

Lyu Qiyang

Singapore PR

✉ qiyang.lyu@outlook.com

☎ +65 8244 1243

👤 PROFILE

in LinkedIn | 🌐 qiyang-lyu.pages.dev

School of Electrical & Electronic Engineering

Nanyang Technological University

Singapore 639798

Robotics perception Ph.D. candidate at NTU building real-time spatial representations and robust robot localization from LiDAR, IMU, magnetometer, and V2X infrastructure sensing. Research spans multimodal BEV world representations, Transformer/ViT place recognition, foundation-model-enhanced feature extraction, and target-free sensor calibration. 4 first-author papers/preprints and 15+ robotics publications/preprints.

🔧 SELECTED PROJECTS

Ambient Magnetic-field Aided Mapping and Localization

NTU, Singapore

Ph.D. Research

Aug. 2022 – May. 2026

Developed a magnetic perception stack as persistent environmental spatial memory for AMRs operating where GNSS and geometric perception are degraded.

- ▶ **Efficient Magnetic Mapping:** Proposed Sliding-GPR with ROI selection and adaptive sampling, achieving $0.266\mu\text{T}$ mean error, up to 5x lower error than bilinear interpolation and 99x faster processing than full GPR.
- ▶ **Online Simultaneous Localization and Calibration:** Built target-free LiDAR-magnetometer calibration; deployed a real-time ROS node running at 100+ Hz with online localization, cutting ATE by 61% on raw readings to about 0.10m.
- ▶ **Magnetic-Aided Multimodal Localization:** Designed magnetometer-inertial-LiDAR fusion with degeneracy checks and modality weighting; achieved 100% success and 0.192m ATE with only 10m LiDAR visibility in degenerated cases.

Place Recognition in Complex Environments

NTU, Singapore

Research Associate

Aug. 2023 – Mar. 2026

Built BEV-based pipelines that convert raw LiDAR reflectivity/geometry and ambient magnetic sequences into compact spatial descriptors for infrastructure-free robot place recognition.

- ▶ **Ambient Magnetic-field Based Place Recognition (AMFPR):** Converted sequential magnetic-field observations to BEV images and reframed magnetic matching as image retrieval, reached 93.4% Recall@1.
- ▶ **Dual-input ViT-based LiDAR Place Recognition (LPR):** Fused BEV geometry and reflectivity intensity to learn global descriptors across FOV-limited and panoramic heterogeneous LiDARs.
- ▶ **Foundation-Model-Enhanced Feature Extraction:** Introduce viewpoint-invariant supervision and Vision Foundation Model fine-tuning, achieving 96%+ Recall@1.

Long-Baseline Multi-LiDAR Calibration for V2X Infrastructure

NTU, Singapore

M.Sc. Research

Aug. 2020 – Mar. 2022

Built extrinsic calibration stack for fixed roadside V2X LiDAR networks with long baselines and large viewpoint differences to support accurate multi-LiDAR scene fusion.

- ▶ **Viewpoint-Invariant Target Calibration:** Designed sphere-target LiDAR calibration with sphere segmentation and center estimation, achieving $<0.01\text{m}$ and $<0.01^\circ$ calibration error in simulation.
- ▶ **Long-Baseline Robustness Validation:** Tested non-movable Velodyne/Livox LiDAR setups in real carparks, validating calibration with up to 33.54m translation and 73.47° yaw in real Livox experiments.

🎓 EDUCATION

Nanyang Technological University

Singapore

▶ *Ph.D. in Electrical and Electronic Engineering*

Aug. 2022 – Nov. 2026 (Expected)

▶ *M.Sc. in Computer, Control and Automation*

Aug. 2020 – Oct. 2021

University of Glasgow / UESTC Joint Program

Chengdu, China

▶ *B.E. in Electronic and Information Engineering (First Class Honors)*

Sept. 2016 – Jun. 2020

✂ SKILLS

- ▶ **Engineering Stack:** PyTorch, PCL, OpenCV, Open3D, CloudCompare, ROS, Gazebo, CARLA, Git, CMake, Linux, Bash/zsh, Docker, Anaconda
- ▶ **AI/Perception:** CNN/ViT/Transformer models, BEV representation learning, feature descriptors, retrieval/place-recognition evaluation, foundation-model fine-tuning, point-cloud processing, multimodal fusion, Gaussian Process Regression, degeneracy/localizability analysis.
- ▶ **Programming:** Python, C++, MATLAB, L^AT_EX
- ▶ **Languages:** Chinese (Native), English (Fluent)

Journal Articles / Preprints

- ▶ [arXiv](#) MIL-LC: A Robust Magnetometer-Inertial-LiDAR Fusion Multimodal Localization Framework 2026
Keywords: Multimodal localization; Magnetic sensor; Degenerate environments.
Qiyang Lyu, Zhenyu Wu, Wei Wang, Hongming Shen, Danwei Wang
- ▶ [arXiv](#) RoSLAC: Robust Simultaneous Localization and Calibration of Multiple Magnetometers 2026
Keywords: LiDAR-magnetometer calibration; Localization; SLAC.
Qiyang Lyu, Zhenyu Wu, Wei Wang, Hongming Shen, Danwei Wang
- ▶ [TRO](#) UniLGL: Learning Uniform Place Recognition for FOV-limited/Panoramic LiDAR Global Localization 2026
Keywords: Global localization; Place recognition; SLAM.
Hongming Shen, Xun Chen, Yulin Hui, Zhenyu Wu, Wei Wang, **Qiyang Lyu**, Tianchen Deng, Danwei Wang
- ▶ [TIE](#) MC-Mapping: Magnetic-Aware Collaborative Mapping in Perceptually Degraded Environments 2026
Keywords: Collaborative mapping; Magnetic field; Degraded environments.
Zhenyu Wu, Wei Wang, Hongming Shen, **Qiyang Lyu**, Tianchen Deng, Guohao Peng, Huiqin Zhou, Danwei Wang
- ▶ [RAL](#) IR-MFGL: Image-Represented Magnetic Field Global Localization in Repetitive Environments 2025
Keywords: Global localization; Localization and mapping; Place recognition.
Hongming Shen, Shibo Yang, Xun Chen, Zhenyu Wu, **Qiyang Lyu**, Wei Wang, Huiqin Zhou, Danwei Wang
- ▶ [TFR](#) CTE-MLO: Continuous-Time and Efficient Multi-LiDAR Odometry with Localizability-Aware Point Cloud Sampling 2025
Keywords: Multi-LiDAR odometry; Continuous-time estimation; Point-cloud sampling.
Hongming Shen, Zhenyu Wu, Yulin Hui, Wei Wang, **Qiyang Lyu**, Tianchen Deng, Yeqing Zhu, Bailing Tian, Danwei Wang

Conference Papers

- ▶ [ITSC](#) L2M-Calib: One-key Calibration Method for LiDAR and Multiple Magnetic Sensors 2025
Keywords: LiDAR-magnetometer calibration; Magnetic sensors; Extrinsic calibration.
Qiyang Lyu, Wei Wang, Zhenyu Wu, Hongming Shen, Huiqin Zhou, Danwei Wang
- ▶ [ITSC](#) C3M: Collaborative Magnetic-Aware Map-Merging for Intelligent Vehicles in Degraded Environments 2025
Keywords: Collaborative mapping; Magnetic field; Intelligent vehicles.
Zhenyu Wu, Wei Wang, Hongming Shen, **Qiyang Lyu**, Mingxing Wen, Guohao Peng, Danwei Wang
- ▶ [IECON](#) S-GPR: Sliding Gaussian Process Regression-based Magnetic Mapping and Evaluation of Different Magnetic Mapping Methods 2024
Keywords: Magnetic mapping; Gaussian process regression; Map evaluation.
Qiyang Lyu, Zhenyu Wu, Hongming Shen, Wei Wang, Jun Zhang, Huiqin Zhou, Danwei Wang
- ▶ [IROS](#) IDF-MFL: Infrastructure-free and Drift-free Magnetic Field Localization for Mobile Robot 2024
Keywords: Magnetic localization; Drift-free localization; Mobile robots.
Hongming Shen, Zhenyu Wu, Wei Wang, **Qiyang Lyu**, Huiqin Zhou, Danwei Wang
- ▶ [ICRA](#) LB-R2R-Calib: Accurate and Robust Extrinsic Calibration of Multiple Long Baseline 4D Imaging Radars for V2X 2024
Keywords: Radar calibration; Long baseline; V2X.
Jun Zhang, Zihan Yang, Fangwei Zhang, Zhenyu Wu, Guohao Peng, Yiyao Liu, **Qiyang Lyu**, Mingxing Wen, Danwei Wang
- ▶ [IROS](#) LB-L2L-Calib 2.0: A Novel Online Extrinsic Calibration Method for Multiple Long Baseline 3D LiDARs Using Objects 2023
Keywords: Online calibration; Multi-LiDAR; Object centers.
Jun Zhang, Qiao Yan, Mingxing Wen, **Qiyang Lyu**, Guohao Peng, Zhenyu Wu, Danwei Wang
- ▶ [ITSC](#) NTU4DRadLM: 4D Radar-Centric Multi-Modal Dataset for Localization and Mapping 2023
Keywords: 4D radar; Multi-modal dataset; Localization and mapping.
Jun Zhang, Huayang Zhuge, Yiyao Liu, Guohao Peng, Zhenyu Wu, Haoyuan Zhang, **Qiyang Lyu**, Heshan Li, Chunyang Zhao, Dogan Kircali, Sanat Mharolkar, Xun Yang, Su Yi, Yuanzhe Wang, Danwei Wang
- ▶ [CIS-RAM](#) APC: Automatic Passenger Counting and Seat Occupancy Detection for Sightseeing Tram Based on 3D LiDAR and Camera 2023
Keywords: Passenger counting; Seat occupancy; 3D sensing.
Yiyao Liu, **Qiyang Lyu**, Jun Zhang, Xudong Suo, Chaoyu Hong, Lin Lin, Danwei Wang
- ▶ [ICRA](#) Global Localization in Repetitive and Ambiguous Environments 2023
Keywords: Global localization; Place recognition; Repetitive environments.
Zhenyu Wu, Wei Wang, Jun Zhang, **Qiyang Lyu**, Haoyuan Zhang, Danwei Wang
- ▶ [ICRA](#) LB-L2L-Calib: Accurate and Robust Extrinsic Calibration for Multiple 3D LiDARs with Long Baseline and Large Viewpoint Difference 2022
Keywords: Extrinsic calibration; Multi-LiDAR; Long baseline.
Jun Zhang, **Qiyang Lyu**, Guohao Peng, Zhenyu Wu, Qiao Yan, Danwei Wang