

E-In Son

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RESEARCH INTERESTS

My research focuses on learning-based autonomous navigation, with particular interest in visual navigation, traversability estimation, and representation learning. Building on earlier work in unstructured, off-road environments, I am extending toward more general navigation and robotics, including embodied agents such as world models and vision-language-action models.

EDUCATION

Seoul National University **Mar 2021 – Present**
Ph.D. Student, Dept. of Electrical & Computer Engineering *Seoul, Korea*
Vehicle Intelligence Laboratory. (Advisor: Prof. Seung-Woo Seo)

Konkuk University **Mar 2015 – Feb 2021**
B.S., Electrical & Electronics Engineering *Seoul, Korea*
Summa Cum Laude (GPA 4.33 / 4.5).

PUBLICATIONS

- [1] **Ordinal Neural Collapse as a Representation Prior for Visual Navigation.**
E-In Son^{*}, Jung-Taak Kim^{*}, Seung-Woo Seo.
European Conference on Computer Vision (ECCV), 2026. [\[Paper\]](#)
- [2] **PTS-Map: Probabilistic Terrain State Map for Uncertainty-Aware Traversability Mapping in Unstructured Environments.**
Dong-Wook Kim, E-In Son, Chan Kim, Ji-Hoon Hwang, Seung-Woo Seo.
IEEE Robotics and Automation Letters (RA-L), 2025. [\[Paper\]](#)
- [3] **Follow the Footprints: Self-supervised Traversability Estimation for Off-road Vehicle Navigation based on Geometric and Visual Cues.**
Yurim Jeon, E-In Son, Seung-Woo Seo.
IEEE International Conference on Robotics and Automation (ICRA), 2024. [\[Paper\]](#)
- [4] **Adaptive Robot Traversability Estimation Based on Self-Supervised Online Continual Learning in Unstructured Environments.**
Hyung-Suk Yoon, Ji-Hoon Hwang, Chan Kim, E-In Son, Se-Wook Yoo, Seung-Woo Seo.
IEEE Robotics and Automation Letters (RA-L), 2024. [\[Paper\]](#)
- [5] **Traversability-aware Adaptive Optimization for Path Planning and Control in Mountainous Terrain.**
Se-Wook Yoo^{*}, E-In Son^{*}, Seung-Woo Seo.
IEEE Robotics and Automation Letters (RA-L), 2024. [\[Paper\]](#)

AWARDS & HONORS

Earth Rovers Challenge (1st Place) Oct 2024
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)

Academic Excellence Scholarship 2018 – 2020
Konkuk University

RESEARCH PROJECTS

Challengeable Future Defense Technology R&D Program (Phase 2) 2024 – 2026

Agency for Defense Development (ADD)

Leading the planning stack, from learning-based path prediction to real-time safe replanning, for an end-to-end visual navigation system operating in unknown, hazardous terrain.

Challengeable Future Defense Technology R&D Program (Phase 1) 2022 – 2023

Agency for Defense Development (ADD)

Developed the path tracking module for accurate and stable trajectory following.

TEACHING EXPERIENCE

Seoul National University, Teaching Assistant

SNU in Silicon Valley Program, joint with UC Berkeley (*Summer 2024*)

Fundamentals of Random Variables and Probability Processes (*Spring 2023*)

Network Protocol and Design (*Fall 2021, 2023*)

SKILLS

Tools and Languages Python, C/C++, PyTorch, ROS

Communication Korean (native), English

REFERENCE

Advisor: Prof. Seung-Woo Seo

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