

September 14, 2002

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

Re: ENSC 340 Project Proposal for AutoWake™

Dear Dr. Rawicz,

This document includes a description of SecuriTeam®'s product, AutoWake™, for the ENSC 340 project.

Every year many lives are lost in accidents due to drivers who fall asleep behind the wheel. We intend to design and implement AutoWake™: a device that prevents drivers from falling asleep by alerting them in such a case.

In this proposal we provide you with an elaborate description of the functionality and possible implementations of our product as well as timing schedule and team management.

SecuriTeam®'s strong and diversified management consists of Azadeh Farzin (CEO), Ali Keyvani (VP Marketing), Nasim Morawej (CFO) and Nima Boostani (CTO).

Should you require further information, please feel free to contact us by e-mail at AutoWake@sfu.ca.

Sincerely Yours,

Azadeh Farzin

Chief Executive Officer
SecuriTeam® Co.

Enclosure: Proposal for AutoWake™



Proposal

SecuriTeam[®] Co.

School of Engineering Science
8888 University Drive
Simon Fraser University
Burnaby, B.C., Canada, V5A 1S6
(778) 881-2943

Project Team: Nima Boostani
Azadeh Farzin
Ali Keyvani
Nasim Morawej

Contact Person: Azadeh Farzin
afarzin@sfu.ca

Submitted to: Dr. Andrew Rawicz (ENSC340)
Steve Whitmore (ENSC 305)
School of Engineering Science
Simon Fraser University

Issued date: September 16, 2002

Revision: 1.6

Executive Summary

“A single shoe, sole up. A battered overnight bag with clothing bursting out at all angles. A family photograph, the frame twisted and the glass smashed. The remnants of a laptop computer.

These were just a few of the items owned by the 35-year-old victim of a fatal, single-vehicle crash near Vars last year. He was on his way from Halifax to Calgary, heading for his dream job. Alone in the car, he kept driving. Some 1,500 kilometres later, he drove his car into the back of a transport truck parked on the shoulder of the highway. The car caught fire and the driver died in the flames.”[1]

Recent studies show that up to one quarter of single car accidents are caused by drowsy drivers falling asleep behind the wheel. As an example, the Ontario Road Safety Annual Report for 1999 states that of 401,572 collisions listed 1,744 were caused by fatigue. Also, a recent Manitoba Public Insurance study considers drowsy driving among the three major causes of car accidents (the other two being alcohol and speeding.)[4]

SecuriTeam[®]'s AutoWake[™] is a device aimed at greatly reducing the number of such accidents. The device takes advantage of cutting edge optical technology to monitor the state of the driver's eyes and, using the latest microprocessor components, manages to make a highly accurate assessment of the driver's condition. If the device detects that the driver has fallen asleep it will promptly activate a vibrating mechanism strapped to the driver's body waking him or her up.

The device consists of a sensor component, in the form of ordinary eyeglasses, that the driver will be required to wear. In the case of drivers who wear prescription glasses, the sensor component will be available in the form of an add-on kit, which will very easily attach to the frame of the glasses.

SecuriTeam[®]'s main initial goal is to target the trucking industry. There is an overwhelming concern about the long hours of continuous driving that truck drivers are faced with [2]. Therefore the trucking industry is expected to be greatly interested in a device that can effectively insure the safety of its drivers and the public. Furthermore, other car manufacturing companies are constantly looking for technologies that will satisfy the public's ever growing needs for more safety. Hence, SecuriTeam[®] intends to target streetcar companies like Volvo and Mercedes next.

Development on the prototype will commence on September 16, 2002 and the first fully working prototype of this product is scheduled to be released on November 15, 2002. The estimated budget needed for the project is \$300 dollars, which is expected to be provided by SFU and other government organizations.

SecuriTeam[®]'s members come from a variety of technical backgrounds in the high-tech sector. The team consists of four third year Computer, Systems, and Electronics Engineering students with solid backgrounds in analog/digital hardware design, PCB schematic design and software programming. Each member's diverse skill set has been carefully studied and utilized accordingly.

In the end, people at SecuriTeam[®] truly believe in the company vision and are committed to making this vision reality.

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1. Introduction

As future engineers, we are all familiar with the concept of being sleep deprived, and we treat the whole issue of being tired as part of our lifestyle. Most of us have also experienced falling sleep trying to drive home late at nights or early in the mornings. In fact, it happens to many drivers:

“The National Highway Traffic Safety Administration estimates that more than 200,000 auto collisions annually may be fatigue-related. Many more victims lose their lives in crashes for the same reason, but because they died they cannot report this fact to the investigating officer. Consequently, the statistics underreport the actual number of victims.

According to a National Transportation Safety Board (NTSB) study, 31 percent of fatal-to-the-driver commercial truck collisions were caused by drowsiness.”[3]

This tells us that not all the drivers who are weaving all over the road are drunk drivers. But they are tired drivers on the edge of falling asleep at the wheel. Our goal is to eliminate the jeopardy of standing on the edge of drowsy driving.

Our product is simple and easy to use. It is basically a smart pair of glasses, which can detect if the driver’s eyes are closed and he is falling sleep. Further more, the system alerts the driver to get her/his synapses start working again. An infrared sender and a receiver are installed in the frame of the glasses as shown in figure 1.1, and from the amount of light reflected open or closed eyes are detected. If the eye is closed for more than a certain amount of time, an alarm starts (figure 1.2).

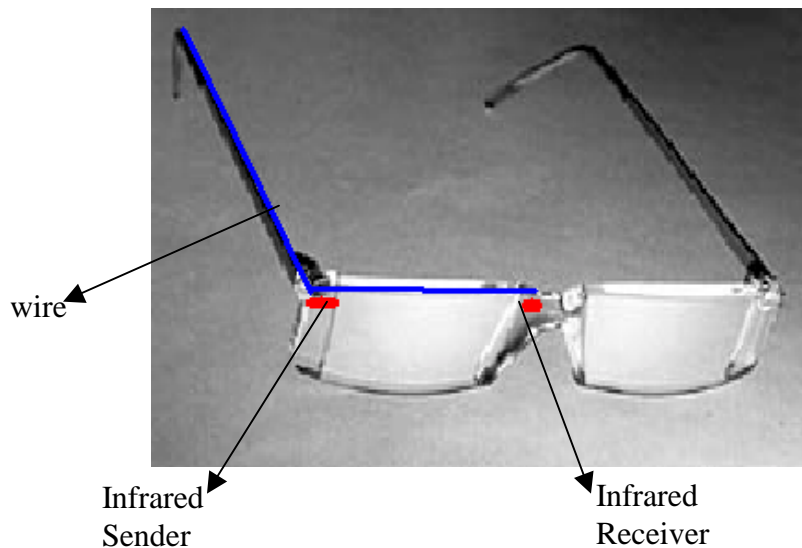


Figure 1.1: smart glasses used in AutoWake™



Figure 1.2: overview of how AutoWake™ system works

With such a high probability for a tired driver to fall asleep while driving, the AutoWake™ will become a permanent fixture in today's automobile marketplace. However, we at SecuriTeam® are not only concerned with detecting the symptoms of a hard day's work—we are all about safety features of vehicles.

Ready to learn more? Come look at the road through our smart AutoWake™ glasses...

We will provide an overview of our product, outline of design considerations, sources of information and funding, and project scheduling in this proposal.

2. Possible Design Solutions

The general design of AutoWake™ system is shown in figure 2.1.

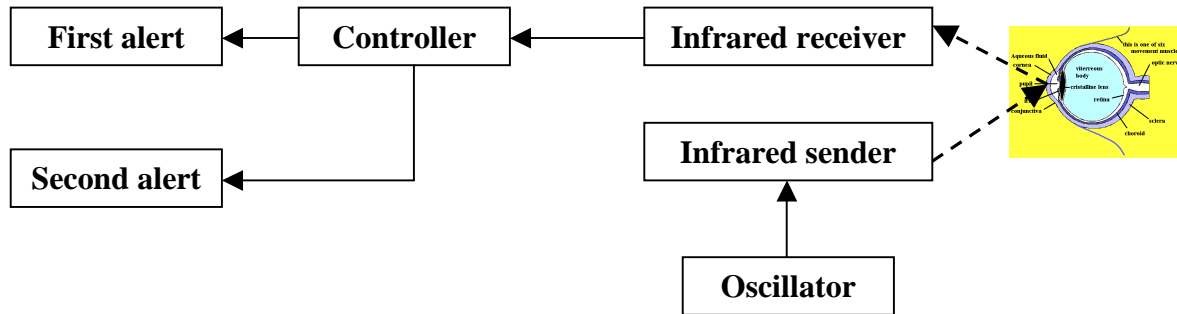


Figure 2.1: Block diagram of the design of AutoWake™ system

Three different approaches were considered when designing this product:

1. In our first design we decided to use probes attached to the muscles around the eye to detect electric pulses as the eyelid opens and closes. This design is somehow invasive and not comfortable considering the driving conditions.
2. In our second design we intended to separate the detection system from the eye. We decided to mount an infrared sensor on the dashboard aiming at the eye of the driver to detect whether the eye of the driver is closed or open. The problem with this idea was that if the driver moved his or her head the infrared beam sender would no longer aim at the eye, which definitely is a problem!
3. An alternative to the infrared sensor was a small NTSC camera. But, since a camera couldn't detect eyes in low light intensity it was not feasible. Besides, if we were to put the camera on the dashboard we would face the same problem as having the infrared mounted on the dashboard. On the other hand, if we were to attach it somehow to the driver's head it would be uncomfortable and not practical.
4. In the last design idea, as we needed a fixed position for the sensors relative to the eyes, we decided to mount small infrared sensors on an eyeglass frame. Also, wearing regular glasses causes no disturbance and distraction for the driver while driving.

3. Proposed Design Solution

The purposed solution for detecting the status of the eye is the last idea in which we are going to use an eyeglasses frame with sensors mounted on it.

In the general design, the infrared beam sender is directed such that it shines a beam directly at the pupil of the eye. If the eye is open, the iris absorbs the reflection and therefore the receiver does not receive any signal. Contrary to this situation, the infrared beam is reflected from the surface of the eyelid when the eye is closed and then received by the receiver. The reception of the beam causes a change of voltage across the lids of the sensor, which is digitized and fed into a microcontroller unit. This digital value corresponds to when the eye is closed. Having received this value, the microcontroller activates an alert system to wake up the drowsy driver. If no change happens in the state of the system (meaning the eye doesn't open) another alert system activates. The second alert is to inform others of the danger.

The first alert system is basically an alarm system with a loud distinguishable sound and a vibrator attached to the seat belt. The second alert system is to turn on the flashers and sound the horn as well as harder vibration of the belt.

4. Budget and Funding

Table 4.1 lists the approximate cost of the components needed for our production. The cost is subject to change due to losses that may happen during testing and assembling stages.

Table 4.1: Component prices and the total estimated cost of the product

Item	Cost
Development Kit	160.00\$
Eyeglass frame	50.00\$
Electronic parts such as crystal, resistors, diodes, opamps, capacitors, wire ...	50.00\$
Infrared emitting and receiving diodes	10.00\$
AT89C2051 Microcontroller	10.00\$
Total Cost	280.00\$

As the cost for this product is rather high we are considering to apply for available sources of funding such as ESSEF. If the incoming financial help fails to cover all the cost we may have, the team members will willingly share the remaining costs equally.

5. Timing Schedule

Our planned schedule is shown in table 5.1.

Table 5.1: timing schedule

	Sept. 16	Sept. 23	Oct. 3	Oct. 17	Oct. 24	Oct. 27	Nov. 3	Nov. 6	Nov. 13	Nov. 22	Nov. 30
Building Test-Bed for Sensors/Transmitters + Feasibility Testing	Yellow										
Calibration of Sensors/Transmitters on Glasses Frame			Blue								
Design/Development of Prototype Sensor Circuit		Orange									
Design/Development of Prototype LED Circuit		Orange									
Building Test-Bed for Processor (Logic) Unit			Green	Green							
Design/Development of Prototype Alarm #1 Circuit				Blue	Blue						
Design/Development of Prototype Alarm #2 Circuit						Blue	Blue				
Implementation of Processor-Sensor Circuit Interface					Yellow	Yellow					
Implementation of Processor-LED Circuit Interface							Red	Red			
Implementation of Processor-Alarm Circuit Interface									Green	Green	
Overall Testing/Debugging								Yellow	Yellow	Yellow	Yellow

6. Company Organization

SecuriTeam[®] was founded by four Simon Fraser University (SFU) students. These individuals make up the company's executive team, and their contact information is found below, followed by a comprehensive description of each position.

Chief Executive Officer	Azadeh Farzin	afarzin@sfu.ca
Chief Financial Officer	Nasim Morawej	nmorawej@sfu.ca
Vice President of Marketing	Ali Keyvani	akeyvani@sfu.ca
Chief Technical Officer	Nima Boostani	nboostan@sfu.ca

Azadeh Farzin: Chief Executive Officer

The Chief Executive Officer (CEO) is appointed by the Board of Directors and chairs the internal governing body of SecuriTeam[®]. Azadeh Farzin has the challenging responsibility of committing the company's resources toward guiding it in a profitable direction. Consequently, she is a visionary with the ability to communicate effectively with a variety of people, be innovative, and set goals and milestones within the company.

Azadeh is a fourth year student at SFU pursuing a Bachelor of Electronic Engineering. Her background as being project manager in most her group projects have given her the experience to take on this demanding new role. She also has valuable contacts within the business community, which will aid SecuriTeam[®]'s future expansions.

Nasim Morawej: Chief Financial Officer

The Chief Financial Officer (CFO) provides recommendations to the CEO on major financial decisions and carries out the financial policy of the company. This involves developing and maintaining a financial vision to meet the challenges that SecuriTeam[®] faces, thereby facilitating enhanced management decision-making, and ensuring effective management of the company's financial operations.

Nasim Morawej's specific responsibilities include budget preparations, and securing financing for short- and long-term growth of the company.

Nasim is a fourth year Electronic Engineer student at SFU, and she is familiar with international business operation and systems and has worked close with customers in her previous work term at CATEC Electro in Ukraine. Nasim filled the role of a coordinator in Western Engineering Competition and Congress (WECC) at SFU, enabling her to effectively manage the financial aspects of an organization. Having also chaired the ESSEF committee of SFU's Engineering Undergrad Student Society (EUSS) in 2001, she has developed effective communication skills and strategies for targeting specific audiences.

Ali Keyvani: Vice President of Marketing

The Vice President of Marketing (VP Marketing) reports directly to the CEO and manages a unit responsible for developing overall marketing strategies and positioning products and services.

Ali Keyvani acts as a liaison between the needs of customers and product development. He also collaborates with the CTO to ensure that products correspond with market needs.

As a fourth year Computer Engineering student at SFU, Ali Keyvani has a strong technical background, enabling him to effectively manage the marketing of our product. He understands what technology can do and knows what people can do with technology.

Nima Boostani: Chief Technical Officer

The Chief Technical Officer (CTO) reports directly to the CEO and manages the development of SecuriTeam[®]'s technologies. This involves recruiting and building a productive engineering team, continuously improving existing technologies, developing new products in line with the company's mission statement and vision, and overseeing quality control.

Nima Boostani is responsible for technical and non-technical liaison with upper management and with engineers within the group. He also works closely with the VP Marketing to ensure that the needs of the company and its customers are fulfilled.

Nima Boostani is a fourth year Systems Engineering student at SFU. Nima's previous experiences at SFU Engineering department, carrying out research on developing a mechanism for a laparoscopic joystick, give him real-life working knowledge.

7. Conclusion

SecuriTeam[®] Co. is indeed devoted to employing cutting-edge technology to making our streets safer. Since the public has a rapidly growing concern for safety, the high rate of casualties resulting from driver fatigue has created a large need for a preventive device. At SecuriTeam[®] we believe that this need will create a promising marketplace for AutoWake[™].

The consumer market for AutoWake[™] will consist of –and not limited to- insurance companies, car manufacturers, trucking companies and in general all taxpayers. Since SecuriTeam[®] is the sole provider and the pioneer of this technology, financial outlook of the company looks very promising. Our vision is that, AutoWake[™]'s accuracy and effectiveness, its ease-of-use and its low price will eventually make it an integral part of any car or truck.

At SecuriTeam[®] we look forward to a day when new statistics show considerable drops in automobile accidents and injuries. After all, this is what SecuriTeam[®] is all about: public safety and security.

8. References

- [1] 'Drowsy Drivers', January 28, 2002, Iris Winston, www.canadiandriver.com
- [2] According to a survey carried out by the Insurance Institute for Highway Safety (IIHS) in 1992, 20 percent of 1,249 truck drivers interviewed admitted falling asleep at the wheel one or more times during the past month.
- [3] http://www.xpressites.com/lee/lacrosse/xpspecialsections/automotive/story_279452.asp
- [4] <http://www.canadiandriver.com/articles/iw/drowsy.htm>
- [5] <http://www.trucksafety.org/>

Appendices

Appendix 1 – Patent Information

A patent is a government grant giving the right to exclude others from making, using or selling an invention. SecuriTeam® Co. will be the agent holding the patent for the electronic sleep detectors. This will be a Canadian patent effective only in Canada. Since January 1, 2000, the IPC version 7 has been forced which is divided into 120 classes, 628 subclasses, and over 69,000 groups.

Currently SecuriTeam® is not licensing out the technology that we develop, but will consider licensing the rights to the patent in the future. The term of the patent will be 20 years from the date of filing of the application, as it is the term period for patent applications filed on or after October 1, 1989.

The cost of obtaining a patent for a product of the complexity of AutoWake™ is estimated around \$17000 USD.

Appendix 2 – Resumes

NIMA BOOSTANI

1431 Bramwell Road
 West Vancouver, BC, V7S 2N8
 E-mail: nboostan@sfu.ca
 Tel: 604-922-5587

EDUCATION

- | | |
|---------------------|---|
| Sept 2000 – present | Simon Fraser University , Burnaby, BC
Systems Engineering |
| 1998-2000 | Shiraz University , Iran
Electronics Engineering |

WORK EXPERIENCE

- | | |
|-----------------------|---|
| Summer 2002 | Research Assistant, Simon Fraser University BC , Canada
Developed a driver for a feedback laparoscopic device under QNX, designed and assembled the PCB for the control circuitry of the device's feedback motors and encoders. |
| Summer 2002 | Teaching Assistant: Engineering Drawings and Schematics. |
| Spring 2002 | Teaching Assistant: Microprocessor Laboratory. |
| Summer 2001 | Research Assistant, Simon Fraser University BC , Canada
Developed my own mechanism for a laparoscopic joystick, designed and assembled the joystick's electronic interface, and developed the driver under VC++. |
| Summer 1999 | Programmer/Electrical Assistant, Saravid Industrial Company
Shiraz, Iran
Developed stock inventory control programs, Manufactured and assembled PCBs, wired and installed parts for industrial electrical panels. |
| School year 1998-1999 | Tutor: Computer programming with C and C++. |
| 1996-1999 | Tutor: Dulcimer playing. |

SKILLS

- | | |
|----------|---|
| Hardware | 68HC12 and 68HC11 Microcontrollers, 8051 ATMEL Microcontorller family, VHDL, PLC programming, soldering, clean-room equipments, lab equipments. |
| Software | C/C++/VC++, JAVA, BASIC, HSpice, KIC Layout design, Eagle Layout Editor, Electronics WorkBench, SolidWorks, MS Word/Excel, DOS, QNX, Windows 98/NT/XP, Linux, MAP LE, MATLAB. |

PROJECTS

Summer 2002	Displayed the NTSC video signal on an oscilloscope screen .
Spring 2002	Fabricated diodes and transistors on silicon wafers, Programmed PLCs to control an assembly line, DSP with MATLAB.
Fall 2002	IC design Designed a Bandgap Voltage Reference Integrated Circuit , Simulated the design in HSpice using GA911 models, Created the layout of the design using KIC Layout editor .
Spring 2001	Line Tracer Designed and assembled the required circuitry and mechanics of a line tracer robot. Programmed the HC12 control unit of the robot.
Spring 2001	Simple Pipelined CPU Implemented a pipelined CPU using VHDL , generated the Fibonacci series using the CPU.

ACADEMIC ACHIEVEMENTS

- Winner of the **Undergraduate Open Scholarship** and **Alumni Scholarship**.
- **Ranked 210** among some one million competitors in the nation-wide Iranian universities entrance examination.
- **Ranked first** in the pre-university entrance examination within the province of Fars, Iran.
- Obtained **certificate** for advanced **C/C++** programming.

ARTISTIC ACHIEVEMENTS

May 1994-1997	Letter of Honor: Achieved the superior rank in the field of dulcimer playing, solo and binary, and playing the Tombak.
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INTERESTS

- Electro-Mechanical design and implementation such as building robots
- Computers (programming in particular)
- Playing music individually and in bands
- Soccer, Table tennis, Swimming

Nasim Morawej

1264-LaSalle Place
Coquitlam, BC V3B 6T5
E-mail: nmorawej@sfu.ca
Phone: (604) 552-1119

EDUCATION

- Sept 1999- present
- Simon Fraser University**, Burnaby, BC
Third-year Engineering Science, Electronics Engineering Option
- ◆ **BC Hydro** Scholarship Award
 - ◆ Nominated by **Canadian Engineering Memorial Foundation** as one of Canada's most promising engineering students in 2000

WORK EXPERIENCE

- Sept 2001– Dec 2001
- Validation Engineer, CATEC ELECTRO**, Ukraine, Kiev
- ◆ Responsible for Enamel Wire quality control and data analysis
 - ◆ Dealt with technical problems and performed troubleshooting throughout the testing phase
 - ◆ Verifying the production system improvements
 - ◆ Learned a new perspective on international business operation and systems while working close with customers
- Jan 2000 – Sept 2001
- Research Assistant, Department of Biochemistry**, SFU, Burnaby, BC
Involved in the Neurophysiology project on the Gypsy Moth antenna:
- ◆ Measured and analyzed the voltage changes across the nerves in the antenna as it detects pheromone and inhibitors
- Engaged in the research program on cytochromes P450 in biocatalysis:
- ◆ Protein determination with the Bradford dye assay
 - ◆ Extract sample preparation for various assays
- June 1998 – Sept 1999
- Computer Assembler, Computer Depot**, Vancouver, BC
- ◆ Assembled computers and installed programs
 - ◆ Informed customers on how to use computer programs
- Sept 1997 – present
- Tutor**
- ◆ High school and university first year Math, Physics and Chemistry
- June 1997 – Sept 1997
- Electric Circuits Assembler, Canakit Company, Vancouver, BC**
- ◆ Manufactured and tested the mixed and analog circuits such as alarms, melody generators, digital panel meter and digital clocks

PROJECTS

- Team Member, Digital pH Detector**, Student Project, SFU
- ◆ Designed a microprocessor-controlled analog pH sensor with an LCD display. Wrote assembly language code for **HC12** microprocessor.
- Simple Computer Architecture**, Student Project, SFU
- ◆ Modeled a computer control unit, data path and RAM using **VHDL**. Implemented a Fibonacci sequence generator using MIPS.

SKILLS

- Hardware
- ◆ **Digital design** concepts (flip flops, registers, counters and logical gates)
 - ◆ **Embedded** Control Systems design
 - ◆ Circuit **schematic** design

- ◆ Design methodology and practical implementation techniques for **Real Time** systems
 - ◆ **VHDL** programming (experienced in using Max+Plus II to program **ALTERA MAX 7000** series **FPGA**)
 - ◆ **HC11/HC12 Micro Controller** programming
 - ◆ RLC, resonant, bandpass, magnetically coupled, two port and three-phase circuits, filtering, transistors, diodes, BJT and MOSFET
 - ◆ Modeling and analysis of continuous and discrete signals using linear techniques
 - ◆ Methods of circuit analysis and computing circuit responses
 - ◆ **Altera Max+Plus II, PSPICE, and Logicworks**
 - ◆ **Bread boarding, soldering and circuit assembling**
 - ◆ Basic lab equipment such as oscilloscopes, DMMs, power supplies, and function generators
 - ◆ Semiconductor integrated circuit **fabrication**
- Software
- ◆ **C, C++, HTML, and Assembly language** (Motorola 68HC12)
 - ◆ **Windows, DOS, UNIX, MS-Office, AutoCAD, Maple, MATLAB, PhotoShop**
- Biochemistry
- ◆ Performed protein comparison using PAGE (polyacrylamide gel electrophoresis), Electroblothing, and silver staining
 - ◆ Lab equipment and supplies: protein electrophoresis accessories, spectrophotometers, centrifuges, pH meters, shakers, and rockers
- Others
- ◆ Mechanical Drafting
 - ◆ Excellent Math and Physics skills

VOLUNTEER AND ACTIVITIES

- Summer 2001 **Engineering Undergraduate Student Society, SFU**
 ◆ VP University Affairs and ESSEF Committee Chair
- Winter 2001 **Women in Science and Engineering Conference,**
 ◆ Represented SFU at University of Washington, Seattle, WA
- May 2000- Feb 2001 **Western Engineering Competition and Congress, SFU**
 ◆ Organized events and designed competitions for contestants
- Sept 1999- present Engineering Science **Soccer Team, Unicef Club and Ski Club**

INTERESTS

- Electronics/Computers Assembling circuit boards, designing and implementing various digital systems and electric circuits, Semiconductors integrated circuit fabrication, and learning different programming languages
- Other Swimming, skiing, playing soccer, horseback riding, painting, drawing, reading, learning about other cultures and languages

Azadeh Farzin

1504-945 Marine Drive
West Vancouver, BC V7T 1A8
Phone: (778) 881-2943
E-mail: afarzin@sfu.ca

EDUCATION

- Sep. 2000– Present **Simon Fraser University**, Burnaby BC
Engineering Science, fourth year, Electronics Engineering
- 1998 – 2000 **Capilano College**, North Vancouver BC
University Transfer

WORK EXPERIENCE

- Sep 2002 – Present **Researcher, Engineering Department of Simon Fraser University**, Burnaby BC
Researching on “Distributed Storage and Retrieval for Multimedia Communications” project. This project is to expand technologies for improving the functionality of Internet.
- Jan 2002 – Present **Researcher, Physics Department of Simon Fraser University**, Burnaby BC
Carried out a series of experiments intended to characterize nuclear relaxation processes in glass cells containing laser polarized helium-3 gas. Carried out ultra-low-field nuclear magnetic resonance (NMR) experiments along with data reduction.
- Sep 2001 – Dec 2001 **Teaching Assistant, Engineering Science Department of Simon Fraser University**, Burnaby BC
Ran Tutorials for students, and helped them to go towards the goals of the class.
- Jun – Aug 2000 **Researcher, Committee for Racial Justice**, Vancouver BC
Researched areas of youth and Racism, and youth and internet. Performed surveys and met with teenagers to discuss these issues.

TECHNICAL SKILLS

- Hardware
- Experienced in programming and implementing **Motorola 68HC11/12** micro-controller
 - Experienced in Circuit design and Simulation Using **PSPICE, HSPICE**
 - Experienced with chip layout design using **XKic**
 - Experienced in assembling circuit boards and **soldering**
 - Competent with variety of lab equipment such as oscilloscopes, function generators, FFT digital analyzers, spectrum analyzers, DMM’s
 - Familiar with Microelectronic fabrication
 - Familiar with **DSP, FPGA, PLC** and **Micro Controller**
 - Familiar with **PCB** design
- Software
- Familiar with **web page** creation and design using **HTML**
 - Familiar with **DOS, UNIX, QNX**, and **WINDOWS** environments

- Experienced in **VHDL** Programming using **SYNOPSIS**, and **MAX+plusII**
- Experienced in **Visual Basic**, and Object Oriented Programming using **Visual C++**, and **Visual J++**
- Familiar with Matlab, Maple, Origin, **Corel Draw**, **AutoCAD**
- Competent with Logic Works
- Competent with Microsoft Office 97/2000

Others

- Good Presentation and Communication Skills
- Demonstrated Teamwork skills, including ability to work effectively in a multi-national environment

PROJECTS

NTSC video signal on the oscilloscope screen,

Analyzed the NTSC video signal and extracted its composite, horizontal and vertical sync pulses. Then generated horizontal and vertical ramps, and fed them into x and y axes of the oscilloscope. By feeding the processed video signal in the z-axis of the oscilloscope and setting the luminance and brightness of the image NTSC video signal displayed on oscilloscope screen.

IC Design, Bandgap Voltage reference,

Designed and tested a Bandgap Voltage reference chip. This chip regardless of changes in VCC and temperature gives a constant output voltage. The simulation of this design was done using H-Spice with GA911 technology. The layout of this design was created using XKic editor.

robot arm controller,

Implementing in VHDL the robot arm controller logic based on a given state diagram. The design was targeted on the Altera MAX7128LC84S-7 CPLD. The robot performed object manipulation tasks under our VHDL based controls.

Automatic Engine Ignition and Climate Control (AEICC),

AEICC is a consumer-oriented prototype project. Using a Motorola HC12, designed the AEICC to automatically start a car about fifteen minutes before the car is scheduled to be used and to adjust the air temperature according to the outside weather.

**INTERESTS
AND
ACTIVITIES**

Electronics

Designing electrical circuits and assembling circuit boards

Computer

Writing software, learning to work with different computer languages and object oriented programming
Installation and upgrading computer systems, parts and components

Sports

Swimming, Skiing, Tennis

Ali Keyvani

2797 Westlake Drive, Coquitlam, BC V3C 5J9

Tel: (604) 552-9359 / Fax: (604) 552-9342

Email: akeyvani@sfu.ca

WORK HISTORY

- Jan 2001-April 2001
- **Hardware Engineer, Electronic Arts Canada Inc.**, Took part in all phases of the development of a **Motion Capture** Camera System. Project involved interfacing a high-speed (**40Mhz**) digital camera, a TI DSP and an ALTERA Apex FPGA.
 - Fully designed and debugged a **PCB** containing an **Apex FPGA** with necessary components to interface a digital camera, a **DSP** and **JTAG**. Researched, selected and ordered required parts, designed the board in **OrCad** Capture and finally debugged the manufactured PCB.
 - Maintained and analyzed **VHDL** code written by an external contractor for EA. Used **Quartus II** to build and **simulate** the design and program the chip.
 - Used Quartus II to create an FPGA design responsible for generating complex timing signals for a CCD.
- Sept 2000-Dec 2000
- **Teaching Assistant for ENSC 150 (Introduction to Computer Design)**, Simon Fraser University, Burnaby, BC Assisted in teaching topics such as basic Von Neumann computer architecture, **HC12** Assembly language programming and combinational as well as sequential logic design.
- May 2000-August 2000
- **Software Design Engineer, Broadcom Canada Ltd.**, Richmond, BC
 - Designed and developed a **multithreaded**, hardware platform independent, **Object-Oriented, C++** program, responsible for running multiple channels of test on Broadcom's **VoIP** software running on a TI **DSP**. The program worked both on Win32 and an embedded system running **pSOS**.
 - Developed a multi-client **File Server** program in C++. The Test Application mentioned above uses this File Server to perform file I/O on a remote machine.
- Jan 1997-Jun 1997
- **Private Tutor** for the C programming language, Tehran, Iran

RELATED EXPERIENCE (PROJECTS)

- **ENSC 151 (Digital Design Laboratory) Final Project,**
Used an EVB containing a Motorola **HC12** Microcontroller and an **Altera MAX 7000** series **FPGA**, to control a Logitech Mouse and an HP Plotter. In this system, coordinates received from the mouse were sent to the plotter as HP-GL/2 commands in order for it to 'draw' the movements of the mouse.
 - Used **VHDL** (in **MAX+PLUS II**), to design a receiver/transmitter **UART**, as well as a circuit to detect mouse input and synchronize the sampling frequency.
 - Co-wrote an **HC12 Assembly Language** Program responsible for interfacing the **FPGA UARTs** and performing data conversion between the input (Mouse) and the output (Plotter) format.

(I have written the following two programs out of interest)

- **An implementation of the mathematical game of NIM.**
Consists of a main application written in **Delphi** and a separate **VBX** component written in **C++**.
- **An Object-Oriented drawing program** written in **Visual C++** that I intend to distribute as **Shareware**. In this program, entities (such as rectangles, ellipses, polygons and bitmaps) are treated as well-defined abstract objects with distinct properties (such as color, size and position.)

COMPUTER SKILLS

Hardware

- Competent in **VHDL** programming (experienced in using **Quartus II** and **MAX+PLUS II**)
- Experienced in using the Quartus II Compiler, Programmer, Simulator, Floor Plan Editor and SignalTap **Embedded Logic Analyzer**,
- Solid experience in **OrCad** capture
- Working knowledge of the **PCB** design flow
- Solid understanding of the principles of computer architecture and **logic design**
- Solid understanding of Electric Circuit Design Concepts
- Hands-on experience using lab in using lab equipment (Oscilloscope, function generators, spectrum analyzers, soldering irons...)
- Proficient with **MATLAB**

Software

- Proficient **C++** programmer
I have a good grasp and a working knowledge of the following **C++** topics:
 - Object-Orientation
 - Multithreading
 - **Socket Programming** (standard UNIX as well

- as using MFC)
- **Exception Handling**
- Templates
- **MFC**
- RTTI
- STL (basic understanding)
- Competent **JAVA** programmer
- Experienced in using the **IP**, **UDP** and **RTP** protocols.
- Very Solid understanding of **Object-Orientation** concepts and ability to apply these concepts to analysis and design of software/hardware systems (familiar with **UML** and BON Object-Oriented methodologies)
- Working knowledge of **Ration ROSE**
- Familiar with **pSOS** and **QNX**

EDUCATION

Sep 1999-present

- Simon Fraser University, School of Engineering Science, Computer Engineering Option

Sep 1998-Jun 1999

- Centennial Secondary School, Graduated with Honors

EDUCATIONAL ACHIEVEMENTS

- Simon Fraser Open Scholarship
- Simon Fraser University Entrance Scholarship (Summit)
- Provincial Scholarship

AREAS OF INTEREST

Hardware

- Very interested in **Logic Design** using **VHDL**

Software

- Using **Object-Oriented** methods to *analyze* and *design* complex software, as opposed to pure coding. In particular, interested in designing **reusable** Object-Oriented component libraries (from C++ class libraries to standalone OCX libraries to 3D game engines, etc.)
- Low level programming for **Embedded Real-time** Systems, interfacing hardware FPGAs, external processors, etc.

HOBBIES

Music

- Playing Rock Guitar

Athletics

- Swimming
- Skiing