

Vaibhav Sanjay

✉ vsanjay@andrew.cmu.edu

🐙 [GitHub](#)

🎓 [Google Scholar](#)

🌐 <https://vaibhavsanjay.github.io>

EDUCATION

Carnegie Mellon University (GPA 4.17/4.33)

Aug 2025 – May 2027 (Expected)

Majors: Masters in Robotics (MSR), **Advisor:** Dr. Jiaoyang Li

Selected Coursework: Multi-Robot Planning & Coordination, Advanced Computer Vision, Intro to Robot Learning

University of Maryland, College Park (GPA 3.98/4.00) Summa Cum Laude

Aug 2021 – May 2025

Majors: Computer Science & Mathematics; **Minor:** Robotics and Autonomous Systems

PUBLICATIONS AND REPORTS

[1] [Diffusion for Long-Horizon Multi-Robot Path Planning in Human-Shared Environments](#)

Vaibhav Sanjay, Yorai Shaoul, Jiaoyang Li

IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2026

[2] [Scalable Long-Horizon Planning with Staggered Updates for Lifelong MAPF](#)

Vaibhav Sanjay, Jiaoyang Li

Under Review

[3] [Illusion3D: 3D Multiview Illusion with 2D Diffusion Priors](#)

Yue Feng, Vaibhav Sanjay, Spencer Lutz, Songwei Ge, Badour AlBahar, Jia-Bin Huang

arXiv preprint, 2024

[4] [Image Stitching with Real-Time Panorama Creation for the NIOSH Mine Rover \(Technical Report\)](#)

Vaibhav Sanjay, Erica Tevere, Xavier Zapien

NASA Jet Propulsion Laboratory, 2023

[5] [Where Am I Now? Dynamically Finding Optimal Sensor States to Minimize Localization Uncertainty for a Perception-Denied Rover](#)

Troi Williams, Po-Lun Chen*, Sparsh Bhogavilli*, Vaibhav Sanjay*, Pratap Tokekar

IEEE International Symposium on Multi-Robot and Multi-Agent Systems (MRS), 2023

RESEARCH EXPERIENCE

Artificial Intelligence for Robot Coordination at Scale Lab (CMU RI)

Aug 2025 – Present

Student Researcher

- Working with Dr. Jiaoyang Li on scalable multi-robot coordination across learned and classical planners.
- Developed **Multi-Robot Rolling Diffusion (MRRD)**, a diffusion model planner capable of simultaneously generating predictable, humanlike paths in a human-shared environment. Maintains 92% success rate (nearly 3 times the best baseline) while planning with **15 robots in a crowded environment**.
- Created **Path Updates over Staggered Horizons**, a lifelong MAPF planner achieving sub-second coordination of **up to 10,000 agents** with formal deadlock-avoidance guarantees. On simulated warehouse loading/unloading benchmarks, PUSH raises throughput by up to 300% over scalable baselines including PIBT and EPIBT. Under review.

Graduate RA with Advanced Robotics for Manufacturing Institute (CMU RI)

Jan 2026 – Present

Student Researcher

- Collaborating with the ARM Institute, Professor Changliu Liu, and Professor Jiaoyang Li on an automated robotic grinding, welding and sanding system.
- Developing a coordinated **two-arm** planning system where one arm positions and orients a workpiece while a second arm executes a weld. Workpiece orientation and weld planning is coupled to ensure optimal coverage of the weld with the least number of rotations required.
- Multi-arm planner reports a **95% average weld reachability** on a comprehensive workpiece dataset.

UMD Vision and Learning Lab

Dec 2023 – Aug 2025

Student Researcher

- Worked with Dr. Jia-Bin Huang to simulate three-dimensional illusions using **Diffusion** models.

* Equal contribution

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- Developed **differentiable rendering** methods for curved, rotating, and reflective surfaces.
- Trained a **Neural Radiance Field** to hide images in a 3D model, producing multi-view 3D illusions.

NASA Jet Propulsion Laboratory [Group 347F]

Jun 2023 – Aug 2023

Robotics Intern, NIOSH mine rover project

- Engineered and deployed a **OpenCV/CUDA** panoramic vision system with Dr. Rudranarayan Mukherjee and Erica Tevere for a teleoperated rescue rover, enabling **real-time** operation and superior control.
- Ensured a strict frame rate budget using a registration and compositing pipeline, improving end-to-end latency to 0.06 seconds (**65% improvement**) and producing a frame rate of 18 Hz (**237% improvement**).

UMD Robotics Algorithms and Autonomous Systems (RAAS) Lab

Jan 2022 – Jun 2023

Student Researcher

- Worked with Dr. Pratap Tokekar and Dr. Troi Williams to use drone and robotic **perception** to track and guide sensor-less rovers around obstacles. Tested implementation using **Vicon** motion capturing system.

National Institute of Standards and Technology (NIST)

Jun 2022 – Aug 2022

Student Researcher

- Worked with Dr. Jacob Collard and a startup to create an encyclopedia of math concepts using **NLP**.
- Graphed 4000 terms and 6000 relations with Python and neo4j to create knowledge graphs.

TEACHING AND MENTORING

Teaching Assistant for Multi-Robot Planning and Coordination (16-891)

Aug 2026 – Present

- Chosen by Dr. Jiaoyang Li to be the sole TA over external PhD applicants to **graduate level course**.
- Assisting design of assignment structure; **evaluating over 30 graduate student project pitches** and presentations for state-of-the-art MAPF contributions in final projects.

Paths to AI Research (PAIR) Mentor

Sep 2025 – May 2026

- Mentored two freshmen in AI research by helping them narrow their interests, join labs, and contribute to group work that led to co-authorship in a top-tier conference submission.

TALKS

[1] [Diffusion for Long-Horizon Multi-Robot Path Planning in Human-Shared Environments](#)

*IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)
Pittsburgh, PA, Sept 2026. [Oral Presentation and Poster]*

[2] [Illusion3D: Generating 3D Illusions using Diffusion Models](#)

UMD Undergraduate Research Day (URD), College Park, MD, 2024, [Poster]

[3] [Image Stitching with Real-Time Panorama Creation for the NIOSH Mine Rover](#)

NASA Jet Propulsion Laboratory, Pasadena CA, 2023. [Presentation]

[4] [Term and Relation Extraction in Mathematical Texts](#)

National Institute of Standards and Technology (NIST), Gaithersburg, MD, 2022. [Presentation]

PROFESSIONAL EXPERIENCE/LEADERSHIP

Software Engineering Intern at Amazon Web Services

Jun 2024 – Aug 2024

- Developed a ReactJS AWS Marketplace feature for cloning private offers, cutting workflow time by 91%.

Google Developer Student Club (GDSC) Lead/President

Aug 2022 – Aug 2023

- Led 450-member club, delivered workshops for 100+ people, initiated well received guest expert events.

AWARDS

Developer Community Excellence Award, University of Maryland, College Park, (2025)

President's Scholarship, University of Maryland, College Park, (2021- 2025)

Summer Research Fellowship, National Institute of Standards and Technology (NIST), 2022

TECHNICAL SKILLS

Python, C++, CUDA, PyTorch, PyTorch3D, ROS1/ROS2, Gazebo, Docker, MATLAB