

**ALEXANDER THOMS**  
adthoms@ucla.edu (424)-434-9054

**EDUCATION**

- *Doctor of Philosophy*, Mechanical Engineering Expected 2025  
Major & Minor Fields: Computational Robotics & Data Science and Machine Learning (cGPA 4.0)  
Lab: Sensing and Robotics for Infrastructure Laboratory  
Supervisor: Dr. Sriram Narasimhan  
University of California Los Angeles, Los Angeles, CA. (2021-present)  
University of Waterloo, Waterloo, ON. (2019-2021)
- *Bachelor of Applied Science*, Honours Civil Engineering Winter 2018  
Distinction, Dean's Honours (cGPA 3.91, mGPA 3.99)  
Certificate in Structural Engineering  
University of Waterloo, Waterloo, ON.

**WORK EXPERIENCE**

*Visiting International Researcher* Summer - Fall 2018  
University of Tübingen, Tübingen, Germany.

- Developed discrete fracture network finite element groundwater models to quantify bedform-scale hyporheic exchange in a bedrock river setting
- Investigated hydrostatic and hydrodynamic pressure variations that drive hyporheic exchange via computational fluid dynamics modeling
- Utilized MATLAB, Tecplot, and Excel for data exploration and statistical inference for model calibration
- Performed sensitivity analysis on model parameters for model uncertainty quantification

*Structural Designer*

Blackwell, Toronto, ON. Fall 2017  
LEA Consulting, Markham, ON. Fall 2015  
Quinn Dressel Associates, Toronto, ON. Winter 2015

- Designed and analyzed in concrete, steel, timber, and masonry for commercial, institutional, residential, adaptive-reuse, and heritage buildings
- Utilized ETABS, RISA3D, and SAFE for structural analysis
- Developed comprehensive analysis spreadsheets for fiber-reinforced polymer strengthening of concrete elements
- Significant Projects: ESDA Farm Dome, MSAFE, 4 Indian Valley, St Michael's Cathedral, CBC Broadcasting Centre, MAC Cosmetics Corporate Office, Scotia Plaza, Trent University Centre, Victoria Road Community Centre

*Transportation Designer*

BA Group, Toronto, ON. Summer 2014

- Completed conceptual and detailed designs for various transportation facilities, including public transit networks, interchanges, and parking lots
- Applied geometric design principles creatively within the frameworks of both AASHTO and TAC
- Prepared graphics and technical drawings for client reports and deliverables

*Transportation Analyst*

LEA Consulting, Markham, ON. Fall 2013

- Calibrated transit network models to quantify and evaluate traffic performance metrics
- Conducted signal timing optimization via sensitivity analysis of model parameters (i.e. varying green time, introducing additional phasing, revising projected traffic growth/distribution)
- Utilized Synchro traffic analysis software, Word, Excel, and PowerPoint throughout the engineering process

*Data Analyst*

Environment Canada, Toronto, ON. Winter 2013

- Conducted inter-comparison study of weather sensor instrumentation for the Toronto 2015 Pan AM Games
- Developed automated workflows in MATLAB to handle a diverse range of data analyses and visualizations
- Increased the accuracy and quantity of output to move the project schedule eight months forward
- Presented research findings to Pan AM committee to guide sensor selection for Mesonet

## RESEARCH

### Journal Articles

- **Thoms, A.**, Earle, G., Charron, N., & Narasimhan, S. (2023). Tightly Coupled, Graph-Based DVL/IMU Fusion and Decoupled Mapping for SLAM-Centric Maritime Infrastructure Inspection. *IEEE Journal of Oceanic Engineering*, 48(3), 663–676. <https://doi.org/10.1109/JOE.2023.3265742>
- **Thoms, A.**, Al-Sabbag, Z., & Narasimhan, S. (2023). Graph-based structural joint pose estimation in non-line-of-sight conditions. *Earthquake Engineering and Engineering Vibration*, 22(2), 371–386. <https://doi.org/10.1007/s11803-023-2175-y>
- Chow, R., Parker, B. L., Steelman, C. M., **Thoms, A.**, & Nowak, W. (2021). How Do Fractures Influence Hyporheic Exchange in Sedimentary Rock Riverbeds? *Water Resources Research*, 57(7). <https://doi.org/10.1029/2020WR028476>

### Conference Articles

- McLaughlin, J., **Thoms, A.**, Charron, N., & Narasimhan, S. Depth Completion from Sparse 3D Maps for Automated Defect Quantification. In *Lifelines 2022* (pp. 566-576).
- **Thoms, A.\***, Earle, G.\*, Charron, N., Malama, S., & Narasimhan, S. (2022). Combined Lidar and Sonar Mapping for Partially Submerged Infrastructure. *Proceedings of the 13th International Workshop on Structural Health Monitoring*. Destech Publications, Inc. <https://doi.org/10.12783/shm2021/36336>

### Competitions

- ANA Avatar XPRIZE 2021 Summer 2021  
Team: Human Fusions Avatar - Sensa  
Subteam: Mobility and Collision Avoidance  
Place: Semi-finalists

### Undergraduate Research Assistantships

- Structural Dynamics and Control Experiments Fall 2015  
Supervisor: Dr. Sriram Narasimhan, P. Eng., Professor, Canada Research Chair  
University of Waterloo, Waterloo, ON.
- Bio-mechanical Simulation Summer 2013  
Supervisor: Dr. Adil Al-Mayah, P. Eng., Associate Professor.  
University of Waterloo, Waterloo, ON.

## TECHNICAL STRENGTHS

- Computer Languages: C++, Python
- Libraries & APIs: Eigen, GTSAM, FUSE, ROS, Sophus, Ceres, ROPTLIB
- Data Processing: MATLAB, Bash, Microsoft Excel
- Tools & External: Git, Github, Microsoft Office Products

## AWARDS & ACHIEVEMENTS

- *Graduate Student Research Assistantship*, University of California Los Angeles, Los Angeles CA. Sept. 2021 - Sept. 2024
- *Ontario Graduate Scholarship (Declined)*, University of Waterloo, Waterloo, ON. Apr. 2021
- *QE-II Graduate Scholarship in Science and Technology*, University of Waterloo, Waterloo, ON. Apr. 2020
- *NSERC Alexander Graham Bell Canada Graduate Scholarship*, University of Waterloo, Waterloo, ON. Apr. 2019
- *President's Scholarship*, University of Waterloo, Waterloo, ON. Apr. 2021, Apr. 2020, Apr. 2019
- *Engineering Excellence MASc Fellowship*, University of Waterloo, Waterloo, ON. Feb. 2019
- *Deans Entrance Award*, University of Waterloo, Waterloo, ON. Feb. 2019
- *David Johnston International Experience Award*, University of Waterloo, Waterloo, ON. Apr. 2018
- *Recipient, Sandford Fleming Foundation Award*, University of Waterloo, Waterloo, ON. Nov. 2014
- *First In Class Scholarship*, University of Waterloo, Waterloo, ON. June. 2014
- *Nominee, Sandford Fleming Foundation Award*, University of Waterloo, Waterloo, ON. April 2014, July 2015
- *Dean's Honour List*, University of Waterloo, Waterloo, ON. Terms. 4B-1B