Freedom ● Life
Systems

September 16, 2002

Dr. Andrew Rawicz
School of Engineering Science
Simon Fraser University
Burnaby, British Columbia
V5A 1S6

Re: Proposal for a Voice Activated Remote Control System (ENSC 340 Project)

Dear Dr. Rawicz,

The attached document, *Proposal for a Voice Activated Remote Control System*, outlines our project idea for ENSC 340. Our project is to design a voice activated remote control system. It can be customized to control any device that uses an infrared remote control by associating a voice tag with a desired infrared sequence. This device will give paraplegics and those physically disabled the convenience of remote controls that most people take for granted.

The attached proposal provides an overview of our product and design solution, as well as outlining a tentative budget and timeline. We also explain the advantages our product has over current solutions.

Freedom Life Systems consists of six fourth year students: Roger Lum, Alex Cheng, Jason Wang, Gary Liaw, Jeff Liu and Colin Ng. Each student brings their diverse knowledge and talent to the team. If you have any questions regarding our proposal, please contact me at 604-325-8569 or email at fls-340@sfu.ca.

Sincerely,

Roger Lum

Roger Lum
CEO
Freedom Life Systems

Enclosure: *Proposal for a Voice Activated Remote Control System*

Proposal for a

Voice Activated Remote Control System

Project Team:	Alex Cheng
	Jeff Liu
	Gary Liaw
	Roger Lum
	Colin Ng
	Jason I-chih Wang
Contact Person:	Roger Lum
	fls-340@sfu.ca
Submitted to:	Dr. Andrew Rawicz
	Steve Whitmore
	School of Engineering Science
	Simon Fraser University
Issued Date:	September 16, 2002

Executive Summary

Freedom Life Systems is a recently founded company looking at aggressively entering the large market for assistive devices. Assistive devices are anything that makes a person's life easier, whether they are disabled or able-bodied. The market for support devices is established but far from saturated; there is room for cheaper and innovative products. From this angle, we plan to establish our presence and develop products that will become the preferred choice for consumers.

Our company is founded around the development of our initial product: the VoiceIR. This device augments any remote control with user-defined voice commands. Our motivation for developing such a device is to aid the disabled. Someone who is paraplegic or has difficulty moving around will appreciate the simplicity that VoiceIR offers. By simple voice commands, those disabled will enjoy the convenience of remote controls that most of us take for granted.

We plan to establish our position in this market by offering an inexpensive and versatile solution. The appeal of these two factors will drive our sales and distinguish our product from the competition. While similar products exist in the market, these are limited to controlling a fixed number of devices. Our product can be configured to work with any infrared remote; hence, our versatility will be unmatched in the current market.

Once we have established ourselves in the medical market through developing a useful product for the disabled, the consumer market will drive the next phase of growth. The ability that VoiceIR empowers the disabled translates to convenience for consumers. VoiceIR eliminates the frustration of searching for the appropriate remote control since our product will provide a unified control for any IR device. We foresee enormous growth potential in the consumer market.

We believe we can stay ahead of our competitors through the philosophy behind our products: simple and inexpensive. Functionality and quality will not be compromised in our pursuit of cost-efficient solutions.

At Freedom Life Systems, we plan to offer simple and quality solutions. Our motivation and design philosophy will make us a leader in the market for assistive devices.

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1 Introduction

It is sometime in the evening. John relaxes in front of the TV, and grabs the remote. He turns on the TV, and tunes in to a news broadcast. He raises the volume to listen to an important news event.

An ordinary routine not to be given a second thought? Not necessarily.

Next door, Josh, who is a paraplegic, is also watching TV. He calls to his wife to change the channel for him. She changes it to the news broadcast and leaves the room. However, the volume is too low for him to hear the anchor. He calls out again for his wife but she has already gone upstairs. He has no choice but to cope with the lower volume.

Household electronics, such as television, have evolved to become easy to use. A large aspect of this evolution is the development of infrared (IR) remote controls. However, many are unable to enjoy the simplicity that IR remote controls provide in operating household electronics. They are the people who suffer from debilitating conditions ranging from arthritis to amputation to paralysis. We take John's actions for granted; yet people like Josh have lost the ability to perform these actions independently. Instead, they rely on family members, friends or caretakers to allow them to do what others do easily.

We propose a project, the VoiceIR, that would allow these disabled individuals to regain some of their independence. Our solution is a product where a person would be able to control any IR device by voice. Currently, alternative solutions include caretakers, expensive environmental control units, or limited application voice-operated remotes. Our solution, by contrast, will be completely operable by the disabled, low cost, and compatible with any IR device.

Our product will receive input in the form of voice commands. These commands will be interpreted and an IR transmitter will cause the proper device to perform the desired function.

This document proposes a design solution for our product, demonstrates existing solutions, outlines our budget and establishes our project timeline.

2 System Overview and Proposed Design Solution

The steps below demonstrate how to use the VoiceIR.

1. User speaks voice command into microphone.
2. Central control unit process command and instructs appropriate IR module.
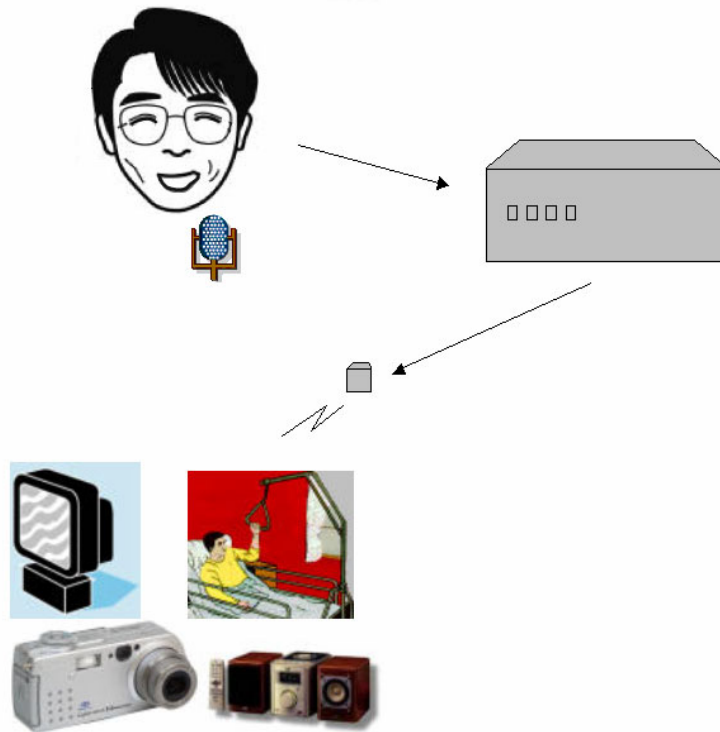3. IR module sends an IR signal to the targeted device.

Figure 2.1: System Overview

The VoiceIR comprises of three components: the microphone, the central control unit, and the IR modules.

The **microphone** is the point of interaction with the user. It captures voice commands and transmits them wirelessly to the central control unit.

The **central control unit** receives the voice commands and matches it with a user-defined set of commands. It then activates the appropriate IR module to execute the commands. To define these commands, the user needs to "train" the unit with existing remote controls to associate a voice command with a set of IR signals that performs the desired function.

IR modules are placed in front of every device the user wishes to control. Once the IR module receives a command from the central control unit, it emits the corresponding IR signal. Multiple IR modules can be controlled by the same central control unit.

3 Existing Solutions

There are several similar products existing in the market. The InVoca 4-in-1 Voice Operated Remote Control, shown in Figure 3.1, is one of them. It can control up to four devices, such as a TV, VCR, cable box, satellite, or home theatre. Fifty commands in any language can be recognized.

Figure 3.1: InVoca 4-in-1 Voice Operated Remote Control

Another product is the VoiceMe Voice-Activated Remote Control. This device can control a TV, DVD player, audio system, video player, or lighting. The unit can be placed anywhere in the room and be activated from up to 17 ft away. It is shown below in Figure 3.2.

Figure 3.2: VoiceMe Voice-Activated Remote Control

Figure 3.3 is the Voice Activated Environmental Control Unit.

Figure 3.3: Voice Activated Environmental Control Unit

This device can control lights, appliances, phones, infrared remote control devices, beds, and computers. However, it cost US$6000, which makes it a niche product.

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Our focus is in making our product versatile and inexpensive. The VoiceIR is able to control devices in separate locations through the placement of the wireless IR modules, a feature not available in our competitors' products, as well as be completely trainable for any IR device. It is not limited to only certain types of IR devices. We aim to keep our product cost-efficient to make it accessible to everybody. Because of VoiceIR's use of a wireless microphone, there can be greater distance between the user and the control unit. Our completely customizable product gives it an advantage over existing solutions.

4   Budget and Funding

Table 4.1 outlines the tentative budget for the development of a prototype of the VoiceIR. In addition to the estimated costs of individual components, a 15% contingency fund has been allocated.

Table 4.1: Tentative Budget

Item	Cost
Voice Recognition Toolkit	$75
Microprocessor & EVB	$300
Wireless Microphone	$100
IR Learner & Transmitters	$200
Power Supply	$60
Miscellaneous	$50
Case	$30
Subtotal	$815
15% Contingency Fund	$120
Total	**$935**

Freedom Life Systems is currently in the process of searching for sources of funding for the development of the VoiceIR. We currently plan on applying to the Engineering Student Society Endowment Fund (ESSEF) and Wighton Development Fund. Other possible sources of funding will be explored continuously throughout the duration of our project. In addition to outside sources of funding, all members of our team are prepared to make contributions to account for differences between our budget and available funds.

5 Time Schedule

Table 5.1 shows the expected time spent on each aspect of product development. Figure 5.1 highlights the due dates for the expected tasks illustrated in Table 5.1.
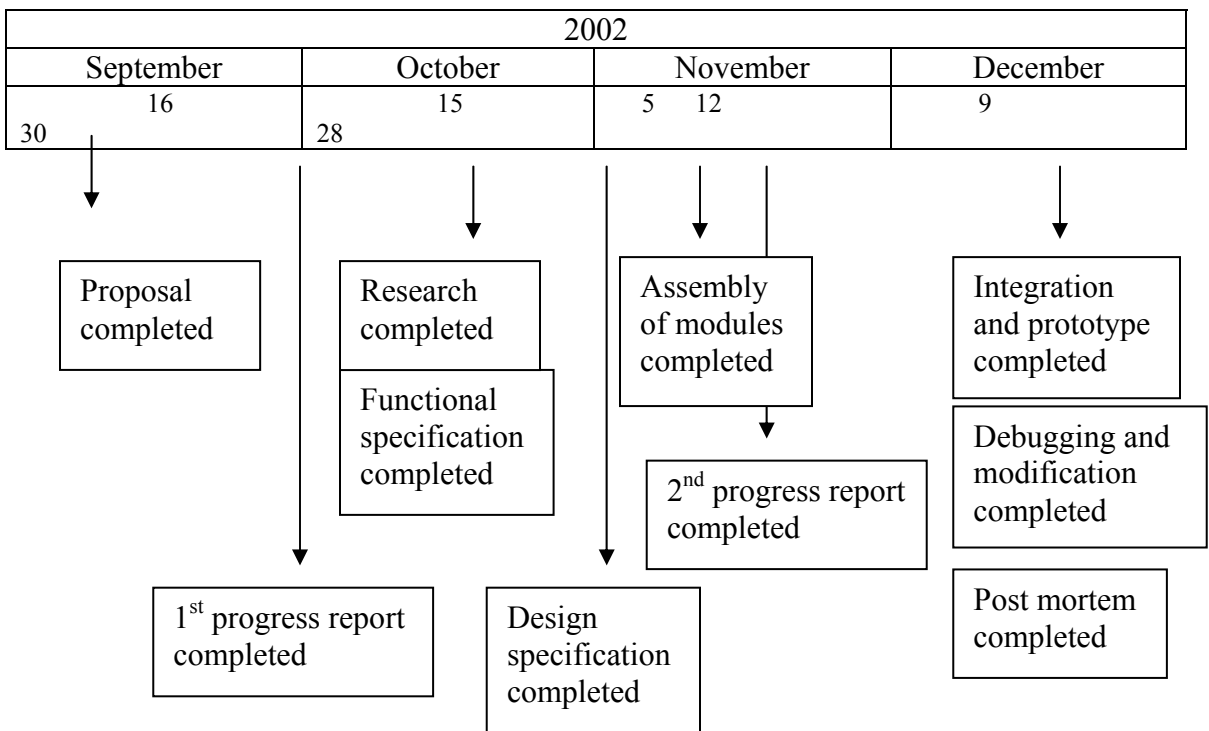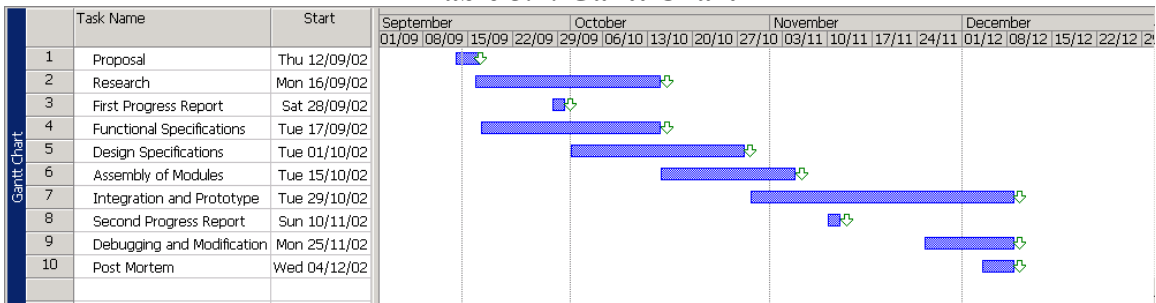
Table 5.1: Gantt Chart

	Task Name	Start
1	Proposal	Thu 12/09/02
2	Research	Mon 16/09/02
3	First Progress Report	Sat 28/09/02
4	Functional Specifications	Tue 17/09/02
5	Design Specifications	Tue 01/10/02
6	Assembly of Modules	Tue 15/10/02
7	Integration and Prototype	Tue 29/10/02
8	Second Progress Report	Sun 10/11/02
9	Debugging and Modification	Mon 25/11/02
10	Post Mortem	Wed 04/12/02

	2002		
September	October	November	December
16	15	5 12	9
30	28		

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Proposal completed

Research completed

Functional specification completed

Assembly of modules completed

2nd progress report completed

Integration and prototype completed

Debugging and modification completed

1st progress report completed

Design specification completed

Post mortem completed
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Figure 5.1: Milestone Chart

6 Description of Team

Our team consists of talented engineering students who all bring diverse talents to the group. Below is a short biography of each team member.

Roger Lum (CEO)

Roger is a fourth year Systems engineering student at Simon Fraser University. His work experience includes software development at Inetco Systems Ltd. and Honeywell ACSa Ltd. Roger has extensive knowledge in both software and hardware. His software skills include knowledge of C/C++, Java, web development languages, as well as working with real-time operating systems. In hardware, he has experience working with electric circuits, which includes op-amps, transistors, and MOSFETS. Roger brings strong communication and leadership skills to the team.

Alex Cheng (CTO)

Alex is a fourth year Systems engineering student in Simon Fraser University who has ample experience in software programming using C++, JAVA, and PERL. Through his past work experience in the Quality Assurance departments at Broadcom Canada, Ltd. and Colligo Networks, Inc., he has extensive knowledge in both hardware and software quality assurance procedures. He has both interest and background in wireless communication. He is also competent in writing technical documents.

Jason I-chih Wang (COO)

Jason is a fourth year Electronics engineering student having a broad range of technical skills ranging from software programming to electronic design. Jason has experience with C, Java and assembly programming languages, and can design analogue or digital electronic systems using discrete electronic elements or complex chips such as microcontrollers and FPGAs.

Gary Liaw (CFO)

Gary is a fourth year Electronics engineering student with a previous co-op experience at Broadcom Canada. His skills include programming in C++, assembly language, PERL, TCL and Matlab and implementing hardware using discrete components such as timers and op-amps. He has a varied set of hardware implementation and debugging techniques as well as testing techniques. Most importantly, he possesses great inter-personal skills as well as verbal and written communication skills.

Jeff Liu (VP R&D)

Jeff is a fourth year Electronics engineering student at Simon Fraser University with co-op experience at Broadcom Canada. His strengths lie predominantly in software and digital design. Through his education, he has learned C/C++, Java, HC11/HC12, and VHDL programming. He also has experience with real time systems and digital implementation using PLDs and FPGAs. He is also familiar with the operation of most electronic test equipment, such as oscilloscopes, power supplies, function generators, DMM, and FFT spectrum analyzers.

Colin Ng (VP Marketing)

Colin is a fourth year Computer engineering student at Simon Fraser University. His strengths lie in software programming, ranging from Java and C++ to assembly and VHDL. He also has experience in digital hardware implementation such as the use of FPGA and PAL chips, and real-time embedded systems, which include microcontrollers and logic controllers. From previous extracurricular activities, he also brings a different dimension to the group in the form of group leadership and group marketing strategies.

7 Conclusion

Freedom Life Systems is devoted to making assistive devices as evident by our initial product: the VoiceIR. Our focus is on developing a product for the disabled that will provide them with a convenience that most people take for granted.

The VoiceIR will allow the disabled to control any IR device with voice commands. After initial training of the VoiceIR, the user can use any voice command to control any IR device. The user defines the voice command associated with the IR command of their choice, making the VoiceIR completely customizable. The simplicity of the VoiceIR makes it easy to use and an ideal product for the physically disabled. Because of our modular design, the VoiceIR's versatility is unmatched by any current product. The user is not limited by having all their remote controlled devices in one room.

Our team looks to complete the proposed project within a four month time frame. We believe that we will be able to complete the product with the benefits and features we propose.

Through the versatility of our product, as well as the desire to keep it cost-efficient, we see our product being a preferred choice for consumers.

8 References

Current Products:

http://www.smarthomeusa.com/invoca/invoca.asp

http://www.surprise.com/likes_dislikes/gadgeteer/voice_activated_remote_control.cfm

http://www.laservision.co.uk/voiceme_remotecontrol.html

Preliminary Budget Research:

http://e-www.motorola.com/webapp/sps/site/application.jsp?nodeId=03M0ym4t3ZGM100NRT88

http://www.kaitousa.com/wm606.htm

www.sensoryinc.com