

2008

@dcs



Computer Science
UNIVERSITY OF TORONTO



Plugged In:

The Systems and Networks Group
Bridges the Gap Between Theory and Practice

MESSAGE FROM THE CHAIR

Welcome to the second edition of @dcs, the annual newsletter of the Department of Computer Science. The response to last year's inaugural issue was tremendous. It's especially gratifying to hear from so many of our alumni, and we will continue—through the newsletter and other channels—to share various aspects of department life with our friends, colleagues and partners.

It has been an exciting year in DCS as we continue to push forward with new curriculum and teaching initiatives; to broaden the scope and impact of our research by developing new industrial partnerships and interdisciplinary ties; and to engage the next generation of computer scientists through our outreach efforts. It is impossible to do justice to all of this in such a short space, but let me provide a few highlights.

Curriculum renewal has been the watchword of the past year, with the Faculty of Arts & Science undergoing a major review of its undergraduate teaching mission. The review placed an emphasis on core knowledge areas, breadth requirements, experiential learning and enhanced student environment. Within DCS, we constantly look to improve our undergraduate learning experience in all of these dimensions. For instance, this past year has seen us explore the integration of service learning—whereby students apply the concepts learned in the classroom to a significant project for, say, a non-profit or social services agency. Imagine, for example, students in a class applying the software design or networking principles being taught in class directly to the development of smart phone applications for caregivers in a retirement facility... and working directly with the caregivers as part of the class! With funding from the Faculty, a new pilot project along these lines will launch in DCS this fall, and will help drive the more systematic integration of service learning across our curriculum.



“(We must) take every opportunity to convey the ‘inside scoop’ to youngsters: the excitement, diversity and job demand in computer science are astounding!”

At the graduate level, a major curriculum review is underway in DCS. We are also in the midst of developing a professional Masters program to complement our existing research Masters. The cornerstone of the new program will be an industrial internship rather than a research thesis. This will open up graduate studies in our department to students looking for a different type of graduate experience.

On the research front, faculty and students across DCS continue making superb contributions to the discipline. The level of undergraduate engagement in research continues to impress, both in number and quality. Greg Wilson's showcase for CSC490/CSC2125 Software Consulting project course highlighted 24 amazing undergraduate projects; and undergrads Adrian Dalca and Rhys Causey were both recognized by the Computing Research Association with the CRA Undergraduate Award for their research.

(continued on page 11)

EDITOR'S NOTE

WE GET BUSY. We have deadlines, families, meetings and innumerable other responsibilities that keep us running ragged. Here at DCS, I see that everyday, and it's become such an issue that our incoming Acting Chair, Sven Dickinson (see his profile on pg. 8), has made it a priority to explore ways of alleviating faculty and staff time pressures.

I was recently talking to a colleague about this. At that moment, I couldn't muster a compelling rationalization for the time crunch. However, after a slight pause, a grin spread across my colleague's face and he shrugged, saying, “Well, you know what? We do great things.”

It is so simple. When you take a real step back from the day-to-day grind, what's left here is extraordinary research and students, faculty, staff, industry partners and alumni giving their time and enthusiasm to teaching and learning, and to staying on the leading edge of computer science.

Of course, if you're reading this, you are a part of this community. I hope this issue of @dcs gives you a glimpse at our greatness.

Sara Franca

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Cover photograph (left to right): Faculty members Eyal de Lara, Stefan Saroiu, Bianca Schroeder, Yashar Ganjali, Peter Marbach and Angela Demke Brown

CSSU's first Game Night brings in a crowd

IN LATE NOVEMBER, the Computer Science Student Union (CSSU) held its first ever Game Night. Sponsored by the department, Google and Microsoft, the Game Night was a social event created to give undergraduate computer science students the opportunity to play video games, eat pizza, and generally relax before exams.

Game Night was held in the Great Hall of Computing, one of the largest rooms in the Bahen Centre. Set up inside the hall were 6 projectors and screens, dozens of monitors and computers, switches for LAN parties and a variety of consoles and games. There was a hum of excitement throughout the room, as

students competed for prizes, playing popular games such as Starcraft, Smash Brothers, Rockband, Halo 3 and Gears of War, and the winning game from the DCS upper year game programming project course. By the end of the night, attendance reached 150 students and a few faculty members, and even visitors from video game publisher Ubisoft stopped by.

While Microsoft and Google provided some smaller prizes like games and water bottles, the CSSU provided the grand prizes for the winners of the tournament-style competitions: a new iPod Nano and Orange Box for PC. The Game Night was in every way considered a complete success, drawing stu-



dents from computer science and beyond. In fact, this past March, the CSSU held a second equally popular Game Night, and we look forward to hosting many more in the years to come!

Nicole Allard, CSSU Social Director



UNDERGRADUATE RESEARCH HIGHLIGHTS

Image Guided Focal Therapy

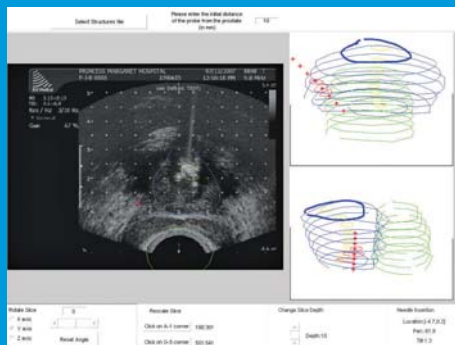
Robert Beghian

DOCTORS AT Princess Margaret Hospital are working on an alternative method for dealing with prostate cancer. Their procedure, Image Guided Focal Therapy, involves the local treatment of the affected organ, using a needle to inject radioactive material into the tumour. I discovered this project when Professor Greg Wilson sent

out a list of possible research topics open to undergraduate students; this one looked really interesting.

I have been writing software that optimizes the needle insertion and improves the visualization of the Focal Therapy procedure. The doctor needs to be able to see where the needle should go, and how it should get there, and my software assists by displaying overlapping Ultrasound and MRI outlines of the prostate, tumour and other nearby organs. At every point during the procedure, it also calculates the optimal location where the needle should be inserted and the ideal position it should be in – in this case, the needle will be delivering medicine directly to the center of the tumor. It has been incredibly rewarding to work on improving techniques for treating cancer.

(Left) Robert's Project User Interface.



Stargate

Dritan Xhabija

I STARTED WORKING on project Stargate in the summer of 2007 as part of NSERC research. I had the privilege of working with Jing Su, a Ph.D. student of DCS professor Eyal de Lara, whose research involves ubiquitous mobile computing. I really enjoyed working on the project during the summer, so I decided to pursue it in CSC494, a project-based course.

Stargate is web-based portal which authenticates to your online web services allowing for the sharing of your public or private media via your mobile device to friends that are physically near you. I had the opportunity to program the server-side using Java Servlets as the predominant technology, in conjunction with the MySQL database. I particularly enjoyed programming the Google Picasa module as the first web service supported – like most Java API's, Google Picasa's API is rich in functionality and well-documented. I highly recommend Uoft's CS research courses to those who wish to get a hands-on feel for computer science; I have had a great experience.





CS Graduate Student Benevolent Society on the pulse of student life at the Department

THE COMPUTER SCIENCE Graduate Student Benevolent Society (CSGSBS) represents DCS graduate students, coordinating social activities and ensuring that students have a voice in the department. CSGSBS is involved with the graduate affairs committee, the space committee, a planning group discussing the possibility of a professional master's degree at DCS, and the University's Graduate Students' Union (GSU) at UofT.

Keeping with the tradition of fostering stronger ties among graduate students,

CSGSBS sponsored regular cookie breaks, movie nights and monthly games nights in the graduate student lounge. Together with DCS, CSGSBS also hosted its annual orientation week mentor lunch and island picnic at Toronto's Centre Island. This year's picnic was well-attended as many students, faculty, and their families came out to mingle. Picnickers had a good time juggling, playing volleyball, tossing frisbees, conversing, and just enjoying the beautiful September weather. In late winter, CSGSBS was involved with

this year's Grad Visit Day, where current students took prospective students to dinner in an informal setting.

The Graduate Student Society also hosted a spring party at O'Grady's Pub followed immediately by a video games night co-hosted with CSGSBS' undergraduate counterpart, the Computer Science Student Union. A large number of people turned out and had fun, in spite of a temporary blackout in the middle of the all-night games-fest! In the beginning of May, CSGSBS had its annual general meeting and then hosted an end-of-year party that was a smashing success. Visit the society's website at www.csgsbs.com.

*Jonathan Lung
Treasurer, CSGSBS*



DCS Women have a strong presence at Grace Hopper 2007

THE GRACE HOPPER Celebration for Women in Computing (GHC) is a yearly conference at which women in Computer Science get together to discuss research and career issues. It is the largest technical conference for women in computing - approximately 1,400 people attended GHC '07, held in Orlando, Florida. Women from industry and government, professors and researchers, graduate and undergraduate students regularly participate. During the weeklong event, there are plenary sessions, technical papers, panels, poster sessions and workshops.

Twelve graduate students from the department went to GHC this year: Fei Chiang, Jessica Davies, Yulia Eskin, Maryam Fazel, Geri Grolinger, Yilan Gu, Jennifer Horkoff, Bowen Hui, Elizabeth Lam, Jocelyn Simmonds,

Anya Tafliovich, and Yiqiao Wang. Many of our graduate students were involved in the conference proceedings: Maryam, Yilan, and Jennifer presented research posters, Anya presented a poster and a paper, and Jocelyn was a panelist for a discussion on the opportunities and challenges of pursuing graduate education.

Participants appreciated the strong industrial presence at GHC, taking the opportunity to speak to representatives from some of the more well-known companies in computer science. Graduate students with a focus on academia networked with possible future colleagues. As Jocelyn Simmonds shares: "it's important to remember that this is a celebration, not just a conference. GHC includes various social activities that complement the technical program, including a closing night party. I never thought

(Above left to right) Jennifer Horkoff presents her poster to Jocelyn Simmonds. Computer science pioneer Fran Allen gives a talk at the conference banquet. Fei Chiang, Elizabeth Lam and Jennifer Horkoff at the Sponsor evening party. Conference t-shirt.

"I'd be sharing a dance floor with old friends and a Turing Award winner!"

The DCS Women's group plans to organize a similar trip to GHC 2008, when the conference will be held in Colorado. Funding for participants is provided through GHC scholarships, DCS funding and individual supervisor contributions, and DCS students do not need to have a submission in order to participate in this trip. The department was proud to have so many accomplished students attend the conference this year.

BUL fosters academic and industrial collaboration at DCS

Established in 1998, Bell University Laboratories (BUL) is one of Bell Canada's programs dedicated to university Research and Development. The mandate of this important program is to implement research projects that bring together Bell professionals, university researchers and students within multi-disciplinary teams. Bell University Labs forge special partnerships with Canadian universities in order to encourage innovative projects that explore new perspectives, resolve concrete problems and create innovative applications and ideas for the future.

The University of Toronto is Bell's largest partner in Bell University Labs, with thirty projects currently underway involving ninety graduate students. Each project has an internal Bell Champion associated with the work, who is responsible for assistance from the Bell side, and ensuring that Bell benefits from the collaboration.

DCS plays an active role with BUL. Computer science faculty member Prof. Steve Easterbrook is the current Academic Director of the program at UofT, and a high percentage of BUL awards are allocated to computer science researchers. According to Steve, "Bell Canada is an immense company with all sorts of fascinating issues that appeal to computer science researchers. The range of projects that have been supported in computer science since the program was initiated is as broad and diverse as the company itself. Projects can relate to new products, product or corporate strategy or internal operations."

BUL is involved with research across the spectrum of computer science. Examples of projects involving computer science professors currently underway include:

Towards Articulatory-Based Adaptation in Recognition of Dysarthric Speech

Prof. Graeme Hirst

The goal of this project is to develop advanced, adaptive speech recognition (ASR) software for dysarthric speech that approaches the accuracy regular speakers achieve in modern ASR.

Context-aware Mobile Devices and Wireless Services as Cognitive Aids for Senior Citizens

Prof. Ron Baecker

This project explores methods for the appropriate design of next-generation wireless services for senior citizens. The research team is exploring how these services can be prosthetic and rehabilitative for seniors with mild cognitive impairment (MCI). The results will help better understand how to design more general services for all seniors.

CDMA Modeling for Coverage Estimation and User Localization in Indoor Environments

Prof. Eyal de Lara

Prof. de Lara's project explores two separate but related research issues: models that describe the radio-frequency (RF) environment within buildings, and an indoor localization system based on RF signal fingerprinting.

Video-Based 3D People Tracking

Prof. David Fleet

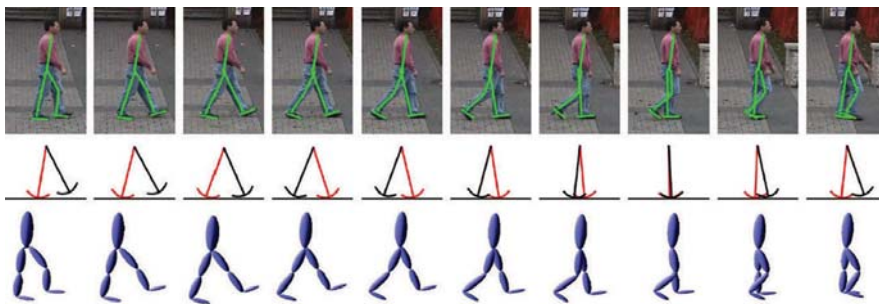
Prof. Fleet's project addresses two major gaps in people tracking research, namely, dynamics and shape modeling. It utilizes a new approach to people tracking in which physics-based models are used to ensure that the estimated poses and motions are physically realistic.

BUL accepts proposals semi-annually, and has two levels of funding: exploratory and seed. Exploratory (or mission-oriented) research project submissions require an internal Bell Champion. The Champion acts as an intermediary between Bell and the university research team and looks for opportunities to maximize the benefits of the project. Seed projects are expected to have a 12 month duration, show potential to grow into a larger project, and have a budget of \$20K to \$30K. Seed projects do not require a Champion, but typically Bell has indicated an interest in the research.

Bell's interest in a particular research area may relate to specific products in development, or it may reflect their desire to learn more about an area for longer term strategy and marketing reasons. Lorna Joseph, Associate Director, Bell Canada (BUL) says, "the knowledge transfer that results from the interaction between champions and researchers is the most valuable piece of the program. The closer the interaction is, the greater the benefit – for both sides."

The BUL office at UofT also supports BUL researchers in other ways. Leslie Dolman, BUL Associate Director, helped attract industry support for a recent Strategic Network grant application spearheaded by computer science professor and Bell Chair holder Renee Miller. The office also promotes BUL researchers through regular knowledge transfer events. In October 2007, BUL organized a research symposium related to social networking, with presentations by CS professors Peter Marbach, Steve Easterbrook, Nick Koudas and Stefan Saroiu. The office also organized an interdisciplinary research symposium related to video gaming in May 2008 with strong involvement from the computer science department.

The BUL program is one of a number of different ways that the department of computer science interacts with industry, and it underscores the value of close interaction for industry and for our researchers. According to Steve Easterbrook, "the BUL program works well, mainly because of the time commitment made by both parties. In addition to the champion involvement, Bell and UofT both provide substantial administrative support to oversee the funding program and ensure relationships are developed and maintained – with excellent results."



David Fleet's Video-Based People Tracking Project

Plugged in: the Computer Systems & Networks research group at DCS

Over the last few years, the Systems group has built a creative, lively environment that has drawn public interest and motivated students alike. With 7 faculty members and over 25 graduate students and numerous undergraduates, the Systems group works on projects that cover a diverse range of experimental and theoretical research, including operating systems, network security, mobile code architectures, high-performance computing and wireless networking. These topics touch on issues important to the public at large who use computers everyday, and this dynamic group is eager to take on the issues and challenges posed. The Systems group balances significant industry relationships with special opportunities for students to learn and develop their research. When faculty and students talk about the group and their goals, the spirited dialogue reveals a core of initiative, intellectual curiosity and ambition, and we can see that even in just the last few years, they have already come a long way.

A new team, a fresh approach

When asked about being a younger research group in the department, Professor Stefan Saroiu highlights a major benefit: “because we are an up-and-coming group, our students have the unique opportunity to help shape the direction of our group; they have the chance to build something great.” Professor Angela Demke-Brown concurs: “We are a young group with a lot of enthusiasm. From the faculty standpoint, we bring together experiences about how things are done at a number of other top CS departments (MIT, Stanford, Washington, Rice, CMU), but without any ‘we’ve always done it this way’ baggage. Ultimately, I think this helps to improve the way we work with our students.” Another impressive aspect of the faculty assembled are their diverse cultural backgrounds – the professors in the Systems group hail from all over the world, including Canada, Mexico, Iran, Switzerland and Germany.

An enriched student experience

The group’s faculty members are able to offer a significant amount of time and attention to their students. Students enjoy numerous opportunities to share work and get feedback, and are encouraged to work together on research. PhD student Alex Varshavsky observes, “Students in our group often collaborate with each other, allowing us to work on bigger and more ambitious projects.” And, as Professor

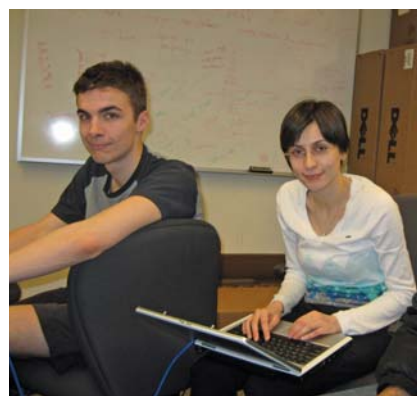
Peter Marbach notes, the group’s faculty and students have the opportunity to make an immediate difference: “We are working on research problems that can have a big impact on people’s everyday lives. New ideas/algorithms can be implemented on the Internet tomorrow and be used by millions of users.” Of course, having access to the fun toys helps, too: Alex admits, “In the Systems group, we’re not only doing leading edge research, but I’ve been able to play with the newest and coolest gadgets.”

Connected students and faculty

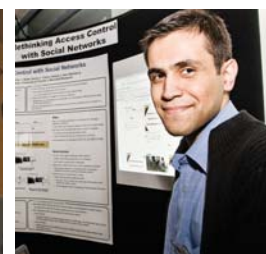
The Systems group also has the advantage of strong links to groups outside the department. Stefan comments, “We have a large number of research collaborators from top academic and research labs, including MIT, CMU, Stanford, the Max Planck Institute, Microsoft Research and Intel Research.” Through these relationships, graduate students are afforded exceptional learning opportunities, as Alex shares: “It is very common for graduate students in the Systems group to spend a summer or two doing an internship at a top research lab. I, personally, spent a great summer of 2005

at Intel Research Seattle.” The Systems group has also received a great number of large grants for purchasing equipment from the federal and provincial governments, and private companies such as Cisco, Microsoft, IBM, and Bell. This support has made a significant impact, allowing the group to build a state-of-the-art infrastructure (see the picture with the server rack below) which allows them to attack systems problems on a large-scale, such as learning how to build data centers, fast routers and switches, and wide-area networked systems. Also, students are able to test their ideas on hundreds of servers belonging to the group.

Professor Yashar Ganjali sums it up: “I am very glad to be part of DCS in general, and particularly happy to be in the systems and networking group. This is an energetic team, working hard to excel as a world class research team. Computer systems and networks have significantly affected numerous aspects of our lives: from communications, to business, from education to entertainment, and even healthcare. This is one of the areas that bridges the gap between theory and practice.”



Geoff Salmon and Monia Ghobadi work on buffer sizing experiments into the wee hours of the night.



(Above) Left to right: Angela Demke Brown, Peter Marbach, Bianca Schroeder, Yashar Ganjali, Eyal de Lara, Stefan Saroiu.

(Left) Amin Tootoonchian demos some work at the department’s Research in Action showcase in March.



Systems group research highlights

Amigo: Proximity-based Authentication of Mobile Devices

Eyal de Lara

Amigo, which is being developed in collaboration with the Intel Research Seattle Lab, investigates techniques that enable secure spontaneous communication between wireless devices that come within close proximity of each other, but lack a pre-existing trust relationship – devices that are previously unknown to each other. Secure pairing ensures, for example, that when a hotel guest pairs her mobile device (possible over Bluetooth or WiFi) with the large-screen display and input devices available in her room, she does not end up communicating instead with a malicious device that has spoofed the identity of one of her room's devices. Our approach uses knowledge of the common radio environment, which changes over location and time, as proof of physical proximity.

Compiler Optimization

Angela Demke Brown

This research was done with the support of the IBM Toronto Lab (through the Centre for Advanced Studies). Modern high-level languages offer a lot of features that improve programmer productivity and aid in the development of portable programs. Doing so, however, requires support from the language at runtime. Typical implementations use a language-level virtual machine – that is, applications are written and compiled to run on a fictitious and idealized virtual machine, rather than on any real CPU architecture (for example, the Java Virtual Machine, or JVM). Our resulting design provides both a high-performance interpretation technique and a simpler path forward to even higher-performance just-in-time compilation.

Evaluation of Core Router Buffer Size Requirements

Yashar Ganjali

For this exciting project, we have created a configurable testbed of 20 servers (expandable up to a few hundred nodes) for experiments. Each server is equipped with 1-2 programmable boards called NetFPGA. We have created tools that can generate, switch, and measure network traffic with extremely high accuracy. This is a unique testbed of its kind and can be used to evaluate various networking protocols, algorithms, and architectures. We are collaborating with Cisco Systems, and Stanford University on this project.

Online Social Networks

Peter Marbach

Online social networks have revolutionized the way we interact and share information over the Internet, and social networking applications such as YouTube, Flickr, MySpace, Facebook, etc., have millions of active users. While already being enormously popular, these applications only scratch the surface of online social networking possibilities. The goal of this research project is to investigate and find new and creative ways of how to make use of social networking applications to enrich people's everyday lives. Answering this question poses challenging and fascinating research problems that require both creativity and rigorous mathematical analysis. As part of the project, we are developing novel mathematical models of how online social networks are formed, and are trying to find creative ways to use the resulting network topologies to efficiently share/distributed information. While our work focuses on online social networks, our models and results also provide surprising insights into how and why the social networks that we form and use in our everyday life are so important and efficient.

Tamper Resistant Network Tracing

Stefan Saroiu

Many ISPs and researchers want to monitor network traffic to debug and understand their networks. At the same time, monitoring traffic introduces huge privacy concerns -- users do not want their captured traffic data to be inspected by unauthorized persons, leaked or stolen. Our project designed and implemented a system that allows authorized persons to monitor network traffic while providing very high privacy guarantees to the network users. Our system uses virtual machines and encryption to make the software tamper resistant. This system is deployed at University of Toronto Mississauga to monitor the prevalence of phishing attacks on the campus network.



Prototype for delivering news updates to people's cell-phones over Bluetooth.

SPOTLIGHT

Bianca Schroeder

HAILING FROM Germany originally, and Carnegie Mellon University more recently, Bianca has joined the Systems Group as the newest member of the team this year. With a main focus in computer system reliability, the goal of Bianca's work is to use data to develop a deeper understanding (and better models) of real-world failures and on this basis design more reliable systems.



She explains, "Much research, in industry as well as academia, is based on hypothetical and often simplistic assumptions. The reason for that is that there is virtually no data publicly available on failures in real large-scale systems. In my recent work, I have convinced a number of large-scale sites, including commercial sites and supercomputing labs, to collect and share detailed data on failures in their systems. This provides a very unique and exciting research opportunity, because this data can be used to derive more realistic models, and to design and build more reliable systems."

Bianca couples her enthusiasm for computer science with her appreciation of DCS: "Computer science has such a large scope, from the very theoretical and mathematical areas, to the very applied work. I like that the department is large and very broad in its range of research... it's great that we have very strong research groups in other areas of computer science, including, for example, Theory and AI."

Asked about some of the perks of being in cosmopolitan Toronto, Bianca remarks, "I enjoy exploring the different neighborhoods here. There's an amazing diversity of people and cultures - you walk a few blocks and the neighborhood completely changes." She laughs and adds, "And it also has great food – out of all of the places I interviewed last year, I definitely had the best food during my interview in Toronto!"

FACULTY PROFILE: Sven Dickinson, incoming acting chair

As of July 1, 2008, Sven Dickinson, a faculty member in the department's Computational Vision group, will become Acting Chair of DCS. With infectious enthusiasm and an eight-year history as a faculty member with the Department, Sven is looking forward to an exciting year in the Chair's office. He notes, "The Department has embarked on a number of important initiatives whose momentum must continue forward. Having worked closely with the Chair's office and having been involved in some of these initiatives, I feel I can provide continuity in the process."

Before becoming a faculty member at DCS, Sven and his wife, Suzanne Stevenson (also a faculty member at DCS and Vice-Dean, Students at the Faculty of Arts & Science) spent time in both Canada and the US. In 1998, Sven was a faculty member at Rutgers University when academic friends in Ontario encouraged him and his family to take advantage of ATOP to return to DCS, where Sven had spent three years as a postdoctoral fellow. While this was a move that Sven describes as "a dream come true," he still misses some things about New Jersey, admitting, "I'm sorry we couldn't bring our NHL team with us."

Sven is a member of the computational vision group, and he explains, "my research revolves around the problem of object recognition – understanding the semantic content of digital images." Sven and his students address questions such as: How do we visually represent categories of objects? How do we quickly retrieve from a large database of objects a few promising candidates that might account for the contents of a query image? How do we match an object model to a cluttered scene in which objects may be occluded? Sven marvels, "I've always loved the problem of object recognition – something that we, as humans, perform so effortlessly."

Sven explains why he is so drawn to computer science, a field that is connected to so many disciplines: "The constantly shifting boundaries of computer science have migrated into many disciplines, exposing us to a diverse

array of challenges, people and ideas. In my own discipline of vision, for example, I've always appreciated the opportunity to interact with psychologists, engineers, cognitive scientists, physicians, neuroscientists, mathematicians and physicists. Each brings an important perspective to the problem, and I really value a diverse research community." Sven acknowledges that these shifting academic



"A forward-looking vision of (computer science) is essential for a large department such as our own."

boundaries also present a unique challenge, in that "it becomes a bit more difficult to circumscribe the discipline when it comes to defining our curriculum and hiring faculty, for example. A forward-looking vision of the field is essential for a large department such as our own."

And Sven will play a large part in this vision over the next year, as he takes on the role of Acting Chair until June 2009. The chair's office is somewhat familiar territory, as Sven served as the Vice Chair for three years under two Chairs. Sven is also inspired by his colleagues: "this department has a long history of people stepping up to help the department in a multitude of ways, and I'm happy to take a turn." The timing is propitious as well: "I believe that the department has recovered from its growing pains and we can start looking outwards more."

In particular, Sven hopes to work on alleviating time pressures for faculty and staff, evolving undergraduate and graduate curricu-

la to meet the changing landscape of computer science, better recruiting undergraduate and graduate students, managing the effects of space fragmentation and strengthening DCS' ties to industry. He admits, "these are but a few of the challenges facing the department right now, and while I won't solve any of them in one year, I hope to chip away at them!"

When asked about what makes the department special, Sven's response is unequivocal: "The people. We're one of the world's top CS departments, with a complement of really outstanding research faculty covering an incredibly broad range of areas. Our teaching faculty are exceptional, and set the standard for innovation and commitment in the classroom for all of us. In my administrative roles, I've had the pleasure of working with wonderful staff that are responsible for so much critical work behind the scenes. And, of course, our highly talented undergraduate and graduate students, who are the life blood of any department." Sven lauds his colleagues in his research area, "I feel very fortunate to be part of one of the strongest vision and AI groups in the world," and identifies what really puts DCS in its own category: "the number of senior, high profile faculty who regularly put the interests of the department before their own. They set an amazing example of commitment that's reflected in our teaching, our committees, our sharing of critical resources and our research excellence."

Finally, Sven takes a moment to talk about how he spends his spare time: "my family is very important, and the three of us (including my son) like to do a lot together, including scuba diving, travelling, watching movies and listening to music. For many years, I coached youth soccer and hockey, two games I really love and still play." In fact, Sven is a part of the departmental hockey team, and manages to play twice a week. The feeling of camaraderie that Sven has built with colleagues is strong on and off the rink: "even after being here for eight years, I still marvel at how many close friends I have in this department, and how lucky I am to go to a faculty meeting and see them around the room."

GIVING TO DCS: I would like to contribute \$ _____ to the Computer Science Departmental Trust.
Gifts to this project are used in the areas of greatest need, supporting student activities such as the Student Mentorship Program, special seminars and the First-Year Learning Communities program.

For more information, contact us at
dc-donations@cs.toronto.edu

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Dave Wortman: honouring 38 years with DCS

As Professor Dave Wortman retires on July 1, he has the opportunity to contemplate his 38-year career with the department. Dave has made a great impact on everyone he has had the opportunity to work with and teach. It's hard to believe that all of this started so simply: Dave was first drawn to computer science as an undergraduate student at Yale, and he comments, "I took computer programming in my first year (1961) as a non-credit course, and I've been programming ever since. I've always been amused that the first computer I programmed, the IBM 709, was built using vacuum tubes."

Reflecting on his arrival at the department in 1970, Dave shares, "The first course I taught was CSC258F, Computer Organization and Assembly Language Programming. As a young, enthusiastic professor, I really overworked those students!" He laughs, "I paid for it in the end... on the final exam, I gave a design problem, and 120 students came up with 80 different solutions – and about 60 of those were correct! I spent my whole Christmas holiday marking those exams..." Dave, who admittedly loves building things, made significant contributions to the department- and the classroom. He remembers one instance in



particular: "My colleague Ric Holt and I and our students designed the SP/k programming language and compiler in the late 1970's. We built a computer system on a cart to run the compiler; TAs would wheel it into a lab, and students could program on the spot, which was not done in those days... I like to think of the SP/k machine as 'the first instance of mobile computing at UofT.'"

When asked what he will miss the most about leaving DCS, Dave immediately says, "teaching. I really enjoy working with students." His favorite course to teach was the compiler course, which is understandable, as Dave notes, "That's been my area of expertise for over 40 years!"

Dave has been involved in several major compiler development projects for languages XPL, SP/k, Euclid and Modula-2+. The first compiler he helped write (see www.cs.toronto.edu/XPL) in 1967 is, in fact, still being used by a small group of dedicated fans.

Some of Dave's fondest memories of DCS stem from his early days as a professor. "Back when I started, the department was a small, tight-knit community. We did a lot of things together. For example, in the late '70s, fellow professors and graduate students helped me move into my current house!" He goes on: "I always credited Tom Hull (the Chair at the



SP/k Machine (PDP11 computer, console, printer, mark sense card reader).

time) with being excellent at hiring collegial people, who wanted to be a part of this community and who stuck around. Even today, at this department, people come- and people stay. That's the sign of a great place – that's the kind of place this department is."

For someone who enjoys "building things," Dave has built quite a legacy at DCS: he originated seven courses in the department and inspired students at all levels. His warm, engaging presence will be greatly missed. After June, Dave plans to remain in Toronto: "my wife and I find it a lovely place to live." He will spend more time enjoying his hobbies, including travelling, vegetable gardening and building furniture. Dave also plans to work with Habitat for Humanity.

FACULTY PROFILE: John Mylopoulos

In this Q&A, Professor John Mylopoulos talks about his greatest research achievement, the "Wild West" of computing and his move to Italy.

What makes DCS special?

What I came to know as the Canadian way of thinking about University work, where young faculty are helped to get started by sharing resources with other more established colleagues. When I joined the department, I had very little funding but many graduate students. I was the only faculty member doing Artificial Intelligence (AI) at the time, and AI was popular with students but at the very fringes of what was considered Computer Science. DCS supported my students, reduced my other responsibilities and helped me establish my research group.

What research are you currently involved with?

I am a member of the Software Engineering group, and work specifically on requirements engineering. Roughly speaking, this means that I work with Eric Yu and other colleagues on new techniques for modeling and analyzing software requirements. Our work draws concepts and techniques from Knowledge Representation in AI. I'm also a member of the Database group and have collaborated with Renée Miller and colleagues from abroad.

Of course, I have remained a (virtual) member of the AI group,

and part of my attachment relates to the fact that I have supervised two of its faculty members (Hector Levesque and John Tsotsos, who is now at York University). Actually, I also supervised Eric Yu, and co-supervised Igor Jurisica and Thodoros Topaloglou, all of whom are UofT professors affiliated with DCS. In total, I believe I have supervised more PhDs than any other colleague in DCS. For me, THAT is my greatest achievement in research.

What do you like about the field of Computer Science?

The open-endedness of the discipline. It must be a lot like the Wild West, though I haven't had the opportunity to personally



John in northeastern Italy, at the Tre Cime ("three peaks") of the Dolomites.

experience the latter (old as I might be).

What are you currently up to?

Migrating to Italy where I hope to finish my academic career. The department that I joined at the University of Trento is quite young (established in 2001) and I am experiencing many of the challenges and the thrills of the early days of DCS, within a context of beautiful scenery and a wonderful culture.

STAFF PROFILE: Chris Sparks

As the department's Chief Administrative Officer for the past few years, Chris Sparks has had the opportunity to play a leading role in the development and growth of DCS. Here, he takes a moment to reflect on his "roots" in the music industry, making the move to the education sector and what he's been up to at DCS.

Where were you before this role?

Believe it or not, my first job out of university was in the recording industry at RCA Records. I didn't have the opportunity to take in the glamour of this industry, since I spent most of my time counting and accounting for LP's, cassettes and 8-tracks. Since RCA was big in country and western, I counted a lot of 8-tracks. After returning to grad school at UofT, I entered the world of public accounting where I worked for a couple of the large firms, and then went to work for the provincial government as an insurance company examiner with the Superintendent of Insurance.

After three years at the government in Toronto, I started to look for a position closer to home, so I moved to Mohawk College in Hamilton as the Internal Auditor. While at Mohawk I also managed the accounting department, purchasing, the bookstore, printing services, the mail room and receiving (the last five all at the same time). I wanted to find a

less schizophrenic job, so I thought that coming to UofT would fit the bill. I came to the university to work as the Director of Business Services for New College, where I was for seven years before I came to DCS.

Why did you choose to work in educational institutions (rather than "traditional" accounting roles)?

I moved into the education sector more by good luck than good planning. I had started my professional career as an auditor, which involved a considerable amount of travel. I was getting tired of the travel and at the same time, my wife Jill and I were thinking about starting a family. I was working out of Toronto with the provincial government so I began looking for a new job in the Hamilton/Burlington area. One of the jobs I interviewed for was the Internal Audit position at Mohawk. What impressed me was the dynamic nature of the college and the variety of activities it was involved in. I was hooked!

Why did you choose to come to DCS?

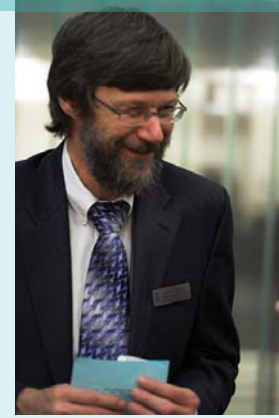
At UofT, I started at New College, and it was the longest time I had been at one position. I was looking for new challenges when the CAO position here opened up. Even though DCS was going through some rough times, I could tell the building blocks were there to turn things around.

Are there any particular projects you are working on that have been particularly interesting?

I really enjoy being part of the group that is looking at our undergraduate recruitment and communications efforts. The quality of the activities and the amount of effort that is given by everyone involved is quite inspiring, and the response we've gotten from teachers and prospective students is particularly encouraging.

What do you enjoy about your job?

One of the things I really enjoy about the job is that I get to work with a fabulous group of individuals in this department. I am constantly amazed at the



energy of our research faculty and I quite enjoy hearing about their research even though I usually don't understand it! Our lecturers have such a positive attitude about everything; it certainly helps me whenever I get down. The tech staff has been very supportive of me and what I have been doing in the department. The admin staff and the rest of the chair's office are, without question, the best team I have had the privilege to work with. I get a certain amount of pride whenever I hear from the Dean's office and research services what a great job the admin staff are doing at DCS.

What do you do in your spare time?

I have recently started a Master of Education in Higher Education at OISE. I also enjoy photography and gardening.



Elizabeth Ribeiro

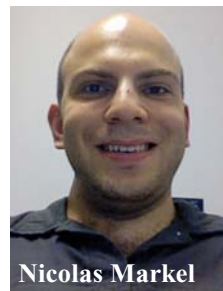
Administrative & Financial Assistant, Theory and Distributed Computing Groups

What is your favourite part about your job?

I take great pleasure in contributing to the docent team's efforts and serving their needs. It feels terrific to be a part of a successful team.

What do you enjoy doing in your spare time?

I enjoy shopping and looking for bargains in antique shops. I also like to attend concerts and art galleries.



Nicolas Markel

Technical Staff, CSLab

What is your favourite part about your job?

I would say this is my dream job because it allows me to immerse myself in the ever-changing technological world of computer science at UofT. As well, I enjoy working with my talented colleagues in the department who inspire me everyday.

What do you enjoy doing in your spare time?

I am an avid billiards player; I also enjoy cooking, learning new things and being outdoors.

1 JULY 2007: Graduate student Ryan Schmidt shows high school students in the DCS Computing Insights program his work on ShapeShop.



2 APRIL 2008: Students show off CSC490/CSC2125 coursework to industry guests at a local pub.



3 MARCH 2008: Graduate student Joe Laszlo shows his work on Interactive Performance Control at the DCS annual Research in Action showcase.



4 SEPTEMBER 2007: The department kicks off the year with a BBQ in the Bahen Centre courtyard.



5 DECEMBER 2007: Faculty and graduate students suit up for the annual DCS holiday party hockey game.



6 MARCH 2008: Alumnus Michael McCarthy and undergraduate student Andrei Petrov enjoy the DCS Alumni Mentorship Program Launch reception.



Message from the chair

(continued from page 2)

Within this brief message, I cannot list all the significant honours afforded our researchers over the past year (please see www.cs.toronto.edu). Let me simply mention Allan Borodin's receipt of the 2008 CRM-Fields-PIMS Prize, John Mylopoulos's election to the Royal Society of Canada, and the significant dissertation awards received by two graduate students, Richard Pancer and Lap Chi Lau. One key theme of the past year has been industrial relations. Our 2nd Annual Research in Action Showcase in March highlighted 20 cutting-edge research demos by DCS faculty and grad students, and attracted more than 70 attendees from outside the department, most from companies in the Greater Toronto region. DCS has been accelerating efforts to engage in industrial research collaborations and partnerships as we look to maximize the impact of our research and expertise. We've had workshops with three large companies over the past year, and are in conversation with a variety of others (both large and small) with more such events planned. The number of industrial partnerships has increased substantially in the past year, but we are always looking to do more.

While we have seen considerable success in

the past year, much of this is taking place in the context of a challenging environment for computer science education. Some of you may be aware of the dramatic drop in enrolments in computer science across Canada and North America in the past five years (50-70% declines in most regions of North America). If you are reading this newsletter, chances are you know how exciting and rewarding a career in computer science (or information and communications technology, more broadly) can be. Recent studies by both Industry Canada and the Conference Board of Canada are finally raising alarms, alarms that have been ringing for those of us in the discipline for a number of years: without a sustained effort to attract top students to the discipline at both the undergraduate and graduate levels, the economic health of the region and the country will suffer. We are just beginning to see a mild rebound in undergraduate admissions. Unfortunately, the inflow of M.Sc. and Ph.D. admissions is now in decline as the undergraduate pipeline softens; and this will not recover until the new cohort of undergraduate admissions emerges in a few years. In DCS, we've been doing a lot to help counter

this trend—constant high school recruitment; special design events for Grade 8 girls; a number of programs for high school students and teachers; participation in national conferences, publicity and lobbying efforts; and much more. But we need help. Our friends and alumni can be some of the greatest champions for the discipline. So please take every opportunity to convey the “inside scoop” to youngsters (and their parents): the excitement, diversity and job demand in computer science are astounding!

Finally, let me welcome Sven Dickinson to the Chair's Office. He will be Acting Chair from July 1, 2008 to June 30, 2009, while I am on research leave. Sven is no stranger to the Office, having served as Vice-chair for three years, and will be fantastic in this new role.

As always, I encourage you to keep in touch. Let us know what you're up to personally or professionally. And if you're interested in engaging in any aspect of departmental life—whether you wish to simply keep up to date or make contributions to our many activities in teaching, scholarship, or public outreach—don't hesitate to contact us!

Until next time @dcs,

Craig Boutilier
CHAIR, DCS

Mun-Kew Leong (B.Sc. 1987)

The Singapore government sent Mun-Kew Leong to the University of Toronto in 1983. “Computer science was still relatively new at that time,” Leong comments. “In a sense, it was a wide open frontier. As practically anything you did at that time was going to be new work, I think it’s important to note that DCS gave me and my classmates a solid grounding in computing, and then gave us free rein to explore – though run amok may be more accurate!”

Twenty years later, Leong still remembers the names and faces of the professors and fellow students who inspired him at DCS. “On the first day of university, Prof. Ken Sevcik tested students to see if they should be in the intro or advanced programming class – this was in 1983, so it’s not like everybody knew how to program. The problem was to



reverse a string in any language we chose. I wrote the answer in APL in about 3 seconds (a one line solution), submitted it and walked out. I became good friends with Prof. Sevcik after that!” Leong also remembers resurrecting the UofT student chapter of ACM with three classmates (James Rowell, Sam Weber and Gideon Sheps), with the help of faculty members C.C. Gotlieb (an ACM founder) and Derek Corneil (head of DCS at the time). Other highlights included working for Ron Baecker and with Eugene Fiume as part of the new Dynamic Graphics Project, enjoying “very generous” wine and cheese parties as part of the Cognitive Science and AI program, and being in Graeme Hirst’s first Natural Language Processing (NLP) course. “Graeme wanted the class to use augmented transition networks for parsing, but [classmate] Anton Geshelin and I figured it was too easy and decided to build a Marcus parser instead (a much more difficult task). Everything went smoothly until grading day, when things refused to work. We got an A for effort, but a B for the course. Still, Graeme remembers us (fondly, we hope) even today.”

After graduating from DCS, Leong returned to Singapore and started work in a govern-

“DCS gave me and my classmates a solid grounding in computing, and then gave us free rein to explore.”

Lawrence Mandel (Hons. B.Sc. 2002)

For someone who didn’t start out majoring in computer science and wasn’t much of an English student, it comes as something of a surprise that graduate Lawrence Mandel is now convinced that communication and flexibility are the keys to success in software development.

In the last 5 years, Mandel has authored a book, *Eclipse Web Tools Platform: Developing Java Web Applications*, and several articles for industry publications like Dr. Dobb’s Journal and developerWorks. He has also taken the opportunity to speak at conferences such as OOPSLA and EclipseCon about developing with and for Eclipse, and he says, “I feel so fortunate that I can define my career in terms of what challenges me and what I’m passionate about.”

Initially focused on medicine in his first year of undergraduate studies, Mandel was so impressed by the computer science department and its friendly and accessible professors, challenging work, and abundant opportunities to be creative, that he soon declared this field his second major. Mandel also developed his communication skills at the department, signing up to be a teaching assistant for CSC108 in his second year:



ment-funded research lab (taking time to acquire his PhD at Stanford). Leong’s personal research was in the semantics of non-text information retrieval, mobile and social information management, technologies for education, digital libraries and distributed multilingual search systems.

Throughout his career, he has worn many hats, working for government, becoming the VP and CTO of a startup company and being an adjunct professor at the National Institute of Education for a number of years. Currently, Leong is the Chief Technology Officer and Chief Information Officer-designate for the National Library Board of Singapore, and he provides strategic technology advice to the organization and ensures IT activities are linked to business goals.

“That was where I learned how to get up in front of a room and communicate clearly.”

Upon graduating, Mandel knew that he wanted to work on software that would reach a large user base, and he accepted a position as a software developer at the IBM Toronto Lab working on XML and Web services tooling. It wasn’t long before Mandel started working on Open Source software. When IBM decided to Open Source most of the tools Mandel was developing, he helped found the Eclipse Web Tools Platform (WTP) project, taking on the ecosystem and documentation lead roles with the project. “I realized the success of a project should correlate to the literature and communication it generates,” Mandel recalls. “So a book was necessary and I set out to recruit a couple of co-

authors. Together we wrote one.” *Eclipse Web Tools Platform* found a keen audience, and is now in its second printing.

Mandel makes time to share his experiences with students by regularly speaking on IBM recruiting tours at UofT, York, and Ryerson, giving guest lectures at Seneca, and mentoring students. Mandel is also still a student himself, currently pursuing a Masters of Science degree part time at UWO.

When asked about what he enjoys doing in his spare time, Mandel says, “At home, my wife Elana and I enjoy taking walks and playing with our baby daughter, Erica.”

When asked about advice for current students and fellow alumni, Leong shares “some of the things I tell my staff, and students whom I have mentored: A) the future comes from thinking out of the box, challenging assumptions and taking risks. Before you do that, walk in the shoes of those who have come before you. Good research starts from a solid foundation of scholarship. B) Too many researchers do research for the sake of the next paper. That might get you a promotion, but it doesn’t do the field of computer science very much good. Good research isn’t just good scholarship. C) Get season subscriptions to the Canadian Opera Company. That may be the thing I miss most about my days in Toronto! Subsequently, I either couldn’t afford the tickets (e.g., in San Francisco) or just didn’t have access to a decent opera company. D) $2+2 = 5$ but only for sufficiently large values of 2. If you didn’t laugh at that, you’re probably in the wrong field.”