

Thien-Minh Nguyen

Room 45-503, School of MME, The University of Queensland, QLD 4072

☎ (+61) 0487719181 | ✉ thienminh.nguyen@uq.edu.au | 🏠 brytsknguyen.github.io | 🌐 brytsknguyen | 🔍 [Google Scholar](#)

Research Interests

Cooperative Autonomous Systems: Individual Autonomy to Collective Synergy

I am passionate about advancing the capabilities of autonomous robots in complex, large-scale environments by addressing two key areas. First, I explore novel methods to fuse complementary sensing modalities and distilled prior knowledge embedded in learning-based models to enable robust and intelligent perception, which I consider to be *the* fundamental prerequisite of autonomy. Second, I investigate cooperative strategies for multi-robot systems, particularly heterogeneous teams with complementary capabilities, to tackle tasks that exceed the capabilities of a single agent. These include challenging scenarios such as inspection, exploration, and manipulation, where collaboration unlocks new levels of efficiency, scalability, and resilience.

Appointments

Lecturer in Robotics

(Equivalent to *Assistant Professor*)

School of Mechanical and Mining Engineering - The University of Queensland (Dec. 2025 - Current)

Research Assistant Professor

Centre for Advanced Robotics Technology Innovation - Nanyang Technological University (May. 2023 - Nov. 2025)

Wallenberg-NTU Presidential Postdoctoral Fellow

Nanyang Technological University & KTH Royal Institute of Technology (Dec. 2020 - Feb. 2023)

Education

Nanyang Technological University

DOCTOR OF PHILOSOPHY IN ROBOTICS

- [NTU Research Scholarship](#).
- [Best Thesis Award: Ranging-Based Adaptive Navigation for Autonomous Micro Aerial Vehicles](#).

Singapore

2015 - 2020

Vietnam National University - Ho Chi Minh City University of Technology

B.ENG IN ELECTRICAL AND ELECTRONIC ENGINEERING (HONORS)

- Automation and Control Major.

Ho Chi Minh, Viet Nam

2009 - 2014

Grants, Honors and Awards

[Wallenberg-NTU Presidential Postdoctoral Fellowship PI Research Grant](#), SGD 100,000 + SEK 300,000

[Hilti SLAM Challenge, 2nd Prize](#), International Conference on Intelligent Robots and Systems (IROS), 2021

[Best Thesis, Doctorate Innovation Award](#), School of EEE, NTU 2020

[Best Paper Awards Finalist](#), International Micro Aerial Vehicles Competition and Conference (IMAV), 2016

[1st Prize in Go Green in the City Contest](#), by Schneider Electric Viet Nam, 2013

[Intel Vietnam Engineering Scholarship](#), VNU-HCMUT, 2012

Professional Activities

Guest Lecturer

Optimization-based Localization and Mapping (6-credit PhD-level Course), Division of Robotics, Perception and Learning (RPL), KTH, Autumn 2023. All lecture recordings and course materials are shared to public at [KTH Canvas](#).

Deep Reinforcement Learning Bootcamp An introduction class on deep reinforcement learning for postgraduate students at NTU, April 2025. [Lecture and Code](#).

Invited Talks

Ranging-Aided Navigation for Mobile Robots, Hangzhou Institute of Technology - Beihang University, China, 2020, invited by Associate Professor Guo Kexin.

The SLAM-craft of Aerial Robots: Theory, Practice, and Challenges, Workshop on Autonomous Unmanned Systems Technologies and Applications, 2023 Control and Decision Conference, Singapore.

Associate Editor [IEEE Robotics and Automation Letters](#)
[2025-2026 IEEE International Conference on Robotics and Automation \(ICRA\)](#)
[Unmanned Systems \(2025 - 2028\)](#)

Reviewer [Robotics: Science and Systems \(RSS 2026\)](#)
[IEEE Transactions on Robotics \(TRO\)](#)
[IEEE Robotics and Automation Letters \(RA-L\)](#)
[International Journal of Robotics Research \(IJRR\)](#)
[IEEE/ASME Transactions on Mechatronics](#)
[IEEE Robotics & Automation Magazine \(RAM\)](#)
[IEEE Transactions on Instrumentation and Measurement](#)
[IEEE Transactions on Automation Science and Engineering](#)
[IEEE Transactions on Vehicular Technology \(TVT\)](#)
[IEEE Transactions on Industrial Electronics \(TIE\)](#)
[Robotica](#)
[Robotics and Autonomous Systems](#)
[IEEE International Conference on Robotics and Automation \(ICRA\)](#)
[Conference on Neural Information Processing Systems \(NeurIPS\)](#)
[IEEE/RSJ International Conference on Intelligent Robots and Systems \(IROS\)](#)
[IEEE International Conference on Automation Science and Engineering \(CASE\)](#)
[IEEE International Conference on Intelligent Transportation Systems \(ITSC\)](#)

Organizer **Cooperative Aerial Robot Inspection Challenge (CARIC):** A benchmark based on Gazebo, RotorS and Robot Operating System to accelerate the adoption of multi-UAV systems in inspection operation. Adopted as a challenge at [CDC 2023 \(Singapore\)](#), IROS 2024 (Abu Dhabi, UAE), IROS 2025 (Hangzhou, China). The resources and latest updates are provided at [CARIC Website](#).
CVPR 2024 UG2+ UAV Tracking and Pose-Estimation Challenge: A comprehensive multi-modal perception dataset to facilitate research on early detection and tracking of potentially harmful UAVs, addressing the recent international attention on security issues related to small commercial drones. Approved to become the benchmark for [the CVPR 2024 UG2+ Track 5 Challenge](#).

Industry Collaboration Projects

Temasek Lab Aerial Drone Swarm Challenge

RESEARCH ASSISTANT PROFESSOR (MAY. 2025 - PRESENT)

A national competition focused on developing autonomous UAV swarms for disaster response in complex urban environments, organized by Temasek Lab with over 10 teams from Singapore's top universities such as NTU, NUS, STUD.

CARTIN WP1.3 Navigation in Repetitive and Dynamic Environment

RESEARCH FELLOW (MAY. 2023 - PRESENT)

A project under the logistics thrust of Centre for Advanced Robotics Technology Innovation (CARTIN), NTU.

UAV Localization and Safe Navigation Around Container Cranes During Inspection

RESEARCH FELLOW (SEP. 2019 - 2021)

A joint research program by National Research Foundation (NRF) – Singapore Technologies Engineering (STE) – Nanyang Technological University (NTU) under NRF's Corporate Lab @ University Scheme.

Drone Inspection for Building Façade

RESEARCH FELLOW (SEP. 2019 - 2021)

A joint research & development program by research institutions NTU, A*STAR and industry partners Xjera Labs, Tuv Sud Asia Pacific, MTech Imaging under the sponsorship of Singapore Building and Construction Authority (BCA).

GPS-less Localization and Path Planning for UAV Inspection of 3D Structures

PHD CANDIDATE (AUG. 2015 - APR. 2019)

- A joint research project in the area of Collaborative Teaming (C-RP10A), under NRF-STE-NTU Corporate Lab.
- Accomplished Deliveries: (a) Accurate and efficient Ultra-wideband (UWB) based localization system for UAV navigation in indoor environment; (b) Path planning strategies for 3D object inspection taking into account 5DoF camera model, safety clearance and flight time constraints.

Autonomous Vision-UWB Aided Landing UAV System

PHD CANDIDATE (AUG. 2015 - APR. 2019)

- A project in collaboration with STE Land Systems to develop an autonomous landing system for UAV in both indoor and outdoor operations using a novel combination of visual navigation and tracking with UWB-based ranging techniques.

2016 Singapore Airshow - STE-Aerospace's Unmanned System Solutions Exhibition

PHD CANDIDATE (AUG. 2015 - APR. 2019)

- A collaborative project between STE Aerospace and NTU to showcase GPS-less localization technology, where the UWB-based localization system is integrated on STE Aerospace's USTAR-Y UAV platform.

Publications (Selected)

THE FULL AND UP-TO-DATE LIST OF PUBLICATIONS AND CITATION REPORT CAN BE FOUND AT [MY GOOGLE SCHOLAR PAGE](#).

Number of citations: 1800. H-index: 25.

PREPRINTS / UNDER REVIEW

- [P1] A Third-Order Gaussian Process Trajectory Representation Framework with Closed-Form Kinematics for Continuous-Time Motion Estimation
Thien-Minh Nguyen, Ziyu Cao, Kailai Li, Tongxing Jin, Shenghai Yuan, Timothy D Barfoot, and Lihua Xie
arXiv preprint arXiv:2410.22931, 2024

JOURNAL ARTICLES

- [J1] Graph Optimality-Aware Stochastic LiDAR Bundle Adjustment with Progressive Spatial Smoothing
Jianping Li, **Thien-Minh Nguyen**, Muqing Cao, Shenghai Yuan, Tzu-Yi Hung, and Lihua Xie
IEEE Transactions on Intelligent Transportation Systems, 2024
- [J2] Tire wear aware trajectory tracking control for Multi-axle Swerve-drive Autonomous Mobile Robots
Tianxin Hu, Xinhang Xu, **Thien-Minh Nguyen**, Fen Liu, Shenghai Yuan, and Lihua Xie
Journal of Automation and Intelligence, 2025
- [J3] Cooperative Aerial Robot Inspection Challenge: A Benchmark for Heterogeneous Multi-UAV Planning and Lessons Learned
Muqing Cao, **Thien-Minh Nguyen**, Shenghai Yuan, Andreas Anastasiou, Angelos Zacharia, Savvas Papaioannou, Panayiotis Kolios, Christos G Panayiotou, Marios M Polycarpou, Xinhang Xu, Mingjie Zhang, Fei Gao, Boyu Zhou, Ben M. Chen, and Lihua Xie
IEEE Robotics and Automation Magazine (accepted, to appear), 2025
- [J4] Robust Loop Closure by Textual Cues in Challenging Environments
Tongxing Jin, **Thien-Minh Nguyen**, Xinhang Xu, Yizhuo Yang, Shenghai Yuan, Jianping Li, and Lihua Xie
IEEE Robotics and Automation Letters, 2025
- [J5] AV-FDTI: Audio-Visual Fusion for Drone Threat Identification
Yizhuo Yang, Shenghai Yuan, Jianfei Yang, Thien Hoang Nguyen, Muqing Cao, **Thien-Minh Nguyen**, Han Wang, and Lihua Xie
Journal of Automation and Intelligence, 2024
- [J6] A data-driven control method for ground locomotion on sloped terrain of a hybrid aerial-ground robot
Xinhang Xu, Yizhuo Yang, Muqing Cao, **Thien-Minh Nguyen**, Kun Cao, and Lihua Xie
Journal of Automation and Intelligence, 2024
- [J7] Eigen Is All You Need: Efficient Lidar-Inertial Continuous-Time Odometry with Internal Association
Thien-Minh Nguyen, Xinhang Xu, Tongxing Jin, Yizhuo Yang, Jianping Li, Shenghai Yuan, and Lihua Xie
IEEE Robotics and Automation Letters, 2024
- [J8] SLICT: Multi-Input Multi-Scale Surfel-Based Lidar-Inertial Continuous-Time Odometry and Mapping
Thien-Minh Nguyen, Daniel Duberg, Patric Jensfelt, Shenghai Yuan, and Lihua Xie
IEEE Robotics and Automation Letters, 2023
- [J9] NTU VIRAL: A Visual-Inertial-Ranging-Lidar Dataset, From an Aerial Vehicle Viewpoint
Thien-Minh Nguyen, Shenghai Yuan, Muqing Cao, Yang Lyu, Thien Hoang Nguyen, and Lihua Xie
The International Journal of Robotics Research, 2022
- [J10] VIRAL-Fusion: A Visual-Inertial-Ranging-Lidar Sensor Fusion Approach
Thien-Minh Nguyen, Muqing Cao, Shenghai Yuan, Yang Lyu, Thien Hoang Nguyen, and Lihua Xie
IEEE Transactions on Robotics, 2022
- [J11] MILIOM: Tightly Coupled Multi-Input Lidar-Inertia Odometry and Mapping
Thien-Minh Nguyen, Shenghai Yuan, Muqing Cao, Yang Lyu, Thien Hoang Nguyen, and Lihua Xie
IEEE Robotics and Automation Letters, 2021
- [J12] Persistently Excited Adaptive Relative Localization and Time-Varying Formation of Robot Swarms
Thien-Minh Nguyen, Zhirong Qiu, Thien Hoang Nguyen, Muqing Cao, and Lihua Xie
IEEE Transactions on Robotics, 2019
- [J13] Distance-Based Cooperative Relative Localization for Leader-Following Control of MAVs
Thien-Minh Nguyen, Zhirong Qiu, Thien Hoang Nguyen, Muqing Cao, and Lihua Xie
IEEE Robotics and Automation Letters, 2019

- [J14] Single Landmark Distance-Based Navigation
Thien-Minh Nguyen, Zhirong Qiu, Muqing Cao, Thien Hoang Nguyen, and Lihua Xie
IEEE Transactions on Control Systems Technology, 2019
- [J15] SPINS: A Structure Priors Aided Inertial Navigation System
Yang Lyu, **Thien-Minh Nguyen**, Liu Liu, Muqing Cao, Shenghai Yuan, Thien Hoang Nguyen, and Lihua Xie
Journal of Field Robotics, 2023
- [J16] Neptune: Non-Entangling Trajectory Planning for Multiple Tethered Unmanned Vehicles
Muqing Cao, Kun Cao, Shenghai Yuan, **Thien-Minh Nguyen**, and Lihua Xie
IEEE Transactions on Robotics, 2023
- [J17] Range-Focused Fusion of Camera-IMU-UWB for Accurate and Drift-reduced Localization
Thien Hoang Nguyen, **Thien-Minh Nguyen**, and Lihua Xie
IEEE Robotics and Automation Letters, 2021
- [J18] Tightly-Coupled Ultra-Wideband-Aided Monocular Visual SLAM with Degenerate Anchor Configurations
Thien Hoang Nguyen, **Thien-Minh Nguyen**, and Lihua Xie
Autonomous Robots, 2020
- [J19] Loosely-Coupled Ultra-Wideband-Aided Scale Correction for Monocular Visual Odometry
Thien Hoang Nguyen, **Thien-Minh Nguyen**, Muqing Cao, and Lihua Xie
Unmanned Systems, 2020
- [J20] Graph Optimization Approach to Range-Based Localization
Xu Fang, Chen Wang, **Thien-Minh Nguyen**, and Lihua Xie
IEEE Transactions on Systems, Man, and Cybernetics: Systems, 2020

CONFERENCE PROCEEDINGS

- [C1] ULOC: Learning to Localize in Complex Large-Scale Environments with Ultra-Wideband Ranges
Thien-Minh Nguyen, Yizhuo Yang, Tien-Dat Nguyen, Shenghai Yuan, and Lihua Xie
2025 IEEE International Conference on Robotics and Automation (ICRA), 2025
- [C2] Large-Scale UWB Anchor Calibration and One-Shot Localization Using Gaussian Process
Shenghai Yuan, Boyang Lou, **Thien-Minh Nguyen**, Pengyu Yin, Muqing Cao, Xinghang Xu, Jianping Li, Jie Xu, Siyu Chen, and Lihua Xie
2025 IEEE International Conference on Robotics and Automation (ICRA), 2025
- [C3] PSS-BA: LiDAR Bundle Adjustment with Progressive Spatial Smoothing
Jianping Li, **Thien-Minh Nguyen**, Shenghai Yuan, and Lihua Xie
2024 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2024
- [C4] I2EKF-LO: A Dual-Iteration Extended Kalman Filter Based LiDAR Odometry
Wenlu Yu, Jie Xu, Chengwei Zhao, Lijun Zhao, **Thien-Minh Nguyen**, Shenghai Yuan, Mingming Bai, and Lihua Xie
2024 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2024
- [C5] MCD: Diverse Large-Scale Multi-Campus Dataset for Robot Perception
Thien-Minh Nguyen, Shenghai Yuan, Thien Hoang Nguyen, Pengyu Yin, Haozhi Cao, Lihua Xie, Maciej Wozniak, Patric Jensfelt, Marko Thiel, Justin Ziegenbein, and Noel Blunder
Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition, 2024
Available at: URL: <https://mcdviral.github.io/>
- [C6] A Cost-Effective Cooperative Exploration and Inspection Strategy for Heterogeneous Aerial System
Xinhang Xu, Muqing Cao, Shenghai Yuan, Thien Hoang Nguyen, **Thien-Minh Nguyen**, and Lihua Xie
2024 18th IEEE International Conference on Control and Automation (ICCA), 2024
- [C7] MMAUD: A Comprehensive Multi-Modal Anti-UAV Dataset for Modern Miniature Drone Threats
Shenghai Yuan, Yizhuo Yang, Thien Hoang Nguyen, **Thien-Minh Nguyen**, Jianfei Yang, Fen Liu, Jianping Li, Han Wang, and Lihua Xie
2024 IEEE International Conference on Robotics and Automation (ICRA), 2024
- [C8] Outram: One-shot Global Localization via Triangulated Scene Graph and Global Outlier Pruning
Pengyu Yin, Haozhi Cao, **Thien-Minh Nguyen**, Shenghai Yuan, Shuyang Zhang, Kangcheng Liu, and Lihua Xie
2024 IEEE International Conference on Robotics and Automation (ICRA), 2024
- [C9] LIRO: Tightly Coupled Lidar-Inertia-Ranging Odometry
Thien-Minh Nguyen, Muqing Cao, Shenghai Yuan, Yang Lyu, Thien Hoang Nguyen, and Lihua Xie
2021 IEEE International Conference on Robotics and Automation (ICRA), 2021
- [C10] Tightly-Coupled Single-Anchor Ultra-Wideband-Aided Monocular Visual Odometry System
Thien Hoang Nguyen, **Thien-Minh Nguyen**, and Lihua Xie
2020 IEEE International Conference on Robotics and Automation (ICRA), 2020
- [C11] Integrated UWB-Vision Approach for Autonomous Docking of UAVs in GPS-denied Environments
Thien-Minh Nguyen, Thien Hoang Nguyen, Muqing Cao, Zhirong Qiu, and Lihua Xie
2019 International Conference on Robotics and Automation (ICRA), 2019
- [C12] Post-Mission Autonomous Return and Precision Landing of UAV
Thien Hoang Nguyen, Muqing Cao, **Thien-Minh Nguyen**, and Lihua Xie
2018 15th International Conference on Control, Automation, Robotics and Vision (ICARCV), 2018

- [C13] Robust Target-Relative Localization with Ultra-Wideband Ranging and Communication
Thien-Minh Nguyen, Abdul Hanif Zaini, Chen Wang, Kexin Guo, and Lihua Xie
2018 IEEE International Conference on Robotics and Automation (ICRA), 2018
- [C14] Correlation Flow: Robust Optical Flow Using Kernel Cross-Correlators
Chen Wang, Tete Ji, **Thien-Minh Nguyen**, and Lihua Xie
2018 IEEE International Conference on Robotics and Automation (ICRA), 2018
- [C15] Ultra-Wideband Aided Fast Localization and Mapping System-
Chen Wang, Handuo Zhang, **Thien-Minh Nguyen**, and Lihua Xie
2017 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2017
- [C16] An Ultra-Wideband-based Multi-UAV Localization System in GPS-denied environments
Thien-Minh Nguyen, Abdul Hanif Zaini, Kexin Guo, and Lihua Xie
International Micro Air Vehicle Competition and Conference 2016, 2016

Intellectual Properties

WO2022045982 - UAV And Localization Method For UAV

PATENT

Authors: Thien-Minh Nguyen, Lihua Xie, Shenghai Yuan, Muqing Cao.

TD 2019-007 - Autonomous Vision-UWB-Aided Landing UAV System

COPY-RIGHTED SOFTWARE

Authors: Thien-Minh Nguyen, Lihua Xie, Thien Hoang Nguyen, Muqing Cao. **Licensed by: STE - Land Systems.**

TD 2019-008 - Hardware Design For UWB-Aid Autonomous Landing UAV System

KNOW-HOW

Authors: Thien-Minh Nguyen, Lihua Xie, Thien Hoang Nguyen, Muqing Cao. **Licensed by: STE - Land Systems.**

TD 2019-246 - UAV Localization Using UWB Ranging and Onboard Sensors

COPY-RIGHTED SOFTWARE

Authors: Thien-Minh Nguyen, Lihua Xie, Thien Hoang Nguyen, Muqing Cao.

TD 2019-247 - A UWB-Based Localization System

COPY-RIGHTED SOFTWARE

Authors: Kexin Guo, Lihua Xie, Thien-Minh Nguyen.

TD 2019-248 - Model Based Path Planning Method

COPY-RIGHTED SOFTWARE

Authors: Thien-Minh Nguyen, Lihua Xie.

TD 2019-249 - Self-Localization of a UWB Network

COPY-RIGHTED SOFTWARE

Authors: Thien-Minh Nguyen, Lihua Xie.

Contacts for Reference

Dr. Xie Lihua - PhD supervisor, Wallenberg-NTU Presidential Postdoctoral Fellowship Mentor
Professor, School of Electrical & Electronic Engineering
Director for Centre for Advanced Robotics Technology Innovation (CARTIN)
Nanyang Technological University, 50 Nanyang Avenue, Singapore 639798
Tel: +65 6790 4524
Fax: +65 6793 3318.
Email: elhxie@ntu.edu.sg
Office location: S2-B2c-94, Block S2.

Dr. Patric Jensfelt - Wallenberg-NTU Presidential Postdoctoral Fellowship Mentor
Professor, Head of Division
Division of Robotics, Perception and Learning
KTH Royal Institute of Technology, Brinellvägen 8, 114 28 Stockholm, Sweden
Tel: +46 8790 6731
Email: patric@kth.se
Office location: Room 714, Lindstedtsvägen 24

Dr. Ben M. Chen - Research Collaborator
Professor, Department Chairman of Mechanical and Automation Engineering
Chinese University of Hong Kong (CUHK)
Email: bmchen@cuhk.edu.hk
Website: <https://www4.mae.cuhk.edu.hk/peoples/chen-benmei>

Dr. Yuan Shenghai - Colleague, Research Collaborator
Senior Research Fellow, Centre for Advanced Robotics Technology Innovation (CARTIN)
Nanyang Technological University, 50 Nanyang Avenue, Singapore 639798
Tel: +65 9710 8795
Email: shyuan@ntu.edu.sg
Office location: S1-B4C-14

Dr. Wang Chen - Colleague, Research Collaborator
Assistant Professor, Department of Computer Science and Engineering,
The University at Buffalo, State University of New York, 12 Capen Hall, Buffalo, New York 14260-1660
Tel: +1 716 645 0566
Email: cwx@buffalo.edu
Office location: 304 Davis Hall

Dr. Li Kailai - Research Collaborator
Assistant Professor at Department of Computer Science,
Bernoulli Institute for Mathematics, Computer Science and Artificial Intelligence
University of Groningen, The Netherlands
Email: kailai.li@rug.nl
Website: <https://www.rug.nl/staff/kailai.li>