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THE IRON WARRIOR

THE NEWSPAPER OF THE UNIVERSITY OF WATERLOO ENGINEERING SOCIETY • SPECIAL EDITION

Timothy Burns
Swing Kid
Page 7

Ruth Allen
Solar Race Car Driver
Page 5

David Kroetsch
Autonomous Helicopter Maker
Page 4

Winston Mok
Break Dancer
Page 8

Come fly with me

The history of the Waterloo Glider Team

Greg Thompson

MECHANICAL ENGINEERING
CLASS OF 1999

Each year the Canadian Aeronautics and Space Institute based in Ottawa presides over the national CASI Free Flight Competition. The competition is now in its sixth year. It is a small but growing competition that brings together students who have an interest in aviation and enjoy the challenge of designing, building and flying their own gliders.

The competition is a four-part competition with a written report, a technical presentation and two days of flying. Each glider entered in the competition must fit in a two meter square and one meter tall box before taking to the field. After meeting the size constraints the glider must demonstrate stable flight without carrying payload by being tossed from head height and gliding safely to the ground.

After meeting both of these requirements, the glider is allowed to begin the scored portion of the competition where the real flying occurs. The gliders are launched like kites, being towed by a runner with a 50 meter long 80 pound fishing line. One of the largest complexities of the competition is the requirement that the glider must fly without any controlling equipment either on-board or from the ground.

*Please see **FLIGHT** page 6*

NEED FOR SPEED - UW Formula SAE, Page 8

Intelligence without ambition is a bird without wings.
C. Archie Danielson

Knowledge is limited.
Imagination encircles the world.
Albert Einstein

We make a living by what we get, but we make a life by what we give.
Sir Winston Churchill

If you think education is expensive, try ignorance.

Inside This Issue

Volume 24 : Issue 5 (Special Edition)

A DAY IN THE LIFE OF NINA PYRON

*LECTURES, LABS AND LIFE - The Iron Warrior spends 24 hours with Nina Pyron, a second year mechanical engineering student. Please see **24 HOURS** page 3*

Waterloo wins world championship

Jason Wong

COMPUTER ENGINEERING
CLASS OF 2002

The University of Waterloo are the world champions of computer programming for the second time since 1994. The Waterloo team, consisting of David Kennedy, Ondrej Lhotak, Viet-Trung Luu, reserve Donny Cheung, and coach Gordon Cormack traveled to the Netherlands this April where they defeated 61 other teams to win the 1999 World Finals of the ACM International Collegiate Programming Contest.

6,000 students from 59 countries competed in the regional preliminary contests in the fall. Waterloo's 'Team A' placed first at the East Central Regional Contest, hosted here at the University of Waterloo. 'Team B' placed 5th out of the ninety teams participating.

Only the top teams from each region got to go to Eindhoven, Netherlands, to compete in the World Finals. The 3-member student teams each have one computer and used Pascal, C, C++, or Java to solve the eight real-world problems posed to them in the span of five hours. In the last decade, the University of Waterloo has consistently scored in the top 10 at the World Finals, something no other North American university has been able to accomplish. This year's ACM team was composed entirely of mathematics majors, however in the past the faculty of engineering has had strong representation by computer engineering students.

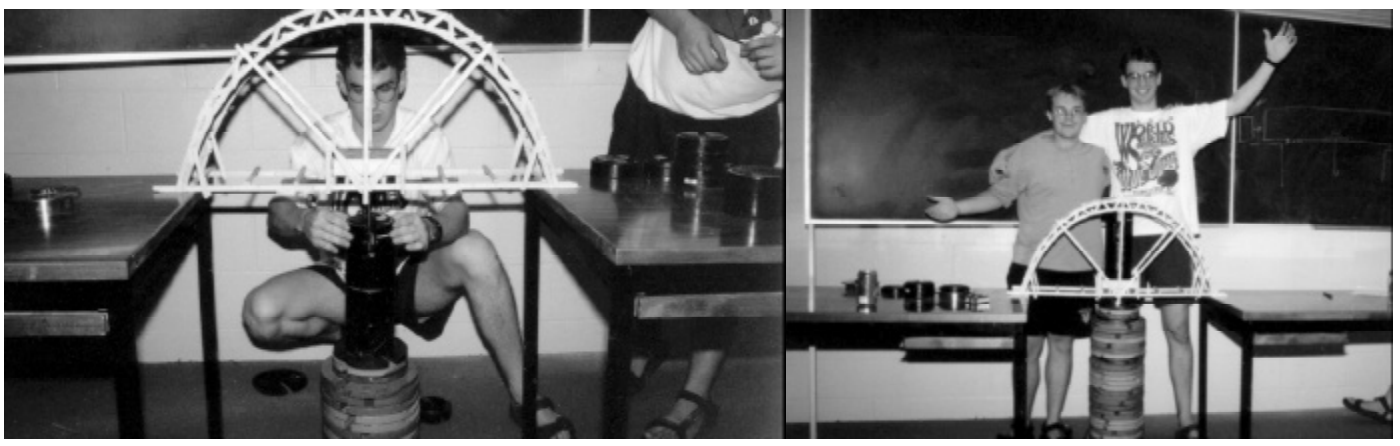
***FINAL STANDINGS** are listed on page 6*

GOING TO DISNEYLAND - The Midnight Sun V solar racecar, crosses the finish line at Sunrayce 99 outside the EPCOT Centre in Orlando, Florida.

Race for the Sun

Waterloo's solar race car team will travel to Australia this year to compete in the World Solar Race Car Challenge. The competition runs 3,010 kilometers from Darwin to Adelaide, north to south across the continent. The WSC is the world's most prestigious solar car event; Midnight Sun V will be one of 42 teams from around the world competing for a first place finish.

***Please see SUN** page 5*



WHERE'S THE BEEF? – As part of a second year design course, civil engineering students construct bridges made entirely out of wooden popsicle sticks. The "Beefy Boy", shown above, could not be broken by conventional means and had to be tested using a hydraulic actuator. The bridge withstood a force of 418.5 kilograms.

It's a bird, it's a

p l a n e , it's a r o b o t

The Waterloo Aerial Robotics Group traveled to Richland, Washington this year to compete in the second round qualifier at the 1999 International Aerial Robotics Competition. The project involves the production of autonomous computer-controlled air vehicles designed to enter a simulated disaster scene to collect information and rescue survivors.

The scenario is designed to model a real life disaster. While on the proving grounds, the autonomous robots must dodge randomly placed columns of fire, streaming geysers of water, and other undisclosed obstacles.

For two years running, WARG has received the Best Overall Design Award. In 1998, WARG placed second overall, beating out MIT, UC Berkeley, and the Georgia Institute of Technology.

The WARG helicopters are completely computer controlled and are equipped with a differential global positioning satellite system receiver capable of determining the longitude and latitude of a given object to an accuracy of 2 centimeters.

*Please see **WARG** page 4*

EASY DOES IT - The WARG helicopter enters a pilot controlled low altitude hover during a test flight at the 1999 International Aerial Robotics Competition.

***THE ICE DRAGONS** – The concrete toboggan team is Waterloo's largest and most prominent civil engineering student project group. Each year, universities across North America compete to construct snow sleds with treads made out of pure concrete.*

Letter from the Editor

Ian Tien
EDITOR-IN-CHIEF
THE IRON WARRIOR

COMPUTER ENGINEERING
CLASS OF 2002

Present Age: 21
Fav. Books: Marcus Aurelius
The Great Gatsby

Co-op Work Experience

1999 – **Versus Technology,** Programmer/Analyst, Toronto, ON
1999 – **Toronto Stock Exchange**, Applications Developer, Toronto, ON
1998 – **Leitch Technologies**, Software Engineering Student, North York, ON

Waterloo

Some things you should know about Waterloo: All our engineering programs involve co-operative education. All engineering programs are five years long, consisting of six four-month workterms roughly sandwiched between eight four-month school terms.

Students oscillate between school and work for their entire university career. The engineering student societies and academic programs are divided into two alternating groups of students.

Waterloo has been pioneering co-operative education in Canada since 1957. In the early years, co-operative education was the cornerstone of the university. UW was able to attract Canada's top students by offering them something special, industry experience.

A co-op workterm isn't like having a summer job, or an internship. Employers expect students to be productive, and to contribute to real world projects; just as students compete for the best co-op jobs, companies compete for the best co-op students.

Workterms are a chance to try new things, different projects, different cities, different technologies—my lab partner just got back from working for ASIS in Taiwan for four months; my other lab partner's off to Montreal to work on satellites for the Canadian Space Agency. Microsoft, Qualcomm, Cypress, IBM, Cisco, Nortel Networks—every term we're scattered across the world like leaves in the wind.

Four months later, we'll be back in school. A little wiser, a little richer, a little more employable. We'll swap stories of our adventures—both the good and bad—like old war buddies in one those Bing Crosby movies.

You can do anything with an engineering degree. We've got grads going all over the place, Industrial Light and Magic, MIT Media Labs, Harvard Medical School—some alumni even start their own companies straight out of university.

College is the best time of your life. It's where you make your lifelong friends; it's where you're supposed to "find yourself" and figure out what you want to do for the rest of your life.

Somewhere along the way, you'll find out what it means to be an engineer, how to use technology to make the world a better place.

That's cool too.

THE IRON WARRIOR
THE NEWSPAPER OF THE UNIVERSITY OF WATERLOO ENGINEERING SOCIETY

The Iron Warrior is a forum for editorial and information articles published by the Engineering Society. Views expressed in **The Iron Warrior** are those of the authors and do not necessarily reflect the opinions of the Engineering Society. **The Iron Warrior** encourages submissions from students, faculty and members of the university community. Submissions should reflect the concerns and intellectual standards of the university in general. All submissions, unless otherwise stated, become the property of **The Iron Warrior**, which reserves the right to refuse publication of material which it deems unsuitable. **The Iron Warrior** also reserves the right to edit grammar, spelling and text that do not meet university standards. Mail should be addressed to **The Iron Warrior**, Engineering Society, University of Waterloo, Waterloo, Ontario, N2L 3G1. Our phone number is (519) 888-4567 x2693. Our fax number is (519) 725-4872. Email can be sent to *iwarrior@engmail.uwaterloo.ca*. Visit us on the web at www.eng.uwaterloo.ca/groups/iwarrior/

24 hours of mechanical engineering

Nina Pyron

MECHANICAL ENGINEERING
CLASS OF 2002

Present Age: 20
Hometown: Toronto, ON
High school: Northern Secondary School
Inspiration: Toyota Supra Mark IV
My parents
Fav. Books: The Summer Tree
The Wandering Fire
The Darkest Road

Co-op Work Experience

1999,1998 – **CAMI Automotive**, Maintenance Mechanical Support, Ingersoll, ON
1999 – **Konal Engineering and Equipment**, Junior Design Engineer, Chatham, ON

Typical School Day

8:15 am - Alarm goes off
8:20 am - Alarm goes off
8:25 am - Alarm goes off
8:30 am - Nina drags herself out of bed.
9:16 am - Leave for school
9:31 am - **Mechanical Engineering 262**. Welcome to the exciting world of microprocessors. Did you know the electronic components in a modern-day automobile cost more than the steel that goes into making the frame?
10:23 am - Trip to the C&D [Coffee & Donuts is snack shop run by the Waterloo engineering society. It's located in the heart of the engineering buildings and most students go there for a quick breakfast/lunch between classes]
10:30 am - **Mechanical Engineering 203**. Ordinary differential equations (calculus).
11:23 am - The class erupts into a flurry of clacking binders and shuffling papers in an attempt to draw the prof's attention to the fact that the class is over.
11:25 am - No time for another trip to the C&D, Nina chats with nearby friends. Topics include: what happened on Buffy the Vampire Slayer, Vicki's weekend trip to New York City, who's that weirdo following Nina around with a camera??
11:30 am - **Mechanical Engineering 250**. Thermodynamics ("It doesn't matter what's in the system, we only look at the fluid as it goes in and out")
12:21 pm - POETS for lunch – watch taped episode of "The Practice".
1:30 pm - **Mechanical Engineering 220**. MODS II. Last lecture for the day.
2:29 pm - Miscellaneous errands. Talking to teaching assistants, photocopying solution sets, socializing, etc.
4:20 pm - Nina meets up with friends to go mountain biking.
7:30 pm - Shopping at Beechwood Zehr's. Bread, milk, cranberry scones, pita, bagels, animal crackers.
8:39 pm - Dinner. Vegetarian stir fry.
9:22 pm - Watch TV, study, talk on the phone, surf the net on the high speed cable modem [Nina lives with three computer engineers and her entire house is networked. Room to room transfer rates can as high as 1 megabit per second]
2:01 am - Zzzzzzzzz...
8:15 am - Alarm goes off.

GOOD MORNING WATERLOO - Nina's day begins with an M E 262 lecture. The course studies the implementation of microprocessor controls in mechanical systems.

TAKING ONE FOR THE TEAM - Mark Cesena (left) sports a separated shoulder from a weekend football game. In his spare time, Cesena serves as the Director of the Waterloo Engineering Endowment Fund, a $3.2 million student managed investment fund which has spent over $1 million improving Waterloo engineering since its inception in 1991.

TIME OUT – In between morning lectures, the class representative announces the week's athletic events. The 2002 mechanical engineering class has several recreational sport teams (hockey, ultimate, volleyball, football, soccer) that compete with teams from other engineering disciplines.

"S" IS FOR SOCIALIZING – Nina and friends gather round as Vicki shows the photos from her weekend jaunt to New York City.

LUNCH IN POETS - Complete with big screen TV, Waterloo Engineer's on-campus bar plays movies and TV shows all afternoon long.

Mike Muffels
VICE PRESIDENT FINANCE
WATERLOO ENGINEERING SOCIETY A

ENVIRONMENTAL CIVIL ENGINEERING
CLASS OF 2001

Present Age: 22
Hometown: Dunnville, ON
High school: Lakeshore Catholic High School
Role Models: Pele,
Johan Cruijff,
Pierre Trudeau,
my dad

Fav. Books: Cat's Cradle
Hitch Hiker's Guide to the Galaxy
Lord of the Rings
Buddy Holly is Alive and Well on Ganymede
Left Hand Side of Darkness

Co-op Work Experience

1999 – **University of Waterloo**, Teaching Assistant, Waterloo, ON
1999 – **Conestoga Rovers and Associates**, Engineering Student, Waterloo, ON
1998 , 1997– **Regional Municipality of Hamilton-Wentworth**, Solid Waste Field Technician, Hamilton, ON
1997 – **Fluid Transfer**, Quality Assurance Representative, Dunnville, ON

University Applications

University of Waterloo – Mechanical Engineering, University of Waterloo – Physics, Carlton University – Mechanical Engineering

Volunteer Work

Ontario Engineering Competition, Concrete Toboggan, Hoop Stars Basket Ball Camp, Various Soup Kitchens in Toronto

Awards

Undergraduate Research Assistantship
2 Outstanding Work Report Awards
Various Leadership Awards
Athelete of the Year
Caring Spirit Award
Award for Most Involved Student

What were some of the reasons you chose Waterloo?
Coop, reputation

What impressed you about the university when you arrived?
Students, profs, my courses

What activities do you enjoy during your spare time?
EngSoc, Lego, reading, running

What are some of the projects you worked on during your work terms?
Biological Wastewater Treatment, landfill design

What are some of the coolest things you've done since you came to Waterloo?
Everything I do is cool

What were some of the difficulties you encountered during first year?
Course loads and difficulty

Where do you see yourself five years from now?
Grad school

What are the best points about being on work term?
Break from school, work experience, money

What are the best points about being on school term?
Break from work, you are your own boss, school work

Why did you want to become an engineer?
I've wanted to build tractors since I was 5

What are some of the characteristics of a good engineer?
Patient, open minded, creative, hard working, responsible, professional, caring, intelligent

Chris Gardiner

GEOLOGICAL ENGINEERING
CLASS OF 2003 (MMM ROCKS)

Present Age: 22
Hometown: Owen Sound, Ontario
High school: West Hill Secondary School
Fav. Books: Dark Elf series by R.A. Salvatore
Enginoods

Co-op Work Experience

1999, 1998 – **Canadian Food Inspection Agency,** Computer Support, Guelph ON
1998 – **West Hill Secondary School,** Teaching Assistant, Owen Sound ON

University Applications

University of Waterloo – Chemical Engineering, University of Guelph – Water Resources Engineering, University of Waterloo – Chemistry

What activities do you enjoy during your spare time?
Backpacking, reading, socializing

Why did you choose to pursue a career in geological engineering?
I was deflected from [chemical engineering] and found out that I really liked playing in the mud, so here I am.

What were some of the reasons you chose Waterloo?
The people here really impressed me as open and friendly on the campus day. The fact that the university had co-op put the icing on the cake. The great reputation and stuff was good too.

What are the best points about being on work term?
$$$$ No classes, change of scene, change of pace

What are the best points about being on school term?
All of your friends are concentrated into a small area, and you are getting away from work which by this time has become tedious and boring.

How has your view of engineering changed since you started?
More work, more fun than I thought.

Why did you want to become an engineer?
I wanted to do something that would help people and I didn't really care if I got a thank you at the end of the day or not.

What are some of the characteristics of a good engineer?
Honesty, integrity, getting along with people, not bowing to public opinion and having fun, working hard and playing hard.

Waterloo Aerial Robotics Group

Project Description

We are engineering students from various disciplines currently working on an entry for the Millennial International Aerial Robotics Competition held by the Association for Unmanned Vehicle Systems.

This is a very prestigious international competition and our competitors will include teams from top Universities around the world. Our main project tasks involve the design, construction and implementation of totally autonomous computer controlled model helicopters and ground vehicles.

This extremely involved project encompasses a broad range of engineering designs and solutions. Our work in each of the technological areas involved is pushing the edge of what is currently possible. We work with and develop state-of-the-art software and hardware systems in order to complete the required mission.

Team Members

WARG is a student project team open to students of all years and disciplines. Presently, our team consists of approximately thirty students, both undergraduate and graduate students, from Computer Engineering, Electrical Engineering, Systems Design Engineering and Mechanical Engineering.

Our team must focus together on several key tasks. They include:

Control Systems - flying the helicopters and driving the ground vehicles;

Artificial Intelligence - planning the mission and navigating through the course;

Computer Vision Systems - allowing the robots to see and identify things in their surroundings;

Mechanical Systems - design and modification of our helicopters and electronics to allow them to withstand the harsh environments; and

Team Administration and Management - keep the group running and find the sponsorship to fund our research (we can always use more sponsors :)

These divisions are not definite. With such a small number of people involved in such an immense project, we all contribute our abilities to each area that we can and learn more about those areas and concepts with which we were unfamiliar.

LITTLE CANADA – Group members who traveled to the 1999 qualifier. From left to right, Dave Kroetsch, Doug Hemingway, Chris McKillop, Gilbert Lai, Bill Rosehart.

Project Origins

The University of Waterloo Aerial Robotics Group is in its third year. WARG was started in the fall of 1997 within the Electrical and Computer Engineering department. David Kroetsch, our team leader, had done a similar project while he was in high school.

During his 1A term in Computer Engineering, Dave was interested in moving the project to a higher level. Prof. David Wang, Associate Graduate Chair of the Electrical and Computer Engineering Department, helped Dave by bringing together a group of students that had expressed interest in participating in such a competition.

Our team was formed with the intention of entering the International Aerial Robotics Competition Millenial Event.

Competition Description

The Association for Unmanned Vehicle Systems is a non-profit international industry association which works closely with various governmental agencies including the United States Department of Energy. Past president of this association, Robert Michelson of the Georgia Institute of Technology, is the creater and annual organizer of the International Aerial Robotics Competition.

The overall purpose of this competition is to push the envelope of technology by challenging students to accomplish near-impossible mission objectives. In most cases, the functionality required has never even been demonstrated before. Currently, a 3-year competition is underway - the Millenial Event.

The competition entries must consist of a team of robots (mainly aerial) that will navigate through a hazardous disaster area autonomously. The robots are looking for human-like animatronic victims that wave their arms and scream for help. The exact latitude and longitude of these victims must be identified and if possible the survivors are to be rescued or assisted.

Meanwhile, enormous columns of fire, powerful jets of water and other unknown and very dangerous hazards exist in the environment and must be avoided. WARG attended the first qualifier for this competition, which was held in August 1998 and the 2nd qualifier which was held this past summer. The final qualifier and the Millenial event will be held in Richland, Washington in the summer of 2000.

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*In his first year at Waterloo, David Kroestch founded the **Waterloo Aerial Robotics Group** , a student project team that went on to defeat some of the world's best technical universities at the 1998 and 1999 Aerial Robotics Competition.*

Dave Kroetsch
FOUNDER AND PROJECT LEADER
WARG
WATERLOO AERIAL ROBOTICS GROUP

COMPUTER ENGINEERING
CLASS OF 2002

Present Age:	20
Hometown:	St. Clements, Ontario
High school:	Resurrection Catholic Secondary School
Role models:	Macgyver, Walt Disney, Stephen Hawking
Fav. Books:	Frankenstein The Hobbit

Co-op Work Experience

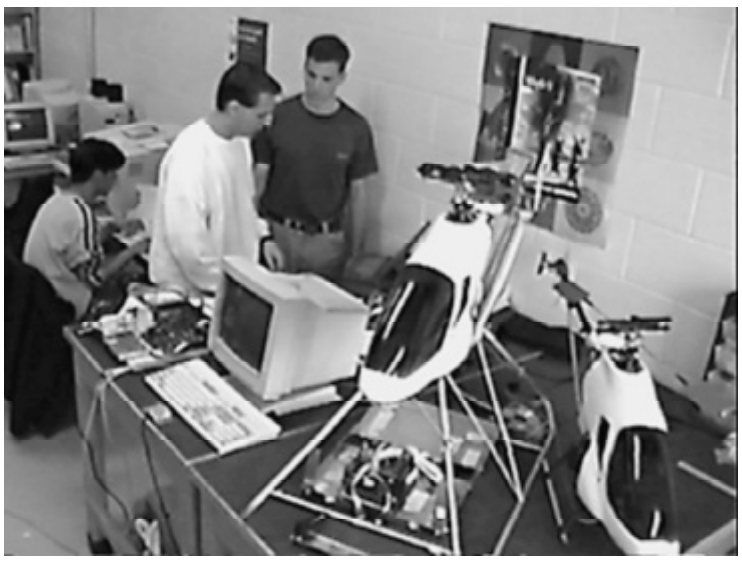
1999 - **Focus Automation Systems**, Firmware Engineer, Waterloo, ON
1999 - **Northern Digital Inc**, Senior Software Developer, Waterloo, ON
1998 - **University of Waterloo**, Hardware/Software Developer, Research Assistant, Waterloo, ON
1997 - **Research in Motion**, I.T. Developer, Waterloo, ON

Activities

Waterloo Aerial Robotics Group - Founder and Project Leader

Awards

International Aerial Robotics Competition, First Place - Open-Class Event; Canadian Skills Competition - National gold medal winner in electronics; Governor General's Award for Academic Excellence; Waterloo County Special Entrance Scholarship; Ontario Skills Canada Competition - First Place in computer technology with a mark of 100%; Highest overall average at Resurrection Catholic Secondary School (1994, 1995, 1996, 1997); OAC Technology, OAC Physics, OAC Computer Science, OAC Math



PING! – Dave Kroetsch and Stephen Marchetti discuss modifications to the helicopter's sonar unit.

DOWN TO THE WIRE - Test pilot Scott Gray performs repairs and tune-ups at the Waterloo testing grounds just days before the 1999 competition.

University Applications

University of Waterloo - Computer Engineering, University of Toronto - Computer Engineering, University of Waterloo - Computer Science

Why did you want to become an engineer?
I get to play with neat stuff.

Why Waterloo?
It was the best school for what I wanted to do. It was nice and close to home. The co-op program was also a deciding factor.

What impressed you about the university when you arrived?
The people… I loved FROSH week. Lots of fun. Also, the people… lots of smart people.. sooo much to learn!

What do you do in your spare time?
Rock climbing, camping, canoeing, biking, playing piano, playing guitar (writing music)

What are some of the projects you worked on during your work terms?
Aside from WARG, I have my own small business (Creative Solutions). I do networking, custom software, hardware, and computer consulting, etc. I've written databases for small companies, worked on end-user software in MFC, and I've worked on various other projects no one would be interested in :P

develop new things and do a GOOD job. The stuff we do is WAY more professional.

What are your plans for after graduation?
Probably start my own company, go public in a year an then retire. I want to work on something that changes the world. (After I retire)

What are the best points about being on work term?
Making money, getting experience, getting to work on real world stuff (see your work in products), meeting really neat people/networking

What are the best points about being on school term?
People; getting to learn neat things once and a while; parties.

TECHNICAL DIFFICULTIES – At the competition qualifier, robots must overcome unforeseen obstacles, which are used to model the unpredictability of a real-world disaster. The above fire pit used at the 1998 competition interferes with motion and heat sensors.

What were some of the difficulties you encountered during first year?
Not that many.. felt pretty at home. People were nice and I found it pretty easy academically

What makes Waterloo engineers different from those of other schools?
We are actually smart and know how to think for ourselves. My contact with people from other schools (MIT, etc) from the Robotics competition gives me great faith in our school. We actually

Why did you choose to pursue a career in computer engineering?
I liked hardware and I liked software - comp eng seemed to be a nice combination of the two. I was interested in a career maybe in robotics - this seemed perfect

How has your view of engineering changed since you started?
Now I see it as a career. I'm aware of the responsibilities. It's more than just knowing school stuff - you've got to BE an engineer

SUNRAYCE 99 – The Midnight Sun Sunrayce 99 Solar Race Car Team takes a break from the 10 day long competition to pose for a photograph.

START YOUR ENGINES - Midnight Sun V and its competitors are lined up in front of the White House in Washington D.C.

DOWNTIME - The Midnight Sun team is working hard to prepare for Day 3 of the race. Underneath the tent, from left to right, are Eugene Huang, the strategy expert and Simon Foo, the electrical manager.

The Midnight Sun

Connie Kwan

COMPUTER ENGINEERING
CLASS OF 2003

Our sun is the earth's one and only powerhouse. All energy, directly or indirectly, comes from our sun. From the food you eat to the batteries that power your radio, the energy source traces back to the sun.

It is no wonder then, that humans continue to seek out methods to capture the sun's limitless energy. Such is the goal of the Midnight Sun solar race team. We aim to design a vehicle powered only by the sun.

There are many benefits to capturing energy from the sun. As solar energy become widespread, burning of fossil fuels and demand for nuclear reactors decrease, which in turn reduces pollution and global warming effects.

Solar cells have no moving parts to break down and require minimal maintenance. Through building a solar car, Midnight Sun provides a unique experience for University of Waterloo students and raises public awareness of solar technology and its capabilities.

The University of Waterloo Midnight Sun Solar Race Car Project began in the fall of 1989. The Midnight Sun team participates in Sunrayce, a biennial Solar Car Race across North America for Collegiate teams.

The average duration of Sunrayce is 10 days spanning over 2000 km. Sunrayce 99 awards received by Midnight Sun V in their most recent race include the Team Workmanship Award as well as a special "Cone Eating" Award! (Both drivers managed to pick up a cone at the qualifier!) Our best record was set by Midnight Sun IV, which raced at Sunracye 97 in June 1997 and finished seventh overall out of the thirty-six competing teams. This team also won the Mechanical Award for Technical Innovation.

In October1999, we will compete in The World Solar Car Challenge (WSC) which is the single most prominent solar car competition in the world. The competition runs from Darwin in Australia's north to Adelaid in the south - 3,010 km. Solar cars from all around the world line up to test their designs and endurance in this unforgiving "first to cross the finish line" race. With Sunrayce 99 less than five months preceding WSC, we have experience and are geared up for this exciting event.

Midnight Sun is the largest student run project at the University of Waterloo. Over 100 students contribute their skills and talents to the project every term. We encourage students from all faculties to pool their expertise and learn new skills at Midnight Sun.

The project responsibilities are broken into seven groups: aerobody, business, mechanical, primary electrical, secondary electrical, solar array and strategy. The business group seeks sponsorships, gives presentations, directs marketing and educates communities. The strategy group plans the race strategy and is vital during solar car races such as Sunrayce as well as vehicle testing.

All other groups concentrate on the actual production and manufacture of the solar car. Despite differences in tasks, all Midnight Sun team members value teamwork, gain memorable experiences, and acquire valuable skills.

http://www.midsun.uwaterloo.ca

Ruth Allen
PROJECT MANAGER
MIDNIGHT SUN SOLAR RACE CAR

CHEMICAL ENGINEERING
CLASS OF 2001

Present Age:	23
Hometown:	Ottawa, Ontario
High school:	Gloucester High School
Fav. Books:	Seventh Princess A Wrinkle in Time The Hobbit

Co-op Work Experience

1999 – **BlueStar Technologies**, Surrey, BC
1999, 1998 – **Midnight Sun**, Waterloo, ON
1997 - **Finisar Corporation**, Mountain View, California

Activities

Midnight Sun (Project Manager, Array Manager and Driver) , classical ballet, baking

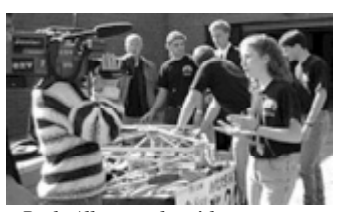
University Applications

University of Waterloo - Chemical Engineering
Queens University – Engineering
McGill University – Chemical Engineering
Ottawa University- Chemical Engineering

Why did you choose Waterloo?
Reputation. The ducks

What difficulties did you have in first year?
Adjusting to a highly packed schedule. Adjusting to living in a dorm with 50 or so people many of whom had never been away from home.

What's the best part about being on workterm?
Change of pace; meeting new people - many of whom are neither engineers nor students; with luck, home cooked meals!



Ruth Allen speaks with a reporters after receiving a donation from a sponsor.

SANDFORD FLEMING FOUNDATION

The Sandford Fleming Foundation, chaired by P. Roe, maintains an active awards programme. Funds to support the programme come from student and faculty donations and endowment earnings.

AWARDS	WORK TERM REPORTS CONVOCATION MEDALS DEPARTMENTAL DESIGN AWARDS TEACHING ASSISTANTSHIP EXCELLENCE ENGINEERING DEBATES TECHNICAL SPEAKER COMPETITION KAREN MARK SCHOLARSHIP JOHN FISHER LEADERSHIP AWARD W.R. PETRI ENGINEERING AWARD TEACHING EXCELLENCE AWARD
FINANCIAL ASSISTANCE	TRAVEL GRANTS EMERGENCY LOANS
PRESENTATIONS & SPONSORSHIPS	BRIDGING THE GAP ONTARIO ENGINEERING COMPETITION CANADIAN ENGINEERING COMPETITION

Anyone wishing to learn more about the Foundation may contact the Waterloo Campus Office at x4008 or sff@engmail.uwaterloo.ca

Taking it from the top

"There is more of a demand for engineers today than there is supply, worldwide. It's a very exciting time from your perspective."

A WHOLE NEW WORLD – Brian Barry, President and CEO of Ericsson Canada speaks on the future of telecom in Engineering Lecture Hall. Ericsson spends over $200 million a year at its Canadian research facility, which employs over 1100 people.

IW: What characteristics does Ericsson Canada look for in its new hires?

Brian Barry: When you recruit somebody you look at their track record, a lot of the track record of course are the grades… but a lot of it is personality, expectations, do they fall in line with those of the company.

…One thing you must remember when you're starting off is that an organization is made up of many people; it's like a family.

If one member doesn't fit in, even if he's an incredible resource—everybody has to fit together, there are a few R&D people who can sit in their corner and not communicate, but by and large, you need people to fit in culturally, that's very important.

IW: How does Waterloo compare among technical universities worldwide?

Brian Barry: Ericsson, certainly in Canada, values it very highly. We invest more in the University of Waterloo than we do in any other university in Canada…

I would say that Canadian engineers have a very good passion for fun.

You've got a lot of interest, a lot of dedication, but there's a lot of balance—and that's very important.

...You're really creative. We see that we're a lot more creative in Canada than we are in the US, believe it or not.

They're very good at the volume stuff, but the new creativity, the new ideas, very fertile ground, and that's why we have three product units—we probably have 30 product units in Ericsson, three of them are based in Canada for that reason.

Some of our best experts, new generation of new ideas, come from our Canadian organization.

The sky is the limit

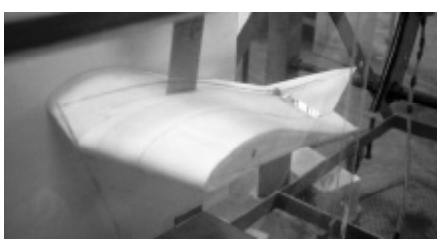
FLIGHT from page 1

This adds a significant challenge that has dispelled the hopes of many competitors. For each flight both time aloft and payload weight determine the score. The flying portion of the competition is based on the sum of the top three flights for each team on each day.

Waterloo has a variable history of successes and failed attempts within its four years of participation in the competition. The first entry from Waterloo was in May of 1996, taking the small newly found team to Calgary with a balsa wood glider. This was a learning experience for the team, snapping the wings of the glider into two pieces on the first day of the competition and staying up all night to repair them for the second day of the competition.

On the second day, the very same glider met its eventual destruction as it dove towards the ground, winning the team the Top Gun award for the best crash. Although the glider came home in many pieces the team had acquired experience which would lead them to a much better result in their next endeavor.

In May of 1997 the Waterloo team shone. Travelling to Ottawa the team unveiled their new composite and Styrofoam flying wing glider, the "Eclipse". The flying wing design was



JUST A LITTLE OFF THE TOP - The glider wing is precisely sculpted and to optimize aerodynamic performance.

something that had never been seen before in the glider competition. After the team delivered the technical presentation on the day proceeding the flying, the judges and other competitors were skeptical of the flying wing.

The flying portion of the competition soon answered all questions about the capabilities of the glider, as it took to the air with the longest flight of the competition, 83 seconds carrying 1.0 kg of payload. The team won the competition after only the first day of flying, as no other team could better the performance of the Waterloo flying wing.

THE RIGHT STUFF - UW Glider Team poses for a photo outside the Davis Centre

The competition moved to Waterloo the following year, being held at the Hofer family farm on the route to Listowel. To the dismay of both the team and the other competitors, the Waterloo team decided not to enter a glider but to focus on hosting the competition. What resulted was one of the most organized and enjoyable events for the participants.

Unlike the previous years the competitors attended the 1998 competition with a myriad of unconventional designs, with some competitors claiming that they tried to copy the flying wing from Waterloo but could not make it work. Waterloo also demonstrated a prototype flying wing which was under development. Under good flying conditions, it made a flight which lasted 105 seconds surpassing the winning flight time from 1997.

Although the prototype shown off in the 1998 competition showed promise the team was not happy with its payload carrying capacity, and they completely redesigned the glider. This time, the glider was designed without the countless prototypes and test flights used in 1997 but with a greater dependence on computer simulations and windtunnel testing.

The result was a glider, which had the potential to break the flight time, and payload record held by the Southern Alberta Institute of Technology team. The 1999 glider design, another flying wing glider, the third of its kind featured newer airfoils, an improved method of achieving stability and winglets. On top of designing a new glider the Waterloo team was asked to host the competition at the Hofer farm once again. Unfortunately, the weather was not ideal featuring rain, bitter cold and heavy winds. This plagued each of the teams, preventing the gliders from reaching their full potential.

This problem was further compounded for the Waterloo team, as the winglets began to cause some baffling stability problems. These stability problems, so common in flying wings could not be solved during the competition despite of the team's best efforts. Only, on the final flight of the competition did the flying wing work as expected providing the longest flight of the competition while carrying the heaviest payload. Ironically, the winglets added to the glider to improve stability during launch were the cause of the stability problems.

Unfortunately, the flight was not counted as the team had removed the winglets, which was deemed a significant change in configuration and was not permitted. Despite of the stability problems the team still captured third place overall, as well as having the best report and technical presentations.

Throughout the history of the Waterloo participation in the glider competition the team has gained valuable research experience and technical knowledge. As well valuable relationships with companies such as DOW Chemical, AEA Technology and AlliedSignal Aerospace, our 1999 corporate sponsors, have been developed.

Competing in the CASI Free Flight glider competition is an exciting project, which allows students to be involved in the original design and construction of a glider, which will take to the air. It provides insights into the nature of engineering design and teamwork that is important to future success.

ACM International Collegiate Programming Contest World Finals 1999

Final Standings

Rank	Name
1	**University of Waterloo**
2	Albert-Ludwigs Universität Freiburg
3	St. Petersburg Institute of Fine Mechanics and Optics
4	Bucharest Universtiy
5	Duke University
6	Caifornia Polytechnic State University
7	University of California at Berkeley
8	Harvard University
9	St. Petersburg State University
10	National Taiwan University

Other Schools of Note

11 Carnegie Mellon University
18 Cornell University
28 Harvey Mudd College

Honorable Mention

Stanford University
National Tsing Hua University
University of Nebraska, Lincoln
Georgia Institute of Technology
Texas Tech University
Florida State University
ITESM, Monterrey
Queensland University of Technology
Al Akhawayn University in Ifrane
University of Scranton
University of Utah
Universidade Federal de Pernambuco
Universidad de las Americas
ITESM, Estado de Mexico

Ondrej Lhotak

ACM WINNER

COMPUTER SCIENCE
CLASS OF 2001

Present Age:	22
Hometown:	Burlington, ON
High school:	Aldershot High School
Role Models:	Generally my closest friends. There are cool people all around you, and you can learn lots from them if you take the time to know them well
Fav. Books:	Martin Eden Cannery Row & Sweet Thursday

Co-op Work Experience

1999 – **Research in Motion**, Embedded software developer, Waterloo, ON
1999 – **University of Waterloo, Department of Computer Science**, Research Assistant, Waterloo, ON
1998 – **Sybase France,** Software developer, Paris, France.
1997 – **Sybase Waterloo**, Software developer, Waterloo, ON

University Applications

University of Waterloo - Computer Science; University of Waterloo - Computer Engineering; Queens University - Engineering

Activities

Sailing, skiing (downhill), volleyball, reading, biking, teaching, camping, travelling, helping friends with school work or other stuff.

Awards

42nd place Putnam math contest.
Governor General's medal
J. Wesley Graham scholarship
3rd prize, Canadian Math Olympiad
8th in Canada, Descartes
Gold medal, Euclid
Halton Board of Education Student Excellence award

What were some of the reasons you chose Waterloo?

It has the best reputation for CS *[computer science]* and comp *[computer engineering]*. The brightest people come here. Even had it not lived up to its reputation, I knew I'd be surrounded by the best. Also, the campus. I despise large cities and I knew I wouldn't last four years in one.

What are the best points about being on work term?

You have lots of time, and if your friends are in different cities, you get to go visit them and visit cool places at the same time. Also, you learn all that important stuff that they forget to teach you in class.

What are the best points about being on school term?

You get to be here where you know everyone, not in some strange city.

Why did you want to be in your program?

I liked programming and math ever since I was a little kid. It was a tough decision between CS and Comp, and I went for CS mostly because of CS/EEE*, which allowed me to see the engineering side of things as well as the math side.

What are some of the most interesting things you've done since you came to Waterloo?

My Paris work term was definitely the most interesting. Road trips to visit friends on work terms were definitely cool too.

**The computer science program is offered by the faculty of mathematics and focuses on the software aspects of computer studies, whereas computer engineering focuses on both software and hardware (semiconductors, microprocessors, electronic devices, etc.). The EEE option allows computer science students to take electrical engineering courses to gain exposure to the hardware side of computer design.*

Shall We Dance?

Timothy Burns

Systems Design Engineering
Class of 2001

The Swing and Social Dance Club saw its genesis in the Fall of 1998. After spending the summer in Seattle discovering the joys of swing dancing, I was hooked, and had to continue. To my dismay, there were no such venues

in Kitchener-Waterloo to partake in my new found love. So it was with a meagre three months dance experience I decided to start a club at UW.

Since Khakis where still swinging without the slightest hint of a-go-go, I had some free advertising to help me out. I got a hint of what was to come during campus club days, signing up 200 people.

I booked Fed Hall, the largest venue on campus (incidentally, Canada's largest student club). After papering campus in anticipation of our first meeting, I nervously waited at Fed Hall for people to come.

Luckily they did –the dance floor was packed, the stage was packed, there were even people upstairs trying to catch my lesson. In two months the club had over 450 members, making it the fastest growing club in UW history. Or as I put it to a reporter for the KW Record, "I was just looking for a dance partners, then 300 people showed up."

The club is still running, and every week a group of enthusiastic would-be-Fred-and-Ginger's get together to dance. We focus on swing, since that's what's popular, but we sprinkle in other social dances as well, like fox trot and waltz. Typically, we have an hour of instruction followed by open dance. The atmosphere is always friendly, and the goal is to have fun. Fortunately, people do – every week.

Running the club has been a real joy for me. It's been a pleasure to share what I know and see others enjoy themselves. Hearing comments like "it's the highlight of my week" from members is extremely rewarding..

I've met many fantastic friends, and I know others who have done the same (I know several people who have met their current beau's through the club). The great part about social dance is that it's, well, social. You have to dance with a partner, which means meeting and getting to know new people.

There's nothing quite like the rush when you, the music and your partner all connect. You walk off the floor thinking 'wow', and that's it. You're hooked.

The UW Swing and Social Dance Club will be active for the 99-00 school year. Check out our web site at http:\\watserv1.uwaterloo.ca\~dance, or e-mail dance@watserv1.uwaterloo.ca.

Fall 1998 Engineering Semi-Formal

Timothy Burns
President and Founder
Swing and Social Dance Club

Systems Design Engineering
Class of 2001

Present Age:	23 (transferred from computer engineering in 1997)
Hometown:	Richmond Hill, Ontario
High school:	Country Day School/ Cardinal Carter CHS
Fav. books:	Influence: The Psychology of Persuasion. Innovators Delimma: How new technologies cause great firms to fail.

Co-op Work Experience:

1999 – **MediaLynx**, Project Manager, Toronto, Ontario
1999 – Vacation in Australia/New Zealand
1998 – **Microsoft**, Program Manager, Seattle, Washington
1997 – **Procter&Gamble**, Project Team Leader, Toronto, Ontario
1997 – **Formula Growth**, Stock Research Analyst, Montreal, Quebec
1996 – **J.D. Irving**, PC Technician, Saint John, New Brunswick

Awards

Governor General's Medal
First Place – Sanford Flemming Foundation Debates
Third Place – Ontario Engineering Competition (Parliamentary Debate)
Third Place – Ontario Engineering Competition (Editorial Communications)
English Language Proficiency Examination Prize
OAC Physics, OAC Calculus, OAC Algebra & Geometry, OAC Finite Math, OAC Writers Craft Awards

Activities

Waterloo Swing and Social Dance Club (founder), Waterloo Debating Team, Investment Club, Business Club

Universities Applications

University of Waterloo – Computer Engineering, University of Waterloo – Science and Business, University of Toronto – Engineering Science,

Why did you choose Waterloo?
The biggest reasons I chose Waterloo were the co-op program and it's reputation. I'm very pleased I chose Waterloo, in particular because of co-op. Through the co-op program I've had access to experience and opportunities just not seen at other schools. It's also let me try different jobs, and industries. If you're not sure what you want to do in a career, you can't beat co-op at Waterloo, it's helped me sort out where I wanted to go.

Where will you be 5 years from now?
Running my own company.

Keep on truckin'

University of Waterloo Alternative Fuels Team (UWAFT)

This 1999 Chevy Silverado 5.3L Vortec V8 Extended Cab 4x4 Pickup truck was re-engineered from a dedicated gasoline power to dedicated fuel ethanol power.

Alternate Fuels Competitions

Year	Competition	Vehicle	Alternative Fuel	UW Ranking
1997	Propane Vehicle Challenge	Dodge Dakota Pickup Truck	Propane	First
1998	Ethanol Vehicle Challenge	Chevrolet Malibu Sedan	Fuel Ethanol (85% ethanol, 15% gasoline)	Second
1999	Ethanol Vehicle Challenge	Chevy Silverado Pickup Truck	Fuel Ethanol (85% ethanol, 15% gasoline)	Fourth

Project Description

UWAFT is an ongoing student project team exploring the implementation of alternative fuel technologies in today's automotive industry.

Students involved in UWAFT are entirely responsible for the full scope of this project, including strategy development, system design, implementation, testing, public relations, and fundraising.

Each year the team participates in an alternative fuel competition. The competitions that we take part in are not ongoing, but change from year to year.

This makes our project challenging and exciting because, each year, we are faced with completely new problems that previous teams have not had to deal with.

The three competitions that we have participated in have involved converting a dedicated gasoline powered vehicle to operate dedicated on a certain alternative fuel:

Team Members

UWAFT is a project team open to students of all years and disciplines. The current team consists of three undergraduate students (mechanical), two graduate students (mechanical), a recent graduate (electrical), and two faculty advisors (mechanical).

Most of our projects fall within the disciplines of mechanical, electrical, systems, or chemical engineering. For our next competition (in May 2000), the team has an especially important need for chemical engineers.

The team was first started in 1996 with the intention of competing in the 1997 Propane Vehicle Challenge. Since that time we have also competed in the 1998 Ethanol Vehicle Challenge and 1999 Ethanol Vehicle Challenge.

The team typically works in seven key groups:

- Fuel Delivery System
- Engine and Powertrain
- Exhaust/Emissions Control Systems
- Cold-Start Systems
- Electrical and Control Systems
- Sponsorship and Communication
- Team Administration/Management

Competition Description

Our most recent competition was the 1999 Ethanol Vehicle Challenge. This competition involved re-engineering a 1999 Chevy Silverado 5.3L Vortec V8 Extended Cab 4x4 Pickup truck from dedicated gasoline to dedicated fuel ethanol power. Fuel ethanol, also known as "E85", is a blend of 85% ethanol and 15% gasoline. (Ethanol is a alcohol fuel produced from corn and other agricultural products.) Fourteen engineering colleges and universities participated in this competition. The University of Waterloo team was the only Canadian entry.

At the competition, the vehicles are put through extensive static and dynamic testing. The events include a safety inspection, emissions testing, fuel economy testing, cold-starting, acceleration, hill-climb/towing, an off-road rally race, design judging, a design report, and a design presentation. The competition is intended to test the vehicle in all aspects of marketplace importance.

Our next competition will be the Ethanol Vehicle Challenge 2000. This event will occur in May 2000 and will be held (for the first time) entirely in Canada. For this competition, the vehicle and fuel will again be the 1999 Chevy Silverado and fuel ethanol, respectively. UWAFT is very excited about the competition coming to Canada because this will give us a chance to showcase our innovations on our 'home turf'.

More information about next year's competition can be found at the Canadian Renewable Fuels Association's web site (www.greenfuels.org).

For more information about the team, please contact:

Dave Mather, Team Leader:
dwmather@engmail.uwaterloo.ca
Professor Roydon Fraser, Faculty Advisor:
rafraser@engmail.uwaterloo.ca
Team website:
www.eng.uwaterloo.ca/project/uw_aft/

Awards

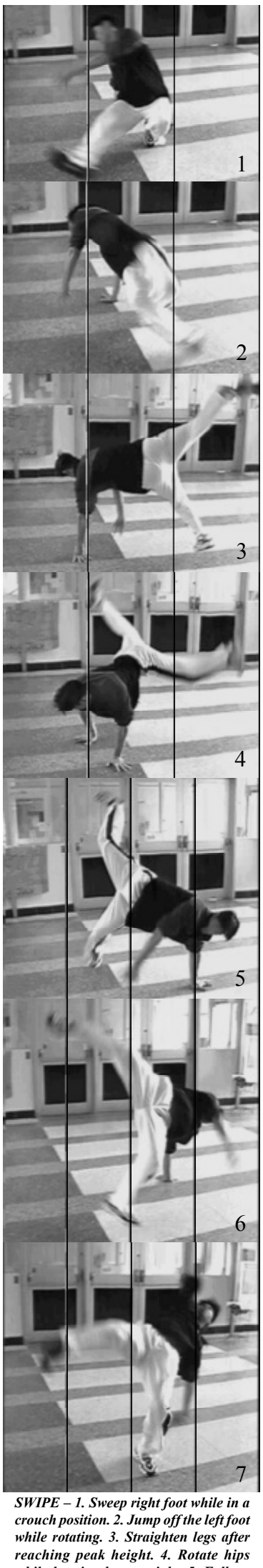
1997 Propane Vehicle Challenge, Texas World Speedway, Texas
1st Place Finish Overall
Best New Team Award
Lowest Emissions Award
Best Design Presentation Award
1998 Ethanol Vehicle Challenge, General Motors Proving Grounds, Milford, Michigan
2nd Place Finish Overall
Lowest Emissions Award
1999 Ethanol Vehicle Challenge, General Motors Proving Grounds, Milford, Michigan
4th Place Finish Overall
Best Design Presentation Award
Lowest Engine-Out Emissions Award

Sponsors

For the 1999 Ethanol Vehicle Challenge:

Competition Headline Sponsors
General Motors
Natural Resources Canada
United States Department of Energy

Team Sponsors
Bodycote-ORTECH Inc.
Canadian Renewable Fuels Association
Centaur Thermal Systems Inc.
Commercial Alcohols Inc.
Degussa-Huls Corporation
Downtown Auto Center
Environment Canada
Iogen Corporation
Long Manufacturing Ltd.
Midas Muffler and Brake Shops
NCR Corporation
Nett Technologies Inc.
NGK Spark Plug Co.
Niagara Valve and Fitting
Quad Engineering
Ontario Corn Producers Association
Rudy Held Performance Centre
Thermotech Engineering
Waterloo Engineering Endowment Fund



SWIPE – 1. Sweep right foot while in a crouch position. 2. Jump off the left foot while rotating. 3. Straighten legs after reaching peak height. 4. Rotate hips while keeping legs straight. 5. Follow-up by rotating shoulders and legs. 6. Keep legs wide. 7. Continue.

BREAKING IT DOWN - Photos from past performances.

In his first year at Waterloo, Winston Mok founded the UW Hip Hop & Break Dance Crew, which has performed at dance halls, clubs, and other universities on several occasions.

Winston Mok
FOUNDER
UW HIP HOP & BREAK DANCE CREW

COMPUTER ENGINEERING
CLASS OF 2002

Present Age: 19
Hometown: Scarborough, Ontario
High school: Albert Campbell C.I.
Role models: Helen Tran
My Dad and Mom
Fav. Author: Roald Dahl

Co-op Work Experience

1999 – **Sun Microsystems,**
System Administration, Markham, ON
1998 - **Motorola**,
Software Engineering, Missisauga, ON

Activities

UW Hip Hop & Break Dance Crew; Midnight Sun Solar race team; Undergraduate Research Assistantship (Mechanical Engineering); Youth Resource Centre – Academic Tutor; Youth Multi-Cultural Camp – Camp Mentor and Leader; Waterloo Cooperative Residence – Dance Instructor

University Applications

University of Waterloo – Computer Engineering,
University of Toronto – Computer Engineering

Projects

Midnight Sun Solar Race Team – Strategy Manager
Self-initiated Student Project – developed a computer controlled regenerative braking system
Self-initiated Student Project – designed and manufactured an compact sound system
Self-initiated Student Project – currently designing and implementing a portable transportation vehicle

What do you do in your spare time?
I love dancing and listening to music, in addition to putting my ideas down on paper and possibly going to the local machine shop (or my garage) to actually build them.

What were some of the difficulties you encountered during first year?
I found the adjustment to freedom in university life a little hard to adjust to, it's a place where anything and everything can happen, just have to know what's best to do.

Why did you choose Waterloo?
Your given the chance to meet some of the brightest students in Canada and work co-operatively on projects with them.

Why engineering?
I wanted to become an engineer because of all those space shows on TLC and Discovery. I thought all those cool NASA workers in white lab jackets were space craft engineers, thus leading me to choose a future in engineering.

Formula SAE

Project Description

Each team is to assume that a manufacturing firm has engaged them to produce a prototype formula-style racing car. A new car is designed and built from scratch every year.

The car must be designed and built to meet the competition specifications. Additionally, each car must come in at a price of under $9000 US for a production run of 1000 cars. The Formula SAE provides a real world engineering and business experience to its participants. The project requires team members to develop skills in management, design, manufacturing, finance, communication with suppliers and sponsors, logistics and team work in a cross-functional team environment.

Competition Description

UW Formula SAE is an international engineering design competition contested by close to 130 universities from around the world. It is the largest student vehicle design competition in the world.

The competition provides a means for students to apply acquired knowledge to a practical situation. The object of the competition is for the students to design, build, test and race a prototype "Formula" style racecar in a single academic year. The competition requires that the prototype be mass marketable.

The target sales market for this vehicle is the non-professional weekend Solo II competitor. The vehicle must therefore be built for maximum performance and reliability at minimum cost and maintenance.

The Formula SAE competition is held every May over four days at the Pontiac Silverdome and is hosted jointly by DaimlerChrysler, General Motors and Ford. Practicing automotive and race engineers judge each entry based on both static and dynamic events.

Static events include engineering design, manufacturing cost analysis, and marketing presentations. Performance events include acceleration runs, skid pad tests, Solo II (autocross) events and an endurance/fuel economy event.

Ryan Chen-Wing
PAST PRESIDENT
WATERLOO ENGINEERING SOCIETY B

MECHANICAL ENGINEERING
CLASS OF 2000

Present Age: 23
Hometown: Terrace, BC
High school: Brentwood College School
Role Models: Father, Family, Friends
Fav. Books: The Dictionary Shakespeare

Co-op Work Experience

1999 – **Siemens Automotive**, Process/ Industrial Engineering, Chatham, ON
1998 – **First Brands**, Maintenance, Orangeville, ON
1997 – **Co-Ex-Tec**, Quoting, Concord, ON
1996 – **CAMI Automotive**, Stamping, Ingersol, ON

University Applications

University of Waterloo
University of British Columbia
University of Victoria
Simon Fraser University
McMaster University
Queen's University
McGill University
(all engineering, and yeah I did get in)

Activities

Warriors Rugby, Imprint (student newspaper), Iron Warrior (past editor-in-chief), Waterloo Engineering Endowment Fund Director, Engineering Society President, EngSoc Director, Engineering Undergraduate Senator, Board of Governors, Orientation Week Leader (Big, Huge, Super Huge),

Awards

Federation of Students, Student Leadership Award 1997
EngSoc President's Award
EngSoc Plummer Award
B.C. Provincial Scholarship,
Physics Award (at my high school)
Andrew T. Rahme Memorial Award

What did you think of Waterloo when you arrived?
Something that impresses me about Waterloo is the enthusiasm and drive, a willingness to work that so much a part of our culture. Students' experiences in co-op definitely contribute to this.
Our student organisations on campus benefit greatly from the committed attitude of students the success and achievements of the Engineering Society and WEEF and of our student project teams.

What were some of the difficulties you encountered during first year?
I think different than most I had a pretty easy first year I had a good background in most of the courses we were taking so I did very little work. Whether or not you have trouble in first year students should try to develop good study skills and work habits in first year so that you can later choose to relax a bit as that is the tendency and it is harder going the other way. Coming from B.C. I was coming from a very different (though Canadian) culture from those who came from Southern Ontario and the rest of Ontario and it was something to overcome. It is important to meet people at school, try to keep an open mind and you may not find people like you but surely you can find people you like.

What distinguishes Waterloo engineers from those from other schools?
Students at other schools see university as a distinct segment of their life whereas at Waterloo students consider it more closely with the rest of their lives and as a beginning of their career whatever it may be.

Why did you want to become an engineer?
I came into engineering because I like creativity, solving problems, and making things happen; I like learning and figuring how things work.