JUNWOON LEE

leejunwoon@robot.t.u-tokyo.ac.jp

REASEARCH INTEREST

Mobile robotics, Field robotics, 3-D Mapping, SLAM, Path planning, Exploration, Computer Vision

EDUCATION

University of Tokyo *April, 2023 - March, 2025* (expected)
M.E.S. Student in Human & Engineered Environmental Studies
- Advisor: Prof. Atsushi Yamashita
- Focus: SLAM robust in LiDAR/visual degeneration, Field Robotics

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, SLAM, Field Robotics

PUBLICATIONS

Journal Papers

[1] J.Lee, R.Komatsu, M.Shinozaki, T.Kitajima, H.Asama, Q.An, A.Yamashita. "Switch-SLAM: Switching-based LiDAR-Inertial-Visual SLAM for Degenerate Environments," *IEEE Robotics and Automation Letters (RA-L)*. (accepted)
[2] J.Lee, M.Kurisu, K.Kuriyama. "Three-dimensionalized feature based LiDAR-visual SLAM for online mapping of unpaved road surface," *Journal of Field Robotics*, (DOI: 10.1002/rob.22334) (2024).

Conference Papers

[1] J.Lee, T.Ando, M.Shinozaki, T.Kitajima, Q.An, A.Yamashita. "TC-LTIO: Tightly-coupled LiDAR Thermal Inertial Odometry for LiDAR and Visual Odometry Degraded Environments," in *24th International Conference on Control, Automation and Systems (ICCAS2024)*, Jeju, Seoul, 2024. (under review)
[2] T.Ando, J.Lee, M.Shinozaki, T.Kitajima, Q.An, A.Yamashita. "Highly Accurate and Fast Two-view Pose Estimation between Two Viewpoints by Fast Reduction of Spherical Image Distortion Effects," in *24th International Conference on Control, Automation and Systems (ICCAS2024)*, Jeju, Seoul, 2024. (under review)
[3] T.Ando, R.Komatsu, J.Lee, M.Shinozaki, T.Kitajima, H.Asama, Q.An, A.Yamashita. "Mutual Nearest Neighbor Matching Using Adaptive Threshold for Two-View Pose Estimation with Spherical Images," in *2024 JSPE Spring Meeting*, Tokyo, Japan, 2024. (in Japanese)
[4] T.Ando, R.Komatsu, J.Lee, M.Shinozaki, T.Kitajima, H.Asama, Q.An, A.Yamashita. "Improving Two-View Pose Estimation for Spherical Images Using Adaptive Threshold Mutual Nearest Neighbor Matching," in *SICE SI2023*, Nigata, Japan, 2023. (in Japanese)

Patent

[1] K. Adachi, M.Kurisu, J.Lee. "Terrain detection system and method", Japanese Patent 2023-105215, Filed on June 27, 2023. (in Japanese)

REASEARCH EXPERIENCE

Reasearch Assistant, University of Tokyo *April, 2023* - Present
Real World Robot Informatics Lab.
- Focus: SLAM for autonomous farm tractor, LiDAR-visual·Thermal·Learning-based localization
- Developing LiDAR-visual-Inertial SLAM for robust to each sensor degenerate situations.
- Developing Thermal-Inertial SLAM for robust to dark, dusty, or foggy environments.
- Submitted a paper in RA-L on LiDAR-visual SLAM for each sensor degenerate environments.
- Published two domestic conference papers on robust feature matching for spherical image pairs.
- Working with Kubota Corporation for developing autonomous farm tractor.

- Advisor: Prof. Atsushi Yamashita, Associate Prof. Qi An, Assistant Prof. Ren Komatsu, and Prof. Hajime Asama

Reasearch 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 LiDAR-visual odometry.
- Published a paper in JFR and a Japanese patent on surface mapping system.
- Worked with Komatsu Ltd. for developing autonomous road maintenance system in mining sites.
- Advisor: Project Prof. Masamitsu Kurisu[†]

HONORS AND AWARDS

Rotary Yoneyama Memorial Foundation Scholarship *April, 2023 - March, 2025*
- Full scholarship of JPY 140,000 per month.

Korea-Japan Joint Government Scholarship Program *April, 2017 - March, 2023*
- Full scholarship of JPY 120,000 per month and full tuition fee waiver.

SKILLS

Reasearch Skills
- Program Languages : C/C++, Python, MATLAB
- Libraries : GTSAM, Ceres Solver, OpenCV, Open3D, PCL
- Frameworks : ROS, Git, PyTorch, Keras, TensorFlow, LibTorch, TensorRT, Kalibr, LaTeX
- Sensors : Pinhole/Fisheye/Omnidirectional/Thermal Camera, LiDAR, IMU, RTK-GNSS
- Others : Mobile Robots (Clearpath Jackal, Unitree Go1), Arduino, Rasberry Pi, 3D CAD

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

SERVICES

Special Lecturer, Rotary Club of Funabashi-West/East *October, 2023 & February, 2024*
- Delivered a presentation entitled "The Present and Future of Mobile Robot"

Military Service at Republic of Korea Army *April, 2020 - October, 2021*
- Frontline guardian on coastline observation post in the 23rd Security Brigade
- Dischared from full military service as a ROK Army Sergeant

Special Lecturer at Sungkyunkwan University Trading Club *April, 2020*
- Lectured about introduction to Python for automated trading system

REFERENCES