

PROGRESS REPORT 2008-2009

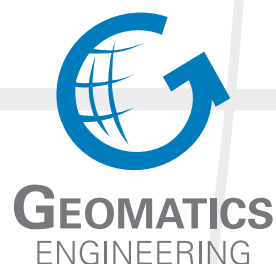
Department of Geomatics Engineering

Schulich School of Engineering
University of Calgary



Position Yourself Ahead of the Crowd

UCGE Number 50040



SCHULICH
School of Engineering



HIGHLIGHTS 2008/2009

The world is facing daunting global economic challenges, the impact of which has been felt at the University of Calgary, presenting us with serious hurdles to effectively achieve our core business goals. However, the Department remains strongly focused on recruiting and educating high-quality students, and conducting high-caliber research. We will continue to deliver the best possible program to our undergraduate and graduate students, and conduct research that will further our aim to be a world leader in geomatics engineering.

I want to thank our faculty, support and technical staff, and our students for their continued strong commitment to the Department. Here is the result of their good work: a total of 39 students received their BSc degree, 10 students a MSc degree, and 6 students received their PhD degree this year.

We are pleased that Dr. Quazi Hassan joined as a new faculty member this year. Dr. Hassan is an Assistant Professor in the area of earth observation for energy and the environment.

The 2008-2009 fiscal period was another very successful year from a research excellence point of view. Faculty members have continued to secure major research funding. Total direct research funding exceeded \$4.2 million, which is approximately \$213,000 in average research funding per faculty member. This is an increase of 8% over the previous year. Numerous awards were received by students and faculty members that are detailed on the following pages. Several faculty members continue to serve in leadership positions on various boards and in learned societies. The Department launched a new web page, to keep our supporters, alumni, friends and other colleagues up to date on our activities and direction.

Our industrial partners continue to provide us with unprecedented support us and this year



marked the establishment of the **John Holmlund Chair in Land Tenure and Cadastral Studies**. Dr. Michael Barry was awarded the Chair, made possible through a generous donation from John and Jane Holmlund and family of Leduc, Alberta. Mr. Holmlund is a key-figure in the Geomatics Industry in Alberta and the Chairman of the Board of Focus Corporation, a provider of land surveying, engineering and project management services. On behalf of the Department of Geomatics Engineering, I would like to express our deep gratitude to the Holmlund family for their very generous donation. The Chair will make a difference not only to our department but the land surveying community in Alberta and Canada as a whole.

- ◆ One new faculty member joined the department
- ◆ Establishment of the John Holmlund Chair in Land Tenure and Cadastral Studies
- ◆ Research funding reaches \$213,000 K per faculty member
- ◆ Numerous senior faculty and student awards
- ◆ Involvement in high level national and international boards, professional & learned societies
- ◆ Number of convocants: 39 BSc students and 16 MSc and PhD students
- ◆ Establishment of Tecterra, a centre for integrated resource management

Continued on next page

We are extremely pleased to announce that this year marks the beginning of the newly incorporated **Tecterra**, an Alberta Ingenuity and NCE CECR Centre. Tecterra is a joint venture between *the University of Calgary, University of Alberta, and University of Lethbridge*, and the *Alberta provincial government, the Canadian federal government, and private industry*. Its aim will be to expand geomatics research and commercialization, and we see this as an exciting opportunity for the future for our Department and the geomatics industry in general.

Alberta and Canada is in a unique position to achieve significant progress in the area of integrated resource management and, in so doing, establish a critical mass of economically and environmentally valuable, exportable, geomatics-based business skills and solutions built on state-of-the-art research. Through this major funding of \$35 million and the anticipated \$15M funding from other sources, the centre will work closely with key industry, provincial and government partners, and other Canadian National Centres of Excellence to achieve many goals. First of all, Tecterra will offer world class researchers from Canada and beyond the opportunity to collaborate on challenges that are relevant to Canada's land, water and natural resources management. Tecterra will also work to accelerate the commercialization of products and services related to IRM and train--and retain--future generations of highly qualified professionals who will further grow the industry and build capacity for the geomatics and resources industries. The new centre will result in new knowledge, tools, products, and processes that can be commercialized and marketed by Tecterra's partners both locally and internationally.

I will be seconded to spearhead our Department's effort in setting up Tecterra, and as a result step down as Department Head as of May 1, 2009. I am very pleased to announce and congratulate Dr. Ayman Habib on his appointment as Department Head effective July 1, 2009. The Department has chosen Ayman because of his outstanding record in teaching and research. We are fortunate to have Ayman in this new role and we wish him all the best in his new role leading this amazing Department into more success.

Dr. Naser El-Sheimy, PEng, CRC
Professor and Head



Dr. Barry is awarded the John Holmlund Chair in Land Tenure and Cadastral Studies.

L to R: John Holmlund, Jane Holmlund and Michael Barry.

Geomatics Engineering
Faculty Members at the Annual Retreat
June, 2008



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

MESSAGE FROM THE DEAN



The past year has provided significant momentum to the Department of Geomatics Engineering through the establishment of a centre of excellence in research and commercialization - Tecterra - which will be a hub for internationally recognized teaching and research for the application of geomatics tools to the management of our natural resources. The Department is well positioned to play a leadership role and to work with other academic institutions, industry and government to leverage its success and to broaden its impact to new sectors and applications. Current capabilities will be expanded and enhanced through new linkages and commercialization opportunities and the geomatics sector in Alberta and beyond will undoubtedly be transformed. I am fully confident that the Department will capitalize on this major initiative and will build and grow in the years to come. I look forward to working with the faculty, staff, students to implement this exciting initiative to the benefit of our broader community.

M. Elizabeth Cannon, PEng, FCAE, FRSC
Dean, Schulich School of Engineering

PERSONNEL

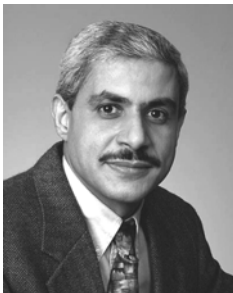
Faculty



Dr. N. El-Sheimy
Professor and Head
CRC in Multi-sensor Systems
B.Sc., M.Sc., Ph.D. (University of Calgary), P.Eng.
Multi-sensor systems, real-time mapping
and their applications in GIS
Telephone: (403) 220-7587
Email: elsheimy@ucalgary.ca



Dr. M.B. Barry
Associate Professor and Associate Head (Undergrad)
B.Sc., MBA, PhD (Natal)
Cadastral Systems, land tenure and
geographic information systems
Telephone: (403) 220-5826
Email: mbarry@ucalgary.ca



Dr. A.F. Habib
Professor and
Associate Head (Graduate Studies) until Aug 31, 2008
B.Sc., M.Sc., Ph.D. (Ohio State University), P.Eng.
Digital photogrammetry, image processing, image
understanding, mobile mapping systems, sensor,
data, and information integration
Telephone: (403) 220-7105
Email: ahabib@ucalgary.ca



Dr. D. Marceau
Professor
Associate Head (Graduate Studies) effective Sept 01, 2008
B.Sc., M.Sc., Ph.D. (University of Waterloo)
Geospatial Information Systems (GIS),
cellular automata and multi-agent system modeling for
environmental resource management
Telephone: (403) 220-5314
Email: dmarceau@ucalgary.ca



Dr. A. Braun
Associate Professor
Diplom-Geophysiker, Dr. phil. nat.
(geophysics, magna cum laude,
Johann Wolfgang Goethe-Universität Frankfurt)
Byrd Fellow (The Ohio State University)
Geophysics, satellite geodesy, geodynamics,
sea level change, Earth systems observation
Telephone: (403) 220-4702
Email: braun@ucalgary.ca



Dr. M.E. Cannon
Dean, Schulich School of Engineering
Steacie Fellow
B.Sc. (Mathematics), B.Sc., M.Sc., Ph.D. (Killam
Scholar, University of Calgary), P.Eng., C.L.S.
Satellite-based radionavigation systems, precise static
and real-time kinematic positioning
Telephone: (403) 220-5731
Email: cannon@ucalgary.ca



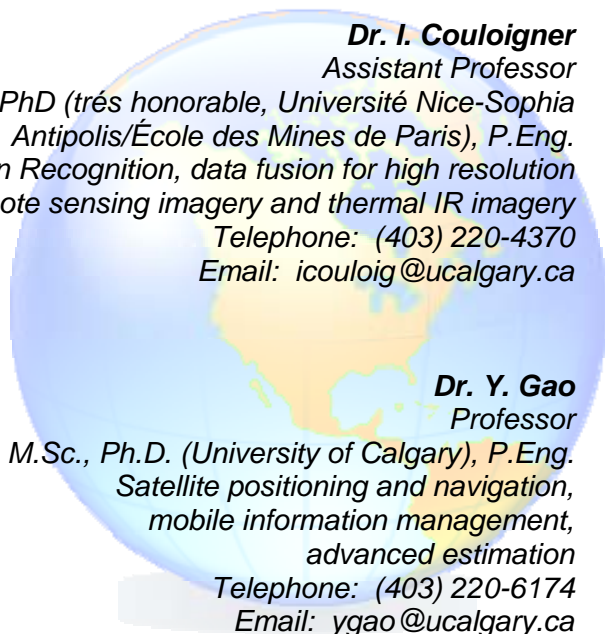
Dr. M.J. Collins
Associate Professor
B.Sc., M.Sc., Ph.D. (York), P.Eng.
Synthetic aperture radar,
remote sensing algorithm design
Telephone: (403) 220-7534
Email: mjcollin@ucalgary.ca



Dr. I. Couloigner
Assistant Professor
Fr. Ing., PhD (très honorable, Université Nice-Sophia
Antipolis/École des Mines de Paris), P.Eng.
Pattern Recognition, data fusion for high resolution
remote sensing imagery and thermal IR imagery
Telephone: (403) 220-4370
Email: icouloig@ucalgary.ca



Dr. Y. Gao
Professor
B.Sc., M.Sc., Ph.D. (University of Calgary), P.Eng.
Satellite positioning and navigation,
mobile information management,
advanced estimation
Telephone: (403) 220-6174
Email: ygao@ucalgary.ca





Dr. Q.K. Hassan
Assistant Professor
B.Sc., M.Sc., Ph.D. (University of New Brunswick)
Environmental modelling, remote sensing
Telephone: (403) 210-9494
Email: qhassan@ucalgary.ca



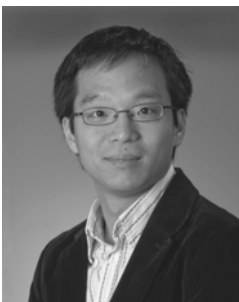
Dr. A.J.S. Hunter
Assistant Professor
B.Sc., M.Sc., Ph.D. (University of Calgary)
Spatial analysis, mobility studies, GIS, land tenure
Telephone: (403) 220-7377
Email: ahunter@ucalgary.ca



Dr. J.W. Kim
Associate Professor
B.Sc., M.Sc., Ph.D. (Ohio State University)
Geodetic earth observation,
satellite geophysics, geodynamics
Telephone: (403) 220-4858
Email: jw.kim@ucalgary.ca



Dr. G. Lachapelle
Professor
CRC/iCORE Chair in Wireless Location
B.Sc., M.Sc., L.Ph.,
Dr. Techn. (Technical University of Graz), P.Eng.
Satellite-based positioning and
navigation, wireless location
Telephone: (403) 220-7104
Email: lachapel@ucalgary.ca



Dr. S. Liang
Assistant Professor
B.Sc., Ph.D. (York University)
Geospatial Information Systems (GIS),
geo web, sensor web, cyberinfrastructures
Telephone: (403) 210-4703
Email: steve.liang@ucalgary.ca



Dr. D. Lichti
Associate Professor
B.Tech, M.Sc., Ph.D. (University of Calgary)
Optical and range imaging systems
for precise 3D measurement
Telephone: (403) 210-9495
Email: ddlichti@ucalgary.ca



Dr. K. O'Keefe
Assistant Professor
B.Sc. (Honours Physics), B.Sc.,
Ph.D (Honorary Killam Scholar,
University of Calgary), P.Eng.
Wireless location, satellite-based
positioning and navigation
Telephone: (403) 220-7378
Email: kpgokeef@ucalgary.ca



Dr. M. Petovello
Assistant Professor
B.Sc. (Geomatics),
Ph.D. (University of Calgary), P.Eng.,
GNSS navigation, inertial navigation
and software receiver development
Telephone: (403) 210-9795
Email: mark.petovello@ucalgary.ca



Dr. M.G. Sideris
Professor and Associate Dean (Faculty of
Graduate Studies)
Dipl.Ing. (Honours); M.Sc.,
Ph.D. (University of Calgary), Dr. h.c., P.Eng.
Geodesy, optimization in geomatics, spectral analysis,
gravity field approximation
Telephone: (403) 220-4985
Email: sideris@ucalgary.ca



Dr. S.H. Skone
Associate Professor and
B.Sc., M.Sc., Ph.D. (University of Calgary),
Wide-area differential GPS, marine DGPS, atmospheric
effects and modelling on satellite navigation
Telephone: (403) 220-7589
Email: shskone@ucalgary.ca





Dr. W.F. Teskey

Professor

*B.Sc. (Distinction; APEGGA Gold Medal), M.Sc.,
Dr.-Ing. (Stuttgart University), P.Eng., A.L.S.,
C.L.S. Precise engineering and deformation
surveys, integrated analysis of deformations*

Telephone: (403) 220-7397

Email: wteskey@ucalgary.ca

Dr. X. Wang

Assistant Professor

*B.Sc., M.Eng., PhD (University of Regina)
Spatial data mining, knowledge engineering;
web GIS and privacy protection in GIS*

Telephone: (403) 220-3355

Email: xcwang@ucalgary.ca

Professors Emeritus

Dr. J.A.R. Blais, Ph.D. (University of New Brunswick), P.Eng. Estimation, spectral analysis, information theory and systems numerical methods, reference systems and gravitation.

Dr. E.J. Krakiwsky, Ph.D. (Heiskanen Award; The Ohio State University), P.Eng. Least squares estimation and statistical testing, network design, satellite positioning, automatic vehicle location and navigation systems.

Dr. A.C. McEwen, Ph.D. (University of London), C.L.S., N.L.S., Cadastral studies, survey law, land registration systems, international land and maritime boundaries surveys for aboriginal land claims.

Dr. K.P. Schwarz, Dr.-Ing. (Summa cum laude; Technical University of Berlin), P.Eng., Geodesy, inertial techniques, airborne gravimetry, kinematic positioning and attitude determination by GPS/INS, multi-sensor systems, real-time applications.

New Faculty Member

Dr. Quazi Hassan was appointed in a faculty position in the area of Earth Observation for Energy and the Environment. Dr. Hassan holds a BSc in Electrical & Electronics Engineering from the Bangladesh Institute of Technology, and a M.S. in Remote Sensing & GIS from the Faculty of Engineering, University Putra Malaysia. He completed his PhD in Remote Sensing and Ecological Modelling from the University of New Brunswick, Faculty of Forestry & Environmental Management. His PhD focus was modeling forest productivity influenced by bio-physical variables using remote sensing and process-based models.



Adjunct Professors

Dr. Bo Huang

Chinese University of Hong Kong

Dr. Richard Klukas

UBC Okanagan

Dr. Don Leckie

Natural Resources Canada

Dr. Bryan Mercer

Intermap Technologies Corp.

Dr. Aboelmagd Noureldin

Royal Military College of Canada

Dr. Nico Sneeuw

Universität Stuttgart



AWARDS AND RECOGNITION

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

Jared B. Bancroft, **Ali Broumandan** and **Saloomeh Abbasiannik**, PhD and MSc candidates, received Best Presentation Awards at the 5th Annual Schulich School of Engineering Student Graduate Conference held in May 08

Richard Ong, now a MSc candidate, was awarded the Chancellor David B. Smith Gold Medal in Engineering and the APEGGA Education Foundation Gold Medal in Engineering in June 08 for his outstanding performance during his BSc studies

Aiden Morrison, PhD candidate, was selected by the Canadian Northern Studies Trust as recipient of the Research Opportunity in Arctic Environmental Studies for 2008-2009.

Dr. Danielle Marceau is now the Associate Head Graduate Studies effective Sept 1, 2008 for a three year term.

Dr. Derek Lichti received the ISPRS President's Citation from the International Society for Photogrammetry and Remote Sensing (ISPRS). The award was presented for his service as Chair of the ISPRS Working Group WG V/3 (Terrestrial Laserscanning) for the period 2004-2008.

Dr. Naser El-Sheimy, was elected by the general assembly of the International Society for Photogrammetry and Remote Sensing (ISPRS) as the president of Commission I (Sensors and Platforms) from 2008 to 2012.

The recipients of the 2008 Teaching Assistant Awards are **Wouter van der Wal** (Senior Excellence), **Axel Ebeling** (Junior Excellence), **Juliano Kersting**, **Taher Hassah**, **Chen Xu**, **Changjae Kim**, **Lance de Groot** (Senior Effectiveness), **Ana Kersting**, **Ala'a Kassab**, **Ahmed El-Ghazouly**, **Taher Hassan**, **Abdel Muhsen** (Junior Effectiveness)

The following six Graduate students won sponsorship awards to present their papers at the GNSS 2008 conference, held in Savannah, GA., **Ali Broumandan**, **Tao Lin**, **Pascal Gaggero**, **Daniele Borio**, **Pejman Kazemi**, **Changsheng Cai**, **Priyanka Aggarwal**. Additional Best Paper Awards were received by **D. Chiu**, **F. Ghafoori**, **Pejman Kazemi**, **Richard Klukas**, **Sid Kwakkel**, **Gérard Lachapelle**, **G. MacGougan**, **K. Muthuraman**, **Cillian O'Driscoll**, **Kyle O'Keefe**, **Susan Skone** and **R. Tiwari**.

Former PLAN Group students **Dr. John Raquet**, **Dr. Heidi Kuusniemi** and **Sameet Deshpande** won Best Paper Awards at the GNSS 2008 conference.

The Government of Canada has announced funding of \$800,000 towards Global Navigation Satellite System (GNSS) research at the Schulich School of Engineering through the Western Economic Diversification (WED) program . **Professors Gérard Lachapelle**, **Elizabeth Cannon** and **Mark Petovello** and their research team (PLAN) are developing next-generation GNSS receivers that are software, rather than hardware, based.

Dr. Michael Barry has been awarded the Holmlund Research Chair in Land Tenure and Cadastral Studies.

Dr. Andrew Hunter is this year's recipient of the Teaching Excellence Award for third and fourth year courses in Geomatics Engineering.

AWARDS AND RECOGNITION, continued

Professor Gérard Lachapelle was presented with The Institute of Navigation 2008 Capt P.V.H. Weems Award in Jan 2009.

Dr. Chaminda Basnayake (PLAN Group from 2001 to 2004) received the 2008 GM R&D's Charles L. McCuen Award.

Dr. Mark Petovello has been awarded highly competitive Alberta Ingenuity New Faculty Award for his research in "Collaborative signal tracking for improved satellite navigation".

Dr. Susan Skone figures prominently in the 2009 list of 20 Compelling Calgarians. The Calgary Herald newspaper compiles this annual list of Calgarians who stand out in their fields and will make significant contributions to the community.

Ali Broumandan, PhD candidate, received the IEEE Southern Alberta Section Best Student Paper Award at the ANTEM/URSI 2009, 13th International Symposium. The paper was co-authored by Professor **John Nielsen** and **Gérard Lachapelle**.

The application to the Networks of Centres of Excellence (NCE) Centre of Excellence for Commercialization and Research (CECR) program was successful in securing \$11.6 million for funding for a Centre of Excellence for Integrated Resource Management, with **Dr. Naser El-Sheimy** as lead applicant

Dr. Mike Barry is 2009 recipient of the Geomatics Engineering Professor of the Year Award. This award is based on excellence, enthusiasm and personality in teaching Engineering students throughout their academic years.

Dr. Mark Petovello was awarded the APEGGA (Association of Professional Engineers, Geologists and Geophysicists of Alberta) Early Achievement Award. The award, recognizes exceptional achievement in a person's early years of a professional career as an engineer, geologist or geophysicist.

Dr. Susan Skone and **Dr. Mark Petovello** were named to GPS World Magazine's "Top 50+ Leaders to Watch".

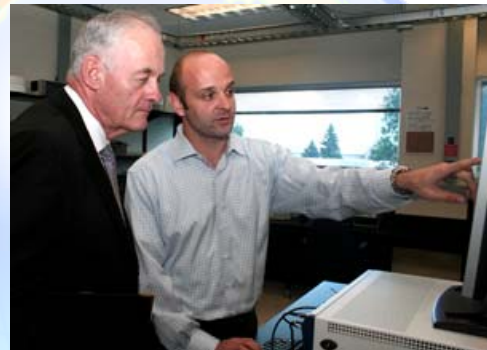


Susan Skone named to 2009 List of 20 Compelling Calgarians

Skone is working to improve the accuracy and timeliness of weather forecasts. Her research involves satellite navigation and various GPS applications including water vapour estimation for meteorology.



Gérard Lachapelle was presented with The Institute of Navigation 2008 Capt P.V.H. Weems Award for continuing contributions to the art and science of navigation at the International Technical meeting of the Institute held in Anaheim, CA.



Mark Petovello (right), explains the Global Navigation Satellite System to Art Hanger, Member of Parliament for Calgary NE.

Photo by Ken Bendiktsen

Support Staff Administrative



Marcia Inch, Administrative Manager
Monica Barbaro, Administrative Assistant
Julia Lai, Administrative Assistant
Lu-Anne Markland, Graduate Program Administrator



*Survey Camp 2008 Alex Ebeling,
Garth Wanamaker, Bill Teskey and Kirk Collins*



*Survey Camp 2008 Kirk Collins, Ala'a Kassab, Bill
Teskey, Alex Ebeling, Wouter van der Wal, Ahmed
El-Ghazouly, Anna Jarvis and Garth Wanamaker*

Support Staff Technical

Garth Wanamaker, BSc, Technical Manager
Kirk Collins, BSc, Dipl. Surveying & Mapping
Technology, Survey Technician
Kathy Hamilton, Network Technician Certificate,
Computer Technician
Gail Leask, Dipl. in Telecomputer Engineering
Technology, Microcomputer Lab Administrator

Research Engineers/Associates/Assistants

Daniele Borio
Positioning, Navigation and Wireless Location

Yu-Chuan Chang
GIS and Land Tenure

Mohamed El Habiby
Earth Observation

Jean Gabriel Hasbani
GIS and Land Tenure

Chen-Yu Hsieh
Positioning, Navigation and Wireless Location

Shui Liu
Positioning, Navigation and Wireless Location

Cecile Mongredien
Positioning, Navigation and Wireless Location

Hasan Murtaza
Positioning, Navigation and Wireless Location

Cillian O'Driscoll
Positioning, Navigation and Wireless Location

Rebeca Quinonez-Pinon
GIS and Land Tenure

Elena Rangelova
Earth Observation

Mohammed Sadeque
Positioning, Navigation and Wireless Location

Surendran Shanmugam
Positioning, Navigation and Wireless Location

Thomas Williams
Positioning, Navigation and Wireless Location

Bruce Wright
Positioning, Navigation and Wireless Location

Post Doctoral Fellows

Walid Abdel-Hamid
Positioning, Navigation and Wireless Location

Hamid Assilzadeh
Positioning, Navigation and Wireless Location

Chris Goodall
Positioning, Navigation and Wireless Location

Dongqing Gu
Positioning, Navigation and Wireless Location

Rossen Grebenitcharsky
Earth Observation

Yu-Shen Hsiao
Earth Observation

Changjae Kim
Digital Imaging Systems

Sameh Nassar
Positioning, Navigation and Wireless Location

Bas Straatman
GIS and Land Tenure

Zainab Syed
Positioning, Navigation and Wireless Location


Yuan Xin Wu
Positioning, Navigation and Wireless Location

Mohamed Youssef
Positioning, Navigation and Wireless Location

Ruifang Zhai
Digital Imaging Systems



Guest Lecturers



Dr. Lothar Gruendig
Technical University Berlin
Deformation Analysis with 3D Laser Scanning

Professor Michael Braasch
Avionics Engineering Centre—Ohio University
Iron Stomachs and White Knuckles: Navigation Flight Testing at the Ohio University Avionics Engineering Center

Mr. Quazi Hassan
University of New Brunswick
Species-specific site quality index based on environmental data generated from remote sensing imagery and a process-based model

Dr. Daniel Roman
U.S. National Geodetic Survey
Geodesy at U.S. National Geodetic Survey

Dr. Bernhard Rabus
MacDonald Dettwiler and Associates
SAR Interferometric Monitoring of Geo-Hazards

Professor Charles P.-A. Bourque
University of New Brunswick

Dr. Olivier Julien
Ecole Nationale de l' Aviation Civile, Toulouse
Advanced GNSS Receiver Technology

International Lecture Series

Professor Wolfgang Keller
University of Stuttgart
Wavelets in Geodesy and Geomatics

Special Lecture Series

Mr. Zolton Biacs
Director of Engineering, Qualcomm
Some Perspectives on Wireless Communications and Position Location Technology

Janet Neumann, Waldemar Kunysz, Sara Masterson
NovAtel Inc
New Product Innovations at NovAtel

Visiting Scientists

Dr. Mohammed Homeida
Chief-Surveying Services
Aramco

Distinguished Lecture Series

Congratulations to students who completed their graduate studies



Zainab Syed, PhD



Sidney Kwakkel, Msc



Mohamed Youssef, PhD



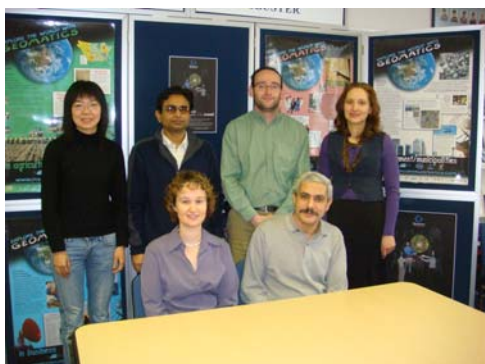
Priyanka Aggarwal, PhD



Chris Goodall, PhD



Wei Cao, MSc



Anna Jarvis, MSc



Chang-Jae Kim, PhD

ADVISORY COMMITTEES AND STUDENT AWARDS

Geomatics Engineering Advisory Committee (GEAC)

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.

The 32nd annual advisory committee meeting was held on Thursday, March 12, 2009. The agenda included discussions on the department strategic plan, the development of a geomatics related centre for Integrated Resource Management, the need to actively recruit undergraduate students, and discussions with undergraduate and graduate students to strengthen ties within the program and with industry.

Advisory Committee 2009

Name	Affiliation
Eric DesRoche, Chair	Intermap Technologies Corporation
Mohamed Abousalem	Hemisphere GPS
Arlin Amundrud	Global Surveys Ltd. (rep: Eryn Gibbs)
Nadia Namini	The City of Calgary
Steve Fediow	FUGRO SESL
Zoltan Biacs	Qualcomm
Tim Crago	North West Geomatics
Stephen Green	Focus Surveys Limited
Teresa Myrfield	Pacific Land Surveying Ltd.
Stuart Salter	Natural Resources Canada
Gary Zhang	MRF Geosystems Corporation
Representatives of the U of C - N. El-Sheimy, M.B. Barry, D.J. Marceau	



Geomatics Engineering Advisory Committee

Back row L to R, Mike Barry, Stephen Green, Tim Crago, Naser El-Sheimy, Eric DesRoche, Nadia Namini, Eryn Gibbs
 Centre row, Mohamed Abousalem, Zoltan Biacs, Danielle Marceau,
 Front row, Gary Zhang

Geomatics Engineering Liaison Committee (GELC)

The Geomatics Engineering Liaison Committee met on March 13, 2009. The committee was established to develop an effective and permanent relationship between the Land Surveyors' Associations and the University of Calgary. The committee consists of two delegates each from the Land Surveying Associations in the four western provinces and the Association of Canada Lands Surveyors, a member at large, as well as the Associates Heads and Cadastral faculty of the Department of Geomatics Engineering at the University of Calgary.

Peter Sullivan, Surveyor general of Canada, was welcomed as the first representative of the Federal Government on the Committee. Bronwyn Denton attended her first meeting as the ABCLS representative.

Discussions centered on the CCLS/CBEBS Accreditation evaluation team that will visit the U of C next year; feedback on Survey camp; and three new courses will be offered in the department, ENGO 333 (Computing for Engineers II), ENGO 103 (Survey Block Week course), ENGO 443 (Geodetic & Engineering Surveys)

Geomatics Engineering Liaison Committee 2009	
Name	Affiliation
Arlin Amundrud	Member at Large
Bronwyn D. Denton	Association of British Columbia Land Surveyors
Paul Dixon	Association of Canada Lands Surveyors
Marie Robidoux	Association of Canada Lands Surveyors
Victor Hut	Alberta Land Surveyors Association
Rob Radovanovic	Alberta Land Surveyors Association
Paul Standing	Association of Manitoba Land Surveyors
Roy Pominville	Saskatchewan Land Surveyors Association
Peter Sullivan	Surveyor General

Representatives of the U of C were M.B. Barry (Chair), N. El-Sheimy, W.F. Teskey, A.J. Hunter.



Geomatics Engineering Liaison Committee

Back row L to R, Victor Hut, Peter Sullivan, Bill Teskey, Mike Barry, Andrew Hunter, Kyle O'Keefe;
Front row, Bronwyn Denton, Marie Robidoux.

Student Awards Night

Student Awards Night was held on Tuesday, March 12, 2009. Awards night is an opportunity to publicly recognize the many accomplishments of our graduate and undergraduate students. It also provides an occasion for an informal meeting between members of the profession, students, faculty and other university representatives.

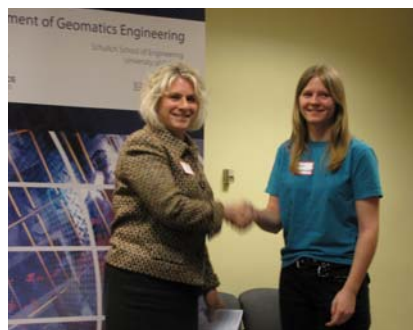
The number of awards available for our students continues to rise, thanks to the commitment of the Geomatics community to our program and to our students.



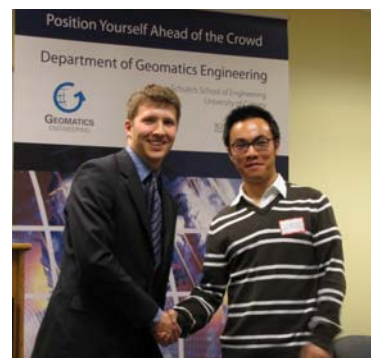
Geomatics Engineering Student Award Winners and Donors



Jerry Rasmuson and Ben Knoechel



Elizabeth Cannon and Jennifer Nordlund



Malcolm Richmond and Jacky Chow

Graduate Awards

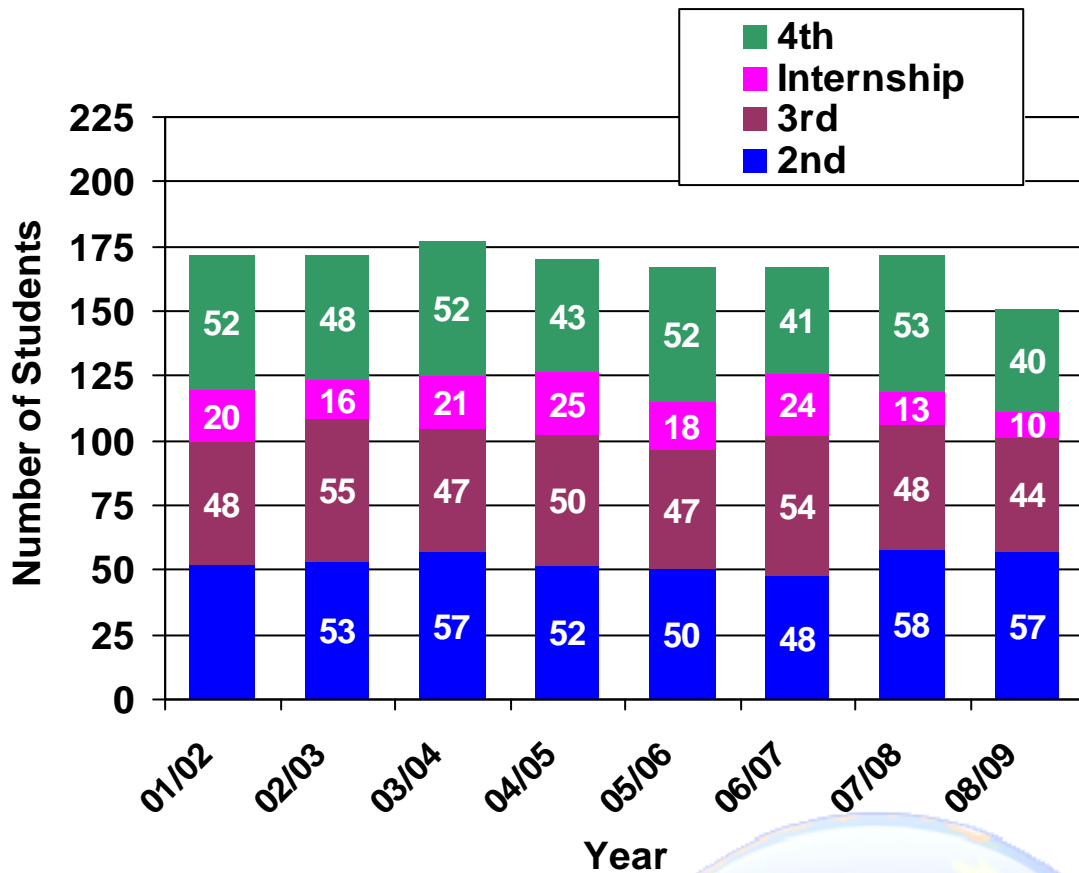
Recipient	Awards
Glenn MacGougan, Wes Teskey, Chengqian Zhang	Alberta Ingenuity Fund Awards
Mohamed Youssef	C. F. Gauss Award
Aiden Morrison Majeed Pooyandeh	Dean's Excellence Award
Ahmed El-Ghazouly	Eratosthenes Award
Mohamed Youssef	Faculty of Graduate Studies Doctoral Scholarship
Ahmed El-Ghazouly Ana Kersting	FGS Graduate Faculty Council Scholarship
Vidyavathy Renganathan	F.R. Helmert Award
Mohammed Daboor	Helmut Moritz Graduate Scholarship
Tracey Timmins	iCore Graduate Student Scholarship in ICT
Aiden Morrison Fang Wang	iCore Scholarship
Zainab Syed	Innovation in Mobile Mapping Award
Pejman Lotfali-Kazemi	Institute of Navigation (ION) Alberta Section Graduate Award
Kannan Muthuraman Florence Macchi	Institute of Navigation (ION) Graduate Award
Cyrille Gernot	Institute of Navigation (ION) National Award
Mohammad Upal Mahfuz	Jacques Cartier Award
Florence Macchi	KIS94 Graduate Scholarship
Yong Bian	L.R. (Dick) Walker Newby Award
Ivan Detchev Chris Goodall Erin Kahr Richard Ong Glenn MacGougan Wes Teskey Aiden Morrison Zainab Syed Jared Bancroft	NSERC Scholarship NSERC Scholarship NSERC CGSM Scholarship NSERC CGSM Scholarship NSERC CGS D2 Scholarship NSERC CGS D2 Scholarship NSERC CGS D Scholarship NSERC IPS Scholarship NSERC PGSM Scholarship
Taher Hassan	North West Group Scholarship
Axel Ebeling Cyrille Gernot	Werner Graupe International Fellowship in Engineering

Undergraduate Awards

Recipient	Awards
Edward Kendall Wingate	A.D. (Denis) Hosford Scholarship
Andrew Garrett Fraser	Alberta Land Surveyors' Association Scholarship
Michael Clayton Brand	British Columbia Land Surveyors Foundation Award
Michael Clayton Brand	British Columbia Land Surveyors Foundation H.R. Goldfinch Memorial Award
Jennifer Dawn Nordlund	Cannon-Lachapelle Family Scholarship
Jacky Chun Kit Chow	Colt Geomatic Solutions Ltd. Bursary
Lindsay Michael McEachern	David Scovill Memorial Bursary
Dominika Wcislo	E.J. Krakiwsky Bursary
Roman Anvarovitch Abdoullaev	Focus Intec Geomatics Bursary
Buke Chen Lindsay Michael McEachern Towfique Ahmed	Geomatics Engineering '25th Anniversary' Bursary
Jacky Chun Kit Chow	Geomatics Engineering Student Society Bursaries
Konrad James Paley	Green MacPhee Endowed Scholarship in Geomatics Engineering
Towfique Ahmed	Institute of Navigation Alberta Chapter Bursary
Lindsay Michael McEachern	Institute of Navigation (ION) Undergraduate Bursary
Ben Charles Knoechel	J.H. Holloway Scholarship in Geomatics Engineering
Andrew Garrett Fraser	Jerry J. Simpson Memorial Scholarship
Andrew Garrett Fraser	Jim Van Dam Scholarship
Ben Charles Knoechel	John Deyholos Memorial Award
Jennifer Dawn Nordlund	KIS-97 Undergraduate Scholarship
Samuel Richard Kiley-Kubik	L.R. (Dick) Newby Memorial Award
Jacky Chun Kit Chow	Leica Geosystems Limited Scholarship
Andrew Garrett Fraser	McElhanney Scholarship
Dominika Wcislo	Ray Lowry Memorial Bursary
Darren Peter Patkau	Saskatchewan Land Surveyors' Association Award
Ben Charles Knoechel	Stephen P. Williams Memorial Award

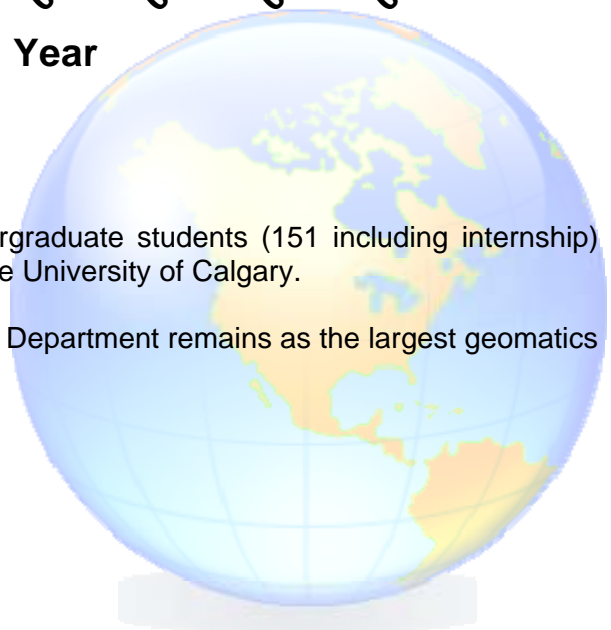
UNDERGRADUATE STUDIES

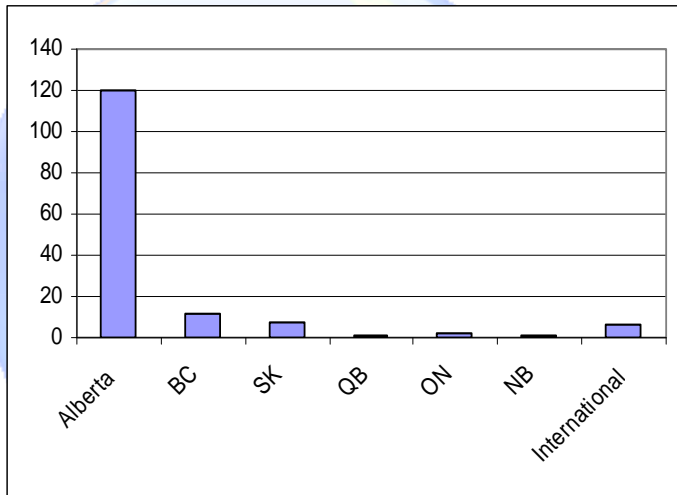
Enrollment



During the 2008/09 academic year, 141 undergraduate students (151 including internship) pursued studies in Geomatics Engineering at the University of Calgary.

Despite a small decline in student numbers, the Department remains as the largest geomatics engineering school in Canada.





The figure to the left shows a breakdown of student enrollment by geographic region. Students from Alberta remain the largest group, and numbers from the other groups remain fairly constant from year to year.

Student Enrollment by Geographic Region



*Student Survey Exercise,
Springbank October 07, 2008*



Career Day February 12, 2009

COMMON CORE CURRICULUM

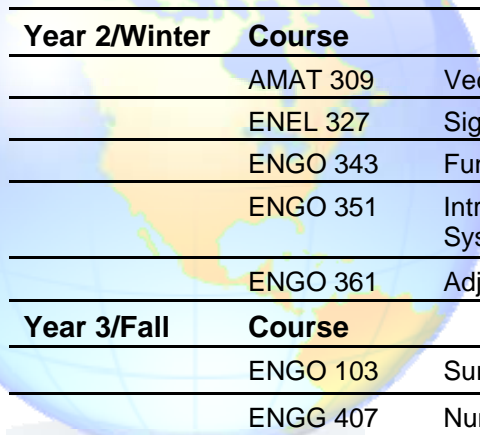
The common curriculum for engineering students is shown in the adjacent table.

Students choose their department at the end of the first year and begin studies specific to that department in of second year.

Common Program for All Engineering Students

Year 1	Course Number	Course Name
	AMAT 217	Calculus for Engineers and Scientists
	AMAT 219	Multivariable Calculus for Engineers
	CHEM 209	General Chemistry for Engineers
	ENGG 201	Behaviors of Liquids, Gases and Solids
	ENGG 205	Engineering Mechanics I
	ENGG 233	Computing for Engineers I
	ENGG 251	Design and Communications I
	ENGG 253	Design and Communications II
	MATH 221	Linear Algebra for Scientists and Engineers
	PHYS 259	Electricity and Magnetism
	COST -1	Complementary Studies Course
Year 2 (Fall)		
	AMAT 307	Differential Equations for Engineers
	ENGG 319	Probability and Statistics for Engineers
	ENGG 325	Electric Circuits and Systems
	ENGO 333	Computing for Geomatics Engineers
	ENGG 349	Engineering Mechanics II
	PHYS 369	Acoustics, Optics and Radiation for Engineers
Abbreviations		
	AMAT	Dept. of Mathematics & Statistics
	CHEM	Dept. of Chemistry
	COST	Complementary Studies Course
	ENGG	Faculty of Engineering
	ENGO	Dept. of Geomatics Engineering
	PHYS	Dept. of Physics

Undergraduate Curriculum in Geomatics Engineering



Year 2/Winter	Course	
	AMAT 309	Vector Calculus for Engineers
	ENEL 327	Signals and Transforms
	ENGO 343	Fundamentals of Surveying
	ENGO 351	Introduction to Geospatial Information Systems
	ENGO 361	Adjustment of Observations
Year 3/Fall	Course	
	ENGO 103	Survey Block Week
	ENGG 407	Numerical Methods in Engineering
	ENGO 421	Coordinate Systems
	ENGO 431	Principles of Photogrammetry
One of:	ENGO 443	Geodetic and Engineering Surveys
or	ENGO 451	Design and Implementation of GIS
	COST-2	Complementary Study
Year 3/Winter	Course	
	ENGO 419	Geomatics Networks
	ENGO 423	Geodesy
	ENGO 435	Remote Sensing
	ENGO 455	Land Tenure & Cadastral Systems
	ENGO 465	Satellite Positioning
	COST-3	Complementary Study
Year 4/Fall	Course	
	ENGO 500	Geomatics Engineering Project
	ENGO 501	Field Surveys
	TE-1	Technical Elective
	TE-2	Technical Elective
	TE-3	Technical Elective
	COST-4	Complementary Study
Year 4/Winter	Course	
	ENGO 500	Geomatics Engineering Project
	COST-5	Complementary Study
	COST-6	Complementary Study
	TE-4	Technical Elective
	TE-5	Technical Elective
	TE-6	Technical Elective

Technical Electives in Geomatics Engineering

Course	
BSEN 395	Business Law for Strategic Decision Makers
BMEN 509	Intro to BMEN Imaging and Applications
BMEN 513	Photogrammetric Techniques
ENGO 531	Advanced Photogrammetric and Ranging Techniques
ENGO 545	Hydrography
ENGO 551	Special Topics in GIS
ENGO 559	Digital Imaging and Applications
ENGO 563	Data Analysis in Engineering
ENGO 567	High-Precision Surveys
ENGO 573	Digital Terrain Modelling
ENGO 579	Survey Law and Practice
ENGO 581	Land Use Planning
ENGO 583	Environmental Modelling
ENGO 585	Wireless Location

GEOMATICS ENGINEERING STUDENT SOCIETY (GESS)

President—Malcolm Richmond
 VP Finance—Sam Kiley-Kubik
 VP Academic—Tammy Smith
 VP Events—David Getzlaf
 VP External—Dan Grover
 Secretary—Kim Yeats
 2nd Year Rep—Bryan Leedham
 3rd Year Rep—Mandy Ferrari
 4th Year Rep—Mitchell Rose
 Webmaster—Parker Badger
 Photographer—Alexander Muir
 Athletics Commissioner—Darren Patkau
 Career Day—Brian Moynihan



Back row L to R: Mitchell Rose, Mandy Ferrari, Kim Yeats, Darren Patkau,
 Alexander Muir, Malcolm Richmond, Sam Kiley-Kubic
 Front: L to R: Parker Badger, David Getzlaf, Dan Grover, Tammy Smith.

GEOMATICS ENGINEERING SURVEY CAMP AT KANANASKIS

An important part of the undergraduate degree program in Geomatics Engineering is the field camp (ENGO 501). This two week camp is held at the Kananaskis Centre for Environmental Research, prior to the start of the Fall Session. It gives incoming fourth year students the opportunity to apply the knowledge and experience gained in the different areas of geomatics to an integrated practical project.

The Department of Geomatics Engineering would like to thank the following companies for their participation in the annual Survey Camp Equipment Day, or for the generous loan of equipment over the duration of Survey Camp:

- Butler Survey Supplies Ltd.*
- Cansel Survey Equipment*
- Spatial Technologies*



Survey Camp 2008

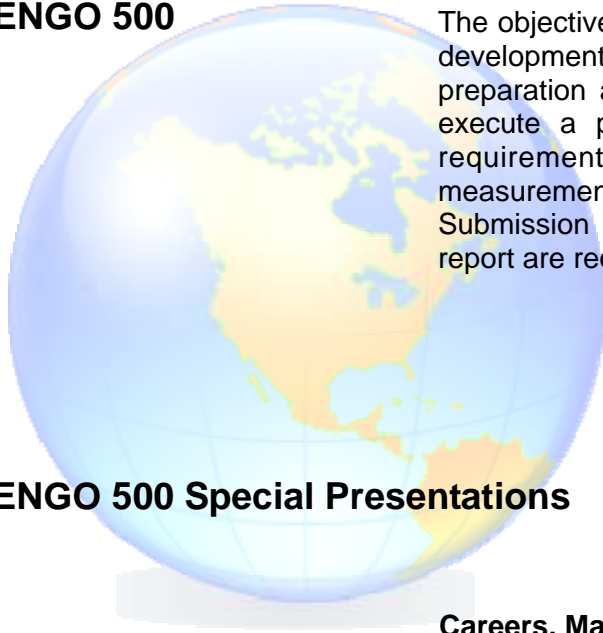
ENGINEERING INTERNSHIP PROGRAM

This program offers an optional cooperative educational work experience for all students who have completed their third year of engineering. Participants spend 12 to 16 months in paid jobs, with companies, gaining valuable geomatics experience.

Student Name	Placement Company	Faculty Mentor
Anderson, Kristine	Autodesk Inc.	Steve Liang
Houghton, Joshua	NovAtel Inc.	Gerard Lachapelle
Knoechel, Ben	Intermap Technologies Corporation	Ayman Habib
Li, Bo	NovAtel Inc.	Yang Gao
Li, Haochang	Focus	Bill Teskey
Preston, Troy	Fugro SESL Geomatics Ltd.	Andrew Hunter
Shiratate, Hitomi	Petro Canada	Alex Braun
Sobieraj, Scott	CDL Systems Ltd.	Xin Wang
Soo, Vincent	National Energy	Danielle Marceau



ENGO 500



The objective of the ENGO 500 group project course is the development of skills in cooperative research, report preparation and seminar presentation. Students plan and execute a project that must conform with professional requirements. The project must have design, measurement, analysis and presentation components. Submission and defense of progress reports and a final report are required.

ENGO 500 Special Presentations

Careers, Management, and Leadership

Matthew Tait
Worley Parsons

2007-8 ENGO 500 Experiences

Sid Kwakkel
Geomatics Engineering

The Human Factor In Management

Mohamed Abousalem
GPS Hemisphere

Projects Management: Simple Problems and Wicked Problems

Mike Barry
Geomatics Engineering

Licensing Your Invention

David Reese & Leah McCartney
UTI

Company Formation

Peter Santosham
UTI

Practical Offshore Project Management

Bruce Calderbank
Hydrographic Survey Consultants Intl. Ltd.

GIS Project Management

Gary Zhang
MRF Geosystems

ENGO 500 GROUPS 2008/2009

Project Title	Group Members	Supervisor
Well-Site Access Planning in Alberta using Space and in Situ Tools	Horatiu Caraba, Sean Kurash, Dustin Engen	Braun
MATLAB-based Visualisation Tool for Polarimetric SAR Image Data.	David Getzlaf, Shawn Tse, Lucie Boucher	Collins
Quality Control of LiDAR Data	Mark Tang, Jie Qing, Andrew Fraser	Habib
Amending Standard Practice for Consistency in GPS use for Surveying	Malcolm Richmond, Mitchell Rose, Kim Yeats	Hunter
Analysis of Ocean Circulation from Satellite Altimetry-Derived Bathymetry	Ryan Lisowski, Brian Ngan, Thomas Bollmann	Kim
Development of a Sensor Web for Environmental Monitoring in the Rockies	Jason Workman, James Badger, Peter Eykens	Liang
Human Torso Measurement Using a Laser Range Camera	Jacky Chow, Justin Waghray, Tammy Smith	Lichti
Development of an Inuit Hunter Tracking and Visualization System	Ryan Enns, Edward Wingate, Michael Brand	O'Keefe
Development and Testing of Inter-Vehicle Baseline Determination Software	Eduardo Infante, Olga Flerkevitch, Darren Swerid	Petovello
Levelling by GPS and the Geoid in Alberta	Darren Patkau, Sam Kiley-Kubik, Bill Gavinchuck	Sideris
GNSS Reference Station Design	Billy Chan, Buke Chen, John Bird	Skone
Deformation Monitoring with Heterogeneous Data	Austen Chyzyk, Brian Moynihan, Dan Grover	Teskey
Design and Implement a Spatial Clustering Analysis Software	Emily Kern, Derek McLennan, Amina Bayram	Wang

GEOMATICS ENGINEERING CAREER DAY

On Thursday, February 12, 2009, the Geomatics Engineering Student's Society and the Department of Geomatics Engineering hosted their thirteenth annual Career Day. Career Day provides a forum for both companies and students to interact and discuss topics and career opportunities in the Geomatics industry. Several guest speakers made presentations on various topics throughout the day. In addition to these presentations, students and company representatives participated in the Industry Showcase, which was introduced to provide all participants with an opportunity to discuss careers in Geomatics.

The Geomatics Engineering Student's Society would like to thank all participants and sponsors for making this year's Career Day a success.

Career Day Participants 2009

Aerotec USA	Alberta Land Surveyors' Association
Applanix Corporation	Association of BC Land Surveyors
Association of Canadian Land Surveyors	Caltech Surveys Ltd.
Canadian Institute of Geomatics	CDL Systems Ltd.
Challenger Geomatics	Destiny Resources
Eclipse Geomatics & Engineering Ltd.	Focus
Global Surveys Group	Hemisphere GPS
Jones Geomatics Ltd.	Intermap Technologies
MMM Group	McElhanney Consulting Services Ltd.
McElhanney Land Surveys Ltd.	Midwest Surveys Inc.
MNC	Natural Resources Canada
Nexen Inc.	The Orthoshop
PCI Geomatics	Saskatchewan Land Surveyors Association
Stantec Geomatics Ltd.	Stewart, Weir & Co. Ltd.
Towill, Inc	Tri-City Surveys Ltd.
Trimble Navigation	Underhill Geomatics

GRADUATE STUDIES

Enrollment

The number of graduate students remained fairly steady with a total of 125 students (111 full-time, 14 part-time). During the academic year 2008/2009, students were either enrolled in the graduate program or finishing their theses. Sixty-one were working towards their PhD degree, 56 towards their MSc degree and 8 towards their MEng degree. Students originated from 14 different countries. There were 22 students that graduated during the reporting period, 7 with a PhD degree, 13 with a MSc and 2 with a MEng. Details are given in the following tables.

Full-time PhD Students 2008/2009

Name	Supervisor	Name	Supervisor
Aggarwal, Priyanka	El-Sheimy	Megahed, Dina Reda	Lachapelle/O'Driscoll
Al-Fanek, Ossama	Skone	Morrisen, Aiden	Lachapelle/Cannon
Anwar, Morshed Sk.	Marceau	Moussa, Adel	El-Sheimy
Baek, Jin	Kim	Muthuraman, Kannan	Lachapelle/Klukas
Bancroft, Jared	Lachapelle/Cannon	Nicholson, Natalya	Skone/Cannon
Bang, Ki In	Habib	Orlob, Martin	Braun
Bian, Yong	Mercer	Osman, Mostafa	El-Sheimy
Broumandan, Ali	Lachapelle/Nielsen	Poncos, Valentin	Collins
Dabboor, Mohammed	Braun	Pooyandeh, Majeed	Marceau
Ebeling, Axel	Teskey	Raaflaub, Lynn	Valeo
Eid, Hassan	El-Sheimy	Renganathan, Vidavathy	Braun
El-Ghazouly, Ahmed	El-Sheimy	Roux, Lani	Barry
Ellum, Cameron	El-Sheimy	Saeedi, Sara	El-Sheimy
Gernot, Cyrille	Lachapelle/O'Keefe	Saylam, Kutalmis	Habib
Ghafoori, Fatemeh	Skone	Shi, Jun bo	Gao
Goodall, Christopher	El-Sheimy	Sun, Debo	Cannon/Petovello
Hassan, Taher	El-Sheimy	Syed, Zainab	El-Sheimy
Kamel, Ahmed	Lachapelle	Tang, Feng	Sideris/Gao
Kersting, Ana	Habib	Teskey, Wesley	El-Sheimy
Kersting, Juliano	Habib	van der Wal, Wouter	Sideris
Kieser, Michael	Marceau	Wang, Fang	Marceau
Kim, Changjae	Habib	Whittal, Jennifer Frances	Barry
Kim, Kwangbae	Kim	Wijesekara, Gayan	Marceau
Kwak, Eunju	Habib	Xu, Feng	Gao
Lotafali Kazemi, Pejman	Lachapelle/O'Driscoll	Youssef, Mohamed	El-Sheimy/Noureldin
Macchi, Florence	Lachapelle	Yuksel, Yigiter	El-Sheimy
MacGougan, Glenn	O'Keefe	Zhang, Chengqian	Collins
Maghsoudi, Yasser	Collins		

Full-Time MSc and MEng Students 2008/2009

Name	Supervisor	Name	Supervisor
MSc Students			
Abbasiannik, Saloomeh	Petovello	Luo, Ping	Petovello
Afzal, Muhammad	Lachapelle	Ma, Martin	Lachapelle
Anantharamu, Pratibha	Lachapelle/Cannon	Mahfuz, Mohammad Upal	Lachapelle/Nielsen
Cai, Changsheng	Gao	Miller, Chase	O'Keefe
Cao, Wei	Cannon/O'Keefe	Mohammadi, Ehsan	Hunter
Chang, Yu Chuan	Habib	Molero, Richard	Barry
Chiu, David Sung – Tat	O'Keefe	Muhsen, Abdel Rahman	Barry
de Groot, Lance	Skone/O'Keefe	Ni, Jingwen	Couloigner
Detchev, Ivan	Habib	Omran, Nabila	El-Sheimy/Habib
Du, Shuang	Gao	Ong, Richard	Lachapelle/Petovello
Feng, Man	Skone	Pahadia, Anshu	Lachapelle
Fraser, Scott	Marceau	Rezel, Rohana Deshapriya	Liang
Gu, Wei	Wang	Sadeque, Mohammed	Skone
Haddad, Oday	Skone	Shunnar, Thaer	Barry
Ince, Elmas	Sideris	Sokolova, Nadezda	Lachapelle/Borio
Izadpanah, Ashkan	Lachapelle/O'Driscoll	Taghvakish, Sina	Braun
Jarvis, Anna Marie	Habib	Tao, Wenyong	Gao
Jamtsho, Sonam	Lichti	Timmins, Tracy L.	Hunter/Barry
Jha, Maya Nand	Gao	Tiwari, Rajesh	Skone
Kahr, Erin	O'Keefe	Wang, Da	O'Keefe
Kassab, Ala'a Shawqi	Gao/Liang	Wang, Jing	Wang
Kim, Kyoung-Min	Habib	Xie, Peng	Petovello
Knezevic, Aleksander	Lachapelle	Zaheri, Mohammadreza	Lachapelle
Kwakkel, Sidney	Lachapelle/Cannon	Zhang, Zhan	Blais
Li, Tao	Lachapelle/Petovello	Zhao, Xing (Bob)	El-Sheimy
Lin, Tao	Lachapelle	Zheng, Botao (Shirley)	Marceau
Liu, Hang (Terry)	El-Sheimy		
MEng Students			
Alghamdi, Yousif	Habib	Liakopoulos, Alexandros	Kim/Sideris
Khan, Muhammad	El-Sheimy		

Part-time Graduate Students 2008/2009

Name	MEng	MSc	PhD	Supervisor
Ali, Ibraheem			1	Braun/Sideris
Boby, Micheal James		1		El-Sheimy
Charkhand, Behtash	1			El-Sheimy
Ching, Kwan Kit (Stephen)	1			Cannon
El-Gizawy, Mahmoud L			1	El-Sheimy
Garin, Lionel			1	Lachapelle
Joseph, Angelo			1	Lachapelle
Kent, Steve	1			Blais
Radons, Charlene Marcia	1			Skone/O'Keefe
Salimi, Nazila		1		Lachapelle/Nielsen
Wang, Min			1	Gao
Wu, Qiang			1	Barry
Zhang, Hongmin (Holly)	1			Collins
Zheng, Bo			1	Lachapelle
Total	5	2	7	

External Convocants Supervised by ENGO Faculty

Name	Degree	Date	Graduate Thesis Title	Co-Supervisor	Dept/Institution
Giorgio Giordanengo	MSc	Jan 09	Impact of Notch Filtering on Tracking Loops for GNSS Applications	Petovello/Borio	Politecnico di Torino
Mohammed El-Delgawy	PhD	Jan 09	Utilization of Linear and Areal Features in Photogrammetric Applications	Habib	Cairo University (Egypt)
A. Martinetti	MSc	Feb 09	Comparison of Standard and Generalized Post-Correlation Differential Coherent Detection Strategies for Weak GNSS Signal Acquisition	Borio/Lachapelle	Politecnico di Torino
David Belton	PhD	Feb 09	Classification and Segmentation of 3D Terrestrial Laser Scanner Point Clouds	Lichti (Supervisor)	Curtin University of Technology
Andrew Hansen	PhD	Feb 09	Semi-automated Geomorphological Mapping Applied to Landslide Hazard Analysis	Lichti (Supervisor)	Curtin University of Technology

Graduate Studies Convocants 2008/2009

Name	Degree	Date	Graduate Thesis Title	Supervisor
Salomeh Abbasiannik	MSc	Mar 09	<i>Multichannel Dual Frequency GLONASS Software Receiver in Combination with GPS L1 C/A</i>	Petovello
Mahmoud Lofy El-Gizawy	PhD	Jan 09	<i>Continuous Measurement While Drilling Utilizing MEMS Inertial Sensors</i>	EI-Sheimy
Priyanka Aggarwal	PhD	Feb 09	<i>Development of Particle Filter Techniques for the Fusion of Multi Sensor Data</i>	EI-Sheimy
Wei Cao	MSc	Feb 09	<i>Multi-frequency GPS and Galileo Kinematic Positioning with Partial Ambiguity Fixing</i>	Cannon/ O'Keefe
Ashkan Izadpanah	MSc	Dec 08	<i>Parameterization of GPS L1 Multipath Using a Dual Polarized RHCP/LHCP Antenna</i>	Lachapelle/ O'Driscoll
Chang-Jae Kim	PhD	Dec 08	<i>Object-Based Integration of Photogrammetric and LiDAR Data for Accurate Reconstruction and Visualization of Urban Environments</i>	Habib
Sidney Kwakkel	MSc	Dec 08	<i>Human Lower Limb Kinematics Using GPS/INS</i>	Lachapelle/ Cannon
Anna M. Y. Jarvis	MSc	Dec 08	<i>Integration of Photogrammetric and LiDAR Data for Accurate Reconstruction and Visualization of Urban Environments</i>	Habib
Zainab Fatima Syed	PhD	Dec 08	<i>Design and Implementation Issues of a Portable Navigation System</i>	EI-Sheimy
Chris Lockett Goodall	PhD	Dec 08	<i>Improving Usability of Low-Cost INS/GPS Navigation Using Intelligent Techniques</i>	EI-Sheimy
Nazila Salimi	MSc	Dec 08	<i>Development of a General Real-Time Multi-Channel IS-95 CDMA Receiver for Mobile Position Location</i>	Lachapelle/ Nielsen
Mohammed Zafer Sadeque	MSc	Dec 08	<i>Quantifying Ionospheric Impact on GNSS Users and Developing Ionospheric Warning System for Middle and High Latitude Region</i>	Skone
Abdel Rahman M. A. Muhsen	MSc	Nov 08	<i>Developing Multimedia Land Record System</i>	Barry
David Sung-Tat Chiu	MSc	Nov 08	<i>Ultra Wideband Augmented GPS</i>	O'Keefe
Mohamed Youssef	PhD	Nov 08	<i>A Cross-Layer Wireless Location Techniques</i>	EI-Sheimy
Yu-Chuan Chang	MSc	Sep 08	<i>A Photogrammetric System for 3D Reconstruction of a Scoliotic Torso</i>	Habib
Mohammad Upal Mahfuz	MSc	Aug 08	<i>Enhanced Detection of GNSS Signals Based on Spatial Combining</i>	Lachapelle/ Nielsen
Behdash Charkhand	MEng	July 08	<i>n/a</i>	EI-Sheimy
Wenyao Tao	MSc	July 08	<i>Real-time GPS PPP –inferred Water Vapor System Development and Evaluation</i>	Gao
Jennifer Frances Whittal	PhD	July 08	<i>Fiscal Cadastral Systems Reform: A Case Study of Cape Town</i>	Barry
Hongmin Zhang	MEng	Jun 08	<i>n/a</i>	Collins
Lance Roland de Groot	MSc	Jun 08	<i>Use of the Global Environmental Multiscale Model of Atmospheric Retrieval from Radio Occultation for Canadian Events</i>	Skone

Graduate Seminars 2008/2009

SPEAKER	TOPIC
Kannan Muthuramam	Evaluation of Data/Pilot Combined Carrier Frequency Tracking for GPS-L2C Signals
Mohammed Sadeque	Prediction of Ionospheric Impact on GNSS Users over Middle and High Latitude Region
Chris Goodall	On-Line Tuning Of A Kalman Filter For High Production INS/GPS Navigation Systems
Abdel Muhsen	Developing Multimedia Land Records Systems
Jennifer Whittal	An Overview Of Research In Fiscal Cadastral Systems Reform
Upal Mahfuz	Optimum Multi-Antenna Detection of GNSS Signals Indoors
Sidney Kwakkell	Gait Kinematics During Walking and Running Using Inertial Sensors
Zainab Syed	Design And Implementation Of A Portable Navigation System
Wei Cao	Performance Evaluation of Combined GPS/Galileo Multi-frequency RTK Positioning Using Single-difference Processing
Dina Megahed	Combined L1/L5 Carrier Phase Tracking for Weak Signal Environments
Priyanka Aggarwal	Hybrid Extended Particle Filter for integrated INS/GPS systems
Anna Jarvis	Utilizing the Complimentary Nature of Photogrammetric and LiDAR Data for Improved DSM and True Ortho-imagery Generation Over Urban Areas
Mohamed Youssef	Robust Cooperative Localization Techniques for Wireless Sensor Networks
Ashkan Izadpanah	GPS Multipath Parameterization Using Kalman Filtering And Dual Polarization Techniques
Yong Bian	Polarimetric SAR Interferometry Processing
Saloomah Abbasiannik	GLONASS Software Receiver
Maya Nand Jha	Development of a Real-time Oil Spill Detection and Decision Support System using Laser Fluorosensors and Event-Driven GI
Mahmoud El-Gizawy	INS – Based Borehole Surveying System in Oil and Gas Drilling Applications
Lionel Garin	Wireless Sensor Network-Based Distributed GNSS Receiver Architecture For Infrastructure Monitoring
Jared Bancroft	Multiple IMU Integration for Vehicular Navigation
Glenn MacGougan	Introducing Tightly Coupled Ultra-Wideband and GPS for RTK Surveying
Wouter van der Wal	Contributions of Time-variable Satellite Gravity Data to Postglacial Rebound modeling with Different Rheologies
Mohammed Dabboor	Histogram-Based Segmentation Of Alos Polarimetric Sar Data
Changsheng Cai	Combined GPS and GLONASS PPP Using dual Frequency Code and Carrier Phase Observations
Wesley Teskey	Removal of Movement Disorder Components of Signals Gathered from Human Motion Using Inertial Sensors and a Computer Mouse
Pejman Lotfali- Kazemi	Optimum Digital Filters for GNSS Tracking Loops

RESEARCH

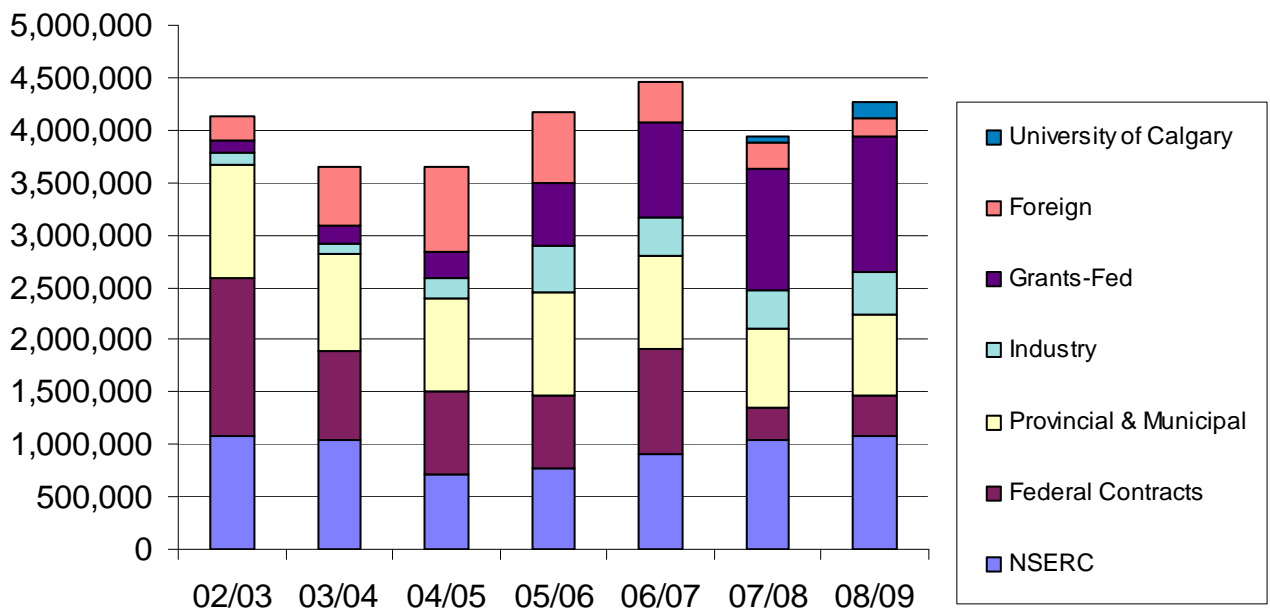
Research Statistics

Research is an integral part of Department activities. It allows individual faculty members to stay at the leading edge of their area of specialization and to apply their knowledge to current problems in industry and government. It also provides funding for research associates and graduate students. It thus supports the education of highly trained future engineers and the teaching activities of the Department.

Direct research funding for this report year was at \$4,267,462.



**Direct Research Funding by Source
2002/03 to 2008/09**

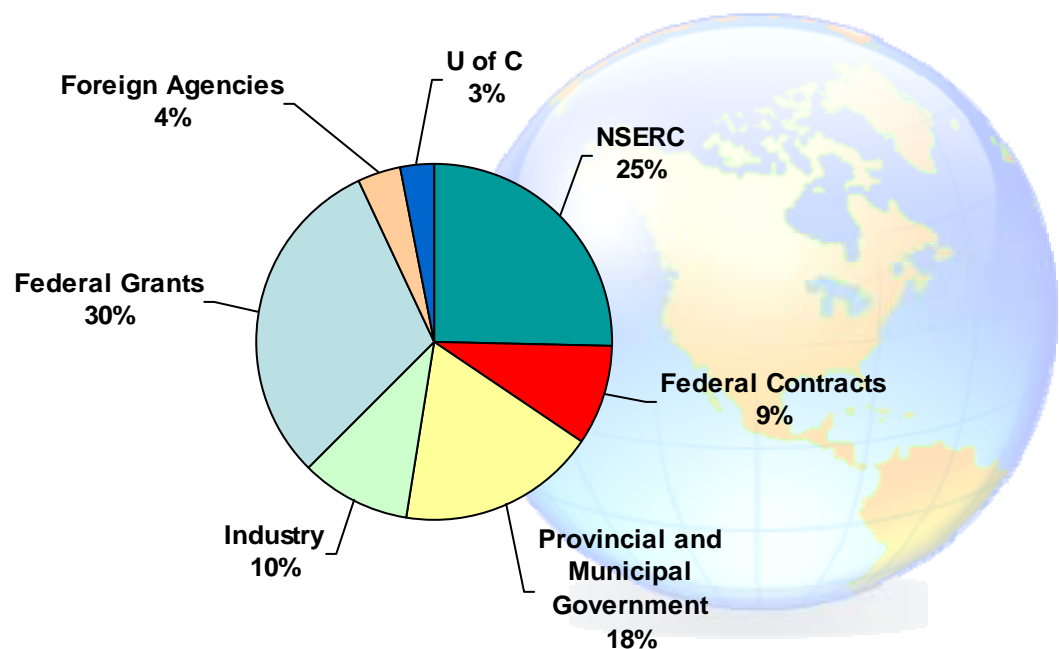


**Research Grants and Contracts for the Period
April 1, 2008 – March 31, 2009**

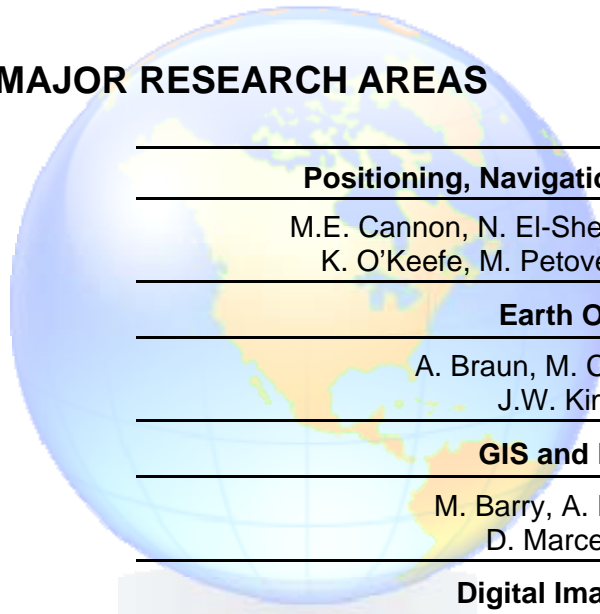
Source	Amount
NSERC	\$1,076,818
Federal Government Contracts	392,884
Federal – Grants	1,275,475
Provincial and Municipal Government	761,708
Industry	422,008
Foreign Agencies	191,546
University of Calgary	147,023
Direct Research Support	4,267,462
Research Scholarships	\$533,227
Total Research Support	\$4,800,689

The figure on the previous page shows direct research funding for the last seven years and the one below shows the research funding by source for 2008/2009

Direct Research Funding by Source 2008/09



MAJOR RESEARCH AREAS



Positioning, Navigation and Wireless Location

M.E. Cannon, N. El-Sheimy, Y. Gao, G. Lachapelle,
K. O'Keefe, M. Petovello, S. Skone, W. Teskey

Earth Observation

A. Braun, M. Collins, Q. Hassan,
J.W. Kim, M. Sideris

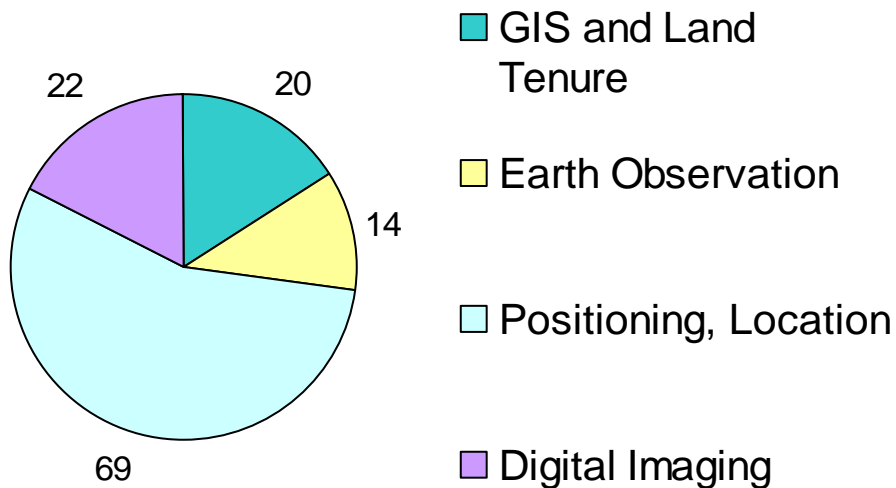
GIS and Land Tenure

M. Barry, A. Hunter, S. Liang,
D. Marceau, X. Wang

Digital Imaging Systems

A. Habib, D. Lichti,

Graduate Student Distribution by Area May 2008—April 2009



Research projects being conducted in the above major research areas are listed in tables on pages 39 to 43.

The number of graduate students working in each area is indicated in the above figure. Some factors in the distribution of students are: the number of faculty members per research area, and the number of new faculty members in the department that are currently in the early stages of recruiting students and building their research groups.

Projects in Positioning, Navigation and Wireless Location

Project Name	Contract Type	Faculty Investigators
Animal tracking by dead reckoning: UTI Commercialization Support	Industry	A. Hunter
A National System for Water Vapour Estimation Using GPS and its Applications	Federal	Y. Gao S. Skone
Adaptive and Flexible GNSS Technology Development for Automotive Systems	NSERC Provincial Industry	G. Lachapelle K. O'Keefe M. Petovello
Adaptive Integration Techniques for Low-cost Integrated Navigation Systems	NSERC	N. El-Sheimy
Advanced GNSS Signal Processing Techniques for Indoor Location	NSERC	G. Lachapelle
Alberta Ingenuity Fund - Research Allowance-Studentship	Provincial	K. O'Keefe
Alpine Canada Alpine Sponsorship Agreement	Industry	G. Lachapelle
Autonomous Navigation, Attitude Determination and Atmospheric Profiling for Nanosatellite Missions	Industry Federal	S. Skone
Collaborative Signal Tracking for Improved Satellite Navigation.	Provincial	M. Petovello
Canada Research Chairs Program	Federal	N. El-Sheimy
Development of a Meteorological Probe for Aircraft	Federal	N. El-Sheimy S. Skone
Development of a Two Component Personal Navigation System	Federal	N. El-Sheimy A. Hunter
Development of a Humidity and Temperature Probe with MEMS-based Inertial Ref. for Aircraft Use	Industry	N. El-Sheimy
Development of Reconfigurable GNSS Software Receivers	Federal	M.E. Cannon G. Lachapelle M. Petovello
Eyeunite integrated consumer navigation systems - Idea to Innovation (I2IPJ)	NSERC	N. El-Sheimy
General Research in Wireless Location	Foreign	G. Lachapelle
Geo-Intelligent Collaborative Decision Support System for Real-Time Disaster & Emergency Management	Industry	Y. Gao G. Lachapelle
Geomatics Enhancements with Dual Use of GPS II/III and Galileo: High Accuracy Position with GPS & Galileo	Federal	M.E. Cannon Y. Gao N. El-Sheimy R. Klukas
Global Differential GNSS Positioning and Navigation	NSERC	Y. Gao
GPS Location Technologies for Personal Digital Assistants	Provincial Industry NSERC	M.E. Cannon G. Lachapelle M. Petovello
iCORE Chair in Wireless Location	Provincial	G. Lachapelle
Integrated Vehicle Navigation of Communication Systems Development	Federal	M.E. Cannon G. Lachapelle

Projects in Positioning, Navigation and Wireless Location, continued

Project Name	Contract Type	Faculty Investigators
Integration of Kinematic GPS with Emerging Inertial Measurement	NSERC	M.E. Cannon
Intelligent Information Infrastructure for Wireless Multi-Sensor Motes Applications	NSERC Industry	N. El-Sheimy
Intelligent Structural Monitoring Project	NSERC	W. Teskey N. El-Sheimy
Intelligent Structural Monitoring	Industry	W. Teskey
Market Study and Business Model for EyeUnite	Federal	N. El-Sheimy
Mitigation of Atmospheric Effects on GNSS	NSERC	S. Skone
Multi-Sensor Navigation Systems	Federal	N. El-Sheimy
Multi-Sensor System for Improved Quality of Life	Federal	N. El-Sheimy
Multi Sensor Systems for Tracking and Mobility Applications	Federal	N. El-Sheimy
Next Generation Direct Geo-Referencing Technology for Airborne Mapping	NSERC	N. El-Sheimy Y. Gao
NSERC Discovery Grant Supplement	NSERC	N. El-Sheimy
Observation and Modelling of Radio Frequency Propagation for Improved Wireless Location in Urban and Indoor Environments	NSERC	K. O'Keefe
Signal Tracking and Measurement Infrastructure to Support Wireless Location and Communications Research	Federal	G. Lachapelle M. E. Cannon
Space Weather Hazards: Monitoring & Mitigation	NSERC	S. Skone G. Lachapelle
Tactical Outdoor Positioning Systems (TOPS)	Federal	G. Lachapelle
Turtle Mountain Deformation Monitoring	Provincial	W. Teskey
Ultra-Tight Software HSGPS/INS Receiver Phase II	Federal	G. Lachapelle M. Petovello
Wireless Location in Geomatics with the Emerging GPS II/III and Galileo Systems	Federal	G. Lachapelle M.E. Cannon
Wireless Location with GPS II/III and Galileo	Federal	G. Lachapelle M.E. Cannon

Projects in Earth Observation

Project Name	Contract Type	Faculty Investigators
Advancing Coastal Hazard Assessment with Satellite Geodesy	Federal	A. Braun M. Sideris
Analysis of Bathymetry and Ocean Circulation from Satellite Radar Altimetry and its relationship to the Arctic Climate Change	Foreign	J.W. Kim
Analysis of Temporal Radarsat Data for Forest Characterization	Federal	M. Collins
Canadian Altimetry Database and Processing System (CADS)	Federal	A. Braun
Computational Tools for the Geosciences	NSERC	J.A.R. Blais
Detection of Ground Subsidence in an Oil Field with Radar Remote Sensing	U of C	J.W. Kim
Electromagnetic Land Surface Classification for Optimal Mobile Communication Modeling	Provincial	J.W. Kim
Field Verification of MODIS-based Leaf Area Index	Industry	Q. Hassan
Forest Landscape Information System	NSERC	M. Collins
Geomagnetic Field Modeling from On-Board LEO Attitude Control Magnetometer	NSERC	J.W. Kim
Mapping the Ocean Surface with Geodetic and Oceanographic Tools	Federal	J.A.R. Blais A. Braun M. Sideris
Multi-Satellite Determination of Global and Regional GEOIDE and Sea Level Changes	NSERC	M. Sideris
Quantification of Sea Ice Thickness and Surface Water Levels in the Arctic Ocean and Canada Using Satellite Altimetry	NSERC	A. Braun
Spaceborne Surface Heave Monitoring by Production Activities at Albertan Oil Field	U of C	J.W. Kim
Space Gravimetry Contributions to Earth Monitoring	Federal	M. Sideris A. Braun



ENGO 625 class—November 2008

Projects in Digital Imaging Systems

Project Name	Contract Type	Faculty Investigators
2D-3D GIS Database Updating through the Integration of Photogrammetric and LiDAR Data	Foreign	A. Habib
3D Realistic Visualization of the University of Calgary Campus	U of C	A. Habib
A Hands-Free Interactive System for Manipulating Object-Oriented Information within Networked Virtual Environments	NSERC	D. Lichti Y. Hu
Calibration & Stability Analysis of Medium-Format Digital Cameras	Foreign	A. Habib
Development of LiDAR-Aided Mono-Plotting and True Ortho-Photo Generation	Federal	A. Habib
Development of M2G Multi-Sensor Geomatics System	Federal	A. Habib
Geometric Modelling of 3D Laser Cameras for Biomedical Applications	NSERC	D. Lichti
Integration of Multi-Sensory Data for Realistic Reconstruction of 3D Urban Environments	NSERC	A. Habib
Modelling and Correction of Radiometric Errors in 3D Range Cameras	U of C	D. Lichti
Next Generation Direct Geo-referencing Technology for Airborne Mapping	NSERC	A. Habib
Radar Remote Sensing - Aspects of Radar Interferometry & Polarimetry	Industry	B. Mercer
Radar Satellite Data Processing to Derive Soil and Crop Information	Federal	M. Collins
Semi-Automated 3D Complex Building Extraction from Multiple Aerial Images	Foreign	A. Habib
Three-Dimensionalizing Surveillance Networks	Federal	A. Habib

Projects in GIS and Land Tenure

Project Name	Contract Type	Faculty Investigators
A Model-Based Decision Support System to Quantify the Impact on Human Receptors of Air Emissions from the Oil and Gas Activities in Central Alberta	U of C	D. Marceau
Best Practices in the Provision of Geospatial Data and Services to the Public	Unclassified	A. Hunter
Canada Research Chairs Program	Federal	N. El-Sheimy

Projects in GIS and Land Tenure

Project Name	Contract Type	Faculty Investigators
Development of a Clustering Method for Wireless-Based Distributed Geospatial Information	U of C	X. Wang
Development of M2G - A Mobile Multi-Sensor Geomatics System	Federal	N. El-Sheimy
Development of a Multi-Agent Model to Facilitate the Sustainable Management of Boat Traffic in the Saguenay-St. Lawrence Marine Park and Marine Protected Area in Quebec	NSERC	D. Marceau
Development of a Two Component Personal Navigation System	Federal	N. El-Sheimy
Incorporating Domain Knowledge in Spatial Clustering	NSERC	X. Wang
Integrating a land-use cellular automata model with a hydrological model to simulate the impact of land-use changes on water resources in the Elbow river watershed in southern Alberta	Provincial	D. Marceau
Intelligent Information Infrastructure for Wireless Multi-Sensor Motes Applications	NSERC	A. Hunter
John Holmlund Chair in Land Tenure and Cadastral Systems	Industry	M. Barry
Local Climate Change Visioning: Tools and Process for Community Decision-Making	Federal	D. Marceau
Multi-Agent Modeling of Stakeholders' Decisions Related to Water Resource Management	U of C	D. Marceau
Multi Sensor Systems for Tracking and Mobility Applications	Federal	A. Hunter
Optimizing Air Quality in the Context of Expanding Petroleum Operations: A Receptor Approach	Industry	D. Marceau
Real Time Detection of Oil Spills Using Laser Induced Fluorescence LiDAR Internet Based Temporal GIS and Mobile Emergency Asset Management	NSERC	Y. Gao
Real Time MCSDSS to Improve Fire Response	Federal	Y. Gao
Sense-Able GIS: An P2P-Based Interoperable Spatial Sensor Web Architecture	NSERC	S. Liang
Spatial Dynamic Modeling for Environmental Recourse Management	NSERC	D. Marceau
Talking Titler	NSERC	M. Barry
Using Multi-media Data to Support Land Tenure Security, Part of the Talking Titler System	Industry	M. Barry
Using Rough Set theory for the calibration of a land-use cellular automata model	Provincial	D. Marceau

LICENSES AND PATENTS

- Barry, M., Talking Titled Object Manager; Surveyor General of Canada. 4 licences, UN-Habitat 4 licences, Lagos State Government, Nigeria, Director of Land Regularization, Nigeria, 4 licences, University of Cape Town, 30 licences, Kwame Nkrumah University of Science and Technology, 30 licences.
- Becker, T.W and Braun, A., iGMT – interactive Mapping Tool, open source software under GNU public license, ~400 user institutions worldwide.
- Ellum, C., and N. El-Sheimy, BUNDLE Software— software package that performs self-calibrating Photogrammetric Bundle™ adjustments and terrestrial network adjustments. Licensed by University Technologies International.
- Gao, Y., iVCAMS3, 2005, Software applied to support the following public events: 1) 2005 North America Solar Challenge 2) 2005 Sea to Sea Bike Tour.
- Gao, Y., P3(R), 2005, Software licensed to major airborne mapping and land/marine surveys companies in North America and Asia.
- Gao, Y., Precise point positioning, P3TM, 2004, Licensed to several companies.
- Gao, J., M.E. Cannon, M. Petovello, K. Nagamiya, I. Maeda and K. Kagawa, (2007), Vehicular Navigation and Positioning System, Publication December 17, 2007, US Patent # WO 2007/143806 A2.
- Habib, A., Stereo-Measure, 2004, software developed for ENGG 253 (Engineering Design II).
- Habib, A., Calibration and Stability Analysis of Medium-Format Digital Cameras, 2006. Licensed by University Technologies International (Reference Number 725.1).
- Hunter, AJS., N. El-Sheimy, G. Stenhouse, B. Wright (2007) Multi-sensor Systems for Animal Tracking Applications.
- Hunter, AJS., N. El-Sheimy, Z. Syed, B. Wright (2007) Portable Navigation Systems.
- Julien, O., C. Macabiau, M. E.Cannon and G. Lachapelle (2008) BOC Signal Acquisition and Tracking Method and Apparatus, European Patent No. ES2292048
- Lachapelle, G, M. Petovello and C. O'Driscoll (2007) GSNRx™ - GNSS Software Receiver. Developed by the PLAN Group
- O'Keefe, K., G. MacGougan, D. Chiu (2008) System and Methods for Real Time Kinematic Surveying using GNSS and Ultra Wideband Ranging, US provisional patent application filed Sept 2008.
- Petovello, M. and G. Lachapelle (2006) Efficient New Method of Performing Doppler Removal and Correlation Computations. Patent filed in 2006.
- Petovello, M., M.E. Cannon and G. Lachapelle, C³NAVIG²™- Combination of Code and Carrier Phase for Navigation using GPS and GLONASS. Licensed by University Technologies International.
- Petovello, M., M.E. Cannon and G. Lachapelle, SAINT™- software for the integration of GPS and low cost inertial navigation systems. Licensed by University Technologies International, a wholly-owned subsidiary of the University of Calgary.
- Schwarz, KP and N. El-Sheimy, KINGSPAD (KINematic Geodetic System for Positions and Attitude Determination) Software. A GPS/INS Integration Software for Navigation and Mapping Applications (www.kingspad.com). Licensed by University Technologies International.
- Shin, E. and N. El-Sheimy, AINS™—Aided Inertial Navigation Software, Matlab Tool Box for GNSS/INS Integration using EKF, UKF, and Backward Smoothing. Licensed by University Technologies International.
- Sideris, M., FFTGEOID™ - Geoid Determination Software licensed by the Hydrographic and Oceanographic Department, Japan Coast Guard, through University Technologies International.
- Skone, S., TECMODEL Software, Licensed by University Technologies International.
- Yang, Yong and N. El-Sheimy, Inertial Simulator—An Inertial Navigation Simulation Tool, 2007. Licensed by University Technologies International.

PUBLICATIONS

Books and Chapters

- El-Sheimy, N. (2008) Georeferencing Component of LiDAR Systems, Chapter 6 - Topographic Laser Ranging and Scanning: Principles and Processing, CRC Press, pp195-214 (Editors: Jie Shan, Charles K. Toth).
- El-Sheimy, N. (2008) Land Mobile Mapping Systems, Chapter 7, ISPRS Book Series: Advances in Photogrammetry, Remote Sensing and Spatial Information Sciences, 2008 ISPRS Congress Book, pp85-100 (Editors: Zhilin Li, Jun Chen and Emmanuel Baltsavias), Taylor&Francis Group, London, ISBN 978-0-415-47805-
- Fernando, H.J., A. Braun, R. Galappatti, J. Ruwanpura, S.C. Wiransinghe (2008) Tsunamis: A Journey through their Manifestation and Aftermath, Chapter in: Large-Scale Disasters: Prediction, Control and Mitigation, Ed. M. Gad-el-Hak, Cambridge University Press, 600 pp, p 258-292.
- Habib, A., (2008) Topographic Laser Ranging and Scanning: Principles and Processing. Chapter 9: Accuracy, Quality Assurance, and Quality Control of LiDAR Data. Jie Shand and Charles Toth (Editors), CRC Press (Taylor & Francis Group), pp. 269 – 294.
- Habib, A., (2008) Topographic Laser Ranging and Scanning: Principles and Processing. Chapter 13: Integration of LiDAR and Photogrammetric Data: Triangulation and Ortho Rectification. Jie Shand and Charles Toth (Editors), CRC Press (Taylor & Francis Group), pp. 371 – 401.
- Marceau, D.J. and N. Moreno (2008) An object-based cellular automata to mitigate scale dependency. In: Object-Based Image Analysis, T. Blaschke, S. Lang, and G.J. Hay, eds, Springer-Verlag, pp. 43 - 73.

Refereed Journals

- Aggarwal, P., Z. Syed, X Niu, N. El-Sheimy (2008) A Standard Testing and Calibration Procedure for Low Cost MEMS Inertial Sensors and Units, **The Journal of Navigation**, 61(2), 323-336.
- Bae, K.-H., D. Belton, D.D. Lichti (2009) A Closed-Form Expression of the Positional Uncertainty for 3D Point Clouds. **IEEE Transactions on Pattern Analysis and Machine Intelligence**. 31(4), 577-590.
- Baek, J., S.W. Kim, H.J. Park, H.S. Jung, K.D. Kim, J.W. Kim (2008) Analysis of Ground Subsidence in Coal Mining Area Using SAR Interferometry, **Geosciences J.**, 12(3), 277-284
- Bancroft, J., S. Kwakkel, B. Troyer and G. Lachapelle (2008) Mapping of River Surface Currents with GNSS. **Geomatica**, 62(3) 267-276.
- Barry, M., A. Hunter, A. Muhsen (2008) Scalable Land Tenure Record System. **Technika Chronika**, 28(2-3), 11-18.
- Barry, M.B., (2009) Land Administration Strategy Formulation using GIS in Post Conflict Hargeisa, Somaliland. **Surveys and Land Information Science**. 69 (1), 39–52.
- Bisnath, S., Y. Gao (2008) Current State of Precise Point Positioning and Future Prospects and Limitations. **IAG Symposia**, 133, pp 615-624.
- Borio, D., C. Mongrédien, G. Lachapelle (2009) Collaborative Code Tracking of Composite GNSS Signals. **IEEE J-STSP** Special Issue on Special Issue on Advanced Signal Processing for GNSS and Robust Navigation, 3, 4 (August)
- Borio, D., G. Lachapelle (2009) A Non-Coherent Architecture for GNSS Digital Tracking Loops. **Annals of Telecommunications**, Springer, DOI: 10.1007/s12243-009-0114-1.

- Bourque, C.P.-A, W. Buchanan, Q.K. Hassan (2009) An Analysis of Habitat Suitability and Charcoal-Yielding Characteristics of Five Exotic Tree Species Intended for Bioenergy Production in Jamaica. **Journal of Biobased Materials and Bioenergy**, 3, pp. 46-56
- Bourque, C.P.-A., Q.K. Hassan (2008) Projected Impacts of Climate Change on Species Distribution in the Acadian Forest Region of Eastern Nova Scotia. **The Forestry Chronicle**, 84(4), 553-557
- Braun, A., C.-Y. Kuo, C.K. Shum, P. Wu, W. van der Wal, G. Fotopoulos(2008) Glacial Isostatic Adjustment at the Laurentide ice sheet margin: Models and Observations in the Great Lakes Region, **Journal of Geodynamics**, 46(3-5), 165-173 doi:10.1016/j.jog.2008.03.005.
- Cai, C., Y. Gao (2009) A combined GPS/GLONASS navigation algorithm with limited satellite visibility **Journal of Navigation**, Royal Institute of Navigation, 62(4).
- Chen, K., Y. Gao (2008) Ionospheric Effect Mitigation for Real-Time Single-Frequency Precise Point Positioning, **Journal of Navigation**, Institute of Navigation, 55(3).
- El-Ghazouly, A., M. El Habiby, N. El-Sheimy (2008) Assessment of Wavelets Analysis for Carrier Phase Multipath Mitigation. **Canadian Journal of Earth Sciences** 15 pages.
- El-Habiby, M., Y. Gao, M. Sideris (2009) Comparison and Analysis of Non-Linear Least Squares Methods for 3-D Coordinates Transformation. **Survey Review**, 41(311) 26-43, <http://www.surveyreview.org>.
- Gao, G., G. Lachapelle (2008) A Novel Architecture for Ultra-Tight HSGPS-INS Integration. **Journal of Global Positioning Systems**, 7(1) 46-61.
- Gao, J., M. Petovello, M.E. Cannon (2008), Integration of Steering Angle Sensor with GPS and MEMS IMU for Vehicular Positioning, **Journal of Intelligent Transportation Systems**, 12,(4) 159-167
- Gao, Y., M. Wang (2008) Real-Time Kinematic OTF Positioning Using a Single GPS Receiver, **IAG Symposia**, 133, pp. 655-668.
- Habib, A., A. Kersting, K. Bang, R. Zhai, M. Al-Durgham (2009) A Strip Adjustment Procedure to Mitigate the Impact of Inaccurate Mounting Parameters in Parallel Strips. **The Photogrammetric Record** 24(126) 171-195.
- Habib, A., Y. Chang, D. Lee (2009) Occlusion-based Methodology for the Classification of LiDAR Data. **Journal of Photogrammetric Engineering and Remote Sensing**, 75(6) 703-712.
- Kim, J.W., J. Neumeyer, T.H. Kim, I. Woo, H.J. Park, J.S. Jeon, K.D. Kim (2009) Analysis of Superconducting Gravimeter Measurements at MunGyung Station, Korea, **J. Geodynamics**, doi: 10.1016/j. jog.2008.07.008, 47, 180-190
- Kim, K.D., J.W. Kim, J. Neumeyer, R. Kao, C. Hwang, H.J. Park, I. Woo, Y.W. Lee (2009) Determination of Gravity Values and Calibration of Superconducting Gravimeter at MunGyung (Mungyeong) Observatory, Korea, **Geosciences J.**, 13(2), 141-150
- Lee, H., C.K. Shum, Y. Yi, A. Braun, C.-Y. Kuo (2008) Laurentia crustal motion observed using TOPEX/POSEIDON radar altimetry over land, **Journal of Geodynamics**, 46(3-5), 182-193, doi:10.1016/j.jog.2008.05.001.
- Lichti, D.D., J. Lampard (2008) Reflectorless Total Station Self-Calibration. **Survey Review**, 40(309) 244-259.
- Lichti, D.D., M.M. Gumulya, R.R. Horsley (2009) Determination of Trajectories of Metallic Spheres Settling in Non-Newtonian Fluids. **Photogrammetric Record**, 24(125), 37-50.
- Lupart, J.L., C. Barva, M.E. Cannon (2008), What Happens When Gifted Girls Grow Up?, **Mensa Research Journal**, 39(2), 11 pp.
- MacLaren, O., K. Sangster, M.B. Barry (2008) Aboriginal title: The Marshall and Bernard Cases. **Geomatica**, 62(3), 257-265.

- MacLaren, O., M.B. Barry (2008) Video Evidence and the Land Surveyor in a Changing Technological Environment. **New Zealand Surveyor**, 298 14-19.
- Mongrédien, C., J. Schleppe, G. Lachapelle, M.E. Cannon (2008) An Efficient Dual-Frequency Ambiguity Resolution Algorithm for GPS-Based Attitude Determination. **Journal of Surveying Engineering**, ASCE, 134(3), 67-75.
- Moreno, N., A. Ménard, D.J. Marceau (2008) VecGCA: A vector-based geographic cellular automata model allowing geometric transformations of polygons. **Environment and Planning B**. 35, pp 647-665.
- Moreno, N., F. Wang, D.J. Marceau (2009) Implementation of a dynamic neighbourhood in a land-use vector-based geographic cellular automata model. **Computers, Environment and Urban Systems**. 33, pp 44-54.
- Muhsen, A-R., M.B. Barry (2008) Technical Challenges in Developing Flexible Land Records Software. **Surveys and Land Information Science**. 68(3), 171-181.
- O'Keefe, K., M. G. Petovello, W. Cao, G. Lachapelle, E. Guyader (2009) Comparing Multi-carrier Ambiguity Resolution Methods for Geometry-Based GPS and Galileo Relative Positioning and their Application to Low Earth Orbiting Satellite Attitude Determination. **International Journal of Navigation and Observation**, Article ID 592073, 15 pages, doi:10.1155/2009/592073.
- Petovello, M., C.O'Driscoll, G. Lachapelle, D. Borio, H. Murtaza (2008) Architecture and Benefits of an Advanced GNSS Software Receiver. **Journal of Global Positioning Systems**, 7(2), 156-168.
- Petovello, M., G. Lachapelle (2009) Centimeter-Level Positioning Using an Efficient New Baseband Mixing and Despreading Method for Software GNSS Receivers, **EURASIP Journal on Advances in Signal Processing**, 83(1), 12 pages, pp 51-57 (doi:10.1155/2008/19427).
- Petovello, M., K. O'Keefe, G. Lachapelle, M.E. Cannon (2009) Consideration of Time-Correlated Errors in a Kalman Filter Applicable to GNSS. **Journal of Geodesy**, Springer-Verlag, 83(1), pp.51-57.
- Petovello, M., K. O'Keefe, G. Lachapelle, M.E. Cannon (2009) Measuring Aircraft Carrier Flexure in Support of Autonomous Aircraft Landings. **IEEE Transactions on Aerospace and Electronics Systems**, 45(2), 523-535.
- Ruwanpura, J., S. Wickaramaratne, A. Braun, C. Wirasinghe (2009) Planning and modeling for mitigation of Tsunami impacts, **Civil Engineering and Environmental Systems**, 26(2), 195-209, DOI: 10.1080/10286600802435835.
- Schleppe, J., G. Lachapelle (2008) GPS Tracking Performance under Avalanche Deposited Snow. **GPS Solutions**, Springer, 12(1), 13-21.
- Skone, S. (2009) Using GPS TEC Measurements to Detect Geomagnetic Pc 3 Pulsations, **Radio Science**, May, Online publication doi: 10.29/2008rs004106.
- Sun, D., M. Petovello, M.E. Cannon (2008) GPS/Reduced IMU with a Local Terrain Predictor in Land Vehicle Navigation. **International Journal of Navigation and Observation**, Article ID 813821, doi:10.1155/2008/813821, 15 pages.
- Syed, Z.F., P. Aggarwal, X Niu, N. El-Sheimy (2008) Civilian Vehicle Navigation: Required Alignment of the Inertial Sensors for Acceptable Navigation Accuracies, **IEEE Transactions on Vehicular Technology**, 57(6), (ISSN: 0018-9545).
- von Frese, R.R.B., L. Potts, S.B. Wells, T.E. Leftwich, H.R. Kim, J.W. Kim, A.V. Golynsky, O. Hernandez, L.R. Gaya-Piqué (2009) GRACE gravity evidence for an impact basin in Wilkes Land, Antarctica, **Geochemistry, Geophysics, Geosystems**, Q02014, 10(2), doi:10.1029/2008GC002149, ISSN:1525-2027, 14p
- Wang, J., Y. Gao (2008) High Sensitivity GPS Data Classification based on Signal Degradation Conditions, **IEEE Transactions on Vehicular Technology**, 56(2), 566-574.

- Abbisian Nik, S.A., M.G. Petovello (2008) Multichannel Dual Frequency GLONASS Software Receiver. **Proceedings of GNSS08** Savannah, GA, 16-19 Sep, Session B4, The Institute of Navigation, 11 pages.
- Abdelazim T., A. Abdel-Hamid, N. El-Sheimy (2009) A Genetic Fuzzy and Kalman Filtering Model For MEMS-IMU/GPS Integration, **ION International Technical Meeting (ITM) 2009**, Anaheim, CA 26-28 January.
- Aggarwal, P., Z.F. Syed, N. El-Sheimy (2008) Hybrid Extended Particle filter (HEPF) for Integrated System, **IEEE/ION PLANS08**, Monterey, CA 6-8 May.
- Aggarwal, P., Z.F. Syed, N. El-Sheimy (2008) Thermal Calibration of Low Cost MEMS Sensors for Land Vehicle Navigation System, **IEEE 67th Vehicular Technology Conference**, VTC2008-Spring, Marina Bay, Singapore, 11-14 May, pp. 2859-2863
- Anwar, M., M. Musiani, G. McDermid, D.J. Marceau (2009) How do human activities shape wolves' behaviour in the central Rocky mountains region, Alberta, Canada? **Agent-Directed Simulation Symposium**, San Diego, CA 22-27 March.
- Assilzadeh, H., Y. Gao (2008) Geomatics Approach to Real Time Oil Spill Management. **Proceedings of 31st AMOP Technical Seminar on Environmental Contamination and Response**, Calgary, AB, 3-5 June.
- Assilzadeh, H., Y. Gao (2008) Pipeline Monitoring and Real Time Accident Management, **Proceedings of the 7th International Pipeline Conference**, Calgary AB, 29 Sept-03 Oct.
- Assilzadeh, H., Y. Gao (2008) Real-Time Disaster Monitoring and Management System, **Proceedings of Geoinformatics'2008**, Guangzhou, China, 28-29 June.
- Bancroft, J., G. Lachapelle, M.E. Cannon, M. Petovello (2008) Twin IMU-HSGPS Integration for Pedestrian Navigation. **Proceedings of GNSS08** Savannah, GA, 16-19 Sep, Session E3, The Institute of Navigation, 11 pages.
- Bang, K., A. Habib, K. Kusevic, P. Mrstik (2008) Integration of Terrestrial and Airborne LIDAR Data for System Calibration, **ISPRS Proceedings, Vol. XXVII**, Part B1, pp. 391-398.
- Bang, K., A. Kersting, A. Habib, D. Lee (2009) LiDAR System Calibration using Point Cloud Coordinates in Overlapping Strips. **ASPRS Annual Conference Reflection of the Past & Vision for the Future**, Baltimore, MD 9-13 March.
- Barry, M.B. (2009) Applying Low Cost Technology in the Field: Development of the Talking Titler System. **World Bank: Land Governance in Support of Millennium Development Goals Conference**, Washington DC, 9-10 March.
- Borio, D., C. Mongrédien, G. Lachapelle (2008) New L5/E5a Acquisition Algorithms: Analysis and Comparison. **10th IEEE International Symposium on Spread Spectrum Techniques and Applications**, Bologna, 25-28 August, 5 pages.
- Broumandan, A., J. Nielsen, G. Lachapelle (2008) Practical Results of High Resolution AOA Estimation by the Synthetic Array. **Proceedings of IEEE VTC2008 Fall Conference**, Calgary, AB 22-25 September, 5 pages.
- Broumandan, A., J. Nielsen, G. Lachapelle (2008) TOA Estimation Enhancement based on Blind Calibration of Synthetic Arrays. **Proceedings of IEEE VTC2008 Fall Conference**, Calgary, AB 22-25 September, 5 pages.
- Broumandan, A., J. Nielsen, G. Lachapelle (2009) Narrowband Signal Detection in Correlated Rayleigh Fading with a Moving Antenna. **Proceedings of 13th International Symposium on Antenna Technology and Applied Electromagnetics (ANTEM) and the Canadian Radio Sciences Meeting (URSI/CNC)**, Banff, AB, 15-18 February, 4 pages.

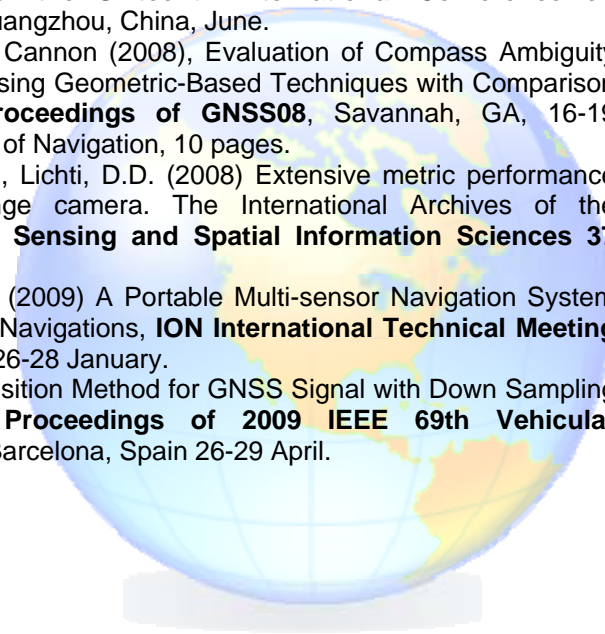
- Broumandan, A., J. Nielsen, G. Lachapelle (2009) Signal Detection Performance in Indoor Environments with a Synthetic Antenna Array. **Proceedings of 13th International Symposium on Antenna Technology and Applied Electromagnetics (ANTEM) and the Canadian Radio Sciences Meeting (URSI/CNC)**, Banff, AB, 15-18 February, 4 pages.
- Broumandan, A., T. Lin, J. Nielsen, G. Lachapelle (2008) Practical Results of Hybrid AOA/TDOA Geolocation Estimation in CDMA Wireless Networks. **Proceedings of IEEE VTC2008 Fall Conference**, Calgary, AB 22-25 September, 5 pages.
- Cai, C., Y. Gao (2008) Estimation of GPS/GLONASS System Time Difference with Application to PPP, **Proceedings of ION GNSS08**, Savannah, GA, 16-19 Sep.
- Cao, H., X. Wang, J. Chen (2008) Design of an Extended Qualitative Cardinal Direction Model Based on Ontology, **Proceedings of the Sixteenth International Conference on Geoinformatics, SPIE**, Guangzhou, China, June.
- Cao, W., K. O'Keefe, M.E. Cannon (2008) Evaluation of Compass Ambiguity Resolution Performance Using Geometric-Based Techniques with Comparison to GPS and Galileo. **Proceedings of GNSS08** Savannah, GA, 16-19 Sep, Session B4, The Institute of Navigation, 10 pages.
- Cao, W., K. O'Keefe, M.E. Cannon (2008) Performance Evaluation of GPS/Galileo Multiple-frequency RTK Positioning Using a Single-difference Processor. **Proceedings of GNSS08** Savannah, GA, 16-19 Sep, Session D6, The Institute of Navigation, 9 pages.
- Cao, W., K. O'Keefe, M.E. Cannon (2008) Performance Evaluation of Combined GPS/Galileo Multi-frequency RTK Positioning Using Partial Ambiguity Fixing. **Proceedings of GNSS08** Savannah, GA, 16-19 Sep, Session D6, The Institute of Navigation, 12 pages.
- Chang, Y., A. Habib (2008) Reconstruction, Registration, and Matching of 3D Facial Models from Stereo-Images, **ISPRS Proceedings, Vol. XXVII**, Part B5, pp. 789–794.
- Chang, Y., A. Habib, D Lee, J Yom (2008) Automatic Classification of LiDAR Data into Ground and Non-Ground Points, **ISPRS Proceedings, Vol. XXVII**, Part B4, pp. 457–462.
- Chang, Y., I. Datchev, A. Habib (2009) A Photogrammetric System for 3D Reconstruction of a Scoliotic Torso. **ASPRS Annual Conference Reflection of the Past & Vision for the Future**, Baltimore, MD 9-13 March.
- Chiu, D., K. O'Keefe (2008) Seamless Outdoor-to-Indoor Pedestrian Navigation using GPS and UWB. **Proceedings of GNSS08 Savannah**, GA, 16-19 Sep, Session A6, The Institute of Navigation, 12 pages.
- Dabboor, M.D., A. Braun, V. Karathanassi (2008) Multiscale Segmentation of Polarimetric SAR Data Using Pauli Analysis Images, **Proceedings of the GGeo Conference**, Chania, Crete, 5 pp.
- Dabboor, M.D., V. Karathanassi, A. Braun (2008) Histogram-based Segmentation of Polarimetric ALOS Polarimetric SAR Data, **Proceedings of the 3rd ALOS PI 2008 Symposium**, Island of Rhodes, Greece, 9-13 November. (ESA SP-664, January 2009).
- Dabboor, M.D., V. Karathanassi, A. Braun (2008) Land Cover Segmentation of ALOS Polarimetric SAR Data, **Geoscience and Remote Sensing Symposium**. IGARSS 2008. IEEE International Volume: 4, page(s): IV - 790-IV - 793 Boston, MA, 10.1109/IGARSS.2008.4779841.
- Ebeling, A., R.S. Radovanovic, W.F. Teskey (2008) Deformation Monitoring at an Industrial Site Using Combined DGPS and Total Station Data, **13th FIG Symposium on Deformation Measurement and Analysis and 4th IAG Symposium on Geodesy for Geotechnical and Structural Engineering**, Lisbon, 12-15 May 10pp.

- El Habiby M., A. El-Ghazouly, N. El-Sheimy (2008) A New Wavelet-Based Multipath Mitigation Technique. **Proceedings of GNSS08** Savannah, GA, 16-19 Sep, Session C2: Multipath, The Institute of Navigation
- El Habiby M., A. El-Ghazouly, N. El-Sheimy (2009) Evaluation of Wavelet Multipath Mitigation Technique in the Final Measurement Domain, **ION ITM 2009**, Session C3: Algorithms and Methods 2 (Data Processing), Anaheim, California 26-28 January.
- Geng, L., H. Wang, X. Wang, L. Korba (2008) Adapting LDA Model to Discover Author-Topic Relations for Email Analysis, **Proceeding of the 10th International Conference on Data Warehousing and Knowledge Discovery (DaWaK 2008)**, Spring LNCS, Turin, Italy, September.
- Geng, L., L. Korba, X. Wang, Y. Wang, H. Liu (2008) Using Data Mining Methods to Predict Personally Identifiable Information in Emails, **Proceedings of the Fourth International Conference on Advanced Data Mining and Applications (ADMA 2008)**, Springer LNCS, Chengdu, China, October.
- Geng, L., L. Korba, Y. Wang, X. Wang, Y. You (2008) Finding Topics in Email Using Formal Concept Analysis and Fuzzy Membership Functions, **Proceedings of the 21st Canadian Conference on Artificial Intelligence (CAI 2008)**. Spring LNCS, Windsor, ON 28-30 May.
- Geng, L., S. Buffett, B. Hamilton, X. Wang, L. Korba, H. Liu, Y. Wang (2009) Discovering Structured Event Logs from Unstructured Audit Trails for Workflow Mining. **Proceedings of the Eighteenth International Symposium on Methodologies for Intelligent Systems (ISMIS'09)**, Springer LNAI, Prague, Czech Republic, September.
- Gernot, C., K. O'Keefe, G. Lachapelle (2008) Combined L1/L2C Tracking Scheme for Weak Signal Environments. **Proceedings of GNSS08** Savannah, GA, 16-19 Sep, Session C4, The Institute of Navigation, 15 pages.
- Goodall C., N. El-Sheimy (2008) On-line Tuning of an Extended Kalman Filter for INS/GPS Navigation Applications, **Proceedings of GNSS08** Savannah, GA, 16-19 Sep, Session C2: Multipath. The Institute of Navigation
- Gu, W., N. El-Sheimy (2008) Heading Accuracy Improvement of MEMS IMU/ DGPS Integrated Navigation System for Land Vehicle, **IEEE/ION PLANS08**, Monterey, CA 6-8 May.
- Gu, W., N. El-Sheimy, T. Hassan, and Z. Syed (2008) Coarse Alignment for Marine SINS Using Gravity in the Inertial Frame as a Reference, **IEEE/ION PLANS08**. Monterey, CA 6-8 May.
- Gu, W., X. Wang, L. Geng (2009) GIS-FLSolution: A Spatial Analysis Platform for Static and Transportation Facility Location Allocation Problem. **Proceedings of the Eighteenth International Symposium on Methodologies for Intelligent Systems (ISMIS'09)**, Springer LNAI, Prague, Czech Republic, September.
- Habib, A., A. Jarvis, A. Kersting, Y. Alghamdi (2008) Comparative Analysis of Geo-referencing Procedures Using Various Sources of Control Data, **ISPRS Proceedings, Vol. XXVII**, Part B4, pp. 1147–1152.
- Habib, A., A. Jarvis, I Detchev, G. Stensaas, D. Moe, J. Christopherson (2008) Standards and Specifications for the Calibration and Stability of Amateur Digital Cameras for Close-Range Mapping Applications, **ISPRS Proceedings, Vol. XXVII**, Part B1, pp. 1059–1064.
- Habib, A., A. Kersting, K. Bang (2009) Detecting Systematic Biases and GNSS/ INS Drifts in LiDAR Data. **Proceedings of the Institute of Navigation 2009 International Technical Meeting**, Anaheim, CA 26-29 January, 14 pages.
- Habib, A., A. Kersting, R. Zhai, M. Al-Durgham, C. Kim, D. Lee (2008) LiDAR Strip Adjustment using Conjugate Linear Features in Overlapping Strips, **ISPRS Proceedings, Vol. XXVII**, Part B1, pp. 385–390.
- Habib, A., J. Kersting, T. McCaffrey, A. Jarvis, (2008) Integration of LiDAR and Airborne Imagery for Realistic Visualization of 3D Urban Environments, **ISPRS Proceedings, Vol. XXVII**, Part B2, pp. 617-624.

- Habib, A., M. Aldelgawy (2008) Alternative Procedures for the Incorporation of LiDAR-Derived Linear and Areal Features for Photogrammetric Geo-Referencing, **ISPRS Proceedings, Vol. XXVII**, Part B1, pp. 219–226.
- Habib, A., M. Al-Durgham, A. Kersting, P. Quackenbush (2008) Error Budget of LiDAR Systems and Quality Control of the Derived Point Cloud, **ISPRS Proceedings, Vol. XXVII**, Part B1, pp. 203–210.
- Hassan T., M. Lavigne, N. El_Sheimy (2008) VISATTM: The Avenue to Highway Data Banks. **7th International Conference on Managing Pavement Assets**, Calgary, AB 24-28 June.
- Hassan T., N. El-Sheimy (2008) Common adjustment of land-based and airborne mobile mapping system data. **TS WG ICWG VII: Integrated Systems for Mobile Mapping, The XXI ISPRS Congress**, Beijing, China, 3-11 July.
- Hassan T., N. El-Sheimy (2008) Land-Based Navigation Aiding by Fusion with Airborne Sensory Data. **Proceedings of GNSS08**, The Institute of Navigation, Savannah, GA, 16-19 Sep.
- Hassan T., N. El-Sheimy (2008) Land-Based Navigation Aiding by Fusion with Airborne Sensory Data". **Proceedings of GNSS08**, The Institute of Navigation Savannah, GA, 16-19 Sep.
- Hassan T., N. El-Sheimy (2008) Land-Based Navigation Aiding by Fusion with Airborne Sensory Data. **Proceedings of GNSS08**, The Institute of Navigation Savannah, GA, 16-19 Sep.
- Izadpanah, A., C. O'Driscoll, G. Lachapelle (2008) GPS Multipath Parameterization and Mitigation Based on Kalman Filtering. **Proceedings of GNSS08**, Savannah, GA, 16-19 Sep, Session C2, The Institute of Navigation, 9 pages.
- Jha, N., Y. Gao (2008) Oil Spill Contingency Planning using Laser Fluorosensors and Web-Based GIS, **Proceedings of Oceans '08 – MTS/IEE**, Quebec, QB 15-18 September.
- Jha, N., Y. Gao, J. Levy (2008) An Analysis of Oil Spill Detection Algorithms using Laser Fluorosensor Data. **Proceedings of 31st AMOP Technical Seminar on Environmental Contamination and Response**, Calgary, AB, 3-5 June.
- Joseph, A., G. Lachapelle (2009) Analysis of a Real-Time Genetic NIORAIM Implementation on a WAAS Beta 3 Receiver. **Proceedings of ION ITM 2009** Anaheim, CA 26-28Jan, 16 pages.
- Kassab, A., Y. Gao (2008) Towards Real-Time Fire Emergency Response System, **Proceedings of Pacific Coast Fire Conference**, San Diego, 1-3 Dec.
- Kieser, M., D.J. Marceau (2009) Multi-agent modeling to understand the impact of stakeholders' decisions in a residential land development project in Southern Alberta. **Proceedings of the International Conference on Systems Sciences**, Hawaii, 5-9 January.
- Kim, C., A. Habib, Y. Chang (2008) Automatic Generation of Digital Building Models for Complex Structures from LiDAR Data, **ISPRS Proceedings, Vol. XXVII**, Part B4, pp. 463–468.
- Kim, C., R. Zhai, A. Habib, S. Shin, C. Yoon, K. Kim (2009) Complex Digital Building Model Generation through the Integration of Photogrammetric and LiDAR Data. **ASPRS Annual Conference Reflection of the Past & Vision for the Future**, Baltimore, MD 9-13 March.
- Kwakkel, S., G. Lachapelle, M.E. Cannon (2008) GNSS Aided In Situ Human Kinematics Studies During Running. **Proceedings of GNSS08**, Savannah, GA, 16-19 Sep, Session E3, The Institute of Navigation, 10 pages.
- Lichti, D.D. (2008) Self-calibration of a 3D range camera. **The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences 37** (Part B5), 927-932.
- Lichti, D.D., D. Rouzaud (2009) Surface-dependent 3D-range camera self calibration. **Proceedings of 3D Imaging Metrology**, SPIE Volume 7239, San Jose, CA, 19-20 January, 10 pp.

- Liu, S., Y. Gao, S. Li (2008) Emergency Management Systems Using Event-Driven GIS, **Proceedings of 31st AMOP Technical Seminar on Environmental Contamination and Response**, Calgary, AB 3-5 June.
- Macchi, F., M.G. Petovello, G. Lachapelle (2008) Consequences of MBOC Approximation by BOC Modulation. **Proceedings of GNSS08** Savannah, GA, 16-19 Sep, Session F2, The Institute of Navigation, 12 pages.
- MacGougan, G., K. O'Keefe, D. Chiu (2008) Multiple UWB Range Assisted GPS RTK in Hostile Environments. **Proceedings of GNSS08** Savannah, GA, 16-19 Sep, Session F6, The Institute of Navigation, 16 pages.
- MacGougan, G., K. O'Keefe (2009) Real Time UWB Error Estimation in a Tightly-Coupled GPS/UWB RTK Positioning System. **Proceedings of the Institute of Navigation 2009 International Technical Meeting**, Anaheim, CA: 360-374.
- Mitishita, E., A. Habib, A. Machado (2008) Photogrammetric Model Orientation Using LiDAR Dataset, **ISPRS Proceedings, Vol. XXVII**, Part B3a, pp. 167–172.
- Moreno, N., F. Wang, D.J. Marceau (2008) An object-based land-use cellular automata model to overcome cell size and neighbourhood sensitivity. **Proceedings of the GEOBIA (Geo-Object Based Image Analysis)**, University of Calgary, Calgary, AB, 5-8 August, available online, pp. 303-308.
- Muthuraman, K., R. Klukas, G. Lachapelle (2008) Performance Evaluation of L2C Data/Pilot Combined Carrier Tracking **Proceedings of GNSS08** Savannah, GA, 16-19 Sep, Session B4, The Institute of Navigation, 9 pages.
- O'Driscoll, C., M.G. Petovello, G. Lachapelle (2008), Impact of Extended Coherent Integration Times on Weak Signal RTK in an Ultra-Tight Receiver. **Proceedings of NAV08 Conference**, Royal Institute of Navigation, London, 28-30 October, 11 pages.
- O'Keefe, K., S. Gearheard, G. Aipellee, D. Iqaqrialu, L. Palluq, J. Panipak, A. Apak, B. Culling, J. Lau, T. Mosstajiri, T. Phillips, M. Brand, R. Enns and E. Wingate (2009) The Igliniit ("Trails") Project: Inuit Hunters and Geomatics Engineering Students Collaborating to Develop an Interactive GPS Tracking System in Nunavut, Canada. **Proceedings of the Institute of Navigation 2009 International Technical Meeting**, Anaheim, CA: 25-33.
- Osman A., A. Noureldin, N. El-Sheimy, G. Mellema, J. Theriault and S. Campbell (2008) Synthetic Virtual Array Processing of GPS Sonobuoys for Underwater Target Tracking, **Proceeding IEEE/MTS Oceans 2008**, Quebec, QB 15-18 September.
- Petovello, M.G., C. O'Driscoll, G. Lachapelle, D. Borio, H. Murtaza (2008b) Architecture and Benefits of an Advanced GNSS Software Receiver, **Proceedings of International Symposium on GPS/GNSS 2008**, Tokyo, Japan, 11 pages.
- Rangelova, E., G. Fotopoulos, M.G. Sideris (2008) Implementing a dynamic geoid as a vertical datum for orthometric heights in Canada, **Proceedings of the International Symposium on Gravity, Geoid and Earth Observation**, Chania, Greece, Springer-Verlag, Berlin Heidelberg, 23–27 June.
- Rangelova, E., W. van der Wal, M.G. Sideris, P. Wu (2008) Spatiotemporal analysis of the GRACE-derived mass variations in North America by means of multi-channel singular spectrum analysis, **Proceedings of the International Symposium on Gravity, Geoid and Earth Observation**, Chania, Greece, Springer-Verlag, Berlin Heidelberg, 23–27 June.
- Skone, S (2008) Using GPS TEC Observations to Detect Geomagnetic Pc 3 Pulsations, **Proceedings of the Ionospheric Effects Symposium 2008**, Alexandria VA, May.
- Skone, S. (2008) Mitigating Geomagnetic Noise in Airborne Magnetic Surveys using GPS. **Proceedings of GNSS08** Savannah, GA, 16-19 Sep, Session E2, The Institute of Navigation, 9 pages.

- Skone, S. (2008) Using GPS TEC Measurements to Detect Geomagnetic Pc 3 Pulsations, **Proceedings of the 21st International Technical Meeting of the Satellite Division of the Institute of Navigation ION GNSS 2008**, ION, Savannah, GA, 16-19 September.
- Skone, S., F. Man, F. Ghafoori and R. Tiwari (2008) Investigation of Scintillation Characteristics for High Latitude Phenomena. **Proceedings of GNSS08** Savannah, GA, 16-19 Sep, Session D5, The Institute of Navigation, 9 pages.
- Skone, S., F. Man, F. Ghafoori, R. Tiwari (2008) Investigation of Scintillation Characteristics for High Latitude Phenomena, **Proceedings of the 21st International Technical Meeting of the Satellite Division of the Institute of Navigation ION GNSS** Savannah, GA, 16-19 September.
- Syed, Z.F., P. Aggarwal, Y. Yong, N. El-Sheimy (2008) Improved Vehicle Navigation Using Aiding with Tightly Coupled Integration, **IEEE 67th Vehicular Technology Conference (VTC 2008)**, Marina Bay, Singapore
- Tao, W., Y. Gao (2008) Real-time Water Vapor Distribution Surface Rendering Using Ordinary Kriging. **CGU Annual Scientific Meeting**, Banff, AB, 11-14 May.
- Taylor, N.M., D. M. L. Sills, J. Hanesiak, J.A. Milbrandt, C. D. Smith, G. Strong, S. Skone, P. J. McCarthy and J. C. Brimelow (2008) The Understanding Severe Thunderstorms and Alberta Boundary Layers Experiment (UNSTABLE): Overview and Preliminary Results, **Proceedings of the 24th Conference Severe Local Storms**, Amer. Meteor. Soc, Savannah GA, May.
- Tocho, C., G.S. Vergos, M.G. Sideris (2008) Further improvements in the determination of the marine geoid in Argentina by employing recent GGMs and sea surface topography models, **Proceedings of the International Symposium on Gravity, Geoid and Earth Observation**, Chania, Greece, Springer-Verlag, Berlin Heidelberg, 23–27 June.
- van der Wal, W., E. Rangelova, M.G. Sideris, P. Wu (2008) Secular geoid rate from GRACE for vertical datum modernization **Proceedings of the International Symposium on Gravity, Geoid and Earth Observation**, Chania, Greece, Springer-Verlag, Berlin Heidelberg, 23–27 June.
- Wang C., T. Hassan, N El-Sheimy, M. Lavigne (2008) Automatic Road Vector Extraction For Mobile Mapping Systems, **The XXI ISPRS Congress, WS-PS: WG III/5- Models and Algorithms for Road Extraction and Traffic Monitoring**, Beijing, China, 3-11 July.
- Wang, X., H.J. Hamilton (2008) Using Clustering Methods in Geospatial Information Systems, **Proceedings of the Sixteenth International Conference on Geoinformatics**, SPIE, Guangzhou, China, June.
- Wei Cao, W., K. O'Keefe, M.E. Cannon (2008), Evaluation of Compass Ambiguity Resolution Performance Using Geometric-Based Techniques with Comparison to GPS and Galileo, **Proceedings of GNSS08**, Savannah, GA, 16-19 September 16-19, Institute of Navigation, 10 pages.
- Weyer, C.A., Bae, K.-H. Lim, K., Lichti, D.D. (2008) Extensive metric performance evaluation of a 3D range camera. *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences* **37** (Part B5), 939-944.
- X. Zhao, Z. Syed, N. El-Sheimy (2009) A Portable Multi-sensor Navigation System for In-vehicle and On-foot Navigations, **ION International Technical Meeting (ITM) 2009**, Anaheim, CA 26-28 January.
- Xu, F., Y. Gao (2009) New Acquisition Method for GNSS Signal with Down Sampling via Frequency Domain, **Proceedings of 2009 IEEE 69th Vehicular Technology Conference**, Barcelona, Spain 26-29 April.




Scholarly Presentations and Seminars

- Ali, I., A. Braun, M.G. Sideris (2008) Using TOPEX and ICESat altimetry for monitoring sea level change in Atlantic Canada, 34th Annual Meeting of the Canadian Geophysical Union, Banff, AB, 11-14 May.
- Bancroft, J.B. (2008) Integrated Systems for Pedestrian and Vehicular Navigation. Poster Presentation, 2008 AUTO21 Conference, London, ON, 2-4 June.
- Barry, M.B. (2009) African Centre for Cities, University of Cape Town. Land Tenure Security in Ghana and Nigeria: Alternatives to Registration. 24 February.
- Barry, M.B. (2009) Alberta Geomatics Group. Land Tools in Action: The Talking Titler System, 13 January.
- Barry, M.B. (2009) Institute of Statistical, Social and Economic Research (ISSER), University of Ghana, 10 February. Kwame Nkrumah University of Science and Technology, 12 February. PLAAS, University of Western Cape, 19 February. Practical Approaches to Improve Land Tenure Security: The Talking Titler System.
- Barry, M.B. (2009) World Bank, FIG Washington. Applying Low Cost Technology in the Field: Development of the Talking Titler System. World Bank: Land Governance in Support of Millennium Development Goals Conference, Washington DC, 9-10 March.
- Bourque, C.P.-A., Q.K. Hassan (2009) Leaf area index determination for the greater Athabasca Oil Sands Region (AOSR) of Northern Alberta. TEEM/NSMWG Technical Meeting, Banff, AB, 29-30 April.
- Bourque, C.P.-A., Q.K. Hassan (2009) Leaf area index review and determination for the greater Athabasca Oil Sands Region of Northern Alberta, Canada. Cumulative Environmental Management Association (CEMA) Committee, Calgary, AB, 26 November.
- Broumandan, A. (2008) Wireless Signal Detection Using Blind Synthetic Antenna Array, presented in Third Canadian Summer School on Communications and Information Theory, Banff, AB, 18-20 August.
- Cannon, M.E. (2008) Wireless Location: Pushing the Limits. Presented at Canadian Embassy, Washington, D.C. 24 June.
- Elhabiby, M.M., C. Xu, M.G. Sideris (2008) Wavelet-torus algorithm for global gravity field analysis, 34th Annual Meeting of the Canadian Geophysical Union, Banff, AB, 11-14 May.
- Gernot, C. (2008) Comparison of L1 C/A L2C Combined Acquisition Techniques. Poster Presentation, GEOIDE Annual Scientific Conference, Niagara Falls, 28-30 May.
- Habib, A., (2008) An Occlusion-Based Methodology for True Orthophoto Generation and LiDAR Data Classification. Sejong University, Korea, 14 May.
- Habib, A., (2008) An Occlusion-Based Procedure for True Orthophoto Generation and LiDAR Data Classification, Purdue University, 28 August.
- Habib, A., (2008) An Occlusion-Based Procedure for True Orthophoto Generation and LiDAR Data Classification, York University, Canada, 21 August.
- Habib, A., (2008) An Occlusion-Based Procedure for True Orthophoto Generation and LiDAR Data Classification, Inha University, Korea, 20 July 20.
- Habib, A., (2008) Digital Building Model Generation and 3D Visualization using Photogrammetric and LiDAR Data. Korean Electronics and Telecommunications Research Institute (ETRI), 19 May.
- Habib, A., (2008) Digital Building Model Generation Through Photogrammetric and LiDAR Data Integration, York University, Canada, 21 August.
- Habib, A., (2008) Digital Building Model Generation Through Photogrammetric and LiDAR Data Integration, Inha University, Korea, 20 July.
- Habib, A., (2008) Error Budget of LiDAR Systems and Quality Control of the Derived Point Cloud, Yonsei University, Korea, 23 July.

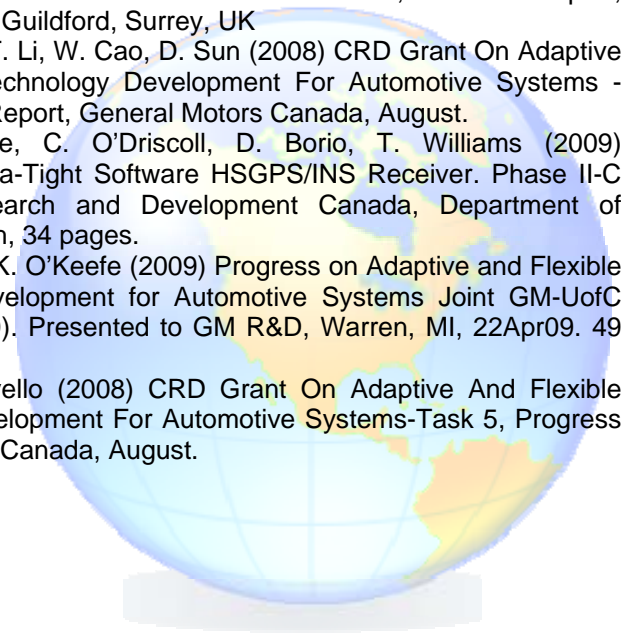
- Habib, A., (2008) Error Budget, Quality Assurance, and Quality Control Procedures for LiDAR Systems and Derived Point Cloud. ASPRS Annual Conference "Bridging the Horizons: New Frontiers in Geo-Spatial Collaboration", Portland, OR 28 April–02 May.
- Habib, A., (2008) Integration of Multi-Sensory Data for Realistic 3D Visualization of Urban Environments. Three Dimensionalizing Surveillance Network Workshop. Niagara, 31 May.
- Habib, A., (2008) Integration of Photogrammetric and LiDAR Data for Accurate Reconstruction & Realistic Visualization of Urban Environments, Defense Research and Development Canada (DRDC), 20 August.
- Habib, A., (2008) Integration of Photogrammetric and LiDAR data for realistic reconstruction and visualization of urban environments, School of Electronic Science and Engineering, National University of Defense Technology, China, 6 July.
- Habib, A., (2008) Integration of Photogrammetric and LiDAR Data for Realistic Reconstruction and Visualization of Urban Environments. Yoensi University, Korea, 15 May.
- Habib, A., (2008) Integration of Photogrammetric and LiDAR Data for Realistic Reconstruction and Visualization of Urban Environments. University of Seoul, Korea, 15 May.
- Habib, A., (2008) Medium-Format Digital Cameras: Standards and Specifications for Calibration and Stability Analysis. ASPRS Annual Conference "Bridging the Horizons: New Frontiers in Geo-Spatial Collaboration", Portland, Oregon, 28 April–02 May.
- Habib, A., (2008) Quality Assurance and Quality Control of LiDAR Systems and Derived Data, Integrity Applications Incorporated (IAI), Virginia USA, 25 August.
- Habib, A., (2008) Quality Assurance and Quality Control of LiDAR Systems and Derived Data, York University, Canada, 21 August.
- Habib, A., (2008) Research Activities of the Digital Photogrammetry Research Group, National University of Ireland at Maynooth, 20 November.
- Habib, A., (2008) Semi-Automated 3D Building Extraction from Multiple Aerial Images and LiDAR Data, Korean Electronics and Telecommunications Research Institute (ETRI), 22 July.
- Habib, A., (2009) Angle-Based Procedure for True Orthophoto Generation. Department of Civil Engineering, Cairo University, 8 January.
- Habib, A., (2009) Integration of Photogrammetric and LiDAR Data for Accurate Reconstruction/Visualization of Urban Environments. Keynote Speaker, FIG Commission 3 Workshop Spatial Information for Sustainable Management of Urban Areas, Mainz, Germany, 4 February.
- Hunter, A.J.S. (2008) Integrated Multi-Sensor Systems for Grizzly Bear, Foothills Research Institute Grizzly Bear Program Sponsor Meeting, Calgary, AB 20 June.
- Hunter, A.J.S., T. Timmins (2009) Analysis of Animal Behaviour using Sensor-based Tracking, Inaugural Meeting for international Research Collaboration between the Foothills Research Institute (Grizzly Bear Program), the Canadian Cooperative Wildlife Health Centre, and the Scandinavian Brown Bear Research Project, Edmonton, AB 6-7 March.
- Lachapelle, G. (2008) GNSS: The Performance Revolution. Presented at UBC Okanagan, Kelowna, 16 June.
- Lachapelle, G. (2008) The GNSS Performance Revolution. Keynote Address, GNSS08 Tokyo, 11-14 November.
- Lachapelle, G. (2009) Geodetic and GNSS Positioning–Differences and Complementarity. Invited Presentation, Stanford University, Dept of Aeronautics and Astronautics, 8 April
- Lachapelle, G. (2009) GNSS – Performance Revolution. Invited Presentation, Geodetic Survey of Canada Centenary Meeting, Ottawa, 20 April

- Lachapelle, G. (2009) GPS Carrier Phase Positioning. Three-day lecture to NovAtel Inc, Calgary, April
- Lachapelle, G. (2009) GPS High Precision Kinematic Carrier Phase Techniques. Three-day lecture, European Patent Office, Munich, 9-11 Mar.
- Lachapelle, G., M. Petovello (2009) GPS Theory, Navigation and Implementation. Three-day lecture, Qualcomm Inc, Santa Clara, 18-20 February.
- Macchi, F. (2008) New Galileo L1 Acquisition Algorithms: Real Data Analysis and Statistical Characterization. Poster Presentation, GEOIDE Annual Scientific Conference, Niagara Falls, 28-30 May.
- Mohammadi, E., A. Hunter, G. Stenhouse (2009) An Object Based Spatial Data Search Engine. Presented at Spatial Knowledge and Information, Fernie B.C 20-21 February.
- Muthuraman, K. (2008) Data/Pilot Combined GPS L2C Signal Tracking – Methods and Performances. Poster Presentation, GEOIDE Annual Scientific Conference, Niagara Falls, 28-30 May.
- Rangelova, E., M.G. Sideris (2008) On the use of multi-channel singular spectrum analysis for modeling GRACE-derived mass variability, 34th Annual Meeting of the Canadian Geophysical Union, Banff, AB, 11-14 May.
- Skone, S., N. Nicholson (2008) 3-D Atmospheric Profiling using GNSS, AGU Western Pacific Geosciences Conference, Cairns, July.
- Skone, S., M.Z. Sadeque (2009) Ionospheric Effects on GNSS Applications for Solar Cycle 24, ION International Technical Meeting, Anaheim CA, January
- Skone, S. (2008) Impact of SED on GPS Applications, CEDAR Workshop 2008, Midway Utah, June.
- Timmins, T., A. Hunter, G. Stenhouse (2009) X Spatial exploration of the relationship between grizzly bear health and environmental conditions in Alberta. Presented at Spatial Knowledge and Information, Fernie B.C 20-21 February.
- van der Wal, W., A. Braun, P. Wu, M.G. Sideris (2008) Prediction of decadal elevation and slope changes in Canada, 34th Annual Meeting of the Canadian Geophysical Union, Banff, AB, 11-14 May.
- van der Wal, W., M.G. Sideris, P. Wu (2008) Observing glacial isostatic adjustment with satellite data, 34th Annual Meeting of the Canadian Geophysical Union, Banff, AB 11-14 May.
- van der Wal, W., P. Wu, H. Wang, M.G. Sideris (2009) Sea level curves, geoid rate and uplift rate from composite rheology in glacial isostatic adjustment modeling, EGU General Assembly, Vienna, Austria, 19-24 April.

Technical Reports, Technical Notes, Research Reports

- Barry, M.B. (2009) Innovative Response to Land Registration, Customary Title and Land Conflict: Applying Talking Titler Methodology: Report No 4 February 2009. British Council, Security Justice and Growth Programme, Nigeria.
- Borio, D., C. Mongrédien, M.G. Petovello (2008) CRD Grant On Adaptive And Flexible GNSS Technology Development For Automotive Systems - Tasks 6 & 7, Progress Report, General Motors Canada, August.
- Borio, D., C. O'Driscoll, G. Lachapelle, M. Petovello, K. O'Keefe (2009) Adaptive and flexible GNSS technology development for automotive systems. Prepared for General motors of Canada, March, 48 pages.
- Bourque, C.P-A., Q.K. Hassan (2008) Leaf area index review and determination for the greater Athabasca Oil Sands Region of Northern Alberta, Canada, For the Cumulative Environmental Management Association, Alberta, December.

- Gernot, C. F. Macchi, M. Petovello, G. Lachapelle (2008) Investigations on the Suitability of a Galileo Ground Station in Calgary. NovAtel Inc, 65 pages.
- Habib, A., J. Rens (2008) Quality Assurance and Quality Control of LiDAR Systems and Derived Data. ASPRS LiDAR Committee 15 pages.
- Habib, A., (2008) Technology Development for the Generation and Updating of Next Generation Digital Base-Maps, Project Korean Land Spatialization Research Project 22 pages.
- Habib, A., A. Kersting, K. Bang (2009) Calibration of LiDAR Systems. Institute of Technology and Development, Curitiba, Brazil 73 pages.
- Habib, A., J. Kersting, J C. Kim (2008) 2D-3D GIS Updating and Change Detection using LiDAR Data. Project Report Sejong University for the Seoul City Project 66 pages.
- Hunter, A.J.S. E. Mohammadi (2009) Best Practices in the Provision of Geospatial Data and Services to the Public, A report for the City of Calgary Geocity Program, Calgary
- Lachapelle, G., K. O'Keefe, M. Petovello (2009) Adaptive and flexible GNSS technology development for automotive systems. Annual Progress Report to General Motors of Canada, NSERC and Alberta Advanced Education and Technology, June, 12 pages.
- Lachapelle, G., M. Petovello, M.E. Cannon, D. Borio, C. O'Driscoll, T. Williams (2009) Enhanced GNSS Receiver Developments for PDAs: Quarterly Report of 31Mar09. Prepared for Research In Motion, 14 pages.
- Nielsen, J., A. Broumandan, V. Dehghanian, G. Lachapelle (2009) Tactical Outdoor Positioning System (TOPS) Technology Demonstration - Development of the handheld synthetic array (HSA). Final Report, Defence Research and Development Canada, Department of National Defence, 323 pages.
- O'Driscoll, C., D. Borio, M. Petovello, G. Lachapelle (2008) Development of an Ultra-Tight Software HSGPS/INS Receiver. Phase II-B Report, Defence Research and Development Canada, Department of National Defence, October, 102 pages.
- O'Driscoll, C., M.G. Petovello, G. Lachapelle (2008) CRD Grant On Adaptive And Flexible GNSS Technology Development For Automotive Systems Progress Report, General Motors Canada, August.
- O'Keefe, K. M.G. Petovello, G. Lachapelle (2008) ProGENY – Multi-Carrier Ambiguity Resolution for LEO Attitude Determination, Contract report, prepared for ESYS plc., Guildford, Surrey, UK
- O'Keefe, K., M.G. Petovello, T. Li, W. Cao, D. Sun (2008) CRD Grant On Adaptive And Flexible GNSS Technology Development For Automotive Systems - Tasks 1 & 3, Progress Report, General Motors Canada, August.
- Petovello, M., G. Lachapelle, C. O'Driscoll, D. Borio, T. Williams (2009) Development of an Ultra-Tight Software HSGPS/INS Receiver. Phase II-C Report, Defence Research and Development Canada, Department of National Defence, March, 34 pages.
- Petovello, M., G. Lachapelle, K. O'Keefe (2009) Progress on Adaptive and Flexible GNSS Technology Development for Automotive Systems Joint GM-UofC Project (Sep07 - Aug10). Presented to GM R&D, Warren, MI, 22Apr09. 49 pages.
- Shanmugam, S., M.G. Petovello (2008) CRD Grant On Adaptive And Flexible GNSS Technology Development For Automotive Systems-Task 5, Progress Report, General Motors Canada, August.





Licenses and Patents

O'Keefe, K., G. MacGougan, D. Chiu (2008) System and Methods for Real Time Kinematic Surveying using GNSS and Ultra Wideband Ranging, US provisional patent application filed through University Technologies International, 15Sept.

Articles in Magazines

Chiu, D., K. O'Keefe (2009) Seamless Outdoor-to-Indoor Positioning. GPS World 20(3): 32-38.

Kwakkel, S., G. Lachapelle, M.E. Cannon (2009) Keep Up the Pace. GPS World, 20(3): 8-10.

O'Keefe, K., S. Gearheard, G. Aipellee, A. Apak, J. Eunaraq, D. Iqaqrialu, L. Palluq, J. Panipak, A. Sivugat, D. Chiu, B. Culling, S. Lam, J. Lau, A. Levson, T. Mosstajiri, J. Park, T. Phillips, M. Brand, R. Enns and E. Wingate (2009) On the Trails of the Inuit. Inside GNSS 4(2): 30-39.

Petovello, M.G. (2009) What are Linear Carrier Phase Combinations and What are the Relevant Considerations?, GNSS Solutions column, Inside GNSS Magazine, 4(1): 16-19.

Interviews/Broadcasts

Marceau, D.J. (2008) Interview for Radio-Canada Calgary, French channel, 13 November.

Marceau, D.J. (2008) Interview for Radio-Canada French TV Channel in Alberta, 01 May.

Skone, S. (2008) Interview, Olds/Disbury airport, July. Interview for article in Calgary Herald about UNSTABLE.

Skone, S. (2008) Interview, Olds/Disbury airport, July. Interview for article in Calgary Sun about UNSTABLE.

Skone, S. (2008) Broadcast, Olds/Disbury airport, July. Interview and broadcast by CTV about UNSTABLE.

Skone, S. (2008) Interview/broadcast, Olds/Disbury airport, July. Interview and broadcast by CBC about UNSTABLE.

Skone, S. (2008) Interview/broadcast, Olds/Disbury airport, July. Interview and broadcast by Global about UNSTABLE.

Skone, S. (2008) Interview/broadcast, Olds/Disbury airport, July. Interview and broadcast by A-channel about UNSTABLE.

Skone, S. (2008) Radio interview, July. QR77 radio interview about UNSTABLE.

Posters

- Bancroft, J., A. Morrison, S. Kwakkel, R. Ong (2008) Athletic Training Through GPS and Inertial Motion Measurement. iCORE Summit 2008, Banff, AB, 21-23 August.
- Bancroft, J.B. (2008) Integrated Systems for Pedestrian and Vehicular Navigation. 2008 AUTO21 Conference, London, ON, 2-4 June.
- Gernot, C., K. O'Keefe, G. Lachapelle (2008) Comparison of L1 C/A L2C Combined Acquisition Techniques. GEOIDE NCE Annual Scientific Conference, Niagara Falls, 28-30 May.
- Liakopoulos, A.G., W. van der Wal, Z. Zhang, J.A.R. Blais, M.G. Sideris (2008) Evaluation of some noise reducing filters for GRACE gravity data, 34th Annual Meeting of the Canadian Geophysical Union, Banff, AB, 11-14 May.
- Macchi, F., M. Petovello, G. Lachapelle (2009) New Galileo L1 Acquisition Algorithms: Real Data Analysis and Statistical Characterization. GEOIDE NCE Annual Scientific Conference, Niagara Falls, 28-30 May.
- Muthuraman, K., G. Lachapelle, R. Klukas (2008) Data/Pilot Combined GPS L2C Signal Tracking—Methods and Performances. GEOIDE NCE Annual Scientific Conference, Niagara Falls, 28-30 May.



ACADEMIC AND PROFESSIONAL SERVICES

M. Barry

- John Holmlund Chair in Land Tenure and Cadastral Systems
- Director, Federation Internationale des Geometres (FIG) Foundation
- Canada Representative, Federation Internationale des Geometres (FIG) Commission 7
- Canadian Council of Land Surveyors Board of Examiners Coordinating Committee
- Canadian Institute of Geomatics (CIG) Certification Committee
- Undergraduate Studies Committee
- Chair Geomatics Engineering Liaison Committee
- Geomatics Engineering Advisory Committee member

A. Braun

- Research Associate, Arctic Institute of North America
- Steering Committee, International Altimetry Service (IAS) of the International Association of Geodesy (IAG)
- Technical committee, IGARSS Boston, MA, USA, 7-11 July 2008
- Member, The International Institute for Infrastructure Renewal and Reconstruction (IIIRR), Sound Science Initiative, American Geophysical Union, European Geophysical Union, Canadian Geophysical Union, member at large, Geodesy Section.
- Reviewer, J. Geophysical Research, J. of Geodynamics, Tectonophysics, Earth Planet. Science Lett., Phys. Chem. Earth. Int., Canadian J. Remote Sensing, J. of Global Positioning Systems, Geomatica, Sensors, Remote Sensing of Environment, Int. J. of Remote Sensing, J. of Geodesy, Pure and Applied Geophysics, Earth Sciences Research Journal, Hydrological & Earth System Science, Acta Geophysica
- Schulich School of Engineering Internship Advisory Council, SSE Building Planning Committee, SSE Energy & Environment undergraduate committee

M.E. Cannon

- Canada Foundation for Innovation (CFI) Board of Directors
- Enbridge Income Fund Board of Trustees
- Canada's Top 40 Under 40 Advisory Selection Board
- Alberta Information and Communications Technology Institute Board
- Member, Women in Engineering Task Force, Engineers Canada
- Member, NSERC Expert Panel on IP Policy
- Member, Royal Society of Canada Woman in Scholarship Committee
- Member, Royal Society of Canada Council

M. Collins

- APEGGA, Board of Examiners
- APEGGA Committee on Aboriginal Affairs
- Associate Editor, International Journal of Remote Sensing
- Reviewer for several technical journals
- Reviewer for NSERC grant proposals

- I. Couloigner**
- Member, European Association of Remote-Sensing Laboratories
 - Member, Canadian Image Processing and Pattern Recognition Society
 - Member, Alberta Geomatics Group
 - Member, APEGGA
 - Reviewer, for Several International Journals
- N. El-Sheimy**
- Canada Research Chair in Mobile Multi-sensor Geomatics Systems
 - President, Technical Commission I, International Society for Photogrammetry and Remote Sensing (ISPRS)
 - Vice Chair, the IAG WG SC4.1 "Mobile Multi-Sensor Systems"
 - Member, GEOIDE NCE Research Management Committee
 - Technical Program Chair, Co-Chair and Member, Organizing Committee for a number of national and international conferences
 - Member of the Editorial Board of Journal of Survey Review, Coordinates, and Journal of Applied Geodesy
- Y. Gao**
- Advisory Board, Association of GNSS Technology and Application in China
 - Board of Directors, International Association of Chinese Professionals in Global Positioning Systems
 - Chairman, IAG Sub-Commission 4.5 "High Precision GNSS"
 - Special Examiner, Board of Examiners for Canada Land Surveyors
 - Associate Editor, IEEE Transactions on Vehicular Technology
 - Editorial Board, Journal of Global Positioning Systems
 - Reviewer for refereed journals and grant applications
 - Session chair and program committee members for international conferences
- A. Habib**
- Adjunct Professor, National Cheng Kung University, Taiwan
 - Associate editor for the Geomatica Journal for the area of Photogrammetry
 - Member, International Editorial Board of the Korean Journal of Geomatics.
 - Member, Editorial Board of the Brazilian Journal of Cartography (RBC) in the field of Photogrammetry and Remote Sensing.
 - Member, American Society for Photogrammetry and Remote Sensing (ASPRS).
 - Chair, ISPRS Working Group I/3 "Multi-sensor and multi-platform inter-calibration"
 - Member, ASPRS LiDAR Committee
 - Member, British Columbia Community of Practice for Medium-Format Digital imaging Systems
 - Member, British Columbia Community of Practice for LiDAR Systems
 - Member, British Columbia Community of Practice for Digital Orthophoto Generation
 - Special Examiner for the Canadian Board of Examiners for Professional Surveyors (CBEPS) in the are of Remote Sensing and Applied Photogrammetry

Q. Hassan

- Member, Canadian Remote Sensing Society
- Member, International Society for Environmental Information Sciences
- Reviewer for several technical journals
- Reviewer, IEEE International Geoscience and Remote Sensing Symposium
- Member, Centre for Environmental Engineering Research and Education

A. Hunter

- Chair, the FIG C.53 WG "Integrated Positioning, Navigation and Mapping Systems"
- Academic Member Canadian Board of Examiners for Professional Surveyors Education
- Education Rep for Alberta Geomatics Group
- Department Rep Internship Advisory
- Member Learning and Instructional Development Subcommittee
- Campus Fair Brochure Development

J.W. Kim

- Member, Canadian Geophysical Union
- Member, American Geophysical Union
- Member, IEEE GRS (Geoscience and Remote Sensing Society)
- Member, Korea Remote Sensing Society
- Member, Korea Soc. of Env. Geology

G. Lachapelle

- Chair, Institute of Navigation Alberta Chapter
- Editorial Board, GPS World
- Editorial Board, GPS Solutions
- Editorial Board, International Journal on Navigation and Observations
- Editor for Navigation, IEEE Transactions on Aerospace and Electronic Systems
- Associate Editor-in-Chief, IEEE Transactions on Aerospace and Electronic Systems
- Guest Editor, IEEE Journal of Selected Topics in Signal Processing (J-STSP) Special Issue on Advanced Signal Processing for GNSS and Robust Navigation
- Guest Editor, Annals of Telecommunications Special Issue on Positioning and Telecommunication systems - Complementary aspects and benefits of merging the two

- S. Liang**
- Secretary, the ISPRS Technical Commission I on Image Data Acquisition - Sensors and Platforms
 - Co-Chair, the ISPRS Intercommission Working Group on Geo-Sensor Networking and GeoGRID (ICWG IV/II)
 - Reviewer for several international journals, books, and research grants
 - Session chair for several international conferences
 - Scientific Committee Member, Spatial Knowledge and Information 2009
 - Member, Canada Institute of Geomatics
- D. Lichti**
- Chair, International Society for Photogrammetry and Remote Sensing Working Group V/3 Terrestrial Laserscanning and 3D Imaging
 - Editorial Board Member, Journal of Spatial Science
 - Project Associate, Heritage 3D, United Kingdom
 - Member: Canadian Institute of Geomatics, Spatial Sciences Institute (Australia)
 - Journal reviewer: Natural Hazards and Earth System Sciences, ISPRS Journal of Photogrammetry and Remote Sensing, Journal of Surveying Engineering, Photogrammetrie – Fernerkundung – Geoinformation (PFG), Sensors, Survey Review
- D. Marceau**
- Associate Head of Graduate Studies, Department of Geomatics Engineering
 - Member of the Council of the Faculty of Graduate Studies
 - Member of the Steering Committee of the Graduate Faculties Council
 - Member of the Committee of the Graduate Faculties Council
 - Member of the International Program Committee of the *IASTED International Conference on Modelling, Simulation and Identification*, Beijing, China
 - Member of the Technical Committee of the *30th Canadian Symposium in Remote Sensing*
 - Member of the program committee of the *3rd ICA Workshop on Geospatial Analysis and Modeling*, University of Gävle, Sweden
 - Member of the International Editorial Advisory Board of *The Open Environmental Engineering Journal*
 - Member of the International Editorial Board of the International Journal of GIS and Spatial Analysis/Revue internationale de géomatique
 - Member of the multidisciplinary evaluation committee of research centre
- K. O'Keefe**
- Member, Institute of Navigation, Canadian Institute of Geomatics, Canadian Aeronautics and Space Institute, American Geophysical Union
 - Member, Faculty Gender and Diversity Committee
 - Member, Faculty Undergraduate Studies Committee Faculty Representative, UofC Engineering Endowment Board
 - Editorial Board, GPS Solutions
 - Member, IAG WG 4.5.1 Network RTK, WG 4.5.4 Data Processing of Multiple GNSS Signals
 - Reviewer, IEEE Aerospace and Electronic Systems, IEEE Vehicular Technology, GPS Solutions, Journal of Geodesy
 - Examiner, APEGGA Satellite Surveying Exam, Fall 2008

M. Petovello

- Contributing editor, Inside GNSS magazine's GNSS Solutions column
- Co-Editor, U.S. Institute of Navigation Red Book on Integrated Navigation
- Vice-Chair, Institute of Navigation Alberta Section
- Chair, U.S. Institute of Navigation's Student/Education Outreach sub-committee
- Session Chair, 2008 IEEE Vehicular Technology Conference (VTC)
- Session Chair, U.S. Institute of Navigation GNSS 2008 Conference
- Member, U.S. Institute of Navigation, APEGGA, IEEE
- Reviewer, IEEE JSTSP, IEEE TAES, IEEE TIM, ION Journal of Navigation, Office of Soft Computing
- Session Chair, U.S. Institute of Navigation GNSS 2009 Conference

M. Sideris

- Associate Dean (Engineering), Faculty of Graduate Studies
- Member, Board of Directors of the GEOIDE NCE
- President, International Association of Geodesy (IAG)
- Member, Bureau and Executive Committee of the IAG
- Member, Executive Committee of IUGG
- Fellow of the IAG and of the International Geoid Service
- Member of several IAG special study groups, commissions, and working groups
- Member, Board of Directors of the Bureau Gravimetric International
- Reviewer for the Journal of Geodesy, Geomatica and Journal of Geophysical Research
- Member, Editorial Board, Journal of Geodesy and Cartography
- External reviewer, NSERC Grants

S. Skone

- NSF CEDAR Science Steering Committee
- Chair, Canadian Navigation Society
- CASI Executive Council
- CIG Hydrography Committee
- Associate Editor, Canadian Aeronautics and Space Journal

W. Teskey

- Member, Faculty of Engineering Academic Appeals Committee
- Canadian representative to Commission 6 (Engineering Surveys) of the International Federation of Surveys (FIG)
- Member, Publications Committee, Journal of Surveying Engineering

X. Wang

- Program Committee Member, The 5th International Conference on Fuzzy Systems and Knowledge Discovery (FSKD'08) and The 4th International Conference on Natural Computation (ICNC'08)
- Reviewer, Pattern Recognition, IEEE International Conference on Data Mining (ICDM 2007) AGG 2009, Geomatica, Journal of Advanced Transportation
- Committee member, Faculty Gender and Diversity in Engineering Committee (GDEC)
- Member, The Association of Chinese Professionals in Geographic Information Systems