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 though the construction of systems whose performance scales with compute and data, *without* requiring human annotations. The world is fundamentally 3D, but currently most vision systems focus on 2D data simply due to general availability of RGB images and strong hardware acceleration for standard processing methods (e.g. 2D convolutions). I am interested in building such scalable vision systems on top of 3D sensor data (e.g. LiDAR, Stereo) that reasons natively in 3D, in the hope that these 3D representations are more useful for quickly and robustly learning downstream behavioral tasks compared to their 2D counterparts.

Publications

Conferences/Journals

- **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]

Workshops

- **Kyle Vedder**, Eric Eaton. *Sparse PointPillars: Exploiting Sparsity on Birds-Eye-View Object Detection.* Sparsity in Neural Networks Workshop (SNN), 2021. [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

- *Goldwater Scholarship Honorable Mention* (2018)
- *Outstanding Undergraduate Course Assistant (CS220 Programming Methodologies)* (Fall 2017)

Academic Experience

- *PhD Student – Lifelong Machine Learning Group (LML), UPenn* (2019 – Present)
  - Intersection of computer vision and machine learning for robots
- *Research Assistant – Autonomous Mobile Robotics Lab (AMRL), UMass* (2016 – 2019)
  - Single / Multi Agent Path Finding Research
    - *X**, an anytime multiagent planner for realtime systems
    - *Obstacle Scaffolds*, an extension to roadmap planners for finer near-obstacle navigation
  - Software lead for the RoboCup Small Size League team UMass Minutebots
    - Realtime path planning, collision avoidance, motion planning
- *Academic Reviewer* (2019 – Present)
  - AAAI 2020 – 2022, AAMAS 2021, JMLR (Secondary) 2021, ICRA 2022
  - Reviewed articles on topics across robotics, vision, machine learning, and classical AI
- *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)
- *Academic Reviewer* (2019 – Present)
  - AAAI 2020 – 2022, AAMAS 2021, JMLR (Secondary) 2021, ICRA 2022, JSA 2022, ICLR 2023

Industry Experience

- *Argo AI – Research Intern* (Summer / Fall 2022)
  - Exploring 2D and 3D methods for generalizing to the long tail of objects. In-progress ICCV 2023 submission.
- *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