SEUNGCHAN KIM

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EDUCATION

Carnegie Mellon University — Pittsburgh, PA
Ph.D. Candidate at Robotics Institute — Sep 2020 - Present
Advisor: Sebastian Scherer

Brown University — Providence, RI
Sc.M. in Computer Science — Sep 2019 - May 2020
Sc.B. in Applied Mathematics & Computer Science, *Magna Cum Laude* — Sep 2013 - May 2019

RESEARCH EXPERIENCE

Field AI — Pittsburgh, PA
Robotics Research Intern — Sep 2025 - Present

- Researching semantic reasoning and world modeling for long-horizon loco-manipulation.

CMU AirLab — Pittsburgh, PA
Graduate Research Assistant — Sep 2020 - Present

- Developed 3D outdoor aerial navigation systems with real-time open-set semantic mapping and onboard VLM.
- Proposed indoor robot exploration algorithms leveraging map predictions and probabilistic information gain.

Brown University Intelligent Robot Lab — Providence, RI
Undergraduate Research Assistant (Advisor: George Konidaris) — Sep 2017 - May 2020

- Conducted research in deep reinforcement learning and model-based reinforcement learning.

SEC Research Institute — Seongnam, Korea
Signals Intelligence Researcher, ROK Army Sergeant — Sep 2015 - Jun 2017

NEW PREPRINTS UNDER REVIEW

[1] **RAVEN: Resilient Aerial Navigation via Open-Set Semantic Memory and Behavior Adaptation**
Seungchan Kim, Omar Alama, Dmytro Kurdydyk, John Keller, Nikhil Keetha, Wenshan Wang, Yonatan Bisk, Sebastian Scherer
arXiv preprint arXiv:2509.23563 (2025). Under Review
IROS 2025 Active Perception Workshop, Best Paper Finalist (Spotlight Presentation)

[2] **RADSeg: Unleashing Parameter and Compute Efficient Zero-Shot Open-Vocabulary Segmentation Using Agglomerative Models**
Omar Alama*, Darshil Jariwala*, Avigyan Bhattacharya*, **Seungchan Kim**, Wenshan Wang, Sebastian Scherer
arXiv preprint arXiv:2511.19704 (2025). Under Review

JOURNAL PUBLICATIONS

[1] **Multi-Robot Multi-Room Exploration with Geometric Cue Extraction and Circular Decomposition**
Seungchan Kim, Micah Corah, John Keller, Graeme Best, Sebastian Scherer
IEEE Robotics and Automation Letters (RA-L) 2023
Presentation at IEEE International Conference on Robotics and Automation (ICRA) 2024

[2] **Unsupervised Online Learning for Robotic Interestingness with Visual Memory**
Chen Wang, Yuheng Qiu, Wenshan Wang, Yafei Hu, **Seungchan Kim**, Sebastian Scherer
IEEE Transactions on Robotics (T-RO) 2021

CONFERENCE PUBLICATIONS

[1] **MapExRL: Human-Inspired Indoor Exploration with Predicted Environment Context and Reinforcement Learning**
Narek Harutyunyan*, Brady Moon*, **Seungchan Kim**, Cherie Ho, Adam Hung, Sebastian Scherer
International Conference on Advanced Robotics (ICAR) 2025
ICRA 2025 Workshop on Structured Learning for Efficient, Reliable, and Transparent Robots

[2] **RayFronts: Open-Set Semantic Ray Frontiers for Online Scene Understanding and Exploration**
Omar Alama, Avigyan Bhattacharya, Haoyang He, **Seungchan Kim**, Yuheng Qiu, Wenshan Wang, Cherie Ho, Nikhil Keetha, Sebastian Scherer
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2025
RSS 2025 Workshop on Semantic Reasoning and Goal Understanding in Robotics
RSS 2025 Workshop on Learned Robot Representations

[3] **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
(*: Equal Contributions)

[4] **MapEx: Indoor Structure Exploration with Probabilistic Information Gain from Global Map Predictions**
Cherie Ho*, **Seungchan Kim***, Brady Moon, Aditya Parandekar, Narek Harutyunyan, Chen Wang, Katia Sycara, Graeme Best, Sebastian Scherer
IEEE International Conference on Robotics and Automation (ICRA) 2025
(*: Equal Contributions)

[5] **AirDet: Few-Shot Detection without Fine-tuning for Autonomous Exploration**
Bowen Li, Chen Wang, Pranay Reddy, **Seungchan Kim**, Sebastian Scherer
European Conference on Computer Vision (ECCV) 2022

[6] **Robotic Interestingness via Human-Informed Few-Shot Object Detection**
Seungchan Kim, Chen Wang, Bowen Li, Sebastian Scherer
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2022

[7] **DeepMellow: Removing the Need for a Target Network in Deep Q-Learning**
Seungchan Kim, Kavosh Asadi, Michael Littman, George Konidaris
International Joint Conference on Artificial Intelligence (IJCAI) 2019
Multidisciplinary Conference on Reinforcement Learning and Decision Making (RLDM) 2019

PREPRINTS, WORKSHOP PAPERS, EXTENDED ABSTRACTS

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[1] **Toward General-Purpose Robots via Foundation Models: A Survey and Meta-Analysis**
Yafei Hu*, Quanting Xie*, Vidhi Jain*, Jonathan Francis, Jay Patrikar, Nikhil Keetha, **Seungchan Kim**, Yaqi Xie, Tianyi Zhang, Hao-Shu Fang, Shibo Zhao, Shayegan Omidshafiei, Dong-Ki Kim, Ali-akbar Agha-mohammadi, Katia Sycara, Matthew Johnson-Roberson, Dhruv Batra, Xiaolong Wang, Sebastian Scherer, Chen Wang, Zsolt Kira, Fei Xia, Yonatan Bisk
arXiv preprint arXiv:2312.08782 (2023)

[2] **Adaptive Temperature Tuning for Mellowmax in Deep Reinforcement Learning**
Seungchan Kim, George Konidaris
NeurIPS 2019 Deep Reinforcement Learning Workshop

[3] **Combating the Compounding-Error Problem with a Multi-step Model**
Kavosh Asadi, Dipendra Misra, **Seungchan Kim**, Michael Littman
arXiv preprint arXiv:1905.13320 (2019)

[4] **Removing the Target Network from Deep Q-Networks with the Mellowmax Operator**
Seungchan Kim, Kavosh Asadi, Michael Littman, George Konidaris
International Conference on Autonomous Agents and Multiagent Systems (AAMAS) 2019

[5] **Using Computational Analysis of Behavior to Discover Developmental Change in Memory-Guided Attention Mechanisms in Childhood**
Dima Amso, Lakshmi Govindarajan, Pankaj Gupta, Heidi Baumgartner, Andrew Lynn, Kelley Gunther, Diego Placido, Tarun Sharma, Vijay Veerabadran, Kalpit Thakkar, **Seungchan Kim**, Thomas Serre
PsyArXiv. doi:10.31234/osf.io/gq4rt

INVITED TALKS

AirStack Simulator and Applications: A Modular Autonomy Stack for Aerial Robotics
Guest Lecture, 16-667A Autonomous Air Vehicle Design and Development, CMU — Aug 2025

Toward Real-Time Open-Vocabulary Semantic Mapping for Outdoor Robot Navigation
Korean-American Roboticists Association (KARA) — Jul 2025

Spatial Reasoning and Semantic Representations for Intelligent Multi-Robot Exploration and Navigation
Artificial Intelligence for Robot Coordination at Scale (ARCS) Lab, CMU (Host: Jiaoyang Li) — Jul 2025
Resilient Intelligent Systems Lab (RISLab), CMU (Host: Wennie Tabib) — Nov 2024

MapEx: Indoor Structure Exploration with Probabilistic Information Gain from Global Map Predictions
Korean-American Roboticists Association (KARA) — May 2025

An Alternative Softmax Operator for Deep Reinforcement Learning
Machine Intelligence Community (MIC) Conference, Boston University — Sep 2019

ADVISING & MENTORING

Master's Research
Seungjae Baek (UNIST M.S. in AI) — Aug 2024 - Feb 2025

Undergraduate Research
Dmytro Kurdydyk (Davidson College; CMU RISS) — Jun 2025 - Present
Narek Harutyunyan (Brown University; CMU RISS) — Jun 2024 - Aug 2024
Aditya Parandekar (BITS Pilani - Goa) — Jun 2023 - Dec 2023

Master's Thesis Committee
Jonathan Lee (CMU M.S. in Robotics) — 2025

TEACHING

Teaching Assistant
CMU 16-711 Kinematics, Dynamics, Control — Spring 2023
CMU 16-833 Robot Localization and Mapping — Spring 2022
Brown CSCI1430 Computer Vision — Spring 2019
Brown CSCI0040 Intro to Scientific Computing and Problem Solving — Spring 2015
Brown ENGN0040 Dynamics and Vibrations — Spring 2015

SERVICE & OUTREACH

Workshop & Seminar Organization
Tartan Planning Series — Mar 2023 - May 2023

Reviewer
International Journal of Robotics Research (IJRR) 2023, 2025
IEEE Transactions on Automation Science and Engineering (T-ASE) 2025
IEEE Robotics and Automation Letters (RA-L) 2022, 2023, 2024, 2025
IEEE International Conference on Robotics and Automation (ICRA) 2023, 2025, 2026
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2024, 2025
IEEE International Conference on Automation Science and Engineering (CASE) 2025
IEEE International Symposium on Multi-Robot & Multi-Agent Systems (MRS) 2023
International Conference on Advanced Robotics (ICAR) 2025
International Conference on Learning Representations (ICLR) 2021, 2023
Neural Information Processing Systems (NeurIPS) 2021, 2022
AAAI Conference on Artificial Intelligence (AAAI) 2021
International Conference on Machine Learning (ICML) 2020

Program Mentor
CMU Paths to AI Research — Fall 2025
CMU AI Undergraduate Mentoring — Fall 2020 - Spring 2021
CMU SCS Graduate Application Support — Fall 2020

AWARDS & HONORS

Outstanding Best Paper Award Finalist, IROS 2025 Active Perception Workshop Oct 2025
Selected Participant, IEEE ICRA 2025 Doctoral Consortium Apr 2025
CMU GSA/Provost Conference Funding Mar 2025
IEEE ICRA 2025 RAS Travel Grant Feb 2025
Karen T. Romer Undergraduate Teaching and Research Awards Mar 2018

MEDIA COVERAGE

Autonomous Aerial Robots Communicate, Prioritize Rooms in Multiroom Exploration Jul 2024
Marylee Williams, CMU School of Computer Science News