

# Seungjae Baek

✉ seungjab@andrew.cmu.edu

🌐 <https://bsj970.github.io>

## Education

### Carnegie Mellon University

Visiting Researcher in Robotics Institute

Collaborator: Sebastian Scherer

Pittsburgh, PA

Aug. 2024 – Present

(Remote: Mar. 2025 – Jul. 2025)

### Ulsan National Institute of Science and Technology

M.S. in Artificial Intelligence

Advisor: Jeong hwan Jeon

Ulsan, Korea

Aug. 2023 – Aug. 2026 (exp.)

B.S. in Electrical Engineering

*Graduated Cum Laude*

Feb. 2017 – Aug. 2023\*

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

## Research Interests

My research focuses on developing intelligent autonomous systems that make information-efficient decisions in complex, partially observed environments. My work spans informative path planning and coverage, safe trajectory planning, and cooperative multi-agent reinforcement learning (MARL) for aerial and/or ground robots. Methodologically, I focus on information-theoretic objectives, deep reinforcement learning (DRL), and model-based planning, with broad applicability across field robotics and large-scale autonomous decision-making.

## 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 Institute of Control, Robotics and Systems June 2024*

### Preprints

#### 1. STOMP-Guided Diffusion for Motion Planning

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

<b>Carnegie Mellon University</b> <b>Robotics Institute, AirLab</b> Visiting Researcher	Pittsburgh, PA  Aug. 2024 – Present (remote Mar. 2025 – Jul. 2025)
<ul style="list-style-type: none"><li>• Developed an indoor map exploration algorithm that leverages path-wise information gain from predicted global maps.</li><li>• Contributing to an end-to-end multi-drone 3D exploration simulation project.</li></ul>	
<b>Ulsan National Institute of Science and Technology</b> <b>Robotics &amp; Mobility Lab</b> Graduate Research Assistant	Ulsan, Korea  Aug. 2023 – Present
<ul style="list-style-type: none"><li>• Developed MARL learning algorithms for cooperative control of UAVs in enemy surveillance scenarios.</li><li>• Conducting experiments and simulations for multi-objective ride-sharing RL algorithms.</li></ul>	
<b>Undergraduate Research Assistant</b>	Jul. 2022 – Aug. 2023
<ul style="list-style-type: none"><li>• Adapted a CTDE MARL method in video-game simulations, culminating in a B.S. research thesis.</li><li>• Developed and ran Python experiments using the CARLA AV simulator.</li></ul>	

## Teaching & Working Experiences

<b>Ulsan National Institute of Science and Technology</b> <b>ITP117: Introduction to AI Programming II, Head Teaching Assistant</b>	Ulsan, Korea Feb. 2024 – Jul. 2024
<ul style="list-style-type: none"><li>• Assisted in teaching a course with 120 students alongside four other teaching assistants.</li><li>• Lectured on MLPs, CNNs, and RNNs using TensorFlow and PyTorch in English.</li></ul>	
<b>EEE351: Automatic Control, Student Lecturer of AFEE</b>	Aug. 2022 – Dec. 2022
<ul style="list-style-type: none"><li>• AFEE is an official student organization within Electrical Engineering at UNIST.</li><li>• Organized and facilitated group study sessions for both domestic and international students.</li></ul>	
<b>Clinomics Inc.</b> <b>Project-Based Learning (PBL) Teaching Assistant</b>	Ulsan, Korea Feb. 2023 – Jul. 2023
<ul style="list-style-type: none"><li>• Supported a project collaborating with office workers to integrate AI solutions into their workflows.</li><li>• Used AnoGAN and VAE to generate hypothetical disease-associated DNA methylation data.</li></ul>	

## Achievements

### Honors, Scholarships & Fellowships

<b>Korean Government Scholarship Program for Study Overseas</b> (total \$150,000) Government of the Republic of Korea. US\$50,000/year for 3 years.	Aug. 2026 – Aug. 2029 (exp.)
<b>Industrial Innovation Talent Growth Support (Overseas Linkage)</b> (\$21,500) Korea University. Funding for visiting research at Carnegie Mellon University.	Aug. 2025 – Feb. 2026
<b>AI Excellence Global Innovative Leader Education Fellowship</b> (\$40,000, including tuition) Sogang University. Funding for visiting research at Carnegie Mellon University.	Aug. 2024 – Feb. 2025
<b>Government-funded Graduate Scholarship (Fully funded)</b> Ministry of Science and ICT	Aug. 2023 – Aug. 2025

- **UNIST Academic Performance Scholarship (4-year, fully funded)**  
Ulsan National Institute of Science and Technology

Feb. 2017 – Aug. 2023

#### Awards & Grants

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

Oct. 2025

Jul. 2023

## Skills & Services

---

#### Languages:

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

**Programming Languages:** C++, Python, MATLAB

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

**Reviewer:** *IROS* (2025)