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FALL 2007

GEOMATICS ENGINEERING

SCHULICH School of Engineering

UNIVERSITY OF CALGARY

DEPARTMENT OF GEOMATICS ENGINEERING

Geomatics News

Message from the Head

Happy new year to you all. With the start of 2008, I would like to start by thanking our faculty, support and technical staff, and our students for their services, contributions and continued commitment to the Department. Building and maintaining a world-class geomatics engineering program takes a lot of team work - without you all, this will not be possible. I would like to welcome our new faculty members, I wish you all continued success in 2008.

On Behalf of the department, I also would like to thank Stephen Green and Janet MacPhee, for their generosity, leadership and vision in supporting the Department with an great gift to support our students, the survey camp, and renovating the students rooms. Please join us in celebrating the unveiling of the newly renovated Green MacPhee Geomatics Homeroom on January 24!

The fall semester has been a busy time for the Department. We hosted our annual meetings of the Geomatics Engineering Advisory Committee (GEAC) and the Geomatics Engineering Liaison Committee (GELC) with the land surveying associates in late November. Both meetings gave us the opportunity to meet with external supporters and recognize the valuable contributions they make to our success.

We have a busy year in front of us. Many activities will be taking place in the next few months. Our Department Career day will take place on February 7th. Students, please take note of this event; it is an excellent opportunity to secure summer or permanent employment.

Finally, I would like to welcome our new 2nd year Undergraduate students and wish them all the best in their new home department. You are in good hands here; and we look forward to helping you help our profession.

Naser El-Sheimy

Professor and Head

Introducing GEAC & GELC 2007

Geomatics Engineering Advisory Committee

First row L to R Arlin Amundrud, Naser El-Sheimy, Eric Desroche, Stephen Green

Centre row Gary Zhang, Danielle Coulter, Teresa Myrfield, Victoria Hoyle

Back row Mike Barry, Ayman Habib, Hazen Gehue, Steve Fediow, Mohamed Abousalem.

It is the responsibility of the Geomatics Engineering Advisory Committee to ensure that the undergraduate, graduate and research programs meet the needs of the country and are kept up to date with society and the rapidly changing technologies. GEAC met on November 30.

Geomatics Engineering Liaison Committee

First row - L to R Arlin Amundrud, John Armstrong, Paul Standing

Back row Naser El-Sheimy, Bill Teskey, Andrew Hunter, Mike Barry, Victor Hut

The Geomatics Engineering Liaison Committee was established to develop an effective and permanent relationship between the Land Surveyors' Associations and the University of Calgary. GELC met on November 29.

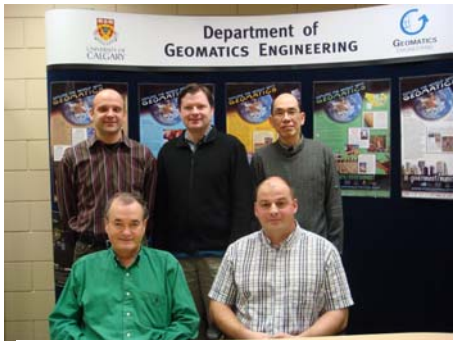
Inside this issue:

Congratulations

- Congratulations to students who completed their graduate studies: Qais K. Marji, MSc; Peter Srajer, MEng; Ahmad Reza Abdolhosseini Moghaddam, MSc; Xia Sally Wu, MEng.

- Dr. Susan Skone won a Best Presentation Award for the paper *"Investigation of Storm Enhanced Density Effects in the Southern Hemisphere"* given at the ION GNSS 2007 meeting, in Fort Worth, Texas.

- Cyrille Gernot won a Best Student Award for the paper *"GPS Signal Disturbances by Water in Various States"* given at the ION GNSS 2007 meeting, in Fort Worth, Texas. Cyrille is working under the supervision of Dr. Gerard Lachapelle.



Peter Srajer successfully defended his thesis.

- Industry Canada recently announced the renewal of Professor Lachapelle's Canada Research Chair in Wireless Location for a second seven year term starting April 1, 2008. Professor Lachapelle leads a group of over 20 graduate students and several research engineers in the development and application of new GNSS signal processing techniques, including the development of software receivers and their use in a wide range of areas, including pedestrian, vehicular and sport applications.

Department News

Professor Gérard Lachapelle and ACA chief athletic officer Max Gartner exchange hats to celebrate the new partnership at a press conference held in Lake Louise on November 23.

- The Schulich School of Engineering has entered into a three-year partnership agreement with Alpine Canada Alpin (ACA) providing critically important additional technical resources to Canada's racing teams. The ultra-precise, ultra-light weight navigation system developed by the Position, Location And Navigation (PLAN) Group will provide skiers with significant training advantages. "The system was tested with complete success on members of the Canadian Ski Team November 06 to April 07 and deployment is now complete" says Professor Gérard Lachapelle, head of the PLAN Group and CRC/iCORE Chair in Wireless Location.

"We are committed to providing athletes with the financial, human and technical resources they require to win against the world's best," said Ken Read, Chief Executive Officer of Alpine Canada Alpin. "In a sport where the difference between winning and losing is a few blinks of an eye, the advanced expertise available at the Schulich School of Engineering delivers on our commitment to world-leading research."

M. Elizabeth Cannon, the Dean of the Schulich School of Engineering, added: "Today's engineering problems require teams working across disciplines - and this in turn demands a leading edge technical education and the skills to work in a diverse, globally changing environment. This innovative approach for which our school is well known is the one we will bring to bear on the technical challenges facing our Olympic hopefuls."

Alpine Canada Alpin (ACA) is the governing body for alpine ski racing in Canada with more than 50,000 athletes, coaches, officials and volunteer members and over 200,000 supporting members. ACA manages the high performance programs for the athletes of the Canadian Alpine Ski Team and the Canadian Para-Alpine Ski Team who represent Canada throughout the world. For more information on Alpine Canada Alpin, visit www.canski.org.

- A three-year agreement on the *Development of Adaptive and Flexible GNSS Technology for Automotive Systems* has been signed between the PLAN Group of the University of Calgary and General Motors of Canada. The $900,000 project is financed by General Motors of Canada, a Natural Sciences and Engineering Research Council of Canada (NSERC) Collaborative Research and Development (CRD) grant and an Alberta Advanced Education and Technology grant. The research will focus on the development of new methods to use current and emerging GNSS signals, including those of GPS and Galileo, with emphasis on vehicular navigation.

The major objective will be the development of a flexible, real-time, multi-frequency and multi-system software receiver. The receiver will also be ultra-tightly integrated with vehicle sensors to improve signal tracking and thus positioning performance.

The PLAN Group, headed by Professor Gérard Lachapelle, includes several professors, research engineers and graduate students, and conducts leading research related to GNSS and other navigation systems.

- Alberta Land Surveyors Association (ALSA) hosted the first year BBQ on November 07, 2007.

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Research Spotlight

Maintaining High-Accuracy Solutions.

Article by Dr. Mark Petovello (Positioning, Navigation and Wireless Location)

My research over the past ten years has focused generally on GNSS and INS

integration, with specific focus on high-accuracy (centimetre-level) positioning. Over the past three years, however, my focus has shifted to include software-based GNSS receiver development and ultra-tight integration with inertial sensors. To this end, focus has been given to tracking weaker signals in order to extent the operating range of the receiver, all the while maintaining high-accuracy solutions.

The primary benefit of software receivers over their hardware counterparts is their inherent flexibility. With all signal processing being performed in software (or programmable hardware), complete control over receiver operation is achieved. In turn, this allows for development of new signal acquisition and tracking methods, especially for the new GPS, GLONASS and Galileo signals. Receivers can also be customized for specific applications, which can yield performance improvements. Non-traditional receiver architectures such as ultra-tight integration with inertial/dead-reckoning sensors can also be implemented.

My future work will expand upon existing ultra-tight integration strategies by looking at using lower cost inertial/dead-reckoning systems (using either lower cost sensors, or fewer of them) and making use of more of the new GPS and Galileo signals. Novel tracking algorithms will also be investigated, including collaborative tracking using multiple closely-spaced users. Inter-receiver ranging will also be investigated as possible means of improving overall tracking performance.

Geohazard and Global Geodynamics

Article by Dr. Jeong Woo Kim (Earth Observation)

Dr. Kim is now establishing his Geohazard and Global Geodynamics Research Lab within the Department of Geomatics Engineering. Very recently, his proposal for the Alberta-Gangwon Research Collaboration Program "*Electromagnetic Land Surface Classification for Optimal Mobile Communication Modeling*" was selected by the working group in Edmonton (Alberta–Gangwon Working Group Committee) after reviewing all of the submissions as well as comparing peer and internal reviews. The objective of this research is to set up and build a new electromagnetic land classification scheme and surface parameter database for optimal wave propagation modeling for the enhanced mobile communications. He is also making a multi-year research contract "Gravity, Bathymetry, and Ocean Circulation from Satellite Radar Altimetry" with the Korea Polar Research Institute. He is currently recruiting several graduate students and a post-doctoral fellow.

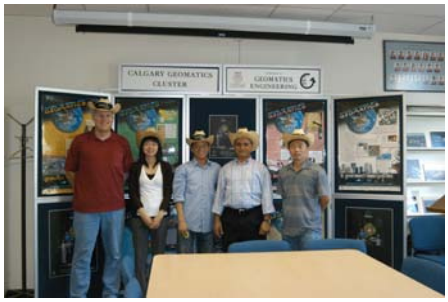
Department News (con't)

Land surveying is an exciting professional career to consider. Land surveyors are in high demand, due to an expanding economy and retiring surveyors.

ALSA First Year Barbeque, November 2007

ALSA First Year Barbeque, November 2007

Land surveyors are involved in oilfield work, Global Positioning Services (GPS), urban and rural land use planning and development and in other related activities involving determination of property boundaries or assembly and analysis of land related information.



New faculty members Andrew Hunter, Xin Wang, Steve Liang and JW Kim join Naser El-Sheimy in welcoming first Engineering students in September.

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

Farewell to Dr. Matthew Tait who, after six years as a member of the academic staff in our Department, has accepted a position as Senior Project Manager, at Colt Geomatics, a division of WorleyParsons Canada. Matthew will initially be transitioning Colt Geomatics into the WorleyParsons management system.

WorleyParsons is one of the largest engineering companies in the world, active in 30 countries, with 24,000 employees. It has grown to this size in just 30 years! Calgary will be their knowledge centre for their worldwide Geomatics operation. Because he is staying in Calgary, there will be opportunities for collaboration with the Department in the future. Best wishes in your future endeavors, Matthew.

Department Activities

- Geomatics Engineering Liaison Committee (GELC) meeting was held on November 29, 2007.
- Geomatics Engineering Advisory Committee (GEAC) meeting was held on November 30, 2007.
- Geomatics Christmas potluck was held on December 17.

- Nishad Wijesekara & Kumudini Ranaweera had a baby boy October 10th. His name is Rithira Pujith Wijesekara. Rithira meaning 'Sun God' and Pujith meaning 'can be worshipped'. He weighed 3.150kg. Congratulations!

- Carina and Anthony Butterworth had a baby boy on November 1st. His name is Karl Avery and was 8lbs, 4 ounces and 21 inches long. Congratulations!

Coming Events

- 4th year Home Room opening—Jan 24, 2008
- Career Day—February 07, 2008.
- Dept meeting—Feb 08, 2008
- Strategy meeting—June 10, 2008

Sites to Visit:

- *http://plan.geomatics.ucalgary.ca*
- *http://www.alsa.ab.ca*
- *http://www.canski.org*
- *http://www.colteng.com/*