Seungjae Baek

seungjab@andrew.cmu.edu
https://bsj970.github.io

Education

Carnegie Mellon University — Pittsburgh, PA
Visiting Researcher at Robotics Institute — Aug. 2024 – Present
Collaborator: Sebastian Scherer — *(Remote: Mar. 2025 – Jul. 2025)*

Ulsan National Institute of Science and Technology — Ulsan, Korea
M.S. in Artificial Intelligence — Aug. 2023 – Aug. 2026 (exp.)
Advisor: Jeong hwan Jeon

B.S. in Electrical Engineering — Feb. 2017 – Aug. 2023*
Graduated Cum Laude

** Including military service, Republic of Korea Army, Feb. 2020 – Sep. 2021*

Publications

**** indicates equal contribution***

Conferences

1. **PIPE Planner: Pathwise Information Gain with Map Predictions for Indoor Robot Exploration**
   Seungjae Baek*, Brady Moon*, Seungchan Kim*, Muqing Cao, Cherie Ho, Sebastian Scherer, Jeong hwan Jeon
   IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2025

Journals

1. **Cooperative Multi-Agent Reinforcement Learning for Multiple Anti-Aircraft Target Surveillance**
   Kangbeen Lee*, **Seungjae Baek***, Philjoon Jung, Tae-Hyun Kim, Jeong hwan Jeon
   Journal of the Institute of Control, Robotics and Systems June 2024

Preprints

1. **Progressive Confinement on Explorative Guidance for Diffusion Planners**
   Sunhwi Kim, **Seungjae Baek**, Jungeun Lee, Jaechan Shin, Junsu Kim, Seongjae Lee, Sungjun Yang, Kyungdon Joo, Jeong hwan Jeon
   Under Review

2. **Multi-Objective Deep Reinforcement Learning for Eco-Friendly Fleet Rebalancing in Autonomous Mobility-on-Demand Systems**
   Jungeun Lee*, **Seungjae Baek***, Sunhwi Kim, Chanju Kim, Seongjae Lee, Jeong hwan Jeon
   Under Revision

Research Experiences

Carnegie Mellon University — Pittsburgh, PA
Robotics Institute, AirLab
Visiting Researcher — Aug. 2024 – Present *(remote Mar. 2025 – Jul. 2025)*

- Designed an indoor exploration algorithm leveraging pathwise information gain from predicted global maps.
- Developing ROS 2 Gazebo simulation environments to evaluate semantics-aware navigation with LLM-based prediction and TSP-based path planning.

Ulsan National Institute of Science and Technology — Ulsan, Korea
Robotics & Mobility Lab
Graduate Research Assistant — Aug. 2023 – Present

- Conduct experiments and simulations on multi-objective ride-sharing RL.
- Designed and implemented multi-agent reinforcement learning (MARL) algorithms for cooperative UAV surveillance.

Undergraduate Research Assistant — Jul. 2022 – Aug. 2023

- Adapted a centralized training with decentralized execution (CTDE) MARL method to video-game simulations and authored a B.S. thesis.
- Engineered an autonomous race car platform as a team leader; won 1st place in a university racing competition.

Teaching & Working Experiences

Ulsan National Institute of Science and Technology — Ulsan, Korea

- Head Teaching Assistant, ITP117: Introduction to AI Programming II — Feb. 2024 – Jul. 2024
- Student Lecturer, EEE351: Automatic Control — Aug. 2022 – Dec. 2022

Clinomics Inc. — Ulsan, Korea

- Project Based Learning (PBL) Teaching Assistant — Feb. 2023 – Jul. 2023

Achievements

Honors, Scholarships & Fellowships

- **Korean Government Scholarship Program for Study Overseas** (USD 150,000) — Aug. 2026 – Aug. 2029 (exp.)
  Government of the Republic of Korea. USD 50,000 per year (3 years).
- **Industrial Innovation Talent Growth Support (Overseas Linkage)** (USD 21,500) — Aug. 2025 – Feb. 2026
  Korea University. Funding for visiting research at Carnegie Mellon University.
- **AI Excellence Global Innovative Leader Education Fellowship** (USD 40,000 incl. tuition) — Aug. 2024 – Feb. 2025
  Sogang University. Funding for visiting research at Carnegie Mellon University.
- **Government-funded Graduate Scholarship (Fully funded)** — Aug. 2023 – Aug. 2025
  Ministry of Science and ICT
- **UNIST Academic Performance Scholarship (4-year, fully funded)** — Feb. 2017 – Aug. 2023
  Ulsan National Institute of Science and Technology

Awards & Grants

- **IEEE IES SYPA Travel Award (IROS 2025)** (USD 1,500) — Oct. 2025
  IEEE Industrial Electronics Society. Selected for participation in IROS 2025.
- **Undergraduate Research Excellent Poster Session Award** — Jul. 2023
  Department of Electrical Engineering, Ulsan National Institute of Science and Technology

Skills & Services

Languages:

- **Korean**: Native
- **English**: Advanced (TOEFL iBT: 106/120)

Programming Languages: C++, Python, MATLAB, PyTorch, TensorFlow

Software and Tools: ROS, Git, Docker, CARLA, SUMO, NVIDIA Isaac-sim

Reviewer: *IROS* (2025)