

RESEARCH INTEREST

SLAM, Perception, Navigation, Exploration, Field Robotics

EDUCATION

The University of Tokyo

April, 2023 - March, 2025 (expected)

M.E.S. Student in Human & Engineered Environmental Studies (expected)

- Thesis: Switching-based Multi-modal SLAM for Extreme and Degraded Environments
- Focus: Localization and mapping robust in sensor degeneration

Osaka University

April, 2017 - March, 2023

B.E. in Mechanical Engineering

- Thesis: LiDAR-visual SLAM for Online Mapping of Unpaved Road Surface
- Focus: 3D mapping for unpaved road surface using lidar-visual sensor fusion.

PUBLICATIONS

Journal Papers

- [1] **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]
- [2] **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]

Conference Papers

- [1] **TC-LTIO: Tightly-coupled LiDAR Thermal Inertial Odometry for LiDAR and Visual Odometry Degraded Environments - Best Paper Award Finalists**
[Junwoon Lee](#), Taisei Ando, Mitsuru Shinozaki, Toshihiro Kitajima, Qi An, Atsushi Yamashita
International Conference on Control, Automation and Systems (ICCAS), 2024.
- [2] **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.

Under Review

- [1] **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)
- [2] **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

RESEARCH EXPERIENCE

Research Assistant, University of Tokyo

April, 2023 - Present

Real World Robot Informatics Lab.

- Focus: Localization and mapping using multi-modal sensor fusion (LiDAR, visual camera, thermal camera, IMU)
- Developing multi-modal based SLAM systems robust to sensor degeneration.
- Collaborating with Kubota Corporation to develop autonomous farm tractors.
- Advisor: Prof. Atsushi Yamashita, Prof. Hajime Asama, Prof. Qi An, Prof. Ren Komatsu

Research Assistant, Osaka University

April, 2022 - March, 2023

Komatsu MIRAI Construction Equipment Cooperative Research Center

- Focus: 3D mapping system for automated maintenance of unpaved roads in mining sites
- Developed an unpaved road surface mapping system using a novel tightly-coupled LiDAR-visual odometry.
- Collaborated with Komatsu Ltd. to develop an autonomous road maintenance system in mining sites.
- Advisor: Prof. Masamitsu Kurisu[†], Prof. Kazuya Kuriyama

HONORS AND AWARDS

Best Paper Award Finalists

October, 2024

- Top 5 papers out of 400 submitted to ICCAS 2024 (1.25%).

IEEE RAS Travel Grant

September, 2024

- Travel support awarded for participation in ICRA@40.

Rotary Yoneyama Memorial Foundation Scholarship

April, 2023 - March, 2025

- Full scholarship for academic achievement and excellent records.

Korea-Japan Joint Government Scholarship

April, 2017 - March, 2023

- Government-sponsored full scholarship with living stipend and full tuition waiver.

SKILLS

Research Skills

- Program Languages : C/C++, Python, MATLAB
- Computer Vision : OpenCV, Open3D, PCL
- SLAM/Optimization : GTSAM, Ceres Solver, g2o
- Deep Learning : PyTorch, TensorRT, LibTorch, Keras, TensorFlow
- Other : ROS, Git, LaTeX, Arduino, Raspberry Pi, 3D CAD, Blender

Languages

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

PATENT

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

TEACHING

Teaching Assistant, UTokyo FEN-SC3102S1 Exercises for Mathematics 2C

April, 2024 - July, 2024

SERVICES

Academic Reviewer: RA-L, ICCAS

2024

Special Lecturer, Rotary Club of Funabashi-West/East

April, 2023 - March, 2025

- Lectured on the introduction to mobile robotics and artificial intelligence

Sergeant, Republic of Korea Army

April, 2020 - October, 2021

- Served as a frontline guardian at a coastline observation post in the 23rd Security Brigade

REFERENCES

Ph.D. Atsushi Yamashita

Professor, The University of Tokyo
yamashita@robot.t.u-toyko.ac.jp

Ph.D. Qi An

Associate Professor, The University of Tokyo
anqi@robot.t.u-toyko.ac.jp

Ph.D. Ren Komatsu

Computer Vision Engineer, Mujin, Inc.
komatsu@robot.t.u-tokyo.ac.jp

Ph.D. Kazuya Kuriyama

Professor, Osaka University
kazuya_kuriyama@global.komatsu