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Academic Positions

Postdoctoral Scholar	Stanford University Computer Science Department Stanford, CA, USA Advisor: Prof. Leonidas J. Guibas	2022–Present
Ph.D.	Carnegie Mellon University The Robotics Institute Pittsburgh, PA, USA Thesis: <i>Amodal Visual Scene Representations With and Without Geometry</i> Advisor: Prof. Katerina Fragkiadaki	2016–2022
M.Sc.	Toronto Metropolitan University Computer Science Department Toronto, ON, Canada Thesis: <i>Segmentation-Aware Convolutional Nets</i> Advisor: Prof. Konstantinos Derpanis Distinction: Gold Medal	2014–2016
B.A.	Toronto Metropolitan University Psychology Department Toronto, ON, Canada Thesis: <i>The Effect of Cognitive Switching on Sustained Attention</i> Advisor: Prof. Benjamin Dyson Distinction: Honors, CPA Certificate of Academic Excellence	2008–2012

Research Interests

I work on computer vision and machine learning methods that build accurate spatial and temporal representations of the world. I am developing these representations as measurement devices for a variety of real-world applications, and also as a basis for high-level abstractions and predictions.

Publications

- [34] **A. W. Harley**, Y. You, X. Sun, Y. Zheng, N. Raghuraman, S. Liang, W.-H. Chu, S. You, A. Dave, P. Tokmakov, R. Ambrus, K. Fragkiadaki, L. J. Guibas. “TAG: Tracking at Any Granularity.” *In submission*.
- [33] C. Stearns, **A. W. Harley**, M. Uy, F. Dubost, F. Tombari, G. Wetzstein, L. J. Guibas. “Dynamic Gaussian Marbles for Novel View Synthesis of Casual Monocular Videos .” *In submission*.
- [32] J. Lei, Y. Weng, **A. W. Harley**, L. Guibas, K. Daniilidis. “MoSca: Dynamic Gaussian Fusion from Casual Videos via 4D Motion Scaffolds.” *In submission*.
- [31] H. He, **A. W. Harley**, C. Stearns, L. J. Guibas. “View-Consistent Hierarchical 3D Segmentation Using Ultrametric Feature Fields.” In *ECCV*, 2024.
- [30] Y. You, K. Xiong, Z. Yang, Z. Huang, J. Zhou, R. Shi, Z. Fang, **A. W. Harley**, C. Lu. “PACE: Pose Annotations in Cluttered Environments.” In *ECCV*, 2024.
- [29] A. Jain, P. Katara, N. Gkanatsios, **A. W. Harley**, G. Sarch, K. Aggarwal, V. Chaudhary, K. Fragkiadaki. “ODIN: A Single Model for 2D and 3D Perception.” In *CVPR*, 2024.

- [28] X. Cheng, C. Deng, **A. W. Harley**, Y. Zhu, L. J. Guibas. “Zero-Shot Image Feature Consensus with Deep Functional Maps.” In *ECCV*, 2024.
- [27] J. Polajnar, E. Kvinikadze, **A. W. Harley**, I. Malenovsky “Wing buzzing as a mechanism for generating vibrational signals in psyllids (Hemiptera: Psylloidea).” In *Insect Science*, 2024.
- [26] X. Sun, **A. W. Harley**, L. J. Guibas. “Refining Pre-Trained Motion Models.” In *ICRA*, 2024.
- [25] W.-H. Chu, **A. W. Harley**, P. Tokmakov, A. Dave, L. J. Guibas, K. Fragkiadaki. “Zero-Shot Open-Vocabulary Tracking with Large Pre-Trained Models.” In *ICRA*, 2024.
- [24] N. Raghuraman, **A. W. Harley**, L. J. Guibas. “Cross-Image Context Matters for Bongard Problems.” In *submission*, 2024.
- [23] Y. Zheng, **A. W. Harley**, B. Shen, G. Wetzstein, L. J. Guibas. “PointOdyssey: A large-scale synthetic dataset for long-term point tracking.” In *ICCV (Oral)*, 2023.
- [22] **A. W. Harley**, Z. Fang, J. Li, R. Ambrus, K. Fragkiadaki. “Simple-BEV: What really matters for multi-sensor bev perception?” In *ICRA*, 2023.
- [21] G. Sarch, Z. Fang, **A. W. Harley**, P. Schyldo, M. J. Tarr, S. Gupta, K. Fragkiadaki. “TIDEE: Tidying up novel rooms using visuo-semantic commonsense priors.” In *ECCV*, 2022.
- [20] **A. W. Harley**, Z. Fang, K. Fragkiadaki. “Particle Video Revisited: Tracking Through Occlusions Using Point Trajectories” In *ECCV (Oral)*, 2022.
- [19] S. Lal, M. Prabhudesai, I. Mediratta, **A. W. Harley**, K. Fragkiadaki. “CoCoNets: Continuous Contrastive 3D Scene Representations.” In *CVPR*, 2021.
- [18] **A. W. Harley**, Y. Zuo, J. Wen, A. Mangal, S. Potdar, R. Chaudhry, R., K. Fragkiadaki. “Track, Check, Repeat: An EM Approach to Unsupervised Tracking. In *CVPR*, 2021.
- [17] Z. Fang, A. Jain, G. Sarch, **A. W. Harley**, K. Fragkiadaki. “Move to See Better: Self-Improving Embodied Object Detection.” In *BMVC*, 2021.
- [16] M. Prabhudesai, S. Lal, D. Patil, H.-Y. F. Tung, **A. W. Harley**, K. Fragkiadaki. “Disentangling 3D Prototypical Networks For Few-Shot Concept Learning.” In *ICLR*, 2021.
- [15] **A. W. Harley**, S. K. Lakshmikanth, Schyldo, P., K. Fragkiadaki. “Tracking Emerges by Looking Around Static Scenes, with Neural 3D Mapping.” In *ECCV*, 2020.
- [14] M. Prabhudesai, S. Lal, H.-Y. F. Tung, **A. W. Harley**, S. Potdar, K. Fragkiadaki. “3D Object Recognition By Corresponding and Quantizing Neural 3D Scene Representations.” In *CVPR Workshops*, 2020.
- [13] M. Prabhudesai, S. Lal, H.-Y. F. Tung, S. A. Javed, M. Sieb, **A. W. Harley**, K. Fragkiadaki. “Embodied Language Grounding With 3D Visual Feature Representations.” In *CVPR*, 2020.
- [12] **A. W. Harley**, S. K. Lakshmikanth, F. Li, X. Zhou, H.-Y. F. Tung, K. Fragkiadaki. Learning from Unlabelled Videos Using Contrastive Predictive Neural 3D Mapping. In *ICLR*, 2020.
- [11] S.-E. Wei, J. Saragih, T. Simon, **A. W. Harley**, S. Lombardi, M. Perdoch, A. Hypes, D. Wang, H. Badino, Y. Sheikh. “VR facial animation via multiview image translation.” In *SIGGRAPH*, 2020.
- [10] **A. W. Harley**, S.-E. Wei, J. Saragih, K. Fragkiadaki. “Image Disentanglement and Uncooperative Re-Entanglement for High-Fidelity Image-to-Image Translation.” In *ICCV Workshops*, 2019.
- [9] Tung, H.-Y. F., **A. W. Harley**, L.-K. Huang, K. Fragkiadaki. “Reward Learning from Narrated Demonstrations.” In *CVPR*, 2018.
- [8] Tung, H.-Y. F.*, **A. W. Harley***, W. Seto*, K. Fragkiadaki. Adversarial Inverse Graphics Networks: Learning 2D-to-3D Lifting and Image-to-Image Translation from Unpaired Supervision. In *ICCV*, 2017.
- [7] **A. W. Harley**, K. G. Derpanis, I. Kokkinos. “Segmentation-Aware Convolutional Networks Using Local Attention Masks.” In *ICCV*, 2017.

- [6] J. J. Yu, **A. W. Harley**, K. G. Derpanis. “Back to Basics: Unsupervised Learning of Optical Flow via Brightness Constancy and Motion Smoothness.” In *ECCV Workshops*, 2016.
- [5] **A. W. Harley**, K. G. Derpanis, I. Kokkinos. Learning Dense Convolutional Embeddings for Semantic Segmentation. In *ICLR Workshops*, 2016.
- [4] **A. W. Harley**. An Interactive Node-Link Visualization of Convolutional Neural Networks. In *International Symposium on Visual Computing*, 2015. **Featured in Popular Science; Displayed in the “Machina Sapiens” exhibit at Festiwal Przemiany 2018, in the Copernicus Science Center in Warsaw.**
- [3] **A. W. Harley**, A. Ufkes, K. G. Derpanis. Evaluation of Deep Convolutional Nets for Document Image Classification and Retrieval. In *ICDAR*, 2015. **Best Student Paper Award.**
- [2] **A. W. Harley**, B. Dyson. “Separating Stimulus, Goal and Response Switching During a Fast-Paced Sustained Attention Task.” In *Psychonomic Society Annual Meeting*, Volume 18, p. 258, 2013.
- [1] **A. W. Harley**. The Effect of Cognitive Switching on Sustained Attention. In *42nd Annual Ontario Undergraduate Psychology Thesis Conference*, 2012.

Honors and Awards

Outstanding Area Chair, WACV 2024	2024
Top Reviewer, NeurIPS 2022	2022
Highlighted Reviewer, ICLR 2021	2021
Best Reviewer, ICCV 2019	2019
NSERC Postgraduate Scholarship – Doctorate (PGS-D; \$42,000)	2018-2020
Qualcomm Innovation Fellowship Finalist	2018
Toronto Metropolitan University Gold Medal (TMU’s highest honour)	2016
Nominated for The Governor General Gold Medal (TMU)	2016
Queen Elizabeth II Graduate Scholarship in Science and Technology (\$15,000)	2015
ICDAR Best Student Paper Award (\$375)	2015
TMU Graduate Development Award (\$2,000)	2015
Mitacs Globalink Research Award – Inria (\$5,000)	2015
TMU Graduate Fellowship (\$3,750)	2014
NSERC Undergraduate Student Research Award (USRA; \$4,500)	2014
Canadian Psychological Association Certificate of Academic Excellence for Thesis	2012
Toronto Metropolitan University Dean’s List	2009-2014

Invited Talks

CVPR: CV4Animals: Computer Vision for Animal Behavior Tracking and Modeling Title: TAG: Tracking at Any Granularity	2024
Stanford CS231A: Computer Vision, From 3D Perception to 3D Reconstruction and beyond Title: From Pixels to Measurements: Understanding the Dynamic World	2024
Meta: Research Summit for Egocentric Perception with Project Aria Title: TAG: Tracking at Any Granularity	2024
ICCV: 5th Workshop on Large-scale Video Object Segmentation Title: Large-Scale Fine-Grained Tracking	2023

ICCV: Workshop on Visual Object Tracking and Segmentation (VOTS) Title: Scaling Up Fine-Grained Tracking	2023
Google Deepmind: Video AI Symposium Title: Tracking Any Pixel in a Video	2023
CVPR: 2nd Workshop on Tracking and Its Many Guises Title: Tracking Any Pixel in a Video	2023
Oxford University, Visual Geometry Group Title: Tracking Any Pixel in a Video	2023
IEEE IV Symposium: 5th Workshop on 3D Deep Learning for Automated Driving Title: What Really Matters for Multi-Sensor BEV Perception?	2023
York University, Lassonde School of Engineering Seminar Title: Tracking Any Pixel in a Video	2022
University of Bristol, Machine Learning and Computer Vision (MaVi) Seminar Title: Tracking Any Pixel in a Video	2022
ECCV: Self-Supervision on Wheels Tutorial Title: Self-Supervised Learning for 3D Tracking and Detection	2022
DARPA Research Review Title: Video Summarization and Search: Geometry-Aware Visual Surveillance	2019
German Research Center for Artificial Intelligence (DFKI) Title: Segmentation-Aware Convolutional Nets	2015

Teaching Experience

16-720: Computer Vision, CMU. Head teaching assistant.	2019
16-831: Statistical Techniques in Robotics, CMU. Teaching assistant.	2018
CPS-109: Intro to Computer Science, TMU. Teaching assistant.	2015
CPS-843: Introduction to Computer Vision, TMU. Teaching assistant.	2015
CPS-511: Computer Graphics, TMU. Teaching assistant.	2014
CPS 721: Artificial Intelligence 1, TMU. Teaching assistant.	2014

Mentoring

Mentorships and collaborations as senior lab member

Stanford: collaborated with 14 junior students (6 Ph.D., 2 master's, 6 undergraduate).	2022-2023
CMU: collaborated with 25 junior students (5 Ph.D., 10 master's, 10 undergraduate).	2016-2022
TMU: collaborated with 2 junior students (1 master's, 1 undergraduate).	2014-2016

Graduate student mentor, CMU AI Mentoring Program

Mentored undergraduates from underrepresented groups interested in getting involved in AI research. 2020-2021

Ph.D. student member of M.S. qualifying exam (CMU)

Jing Wen	2021
Yiming Zuo	2021
Tejas Khot	2019

Guest on TMU "Computer Science Course Union" Podcast

Invited guest on a podcast hosted by TMU undergraduate students, live-streamed through Twitch, about the life of a graduate student and academia in general. 2020

AI4ALL Speaker

Gave an introductory talk about computer vision to low-income high school students visiting CMU. 2019

Speaker at TMU Competitive Programming Club 2014
Invited to speak about dynamic programming and how to get started in computer vision research.

Academic Service

Lead organizer of workshop 2020
“Perception Through Structured Generative Models” (ECCV 2020): In this workshop, we explored how generative models can facilitate perception, and in particular, how to design and use structured generative models (of images, video, and 3D data) for computer vision inference applications.

Co-lead organizer of workshop 2020
“Minds vs. Machines: How far are we from the common sense of a toddler?” (CVPR 2020): In this workshop, we explored the confounding gap between the capabilities of current AI systems and the abilities of toddlers, focusing on topics such as intuitive physics, interaction with the world, and generalization.

Area Chair: WACV 2023, NeurIPS 2024, 3DV 2024.

Reviewer 2015-Present
Computer Vision: CVPR, ICCV, ECCV, WACV, 3DV, TPAMI.
Machine learning: NeurIPS, ICML, ICLR, TMLR, AAI, AISTATS.
Robotics: ICRA, IROS, CoRL.

Industry experience

Internship at Uber ATG (San Francisco) 2019
Worked with Dr. Ersin Yumer on photo-realistic simulation of urban scene videos, using multi-view geometry and GAN priors.

Internship at Meta Reality Labs (Pittsburgh) 2018
Worked with Dr. Shih-En Wei and Dr. Jason Saragih on developing GANs for high-fidelity cross-domain image translation. This work resulted in an ICCV workshop paper (2019) and later served as a component in a SIGGRAPH paper (2020).

Internship at INRIA-Saclay, Center for Visual Computing (Paris) 2015
Worked with Dr. Iasonas Kokkinos on adding attention-based layers within CNNs, aiming to improve the spatial sharpness of the feature maps. This work resulted in an ICLR workshop paper (2015) and later an ICCV paper (2016).

References

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