Dr. Thien Hoang Nguyen

Postdoctoral Research Associate in Robotics and AI
Australian Centre for Robotics, The University of Sydney
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Summary

Robotics researcher specialising in autonomous navigation, perception, and decision-making for mobile robots in extreme and unstructured environments. Expert in SLAM, multi-sensor fusion, and adaptive sampling. Currently leading autonomy for Australia's first lunar rover (ELO2 Roo-ver). 24 peer-reviewed publications (16 journals, 8 conferences) in IEEE T-RO, RA-L, CVPR, and ICRA with 1,425+ citations (h-index 20). Awarded placements in international robotics challenges (ICCV 2023 SLAM 3rd place; Hilti 2021 SLAM 2nd place). Holds an international patent and a PCT application on robotic localisation and soil sensing systems.

Education

Doctor of Philosophy (Ph.D.) in Robotics 2018–2023
School of Electrical and Electronic Engineering, Nanyang Technological University (NTU), Singapore
Thesis: "Ultra-Wideband-Aided Localisation for Autonomous Robots."

Salutatorian, Bachelor of Engineering (Hons.) in Automation and Control 2012–2017
Faculty of Electrical and Electronics Engineering, Ho Chi Minh City University of Technology (HCMUT), Vietnam
Thesis: "Modelling, Analysis, and System Development of a Singlecopter."

Professional Positions

Research Associate in Planetary Robotics Feb 2026 – Present
Australian Centre for Robotics (ACFR), The University of Sydney
Research Lead, ELO2 Roo-ver Mission Leading autonomous navigation and mission operations research for Australia's first lunar rover under the Moon to Mars Initiative.

Vonwiller Postdoctoral Research Associate Feb 2024 – Feb 2026
Australian Centre for Robotics (ACFR), The University of Sydney
Lead Researcher, Integrated AgriSense Project Developed real-time soil-health analysis and adaptive sampling systems for autonomous agricultural robots. Delivered 3 Q1 journals, 1 workshop paper, 1 PCT patent. Featured on CNN Tech for Good.

Research Fellow / Project Officer Nov 2022 – Jan 2024
Centre for Advanced Robotics Technology Innovation (CARTIN), Nanyang Technological University
Lead Developer, Multi-Modality SLAM Project Led a team building a low-cost sensor-fusion solution for autonomous AGVs at Hyundai Motor Group Innovation Center Singapore (HMGICS).

Google Summer of Code Intern 2019 – 2020
ArduPilot Open-Source Project
Core Developer Implemented GPS-less navigation and object-avoidance modules using Intel RealSense cameras; integrated with ArduPilot firmware.

Project Officer 2017 – 2018
ST Engineering – NTU Corporate Laboratory
Hardware Engineer and Algorithm Developer Built mechanical and electronic systems and designed vision-UWB tracking algorithms for the "Autonomous Landing UAV System" project.

Embedded Engineer 2016 – 2017
PIFLAB Co., Ltd / MimosaTEK Smart Farming Startup

Electronics and Firmware Developer Designed Pixhawk–Jetson TX1 carrier boards and developed UAV and IoT firmware prototypes for smart-farming applications.

Selected Publications

2025 Nguyen, T.H., Muller, E., Rubin, M., Wang, X., Sibona, F., McBratney, A., Sukkarieh, S. "A Semi-Autonomous Robotic System for In Situ Soil Sampling, Analysis, and Mapping in Precision Agriculture," *IEEE Transactions on Field Robotics*, 2025. DOI: 10.1109/TFR.2025.3641874.

2025 Nguyen, T.H., Wallace, N., Harrison, N., Sukkarieh, S. "Multivariate Active Learning and Adaptive Sampling With Multi-Kernel Gaussian Processes," *IEEE Robotics and Automation Letters*, 2025. DOI: 10.1109/LRA.2025.3570127.

2025 Nguyen, T.H., Yu, H., Muller, E., Askey, S., van der Markt, M., Sukkarieh, S. "A Heterogeneous Sensing System for Soil Moisture Mapping in Agricultural Environments," *Computers and Electronics in Agriculture*, 2025. DOI: 10.1016/j.compag.2025.110932.

2024 Nguyen, T.-M., Yuan, S., Nguyen, T.H., Yin, P., Cao, H., Xie, L., Wozniak, M., Jensfelt, P., Thiel, M., Ziegenbein, J., et al. "MCD: Diverse Large-Scale Multi-Campus Dataset for Robot Perception," *Proc. IEEE/CVF Conf. on Computer Vision and Pattern Recognition (CVPR)*, 2024. DOI: 10.1109/cvpr52733.2024.02105.

2024 Yuan, S., Yang, Y., Nguyen, T.H., Nguyen, T.-M., Yang, J., Liu, F., Li, J., Wang, H., Xie, L. "MMAUD: A Comprehensive Multi-Modal Anti-UAV Dataset for Modern Miniature Drone Threats," *Proc. IEEE Int. Conf. on Robotics and Automation (ICRA)*, 2024. DOI: 10.1109/icra57147.2024.10610957.

2023 Nguyen, T.H., Xie, L. "Relative Transformation Estimation Based on Fusion of Odometry and UWB Ranging Data," *IEEE Transactions on Robotics*, 2023. DOI: 10.1109/TRO.2023.3264946.

2023 Nguyen, T.H., Yuan, S., Xie, L. "VR-SLAM: A Visual-Range Simultaneous Localization and Mapping System Using Monocular Camera and Ultra-Wideband Sensors," *arXiv preprint*, 2023. DOI: 10.48550/arXiv.2303.10903.

2022 Nguyen, T.H., Xie, L. "Estimating Odometry Scale and UWB Anchor Location Based on Semidefinite Programming Optimization," *IEEE Robotics and Automation Letters*, 2022. DOI: 10.1109/LRA.2022.3182110.

2021 Nguyen, T.H., Xie, L. "Flexible and Resource-Efficient Multi-Robot Collaborative Visual-Inertial-Range Localization," *IEEE Robotics and Automation Letters*, 2021. DOI: 10.1109/LRA.2021.3136286.

2021 Nguyen, T.-M., Cao, M., Yuan, S., Lyu, Y., Nguyen, T.H., Xie, L. "VIRAL-Fusion: A Visual-Inertial-Ranging-Lidar Sensor Fusion Approach," *IEEE Transactions on Robotics*, 2021. DOI: 10.1109/TRO.2021.3094157.

2021 Nguyen, T.-M., Yuan, S., Cao, M., Lyu, Y., Nguyen, T.H., Xie, L. "MILIOM: Tightly Coupled Multi-Input Lidar-Inertia Odometry and Mapping," *IEEE Robotics and Automation Letters*, 2021. DOI: 10.1109/LRA.2021.3080633.

2021 Nguyen, T.H., Nguyen, T.-M., Xie, L. "Range-Focused Fusion of Camera-IMU-UWB for Accurate and Drift-Reduced Localization," *IEEE Robotics and Automation Letters*, 2021. DOI: 10.1109/LRA.2021.3057838.

Projects

AI-Driven Nutrient Monitoring with Semi-Autonomous Two-Wheel Tractors for Sustainable Agriculture 2025
Aus4Innovation Round 5 Proposal

Principal Investigator Developing an AI-enabled precision agriculture system that integrates autonomous soil sampling, mobile nutrient analysis, and adaptive decision-making for sustainable farm management.

Digital FarmHand (DFH) Robotic System 2024–Present
Australian Centre for Robotics (ACFR), The University of Sydney

Lead Developer Designed and integrated a heterogeneous robotic platform comprising a mobile soil sampler, an on-site analysis lab, and a soil moisture sensing network for real-time nutrient and water mapping.

Multi-Modality SLAM System for Autonomous AGVs 2023
Centre for Advanced Robotics Technology Innovation (CARTIN), NTU Singapore

Project Lead Developed and deployed a cost-effective SLAM system integrating vision, LiDAR, and UWB sensors for autonomous guided vehicles at Hyundai Motor Group Innovation Center Singapore (HMGICS).

ArduPilot Open-Source Enhancements 2019–2020
Google Summer of Code

Core Developer Implemented GPS-denied navigation and object-avoidance modules using Intel RealSense cameras; contributions merged into the main ArduPilot firmware.

Awards & Honours

2023 **3rd Place**, ICCV SLAM Challenge — International Computer Vision Conference.

2021 **2nd Place**, Hilti SLAM Challenge — Global Robotics Competition.

2019 & 2020 **Google Summer of Code Awardee**, Open-Source Robotics (ArduPilot Project).

2016 **Best Presentation & 1st Prize**, Texas Instruments Innovation Challenge Vietnam Final.

2015 **"Best of the Best" AmCham II–VI Engineering Scholarship**, Ho Chi Minh City, Vietnam.

2015 **Promising Prize**, Texas Instruments Innovation Challenge.

Talks & Outreach

May 2025 Emerging Researcher Spotlight Talk, *ICRA 2025 Workshop on Field Robotics* (1 of 5 out of 49 papers).

Jun 2025 Co-presenter, *Quad-AI ENGAGE Workshop*, Georgia Tech.

Nov 2025 Invited speaker, *CNN Tech for Good Show*, discussing Digital Farm Hand and NPK Lab.

Oct 2025 Invited speaker, *ACFR Seminar Series*, discussing autonomous soil sampling.

Feb 2025 Presenter, *NSW Smart Sensing Network (NSSN)* Talk on AgTech robotics.

Apr 2024 Presenter, *DSI Digital Transformation Colloquium*, University of Sydney.

Service & Reviewing

Ongoing Reviewer for Journal: IEEE Robotics and Automation Letters (RA-L), Transactions on Robotics (T-RO), Transactions on Field Robotics (T-FR), Scientific Reports (SR)

Ongoing Reviewer for Conferences: IEEE ICRA and IROS.

Nov 2025 Reviewer for BARD Proposal - The US-Israel Agricultural Research & Development Fund.

Oct 2025 Reviewer for NSERC Proposal - The Natural Sciences and Engineering Research Council of Canada.

Skills

- State Estimation, Perception & SLAM, Sensor Fusion, Path Planning, Adaptive Sampling, Mechatronic Design
- C++, Python, ROS1/ROS2, MATLAB, PX4, ArduPilot
- Field Robotics, Planetary Robotics, Agricultural and Environmental Sensing

References

- Prof. Salah Sukkarieh: Professor of Robotics and Intelligent Systems, School of Aerospace, Mechanical & Mechatronic Engineering, University of Sydney. Email: salah.sukkarieh@sydney.edu.au

- Prof. Lihua Xie: Professor, School of Electrical & Electronic Engineering, Nanyang Technological University (NTU), Singapore; Director, Centre for Advanced Robotics Technology Innovation (CARTIN). Email: elhxie@ntu.edu.sg
- Dr. Thien-Minh Nguyen: Lecturer in Robotics - The University of Queensland, Australia. Email: thienminh.npn@ieee.org
- Dr. Shenghai Yuan: Researcher, multi-modal robotics datasets and perception systems. Email: shyuan@ntu.edu.sg