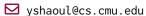
Yorai Shaoul, Ph.D. Student in Robotics



yoraish.com

in LinkedIn

GitHub

Scholar

Education

Ph.D., Carnegie Mellon University Robotics Institute, School of Computer Science. I am researching algorithmic foundations for multi-robot systems [2], [4] and applying my work to multi-arm manipulation [3], [4]. I focus on developing practical algorithms (realized efficiently in C++) and interleaving data-driven flexible behaviors with classical techniques for task and motion planning [2].

I am grateful to have Professors Maxim Likhachev and Jiaoyang Li as my advisors.

2017 – 2021 **B.Sc. Massachusetts Institute of Technology** Electrical Eng. and Computer Science. Minor in mathematics and a focus on robotics via research and coursework. GPA $\frac{4.9}{5.0}$.

Experience

May-Sep 2025 **Amazon Robotics** Applied Scientist II Intern - Movement Science.

• This summer, I will be researching planning and learning algorithms for multi-robot coordination with the Movement Science team.

2022 – present **Carnegie Mellon Robotics Institute** Graduate Researcher and Teaching Assistant.

- Researching algorithms for multi-robot coordination and multi-arm manipulation.
- Actively working with diffusion-models, MAPF algorithms, and graph-search techniques for planning and long-horizon decision making.
- Assisting with teaching the graduate classes Planning and Decision-Making in Robotics
 (Fall 2024, Professor Maxim Likhachev) and Multi-Robot Planning and Coordination
 (Spring 2025, Professor Jiaoyang Li).
- During the first year of my PhD, I worked on **large-scale learning** (≥50 TB datasets) of fisheye monocular visual odometry under Professor Sebastian Scherer.

2021 − 2022 **Indoor Robotics** Algorithm Engineer.

I developed various aspects of aerial autonomous robots operating in the wild.

- My work spanned across the autonomy stack, including localization, mapping, and trajectory optimization using range, inertial, and visual inputs.
- I was the technical lead in multiple mapping and visual/range localization projects.
 These drastically improved the efficiency of mapping new deployment sites (minutes instead of days) and opened up new markets for Indoor (by introducing visual localization signals to state estimation).

2018 − 2021 **MIT CSAIL − Robust Robotics Group** Undergraduate Researcher.

I conducted research under the guidance of Nicholas Roy and his students at MIT. Our projects mostly revolved around **computer vision**, some using deep learning and others with different gradient-based optimization methods. Notable projects:

- Ellipsoid deformations for continuous and differentiable object shape estimation, and
- Learned object-level visual data-association methods for object tracking and SLAM [6].

Jun-Sep 2020 **Amazon Robotics** Research and Software-Development Intern.

I worked tightly with research scientists and software engineers to develop and test new **large-scale multi-robot planning algorithms** for thousands of robots.

- Developed adaptive cost-map policies to reduce congestion in fulfillment centers.
- Estimated warehouse efficiency increased by 13%.

Experience (continued)

- Jun-Sep 2019 Optimus Ride Robotics Software Development Intern.

 At Optimus Ride, an autonomous vehicle startup (acquired since), I developed new techniques for motion planning and decision-making in complex traffic scenarios leveraging semantic and geometric information.
 - Certain improvements yielded an 80% decrease in planning time.
 - My project was later incorporated into Optimus' production autonomy stack.
 - MIT Research Laboratory of Electronics Undergraduate Researcher. Advised by Yoel Fink and his students.
 - Developed and implemented real-time compression algorithms for in-fiber embedded data storage [5].
 - 2016-2017 **Tel-Aviv University Aerodynamics Laboratory** Research Assistant. Designed, built, and tested active-flow drag-reducing contraptions for trucks.

Research Publications

Under Review

I. Mishani, **Y. Shaoul**, and M. Likhachev, "Mosaic: A skill-centric algorithmic framework for long-horizon manipulation planning," under review, 2025. **O** URL: https://arxiv.org/pdf/2504.16738.

Conference Proceedings

- Y. Shaoul*, I. Mishani*, S. Vats*, J. Li, and M. Likhachev, "Multi-Robot Motion Planning with Diffusion Models," in *The Thirteenth International Conference on Learning Representations (ICLR)*. Also presented at the AAAI-25 Workshop on Multi-Agent Path Finding, ICLR Spotlight (top 4%), 2025. OURL: https://multi-robot-diffusion.github.io/.
- Y. Shaoul*, I. Mishani*, M. Likhachev, and J. Li, "Accelerating Search-Based Planning for Multi-Robot Manipulation by Leveraging Online-Generated Experiences," in *Proceedings of the International Conference on Planning and Scheduling (ICAPS)*, Winner: Best Student Paper, 2024. OURL: https://x-cbs.github.io.
- Y. Shaoul*, R. Veerapaneni*, M. Likhachev, and J. Li, "Unconstraining Multi-Robot Manipulation: Enabling Arbitrary Constraints in ECBS with Bounded Sub-Optimality," in *Proceedings of the International Symposium on Combinatorial Search* (SoCS), 2024.

Journal Articles

G. Loke, T. Khudiyev, B. Wang, S. Fu, S. Payra, **Y. Shaoul**, J. Fung, I. Chatziveroglou, P.-W. Chou, I. Chinn, *et al.*, "Digital electronics in fibres enable fabric-based machine-learning inference," *Nature Communications*, vol. 12, no. 1, p. 3317, 2021.

Other Papers

Y. Shaoul, K. Liu, K. Ok, and N. Roy, Online Descriptor Enhancement via Self-Labelling Triplets for Visual Data Association, 2020.

Invited Talks

- 04-2025 **Technion** Multi-Robot Motion Planning with Diffusion Models. Host: Prof. Oren Salzman.
- 03-2025 University of Southern California Multi-Robot Motion Planning with Diffusion Models. Host: Prof. Sven Koenig (online).

Miscellaneous

- **Track and Field:** MIT team captain, triple jump record holder, NCAA (DIII) Indoor/Outdoor national champion, National team (ISR).
 - Code C++, Python, PyTorch, ROS, ROS2, Docker, Java ...
 - CAD Autodesk Inventor/Fusion 360, SolidWorks, Autodesk Eagle (PCB Design), 3D printing.