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GEOMATICS ENGINEERING

SCHULICH School of Engineering

UNIVERSITY OF CALGARY

DEPARTMENT OF GEOMATICS ENGINEERING

Geomatics News

Message from the Head

Dear Valued Reader

This Newsletter is the last issue for the academic year of 2008. It has been a very prosperous year. 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. I also would like to congratulate our fourth year students who graduated this year; well done on finishing your studies from one of the best institutions of Geomatics in North America. As you begin your careers as Geomatics Engineers, we will work with you to ensure that your investment in your skillset is maintained and that when possible, help further that investment. Our commitment to you is to work hard to ensure that the reputation of this institution is maintained, and hence the value is as good as the day you left; but we cannot do it all alone. We need your help - please continue to maintain your work relationship with your department. Let us know the industrial challenges you are facing; we might have a solution, or we might work with you in finding a solution giving both of us a much a needed competitive edge. For our graduate students and our colleagues in industry, be aware of the Professional Course which will be offered in August on " GNSS Receiver Design" (August 18 - August 29) by Dr. Olivier Julien, Ecole Nationale de l'Aviation Civile, Toulouse, France. If you are interested please contact us for further details or visit our web page.

www.geomatics.ucalgary.ca

Dr. Naser El-Sheimy, P.Eng, CRC
Professor and Head

Faculty members at the ENGO Strategy Meeting, June 10, 2008

Back row (L to R): M. Barry, D. Marceau, M. Collins, A. Hunter, K. O'Keefe, W. Teskey, D. Lichti, G. Lachapelle , JW. Kim, M. Sideris
Front row (L to R): X. Wang, A. Habib, M. Petovello, M.E. Cannon, N. El-Sheimy, S. Skone, S. Liang, Y. Gao
Missing: A. Braun, I. Couloigner

Inside this issue:

Congratulations

- Congratulations to students who completed their graduate studies: Hongmin Zhang, MEng and Lance de Groot, MSc.

- Dr. Michael Sideris, Nico Sneeuw, Matthias Weigelt and Chen Xu, are recipients of the 2008 F.W. (Casey) Baldwin Award of the Canadian Aeronautics and Space Institute (CASI). The award was given for their paper entitled "Spaceborne Gravimetry and Gravity Field Recovery", which has been selected as the best paper published in the 2007 volume of Canadian Aeronautics and Space Journal (CASJ).

- Cyrille Gernot, PhD candidate, received the "Best Student Presentation Award" at the European Navigation Conference 2008, for his paper on "Comparison of L1 C/A L2C Combined Acquisition Techniques", which was co-authored by his supervisors, Professors K. O'Keefe and G. Lachapelle.

- Dr. Chaminda Basnayake, who studied in the PLAN Group under the supervision of Professor G. Lachapelle, joined General Motors R&D in 2005 as a Senior Research Engineer where he continued his research activities in vehicular navigation and positioning research. His remarkable contributions at GM have resulted in two major awards; the 2006 Charles P. McCuen Award for contributions to the V2V technology R&D, and the 2007 OnStar President's Award. The Charles P. McCuen Award is the highest award offered by GM R&D.

- Graduate students from the Geomatics department won three out of the six GEOIDE Annual Scientific Conference (ASC) awards: Zainab Syed, won the GEOIDE Communicator of Excellence Award. Taher Hassan and Osama Al-Fanek, won GEOIDE Delegates' Choice Awards.

- Grand prize winner for the 2008 Talbert Abrams Award for the following paper in the Journal of Photogrammetric Engineering and Remote Sensing: Morgan, M., Kim, K., Jeong, S., and Habib, *A. Epipolar Resampling of Space-Borne Linear Array Scanner Scenes using Parallel Projection.* Photogrammetric Engineering and Remote Sensing; 2006. First runner-up for the same award was: Habib, A., Kim, E., and Kim, C., *New Methodologies for True Orthophoto Generation*, Third Place for the 2008 John I. Davidson Presidents Award for Practical Papers in the Journal of Photogrammetric Engineering and Remote Sensing: Habib, A., Kim, E., and Kim, C. *New Methodologies for True Orthophoto Generation*.

- Congratulations to the following students who have won sponsorship awards to present their papers at the GNSS08 conference in September, 2008: A. Broumandan, PhD candidate, and Tao Lin, BSc candidate on *Performance of GNSS Time of Arrival Estimation Techniques in Multipath Environments.* P. Kazemi, PhD candidate, on *Optimum Digital Filters for GNSS Tracking Loops.* P. Aggarwal, PhD candidate, on *Hybrid Extended Particle Filter (HEPF) for INS/ GPS Integrated System.* C.S. Cai, MSc candidate, on *A Solution for Combined GPS/GLONASS Navigation in Conditions of Limited Satellite Visibility*. P. Gaggero, Master candidate and Daniele Borio, Senior Research Engineer, on *Ultra-stable Oscillators: Limits of GNSS Coherent Integration*.

Student News

- Mr. Richard Ong, a BSc graduate of the Geomatics Engineering program, has been awarded the Chancellor David B. Smith Gold Medal in Engineering and the APEGGA Education Foundation Gold Medal in Engineering for his outstanding performance during his BSc studies.

The awards, presented during the convocation ceremony on June 09, recognize those graduating engineering students with the highest academic achievements. The Chancellor David B. Smith Gold Medal in Engineering is awarded to the student who has shown the highest distinction in scholarship throughout the program, while the APEGGA Education Foundation Gold Medals in Engineering are awarded to those students who have the highest academic standing in the third and fourth years of their respective branches of engineering.

Richard, who is also an NSERC scholarship holder, will continue his association with the PLAN Group as a graduate student. He also did his internship in the PLAN Group where he played a major role in the development and support of an ultra-precise and ultra-light navigation and timing device to provide our Canadian Olympic ski team with a winning edge, a collaborative project between the Schulich School of Engineering and Alpine Canada Alpine and Own The Podium 2010.

Visitors

- Dr. Daniel Roman a research Geodesist from the U.S. National Geodetic Survey gave a presentation titled 'Geodesy at U.S. National Geodetic Survey' The presentation covered a number of different topics addressing current and future geodetic research at U.S. National Geodetic Survey. This included the forthcoming national models (GEOID08 & USGG2008), progress towards a regional gravimetric geoid model-based vertical datum, and GRAV-D and other data collection and analyses.

Research Spotlight

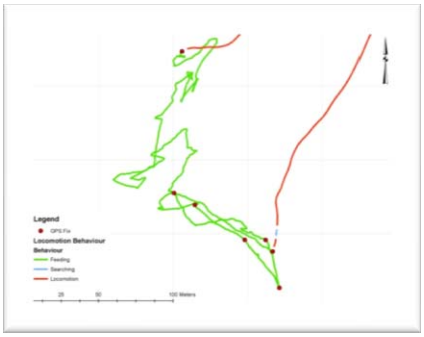
Development and Use of the Animal Pathfinder™

Article by Dr. Andrew Hunter (GIS and Land Tenure)

Animal Pathfinder™

My research over the last few years has focused on the development of the Animal Pathfinder™ that integrates navigation sensors (Global Positioning System (GPS) and Inertial Navigation System (INS) technology) and digital imaging sensors (digital cameras). My research has focused on the development and use of the Animal Pathfinder™ for tracking of wildlife to assist with the development of wildlife management plans.

The results of this work provide a new type of data that has not been previously possible within the wildlife management domain. With the Animal Pathfinder™ we can now begin to provide information about an animal's behaviour as it moves throughout its domain. We are now also able to say where an animal has not been. From a modelling perspective this means that scientists can develop models with greater certainty, if for no other reason than an improved understanding of the boundary conditions of a proposed model. It also means that it is now possible to associate animal behaviour with habitat use, which has previously not been possible with GPS alone. Additionally, recent work has shown that an understanding of animal locomotor activity can be tied directly to an animal's energetic requirements (Williams, 2007), and that this concept of energy flow from plant populations to animals can be tied to animal behaviour (Pearson, 1947). Therefore, we can derive an understanding of which habitats are fit for use by a particular species.



My future work is focusing on interpretation strategies that enhance the quality of locomotor behavioural information that can be derived from the Animal PathFinder™ data streams; locomotion analysis of a broader range of animals and people; and integration of behavioural information into spatial models that can be applied to land management problems.

UNSTABLE (UNderstanding Severe Thunderstorms and Alberta Boundary Layer Experiment)

Article by Dr. Susan Skone (Earth Observation)

Dr. Susan Skone and her research team have been involved in several projects to support weather and climate studies. This summer the group participated in a

collaborative effort to study severe weather in southern Alberta. The UNSTABLE (UNderstanding Severe

Continued on page 4

Alumni Voice

While I was finishing my first bachelor's degree at the University of Alberta, I had a discussion with a professor about what I should do next. Engineering seemed right but I couldn't find a branch that really appealed. He had an idea; what about Geomatics at the University of Calgary?

During my Geomatics undergrad I became the poster child for the department, literally! I became active in GESS and student activities and my interests started to lean towards remote sensing, GPS and programming. I was given the opportunity to work two summers for Dr Lachapelle which gave me important experience and turned my career path firmly towards GPS.

Grad school was a fantastic experience, and included some of the most interesting work I've ever done. Under my supervisor Dr Skone I also undertook contract projects mostly for the Canadian Coast Guard which helped me gain valuable work experience.

Currently I work for SiRF Technology, Inc., based out of San Jose, California and manage a team of engineers in test engineering. Working in the Silicon Valley is exciting to say the least. SiRF as a company has a unique role in the GPS marketplace in that we produce wireless, automotive and consumer products. It provides a whole other level of challenges and competitiveness. My job has caused me to expand different facets of my knowledge beyond technical skill, however my background in Geomatics right back to undergrad is by far my most valuable asset.

Victoria Hoyle MSc '05

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A Passion for Excellence

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Thunderstorms and Alberta Boundary Layer Experiment) field campaign took place July 9-23. This effort was led by Environment Canada and included personnel from University of Manitoba, University of Alberta and University of Calgary. An unprecedented data set was collected in the foothills region northwest of Calgary. Observations included weather balloon and tethersonde soundings, temperature and humidity measurements (from mobile ground platforms and aircraft), and atmospheric moisture information. Dr. Skone's research team operated a network of GPS reference stations in the foothills region and they applied novel methods to extract water vapour information from the GPS signals. The GPS-based methods provided high spatial and temporal resolution of moisture variations associated with the severe weather events. Results of this campaign will include improved modeling of the storm initiation processes with the objective of developing more accurate weather forecasts for the southern Alberta region. Given the high impact of severe weather, UNSTABLE generated extensive media interest – with radio interviews, articles in local newspapers, and coverage by all major television stations.

Department Activities

- Tuesday, May 13, 2008 was "Women in Engineering" Day. A fun and exciting annual event designed to introduce Grade 10 and 11 young women to career opportunities in engineering. Components included a design contest, department demonstrations, lunch, and a panel discussion led by successful female engineers from industry.
- Dr. Danielle Marceau has accepted the position of the Associate Head Graduate Studies effective Sept 1, 2008 for a three year term. Thank you Dr. Ayman Habib for your excellent service and dedication to the department over the last three years.
- Dr. Alec McEwen, Professor Emeritus, was appointed an Honorary Member of the Alberta Land Surveyors' Association at the Association's 99th Annual General Meeting and Convention, held at Lake Louise, April 24 -26, 2008.
- The Fifth Annual Graduate Student Research Conference of the Schulich School of Engineering was held May 5-6. More than 140 graduate students presented their ongoing research. The top presentations were recognized at an award ceremony.

Coming Events

- ENGO 501: Field Survey Camp, August 18—August 28, 2008
- Special Graduate Course: Dr. Olivier Julien, Ecole Nationale de l ' Aviation Civile, Toulouse—GNSS Receiver Design, August 18-29.
- Professor Wolfgang Keller from the University of Stuttgart will present a short course called "Wavelets in Geodesy and Geomatics". Ten hours of lecture. July 21, 23, 25.

Sites to Visit:

- *http://www.ngs.noaa.gov/*
- *http://plan.geomatics.ucalgary.ca/*
- *http://www.geoconnexion.com/geo_events/April/2008*
- *http://www.sirf.com/*