SEOKJU LEE

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Education

Korea Advanced Institute of Science and Technology (KAIST) 2025.03 - (in progress)
- Ph.D Candidate, Mechanical Engineering
- Mechatronics, Systems and Control Lab (Advisor: Kyung-Soo Kim)

Korea Advanced Institute of Science and Technology (KAIST) 2023.03 - 2025.02
- Master's Degree, Mechanical Engineering
- Mechatronics, Systems and Control Lab (Advisor: Kyung-Soo Kim)
- M.S. Thesis: Slip-Compensated Legged Robot State Estimation Using Latent Space Attention Mechanisms

Ulsan National Institute of Science and Technology (UNIST) 2020.03 - 2023.02
- Bachelor's Degree, Electrical Engineering (Graduate Representative, Early Graduation)
- Total GPA: 4.07/4.30 Major GPA: 4.13/4.30

Chung-Buk Science High School 2017.02 - 2020.02

Research Interests

I am deeply passionate about the intersection of legged robotics and reinforcement learning, with a particular focus on advancing the capabilities of legged robots in mapping and navigation tasks through the utilization of deep neural networks. My primary research thrust revolves around the development of fully autonomous driving systems tailored for legged robots. Within this domain, I am committed to exploring innovative methodologies that leverage deep learning techniques to empower legged robots with the ability to autonomously navigate diverse and dynamic environments. Moreover, I am actively engaged in sub-research endeavors aimed at enhancing state estimation and mapping capabilities for legged robots. One notable facet of my work involves investigating novel approaches that harness contact information from legged robots, obviating the necessity for traditional exteroception sensors. By leveraging neural networks and advanced surface estimation techniques, I seek to redefine the boundaries of autonomous navigation for legged robotic systems. My research endeavors reflect a steadfast commitment to pushing the boundaries of legged robotics, with a keen emphasis on the development of robust, efficient, and adaptive navigation frameworks that can seamlessly operate in real-world scenarios.

Honors, Awards, and Scholarships

- Summa Cum Laude, UNIST Feb.2023
- UNIST Best Students Awards (Minister of Science and ICT Award) Feb.2023
- Presidental Science Scholarship Jun.2022
- Social Venture Contest LG Sponsorship Award Sep.2020
- Daejeon Design Thinking Hackathon 1st Award (Minister of Environment Award) Jul.2019

Publications

1. **Seokju Lee**, Hyun-Bin Kim, and Kyung-Soo Kim. Legged Robot State Estimation Using Invariant Neural-Augmented Kalman Filter with a Neural Compensator. *arXiv preprint arXiv:2503.00344*, 2025. (Accepted, 2025 IEEE International Conference on Intelligent Robots and Systems (IROS))
2. Hyun-Bin Kim, **Seokju Lee**, Byeong-Il Ham, Keun Ha Choi, and Kyung-Soo Kim. Temperature Compensation Method of Six-Axis Force/Torque Sensor Using Gated Recurrent Unit. *IEEE Sensors Journal*, 2025.
3. Yunji Jung, **Seokju Lee**, Tair Djanibekov, Jong Chul Ye, and Hyunjung Shim. Text Optimization with Latent Inversion for Non-Rigid Editing. *Pattern Recognition Letters*, 2025.
4. **Seokju Lee**, Seunghun Jeon, and Jemin Hwangbo. Learning Legged Mobile Manipulation Using Reinforcement Learning. In *International Conference on Robot Intelligence Technology and Applications.* pages 310-317. Cham: Springer International Publishing, 2022.

Internship

Korea Advanced Institute of Science and Technology (KAIST) Daejeon, South Korea

– Robotics and Artificial Intelligence Lab (Advisor: Prof. Jemin Hwangbo) Jun.2022 - Aug.2022
  – Learning legged mobile manipulation using reinforcement learning

Ulsan National Institute of Science and Technology (UNIST) Ulsan, South Korea

– Robotics and Mobility Lab (Advisor: Prof. Jeonghwan Jeon) Dec.2021 - Nov.2022
  – Develop the 6-dof robot arm and Ball on Beam System to understand PID control and robot kinematics
  – Comparison between LQR and DQN for Cartpole
  – Develop the Autonomous Platform to deliver service using sensor fusing

Experience and Leadership

Aalto University Espoo, Finland

– Exchange Student Jan.2022 - Feb.2022
  – Studying Big Data, Machine Learning

Ulsan National Institute of Science and Technology (UNIST) Ulsan, South Korea

– AI Graduate School Creative Self-Challenge Contest May.2021 - Feb.2022
  – Team Leader; Lead 3D Modeling and Control Research for controlling the drone
– Brain To Society Contest Mar.2022 - Nov.2022
  – Autonomous driving technology for non-face-to-face delivery
– Calculus I, II Teaching Assistant Sep.2021 - Jun.2022
  – Grading quizzes, Replying to the questions of students
– General Physics I Tutor Apr.2021 - Jun.2021
  – General physics-related conceptual descriptions and problem-solving for freshmen

Korea Water Resources Corporation Scholarship Association Danyang, South Korea

– Mentoring Activity Mentor Apr.2021 - Nov.2021
  – Academic and Career Mentoring

Projects

1. Ultra-high Efficiency Surveillance Reconnaissance Autonomous Flying Robot based on Structural Battery, Agency for Defense Development (ADD).
2. Mutually linked modular waist, shoulder, and knee muscle assist Exosuit technology, Korea Institute of Robotics and Technology Convergence (KIRO).

Professional Services

- ICRA Reviewer (24', 25')
- IROS Reviewer (25')

Languages

- Korean: Native
- English: Intermediate(Reading, Writing); Basic(Speaking, Listening)

Programming Skills

- Python, C, C++, MATLAB, ROS