Joonkyung Kim

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L.F. Peterson Building (PETR) Room # 449, 435 Nagle St, College Station, TX 77843

Education

Texas A&M University College Station, TX, United States
- Ph.D. student in Computer Science and Engineering, (Advisor: Yiwei Lyu) *Aug. 2025 – Present*

Sogang University Seoul, South Korea
- M.S. in Electronic Engineering (Advisor: Changjoo Nam) *Mar. 2023 – Aug. 2025*
- B.S. in Electronic Engineering (Cum Laude) *Mar. 2017 – Feb. 2023*

Carnegie Mellon University Pittsburgh, PA, United States
- Visiting Scholar in School of Computer Science (S3D) *Aug. 2024 – Feb. 2025*

Research Experiences

Robotics Lab, Texas A&M University College Station, TX, United States
Research Assistant *Aug. 2025 – Present*

- Developing control-theoretic safety frameworks for cooperative navigation in heterogeneous multi-robot systems, considering kinematic capabilities of individual robots [Project page]
- Exploring system-level safety in robotics beyond physical constraints, including semantic-, decision-level, and human-centered safety for AI-enabled systems [Paper]
- Studying interaction-aware safety in multi-agent systems beyond pairwise interactions, toward group-level and context-aware behaviors in real-world settings

AI Robotics Lab, Sogang University Seoul, South Korea
Research Assistant, Undergraduate Intern *Sep. 2022 – Aug. 2025*

- Developed a collision-avoidance module for visual navigation foundation models to reduce fine-tuning dependency *(in collaboration with the Advanced Agent-Robotics Technology Lab, CMU, during visiting research)* [Project page]
- Built multi-robot simulation (PyBullet, Isaac Sim) and real-robot systems (ROS 2, TurtleBot 4) to evaluate safety and conflict resolution in navigation experiments [Video1], [Video2], [Video3]
- Developed a deep reinforcement learning-based navigation method for mobile robots in confined spaces with randomly placed obstacles [Video]
- Contributed to a pick-and-place project using a mobile manipulator, integrating and testing the ROS Navigation Stack [Video]

Publications

Conference

[6] Joonkyung Kim[†], Wenxi Chen[†], Davood Soleymanzadeh[†], Yi Ding, Xiangbo Gao, Zhengzhong Tu, Ruqi Zhang, Fan Fei, Sushant Veer, Yiwei Lyu[*], Minghui Zheng[*], and Yan Gu[*], "Position: Modular Safety Guardrails Are Necessary for Foundation-Model-Enabled Robots in the Real World," *International Conference on Machine Learning (ICML) Position Track*, 2026. ([†]Equal contribution, [*]Corresponding authors) [Paper]

[5] Bingyao Du, Joonkyung Kim, and Yiwei Lyu[*], "Gaussian Mixture-based Inverse Perception Contract for Uncertainty Aware Safe Navigation," *American Control Conference (ACC)*, 2026. [Paper]

[4] Wonjong Lee, Joonyeol Sim, Joonkyung Kim, Siwon Jo, Wenhao Luo, and Changjoo Nam[*], "Merry-Go-Round: Safe Control of Decentralized Multi-Robot Systems with Deadlock Prevention," *IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (IROS)*, 2025. [Project page]

[3] Joonkyung Kim[†], Joonyeol Sim[†], Woojun Kim, Katia Sycara, and Changjoo Nam[*], "Enhancing Safety of Visual Navigation through Collision Avoidance via Repulsive Estimation," *Conference on Robot Learning (CoRL)*, 2025. ([†]Equal contribution) [Project page]

[2] Joonkyung Kim, Sangjin Park, Wonjong Lee, Woojun Kim, Nakju Doh, and Changjoo Nam[*], "Escaping Local Minima: Hybrid Artificial Potential Field with Wall-Follower for Decentralized Multi-Robot Navigation," *IEEE Int. Conf. on Robotics and Automation (ICRA)*, 2025. [Paper], [Video]

[1] Joonkyung Kim, and Changjoo Nam*. "Room for me?: Mobile Navigation for Entering a Confined Space Using Deep Reinforcement Learning," *Int. Conf. on Ubiquitous Robots (UR)*, IEEE, 2023. [Paper], [Video]

Preprint / Under Review

[2] Joonkyung Kim, Yanze Zhang, Wenhao Luo, and Yiwei Lyu*, "Capability-Aware Heterogeneous Control Barrier Functions for Decentralized Multi-Robot Safe Navigation," *Under review*, 2026. [Paper] [Project page]

[1] Joonyeol Sim, Joonkyung Kim, and Changjoo Nam*, "Safe Interval RRT* for Scalable Multi-Robot Path Planning in Continuous Space," *Under review*, 2024. [Paper], [Video]

Patents

[1] Changjoo Nam, Joonkyung Kim, "Autonomous Mobile Robot," *US Patent Application No. 19/306,484*, filed Aug. 21, 2025 (pending); based on KR Patent Application No. 10-2025-0011954, filed Jan. 24, 2025

Scholarships & Grants

AI Intensive Education Program at Carnegie Mellon University
Fully funded by the South Korean government (IITP, Ministry of Science and ICT) *Aug. 2024 – Feb. 2025*

Sogang Scholarship
Funded by Sogang University (graduate program scholarship) *Mar. 2023 – Aug. 2025*

Academic Service & Other Experiences

Reviewer
- Conferences: *ICRA* (2025), *IROS* (2025, 2026), *CoRL* (2025), *IFAC* (2026)
- Journals: *Autonomous Robots* (2025), *IEEE RA-L* (2026)

Teaching Assistant Sogang University, South Korea
- [EEE3141] *Introduction to Control Systems* *Spring 2024*

Military Service Donghae, South Korea
- Republic of Korea Army (ROKA) *Oct. 2018 – May. 2020*

Technical Skills

Programming Languages: Python, C, MATLAB
Tools & Frameworks: PyTorch, PyBullet, Isaac Sim, ROS2