Sensible Solutions

September 21st, 2014

Dr. Andrew Rawicz
School of Engineering Science
Simon Fraser University
Burnaby, British Columbia
V5A 1S6
Re: ENSC 440 Project Proposal for a detection unit for the visually impaired

Dear Dr. Rawicz,

You will find enclosed the proposal for the VIA: Visually Impaired Assistant, and the layout for our Capstone Engineering Project. Our objective is to create a device for the visually impaired using multiple proximity sensors to detect obstacles impeding them, or a void in the ground space in front of them (such as stairs), with a speaker used to give feedback to the user. The idea is to eliminate the white cane used by many visually impaired people. The goal of our project is to give a greater awareness to the visually impaired in the most affordable way possible.

This proposal will give an outline, and general design of our product. As well, our team has provided a proposed budget and our planned work schedule leading up to the deadline. Finally, we will discuss the market potential for the VIA.

Sensible Solutions is composed of three creative and determined fourth year engineering students: Ahmad Ibrahim, Robert Sanchez, and Jessica Zanewich. We appreciate you considering our proposal. If there are any questions or concerns regarding this proposal, please feel free to contact us at via email at jzanewic@sfu.ca.

Sincerely,

Jessica Zanewich
Chief Executive Officer
Sensible Solutions

Proposal for the

VIA: Visually Impaired Assistant

Project Team: Ahmad Ibrahim
Jessica Zanewich
Robert Sanchez

Contact Person: Jessica Zanewich

Submitted to: Dr. Andrew Rawicz – ENSC 440
Steve Whitmore – ENSC 305

School of Engineering Science
Simon Fraser University

Issued Date: September 21, 2014

Revision: 1.1

Executive Summary

The right to function the same way in society should be a guarantee for each person, not a suggestion. We have allowed ourselves to move ahead technologically while certain groups are left behind. This includes the visually impaired, where there are only a couple reliable solutions (explained later) as a form of detection for their vicinity.

Sensible Solutions would like to provide a greater awareness of surroundings to the visually impaired, through our device, the VIA: Visually Impaired Assistant. Although there are already solutions to this issue, such as the previously mentioned white cane, and guide dogs, we are hoping to improve on these current methods. These are fine options, but with the amount of technology we have at our disposal, our company believes we can truly improve on these and enhance the experience of everyday life of the visually impaired. We are focused on replacing the white cane first, as this product is outdated and can only give a slight feel for what is around the person. The guide dog has a great sense of awareness that will be hard to replace, but as time continues, we hope to improve on that as well.

After great thought by our small team of dedicated engineers, we have come up with a possibility for a project that could truly revolutionize the market. We are looking to use a combination of components to create the VIA, to make it small and efficient in its use. Specifically, we plan to use the Arduino Uno, along with ultrasonic sensors as our major components. Using multiple ultrasonic sensors will give a great sense of a larger vicinity for the visually impaired, than if they were to use a white cane. We aim to prove how useful these sensors could be to a person without sight.

The Sensible Solutions team is composed of three dedicated and talented Computer Engineers. We have a strong belief in the VIA and want to demonstrate this in the time before the deadline in thirteen weeks. We hope our scheduling of both Gantt and milestone charts will help the understanding of how we plan to accomplish our task of creating an outstanding product. As well, we have worked towards a tight budget for the project, and it is our goal to keep it as limited as possible.

Our team not only believes in the product we wish to put into the market, but we have worked in many different ways, including researching, budgeting and scheduling, to accomplish this task to the best of our ability. We have an experienced group of Engineers looking to help improve a market often overlooked. Our overall goal is to improve the lives of the visually impaired, in the most technologically efficient way possible.

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Sensible Solutions

1. Introduction

In 2006, 87, 830 Canadians were diagnosed as legally blind [1], with "75.5% classified as having severe seeing limitations"[1]. 78.8% of the people with a seeing limitation also have a mobility condition [2]; at Sensible Solutions, it is our hope that the VIA will help alleviate some of these maneuverability concerns.

It seems like a big issue with people who have sight limitations is using public transportation:

> *"In 2006, … 16.8% were not able to use a bus. [It was reported that] the most commonly reported barriers to bus use related to difficulties in getting on or off (43.0%)"*[1].

This may cause them to have to use transportation methods that are more costly, such as taking a taxi. With our device having the ability to not only determine the distance of a step/drop, but also being able to determine the height as well, using busses may not be as daunting of a task as it previously was.

Not only is public transportation an issue, but so is general transportation. The VIA has a longer range than the average white cane, over 6 meters [3] vs. 1-1.5 meters [4], respectively; and it is also able to sample three locations (four, if you include the human/wall sensor) in front of the user, as opposed to just one with a white cane. This gives the user a better idea of what their surroundings are like, hopefully making them more comfortable in their day-to-day travels.

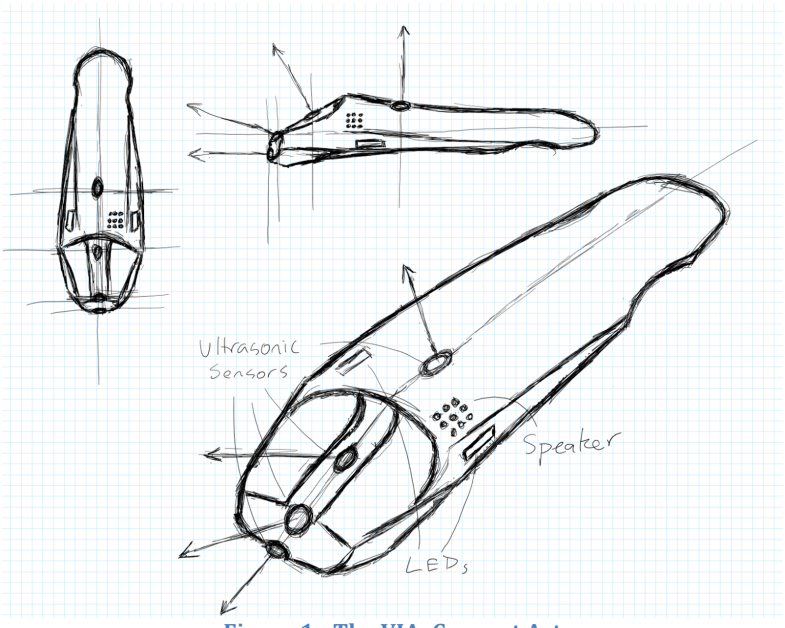


Figure 1 - The VIA: Concept Art

Also, the VIA provides more versatility than a white cane. A longer white cane allows for a longer range, but is a bit more awkward (gripping the cane differently and/or higher chances of running into people) to use in short range situations/crowded areas - the opposite is true with a shorter stick. Aforementioned, the VIA already has a longer range than the typical white cane, and in short range situations/crowded areas, simply holding the device at a lower angle would give it the same functionality but at a shorter range.

The VIA will give great assistance to the visually impaired. Our hope is to make this device affordable and desirable. We have confidence that we can help people with varying degrees of blindness and from all walks of life live a safer and more comfortable life. In our eyes, the VIA is the device that can make this a reality.

2. System Overview

The VIA: Visually Impaired Assistant has four ultrasonic sensors, mounted at different angles to detect obstacles/objects, ledges/drops, and other people. Three of the four sensors are directed to the ground at different distances from the user; these are the primary sensors, and are used to detect obstacles/objects, and ledges/drops. The fourth sensor is designed to detect people, walls, and other objects directly in front of the user, and is mounted further up the device than the other three.

As we progress in the development of the VIA, the implementation of a gyroscope will allow it to be used in more situations. In crowded areas, the device will be held at a lower angle, possibly causing some of the sensors to report false positives as it may be detecting the user instead of an object. In these situations, based on the gyroscope readings, sensors may be turned off/readings will be ignored to prevent these false positives.

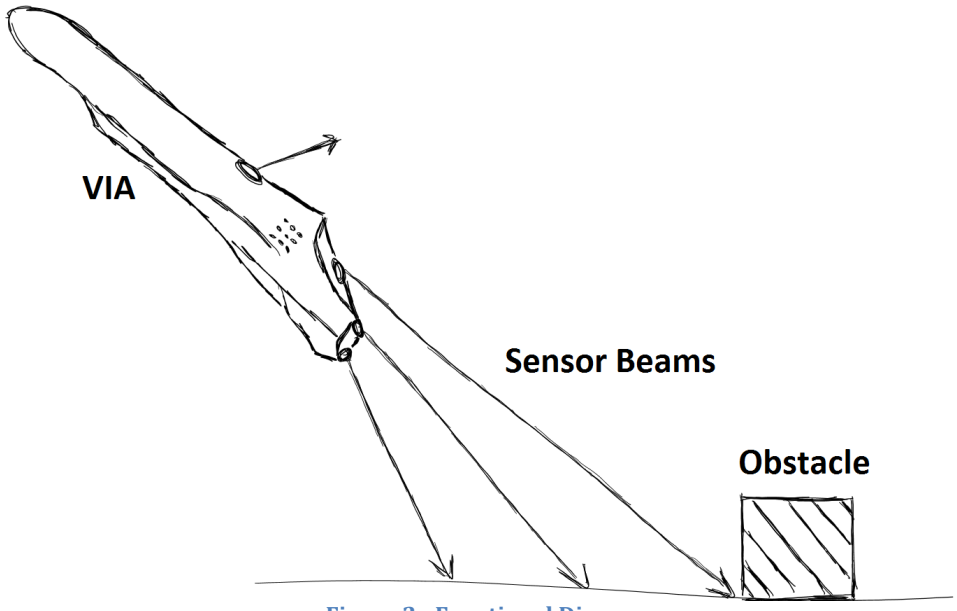


Figure 2 - Functional Diagram

Audio feedbacks/warnings will be played on the speakers (possibly through headphones utilized by the user) based on the obstacles detected by the ultrasonic sensors. Warnings include, but are not limited to, “stairs up/down (distance in meters)”, and “wall (distance in meters)”. These warnings will be pre-recorded samples stored onto the memory of the VIA.

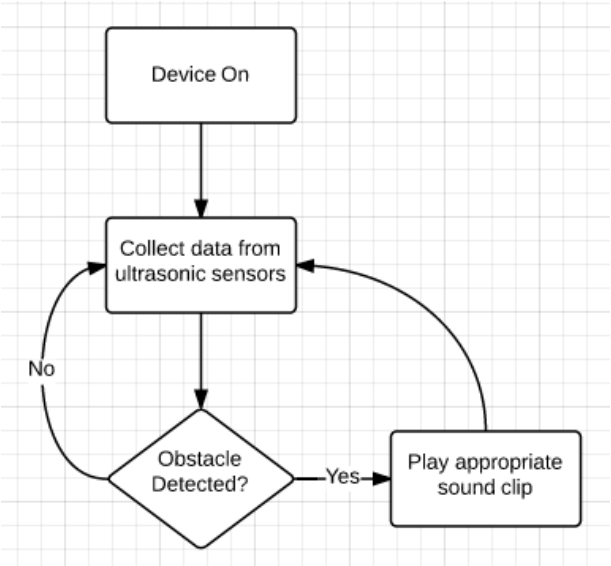


Figure 3 – Obstacle Detection State Diagram

Others are notified that the user is visually impaired through blinking red LEDs at either sides of the device, and the white design of the VIA. This is done to be consistent with the design of the white canes. By enclosing the hardware used for the sensing and feedback portions into a sleek yet ergonomically designed shell, we feel like we could build a stable user-friendly product that can help any and all people that are visually impaired.

3. Budget and Funding

The final product will have four ultrasonic sensors, one speaker, one headphone jack, one on/off switch, one gyroscope, one Adafruit Pro Trinket, and two LEDs. Through the development of the VIA, we plan on going through different progressions from a functional prototype, to a working product, and finally, the final product.

One of the main progressions will be with the audio feedback. We intend to start with buzzers (functional prototype), and move to speakers in the working product. Our goal for the final product is to have speakers, as well as a headphone jack. Through these progressions, we plan on using an Arduino Uno for the functional prototype, and an Adafruit Pro Trinket for the working product, and final device.

Unit	**Initial quantity**	**Anticipated quantity**	**Cost per unit (CDN $)**[9]	**Initial costs (CDN $)**	**Anticipated costs (CDN $)**
Sensors	5	7	30	150	210
Pro Trinket	1	2	16	16	32
Arduino Uno	1	1	33	33	33
Gyroscope	0	2	22	0	44
Speakers	1	2	3	3	6
Headphone Jack	0	2	10	0	20
LEDs	5	10	1	5	10
Buzzers	4	5	3	12	15
Switch	2	3	2	4	6
Breadboard	3	3	4	12	12
Header Pins	1	1	2	2	2
Casing	0	1	50	0	50
9V Batteries	4	8	7(4 batteries)	7	14
9V Holder	1	2	1.50	1.50	3
Contingency					50
			Total (+tax):	274.96	567.84

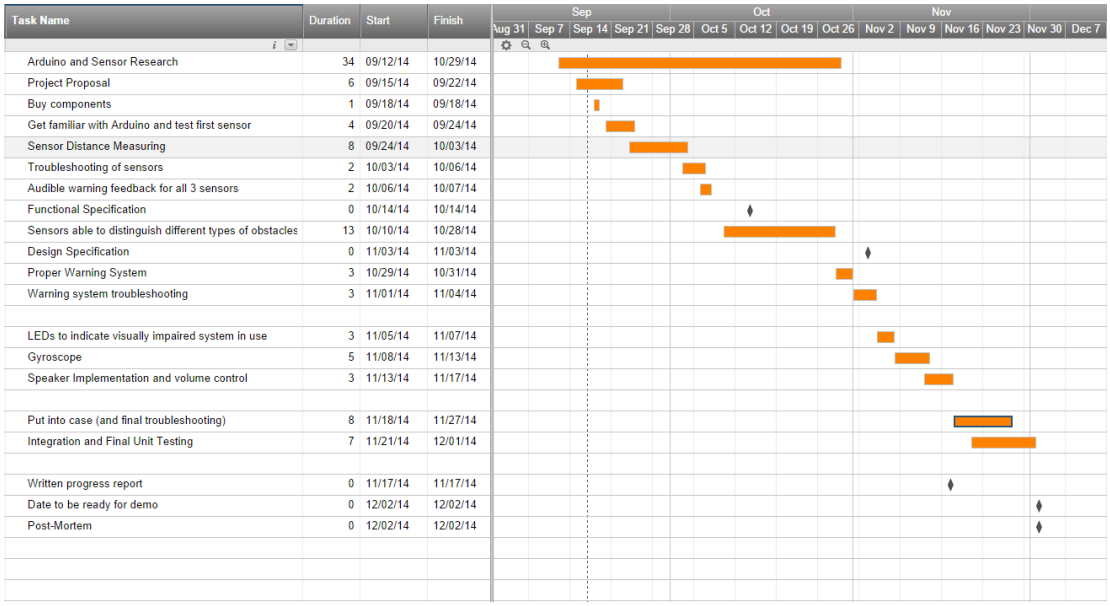
Table 1 - Budget Outline

The anticipated quantities/costs are the estimated totals required, taking into account technical issues and mishaps, as well as further contingency costs. The initial quantities/costs consists of all items bought prior to receiving funding; these should be enough to produce up to, and including, the working product.

We intend on applying for funding from the ESSEF, as well as the Wighton Fund. Further funding from these sources will allow us to improve on the design, and functionality of the VIA. These improvements are the addition of the gyroscope, and headphone jack. The gyroscope will allow for more accurate sensor data analysis; the headphone jack will allow audible feedback in loud areas where an external speaker would be insufficient.

4. Scheduling

The purpose of the Gantt chart found below is to give an approximation of each activity within our project. It gives a possible amount of time taken for each activity, as well as finishing dates for specific deliverables. The goal of the milestone chart is similar, but strongly focused on important deadlines our team wishes to meet. This chart is here to demonstrate our teams plans to keep on track to finish this project by the deadline set forth.



Task Name	Duration	Start	Finish
Arduino and Sensor Research	34	09/12/14	10/29/14
Project Proposal	6	09/15/14	09/22/14
Buy components	1	09/18/14	09/18/14
Get familiar with Arduino and test first sensor	4	09/20/14	09/24/14
Sensor Distance Measuring	8	09/24/14	10/03/14
Troubleshooting of sensors	2	10/03/14	10/06/14
Audible warning feedback for all 3 sensors	2	10/06/14	10/07/14
Functional Specification	0	10/14/14	10/14/14
Sensors able to distinguish different types of obstacles	13	10/10/14	10/28/14
Design Specification	0	11/03/14	11/03/14
Proper Warning System	3	10/29/14	10/31/14
Warning system troubleshooting	3	11/01/14	11/04/14
LEDs to indicate visually impaired system in use	3	11/05/14	11/07/14
Gyroscope	5	11/08/14	11/13/14
Speaker Implementation and volume control	3	11/13/14	11/17/14
Put into case (and final troubleshooting)	8	11/18/14	11/27/14
Integration and Final Unit Testing	7	11/21/14	12/01/14
Written progress report	0	11/17/14	11/17/14
Date to be ready for demo	0	12/02/14	12/02/14
Post-Mortem	0	12/02/14	12/02/14

Figure 4 – Gantt Chart

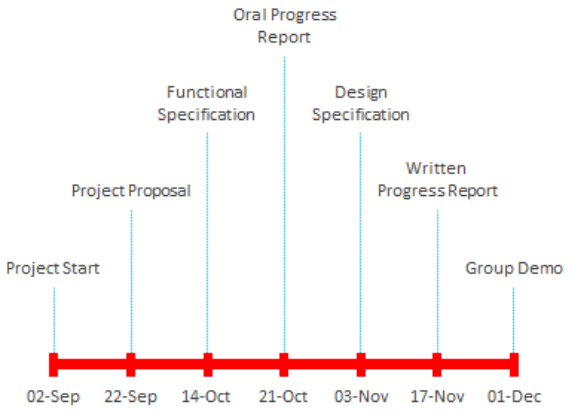


Figure 5 - Milestone Chart

5. Team Organization

At Sensible Solutions, we have a small team of only three engineers. This means that each member of our company must take on multiple roles, both on the technical and management side of the business. It is imperative in a small group to organize well and fair, to avoid as much conflict as possible down the line. We recognize the strengths and weaknesses of each team member and where they would be of greatest benefit.

Jessica Zanewich is the Chief Executive Officer (CEO) at Sensible Solutions. She is also a fifth year Computer Engineering student. Jessica has worked on technical projects throughout school, but her vast team-based work is her strength. In her position as CEO, she will work with each position to make sure duties are being accomplished accordingly. As well, she will work to organize meetings with the group in order to ensure each team member is up-to-date on the current task.

Ahmad Ibrahim is the Chief Financial Officer (CFO) and Chief Information Officer (CIO) at Sensible Solutions. With a year of experience at Blackberry, Ahmad has a large amount of technical knowledge that will be of value to the team as a whole. It will also benefit him as the CIO, where he will be responsible for the computer systems used. This means he is in charge of technical issues (or testing equipment) and the quick resolution of them. As CFO, Ahmad will also be required to oversee financial costs and any problems with financing for the project.

Robert Sanchez is both the Chief Technical Officer (CTO) and the Chief Operating Officer (COO) at Sensible Solutions. He has a great amount of background technical insight from his four years as a Computer Engineering student at Simon Fraser University and has technical experience as an Embedded System Software Developer at BlackBerry. Robert will be in charge of keeping members on track of their current technical task and will oversee the integration and testing of each component in each deliverable.

As described, each team member will have a commitment within the project. Although each of our team members is in the Computer Engineering discipline, we each bring a unique trait and perspective to the group. Of note is that each group member will be working on the implementation of components. As was stated, a small team means we each must take on many roles for the project to run successfully. This means every member of our group will work on each written deliverable, as well as each technical component.

If you would like to know more about the members of the Sensible Solutions team and their technical experience, you will find resumes attached outlining this in detail.

6. Conclusion

We at Sensible Solutions are dedicated to our product and what it can achieve. It is our belief that the VIA will revolutionize the way the visually impaired are able to approach the world.

The goal of our device is to adapt the currently used method of a white cane to a more modern approach to the market. The way technology is expanding in our world, we believe every person should have the same access to the latest device. Allowing visually impaired people to have a greater awareness of their surroundings will increase their standard of living dramatically.

If this document has convinced you that we are ready to take on this project, then our mission has been accomplished. With our Gantt and Milestone charts, we hope that we demonstrated our ability to work on this large-scale project within a deadline. We aimed to prove the success of our project in the market by discussing previous solutions to the visually impaired navigation problem. As well, we have laid out exactly how we plan on creating this device in the most financially viable way possible.

Our company asserts that we are giving the visually impaired a way to improve their everyday life. We believe this document is proof of our determination to finish this project on time and to a high standard. The VIA: Visually Impaired Assistant is a worthy investment of both time and money and will truly revitalize the visually impaired navigation market.

7. Glossary

Adafruit Pro Trinket	Microprocessor; uses the ATmega328 Arduino chip. Small, intended to be used in the working/final product.
Arduino Uno	Microprocessor; uses the ATmega328 Arduino chip. Intended to be used for the prototype/testing phase.
ESSEF	Engineering Science Student Endowment Fund.
Gyroscope	Device for measuring, based on the principles of angular momentum[10].
LED	Light-emitting diode; Semiconductor light source, consists of a pn-junction diode [11].
Ultrasonic Sensor	Transceiver; able to determine the distance between two objects - usually a stationary object, and a moving object. Measurements are determined using sonar (sound navigation and ranging).
VIA	Visually Impaired Assistant.

8. References

1. Statistics Canada. (2009, February 26). *Facts on Seeing Limitations* [Online]. Available: http://www.statcan.gc.ca/pub/89-628-x/2009013/fs-fi/fs-fi-eng.htm

2. Statistics Canada. (2009, February 26). *Common limitations paired with seeing conditions, 2006 - Description* [Online]. Available: http://www.statcan.gc.ca/pub/89-628-x/2009013/c-g/desc/c-g1-desc-eng.htm

3. MaxBotix Inc.. *LV-MaxSonar-EZ1 High Performance Sonar Range Finder* [Online]. Available: http://maxbotix.com/documents/MB1010_Datasheet.pdf

4. Thomas Bickford. (1993). *Care and Feeding of the Long White Cane: Instructions in Cane Travel for Blind People - 2. Getting the Cane Ready* [Online/Book]. Available: https://nfb.org/images/nfb/publications/fr/fr15/issue1/f150117.html

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6. World Health Organization. (2014, August). *Visual Impairment and Blindness* [Online]. Available: http://www.who.int/mediacentre/factsheets/fs282/en/

7. Guide Dogs of America. *Guide Dogs of America - FAQ* [Online]. Available: http://www.guidedogsofamerica.org/1/mission/#cost

8. American College of Allergy, Asthma & Immunology. *Pet Allergies Information* [Online]. Available: http://www.acaai.org/allergist/allergies/Types/pet-allergies/Pages/default.aspx

9. Unit costs are based on Lee's Electronics. Available: http://www.leeselectronic.com/

10. Wolfram Alpha, by Sandor Kabal. (2007, September 28). *Gyroscope* [Online]. Available: http://demonstrations.wolfram.com/Gyroscope/

11. Wikipedia. *Light-emitting Diode* [Online]. Available: http://en.wikipedia.org/wiki/Light-emitting_diode

Education

Computer Engineering student at Simon Fraser University, Burnaby BC Sep 2009-present

Skills

Software

- Solid understanding and skill in operating systems including QNX Neutrino
- Experienced in using Pthreads library to create multithreaded programs
- Strong experience in C and C++ programming
- One year of work experience scripting in Perl and Python
- Very experienced in use of revision control systems such as Perforce
- Two months experience using OpenGL
- Self-learning Unity3D by means of online tutorials
- Experienced in use of both Windows and Linux OS
- Skilled in use of MATLAB
- Currently self-teaching PostgreSQL
- Proficient in Microsoft Word, Excel, PowerPoint, Publisher, and OneNote

Hardware

- Experienced in VHDL programming using the Sonata and Quartus simulators, and the Cyclone II DE2-70 FPGA board
- Strong understanding of processor and computer architectures such as the 32-bit MIPS architecture
- Skilled in assembly language programming such as for the M68HC12 microcontroller
- Skilled in the use of laboratory equipment such as oscilloscopes, and function generators
- Good understanding of circuit components such as Diodes, OpAmps, BJTs, MOSFETs etc.

Technical Work Experience

Radio Software Integrator - Blackberry, Waterloo, ON May 2013-May 2014

- Managed many features and integrated them into different codelines with Perforce
- Performed sanity and regression tests to ensure quality of radio and modem software
- Automated manual tasks such as documenting integrations by scripting tools in Perl and Python

Projects

Video Game Development - Self Directed Jan 2013-present

- Designing and implementing 2D and 3D games using Unity3D software
- Modelled simple animations to help simulate motion of in game sprites

Smaug's World - Operating Systems May–Jul 2014

- Used multithreaded processes to simulate interactions between Smaug, sheep, cows, thieves, and treasure hunters, where each is represented by a thread
- Implemented in a Linux environment using the bankers algorithm in C
- Used mutexes, semaphores, and other common OS tools to avoid deadlocks in simulation

Projects Continued

Alarm Clock - Digital System Design Jan-Apr 2012

- Programmed fully functional digital alarm clock on Cyclone II DE2-70 FPGA board using VHDL
- Implemented random number generator to move time forward using odd parity generator
- Alarm tone executed effectively using a 4-bit counter

Two Input Audio Clipper and Mixer - Digital System Design Jan-Apr 2012

- Built a two input audio clipper and mixer using VHDL on Cyclone II DE2-70 FPGA board
- Mixed audio file would be input into the FPGA board then clipper component would change the ratio of the two audio clips using four switches
- Mixer component takes the clipped audio and outputs it to both speakers

32-bit MIPS architecture - Computer Architecture Sep-Dec 2011

- Designed an un-pipelined 32-bit MIPS architecture with VHDL using sonata simulator
- Completed by building individual components such as the ALU and registers
- Architecture designed to properly execute all I-format and R-format instructions

Thermometer - Microcontroller Interfacing and Assembly-Language Programming Sep-Dec 2010

- Successfully designed and implemented digital thermometer using assembly language on Motorola HC12 microcontroller and Metrowerks CodeWarrior

Work Experience

Retail Sales Associate - Athletes World, Burnaby, BC Jun-Dec 2009

- Aided many customers in a one-on-one manner improving both multitasking and social skills
- Guided clients in buying merchandise by conveying pros and cons of different products

General Clerk and Laminate Floor Installer - MH Flooring, Surrey, BC Jun 2005-Jun 2009

- Assisted customers in finding the products they were seeking to help increase sales margins
- Worked with clients both in person and on the phone to confirm product orders, determine times for floor measurements, and counsel any client with concerns
- Installed tiles, laminate, and hardwood flooring, improving hands-on abilities

Volunteer Experience and Extra Curricular Activities

Co-Chair of SFU Op-Fair Organizing Committee - SFU, Burnaby, BC Oct 2011-Feb 2012

- Called companies and invited them to the SFU Op-Fair to promote a culture of communication between companies and engineering students
- Organized and participated in the assembly of the Op-Fair which included over 30 companies

Ball Hockey League Referee - Panorama Ridge Secondary, Surrey, BC Nov 2007-Jun 2009

- Planned and organized schedule for after school boys hockey league
- Regularly refereed hockey games dealing penalties and suspensions as needed

Interests

- Strong interest in computer architecture, operating systems, FPGA design, and video game development
- Keen interest in sports, specifically soccer, basketball, hockey, and snowboarding

Jessica Zanewich

Computer Engineering Student

Burnaby, BC
jzanewic@sfu.ca

EDUCATION

Simon Fraser University, Computer Engineering Student, Burnaby, BC

- Expected graduation in April 2016

SKILLS

Software:		**Hardware:**	
MS Word/Excel/Outlook	●●●●○	Function Generator	●●●●○
VHDL Programming	●●●●○	Oscilloscope	●●●●○
C/C++ Programming	●●●○○	Assembly Language	●●●○○
Java Programming	●●●○○	Soldering	●●●○○
MS SQL	●●○○○	Design/Build Circuits	●●●○○
MATLAB	●●○○○	FPGA Implementation	●●●○○
Python	●○○○○	HCS12 Implementation	●●○○○

TECHNICAL WORK EXPERIENCE

Project Engineering, Vanguard Engineering, Calgary, AB **May 2013 - Aug 2013**

- Worked towards the implementation of SharePoint Foundation within the office
- Coordinated with my team on the SharePoint project to understand their expectations of a dynamic working intranet with the ability to access a database quickly
- Reviewed oil plant electrical programs, which are used to keep large oil company's systems functioning correctly, to make sure no errors were found

Production Engineering, PetroBakken Energy Ltd, Calgary, AB **May 2012 - Aug 2012**

- Used various desktop software to create production reports for the engineering team to learn about the operations of oil and gas companies
- Learned software quickly by direct teaching to help my team with programs background work
- Analyzed oil production data to determine well productivity and financial return
- Pulled and organized graphs for team members to analyze well productivity
- Met with team weekly for planning sessions and to review progress on a variety of drilling initiatives

TECHNICAL PROJECTS

Operating Systems Assignment Work **May - Aug 2014**

- Automated an animal interaction program with processes using semaphores and mutexes in C on Linux to run the simulation through a series of relations of these animals.
- Created a ferry car loading program with threads using message passing for interaction in C on Linux to simulate how the ferry can board cars and trucks in a set manner.
- Furthered understanding in areas such as memory management, disk operation, and process run times through calculations to enhance our knowledge of current operating systems.

Software Engineering Term Project **May - Aug 2014**

- Programmed a Grading System in Java for teachers and administrators to mark and keep track of student's grades
- Created a User Interface in Swing with over interface 15 Frames interacting with each other to present the system to the user
- Developed database interaction with the System through the use of a Model View Controller design to store and retrieve lists of information about different users within the system

Navigation Sprite Project for Digital Systems Design **Jan - April 2014**

- Created a user controlled sprite using VHDL and the keys of an Altera DE2-115 FPGA board
- Using VHDL, created a background navigational space with objects the sprite was not able to walk through
- Set a trigger component in VHDL to play music and display a room label when sprite was in the correct room
- Combined components of a circuit to allow sprite and background environment to work well with each other and interactions of different components to be properly controlled

Mechanical Design Project for Intro to Mechanical Design **Jan – April 2013**

- Observed a small fully mechanical toy and recreated multiple components using SolidWorks to learn observed bodies of motion
- Built a wired remote controlled hockey car through sketches in SolidWorks and group collaboration to understand bodies in motion and work on technical design skills
- Won a hockey playing robot tournament to test the durability of our design

WORK EXPERIENCE

Accounting Dept., Intact Insurance, Calgary, AB **Jun 2010 - Aug 2010**

- Processed and faxed credit cards for insurance customer's plans to help with organization
- Built letters to cancel policies for unpaid insurance to improve formal writing ability
- Distributing cards to be processed to employees in a number of other departments to improve interpersonal skills

EXTRA-CURRICULAR

Chaser, SFU Quidditch Team **Jun 2014 – Now**

- Competed against the international Australian Quidditch team
- Practiced 5 hours a week after classes
- Attended tournaments on behalf of the school team

Company Relations Team Member, SFU Opfair 2012 **Nov 2011 - Feb 2012**

- Contacted various companies to come and present to co-op students
- Registered students coming to visit the career fair

Novice Team Member, SFU Rowing **Nov 2010 - Aug 2011**

- Attended various regattas to compete for SFU as a competitive athlete

INTERESTS

- **Long Distance Running**

Education

Simon Fraser University — September 2010 – Present

Faculty of Applied Science, Computer Engineering

- Expected Graduation: December 2015/April 2016

Skills

Programming Languages

- Experienced: C
- Intermediate: Ruby, C++, Arduino (based on C/C++), Objective-C
- Familiar with: VHDL, 68HC12 (Assembly), JavaScript, Java, Python

Software

- Preferred OS: Linux (Ubuntu)
- Version Control: Git, SVN, Perforce
- App Development: iPhone, Android

Hardware

- Experienced: Arduino, DE2-70 FPGA (Altera)
- Familiar with: HC12 Microcontroller (Motorola)

Experience

BlackBerry — March 2014 – May 2014

NFC Software – Embedded System Software Developer, Coop

- Primary OS: Linux (Ubuntu); Primary Language: C
- Improved NFC tag detection robustness by adding tag detection session ID's, and increasing the amount of detection related interrupts to decrease ambiguity
- Increased detection accuracy by expanding the compatible products (sub-types) detection list for Type 2 tags
- Developed a client which enabled devices to replicate, and continuously output signals of certain tag type

BlackBerry — September 2013 – March 2014

Radio OS – Embedded System Software Developer, Coop

- Primary OS: Windows; Primary Language: C
- Developed a feature which monitored multi-core communication channels for issues between cores' clients
- Added settings which gave developers more control over log collection; preventing log collection from interfering with debugging tasks
- Implemented version checking between cores in a multi-core system; preventing device crashes due to incompatible software changes
- Improved bug report/log collection speeds, and usability

Projects

Speeding Warning System — July 2014 – August 2014
Personal Project

- Created a system which warned users (via a buzzer, and blinking LEDs) if they were exceeding the speed limit/speed determined by the user
- Hardware used: Arduino, 3-Axis Accelerometer + Gyroscope, buttons (2), 4-digit 7-segment display, buzzer, and several LEDs

Vehicle Parking Assist/Proximity Sensor — June 2014 – July 2014
Personal Project

- Created a system which displayed (via the 7-segment display) the distance of objects directly behind the vehicle while reversing; buzzer would go off if an object was within 0.20 meters of the back bumper
- Hardware used: Arduino, 4-digit 7-segment display, ultrasonic sensor, buzzer

Automated Book Web Crawler — June 2013 – September 2013
Personal Project

- Designed a Ruby-based web crawler which searched online bookstores (outside of Amazon.ca/com) for a predetermined list of books
- Determined by an algorithm based on list prices, and shipping/other fees, books from said online bookstores may then be listed, and indirectly sold on Amazon.ca

Real-Time Messaging Application — April 2013 – May 2013
Real Time and Embedded Systems, SFU/Personal Project

- Developed a real-time messaging application which allowed messaging between iPhones, BlackBerry phones and tablets, and users using an internet browser, via internet connection using post requests to a server
- Software used: Apple application – XCode, and Objective-C; BlackBerry application – QNX, and C (LibCurl library); Internet browser application – JavaScript

Personal Information/Non-Technical Experience

Hobbies

- Longboarding, snowboarding, rock climbing, powerlifting/bodybuilding, volleyball, running, cooking
- Coaching volleyball at the high school I graduated from, Sir Charles Tupper Secondary

Milestone's Restaurant — March 2008 – September 2010, December 2011
Prep cook/Line cook