EMILY STEINER

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Education

Stanford University

MS-PhD Candidate In Electrical Engineering   *2023-2028 (expected)*

- **Advisor**: Professor Iro Armeni
- **Course Highlights:** Foundation Models for 3D/4D Scene Understanding, Deep Learning for Computer Vision, Computational Imaging

University of Waterloo

BASc Honours Mechatronics Engineering/Computing Option - Co-operative Program - With Distinction   *2018 - 2023*

- Graduated Dean's Honour List - *Cumulative average 95.6%*
- **Course Highlights:** Foundations of AI, Pattern Recognition, Image Processing, Autonomous Mobile Robots, Automatic Control Systems

Research Experience

Gradient Spaces Lab | Graduate Research Assistant | *Advisor: Iro Armeni, Stanford University*   *April 2024 - present*

- Researching deep learning-based computer vision approaches for understanding evolving 3D scenes over time (4D), with a focus on spatial AI and applications in sustainability
- Building complete semantic representations of changing 3D environments, and designing robust spatio-temporal reasoning systems for question answering based on 4D inputs

Computational Imaging Lab | Rotation PhD Student | *Advisor: Gordon Wetzstein, Stanford University*   *Winter 2024*

Publications

ReScene4D: Temporally Consistent Semantic Instance Segmentation of Evolving Indoor 3D Scenes

Emily Steiner, Jianhao Zheng, Henry Howard-Jenkins, Chris Xie, Iro Armeni

Under Review, *2026*

Industry Experience

Lumafield | Hardware Research & Development Engineering Co-op   *May - Aug 2022*

- Investigated CT scanner imaging limitations to characterize the trade-off between sharpness and scan time. Determined system parameter improvements for a 3x speed increase with no loss in quality; changes implemented on customer machines and showcased at trade shows.
- Created an exploratory multi-detector prototype, developed an image processing pipeline using OpenCV in Python, and implemented a joint iterative calibration algorithm, consulting current literature. Improved capture speed by 200% with minimal impact on quality.

Inertia Product Development | Product Development Intern (Electrical / Mechatronics)   *Jan - Apr 2022*

- Designed a LiDAR point cloud visualizer using Python and Qt to interface with a Robot Operating System (ROS) backend.
- Conducted a feasibility study of a customer project and used fast-paced prototyping skills to determine the best technical direction to ensure project success.

Canadensys | Aerospace Engineer   *May - Aug 2021*

- Designed embedded state machine architecture, PID controller, and implemented firmware on an STM32 Microcontroller in C for a high precision BLDC motor controller. Performed control system and stability analysis using Simulink.
- Conducted root cause analysis to identify a fundamental hardware design error causing unstable feedback. Implemented a corrective algorithm in software for a Hall Effect sensor processing issue, salvaging the PCB design.

ExactEarth (Spire) | Software Engineering Co-op Student   *Jan - Apr & Sep - Dec 2020*

- Developed autonomous operations management software responsible for communication procedures, telemetry collection, and recovery processes of the EV10 satellite. Supported the software control system throughout satellite commissioning (launched Sept 2020).

Leadership & Involvement

Teaching Assistant: Computer Vision for the Built Environment ↗, Stanford University   *Winter 2026*

Stanford Women In Electrical Engineering (WEE)   *2023-present*

- **Faculty Liaison** (2024-26): responsible for organizing quarterly faculty roundtables.
- **Co-Mentorship Chair** (2025-26): co-organizer and graduate mentor (2024-present) in the mentorship program and volunteer at STEM education outreach events (Stanford SPLASH, SLAC community day).

ICRA 2025 Challenge Organizer: Nothing Stands Still Challenge Hosted by Hilti ↗   *2025*

Undergraduate Mentor: University of Waterloo Mechatronics Mentorship Program   *2020-2022*

Honors & Awards

2025	**TomKat Graduate Fellow in Translational Research** ↗, Stanford University
2022	**Co-Operative Education Student of the Year Honourable Mention** ↗, University of Waterloo
2019	**President's International Experience Award**, University of Waterloo
2022,21, 19	**First In Class Engineering Scholarship**, University of Waterloo
2018	**President's Scholarship of Distinction**, University of Waterloo

Projects

Probing the Object Awareness of Current 3D LLMs   *Fall 2024*
- Designed and conducted systematic perturbation experiments revealing density-induced hallucination and bottlenecks in object detection capabilities of state-of-the-art 3D-LLM architectures.

Towards Open Scene Understanding For Construction Analysis   *Spring 2024*
- Developed an integrated pipeline to lift 2D semantics from foundational vision models (e.g., GroundingDINO, SAM, CLIP) into unified 3D mesh representations, evaluating generalizability and robustness for zero-shot, query-driven monitoring on dynamic construction datasets, and demonstrating both the potential and current limitations of this approach.

Viability of Eye-Tracking Glasses for Beamforming Hearing-Aids   *Winter 2024*
- Engineered and simulated a spatial audio steering system using microphone-enabled glasses, demonstrating enhanced source isolation via eye-tracking-driven beamforming for assistive hearing technology.

Drag Reduction System Automation | Capstone Project in collaboration with Williams Racing Formula 1   *Sept 2022 - Apr 2023*
- *1st Place Winner of the University of Waterloo Design Analysis Competition Sponsored by Ansys*
- Designed a system to automate movement between testing positions for the wind tunnel model's drag reduction system without affecting aerodynamic surfaces.
- Performed mathematical modelling of the airfoil surface during wind tunnel testing using Python (NumPy, scikit-learn, and SciPy) and MATLAB.
- Analyzed system performance and validated the design in adapted conditions to overcome testing limitations.

Comparison of ML Techniques for Freezing of Gait (FoG) Detection   *Jan - Apr 2023*
- Investigated the trade-offs of various published machine learning (ML) techniques for the detection of FoG using tri-axial IMU sensors.
- Adapted pre-processing and data splitting techniques to consider performance for implementation on portable detection devices.