

JUNWOON LEE

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REASEARCH INTEREST

Mobile robotics, SLAM, Path planning, Exploration, Computer vision, Field robotics

EDUCATION

University of Tokyo

April, 2023 - March, 2025 (expected)

M.E.S. Student in Human & Engineered Environmental Studies

- Thesis: Switching-based Multi-modal SLAM for Extreme and Degraded Environments (expected)
- Advisor: Prof. Atsushi Yamashita
- 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
- Advisor: Prof. Masamitsu Kurisu[†]
- Focus: 3D mapping for unpaved road surface, LiDAR-visual SLAM, Field robotics

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 (JFR), 2024. [Link]

Conference Papers

- [1] **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.
- [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 (IJAT) (in prep.)

REASEARCH EXPERIENCE

Reasearch Assistant, University of Tokyo

April, 2023 - Present

Real World Robot Informatics Lab.

- Focus: LiDAR-visual / Thermal / Learning-based localization and mapping
- Developing multi-modal based SLAM systems robust to sensor degeneration.

- Published a paper in RA-L on LiDAR-visual-inertial SLAM for sensor degenerate environments.
- Advisor: Prof. Atsushi Yamashita, Associate Prof. Qi An, Assistant Prof. Ren Komatsu, and Prof. Hajime Asama

Research Assistant, Osaka University

April, 2022 - March, 2023

Komatsu MIRAI Construction Equipment Cooperative Research Center

- Focus: 3D Mapping system for automated maintenance of unpaved road in mining sites
- Developed a unpaved road surface mapping system using a novel tightly-coupled LiDAR-visual odometry.
- Published a paper in JFR and a Japanese patent on road surface mapping system.
- Advisor: Project Prof. Masamitsu Kurisu[†]

HONORS AND AWARDS

IEEE RAS Travel Grant

September, 2024

- Travel support 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, living stipend and full tuition fee 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

Reviewer Services: RA-L, ICCAS

Special Lecturer, Rotary Club of Funabashi-West/East

April, 2023 - March, 2025

- Lectured about introduction to mobile robotics and artificial intelligence

Sergeant, Republic of Korea Army

April, 2020 - October, 2021

- Frontline guardian on coastline observation post in the 23rd Security Brigade

REFERENCES

Ph.D. Atsushi Yamashita

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Ph.D. Qi An

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Ph.D. Ren Komatsu

Computer Vision Engineer, Mujin, Inc.
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Ph.D. Kazuya Kuriyama

Professor, Osaka University
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