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.

For data availability reasons, my current work is in the Autonomous Driving domain, but I believe the same principles apply to other domains such as indoor service robots.

Publications

Conferences/Journals

- **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]
- 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

- Ishan Khatri, **Kyle Vedder**, Neehar Peri, Deva Ramanan, James Hays. *I Can't Believe It's Not Scene Flow!.* arXiv, 2024. [pdf]

Workshops

- **Kyle Vedder**, Eric Eaton. *Sparse PointPillars: Exploiting Sparsity on Birds-Eye-View Object Detection.* Sparsity in Neural Networks Workshop (SNN), 2021. [pdf] [poster]
- Spencer Lane, **Kyle Vedder**, Joydeep Biswas. *Augmenting Planning Graphs in 2-Dimensional Dynamic Environments With Obstacle Scaffolds.* Proceedings of the 5th Workshop on Planning and Robotics (ICAPS PlanRob), 2017. [pdf]

Tech Reports

- **Kyle Vedder**. *Current Approaches and Future Directions for Point Cloud Object Detection in Intelligent Agents.* 2021. [pdf] [slides] [video]

- **Kyle Vedder**. *An Overview of SHAP-based Feature Importance Measures and Their Applications To Classification.* 2020. [pdf] [slides] [video]
- **Kyle Vedder**, Edward Schneeweiss, Sadegh Rabiee, Samer Nashed, Spencer Lane, Jarrett Holtz, Joydeep Biswas, David Balaban. *UMass MinuteBots 2018 Team Description Paper.* 2018. [pdf]
- **Kyle Vedder**, Edward Schneeweiss, Sadegh Rabiee, Samer Nashed, Spencer Lane, Jarrett Holtz, Joydeep Biswas, David Balaban. *UMass MinuteBots 2017 Team Description Paper.* 2017. [pdf]

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
- *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)

Industry Experience

- *Argo AI – Research Intern* (Summer / Fall 2022)
  - Explored 2D and 3D methods for generalizing to the long tail of objects
- *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