-core ARM Cortex-A15 CPU, 2GB Mem, 16GB eMMC	Subtotal : $229.99 Handling : $0 Shipping : $11.99 GST/HST: $12.10 PST: $16.94 Total Sum : $271.02
Kinect Laser Sensing Cam.	**TBA**	**Tomas send recipets.**
HUD for Display.	**TBA**	**TBA**

E. Official Company Name & Product Name

Since the last meeting, while doing the write up for Project Proposal. The team decided up on the

Company Name : **Abosulte Vision Systems**

Product Name **: True Sight**

Officialization Date : **Sept 28, 2015**

F. Next Meeting Date

The next meeting was arranged for Oct 4, 2015 at 2:00PM. Samson's house.

G. Other Busines

1. **Please save folders in appropriate places.**
2. Next meeting suggestion: Make work enviroment fun , while still get work done in time. Increase productivity, while encourage creativity.

Meeting was adjourned at 8:00 PM, keeping the timefram of the meeting within 1 hour.

Abosult Vison Systems.

AGENDA

Oct 08 2015
7:00-7:30 PM
Skype Call

Purpose of Meeting: Quick update of development process, assign roles for functional specifications.

Items for Discussion:

- **Updates on the development process**
- **Functional Specification Breakdown**
- **To Do List**
- **Revisit Schedule**
- **Administrative Tasks**

Abosult Vison Systems.

MINUTES

Oct 02, 2015
7:00-8:00 PM
Skype Call

Present: Jim Tu, Samson Timothy Tam, Don Rafael Prades Labayo,
Curtis Craig Rietchel Tomasz Szajner.
Absent: None
Purpose of Meeting: To discussion functional specifications of the design.

Minutes:

A. Updates on the development process:

1. Display Team [Hardware Assembly]

i. Use HUD?
ii. Pico Projector
iii. When to buy & assembly. Not in the rush to buy, design first

2. Sensor Team [Software Development]

i. GitHub : Dev data program data. Next week optimal way: wirefram, intensity
ii. Linux Enviroment. Issues with Port? [Resolved] hooked up to Jetson.
iii. NVIDIA JETSON TK1 Dev Kit.
low quality at the , Dev kit needs to optimize. needs troubleshoot &optimize.
http://elinux.org/Jetson/Tutorials/Battery_Power

3. Team Archivement:
i. Recieved ESSEF Funding: $500 In da bank on ? Date.

B. To Do List

1. Keep track of financial transactions. [Curtis]
Upload legitimate receipts on the ENSC440 > $$$Accounting….> Recipets Folder
CFO Curtis to build an accountant sheet on Drive to keep track of costs.
2. Find Hardware specification Research>HARDWARE folder [Samson]
3. Find Software Specification Research>SOFTWARE folder [Tomas]
ie. http://webdiis.unizar.es/~raulmur/orbslam/
protonect.cpp [makes image] [Make it ourself]
libfreenect2 [Connection]

4. Design for Sustainability/Safety [Don]
5. Verify Technical Correctness [Curtis]
6. Current Cost Breakdown [Curtis]
i) Energy

ii) Recycability Material
iii) Manufacturing Cost
iv) Product cost

7. Research Engineering Standard [Jim]
   Integration of Standards [Jim]
   Responsibilities of an Engineer [Jim]
   Sustainability [Jim]

B. Functional Specification Breakdown

Primary Topic	Secondary Sections	Owner
Introduction		Curtis
	Scope	Tomaz
	Intended Audience	Curtis
	Classification.	
System Overview .		
System Requirements		Group
	General Requirements	Group
	Environmental Requirements .	
	Standards	Jim
	Reliability and Durability	Don
	Safety Requirements	Don/samson
	Performance Requirements	Samson
	Usability Requirements.	Samson
Electronics Requirements .		Don/Samson
	General Requirements.	Don/Samson
	Physical Requirements	Don/Samson
Kit Requirements		Tomaz
	General Requirements	Tomaz
	Physical Requirements	Tomaz

Software Requirements		Curtis/Tomek/Jim
	General Requirements	Curtis/Tomek/Jim
	Physical Requirements .	Curtis/Tomek/Jim
User Documentation		
	General Requirements.	Group
System Test Plan		
	Electronics Testing .	Don/Samson
	Kit Testing.	Tomek/Curtis
	Software Testing .	Tomek/Curtis/Jim
	System Testing	Group
Safety and Sustainability Analysis		Don/Jim/Samson
Conclusion		

C. Revisit Schedule

1. Where we are in the Design Phase? End Date?
2. Blind Date with the BCIT

See full schedule :
https://docs.google.com/spreadsheets/d/1XmIR-gwRC3pCJsvCFIRB-ZMV8o8fujbgJXBz0m7E6LQ/edit#gid=1800669865

Task Name	Duration	Start	Finish
Idea and Proposal	12 days	Fri 9/11/15	Mon 9/28/15
Brainstorm Ideas	3 days	Fri 9/11/15	Tue 9/15/15
Feasibility Study	5 days	Wed 9/16/15	Tue 9/22/15
Project Proposal	4 days	Wed 9/23/15	Mon 9/28/15
Proposal Submission	0 days	Mon 9/28/15	Mon 9/28/15
Define Specs	26 days	Tue 9/29/15	Tue 11/3/15

User Specs	2 days	Tue 9/29/15	Wed 9/30/15
Functional Specs	10 days	Thu 10/1/15	Wed 10/14/15
Functional Specs Submission	0 days	Wed 10/14/15	Wed 10/14/15
Design Specs	14 days	Thu 10/15/15	Tue 11/3/15
Design Specs Submission	0 days	Tue 11/3/15	Tue 11/3/15
Hardware Rev0	12 days	Wed 11/4/15	Thu 11/19/15
Schematic	3 days	Wed 11/4/15	Fri 11/6/15
Receive Parts	7 days	Mon 11/9/15	Tue 11/17/15
Hardware Prototyping	2 days	Wed 11/18/15	Thu 11/19/15
Sofware Implementation	12 days	Wed 11/4/15	Thu 11/19/15
Data capture module	7 days	Wed 11/4/15	Thu 11/12/15
Image display	5 days	Fri 11/13/15	Thu 11/19/15
System Integration	3 days	Fri 11/20/15	Tue 11/24/15
Camera Alignment	1 day	Fri 11/20/15	Fri 11/20/15
Display and FOV Alignment	3 days	Fri 11/20/15	Tue 11/24/15
Final Report and Presentation	2 days	Wed 11/25/15	Thu 11/26/15
Demo Presentation Prep	2 days	Wed 11/25/15	Thu 11/26/15
Demo Day (TBD)	0 days	Thu 11/26/15	Thu 11/26/15

Events			
BCIT Meetups	**0%**	**Oct-9**	**Oct-9**
UBC Meetups	**0%**	**Oct-16**	**Oct-16**

F. Next Meeting Date

The next meeting was arranged for Oct 29 2015 at 7:00PM. Samson's house

G. Other Busines

Meeting was adjourned at 8:00 PM, keeping the timefram of the meeting within 1 hour.

Abosult Vison Systems.

AGENDA

Oct 15, 2015
7:30-8:00 PM
Skype Call

Purpose of Meeting: Quick status update of development process, review deadlines.

Items for Discussion:

- **BCIT Meetup Oct 16**
- **Choose Oral Progress report dates**
- **Progress report on development**
- **Revisit Schedule**
- **To do list.**

Abosult Vison Systems.

MINUTES

Oct 15, 2015
7:00-8:00 PM
Skype Call

Present: Jim Tu, Samson Timothy Tam, Don Rafael Prades Labayo,
Curtis Craig Rietchel Tomasz Szajner.
Absent: None
Purpose of Meeting: To discussion functional specifications of the design.

Minutes:

A. **BCIT Meetup Oct 16** @ 2PM
Different for each individual.

B. **Choose Oral Progress report dates**
by the end of tomorrow Oct 16 by emailing "Lukas-Karim Merhi" <lma3@sfu.ca>
pick a date & 3 prefered time slot:
Thursday, Oct 22 (Room ASB 8836):
2:00-2:30
2:30-3:00
3:00-3:30

C. **Progress report on development**

1.Software

Challenges:

> No Depth image, can't detect wall.
> Only the Contour itself.
> Driver for Kinect still have problem regonize port.
> USB needs to unpluged twice to reset.

Features:

> introduce toggle view. [switches controls the GPIO in IC]
> Remote desktop into the program

2.Hardware

> Projector : Need design to decide how we project to visor.
Design determines the Parameters to use, what to purchase.
> Power: Consumption, energy restriction, power saving.
> Need to decide when and what to buy, maybe after Func Specs Report.

3. Documentation [Before Sunday]

1. Specs for Kinect [Tomas] Harware Folder
2. Nvidia dev kit [Samson] Harware Folder
3. Libfreenect2 + OpenCV [Curtis] Software Folder
4. Best projection unit Harware Folder
   LCD/LED screen, HUD [Group: Everyone]
5. Power Unit [Don] Harware Folder

D. Revisit Schedule

See full schedule :
https://docs.google.com/spreadsheets/d/1XmIR-gwRC3pCJsvCFIRB-ZMV8o8fujbgJXBz0m7E6LQ/edit#gid=1800669865

Tasks	% Done	Start	End
Design	**80%**	**Sep-21**	**Oct-19**
Development (Software & Hardware)	**20%**	**Oct-4**	**Oct-30**
Integration	**0%**	**Oct-31**	**Nov-20**
Functional Specifications	**10%**	**Sep-29**	**Oct-19**
Oral Progress Report	**0%**	**Oct-20**	**Oct-31**

E. To Do List

1. A checklist of mistakes we have in the preivous Project Proposal.
   So we don't duplicate this mistakes in our next report. **[Jim]**

F. Next Meeting Schedule

Sunday - Oct 18. 2PM Skype/Meet @ Samson's house

G. Other Busines

Meeting was adjourned at 8:00 PM, keeping the timeframe of the meeting within 30 minutes.

Abosult Vison Systems.

AGENDA

Oct 29, 2015
7:30-8:00 PM
Skype Call

Purpose of Meeting: Status update of development process, and plans for upcoming November.

Items for Discussion:

- **Progress Update**
- **Schedule Group Meet Up**
- **Design Specification**
- **To Buy List**
- **Revisit Schedule**

Abosult Vison Systems.

MINUTES

Oct 29, 2015
7:30-8:00 PM
Skype Call

Present: Jim Tu, Samson Timothy Tam, Don Rafael Prades Labayo,
Curtis Craig Rietchel Tomasz Szajner.
Absent: None
Purpose of Meeting: Status update of development process, and plans for upcoming November.

Minutes:

A. Progress Update

1. Sensor Unit

> Developed a rough mockup of display using Kinect. Able to display outlines of field of view.
> Performance : Need to see how well the processor can handle images with lots of edges.
Compression of 3D data to 2D image, emphasis on the 'time of flight' concept.
> Proximity: Need the sensor to distinguish between Proximity.
Test on the difference in image behaviour for static vs dynamic .
> Test Enviroment Setup: Have a Fog machine box build to demo and test.
> Range : Device a way for existing sensor to increase range of visibility and focus on particualr spot. Either programmatically or mechanically.
> Projection: Testing with a Lexan Plastic with film to project the image on to.

2. Display Unit

> Using a LCD display, see if 200nits bright enough for projection quality.
> Buying Battery : A RC battery, and charger $120
> Resource management: Design a charging , power failsafe, and controll button.
Planning to use a PCB design with schematics by Wednesday Oct 4 .
> Exterior enclosure.
For holding power system & Nvidia Dev Kit.
Considering designing or buy it.
> Thermal management.
Plans to integrate Fans or Heat sinks to the enclousure.

B. Schedule Group Meet Up

As we aproach to beginning of November, we are approaching start of integration and end of development phase.

We each came up with plans on how to expedite our current status quo:

- Increase freqency of physical team meet ups
- More communications via Skype / WhatsApps
- Planning ahead:
  Have discussions on documentations early, set goals/task ahead of time.
- Writing in journals.

C. Design Specification

Discussion on how we will create breakdown tasks for each indivual to workon.
Emphasis on the Test plan that is new.

See Design Spec Ruberic

Rubric	Description
Introduction/Background	Introduces basic purpose of the project.
Content	Document explains the design specifications with proper justification for the design approach chosen. Includes descriptions of the physics (or chemistry, biology, geology, meteorology, etc.) underlying the choices.
Technical Correctness	Ideas presented represent valid design specifications that will be met. Specifications are presented using tables, graphs, and figures where possible (rather than over-reliance upon text). Equations and graphs are used to back up/illustrate the science.
Process Details	Specification distinguishes between design details for present project version and later stages of project (i.e., proof-of-concept, prototype, and production versions). Numbering of design specs matches up with numbering for functional specs.
Test Plan	Provides a functional test plan for the present project version. (Note that project success will be measured against this test plan.)
Conclusion/References	Summarizes functionality. Includes references for information from other sources.

D. To Buy List:

In order to obtain resources ahead of time, so we don't impede our development progress. Below is a evaluation of what components we need to buy, and what we have already brought.

1. **Purchasing List:**

   Things need to buy:

   1. Switches
   2. LED
   3. Mounting Equipment & Helmet
   4. PCB components.
   5. Enclosure

2. **Inventory List:**

   Items already broguht

   > LCD Display

   > Battery [Pending Delivery] with Charger.

   We may need back ups just in case.

   > Kinect.

   > Fog Machine.

E. Revisit Schedule

See full schedule :
https://docs.google.com/spreadsheets/d/1XmIR-gwRC3pCJsvCFIRB-ZMV8o8fujbgJXBz0m7E6LQ/edit#gid=1800669865

Currently we rolled back our Design phase to 45% for a realstically look at our current status quo. We are currently in the Agile Development process, in which we switching back and forth between Design & Development Phase.

The Design and Development Phase has extended to next week Nov 6th.

Tasks	% Done	Start	End
Design *	**45 %**	**Sep-21**	**Nov-6**
Development (Software & Hardware)	**45 %**	**Oct-4**	**Nov-6**
Integration	**5 %**	**Oct-31**	**Nov-20**
Design Specifications	**0%**	**Nov-1**	**Nov-9**
Written Progress Report	**0%**	**Nov-10**	**Nov-23**

F. Next Meeting Schedule

Wednesday - Nov 4 . 7PM Skype Meeing

G. Other Bussiness.

Meeting was adjourned at 8:00 PM, keeping the timeframe short to spent more time in development. Also reminder for everyone that group evaluation is due tomorrow Oct 30th.

Abosult Vison Systems.

AGENDA

Nov 05, 2015
7:30-8:30 PM
Skype Call

Purpose of Meeting: Status update of development process, and plans for upcoming November.

Items for Discussion:

- **PCB System Layout**
- **Mechanical Layout**
- **Software Integration**
- **Team Challenges**
- **Design Specs**
- **Schedule / Deadline / Extention.**

Abosult Vison Systems.

MINUTES

Nov 05, 2015
7:30-8:30 PM
Skype Call

Present: Jim Tu, Samson Timothy Tam, Don Rafael Prades Labayo,
Curtis Craig Rietchel Tomasz Szajner.
Absent: None
Purpose of Meeting: Status update of development process, and plans for upcoming November.

Minutes:

A. **PCB System Layout**

The hardware team designed their PCB system layout on Altium Designer.
We planning to export the schematics to PCB manufacturer : Omni's Prototype Services.
This PCB is our Power Management System,
Below are list of hardware components we will integrate with our Nvidia TK1 & LCD.:

- GPIO Header (General-purpose input/output)
- GPIO Switches
- 5V Reg
- Jetson 12V Reg
- Kinect 12V Reg
- 3V3 LDO (Low Drop Out)
- ADC (Analog Digital Converter)
- 3V3 LDO
- Biasing Pots :
- 1V8 LDO
- Indicator LEDs
-

B. Mechanical Layout

> *Placement of electronics board /battery.*
We discussed how we will arrange the mechanical layout with our electronical components inside the metal enclousre for LCD monitor, and plastic enclousre for the GPU.

> *Partition compartments*
If possible we should have partition of each components in a seperate compartments within the metal / plastic enclosures.

> *Thermal management*
We are planning to place a PC fan that intakes cold air into the plastic enclousre.
It may be a challenge due to limited space within the plastic enclousre.

> *Waterproofing.*

We are planing on how to waterproof our enclousre, so that it wont short our electronic components. this is so that it can be tested in moist enviroment.

> *Helmut & Back Pack*

Jim will design Solidworks for our final project, this is for future improvement.

C . Software Integration

We are currently programming our Nvidia TK1 dev kit to communicate in I2C protocol, testing it against a Arduino Uno kit using its analog digital converter. The challeges we faced are that the Nvidia TK1 dev kit source 3.3V for I2C communiction, Arduino Uno on the other hand produce 5 V.

D. Team Challenges

At the moment to we want to highlight our biggest obstacles so we can prioritize what we need to accomplish according to our scheduled deadlines.

- Program the software so it can calibrate the projected image so it aligns with the exterior surroundings.
- Getting image focused on far away object.
- Placement of electronic components.
- Getting the PCB component designed.
- Wiring and fitting of the PCB into the box.
- How to use I2C with our program.

F . Design Specs

- PCB design specs done before Firday Nov 6.
- Software design specs, need to finalize commands and functions.
- Research requirements for Test Plan that is tailor fitted to our project.
- Include Usability Testing. Feedbacks.
- Design for C2C.

G. Schedule / Deadline / Extention.

- We took the a extension for our design spec to Nov 12th , 2015 instead of Nov 9th.
- Written Progress Report Nov 23.

H. Next Meeting Schedule

Wednesday - Nov 11 . 3PM Samson's House.

I. Other Bussiness.

Meeting was adjourned at 8:30 PM, we took an hour due to more technical content for today's mintues.

Abosult Vison Systems.

AGENDA

Dec 03, 2015
7:00-8:30 PM
Tomas's House

Purpose of Meeting: Discussion on current challenges and progress made for the project so far.

Items for Discussion:

- **Software Team To Do List**
- **Hardware Team To Do List**
- **Component Purchase List.**
- **Last Meeting Minutes**

Abosult Vison Systems.

MINUTES

Dec 03, 2015
7:00-8:30 PM
Skype Call

Present: Jim Tu, Samson Timothy Tam, Don Rafael Prades Labayo,
Curtis Craig Rietchel Tomasz Szajner.
Absent: None
Purpose of Meeting: Status update of development process, and plans for upcoming November.

Minutes:

A. Software To do List

a. Set up XY Calibration
b. Set Up XY Potentiomenter
c. Set limit for zoom
d. Fix Text on screen (add server time)
e. Screen Size Fix
f. Boot up without the GUI ,
g. Possible Debug Mode [Escape Mode]
h. Kinnect Power Boot Up Script.
i. Check for Kinnect Errors
j. Solidworks Simulation (Design & Humanoid Model)

C. Hardware To Do List

1. Mount Kinnect to Helmet
2. Mount Display Box to the Helmet
3. PCB fix Kinnect Power
4. Wire Potentiometers.
5. Mount Jetson & Power PCB in the metal box
6. Component Box with Straps (X straps)
7. Mount Cylindrical Power Bank fo LCD Display.

D. Component To Buy List

1. Two more potentiomers to match existing ones. 5Ks
2. 3x Potentimenter Knobs.
3. Switches (Maybe) - CEO Don

E. Last Meeting Minutes

Friday , Dec 11, 2015. 5PM @ Tomas's House.