Kyle Vedder

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Education

- PhD in Computer Science, University of Pennsylvania (in progress)   (2019 – Present)
  - Advisors: Eric Eaton, Dinesh Jayaraman, *GRASP Lab*
- BS in Computer Science, University of Massachusetts   (2015 – 2019)
  - Advisor: Joydeep Biswas, *Autonomous Mobile Robotics Lab (AMRL)*

Research Interests

I believe the shortest path to getting robust, generally capable robots in the real world is through the construction of systems whose performance scales with compute and data, *without* requiring human annotations.

In service of this, I am interested in designing and scaling fundamentally 3D vision systems that learn just from raw, multi-modal data. My contrarian bet is on the multi-modal and 3D aspects; a high quality, 3D aware representation with diverse data sources should enable more sample efficient and robust downstream policies. Most representations today are 2D for historical reasons (e.g. lots of RGB data, 2D convolutions won the hardware lottery), but I believe this ends up pushing a lot of 3D spacial understand out of the visual representation and into the downstream policy, making them more expensive to learn and less robust.

My current line of work is focused on tackling scene flow, a problem that requires systems to construct a robust understanding of the dynamics of the 3D world. For data availability reasons, it primarily focuses on the Autonomous Driving domain, but the same principles apply to other domains, e.g. indoor service robots.

Select Publications

Conferences/Journals

- Ishan Khatri*, **Kyle Vedder***, Neehar Peri, Deva Ramanan, James Hays. *I Can't Believe It's Not Scene Flow!*. European Conference on Computer Vision (ECCV), 2024. [website] [pdf]
- **Kyle Vedder**, Neehar Peri, Nathaniel Chodosh, Ishan Khatri, Eric Eaton, Dinesh Jayaraman, Yang Liu, Deva Ramanan, James Hays. *ZeroFlow: Scalable Scene Flow via Distillation*. Twelfth International Conference on Learning Representations (ICLR), 2024. [website] [pdf]
- Andrea Soltoggio et al. *A collective AI via lifelong learning and sharing at the edge*. Nature Machine Intelligence, 2024. [pdf]
- Megan M. Baker et al. *A domain-agnostic approach for characterization of lifelong learning systems*. Neural Networks, 2023. [pdf]
- **Kyle Vedder**, Eric Eaton. *Sparse PointPillars: Maintaining and Exploiting Input Sparsity to Improve Runtime on Embedded Systems*. Proceedings of the International Conference on Intelligent Robots and Systems (IROS), 2022. [website] [pdf]
- **Kyle Vedder**, Joydeep Biswas. *X*: Anytime Multi-Agent Path Finding For Sparse Domains Using Window-Based Iterative Repairs*. Artificial Intelligence (AIJ), 2021. [website] [pdf]
- **Kyle Vedder**, Joydeep Biswas. *X*: Anytime Multiagent Path Planning With Bounded Search*. Proceedings of the 18th International Conference on Autonomous Agents and MultiAgent Systems (AAMAS), 2019. [website] [pdf]

In Submission

- **Kyle Vedder**, Neehar Peri, Ishan Khatri, Siyi Li, Eric Eaton, Mehmet Kocamaz, Yue Wang, Zhiding Yu, Deva Ramanan, Joachim Pehserl. *Scene Flow as a Partial Differential Equation*. 2024. [website] [pdf]

Challenges

- **Kyle Vedder**, Neehar Peri, Nate, Chodosh, Yang, Liu, James Hays. *Argoverse 2 2024 Scene Flow Challenge at the CVPR 2024 Workshop on Autonomous Driving*. 2024. [website]

Industry Experience

- *Nvidia – Research Intern* (Spring / Summer 2024)
  - Pushing forward scene flow and occupancy flow methods (stay tuned!)
- *Argo AI – Research Intern* (Summer / Fall 2022)
  - Explored 2D and 3D methods for generalizing to the long tail of objects
  - Led to *ZeroFlow* line of scene flow work
- *Amazon Lab126 – Software Development Intern* (Summer 2019)
  - Small object detection on Amazon Astro
- *Google – Software Engineering Intern* (Summer 2017)
  - Automated training data sampling on Ads Quality Metrics
- *Google – Software Engineering Intern* (Summer 2016)
  - Statistical processing for AdWords redesign
- *Unidesk Corporation – C++ Development Intern* (Summer 2015)
  - Windows registry hive manipulation unit testing framework
- *Unidesk Corporation – Robotics Intern* (Summer 2014)
  - Pick and place robot arm control stack for trade show

Honors and Awards

- ZeroFlow was selected as a **highlighted method** in the CVPR 2023 *Workshop on Autonomous Driving* Scene Flow Challenge
- *Goldwater Scholarship Honorable Mention* (2018)
- *Outstanding Undergraduate Course Assistant (CS220 Programming Methodologies)* (Fall 2017)

Academic Experience

- *Academic Reviewer* (2019 – Present)
  - AAAI 2020 – 2022, AAMAS 2021, JMLR 2021, ICRA 2022 – 2023, JSA 2022, ICLR 2023, ICCV 2023 – 2024
- *Research Assistant – Autonomous Mobile Robotics Lab (AMRL), UMass* (2016 – 2019)
- *Teaching Assistant – CIS 519 Applied Machine Learning, UPenn* (Spring 2021)
- *Teaching Assistant – CIS 700 Integrated Intelligence, UPenn* (Fall 2020)
- *Undergraduate Course Assistant – CIS 220 Programming Methodologies, UMass* (2016 – 2017)