

# 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 & LiDAR  
Spatial sensing  
Sensor integration  
Multi-sensor calibration  
Real-time systems  
Photogrammetry  
Bundle adjustments  
Computer vision

## programming

Rust, C++, C  
Scheme, Lisp, Python  
PostgreSQL, L<sup>A</sup>T<sub>E</sub>X

## experience

### Full Time

2020–now **Tangram Vision Inc.** Boulder, CO, USA

#### *Senior Perception Architect*

Performed in the role of technical leader and senior software architect developing a platform for multi-sensor integration and calibration. I have been in charge of developing Tangram Vision's SDK and integrating sensor drivers (RealSense, Velodyne) across C, C++, and Rust into robotic platforms.

Achievements of note:

- Lead architecture & design reviews for the development of a cross-platform SDK integrating and calibrating multi-sensor hardware in industrial robotics.
- Wrote and documented strategic goals through both internal documentation resources as well as on the company's public blog.
- Mentored others in learning to program, test, and document Rust code.

2019–2020 **Occipital Inc.** Boulder, CO, USA

#### *Calibration & CV Technical Lead*

Performed in the role of technical leader for a number of projects ranging across Calibration & Computer-Vision applications. As the Calibration & CV technical lead for Occipital, I have had a mixture of both technical leadership and project management experience combined with the day-to-day engineering tasks. This was done across a variety of products involving Occipital's sensor production line, calibration suite, and other related computer vision technologies (including SLAM).

Achievements of note:

- Remotely maintained, deployed, tested, and verified a 3D sensor production line system in Shenzhen.
- Managed several projects through the development, testing, and release cycle. Directed 2 other engineers and a handful of QA testers through the course of this project.
- Addressed longstanding technical debt within the company in a safe and controlled manner as we scaled the business.

2018–2019 **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 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)

## 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 Surveying & INS / GPS Integration

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

## 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

2016 **Queen Elizabeth II Scholarship** University of Calgary  
Awarded to students displaying excellence in studies and service.

2015 **Alberta Innovates Technology Futures Scholarship** University of Calgary  
Awarded to students with high academic success and service.

2014 **Queen Elizabeth II Scholarship** University of Calgary  
Awarded to students displaying excellence in studies and service.

## interests

**professional:** programming & software design, 3D imaging technologies, LiDAR, SLAM, multi-sensor calibration, 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 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

Explanation for the seam line discontinuity in terrestrial laser scanner point clouds

Derek D. Lichti, Craig L. Glennie, Kaleel Al-Durgham, Adam Jahraus, Jeremy Steward

ISPRS Journal of Photogrammetry and Remote Sensing 154 (2019) pp. 59–69. 2019

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

### Conference Proceedings

Monitoring Masonry Walls Subjected to Earthquake Loading with a Time-of-Flight Range Camera

David Holdener, Derek Lichti, Jeremy Steward, Pedram Kaheh

FIG Working Week 2017, 2017, Helsinki, Finland

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

Using a mobile range-camera motion capture system to evaluate the performance of integration of multiple low-cost wearable sensors and gait kinematics for pedestrian navigation in realistic environments

C. Tjhai, J. Steward, D. Lichti, K. O'Keefe

## Magazine Articles

ENGO 500 - Internet of Things

*Vol. 8:2, URL: [http://www.isprs-sc.org/material/isprs\\_sc\\_vol8\\_no2.pdf](http://www.isprs-sc.org/material/isprs_sc_vol8_no2.pdf), 2014*

Python for Scientific Computing

*Vol. 10:1, URL: [http://www.isprs-sc.org/material/isprs\\_sc\\_vol10\\_no1.pdf](http://www.isprs-sc.org/material/isprs_sc_vol10_no1.pdf), 2016*