Junwoon Lee

Website: https://junwoonlee.github.io
Email: leejunwoon@robot.t.u-tokyo.ac.jp

RESEARCH INTEREST

- **Mapping** : Semantic SLAM, Learned Map Representation, Multi-Agent
- **Navigation** : Risk-Aware, Uncertainty-Aware, Active SLAM

EDUCATION

The University of Tokyo *Apr. 2023 – Mar. 2025*
M.E.S. Student in Human & Engineered Environmental Studies
- Thesis: Switching-based Multi-modal SLAM for Extreme and Degraded Environments (Dean's Award)

Osaka University *Apr. 2017 – Mar. 2023*
B.E. in Mechanical Engineering (Military Service included)
- Thesis: LiDAR-visual SLAM for Online Mapping of Unpaved Road Surface

PUBLICATIONS

[1] **Accurate and Rapid Reduction of Spherical Image Distortion for Feature-Based Pose Estimation**
Taisei Ando, Junwoon Lee, Mitsuru Shinozaki, Toshihiro Kitajima, Qi An, Atsushi Yamashita
International Journal of Automation Technology, 2025. (Accepted)

[2] **Self-TIO: Thermal-Inertial Odometry via Self-supervised 16-bit Feature Extractor and Tracker**
Junwoon Lee, Taisei Ando, Mitsuru Shinozaki, Toshihiro Kitajima, Qi An, Atsushi Yamashita
IEEE Robotics and Automation Letters (RA-L), 2025. Will presented at IROS'25. [Link]

[3] **TC-LTIO: Tightly-coupled LiDAR Thermal Inertial Odometry for LiDAR and Visual Odometry Degraded Environments**
Junwoon Lee, Taisei Ando, Mitsuru Shinozaki, Toshihiro Kitajima, Qi An, Atsushi Yamashita
International Conference on Control, Automation and Systems (ICCAS), 2024. [Link] (Best Paper Award)

[4] **Highly Accurate and Fast Two-view Pose Estimation by Fast Reduction of Spherical Image Distortion Effects**
Taisei Ando, Junwoon Lee, Mitsuru Shinozaki, Toshihiro Kitajima, Qi An, Atsushi Yamashita
International Conference on Control, Automation and Systems (ICCAS), 2024. [Link]

[5] **Switch-SLAM: Switching-Based LiDAR-Inertial-Visual SLAM for Degenerate Environments**
Junwoon Lee, Ren Komatsu, Mitsuru Shinozaki, Toshihiro Kitajima, Hajime Asama, Qi An, Atsushi Yamashita
IEEE Robotics and Automation Letters (RA-L), 2024. Presented at ICRA@40. [Link]

[6] **Three-dimensionalized Feature-Based LiDAR-visual Odometry for Online Mapping of Unpaved Road Surface**
Junwoon Lee, Masamitsu Kurisu, Kazuya Kuriyama
Journal of Field Robotics, 2024. [Link]

HONORS AND AWARDS

Dean's Award *Mar. 2025*
- Top academic achievement in the department during the master's program

Best Paper Award *Oct. 2024*
- Top 1 of 400 submitted papers, ICCAS'24 (0.25%)

IEEE RAS Travel Grant *Sep. 2024*
- Travel support for ICRA@40, $2,000 USD

Rotary Yoneyama Memorial Foundation Scholarship *Apr. 2023 – Mar. 2025*
- Full scholarship for academic excellence, $30,000+ USD

Korea-Japan Joint Government Scholarship *Apr. 2017 – Mar. 2023*
- Government-sponsored full scholarship, $75,000+ USD

RESEARCH EXPERIENCE

Research Assistant, The University of Tokyo *Apr. 2023 – Mar. 2025*
Real World Robot Informatics Lab.
- Developed a multi-modal SLAM system for complex scenes [3, 5].
- Developed a self-supervised point tracker for thermal inertial odometry [2, 3].

Research Assistant, Osaka University *Apr. 2022 – Mar. 2023*
Komatsu MIRAI Construction Equipment Cooperative Research Center
- Suggested an intensity-weighted point cloud registration [6].
- Developed a mapping system for an unpaved road surface.

PATENT

1. Kaoru Adachi, Masamitsu Kurisu, Junwoon Lee, "Terrain Detection System and Method," *Japanese Patent app:2023-105215 / open:2025-005158*, Filed on June 27, 2023.

SERVICES

Academic Reviewer *2024 –*
- IEEE RA-L (2024), IEEE T-ASE (2024), IEEE Sensors Journal (2024), ICRA (2025), ICCAS (2024)

Special Lecturer, Rotary International *Apr. 2023 – Mar. 2025*
- Lectured on the introduction to mobile robotics and artificial intelligence

Sergeant, Republic of Korea Army *Apr. 2020 – Oct. 2021*
- Served as a frontline guardian at a coastline observation post in the 23rd Security Brigade

SKILLS

Research Skills
- Program Languages : C/C++, Python
- Professional : ROS1, ROS2, GTSAM, Ceres Solver, OpenCV, PyTorch, TensorRT
- Etc. : Git, Docker, Open3D, OpenMP, SolidWorks, Blender, LaTeX

Languages
- English (Professional)
- Japanese (Professional)
- Korean (Native)

REFERENCES

Dr. Atsushi Yamashita
Professor, The University of Tokyo
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Dr. Qi An
Associate Professor, The University of Tokyo
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Dr. Ren Komatsu
Engineer, Mujin, Inc. (Former Professor in UTokyo)
komatsu@robot.t.u-tokyo.ac.jp

Dr. Kazuya Kuriyama
Project Professor, Osaka University
kazuya_kuriyama@global.komatsu