

Research Interests

Motion and Path Planning, Robotic Decision Making, Multi-agent Systems, Reinforcement Learning

Affiliations

Carnegie Mellon University Visiting Researcher at Robotics Institute Supervisor: 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	

Publications

* indicates equal contributions.

Conferences

1. Prior-Constrained Explorative Guidance for Generalization in Diffusion Motion Planning
Sunhwi Kim, Junsu Kim, **Seungjae Baek**, Jungeun Lee, Jaechan Shin, Seongjae Lee, Kyungdon Joo, Jeong hwan Jeon
IEEE International Conference on Robotics and Automation (ICRA) 2026

2. 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
- [Link]

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

[Link]

Preprints & In Preparation

1. Manuscript of Deep RL-based AMoD
Co-first author, Under Review at IJCAI 2026

Research Experiences

Carnegie Mellon University Robotics Institute, AirLab Visiting Researcher (Supervisor: Prof. Sebastian Scherer)	Pittsburgh, PA Aug. 2024 – Present (Remote: Mar. 2025 – Jul. 2025)
<ul style="list-style-type: none">Led the development of PIPE Planner, a predictive exploration framework; achieved 10% higher reconstruction quality and a zero-failure rate in benchmarks by integrating deep learning-based map prediction.Leading the system integration of a full-stack aerial platform; containerized SuperOdometry SLAM framework to ensure real-time performance on resource-constrained onboard computers.Successfully demonstrated autonomous aerial inspection capabilities during a high-profile showcase for the Pittsburgh Steelers organization, validating system robustness in real-world settings.Developing a simulation environment for multi-drone inspection of unstructured construction sites, formulating implementing metrics for coverage and efficiency.	

Ulsan National Institute of Science and Technology	Ulsan, Korea
Robotics & Mobility Lab	
Graduate Research Assistant (Advisor: Prof. Jeong hwan Jeon)	Aug. 2023 – Present
<ul style="list-style-type: none"> Developed a CTDE-based cooperative MARL framework for urban fleet management; achieved scalability from 5 to 100 agents while substantially reducing carbon emissions and maintaining service rates. Designed cooperative reinforcement learning algorithms for aerial surveillance, optimizing formation control to minimize covariance of target estimation up to 50%. 	

Undergraduate Research Assistant	Jul. 2022 – Aug. 2023
<ul style="list-style-type: none"> 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; addressed real-world sensor noise and drift, winning 1st place in a course racing competition. 	

Teaching & Working Experiences

Ulsan National Institute of Science and Technology	Ulsan, Korea
<ul style="list-style-type: none"> ITP117: Introduction to AI Programming II, Head Teaching Assistant EEE351: Automatic Control, Student Lecturer 	Spring 2024 Fall 2022
Clinomics Inc.	Ulsan, Korea
<ul style="list-style-type: none"> Project Based Learning (PBL) Teaching Assistant 	Feb. 2023 – Jul. 2023

Achievements

Fellowships	
<ul style="list-style-type: none"> Korean Government Scholarship Program for Study Overseas (USD 150,000) Government of the Republic of Korea. Competitive national scholarship intended to support first three years of PhD study at selected institutions. 	Aug. 2026 – Aug. 2029 (exp.)
<ul style="list-style-type: none"> Industrial Innovation Talent Growth Support (Overseas Linkage) (USD 21,500) Korea University. Funding for visiting research at Carnegie Mellon University. 	Aug. 2025 – Jan. 2026
<ul style="list-style-type: none"> AI Excellence Global Innovative Leader Education Program (USD 40,000 incl. tuition) Sogang University. Funding for visiting research at Carnegie Mellon University. 	Aug. 2024 – Feb. 2025

Scholarships	
<ul style="list-style-type: none"> Government-funded Graduate Scholarship (Fully funded) Ministry of Science and ICT. 2-year, fully funded for Master’s degree. 	Aug. 2023 – Aug. 2025
<ul style="list-style-type: none"> UNIST Academic Performance Scholarship Ulsan National Institute of Science and Technology. 4-year, fully funded for undergraduate. 	Feb. 2017 – Aug. 2023

Awards & Grants	
<ul style="list-style-type: none"> IEEE IES SYPA Travel Award (IROS 2025) (USD 1,500) IEEE Industrial Electronics Society. Selected for participation in IROS 2025. 	Oct. 2025
<ul style="list-style-type: none"> Undergraduate Research Excellent Poster Session Award Department of Electrical Engineering, Ulsan National Institute of Science and Technology 	Jul. 2023

Skills & Services

Languages: Korean – Native, **English** – Advanced (TOEFL iBT: 106/120)
Programming Languages: C++, Python, MATLAB
Software and Tools: Git, Docker, CARLA, SUMO, ROS, Gazebo, NVIDIA Isaac Sim
Reviewer: *IROS* (2025), *ICRA* (2026), *RA-L*
Misc. & Interests: Marathon, Baseball, General Knowledge (TV Quiz Show Champion)