Qianqian Yang

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Education

Carnegie Mellon University — Pittsburgh, PA
M.S. in Mechanical Engineering - Research — Aug 2023 – May 2025

- GPA: 3.98/4.0
- **Related Coursework:** Multi-robot Planning and Coordination, SLAM, Computer Vision, AIML for Engineers

University College London — London, United Kingdom
B.Eng. in Mechanical Engineering — Sep 2020 – June 2023

- GPA: 3.93/4.0, First Class Honours (Top 6%)
- **Related Coursework:** Machine Learning for Robotics, Introduction to Robotics

Publications

Semantic Exploration and Dense Mapping of Complex Environments Using Ground Robot with Panoramic LiDAR-Camera Fusion [pdf] [video] — 2025

Xiaoyang Zhan, Shixin Zhou, ***Qianqian Yang***, Yixuan Zhao, Hao Liu, Srinivas Chowdary Ramineni, Kenji Shimada

IEEE Robotics and Automation Letters **(RA-L)**, 2025

Research Experience

Heterogeneous Multi-Robot Exploration Framework — Pittsburgh, PA
CERLAB at CMU, Advisor: Prof. Kenji Shimada — June 2025 - Present

- Refactored the autonomous exploration system to a unified API with only control-level distinction
- Designed a shared Heterogeneous Topological Graph (HTG) with a robot-aware edge-cost modeling
- Developed a hybrid local Probabilistic Roadmap (PRM) planner integrating robot-specific kinematics for coordinated path generation among heterogeneous robots
- Implemented a decentralized coordination strategy using graph Voronoi partitioning for deterministic task allocation among heterogeneous robots

Target Object Reconstruction with Panoramic LiDAR-Camera Fusion — Pittsburgh, PA
CERLAB at CMU, Advisor: Prof. Kenji Shimada — Sept. 2024 - Apr. 2025

- Developed the dense semantic mapping framework that fuses panoramic camera images with LiDAR point clouds for real-time object-level reconstruction during autonomous exploration
- Implemented LiDAR–inertial odometry and integrated YOLO + SAM detection with LiDAR data to achieve 3D object segmentation in point clouds
- Built coarse-to-fine object models by integrating multi-view observations across exploration, using object update, merging, and re-centering strategies to maintain consistent dense maps
- Containerized the system in Docker for reproducible and efficient deployment on the Spot platform

Heterogeneous Robot Exploration with CBS Task Allocation — Pittsburgh, PA
CMU Multi-robot Planning and Coordination Course Project — Feb. 2025 - Apr. 2025

- Extended a ground-robot exploration framework to UAVs, enabling collaborative exploration in customized Isaac Sim environments
- Implemented a region-level Conflict-Based Search (CBS) allocator that dynamically reassigns subregions based on real-time robot status and exploration feedback
- Integrated a PRM–TSP planner on each robot to plan optimal subregion visiting sequence and generate collision-free path

Comparative Study of LiDAR SLAM Algorithms in Dusty Environments Pittsburgh, PA
CMU SLAM Course Project Oct. 2024 - Nov. 2024

- Evaluated FAST-LIO2, LIO-SAM, and GLIM on dusty LiDAR–IMU datasets, comparing trajectory consistency and 3D map quality under degraded point clouds
- Implemented distance- and intensity-based dust filters and assessed their impact on SLAM performance
- Analyzed dust effects on SLAM frameworks, focusing on odometry drift, map density, and filter robustness

ROS-Integrated Multi-Robot Simulation Framework in Isaac Sim Pittsburgh, PA
CERLAB at CMU, Advisor: Prof. Kenji Shimada Sept. 2023 - May. 2024

- Integrated UAV–UGV simulation platforms in Isaac Sim, with UAV control via Pegasus API and a teleport-based controller, and UGV control via a differential drive module
- Built a ROS-Isaac Sim integration layer via Python API, enabling automated, synchronized data streaming across multiple simulated robots
- Built a multi-robot manager to handle spawning and teleoperation through a unified keyboard interface

VRX Competition 2023 London, United Kingdom
FRL at UCL July 2023 - Nov. 2023

- Containerized a multi-language ROS 2 codebase (C++, Python) with automated testing and linting
- Managed collaborative development via GitHub Actions CI for build validation and version control
- Implemented Line-of-Sight based acoustic guidance with Butterworth filtering for the acoustic perception task

UAV Indoor Visual SLAM London, United Kingdom
FRL at UCL, Advisor: Prof. Yuanchang Liu Nov. 2022 - June 2023

- Assembled and configured a HEX-TD650 UAV with Mission Planner for indoor and outdoor testing
- Implemented fiducial-based VSLAM with ArUco markers and extended experiments with ORB-SLAM3 in Gazebo and on the DJI Tello drone
- Implemented trajectory generation modules (uniform-velocity and minimum-snap) in Gazebo

Work Experience

CERLAB at CMU Pittsburgh, PA
Research Assistant Sept. 2025 - Present

- Contributing to an ongoing LiDAR–360 Camera 3D reconstruction project, extending FAST-LIO with dynamic-object tracking and removal for construction site mapping and safety monitoring

CERLAB at CMU Pittsburgh, PA
Research Assistant May 2024 - Aug. 2024

- Developed a ROS1 wrapper for Spot motion control and data acquisition
- Deployed LiDAR-based semantic exploration experiments in mock construction environments
- Applied Cloud Compare to compute point cloud difference for window installation progress tracking

Bosch Powertrain Systems Co., Ltd (RBCD) Wuxi, China
Intern at Rail Assembly Line Section July 2021 - Sept. 2021

- Updated Working Instruction according to organizational change and workshop risk assessment
- Created inventory management using Excel and conducted inventory update within the department
- Visualized production data using Power BI for daily meeting

Honors & Awards

- Virtual RobotX Competition 2023 (Team FRL): Most Improved Award (2nd Place), 10/16 Overall

Skills

Programming: C++, Python, ROS, ROS2, MATLAB

Engineering Software: Isaac Sim, Docker, Gazebo, Fusion 360, Webots, Mission Planner, ANSYS