BEIMING LI

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EDUCATION

University of Pennsylvania — Philadelphia, PA
PhD, Electrical and System Engineering — *Expected 2029*

University of Pennsylvania — Philadelphia, PA
Master of Science in Engineering, Robotics — *May. 2024*

University of Michigan — Ann Arbor, MI
Bachelor of Science, Computer Engineering — *Apr. 2022*

PUBLICATION

- Yuezhan Tao, Eran Iceland, **Beiming Li**, Elchanan Zwecher, Uri Heinman, Avraham Cohen, Amir Avni, Oren Gal, Ariel Barel, and Vijay Kumar, "Learning to Explore Indoor Environments using Autonomous Micro Aerial Vehicles", *IEEE International Conference on Robotics and Automation (ICRA),* 2024 [Preprint][Video]
- Yuezhan Tao, Yuwei Wu, **Beiming Li**, Fernando Cladera, Alex Zhou, Dinesh Thakur, and Vijay Kumar, "SEER: Safe Efficient Exploration for Aerial Robots using Learning to Predict Information Gain", *IEEE International Conference on Robotics and Automation (ICRA),* 2023 [Preprint][Video]

RESEARCH EXPERIENCE

University of Pennsylvania — Philadelphia, PA
Advisor: Dr. Vijay Kumar, Dr. Alejandro Ribeiro — *Jul. 2022 – Present*

Polarization Camera for Transparent Surface Normal Estimation and Depth Reconstruction
- Proposed a polarization-based pipeline for reconstructing transparent surface depth, which incorporates a semantic segmentation module, surface normal estimation module and depth propagation module
- Devised a learning-based approach to estimate transparent surface normal through reflection and transmission intensity separation

Learning to Explore Indoor Environments using Autonomous Micro Aerial Vehicles (MAV)
- Designed an autonomous exploration system coupling learning-based map predictor and reinforcement learning-based planner
- Developed simulation environments in Gazebo for model evaluation and benchmarking against frontier-based methods
- Deployed the proposed system on customized MAV platforms and conducted extensive indoor autonomous flight experiments

SEER: Safe Efficient Exploration for Aerial Robots using Learning to Predict Information Gain
- Integrated a learning-based map predictor with information-theoretic techniques to enhance autonomous exploration efficiency
- Improved and trained a U-Net-based deep neural network for predicting 3D occupancy grids in partially explored indoor scenes
- Developed an information gain prediction mechanism that outperforms classic methods by 40% in estimation accuracy

Sensor Fusion of Depth Camera and Ultrasonic Sensor for Glass Detection
- Implemented a sensor fusion mechanism that combines depth images and ultrasonic data for glass surface mapping
- Designed a RANSAC-based approach to reconstruct glass surfaces in indoor scenarios by leveraging ultrasonic readings, depth-camera-based occupancy maps and geometric characteristics

University of Michigan — Ann Arbor, MI
Advisor: Dr. Mariel Lavieri — *Jan. 2021 - Apr. 2022*

Factors Associated with Ineligible Donor Use in the United States
- Analyzed national-level datasets containing over 2 million transplantation records and extracted 10 key factors associated with improved organ donation rates; collaborated with healthcare professionals to translate findings into potential policy changes

TEACHING EXPERIENCE

University of Pennsylvania
Teaching Assistant for Principle of Deep Learning, Learning in Robotics, Graph Neural Networks