SCHULICH School of Engineering

DEPARTMENT OF GEOMATICS ENGINEERING

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Geomatics News

January 2019

Celebrating our

40th Year

LOOKING FORWARD

Women in Engineering
February 20, 2019

GeoDays
February 22—25, 2019

Annual Geomatics Award Night
March 14, 2019

Calgary Youth Science Fair
April 5, 2019

APEGA Science Olympics
May 4, 2019

Swiss Trip
Beginning of May

June Convocation
June 4, 2019

Survey Camp 2019
Proposed for August 20—28, 2019

@UofC_Geomatics

geomatics-engg-uofc

GeoDays is a series of Geomatics Engineering events to bring together students, faculty and industry to foster relationships and collaborations from across Canada. The events include:

- 1st Canadian Geomatics Engineering Conference- bringing together departments to meet and exchange ideas and foster inter-department collaborations
- National Geomatics Competition- a student-led consulting engineering competition in it's 2nd year
- Geomathon- bringing together graduate students from geospatial related fields for a day of hacking, designing and innovating
- Geomatics Exposition- a student-led career fair showcasing the many careers and evolving technologies in Geomatics

Canadian Geomatics Engineering Conference

NATIONAL GEOMATICS COMPETITION

Geomathon

February 22-25
Department of Geomatics Engineering
Schulich School of Engineering, University of Calgary

Alumni Career Spotlights

Stephanie Michaud

Quick Bio:

Stephanie Michaud, P.Eng, is a Portfolio Manager within the Geospatial Division at Trimble Inc based in Denver, Colorado. Stephanie is responsible for the strategic development and execution of cadastral survey solutions within the Land Administration division and broader geospatial organization.

Stephanie graduated from U of C in 2011 with an undergraduate degree in Geomatics Engineering, and has been a member of the Geomatics Engineering Advisory Council since 2016. Stephanie also actively interviews and recruits new hires for Trimble from Geomatics programs around the world.

Alumni Career Spotlights

Stephanie Michaud

Upon graduating from the U of C in 2011, I wanted to apply the knowledge I had gained in the Geomatics program to new and unique industries. From my two summer research positions, I had learned how to use sensor fusion to measure vehicle trajectories for assisted navigation with the PLAN group, and how to leverage satellite imagery and GIS data to predict forest fire burn patterns with the Geo-Computing Lab. Throughout my degree I explored many different skills and aptitudes, but in my capstone project I really began to realize my strength at synergizing technical concepts, working with people, and executing on a project and/or solution.

When I accepted the offer to enter Trimble's Graduate Rotation Program, I knew the company would provide me with the opportunity to apply my skills in environments that I had never experienced before, on a global scale with people from all over the world. I moved to Denver, Colorado and worked in four different six-month job rotations, each within a different business unit; Technical Support in Mapping and GIS, Market Acceptance Testing in Survey, Product Management in Agriculture, and Technical Sales in Imagery. In the program I made valuable connections, gained experience and exposure to many different levels of the organization, and developed a reputation as an employee who could take on responsibility.

In 2013 I challenged myself to work in an entirely new field of application, and accepted the role of Technical Solutions Manager in Trimble's Agriculture division. I was hopelessly intrigued when I saw how the precision farming industry was rapidly growing due to the significant impact of Geomatics technology. I worked for several years to evolve our on-tractor precision farming platform, which included GNSS receivers, satellite based correction services, Autopilot steering systems, Android display platforms, and what would become the precursor to our autonomous tractor prototype. In 2014, I filed for and later received a US and EU patent award for defining a method of using three-dimensional elevation modeling for use in operating agricultural vehicles. In this sector I witnessed the power of technology, and how geomatics innovation was able to support not only growing more food, but doing so safely, more efficiently, and with better stewardship for the environment.

In 2015 I transitioned to a business development role in our Land Administration group, where I could leverage my second language (Spanish), gain international exposure, and work directly with our sales' channel in emerging markets. Over the next two years, I applied my geomatics knowledge to a foundational industry that we often take for granted- our ability to purchase and own land. During this time, I worked extensively in Colombia, where together with our local partners, I lead the execution of a USAID funded project to map and formally document land in one of the most rural areas in Colombia affected by the civil war. In this project, Geomatics technology enabled stability for local families, allowing them to reclaim their rights and transform it into a smallbusiness loan, or a permanent farm they could invest in. I also began to understand the impact of technology- as I was working with our customers in remote jungle with no cell signal, I realized how important customer input and feedback is in the product development process, from all demographics and regions.

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Alumni Career Spotlights

In 2016, I received my P.Eng. designation from APEGA, even with the majority of my work experience being based in Colorado. That same year, my husband was accepted to a full-time MBA program at UBC in Vancouver. We moved back to Canada, and I worked in our local Trimble office in North Vancouver for a year, and traveled extensively to various project sites. In May 2017, I was the youngest employee selected to participate in Trimble's Transformational Leadership program, to prepare future generations of leaders for management responsibilities.

In the fall of 2017, I was able to line up my husband's final semester abroad in France with another job transition- where I stayed within our Land Administration team, but focusing more on go-to-market strategy and product development as a Portfolio Manager. I worked remotely in Paris, but traveled regularly to our product development team's office in Germany to focus and hone our product roadmap and strategy. This face to face time with the team was essential to establish solid working relationships prior to our transition back to virtual teams when I returned to Colorado in February 2018. All of these international experiences were challenging, but gave me the much needed perspective of working remotely, communicating effectively in person and virtually, and working across cultures and languages.

Even though I spend most of my time on the marketing side of the business today, the geomatics knowledge and concepts I learned at U of C are essential to the work I do everyday. It allows me to think critically in diverse industries, bring in the right members to collaborate on a project, and work side by side with a customer during a site visit. And yes, every now and then I still go out and do a topo survey, fire up ArcGIS, and look at some lines of code!

John B. Schleppe

P.Eng, M.Eng, CLS

Engineering Fellow and Manager of Research, NovAtel Inc.

B. Sc Surveying Engineering 1981, Masters of Geomatics Engineering 1996, Canada Land Surveyor

I entered engineering at the University of Calgary during the fall of 1977 having just completed grade 12 also in Calgary. At that time, we had two years of common engineering classes and the last two were specialized with the choices being civil, electrical, mechanical and chemical. In 1977 there was no surveying or as it would later be known, Geomatics Engineering. I was originally going to be a civil engineer, but because of summer jobs as a surveyor's assistant and literature talking about offshore navigation, satellite systems and their heavy use of computers, I decided to join the newly formed Division of Surveying Engineering in September 1979. After two years of studies, I graduated with the first class in 1981.

I immediately started working for McElhanney Geosurveys as a survey engineer in their marine and geodetic division and they kept me very busy for the next 9 years. About ½ or perhaps a bit more of my time was spent in the field conducting surveys. Most often, I was offshore in the North Atlantic or Beufort Sea on large geophysical vessels where our job was to provide navigation, positioning and timing for the geophysical crews, onboard supply ships, drilling vessels or platforms where our job was to navigate the rig onto its next location and perform the final survey. This was the pre-GPS era and we used a host of electronics ranging from systems such as Loran-C, ARGO and Syledis, to underwater acoustic systems and Transit satellite systems, all integrated with our own custom software using algorithms we had learned during

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Geomatics Industry Spotlight

our engineering classes and some we made up along the way.

When we weren't in the field, we would work on proposals for new projects, develop new software and systems for our offshore navigation systems. In 1987 I was transferred to Vancouver, where I was survey supervisor for the geodetic division. These were exciting times because GPS was just starting to be used for surveying, with precisions we hadn't seen before. Even though we only had a usable constellation 4 to 6 hours a day, it was still worthwhile to use GPS for precise control surveys.

By the start of the 1990's, companies were starting to offer smaller, low cost alternatives to the expensive GPS equipment we had used since the mid-1980's. The GPS constellation continued to be filled in and equipment prices dropped, making them suitable for some vehicle applications. I left McElhanney in 1990 and joined a group of engineers who had formed Calgary-based Pulsearch Navigation a few years earlier. This was a tough decision since I was a valued member of McElhanney and had a good future there, but the desire to be home with my growing family and to pursue a graduate degree were important factors to me. I moved back to Calgary and began my Masters of Geomatics Engineering part-time with Dr. Gerard Lachapelle as my supervisor. . I learned a lot working for Pulsearch and doing my Masters at the same time. These were the early days of smaller, lower cost
GPS receivers and we built integrated navigation systemsaround these receivers for seismic surveys, vehicle navigation and aircraft navigation. We built a business model out of integrating GPS receivers for many applications.

At the end of 2002, I changed my job again. I called around to my network of colleagues and friends and within a week I had two offers, one from my former professor, Dr. Gerard Lachapelle, to work as a Research Engineer in the PLAN (Position, Location And Navigation) Group of the Department of Geomatics Engineering. Consisting of graduate students, post-grads and professionals, the PLAN Group conducted research into a diverse number of topics, all of the emerging GNSS (Global Navigation Satellite Systems). During the 3 years I worked there, I built and tested two generations of prototypes for cattle tracking ear-tags, worked on several research projects and reports for companies and government agencies, designed a GPS tracking tag for seismic drills slung under a helicopter and performed a test of high-sensitivity GPS receivers under avalanche snow that is still being referenced today. This was a fantastic opportunity for a mature engineer looking for their next career direction and in 2006, Pat Fenton, another graduate of the 1981 Surveying Engineering class offered me a job in NovAtel's research group, I jumped at it.

Calgary-based NovAtel is a world leading manufacturer of advanced GNSS equipment and has offices around the world. I joined the company at a time of phenomenal growth, not only in their business but in the number of GNSS available. The original and gold standard GPS by the US is still a fundamental system, but also available now are the Russian GLONASS, European Galileo, Chinese BeiDou and other regional systems developed by Japan and India. NovAtel builds receivers that tracks satellites from each of these systems, decodes their navigation data, forms measurements and then integrates those measurements into a robust solution providing position, velocity and time. In addition, we have integrated inertial measurement systems with the GNSS receivers to supply navigation and velocity solutions even when the GNSS signals are blocked. Employing electrical, mechanical, computer and geomatics engineers along with software and Quality Assurance professionals, NovAtel employs over 350 people. Dozens of engineers who have graduated from the SSE Geomatics Engineering program work at the company, with many in senior positions.

During 2012 I was made an Engineering Fellow for NovAtel, and in 2013 Manager of the Research group. I come into the office each day to write software, work on new algorithms, interact with other engineers and management, struggle with math to make it solve my problems for me, collect data, analyze it and write reports along the hundreds of other activities in a modern office. I enjoy my work and still get immense pleasure from building something and seeing it work. I am proud when units are purchased by clients, and seeing the others that work for me also experience that sense of accomplishment. When I look back, I realize how great a decision I made in 1980 to become a geomatics engineer. The opportunities were already amazing and continue to grow.

Undergraduate Spotlight

A Summer of Exploring—The Analysis of Low Cost GNSS Units

By Jamie Horrelt, Paul Gratton and Erica Lemieux

Figure 1: Jamie Horrelt Summiting Moose Mountain—June 20, 2018

As we near the end of our last year(s) of our undergraduate degrees, we often ask ourselves: "Where can geomatics take you?" This question was proposed to us many times throughout our degree, being met with broad answers showcasing specific areas of a much larger field. The best way to explore options within the ever changing and growing field of geomatics is to get out there, and take opportunities presented by our department, or leaders within the industry. This past summer, we were fortunate enough to have the opportunity to gain hands-on experience in GNSS satellite navigation through our positions as undergraduate research assistants. This opportunity took us places that we would not have imagined when we signed up for the program just a few years before.

Last winter a research assistant position was posted for third year students, with an interest in GNSS. Although at the time, we had yet to complete ENGO 465 (Satellite Positioning), we all knew we were interested in research and development of new technologies within the field of geomatics. We were hired by Dr. Gérard Lachapelle, Professor Emeritus, to assist with his research on the analysis of low-cost units, raw GNSS measurements. We analysed the data output from units such as Android smartphones and Garmin handheld devices. The data collection required for this project took us far across southern Alberta, from Calgary's downtown core, to quiet drives in the countryside. But the most exciting adventures took us to the highest peaks of Kananaskis Country, on beautiful hikes in the mountains. While it may have seemed to be just an excuse to hike at work, the mountains truly served as the ideal testing ground for the units, offering both the worst-case satellite signal scenario in steep canyons and thick brush, and the best-case scenario on wide open mountain peaks. It was extremely convenient for us that the ideal test locations coincided with some of the most striking scenery in Canada.

That is not to say that the job was all fun and games, we earned each moment in the mountains. On days were we not collecting data we spent long hours in the office processing data, developing code, and analyzing

Continued...

Undergraduate Spotlight

Figure 2: Dr. Lachapelle, Paul Gratton, Jamie Horrelt (left to right) Fortress Mountain Summit—July 9, 2018

the results in technical reports that were discussed at weekly meetings. There were days when the only mountains were made of data, and sometimes it seemed as though we would never find the bug in our software. Thankfully, the hours never feel as long, and no problem seems impossible, when you work with a great team on a project that you really believe is valuable and interesting. Each problem that was discovered and solved opened up even more aspects of the units to explore which kept us motivated. We worked closely together sharing ideas and seeking help and guidance from Dr. Lachapelle, Dr. O'Keefe, Chandra Tjhai and Ali Pirsiavash, who has just successfully defended his PhD thesis.

Our work was even published in two conference papers and a journal paper, which gave us the opportunity to travel even further, well outside of Alberta to Bristol in the UK and Tokyo, Japan. Jamie gained invaluable experience as a presenter at the International Navigation Conference (INC), hosted by the British Royal Institute of Navigation (RIN) in Bristol. Paul was able to network with industry professionals and assist in developing our presentation slides as he joined Dr. Lachapelle while he presented at the International Association of Institutes of Navigation (IAIN) 16th World Congress in Tokyo. These conferences provided more than just a trip to far away lands, the experiences we gained by preparing for and attending international conferences as undergraduate students were an incredible opportunity that enriched our learning experiences.

This summer has been one that we will never forget. Regardless of the hiking and travel, the work was interesting, the environment was pleasant, and the knowledge we gained will be invaluable in our futures as geomatics engineers. Each one of us would highly recommend geomatics engineering to any first-year student. Opportunities like ours to enrich your education are always available, thanks to the amazing faculty and the great work that they do. We would like to thank Dr. Lachapelle and all those who helped us learn and grow as engineers.

Undergraduate Experiences

By Edmond Leahy

The National Geomatics Competition will be taking place in February 2019 at the University of Calgary, in cooperation with the 22nd annual GESS Geomatics Exposition. This year the competition will include student teams from across Canada and is shaping up to a fantastic event for connecting geomatics students with the industry.

After the success of last year's event in Fredericton, New Brunswick - hosted by University of New Brunswick - the University of Calgary is bringing NGC to Calgary, Alberta! The National Geomatics Competition (NGC) is a student-led consulting engineering competition based in the field of Geomatics. The goal of this competition is to increase the visibility of the Geomatics profession and respective programs, to give Geomatics students an opportunity to showcase their knowledge and talents, as well as provide a platform on which Geomatics students and industry members could network.

Last year, the teams were tasked with creating a proposal for a flood mapping and monitoring system located in the flood-ridden state of Karonga, Africa and were then only given 6 hours to come up with their solution as well as their presentation. At the end of 6 hours, the teams were individually given 15 minutes to present their proposal to the panel of judges. The judges, comprising entirely of industry members, were marking with reference to a rubric given to them by the NGC committee.

The weekend will be full of networking events, aimed at getting students excited about geomatics and gaining useful contacts in the geomatics industry. Contact the NGC organizing committee if you are interested in going to these geomatics networking events or if you are interested in volunteering at the competition!

Contact:
http://www.nationalgeomaticscomp.ca/contact.html

Grace Hopper Conference

By Kiera Fulton

From September 25th to September 30th of 2018, a group of 32 students and faculty in the Schulich School of Engineering attended the Grace Hopper Conference for Women in Computing, in Houston, Tx.

Students from disciplines such as electrical, software, geomatics and mechanical engineering came together at this conference to embrace diversity and the social inclusion of minorities in tech. The purpose of this conference was primarily to empower women in all areas of computing, but to also create a support system for anyone who feels that they "don't belong" tech. Over 20,000 people attended this conference, with over 70 countries represented. By coming together, those who feel underrepresented in STEM were given the opportunity to celebrate our presence in the industry and inspire change for the better.

While at this conference, we were given the opportunity to network at a career fair with companies such as Google, IBM, Cisco, Oracle, Amazon, SpaceX and many more. There were also sessions for students and industry professionals to attend that were opportunities for learning, networking, mentoring and inspiration.

These sessions included panels, technical talks, workshops and mentoring circles to allow conference attendees to learn as much as possible from one another. Every evening there were celebrations and events being hosted by several different companies that we got to enjoy.

One that stood out to us was the Museum of Technical Art: Women Techmakers Afterhours hosted by Google. At this event, we got to play with a series of interactive art and science exhibits while also enjoying free food, drinks, dancing and swag!

One of the biggest takeaways that U of C students got from this conference is the idea of battling "imposter syndrome," which is an individual's doubts on his or her accomplishments or ability to succeed. This can be very apparent for minorities in any industry; women in tech is no exception. We learned that you should always reach for the stars and try to achieve your goals, even if you sometimes feel it's not worth the effort. A star-studded list of keynote speakers, including Priscilla Chan, Anita Hill, Justine Cassell and Jessica O. Matthews emphasized that no goal is out of reach, even if the path to success in our industry is more difficult for women. Every U of C attendee was moved by the words of at least one of the featured speakers.

For students who wish to attend in the future, the GHC 2019 will be hosted in Orlando, FL during the first week of October. A group from the Schulich School of Engineering will reach out to students who are interested in coming, so stay tuned to emails and notifications for your chance to attend next year!

Student Councils

GESS

President: Kiera Fulton
VP Academic:
Michael Ah-Kiow
VP External: Carley Hopkins
VP Finance: Christina Lo
VP Internal: Torri Kondics
VP Communications:
Mikko Ramos
VP Events: Brandon Langton
4th Year Rep: Jeffry Plett
3rd Year Rep: Joshua Cho
2nd Year Rep:
Apekhchya Shrestha

Artistic Commissioner:
Miriam Deitz
Events Commissioner:
Mitchell Brown

Swiss Trip Commissioner:
Nicholas Malbasa
Expo Commissioners:
Carter Janssen and Andrew Grab

NGC Commissioner:
Edmond Leahy
Events Officer: Enis Alushi
Secretary: Andreas Brown

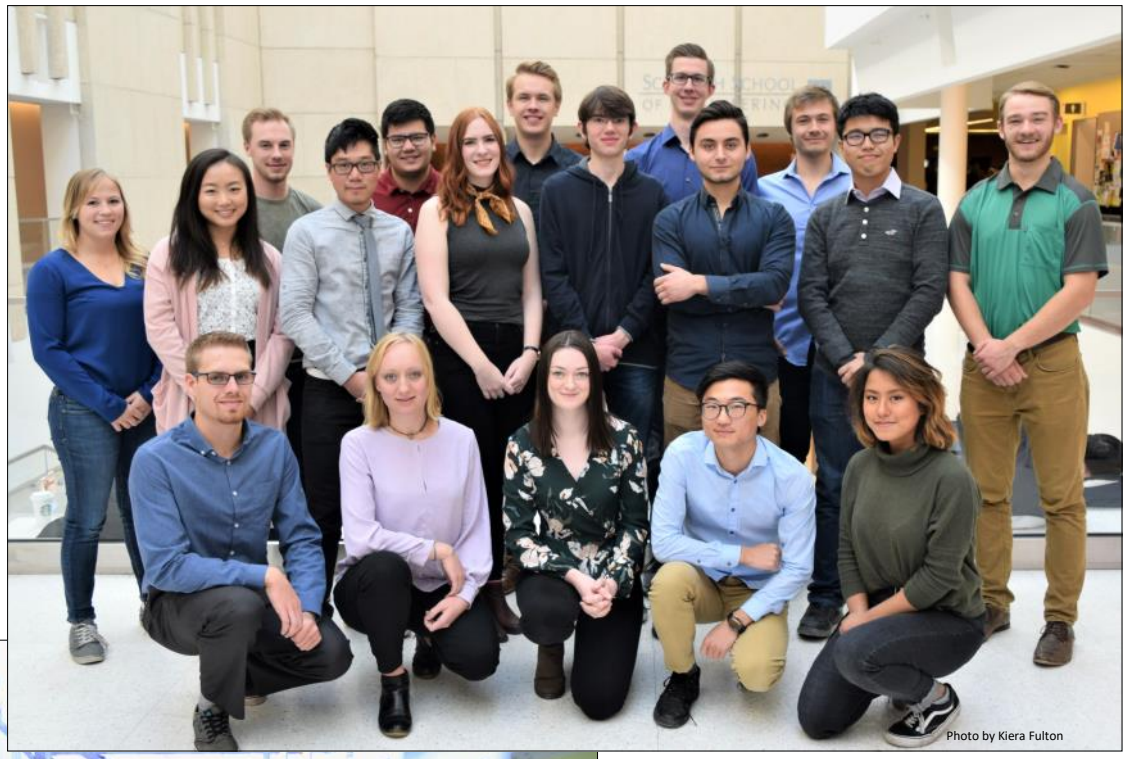

Photo by Kiera Fulton

Photo by Sandra Simeonova

G^3—Geomatics Graduate Group

President: Yuting Gao
Vice President: Eric Wang
Treasurer: Asal Naghdi
Secretary: Rodrigo Augusto de Oliveira E Silva
GRC Rep: Sandra Simeonova

Months in Review

May

Ali Pirsiavash—Best Student Paper Award at ENC 2018 for the presentation of 'Galileo E1/E5 Measurement Monitoring—Theory, Testing and Analysis


Photo by Courtenay Canivet

June

Spring Convocation—We had 27 Undergrads and 14 graduates complete their degrees and thank you to all those who were able to walk the stag.


Photo by Courtenay Canivet

Congratulations to Dr. Naser El-Sheimy who was inducted into the Canadian Academy of Engineering this past June—this is indeed an honor as "Fellows have distinguished themselves in different sectors including business, academia and government...Fellow of the CAE are nominated and elected by their peers (current CAE Fellows) to honorary fellowship in the Academy in view of their distinguish achievements and career-long service to the engineering profession".

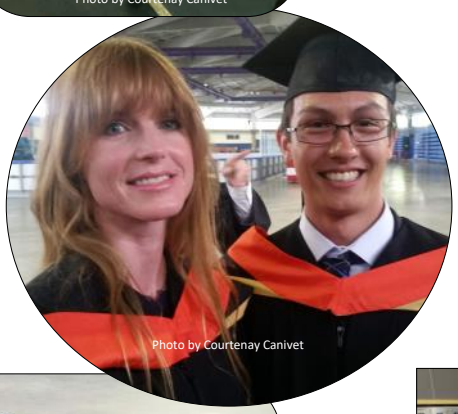
Photo by Courtenay Canivet


Photo by Courtenay Canivet

July

We were fortunate to have guest presenters over the summer months:

Dr. Jason Levy from Hawaii—presented 'Application of Machine Learning and Very High-resolution Pictometry Imagery to Promoting Socio-Ecological Resilience in Hawaii'

Dr. John Raquet, Director of Autonomy and Navigation Technology (ANT) Center at the Air Force Institute of Technology gave a 3 day Tutorial series on 'Camera Modeling and Calibration', 'Epipolar Geometry, Homographies and Lie Groups' and 'Image Features'.

SHAD Program

Dr. Mozhdeh Shahbazi and Dr. Elena Rangelova represented the Geomatics Department at this event. 64 high school students from other provinces and the theme was disaster management. The students were taught how to perform remote measurements of dimensions when due to hazards they cannot get close enough using total stations and stereo cameras. A second activity was hidden hot spots under some of the circular tarts in the calibration room and teams only had 5 minutes to detect them using a thermal camera—this can help prevent fires


Photo by Elena Rangelova

Photo by Elena Rangelova

Months in Review

August

Our very own Dr. Steve Liang gave a presentation about OGC CDB for 3D Modeling and Simulation Collaborative Research and Development Project

Dr. Dunyao Zhu from Wuhan Kotei Informatics Co./Wuhan University was invited by Dr. Yang Gao—gave a presentation on Data Fusion Technologies Applied to Autonomous Driving

Survey Camp
Took place from August 20th to 28th. The format changed from 10 days to 9 due to the change in the academic calendar for the start of Fall 2018 term.

The winners of the Lost peg was the Blue team and even had to have visiting surveyors repeat the measurements which ended in a 2 way tie and the second attempt had the distance at 0.211m, 2nd place 0.216m and 3rd place 0.241m. The members of the Blue team requested that the whole class be engraved onto the Lost Peg trophy as a 3 way tie.


Photo by Ivan Detchev

September

We had a great kick off to the Fall term with both an SSE 1st year student orientation on September 5th and a Geomatics Department Welcome & Welcome Back event on September 7th.

Department Office move—the Geomatics Department office and Faculty offices moved the weekend of September 14th into ICT and CCIT. Engineering E block will undergo a renovation project that will last approximately 18 months.

Dr. Shaohua Chen won the ION GNSS+ 2018 Student Paper Award for his paper titled "Kinematic Performance analysis of Joint Vector Architecture Based Carrier Phase Tracking" at the ION GNSS+ 2018 Conference Sept 24—28th.


Photo by Ivan Detchev

September cont

Some of our female Undergraduate and Graduate students attended the Grace Hopper Conference late September. Kiera Fulton, our GESS president wrote a brief summary about her experiences at this event.

October

Geomatics Engineering Career Meetup Event—The Engineering Career Centre hosted a networking and coffee event which featured Engineering professionals that work in Geomatics careers. This was a great event for 1st Year Engineering students wanting further information about Geomatics careers, and for students in any Engineering discipline to see where their degree could lead.

November

Geomatics presentations—Kiera (GESS president) along with Dr. Mozhdeh Shahbazi and Dr. Alex Bruton visited a first year Engineering class ENGG 200 (Engineering Design and Communication), to give a presentation to the first year Engineering students about Geomatics

November cont

First Year Outreach Event—The GESS council along with Dr. Mozhdeh Shahbazi and Dr. Ivan Detchev held an outreach event to give first year Engineering students an opportunity to learn more about the Geomatics program before program placements. There were lots of 1st year students that stopped by to ask all sorts of great questions about career opportunities, the Geomatics department, classes and course load.

The thermal camera and photogrammetry equipment and demos were a huge hit—they helped showcase some of the different areas of Geomatics.

December

Schulich School of Engineering held their annual Holiday Celebration and awards and our Faculty members and Graduate students showed their excellence once again!

Departmental Teaching Excellence Award: Alex Bruton

Early Research Excellence Award: Mozhdeh Shahbazi

Teaching Assistance Excellence Award: Ahmed Youssef and Kaleel Mansour Al-Durgham

Congratulations!!

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