Yorai Shaoul, Ph.D. Student in Robotics

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Education

2022 – present
- **Ph.D., Carnegie Mellon University** Robotics Institute, School of Computer Science.
I am researching algorithmic foundations for multi-agent planning and applying my work to *multi-robot manipulation* [2], [3]. My focus is on developing practical algorithms with strong theoretical guarantees (realized efficiently in C++) and learning flexible behaviors from data [1]. Coursework GPA 4.17.
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.

Experience

2022 – present
- **Carnegie Mellon Robotics Institute** Graduate Researcher and Teaching Assistant.
  - Conducting research in multi-arm manipulation systems [2], [3].
  - Interleaving data-driven learned skills with classical graph search techniques [1].
  - Assisting with teaching the graduate class *Planning and Decision-Making in Robotics* (Fall 2024, Professor Maxim Likhachev).

2022 – 2023
- **Indoor Robotics** Algorithm Engineer.
I developed various aspects of aerial autonomous robots operating in the wild.
  - Localization, mapping, and trajectory optimization using range, inertial, and visual inputs.
  - I was the technical lead in multiple mapping and visual/range localization projects.

2018 – 2021
- **MIT CSAIL – Robust Robotics Group** Undergraduate Researcher.
Advised by Nicholas Roy and his students. Notable projects:
  - *Ellipsoid deformations for continuous and differentiable object shape estimation*, and
  - *Learned object-level visual data-association methods for object tracking and SLAM [5].*

Jun-Sep 2020
- **Amazon Robotics** Research and Software-Development Intern.
Path planning algorithms for large-scale multi-agent settings.
  - Warehouse efficiency increase (13%) through adaptive cost-map policies.

2019
- **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 [4].

Jun-Sep 2019
- **Optimus Ride** Robotics Software Development Intern.
Developed new techniques for motion planning and decision-making in complex traffic scenarios, leveraging semantic and geometric information.
  - Certain improvements yielded 80% decrease in planning time.

2016-2017
- **Tel-Aviv University Aerodynamics Laboratory** Research Assistant.
Designed, built, and tested active-flow drag-reducing contraptions for trucks.

2014-2017
- **Air Force, Israel** Staff Sergeant, Mechanical Design.

Research Publications

Under Review

1. **Y. Shaoul***, I. Mishani*, S. Vats*, J. Li, and M. Likhachev, "Multi-Robot Motion Planning with Diffusion Models," 2024.

Conference Proceedings

2. **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.
3. **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. URL: https://arxiv.org/abs/2405.01772.

Journal Articles

4. G. Loke, T. Khudiyev, B. Wang, *et al.*, "Digital electronics in fibres enable fabric-based machine-learning inference," *Nature communications*, vol. 12, no. 1, p. 3317, 2021.

Other Papers

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

Miscellaneous

2005-2021 ■ **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.