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LAHAV LIPSON

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EDUCATION

Princeton University: ***Sept. 2019 – Present***
Ph.D. Candidate in Computer Science
Advisor: Jia Deng

Columbia University: **Sept.** ***2015 – May 2019***
B.S. in Computer Science, Summa Cum Laude

AWARDS AND HONORS

Princeton SEAS Award for Excellence ***Sept. 2023***
Qualcomm Innovation Fellowship Finalist ***May 2023***
Best Student Paper Award – *International Conference on 3D Vision (3DV)* ***Oct. 2021***
Academic Excellence Award from Columbia, Department of Computer Science ***May 2019***

RESEARCH EXPERIENCE

ML-Based Visual Odometry and SLAM

- Developed Deep Patch Visual Odometry/SLAM (DPVO & DPV-SLAM) using deep learning and differentiable optimization (NeurIPS 2023 & new paper under review).
- 2X faster (50-FPS inference) and 2X less memory while achieving SOTA accuracy.
- Developed large-scale global optimization (CUDA bundle adjustment + loop closure).
- Developed a SOTA method for multi-session SLAM, supporting disjoint monocular videos (CVPR 2024).

Computer Graphics / Large Scale Synthetic Data Generation

- Co-led the development of Infinigen, a procedural generator of unlimited photoreal synthetic 3D training data.
- CVPR 2023 & 2024. 5K GitHub stars.
- Developed a system for distributed data generation on large GPU clusters.
- Developed an efficient ground truth system, including OpenGL shaders to compute per-pixel depth, surface-normals, occlusion boundaries, panoptic segmentation, and 3D motion fields for dynamic non-rigid scenes.

3D Vision for Robotics

- Developed a SOTA method for 6-DOF object pose from a single RGB or RGBD image (CVPR 2022).
- Co-Winner of the BOP Object Pose Challenge at ECCV 2022 and ICCV 2023.

Dense 3D Reconstruction

- Developed a SOTA approach to stereo-matching, winning 1st on several leaderboards.
- Best Student Paper Award at 3DV '21.
- The 1st, 3rd and 6th current best-performing methods are based on my approach.

WORK EXPERIENCE

Amazon Intern ***June 2018 – Aug. 2018***
Software Developer Engineer

Teaching Assistant ***2018, 2020 – 2021***
Computer Vision (Princeton), Algorithms and Data Structures (Princeton), Computer Science Theory (Columbia)

PAPERS

Preprints / Under-Review

Lahav Lipson, Zachary Teed, Jia Deng. “Deep Patch Visual SLAM”, under review, 2024

Yihan Wang, **Lahav Lipson**, Jia Deng. “SEA-RAFT: Simple, Efficient, Accurate RAFT for Optical Flow”, under review, 2024

Zeyu Ma, Alexander Raistrick, **Lahav Lipson**, Jia Deng. “View-Dependent Octree-based Mesh Extraction in Unbounded Scenes for Procedural Synthetic Data" *arXiv preprint arXiv:2312.08364, 2024.*

Peer-Reviewed Articles

[CVPR 2024] **Lahav Lipson**, Jia Deng, “Multi-Session SLAM with Differentiable Wide-Baseline Pose Optimization”, *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2024.*

[CVPR 2024] Alexander Raistrick, Lingjie Mei, Karhan Kaan Kayan, David Yan, Yiming Zuo, Beining Han, Hongyu Wen, Meenal Parakh, Stamatis Alexandropoulos, **Lahav Lipson**, Zeyu Ma, Jia Deng “Infinigen Indoors: Photorealistic Indoor Scenes using Procedural Generation”, *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2024.*

[NeurIPS 2023] Zachary Teed*, **Lahav Lipson*,** and Jia Deng. "Deep Patch Visual Odometry”, *Proceedings of the 2023 Conference on Neural Information Processing Systems (NeurIPS).*
(equal contribution)*

[CVPR 2023] **Lahav Lipson*,** Alexander Raistrick*, Zeyu Ma*, Lingjie Mei, Mingzhe Wang, Yiming Zuo, Karhan Kayan, Hongyu Wen, Beining Han, Yihan Wang, Alejandro Newell, Hei Law, Ankit Goyal, Kaiyu Yang and Jia Deng. "Infinite Photorealistic Worlds using Procedural Generation", *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2023.* **5K GitHub Stars**
(equal contribution)*

[CVPR 2022] **Lahav Lipson**, Zachary Teed, Ankit Goyal, and Jia Deng. "Coupled Iterative Refinement for 6D Multi-Object Pose Estimation", *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2022.* **Co-Winner of the BOP Object Pose Challenge at ECCV 2022 and ICCV 2023**

[3DV 2021] **Lahav Lipson**, Zachary Teed, and Jia Deng. "RAFT-Stereo: Multilevel recurrent field transforms for stereo matching", *2021 International Conference on 3D Vision (3DV), 2021.* **Best Student Paper Award**