

Jeremy Steward

Geomatics Engineer — 3D Imaging Specialist

contact

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upon request

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request

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specializations

3D imaging
Time-of-Flight cameras
LiDAR
Motion capture
SLAM
Real-time systems

programming

C++, C, Python, C#
Scheme, Lisp, Clojure
HTML, CSS,
Javascript
PostgreSQL, L^AT_EX

education

2014–2017 **Masters** of Science in Geomatics Engineering University of Calgary
3D Motion Capture and Modeling

My project focused on tracking, capturing, and modeling motion using 3D technology such as Time-of-Flight cameras. While my work has focused on tracking and capturing human motion, the work just as easily applies to tracking simpler objects moving through space.

As part of my project, I developed a system capable of capturing data from several synchronized 3D sensors, and integrating them together to perform motion capture and analysis. This system has been patented in collaboration with my research group.

Some courses I have taken as part of my graduate program are:

- *ENGO 642*: Optical Imaging Metrology
- *ENGO 699*: Special Topics - Geospatial / Computer Vision
- *ENGO 629*: Advanced Robust Estimation Methods & Analysis
- *ENGO 623*: Inertial Survyeing & INS / GPS Integration

2009–2014 **Bachelors** of Science in Geomatics Engineering University of Calgary
Specialization in Biomedical Applications

experience

Full Time

2018–Now **Occipital Inc.** Boulder, CO, USA
Platform Software Engineer

Work on calibrating, integrating, and developing the architecture of computer vision and 3D vision systems on mobile, desktop, and integrated systems (e.g. HMDs, robotics, etc). This work was largely involved across many different platforms and operating systems

Achievements of note:

- Worked on cutting-edge SLAM systems and architecture
- Tested and verified sensor data on a range of passive and active visual and visual-inertial systems
- Helped design and shape APIs across many platforms (e.g. iOS, Windows, Android)

2014–2017 **Graduate Research** Calgary, AB, Canada
Masters Student

Developed a motion capture system that can detect, track, and model motion using multiple 3D Time-of-Flight (ToF) cameras.

Achievements of note:

- Implemented software registration of point clouds from scratch
- Extracted and modeled 3D time-series motion
- Synchronized motion capture across several 3D sensors
- Moved projects under version / revision control (Git)
- Added unit tests and documentation
- Learn and implement published solutions from original publications

Teaching Assistantships

- Winter 2016 **ENGO 431 - Principles of Photogrammetry** University of Calgary
Topics cover the basis and fundamentals of photogrammetric practices, involving coordinate transformations, collinearity and coplanarity constraints, and validating what they have learned through software implementation.
- Collaborated in designing brand new lab exercises.
 - Taught students technical skills in programming the labs in C++.
 - Assisted students in resolving group conflicts and project management deadlines for their assignments.
- Fall 2015 **ENGO 531 - Adv. Photo & Range Tech** University of Calgary
Topics cover advanced photogrammetric concepts, such as the particulars of the bundle adjustment, as well as using and integrating LiDAR and range technologies into photogrammetric networks or problems.
- Improved skills in communication in presenting lab work, as well as in providing feedback and assistance to undergraduate students.
 - Collaborated with the professor to ensure lab and lectures were synchronized and approachable.
- Winter 2015 **BMEN 509 - Intro. to Biomedical Imaging** University of Calgary
Topics covered image processing, medical imaging devices, as well as various techniques such as Fourier domain analyses and signal processing.
- Oversaw and taught the majority of the technical portion of the course
 - Taught and explained difficult concepts to students from diverse backgrounds in engineering and science

Professional Designations

- 2014–Now **Association of Professional Engineers, Geologists, and Geoscientists of Alberta (APEGGA)** AB, Canada
I have been a registered Engineer In Training pursuing my Canadian Professional Engineering designation as of May 2014 (<http://apega.ca>)

Capstone Design Project

- 2013–2014 **Project and Team Lead** University of Calgary
Developed a real-time internet-of-things system capable of managing and tracking inventory within a retail outlet or storehouse. I acted in the role of team leader and managed and worked with my fellow teammates to win the Capstone Design Award for 2014.

Summer Research Positions

- Summer 2013 **Summer Research Student** University of Calgary
Furthered my project from the previous year by integrating inertial data with 3D cameras
- Summer 2012 **Summer Research Student** University of Calgary
Interest in determining the growth rate of reindeer antlers using 3D Time-of-Flight technologies.
- Summer 2011 **Data Entry Position** University of Calgary
Working with the University of Calgary SensorWeb group on fixing, updating, finding, and entering data into a large GIS system (formerly WEHUB).

awards

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| 2016 | Queen Elizabeth II Scholarship
Awarded to students displaying excellence in studies and service. | University of Calgary |
| 2015 | Alberta Innovates Technology Futures Scholarship
Awarded to students with high academic success and service. | University of Calgary |
| 2014 | Queen Elizabeth II Scholarship
Awarded to students displaying excellence in studies and service. | University of Calgary |

interests

professional: programming & software design, 3D imaging technologies, LiDAR, motion capture, real-time systems

personal: Scheme (programming), free & open source software, judo, martial arts, logic puzzles, escape rooms, electronics

publications

M.Sc. Thesis

Range Camera Motion Capture - Geometric Parameter Extraction from Human Motion Data in Point Clouds

Jeremy Steward

(July 12, 2017). University of Calgary

Peer-Reviewed Journal Articles

Measurement of Deflection in Concrete Beams During Fatigue Loading Test Using the Microsoft Kinect 2.0

Herve Lahamy, Derek D. Lichti, Jeremy Steward, Mamdouh El-Badry, Mohammad Moravvej

Journal of Applied Geodesy 10.1 (2016) p. 71. 2016

The Practical Application Of 3D Vision in the Field: Measuring Reindeer (Rangifer Tarandus) Antler Growth Velocities

Derek D. Lichti, Jeremy Steward, Jacky C. K. Chow, John Matyas

The Photogrammetric Record 31.156 (2016) pp. 394–406. 2016

Structural Dynamic Deflection Measurement With Range Cameras

Xiaojuan Qi, Derek D. Lichti, Mamdouh El-Badry, Ting On Chan, Sherif Ibrahim El-Halawany, Hervé Lahamy, Jeremy Steward

The Photogrammetric Record 29.145 (2014) pp. 89–107. 2014

ENGO 500 - Internet of Things

Jeremy Steward

ISPRS Student Consortium 8.2 (Oct. 2014) p. 10. 2014

Python for Scientific Computing

Jeremy Steward

ISPRS Student Consortium 10.1 (June 2016) pp. 6–9. 2016

Conference Proceedings

Evaluating the Capability of Time-of-Flight Cameras for Accurately Imaging a Cyclically Loaded Beam

Hervé Lahamy, Derek D. Lichti, Mamdouh El-Badry, Xiaojuan Qi, Ivan Detchev, Jeremy Steward, Mohammad Moravvej

SPIE Optical Metrology 2015, 2015

Developing a methodology to measure the regeneration of reindeer antlers

Jeremy Steward

Journal of Undergraduate Research in Alberta, 2012, 2012 CREATE Symposium at the University of Calgary

Performance assessment and calibration of the Kinect 2.0 time-of-flight range camera for use in motion capture applications

Jeremy Steward, Derek Lichti, Jacky Chow, Reed Ferber, Sean Osis

FIG Working Week 2015, 2015, Sofia, Bulgaria