

# SEUNGCHAN KIM

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## EDUCATION

### Carnegie Mellon University

Ph.D. Candidate at Robotics Institute  
Advisor: Sebastian Scherer

Pittsburgh, PA  
Sep 2020 - Present

### Brown University

Sc.M. in Computer Science  
Sc.B. in Applied Mathematics & Computer Science  
Advisor: George Konidaris

Providence, RI  
Sep 2019 - May 2020  
Sep 2013 - May 2019

## RESEARCH EXPERIENCE

### CMU AirLab

Graduate Research Assistant

Pittsburgh, PA  
Sep 2020 - Present

- Conducting Ph.D. research in robotics, focusing on multi-robot exploration, navigation and embodied AI.
- Developing multi-drone 3D outdoor navigation system with real-time semantic mapping and onboard deployment of vision-language models for search & rescue.
- Proposed indoor robot exploration algorithms using large-scale map predictions and novel information gain metrics.

### Brown University Intelligent Robot Lab

Undergraduate Research Assistant

Providence, RI  
Sep 2017 - May 2020

- Researched on deep reinforcement learning and model-based reinforcement learning.

## 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] 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*

### [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

(\*: Equal Contributions)

### [3] 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)

- [4] **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*
- [5] **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*
- [6] **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] **MapExRL: Human-Inspired Indoor Exploration with Predicted Environment Context and Reinforcement Learning**  
Narek Harutyunyan\*, Brady Moon\*, **Seungchan Kim**, Cherie Ho, Adam Hung, Sebastian Scherer  
*arXiv preprint arXiv:2503.01548 (2025)*  
*ICRA 2025 Workshop on Structured Learning for Efficient, Reliable, and Transparent Robots*
- [2] **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)*
- [3] **Adaptive Temperature Tuning for Mellowmax in Deep Reinforcement Learning**  
**Seungchan Kim**, George Konidaris  
*NeurIPS 2019 Deep Reinforcement Learning Workshop*
- [4] **Combating the Compounding-Error Problem with a Multi-step Model**  
Kavosh Asadi, Dipendra Misra, **Seungchan Kim**, Michael Littman  
*arXiv preprint arXiv:1905.13320 (2019)*
- [5] **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*
- [6] **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*

## ADVISING & MENTORING

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### Master's Research

Seungjae Baek (UNIST; CMU AI Intensive Education Program)

Aug 2024 - Feb 2025

### Undergraduate Research

Narek Harutyunyan (Brown University; CMU RISS)

Jun 2024 - Aug 2024

Aditya Parandekar (BITS Pilani; CMU Visitor)

Jun 2023 - Dec 2023

## TEACHING

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**16-711 Kinematics, Dynamics, Control**, Teaching Assistant (CMU)

Spring 2023

**16-833 Robot Localization and Mapping**, Teaching Assistant (CMU)

Spring 2022

**CSCI1430 Computer Vision**, Teaching Assistant (Brown)

Spring 2019

**CSCI0040 Intro to Scientific Computing & Problem Solving**, Teaching Assistant (Brown)

Spring 2015

## SERVICE & OUTREACH

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- Tartan Planning Series**, Organizer Mar 2023 - May 2023  
Organized a virtual research talk series featuring 12 leading experts in robot planning.
- CMU Robotics Institute Summer Scholars (RISS) Admission** 2025  
Reviewed RISS undergraduate applications and matched top candidates with CMU Robotics faculty and PhD mentors.

### 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  
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 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

## INVITED TALKS

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- MapEx: Indoor Structure Exploration with Probabilistic Information Gain from Global Map Predictions**  
Korean-American Roboticians Association (KARA) May 2025
- Spatial Reasoning and Semantic Representations for Intelligent Multi-Robot Exploration and Navigation**  
Resilient Intelligent Systems Lab (RISLab), CMU Nov 2024
- An Alternative Softmax Operator for Deep Reinforcement Learning**  
Machine Intelligence Community (MIC) Conference, Boston University Sep 2019

## AWARDS & HONORS

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- 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

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