Thanh Nguyen Canh

thanhnc@jaist.ac.jp | https://thanhnguyencanh.github.io | GitHub | Google Scholar | LinkedIn

Research Interests

Simultaneous Localization and Mapping (SLAM), Semantic SLAM, Active SLAM, Lifelong SLAM, Probabilistic Learning, Continual Learning, Robot Perception, Environment Representation, Motion Planning, Human-Robot Interaction, Multisensor Fusion and Control, UAVs.

Education

Japan Advanced Institute of Science and Technology — October 2027 - expected
Ph. D. in Information Science, Ishikawa, Japan — *Current GPA: 0.00/3.0*

Japan Advanced Institute of Science and Technology — September 2024
M.S. in Information Science, Ishikawa, Japan — *GPA: 2.84/3.0, Thesis Score: 100/100*

VNU-University of Engineering and Technology — September 2022
B.S.Eng in Robotics Engineering, Hanoi, Vietnam — *GPA: 3.67/4.0 (Top 1%), Thesis Score: 9.7/10*

Experience

Research Assistant | *School of Information Science Japan Advanced Institute of Science and Technology* — 2023 – present
Advisor: Prof. Nak Young Chong, School of Information Science
Working on semantic simultaneous localization and mapping for UAVs (ROS, C++, Python, PyTorch, UAVs)

Lecturer Assistant | *VNU-University of Engineering and Technology* — 2022 – Present
Working on slides, lectures, tutorial preparation

Research Assistant | *Department of Robotics Engineering, VNU-University of Engineering and Technology* — 2019 – 2023
Advisor: Prof. Xiem HoangVan, Department of Robotics Engineering
Working on simultaneous localization and mapping, obstacle avoidance, navigation, calibration, etc. for robotics (ROS, C++, Python, PyTorch, TensorFlow, mobile robot, dual-arm)

Projects

Delibot | *C++/Python, ROS, MoveIt/Gazebo, Dual-arm service robot, ground robot* — 2020 – 2022

- Optimal design and fabrication of frame structure for dual-arm service robot. *Papers: [J1]*
- 3D localization using 2D estimates for Robot Vision system *Papers: [P2]*
- Obstacle avoidance using multi-sensor fusion. *Papers: [C4]*

Semantic SLAM | *Python/C++, ROS, UAVs* — 2022 – Present

- Real-time Semantic-Aware Simultaneous Localization and Mapping system for Unmanned Aerial Vehicles. *Papers: [C1] [C2]*
- Improve localization quality based on data association method *Papers: [P1, P2]*

Publications

Preprints

[P1] **T. N. Canh,** N. Y. Chong, *"Bayesian Probabilistic Data Association via Gaussian Mixture Models for Semantic SLAM"*, IEEE Robotics and Automation Letters (RA-L), 2024 [website][code]

[P2] **T. N. Canh**, D. T. Ngoc, X. HoangVan, *"M-Calib: A Monocular 3D Object Localization using 2D Estimates for Industrial Robot Vision System"*, Machine Vision and Application, 2024 (accepted) [website][code]

[P3] **T. N. Canh**, A. P. Tuan, X. HoangVan, *"Design of Deep Reinforcement Learning Approach for Traffic Signal Control at Three-way Crossroads"*, Public Transport, 2024 (under review) [website][code]

[P4] **T. N. Canh,** N. Y. Chong, *"Semantic Visual Simultaneous Localization and Mapping: A Survey on State of the Art, Challenges and Future Directions"*, IEEE Transactions on Robotics, 2024 [website][code]

[P5] **T. N. Canh,** D. M. Bui, X. HoangVan, *"A tiny PCB Defect Detection approach with Diffusion and High-Quality Network"*, IEEE Transactions on Industrial Informatics, 2024 [website][code]

Journals

[J1] **T. N. Canh,** S. T. Duc, H. N.The, T. H. Dao, X. HoangVan, *"Optimal Design and Fabrication of Frame Structure for Dual-Arm Service Robots: An Effective Approach for Human-Robot Interaction"*, Engineering Science and Technology, an International Journal (JESTECH), 2024 [website][code]

Conferences

[C1] **T. N. Canh**, H.-H. Ngo, X. HoangVan, N. Y. Chong, *"Toward Integrating Semantic-aware Path Planning and Reliable Localization for UAV Operations"*, The 24th International Conference on Control, Automation and Systems (ICCAS), 2024 [website][code]

[C2] **T. N. Canh**, X. HoangVan, N. Y. Chong, *"Enhancing Social Robot Navigation with Integrated Motion Prediction and Trajectory Planning in Dynamic Human Environments "*, The 24th International Conference on Control, Automation and Systems (ICCAS), 2024 [website][code]

[C3] **T. N. Canh**, M. DoNgoc, T. N. Quang and H. B. Thanh, X. HoangVan, *"Underwater Image Enhancement for Depth Estimation via Various Image Processing Techniques"*, 2024 International Conference on System Science and Engineering (ICSSE), 2024 [website][code]

[C4] M. D. Duc, **T. N. Canh**, M. DoNgoc, X. HoangVan, *"Fusion LiDAR-Inertial-Encoder data for High-Accuracy SLAM"*, 2024 International Conference on Mechatronic, Automobile, and Environment Engineering (ICMAEE), 2024 [website][code]

[C5] **T. N. Canh**, V. Nguyen, X. HoangVan, A. Elibol, N. Y. Chong, *"S3M: Semantic Segmentation Sparse Mapping for UAVs with RGB-D Camera"*, IEEE/SICE International Symposium on System Integration (SII), 2024 [website][code]

[C6] **T. N. Canh**, A. Elibol, N. Y. Chong, X. HoangVan, *"Object-Oriented Semantic Mapping for Reliable UAVs Navigation"*, IEEE International Conference on Control, Automation and Information Sciences (ICCAIS), 2023 [website] [code]

[C7] **T. N. Canh**, X. HoangVan, *"Machine Learning-Based Malicious Vehicle Detection for Security Threats and Attacks in Vehicle Ad-hoc Network (VANET) Communications"*, IEEE International Conference on Research, Innovation and Vision for the Future, 2023 [website][code]

[C8] **T. N. Canh**, T. S. Nguyen, C. H. Quach, X. HoangVan, M. D. Phung, *"Multisensor Data Fusion for Reliable Obstacle Avoidance"*, IEEE International Conference on Control, Automation and Information Sciences (ICCAIS), 2022 [website][code]

Technical Skills

Programming: C++/Python/Matlab, HTML/CSS, LaTeX
Operating Systems: Linux, ROS
Libraries and Toolbox: Pytorch, Pybullet, Gazebo/Habitat/iGibson/Unity/Rviz
Robot Platform: Dual-arm services robot, Turtlebot3, PX4 Quadrotors

Honors and Awards

RIVF Best paper award, IEEE International Conference on Research, Innovation and Vision for the Future 2023

VinIF Scholarship for Master Programmer, Vingroup Innovation Foundation 2023

Instruction students to win Second place, Students Research Competition
VNU-University of Engineering and Technology 2023

Best Student Thesis Award, VNU-University of Engineering and Technology 2022

REV-ECIT Best paper award, Radio and Electronics Association of Vietnam 2022

First place, Students Research Competition, VNU-University of Engineering and Technology 2021

Teaching Experience

Teaching Assistant, Fundamentals of Programming, Japan Advanced Institute of Engineering and Technology 2024

Teaching Assistant, Programming robot with ROS, VNU-University of Engineering and Technology 2023

Teaching Assistant, Introduction to Human Machine Interface, VNU-University of Engineering and Technology 2023

Teaching Assistant, Robotic Control, VNU-University of Engineering and Technology 2023

Teaching Assistant, Mechanical Drawing, VNU-University of Engineering and Technology 2023

Teaching Assistant, Electronics Engineering Practice, VNU-University of Engineering and Technology 2023

Teaching Assistant, PLC and Its Application in Agriculture, VNU-University of Engineering and Technology 2023

Leadership and Mentoring

Master students:

- Hoang Ngo Huy (VNU-UET) 2024-present

Undergraduate students:

- Manh Do Duc (VNU-UET) 2022-present
- Dang Minh Bui(VNU-UET) 2024-present
- Tuan Thanh Nguyen (VNU-UET) 2024-present
- Hoang Ngo Huy (VNU-UET) 2022-2024
- Quan Nguyen (VNU-UET) 2022-2024
- Kien Hoang (VNU-UET) 2022-2024

Professional Memberships

References

- Dr. Nak Young Chong, Ph.D. (Ph.D. Supervisor)
  Professor, School of Information Science, Japan Advanced Institute of Science and Technology, Japan.
  Director of the JAIST Robotics Laboratory
  Co-founder and CEO of CURA Robotics and AI
  Email: nakyoung@jaist.ac.jp; Phone: (+81)761(51)1248

- Dr. Xiem HoangVan, Ph.D (Undergraduate Supervisor)
  Professor, University of Engineering and Technology, Vietnam National University, Vietnam.
  Head of Robotics Engineering Department
  Email: xiemhoang@vnu.edu.vn; Phone: (+84)383767713