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GEOMATICS ENGINEERING

UNIVERSITY OF CALGARY

DEPARTMENT OF GEOMATICS ENGINEERING

Geomatics News

Message from the Head

Dear Readers,

Welcome to the inaugural issue of the newsletter of the Department of Geomatics Engineering at the University of Calgary. If you are reading this I am sure you are aware of the Department of Geomatics Engineering, and possibly aware of some of our activities. We are however, continually changing. With our annual undergraduate enrolment reaching 55 per year, our graduate program growing to over 80, it was important to launch this newsletter to keep in touch with our people, to increase awareness of what we do, and to allow our supporters, alumni, friends and other colleagues across our discipline of practice to continue with their role as catalysts in our continued growth.

With this newsletter our goal is simple. This is first and foremost, your newsletter. We will try to keep you abreast of our department's news, our students' research activities, new initiatives, and up coming events. We will solicit your input, yet more importantly ask you for validation — are we doing our job right; can we do better; and what trends could we be missing?

As you go through the pages of this newsletter, do please help me thank a few individuals whose support have made it possible: The faculty members who supported the newsletter since its inception and whose continued support to this department is highlighted here. The Dean of Engineering for his continuous support to the department, providing us with the required resources to further our growth. Marguerite Anderson for her tremendous support in putting the newsletter together. Last but not least the former heads of the department - Ed Krakiwsky (79-89), Klaus-Peter Schwarz (90-95), and Gerard Lachapelle (95-03), who set the vision to build this department and charted its course for growth of which this newsletter was a natural progression.

The Department of Geomatics Engineering has grown into a world renowned leader in the area of Geomatics Engineering and forged a path of success that continues to build on the needs of our society, industry and more importantly our continually evolving profession. We value our strong ties with Calgary's Geomatics engineering community as well as ties across Canada and the world — alliances that have helped us launch new research and teaching programs, recruit outstanding faculty and students and place the word Geomatics solidly in a new generation. As we approach our twenty fifth anniversary, across the pages of this and many newsletters to come, we would like to share with you our passion for excellence, our culture of collegiality, and our ability to adapt to the changing needs of our society, and beyond it all, solicit your input to some of the many reasons for this resounding and sustained success.

Naser El-Sheimy, CRC
Interim Head

Inside this issue:

Geo Departments Heads—Past, Present, and Future (From right —Drs. Krakiwsky , Schwarz , Lachapelle, El-Sheimy and Cannon

Congratulations

- Dr. Michael Sideris was elected Vice-President of the International Association of Geodesy (IAG).

- Dr. Naser El-Sheimy was voted Professor of the Year by ENGO students and received the ENGO Teaching Excellence Award

- Dr. Gérard Lachapelle was elected Fellow of the U.S.-based Institute of Navigation in recognition of his sustained contributions in the field of global navigation satellite systems and related educational accomplishments. Gerard was also elected as a Fellow of the Canadian Academy of Engineering.

- Drs. Mike Barry, Susan Skone and Caterina Valeo were promoted to Associate Professors.

- Dr. Elizabeth Cannon won the Department and the Faculty Research Excellence Awards.

- Geomatics Engineering graduate students have for 14 years successfully competed for student paper awards at the ION GPS Conferences. The competition is open to engineering and other students from around the world. This year, four graduate students, supervised by faculty members in Geomatics Engineering have won awards, namely Kai-Wei Chiang, Zhizhao Liu, Changlin Ma and Giovanni Pugliano.

- Dr. Naser El-Sheimy received a Canada Research Chair in Mobile Multi-Sensor Geomatics Systems.

- Dr. Nico Sneeuw was awarded a Humboldt Research Fellowship from the German Alexander von Humboldt Foundation. This prestigious award enables him to conduct research at the Stuttgart University, Germany, next year. Dr. Sneeuw will investigate spatio temporal sampling characteristics of current and future gravity field satellite missions.

Gérard Lachapelle was elected as a Fellow of the Canadian Academy of Engineering

Student News

- With another summer behind us, the Geomatics Engineering Student Society (GESS) has finally buttoned down and has begun organizing and planning events such as Career Day, ENGG Week and a handful of GESS-sponsored events. The members of the GESS council have dedicated themselves to the cause of providing our students with the best services and learning environment.

- In mid-September, the students of Geo released their wrath during Frosh Week (actually it was more like a whimper). Despite our 4th place, Geo students managed to capture the spotlight in events such as Tug-of-War and Ultimate Frisbee, beating out the much larger departments such as Mechanical and Chemical. Civil came out on top of everyone for Frosh Week, trouncing everybody with their large student turnouts who were filled with the "Geer Spirit".

- GESS's ENGG Week (Jan/04) theme this year is "Super MarGEO Bros." More to come with the ENGG Week theme, but be sure that magic mushrooms, princesses in distress and plumbers will play an important part in this years ENGG Week .

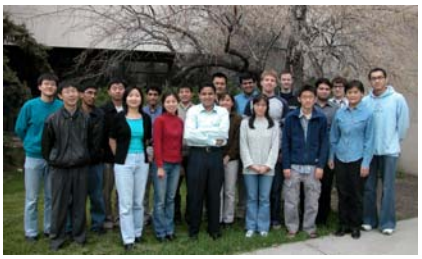
- Georgia Fotopoulos, PhD student, is this year's recipient of the Canadian Geophysical Union Best Student Paper award for the Geodesy Section. Georgia has also been awarded an Alberta Ingenuity Fellowship.

- Michel Morgan, PhD student was awarded the 2003 ASPRS Space Imaging and the 2003 Leica Geosystems Internship.

Visitors

- Aboelmagd Noureldin, Royal Military College of Canada and Jayanta Ray, Accord Software and Systems Inc., gave two graduate courses as part of the Distinguished Lecture Series.

- Challenger Surveys and a delegation from the Surveyor General for Thailand, Geo-Informatics and Space Technology Development Agency (GISTDA) visited the Department October 2. GISTDA is a public organization that has taken over the remote sensing division of the Thai National Research Council and has been assigned responsibility for GIS at the national level. The project — Land Information Systems and Property Mapping for Local Administrative Units in Thailand — will develop business and technical models to enable Local Administrative Units (roughly equivalent to municipalities in Canada) to use GIS and LIS to assist in such areas as tax assessment and management of land within their jurisdiction.



Dr. Jayanta Ray with students from his course on Advanced GPS Receiver Technologies

Research Spotlight

Digital Photogrammetry research group secures GEOIDE funding

Dr. Ayman Habib received funding from GEOIDE; the GEOmatics for Informed DEcisions Research Network for a proposal entitled "*Co-registration of Photogrammetric and LIDAR Surfaces for Evaluation and Validation of the Systems Calibration.* Mosaic Mapping, a leading Canadian company in the field of LIDAR, will be involved in this project as an industrial partner.

Project: GPS and digital levelling data collection in Inuvik

The stability of survey monumentation in permafrost will be an important issue when development of the NWT gas deposits commences. Measuring subsidence and its effect on environment and engineering structures requires stable points for datum definition. So a group of researchers went to Inuvik this summer to measure 7 different types of monument. Observations included GPS data as well as precise digital levelling, to see how accurate GPS levelling could be at 70º North. The team comprised Dr. Matthew Tait, one graduate student, Li Sheng, and 2003 graduating students Matthew Vanderwey and Chang Bae Yoon. On July 17th the team left Calgary for the 40 hour drive to Inuvik. In summer, it is 24 hours daylight in Inuvik and quite humid (compared to Calgary!) with enormous swarms of mosquitoes in the bush, where the survey was made. The team wore headnets, double layers, and gloves and

Chang Bae Yoon gathering data (and mosquitoes!)

still got badly bitten! Despite these determined creatures, very changeable weather, and some seriously unstable terrain the team worked all hours (and sometimes all night) to complete the survey. It was quite an experience.

Project: Scientists Get a Bear's-eye View

"Scientists get a bear's-eye view" aired on CBC's Sci-Tech News section on September 1. Andrew Hunter, a researcher in the Mobile Multi Sensor Research Group under the supervision of Dr. Naser El-Sheimy, is adding digital cameras to GPS collars. The purpose of the cameras is to help Biologists understand when bears are around human activity, what the bears are seeing and doing. The long-term goal of this research project is to measure, quantify and develop a model for the examination of motion parameters for moving point objects within a temporal based reference frame. The work to date addresses the short-term objectives of the research, which is to develop a camera system for the acquisition of habitat information and Grizzly Bear interactions via digital imagery. This research is being undertaken in collaboration with Alberta Sustainable Resource Development and the Foothills Model Forest Grizzly Bear Research Program. Due to environmental constraints, such as tree canopy, or the bear sleeping on the GPS antenna, the acquisition of location information is not complete. As such, it is proposed that if the prototype currently deployed produces acceptable results the design will be extended to include a fully integrated position and motion sensing system with digital image acquisition and communication capabilities for near real-time access to the data being collected. The data from the collar will then be used to develop a spatio-temporal analysis model. It is expected that continuous monitoring of grizzly bears will provide new insights into grizzly bear behaviour across a range of research areas.

Project: Software GNSS Transmitter and Receiver Design and Development

A major research effort has been initiated by the Position, Location And Navigation Group headed by Professors Gérard Lachapelle and M. Elizabeth Cannon to develop a software GNSS transmitter and receiver that will be used for a variety of research and development tasks, including performance analysis of current GPS I and new GPS II/III and Galileo signals, RF interference effects and mitigation, and weak signal tracking for indoor location. The effort, begun in late 2002, involves several phases and six researchers. It is expected that a DSP-based real-time software receiver will be completed by the end of 2005.

Alumni Voice

Sandy Kennedy BSc, MSc. I graduated from the Geomatics engineering undergraduate program in 2000, and entered into graduate studies immediately. I felt undergrad had given me a taste of GPS and GPS/INS integration, and I wanted to dig into it further. In 2002, I completed my M.Sc. Currently, I am a research engineer at BJ Pipeline Inspection Services. The inspection tool travels through the pipeline with an IMU on board, which is used to map the trajectory and to detect curvature of the pipe, in addition to other sensing instruments used to detect defects like corrosion in the pipe wall. I am responsible for the continuous improvement of BJ's inertial surveying procedures. It's a challenging and unique positioning problem.

My experience in Geomatics has been thoroughly positive. My degrees provided me with a broad knowledge of "all things spatial", and strong analytical skills to deconstruct and solve problems.

Beyond that, I have met many great people through the course of my studies and employment. Coincidentally, my husband is also a graduate of the undergrad program, and is on his way to becoming an Alberta Land Surveyor.

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A Passion for Excellence

We're on the web:

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Geomatics Engineering is a modern discipline, which integrates acquisition, modelling, analysis, and management of spatially referenced data, i.e. data identified according to their locations. Based on the scientific framework of geodesy, it uses terrestrial, marine, airborne, and satellite-based sensors to acquire spatial and other data. It includes the process of transforming spatially referenced data from different sources into common information systems with well-defined accuracy characteristics.

Department Activities

- New Fall Term began September 8 with 155 undergraduate students and another 21 students off to Internship. Graduate enrolment is over 80 students.
- Second annual Industry Day, May 2. Plans for expansion next Spring include offering professional development courses and more presentations by industry
- Geoconnections workshop with the Canada Centre for Remote Sensing on October 15, on campus
- Geomatics Engineering Liaison Committee and the annual Student Awards Night, October 16
- Geomatics Engineering Advisory Committee, October 17
- Faculty members sponsored a BBQ for our graduate students on September 26.

Department BBQ September 26

Coming Events

- GESS Bowling on November 7, 2003
- Alberta Land Surveyors BBQ November 17, 2003
- Career Day February 5, 2004
- Look for upcoming information on our fourth year project course presentations.

Sites to Visit:

- *Geomatics Engineering Student Society (GESS) : www.geomatics.ucalgary.ca/%7Egess/*
- *The Department Publications: http:// www.geomatics.ucalgary.ca/research/publications/ index.php*
- *Alberta Geomatics Group: http:// www.geomaticsgroup.ab.ca/*
- *2002/2003 Department Progress Report http:// www.geomatics.ucalgary.ca/research/publications/ ProgressReports/index.htm*