

JUNWOON LEE

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RESEARCH 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: Project 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. (Under review)
- [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)

RESEARCH EXPERIENCE

Research Assistant, University of Tokyo

April, 2023 - Present

Real World Robot Informatics Lab.

- Focus: LiDAR-visual / Thermal / Learning-based localization and mapping
- Developed LiDAR-visual-Inertial SLAM robust to sensor degeneration.
- Developing Thermal-Inertial SLAM robust to dark, dusty, and foggy environments.
- Published a paper in RA-L on LiDAR-visual SLAM for each 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

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
- Optimization : GTSAM, Ceres Solver, g2o
- Deep Learning : PyTorch, TensorRT, LibTorch, Keras, TensorFlow
- Other : ROS, Git, LaTeX, Arduino, Raspberry Pi, 3D CAD

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

Special Lecturer, Sungkyunkwan University Trading Club

April, 2020

- Lectured about introduction to Python for automated trading system

REFERENCES

Ph.D. Atsushi Yamashita

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Ph.D. Qi An

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Ph.D. Ren Komatsu

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