KANGHYUN RYU

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EDUCATION

University of California at Berkeley (UC Berkeley) Jan 2024 - Present
Mechanical Enginnering *Berkeley, CA*

· Ph.D student in Intelligent Control(ICON) lab

University of Illinois at Urbana-Champaign (UIUC) Aug 2022 - Dec 2023
Aerospace Engineering *Champaign, IL*

· Ph.D student in Intelligent Control(ICON) lab

Seoul National University (SNU) Mar 2016 - Aug 2022
B.S. in Aerospace Engineering *Seoul. Korea*

· Summa Cum Laude

· Military Service (Leave of absence) Jul 2018 – Jun 2020

RESEARCH INTEREST

Reinforcement Learning for Robotics, Curriculum learning, LLM for Robotics, Safe learning and control, Risk-sensitive control

PUBLICATIONS

Google Scholar

1. S. Choi*, **K. Ryu***, J. Ock, and N. Mehr, "CRAFT: Coaching Reinforcement Learning Autonomously using Foundation Models for Multi-Robot Coordination Tasks", *preprint*, 2025, [Link]
2. **K. Ryu**, M. Sung, P. Gupta, J. D'sa, F. M. Tariq, D. Isele, and S. Bae, "IANN-MPPI: Interaction-Aware Neural Network-Enhanced Model Predictive Path Integral Approach for Autonomous Driving", *International Conference on Intelligent Transportation Systems (ITSC)*, 2025, [Link]
3. JB. Bouvier, **K. Ryu**, K. Nagpal, Q. Liao, K. Sreenath, and N. Mehr, "DDAT: Diffusion policies enforcing Dynamically Admissible robot Trajectories", *Robotics: Science and Systems (RSS)*, 2025, [Link]
4. **K. Ryu**, JB. Bouvier, S. Lalani, S. Eggl, and N. Mehr, "Risk-Sensitive Orbital Debris Collision Avoidance using Distributionally Robust Chance Constraints", *AIAA SCITECH Forum*, 2025, [Link]
5. **K. Ryu**, Q. Liao, Z. Li, P. Delgosha, K. Sreenath, and N. Mehr, "CurricuLLM: Automatic Task Curricula Design for Learning Complex Robot Skills using Large Language Models", *International Conference on Robotics and Automation (ICRA)*, 2025, [Link]
6. E. Clark*, **K. Ryu***, and N. Mehr, "Adaptive Learning from Demonstration in Heterogeneous Agents: Concurrent Minimization and Maximization of Surprise in Sparse Reward Environments", *Learning for Dynamics & Control Conference (L4DC)*, 2024. [Link]
7. **K. Ryu** and N. Mehr, "Integrating Predictive Motion Uncertainties with Distributionally Robust Risk-Aware Control for Safe Robot Navigation in Crowds", *International Conference on Robotics and Automation (ICRA)*, 2024. [Link]
8. **K. Ryu**, J. Kang, and D. Lee, "Performance Comparison between EKF and UKF in GPS/INS Low Observability Conditions", *The 21th International Conference on Control, Automation, and Systems (ICCAS)*, 2021. [Link]

SKILLS

Programming Language : Python, C++, MATLAB, Julia
Software & Tools : Mujoco, Isaac Lab, ROS, Crazyflie, Turtlebot, Raspberry Pi, Arduino

RESEARCH EXPERIENCE

Intelligent Control(ICON) Laboratory Aug 2022 - Present
Graduate Research Assistant, Advised by Prof. Negar Mehr *Berkeley, CA*

- Curriculum learning for robotics applications using Foundation models (5) (1)
- Satellite collision avoidance algorithm with uncertainty propagation in space debris trajectories (4)
- Safe robot navigation algorithm in human crowded environment using human motion forecaster and distributionally robust controller (7)
- Differentiable-MPC controller for distributionally robust chance-chance constrained control problem
- Adaptive Teacher demonstration method considering Student's surprise in the Teacher-Student framework with different constraint (6)

Making Innovative Space Technology (MIST) Laboratory Aug 2021 – Dec 2021
Undergraduate Research Intern, Advised by Prof. Giovanni Beltrame *Montréal, Canada (Remote)*

- Developed a multi-spectral saliency detection code based on global contrast saliency detection algorithm
- Contributed to a ROS package processing Micasense multi-spectral image in DJI manifold

Interactive & Networked Robotics Laboratory (INRoL) Oct 2020 – Jun 2021
Undergraduate Research Intern, Advised by Prof. Dongjun Lee *Seoul, Korea*

- Analyzed observability of GPS/INS system in drone motion primitives (8)
- Compared the performance gap between EKF and UKF on partially observable maneuvers

WORK EXPERIENCES

Honda Research Institute Jan 2025 – May 2025
Cooperative Mobility Research Intern *San Jose, CA*

- Developed an interaction-aware motion planning algorithm for autonomous driving in lane-changing scenario (2)
- Integrated interaction-aware trajectory prediction model with sampling-based MPPI planning algorithm

SERVICIES

Journal Reviewer

- Transactions on Control System Technology (TCST)
- Robotics and Automation Letters (RA-L)

Conference Reviewer

- International Conference on Intelligent Robots and Systems (IROS) 2025
- Learning for Dynamics and Control (L4DC) 2025
- Conference on Decision and Control (CDC) 2023, 2024
- International Conference on Intelligent Transportation Systems (ITSC) 2025
- International Workshop on the Algorithmic Foundations of Robotics (WAFR) 2024
- International Symposium on Robotics Research (ISRR) 2024

AWARDS & HONORS

Scholarships

William C. Webster Graduate Fellowship - Awarded by UC Berkeley Mechanical Engineering

Robert Beatty Fellowships - Awarded by UIUC Aerospace Engineering

National Science and Engineering Undergraduate Scholarship - Awarded by the Korean Government

International Research Intern Scholarship - Awarded by Polytechnique Motréal

Project & Travel Grants

UC Berkeley Conference Travel Grant - Travel support for L4DC 2024 (6)

IEEE Robotics and Automation Society Travel Grant - Travel support for selected authors from ICRA 2024 (7)

Grant for Student Directed Research - Research fund for (8). Funded by SNU

Honors

AIAA Scitech 2025 ISTC best student paper finalist - Selected as top 6 student paper by Intelligent Systems Technical Committee (ISTC) (4)

TEACHING

Compressible Fluid Dynamics tutoring for Aerospace Engineering junior student Spring 2021

Calculus tutoring for College of Engineering freshmen Winter 2021