



Message from the Head

Each September, students return from their summer adventures to bring renewed energy and enthusiasm to the Department.

This year, we welcomed back another large undergraduate class. We have 50 students in second year who will formally join us in January, 2006

after completing their common core courses. A total of 47 students are in third year and another 18 are currently on internship placements. Fourth year includes 52 students for a total of 166 students plus an additional 83 graduate students (MSc and PhD).

The opportunities in Geomatics Engineering,

and the quality of our program, are undoubtedly two strong reasons for our continued growth, and we thank faculty, staff and external stakeholders for their hard work and support to make this happen.

Elizabeth Cannon
Professor and Head

Geomatics Engineering Supports the World's Longest Solar Car Race

A mobile asset management system development engine, known as iVCAMS3 and developed by Dr. Yang Gao's Positioning and Mobile Information Systems Group (PMIS), has been used to support the 2005 North America Solar Challenge (NASC) – the longest solar car race in the world. The race began in Austin, Texas, July 17 and finished on July 27 in Calgary, Alberta. In partnership

with CSI Wireless Inc, all solar cars were equipped with CSI-built Asset-Link tracking systems while U of C - developed iVCAMS3 supported real-time tracking and monitoring of all race cars. Integrated with satellite navigation (GPS), geospatial information (GIS) and wireless communication technologies, iVCAMS3 helped event organizers ensure the safety and security of the solar cars

and their drivers, and enable solar car fans to view the cars' locations via Internet.

North America Solar Challenge is an intercollegiate competition among student teams from around the world to design, build and race solar-powered vehicles.

More information about the event can be found at <http://www.americansolarchallenge.org>

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The U of C team (Soleon) finished the North American Solar Challenge in 13th place.

Congratulations

- Congratulations to the following students who defended their theses: Ruben Yousuf (MSc); Wen-Ya Chiu (MSc); Mohamed Abdel-Salam (PhD), Olivier Julien (PhD), Wentao Zhang (MSc).
- Heidi Kuusniemi completed her PhD in September, 2005 at the Tampere University of Technology. Heidi spent a year with us, co-supervised by Dr. G. Lachapelle.
- Tao Hu and Bo Zheng, supervised by Dr. Gerard Lachapelle, won Best Poster Paper Awards at the iCORE Summit 2005, held in Banff. The titles of their papers were 'Indoor GPS Signal Replication Using A Hardware Simulator' and 'GPS Software Receiver Enhancements for Indoor Use'.
- Jennifer He (PhD), supervised by Dr. Cathy Valeo, won the Hoskin Inaugural

Award for Best Student Poster, entitled 'Storm Drainage Design for a Changing Climate', at the Canadian Water Resources Association's 58th Annual Conference.

- Two students were awarded Student Sponsorship Awards at the ION GNSS05 in Long Beach. Olivier Julien, (PhD), supervised by Drs. G. Lachapelle and M.E. Cannon, his paper 'Carrier-Phase Tracking of Future Data/Pilot Signals' and Minmin (Belinda) Lin, (MSc), supervised by Drs. G. Lachapelle and K. O'Keefe, her paper 'RTCM 3.0 Implementation in the South Alberta Network'. Six other papers were awarded Best Presentation Awards:

- 1) GPS Software Receiver Enhancements for Indoor Use: B. Zheng, G. Lachapelle.
- 2) The Development of a GPS/MEMS INS Integrated System Utilizing a Hybrid

Processing Architecture: C. Goodall, N. El-Sheimy, K-W. Chiang.

3) Development of a Low-cost MEMS IMU/GPS Navigation System for Land Vehicles Using Auxiliary Velocity Updates in the Body Frame: X. Niu, N. El-Sheimy.

4) Field Results of a GPS/INS-Based Approach to Measuring Ship Flexure Onboard an Aircraft Carrier: M.G. Petovello, K. O'Keefe, G. Lachapelle, M.E. Cannon.

5) Integrating Photogrammetry and GPS at the Measurement-Level: C. Ellum, N. El-Sheimy.

6) GPS Network RTK Performance Under Very Active Ionospheric Conditions: N. Luo, D.T.H. Dao, G. Lachapelle, M.E. Cannon.

Student News

- Welcome and thank you to the 2005/2006 Geomatics Engineering Student Society (GESS) executive:

President-Carina Dunn; VP Academic-Cole Kitchen, VP Events-Neil Gibbs, Treasurer-Tina Mosstajiri, 3rd Yr. Rep- Amanda Side, Webmaster-Sid Kwakkel, Photographer-Nicole Miller, Career Day- Ashley Large

New Undergraduate Scholarship for Geomatics Students

The Jerry J. Simpson Memorial Scholarship, valued at \$2000, will be offered annually to an undergraduate student entering their final year in Geomatics. Based on academic merit, preference will be given to students who demonstrate an interest in cadastral studies through an internship.

Thank-you to Midwest Surveys for establishing this scholarship!

A Geomatics Student's Life Abroad

by Carina Dunn, GESS President

After much research, I found an opportunity to participate in a joint study program in Graz, Austria. My first course was an intensive German course, where in three weeks, I had learned the basics. I was also partnered with an Austrian mentor who helped me through any question or problem that I had, and kept me practicing the German language. Almost everyone in Austria spoke English so I did not have many problems in my daily life!

I took tours of the majestic, gothic cathedrals, castles, and palaces. Walking to the supermarket through narrow cobblestone streets, going to church on Sundays, seeing an opera in the Grazer Oper (the opera house), or attending a ball in the Rathaus (city hall). It was a new experience every day.

The Austrian lifestyle is still very traditional with stores being closed on

Sundays, church bells ringing every hour, and different festivals held year round in the streets that always included some delicious wine or beer. Coffee time is an important and well enjoyed part of the day where everyone sits in outside cafés.

I learned a lot about the uniqueness of other countries and I hope to return one day, not only to taste the wine, beer, cakes, or their famous pumpkin seed oil, but also to revisit my friends and keep the memories alive of my adventures abroad.



Carina enjoys her trip abroad as an exchange student in Graz, Austria

Visitors

- Drs. Derek Lichti from the Department of Spatial Sciences, Curtin University of Technology in Perth, Australia and Ayman Habib from the Department, gave a seminar on July 21 titled 'Geomatics Engineering and Biomedical Applications' This seminar covered the utilization of Geomatics

principles in biomedical applications. Dr. Lichti, a PhD graduate of the Department, taught a two week graduate course on Close Range Photogrammetry.

- Associate Professor, Mr. Earl F.

Burkholder from New Mexico State University, Department of Surveying Engineering, visited from September 13-23 while on sabbatical. He worked on his book titled 'The 3-D Global Spatial Data Model' which is almost complete.

Research Spotlight

P³ software licensed to North American and Asia companies

P³, a software system developed by Dr. Yang Gao's Positioning and Mobile Information Systems Group (PMIS), has recently been licensed to major airborne mapping companies in Canada and others in North America and Asia. An industrial user is also developing a value-added product based on the software system for a special market. Implemented with the latest methods and algorithms of Precise Point Positioning (PPP) developed at the University of Calgary, the software system can support a wide range of GPS applications from precise positioning, deformation monitoring, timing and atmospheric parameter estimation. Since



no base stations are necessary, which is in contrast to the conventional double differential approach, the PPP approach

can simplify operational logistics in the field and bring great efficiency and flexibility to system implementation and operational data processing. Capable of both post-mission and real-time processing, P³ software is available as an executable or as C++ source code. More information can be found at the website: www.ucalgary.ca/~ygao/p3.htm

PLAN Group acquires L2C and L5 capable Spirent GPS hardware simulator

GPS modernization research is well underway in the PLAN group, even before the first new satellite has been launched. The summer of 2005 saw the arrival of two new Spirent GSS 7700 hardware GPS simulators, capable of simulating the newest GPS signals on the L2 and L5 frequencies. The \$500k simulators, combined with new L2/L5-capable RF front ends from NovAtel, give complete access to the modernized signals for receiver testing and the development of new algorithms.

Initial tests of an L5-capable receiver began this summer with acquisition and tracking threshold tests. Both the L5 and L2C signals have modern signal structures that have not been used in the GPS before, so this hardware testing is required to



Shahin Charkhandeh, MSc candidate, Using the Spirent GSS 7700 Hardware Simulator

optimize their performance in receivers now under development. In the following months, raw L5 and L2C signals will be captured and used to further refine acquisition techniques of these new signals using PLAN's software receiver, GNSS_SoftRx™. In addition to receiver development, the group will also explore the effects of L2C and L5 on existing applications and methods. The new signals will triple the number of ranging signals available to civilian users, offering true dual- and triple-frequency operation for the first time. A wide range of opportunities for improving accuracy, availability, and reliability of GPS will be researched. The PLAN Group is headed by Professors Gérard Lachapelle and M. Elizabeth Cannon (<http://PLAN.geomatics.ucalgary.ca>)

Alumni Voice

Hazen Gehue (BSc, 1992; MSc 1995)
Director of Sustaining Engineering, SiRF Technology, Inc.

I just recently experienced my 8th anniversary with SiRF Technology Inc. located in the Silicon Valley in California, and I have had some time to reflect on the challenges going from a small GPS start-up (I was employee 33) to an industry leading public company of ~300.

When I joined SiRF, it was a 2 year old, Venture Capital-financed start-up, like many in the valley at the time. There was only a concept book (the founder's vision) full of consumer-level GPS products and applications, a first generation prototype chip, a deeply skilled engineering team and a marketing group that had extremely

high aspirations for GPS. If we could only figure how to build and productize the radical new approach to GPS, it would be everywhere. The adventure had begun!

Everything you heard about the "start-up" mentality is true. You need unrelenting commitment to the vision, and innovation to overcome the barriers. The pressure is immense and the stress can be overwhelming—start-ups are not for the squeamish! But as things mature, the vision book becomes products, teams become more focused, and productivity and process create the semblance of a real company.

Time for the next stage - going public. This brings with it all types of new activities and responsibilities. Suddenly everyone in the industry takes notice of your successful

endeavors and competitors are looking for weaknesses. Stock holders want sustainable growth and customers want better faster smaller cheaper GPS for their products and applications. If the company has a strong extensible infrastructure and exciting prospects, you can expand quickly and the top skill sets required want to join.

There are several reasons why start-ups and early IPO companies fail but only a few fundamental rules for success. Vision, commitment and some timely luck. SiRF has been a recipient of all three. Personally, it has been a technically-challenging, emotional roller coaster existence; an experience I would highly recommend.



DEPARTMENT OF GEOMATICS ENGINEERING

Schulich School of Engineering
University of Calgary
2500 University Dr. NW
Calgary, AB Canada T2N 1N4

Phone: 403 220 5834
Fax: 403 284 1980

Email: geomatics@geomatics.ucalgary.ca

A Passion for Excellence

We're on the web:
geomatics.ucalgary.ca

New Faces in Geomatics Engineering

Welcome to Dr. Danielle Marceau who joined the Department on July 1, 2005 as Professor in GIS. Dr. Marceau holds a PhD in remote sensing from the University of Waterloo. She was a professor in Geographical Information Science at the Department of Geography, University of Montreal, from 1993 – 2005. Her research program, *Environmental Geocomputation*, is based on the conceptual foundations of Geographical Information Science, Complexity Theory, and Geocomputation. It is focused on developing and integrating advanced spatiotemporal modelling approaches to study the behavior of natural and human ecosystems in order to support environmental management decisions and problem-solving.



The Department of Geomatics is pleased to announce that Ms. Marcia Inch has been appointed as the Department's new Administrative Manager. Many of you know Marcia since she has had a long association with the Department. We are glad that she is back with us and we are confident that she will provide excellent leadership to our program. Since leaving the Department in 2002, Marcia has held positions of increasing responsibility with the Schulich School of Engineering's Undergraduate Studies Office as well as with the University's Research Services.



Department Activities

- Dr. Nico Sneeuw left the Department on July 31 to become the Head of the Geodetic Institute at Stuttgart University, Germany. We look forward to future connections and collaborations.
- Dr. Darka Mioc left the Department on August 1. She took up a position at the University of New Brunswick.
- Effective July 1, Dr. Ayman Habib is the Department's Associate Head of Graduate Studies.
- Dr. Susan Skone is on Sabbatical leave effective July 1—June 30, 2006.
- Cadastral presentations at Survey Camp ran on August 31 and Sept 01. Thank you to lecturers: Robert Allen, Bryan Bates, Paul Dixon, Rob King, Ian Lloyd, Roy Pomerville, Bill Shepherd, and Dave Thomson.
- Tamara McCarron (SCiBerMentor Coordinator) recently left the University September 9 to start a new adventure as Manager, Fund Development for the Science Alberta Foundation.
- Welcome to Julia Millen who will replace Tamara as SCiBerMENTOR coordinator effective September 29, 2005.



Which side is right? Some fun out at Field Camp (August 2005) with Matt Ghanma, Nathan Dennison, Wouter van Der Wal

Coming Events

- Canadian Engineering Accreditation Board (CEAB) visit- October 23-25, 2005
- ALSA 1st Year Engineering Student BBQ, November 1 from 11:00-1:00 pm. All 1st year Engineering students are invited to attend. In addition to representatives from the Alberta Land Surveyors Association there will be a number of companies there to answer questions about the profession.
- Student Awards Night — November 3, 2005
- Geomatics Engineering Liaison Committee meeting — November 3, 2005
- Geomatics Engineering Advisory Committee meeting — November 4 2005
- Career Day—February 2, 2006

Sites to Visit:

- <http://www.americansolarchallenge.org>
- <http://www.midwestsurveys.com>
- <http://www.ucalgary.ca/~ygao/p3.htm>
- <http://PLAN.geomatics.ucalgary.ca>
- <http://www.sirf.com>
- <http://www.alsa.ab.ca>