



**SCHULICH**  
School of Engineering

DEPARTMENT OF  
GEOMATICS  
ENGINEERING

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### COMING EVENTS

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- CONVOCATION June
- VISITING PROFESSORS FROM ENAC IN FRANCE
- SURVEY CAMP
- START OF NEW FACULTY MEMBERS
- START OF CLASSES



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DEPARTMENT OF GEOMATICS ENGINEERING

# Geomatics News

TERM Winter YEAR 2016 • Volume 13, Issue 2

Dear Reader

It is a very exciting time for the Department since we are in the process of recruiting for two new academic positions: an Assistant Professor with research focused on digital imaging systems and an Instructor in surveying and mapping. Watch our newsletter for future announcements!

The first major event for us in the winter semester was the annual Geomatics Engineering Liaison Committee (GELC) meeting in January where members of the Department and representatives from government and the land surveying industry meet to discuss relevant current issues. This was followed by the Geo Expo. Superbly organized by the Geomatics Engineering Student Society (GESS), the event attracted many exhibitors despite difficult economic times. The afternoon featured a panel discussion entitled "Career Opportunities in Geomatics Engineering". Five panelists from industry and government discussed their experiences and the career opportunities in Geomatics and took questions from the audience. Thanks to Jon Neufeld, Teceterra, Barbara Ball, Think Fast

Strategic Consulting, Mark Hatcher, NRCan, Sandy Kennedy, NovAtel and Natasha Spokes, Seisland Surveys Ltd for giving their time to participate.

The Geomatics Engineering Advisory Committee (GEAC) meeting was held in mid-March. This year we welcomed new GEAC members Kevin Swabey from Midwest Surveys and Ian Westlake from the City of Calgary. Agenda items included an update on state of the department, including undergraduate and graduate matters as well as a detailed research discussion. The annual awards night, when we recognize the excellent undergraduate and graduate students in our department, concluded the busy day.

I had the chance to attend the Annual General Meeting of the Alberta Land Surveyors' Association in Banff in April. My main role was to participate in a meeting of association presidents from across the country and a Canadian Board of Examiners for Professional Surveyors (CBEPS) representative to discuss accreditation issues. It was a very productive meeting that I believe will be the impetus for positive change in the near future. Thanks to ALSA President Greg

Boggs for organizing the meeting. I also attended the ALSA New Members' Lunch, which is a fantastic event where new Alberta Land Surveyors are formally recognized.

The Department is proud to acknowledge that Dr Naser El-Sheimy was awarded a Tier 1 Canada Research Chair in Geomatics Multi-sensor Systems. This will allow Naser to continue his world-class research for a seven year period. Congratulations Naser!

Finally, the Department had two successful equipment grant applications from the University of Calgary Engineering Endowment fund. The first was for a new gravity meter led by Dr Michael Sideris and the second was additional components for a multi-sensor prototyping platform led by Dr Mark Petovello. Thanks to Michael and Mark for leading these initiatives that will be invaluable additions to our undergraduate degree program.

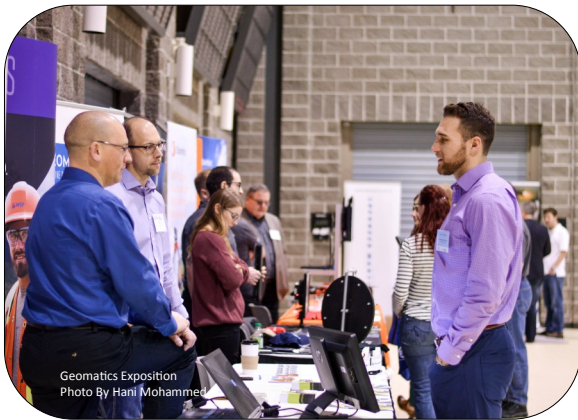
Derek Lichti  
Professor and Head

[schulich.ucalgary.ca/geomatics](http://schulich.ucalgary.ca/geomatics)

# Department & Outreach Activities

Winter 2016 was a very busy term with many activities happening in the Geomatics Department.

We started the semester with the Geomatics Exposition, and brought back the industry panel event with great success! (You can view the full panel discussion at [https://www.youtube.com/watch?v=MQQ9zY\\_EQsY](https://www.youtube.com/watch?v=MQQ9zY_EQsY)).



Geomatics Exposition  
Photo By Hani Mohammed

The Exposition was well attended by U of C students and we even had a junior high school group from Banbury



Geomatics Exposition  
Photo By Hani Mohammed

Crossroads School come for the day to check it out!

We also hosted the Geomatics Engineering Liaison Committee (GELC) meeting in January. Thank you again to all our industry partners for a great meeting.

In February we had a Hot Chocolate Day with ALSA as a 1st year recruitment event just before the program selections closed—thank you to one our industry partners Eryn Gibbs representing ALSA and sponsoring this event.

The Beef & Bun event in March, also sponsored by ALSA, was a great evening that provided a great opportunity for students to network with industry representatives.

The GEAC meeting and the Annual Geomatics Award Night followed shortly after this and everyone had a great time, thank you to all the Industry donors for all the scholarships and awards, without you this evening would not be possible. Congratulations to all the award winners!

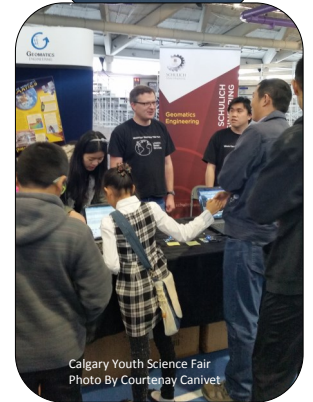
This was followed by Women in Engineering Day, APGEA Science Olympics and the Calgary Youth Science Fair and Explore IT. For Women's Day in Engineering we welcomed junior high school aged girls into our department and had a day of demonstrations' for them.



Women in Engineering Day  
Photo By Courtenay Canivet



Calgary Youth Science Fair  
Photo By Courtenay Canivet



Calgary Youth Science Fair  
Photo By Courtenay Canivet



Geomatics Annual Award Night  
Photo By Hani Mohammed

Both the APEGA Science Olympic and the Calgary Youth Science had a great turnout this year and our Geomatics Department booth was a highlight at both events! We had a Range camera, object sensor demo, Geomatics etcha sketch and snake games at both events. At the APEGA Science Olympics we were lucky to have robotic lego programmed to locate boundary lines and at the Calgary Youth Science Fair we showcased Dr. El-Sheimy's UAV. We even had the kids driving!



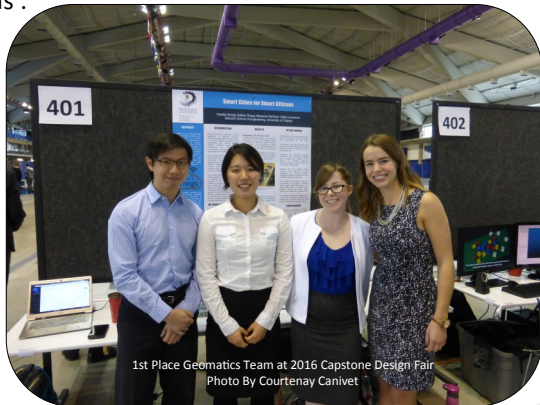
Geomatics Annual Award Night  
Photo By Hani Mohammed

# Department & Outreach Activities

Capstone Design Fair showcased many interesting projects from the 4th year class this year and congratulations to Charlie Chong, Esther Chung, Breanna Hartman and Haley Lawrence for 1st place project 'Smart Cities for Smart Citizens'.

Congratulations also to our Capstone teams who are Video award winners for the LiDAR Road Sign Detection and Pedestrian Navigation and Athletic Analysis Using a Wearable Device videos!

Last but not least, we joined in the Alumni weekend kick off for the University of Calgary's 50th Anniversary with a precision art drawing on the floor of the EEEL building.



1st Place Geomatics Team at 2016 Capstone Design Fair  
Photo By Courtenay Canivet



50th Anniversary Alumni Weekend  
Photo By Courtenay Canivet



50th Anniversary Alumni Weekend  
Photo By Courtenay Canivet



- Dr. Ruisheng Wang receives a 2nd Google Research Award for the Research project titled 'Enhancing Building Facades Using Mobile LiDAR.'
- Dr. Naser El-Sheimy received a 7-year term Canada Research Chair Tier-1 in Multi-Sensor Geomatics Systems (GMS)
- Dr. Kyle O'Keefe was named professor of the Year by the Geomatics Engineering Class of 2016 and received this award at the Iron Ring Banquet.
- Khan Rahaman, PhD student under the supervision of Dr. Quazi Hassan, is the success recipient of a 2 year Postgraduate Scholarship—Doctoral (PGS D) from NSERC.
- Hussein Al-Gurrani, PhD student under the supervision of Dr. Ayman Habib, was a finalist for the 2016 Sustainability Award
- Chunyang Yu, PhD student under the supervision of Dr. Naser El-Sheimy, won the Youth excellent papers award at the 7th China Satellite Navigation Conference for her paper titled "Indoor Map Aiding/Map Matching Smartphone Navigation Using Auxiliary Particle Filter" that she co-authored with Dr. El-Sheimy.

# Undergraduate Student Spotlight

## Site Selection for a Nuclear Reactor: A Geomatics Perspective

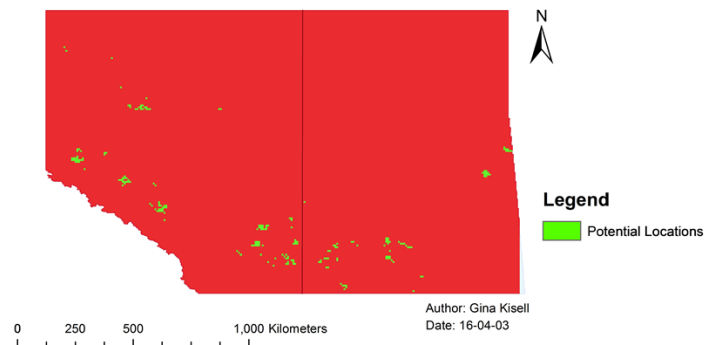
Abstract By:

G.M. Kisell, J.M.K.C Donev

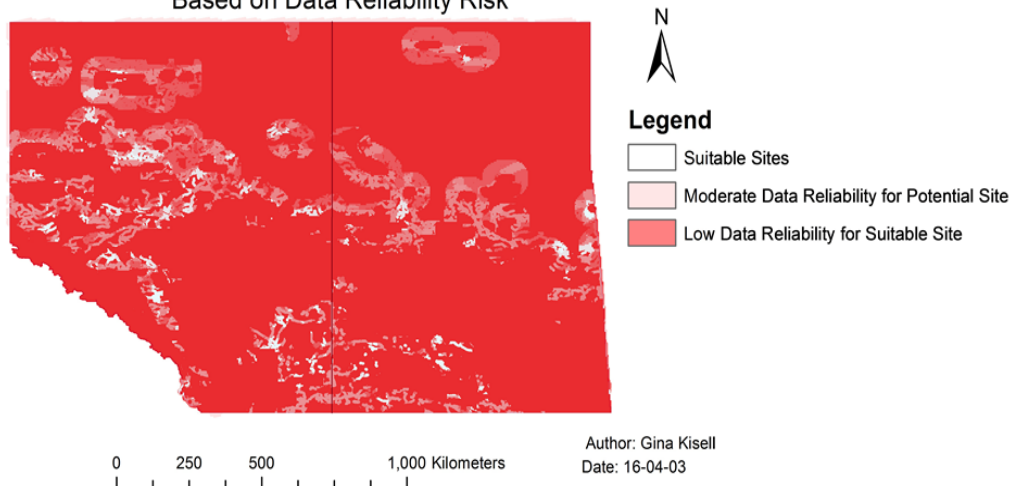
Currently in Canada, selecting a site for a potential nuclear reactor is a complex process with multiple steps. The initial step involves grid planners who evaluate areas to find an ideal location to balance the load on the power grid as well as locations that meet other requirements such as water sources and access. This is the phase that would benefit most from these mapping techniques. From there the sites are continually narrowed down as the requirements to meet the assessments become more detailed. By implementing a geomatics mapping technique, a more detailed initial evaluation could be completed quickly and effectively in the planning stage to further narrow the search for potential sites and increase the chance of successful evaluation of the chosen site. By using geospatial data, a map can be created that highlights all potential sites based on the users specifications and area of interest. These techniques feature the use of Geospatial Information System (GIS) mapping software. GIS is a system that can store, analyse, sort or otherwise manipulate spatial data. The software allows for the spatial data to be stored and then used for the purpose of creating tables for effective sorting, maps for visual display of the information or a number of other similar tasks.

The paper looks in detail at how this mapping process could be completed using the Canadian provinces of Alberta and Saskatchewan as the study areas. The method can also be extended to include any region worldwide that has the necessary data available. The paper will describe the data that was used to generate the maps, the databases used to find the data and why each set of data was determined to be an important factor of consideration. The maps were generated using ArcMap and national and provincial databases to obtain the data files.

Potential Locations for a Nuclear Reactor in Alberta or Saskatchewan



Potential Locations for a Nuclear Reactor in Alberta or Saskatchewan  
Based on Data Reliability Risk



# Undergraduate Student Spotlight continued

## Geomatics Students Participate in City of Calgary Hackathon 2016

By Marcus Polini

The City of Calgary Hackathon 2016 was a 3-day event hosted at the municipal building where contestants competed to develop a solution to better connect Calgary and surrounding communities to its people. Open to the public, contestants varied from students in computer science, engineering, and business, to professionals in industry. People of all ages and backgrounds in knowledge competed for the grand prize of \$5000. This year's winner was CycloConnect, a project that connects cyclists to designated paths and bike racks throughout the city; the team created a functional web app to achieve this, and much more. Providing visual updates of bike racks, tips, parking availability estimates, and a feedback/user communication network, CycloConnect is clearly capable of changing the way citizens of Calgary and area utilize cycling infrastructure.

Our team, cityConnect, was composed of six Geomatics engineering undergraduate students: Alex Dzeilski, Brandon Luong, Brian Choi, Daniel Lee, Harrison Krause, and Marcus Polini.

Without any experience in developing mobile applications or programming in Java, we took on the challenge of creating an Android mobile application; needless to say, it was a big learning curve for us in such a short amount of time. The potential for cityConnect is incredible as it's described as a free service that brings personalized event and restaurant suggestions right to your handheld, and recommends public transit transportation routes to get you to where you need to be, with near real-time transit status updates. Business licenses and transit data available on the City of Calgary's open source database is utilized in this service. To bring personalized event and restaurant suggestions, cityConnect surveys a user to understand what they like in food and entertainment. The application also makes use of the Facebook and Yelp APIs to bring a user public and private events, and restaurant reviews and ratings.

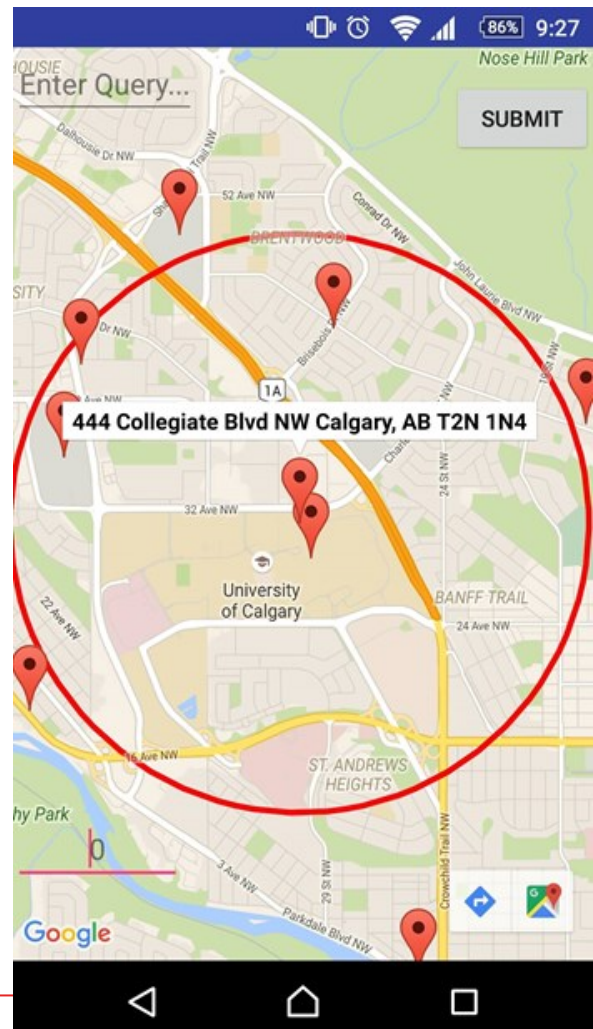
During the 3-day event, we were not capable of developing the fully comprehensive app; however, we did create a functional Android application that queries Calgary's businesses and sample event data based on a keyword and search radius from a pinned location. The results are displayed and visualized on a map using the Google Maps API (see screenshot).

Overall, we are extremely thrilled with our achievements from the event. Despite not winning the grand prize, we learned tons about mobile app development, were fed meals all weekend, and spent some quality time building better relationships among ourselves and others in the competition.

Some tips for future competitors: In order to maximize one's effectiveness during the competition, it's important to be prepared with tools

for programming (e.g., AndroidStudio, parsing tools, open source templates, etc.), and to have a realistic idea of what solutions can be created, and how detailed it can be made in a few days. We definitely bit off more than we could chew with our anticipated service, but made considerable achievements anyways.

*Screenshot of the application after querying "Food" within a "2000 m" radius of the University*



# Undergraduate Student Spotlight continued

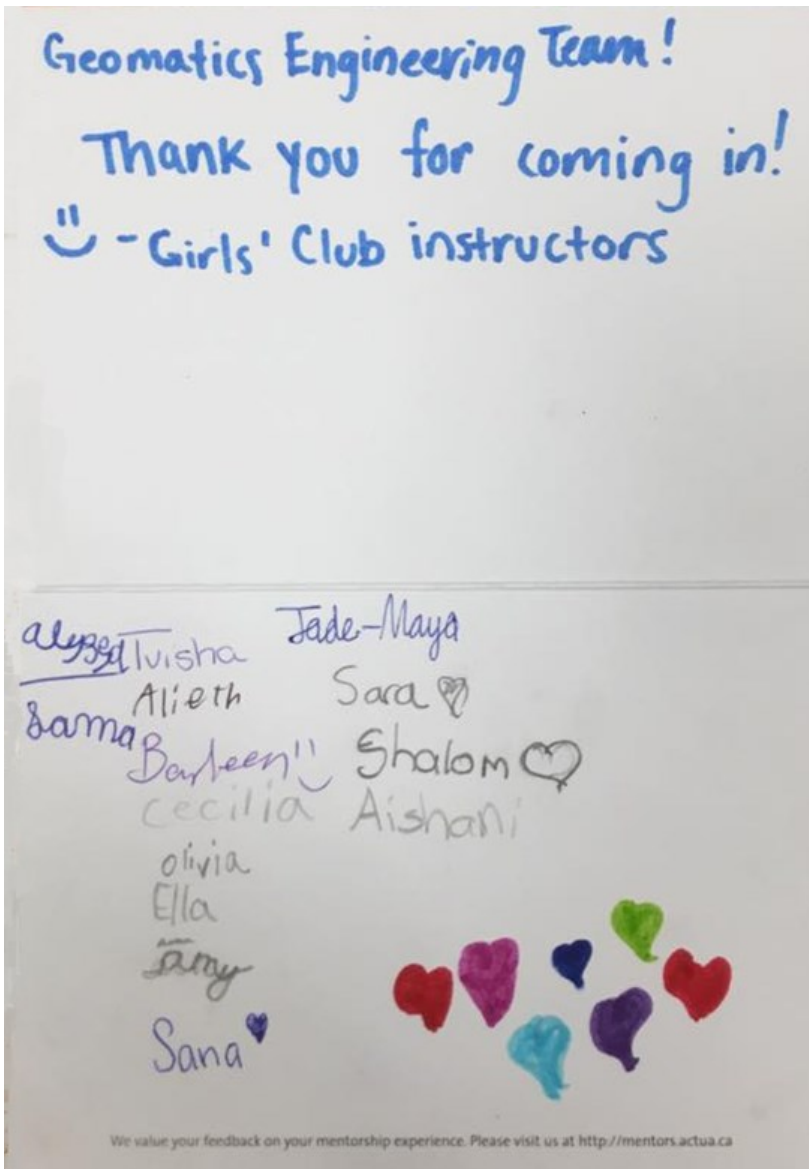
## GESS & Minds in Motion

By Steven Schroeder

In February members of the Geomatics Engineering Student Society (GESS) Christine Cao, Steven Schroeder, Angela Elithorpe, and Colin Edgar hosted a weekend event for the Minds in Motion Girls Club. Minds in Motion is a non-profit organization co-hosted by the University of Calgary Faculty of Kinesiology, Active Living, and Schulich School of Engineering. The club gives young girls (Grades 1-6) the opportunity to learn about science, technology, engineering, and mathematics (STEM) in a fun, and friendly environment.

GESS presented the captivating world of Geomatics to these young minds, and demonstrated some of the new technologies being developed. After the presentation the girls were split up into groups for a geocaching event. Each team was given a map of campus with locations of hidden tokens. Similar to a treasure map, but with information for the kids to record such as weather, number of steps, and important features. Teams that found their tokens first won prizes.

The kids were very engaged throughout all the activities. It's hard to say who had more fun the kids, or the GESS students. This was a great event, and GESS would like to continue doing these outreach activities in the future to promote Geomatics Engineering to young kids.



Geomatics staff and graduate student(s) participating in  $\pi$  week



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