Volume 8, Issue 2

WINTER 2011

GEOMATICS ENGINEERING

SCHULICH School of Engineering

UNIVERSITY OF CALGARY

DEPARTMENT OF GEOMATICS ENGINEERING

Geomatics News

Message from the Head

Dear Valued Reader

Over the Winter Semester, the department has been busy with several events. The Department's 15th Annual Career Day took place on February 3rd. We had more than twenty national and international companies participating in this event. On behalf of the Department, I would like to thank the Geomatics Engineering Student Society (GESS) and the Career Day Student Committee for all their efforts in organizing this year's Career Day. Also, we hosted our annual meetings of the Geomatics Engineering Liaison Committee (GELC) and the Geomatics Engineering Advisory Committee (GEAC) on February 2nd and March 17th, respectively. These meetings gave us the opportunity to meet with the Department's external supporters and solicit valuable feedback to ensure first-class service to our undergraduate and graduate students. Also, we had the Department's Annual Awards Night on March 16th and celebrated the achievements of our undergraduate and graduate students. On behalf of the Department, I would like to congratulate all the award winners and wish them continued success throughout their academic and professional careers.

To our second-year students, I would like to congratulate you for finishing the first full semester in Geomatics Engineering. I hope that you had a chance to know more about Geomatics and we are looking forward to meeting you in the third year of our program. To our Fourth year students: well done on finishing your studies. It has been a pleasure having you in the Geomatics family for the last few years and we wish you all the best in your future endeavors as Geomatics Engineers. As a Department, we are committed to work hard to ensure that the quality of this program is maintained, and the value of your degree is as good as the day you left. In this regard, we will rely on your help and long-term relationship with the Department. Your feedback regarding your experience in the department and how it relates to your work will be essential to the success of our efforts in delivering graduates ready for any challenges they might face.

Dr. Ayman Habib
Professor and Head

Geomatics Engineering Advisory Committee

Back L to R: Kevin Magowan, Stephen Green, David Parker, Zoltan Biacs, Fraser Smith, Ayman Habib

Front L to R: Kyle O'Keefe, Rita Cheng, Nadia Namini, Danielle Marceau

Inside this issue:

Congratulations

- Congratulations to students who completed their graduate studies: Yigiter Yuksel, PhD; Zhan Zhang, MSc.

- Dr. Susan Skone has agreed to serve as Associate Dean, Research, of the Schulich School of Engineering. Dr. Skone is a well respected educator, researcher and leader in the Department of Geomatics Engineering, who has been a faculty member with the Schulich School of Engineering for over 12 years. She has also served as Acting Head and Associate Head in the Department of Geomatics Engineering.

- Dr. Mark Petovello, Associate Professor in Geomatics Engineering and member of the PLAN Research Group, has received the Schulich School of Engineering (SSE) Departmental (Geomatics) Early Research Excellence Award, the SSE Departmental (Geomatics) Teaching Excellence Award, and the SSE Outstanding Teacher Award. The three awards were presented at the 2010 SSE Departmental Awards Presentation.

- Dr. Ayman Habib, has been awarded the 2011 ASPRS Photogrammetric (Fairchild) Award, one of the top awards established by the American Society of Photogrammetry and Remote Sensing.

- Garth Wanamaker was selected to receive the 2010 Schulich School of Engineering Donna Geekie Service Award. Thank you Garth, for your outstanding contributions to the Schulich School of Engineering and congratulations on being selected for this well deserved recognition.

- Department Annual Student Awards Night was held March 16, 2011. Congratulations to all our award winners.

Other News

- President of the Canadian Aeronautics and Space Institute, Ron Holdway, visited the University of Calgary on March 9, 2011. He gave a presentation titled "The Amazing Story of Canada in Space - Global Success on a Shoestring Budget." The presentation explored how Canada's many remarkable achievements in space have been accomplished on the strength of such a modest shoestring budget.

Ron is also Vice President Government Relations for COM DEV, Canada's second largest space company and largest space equipment designer/ manufacturer.

- Pi-throw is a charitable event put on by many engineering schools across Canada. In past years, Pi-Throw has raised over $5000 each year for various charities. A pie can be purchased for $5 from ESS to be delivered to a classmate or professor. A volunteer will deliver the pie. The receiving student or professor may choose to take the pie in the face, pay to redirect the pie (current price + $5) or pay to eat the pie (current price + $10). Pies can be redirected anywhere multiple times with the purchase price increasing $5 each time.

Dr. Ayman Habib takes a Pie

- Dr. Steve Liang is the project leader of TrafficPulse, a $280,000 project, which is mostly funded by GEOIDE (Geomatics for Informed Decisions), an organization that brings together experts from Canadian universities, industry and government. The City of Calgary has also contributed $80,000 to the project. Other partners in the TrafficPulse project are IBI Group and Alberta Cyberinfrastructure for Innovation, known as Cybera.

The City of Calgary wants to use it to calculate vehicle travel times along major city routes. The TrafficPulse application, which can track a driver's GPS location on their phone, will also allow users to report on road conditions with thumbs up, or thumbs down, and report construction delays and traffic accidents. See: http://www.calgaryjournalonline.ca/news/34-news/1584-sean-sullivan

- Dr. Jan Skaloud, Senior Research Fellow and Lecturer, at Ecole Polytechnique Fédérale Lausanne (EPFL), Switzerland, and alumnus of our Department will be offering a graduate course titled "*Special Studies in Integrated Sensor Orientation*". The course will be open to Geomatics Engineering graduate students as well as interested industry participants. This course, which is scheduled as a Fall course, will run over a three week period in August-September 2011. Financial support for this course has been provided by the Tecterra's GEO-Expert Industry Training program.

Research Spotlight

Deformation Monitoring With Close Range Photogrammetry

Article by Ayman Habib & Ivan Detchev (Digital Imaging Systems)

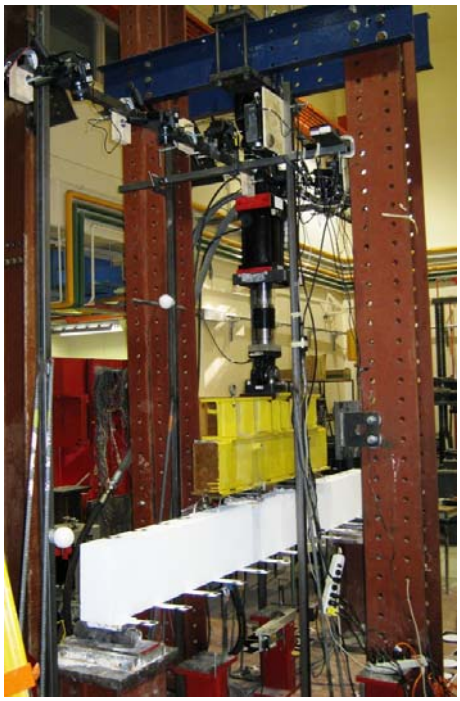

Figure 1. Example of the camera system positioned on a metal frame above a concrete beam

Civil infrastructure systems are some of the most expensive assets in Canada. In order to avoid their deterioration, these structures need to be regularly monitored for potential repairs and/or upgrades. Unfortunately, current structural health monitoring techniques are manual, error-prone and temporally-sparse. The overall monitoring of large structures such as dams, bridges, open-pit mines or high-rise buildings has traditionally been done through surveying techniques. In the last decade or so, monitoring activities have been complemented by the use of global positioning techniques. On the fine-scale side, i.e. deformation monitoring of structural walls or support columns typically has only been done through geotechnical techniques, for example using strain gauges. This process can only measure changes in one direction and does not provide the absolute position of the monitored location. Fine-scale deformation monitoring, however, can also be done via remote sensing techniques such close range photogrammetry and terrestrial laser scanning. The potential advantages of these systems are that the object of interest does not have to be accessed while being measured, precise 3D reconstruction of entire surfaces and not just several points is possible, and the position of monitored locations can be derived.

Figure 2. Close-up example of part of the camera system positioned on one side of the metal frame

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Alumni Voice

At an early age I knew I would be an engineer; however I didn't know what discipline to pursue. That all changed after attending the Engineering Open House as a high school student. From my interest in mapping and love of new technology, the Geomatics display definitely caught my attention.

It's now been close to two years since I graduated from U of C with a Geomatics Engineering degree and almost three years since I've been at CDL Systems which includes my internship. CDL Systems is a software development firm that creates control station software for unmanned vehicles. Some of our more notable products control the Shadow and Grey Eagle UAVs for the U.S. Army.

My role at CDL is in Systems Engineering which is a position that covers a broad range of areas involving software development. My main areas of focus involve designing new features for our software, working closely with our customers and verifying our products.

CDL has afforded me the opportunity to travel frequently to places such as Newcastle-upon-Tyne, Orlando and Washington D.C. in support of our projects and for interesting conferences. I can honestly say that my strong foundation gained from the Geomatics Engineering program at the U of C has been beneficial to me at CDL. Not only did I leave University prepared for the professional world, I often am able to draw on many of the skills given to me during my time at U of C to help me succeed today and in the future.

Dustin Engen BSc 2009

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

Phone: 403 220 5834
Fax: 403 284 1980
Email: geomatics@geomatics.ucalgary.ca

A Passion for Excellence

We're on the web:

geomatics.ucalgary.ca

Since last summer, the Digital Photogrammetry Research Group (DPRG) has been working on the design and implementation of a multi-camera photogrammetric system for fine-scale deformation monitoring. For example, the system could be used to measure the deflection of concrete beams loaded at different conditions by a hydraulic actuator (see Figure 1 and Figure 2).

So far, there were two tests done, where the hydraulic actuator loaded the beams statically. The photogrammetric reconstruction yielded sub-millimetre precision. In fact, compared to a set of high-precision 1D laser transducers (which measured only specific points on the beam for control purposes, see Figure 3), the camera system showed better than 100µm compatibility. Current research is being conducted to measure deformations under dynamic loading conditions as well as enable the testing in non-laboratory environments.

being tested

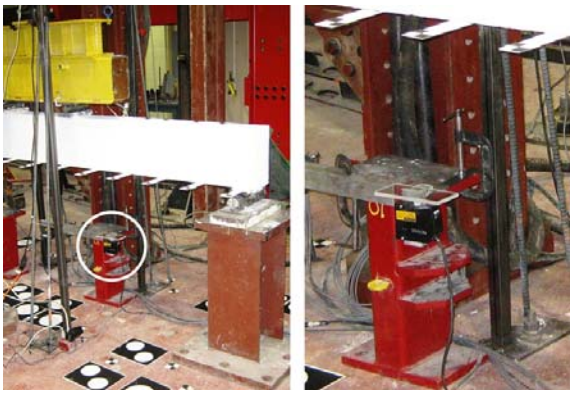

Figure 3. Example of a 1D laser transducer positioned under a beam being tested

Department Activities

Kristopher Locking, Natasha Wong Ken, Tan Varma and Jasen Stein—Career Day held February 03, 2011.

- The first ever Brews and Bruises event was held on March 19, 2011. This event was hosted by GESS and consisted of a Wild Rose Brewery tour and a Calgary Roughnecks (lacrosse) game.

- We say a sad goodbye to Kathy Hamilton, our IT Support Technician. Good luck and best wishes to you, Kathy, on your future endeavors. We will miss you!

Ayman Habib and Kathy Hamilton

Coming Events

- The Iron Ring ceremony and Graduation Banquet will be held on April 2, 2011 and the banquet will be held in the evening at the Hyatt Regency
- Winter Term Lectures End April 15, 2011
- Winter Term Final Exam - April 18 - 29, 2011
- Survey Camp August 22—Sept 01, 2011
- ENGO 699.55 Special Studies in Integrated Sensor Orientation, Instructor Dr. Jan Skaloud — Aug 22-Sept 09, 2011. Register in Fall Timetable.

Sites to Visit:

- *http://www.asprs.org/*
- *http://plan.geomatics.ucalgary.ca/professors/petovello/*
- *http://www.calgaryjournalonline.ca/news/34-news/1584-sean-sullivan*
- *http://dprg.geomatics.ucalgary.ca/*