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

Safe learning and control, Risk-sensitive control, Distributionally robust control, Reinforcement learning for robotics, Curriculum learning, Task planning with LLM

PUBLICATIONS

Conference Papers

K. Ryu and N. Mehr, "Distributionally Robust Risk-Aware Control Framework for Safe Crowd Navigation with Human Motion Predictions", *International Conference on Robotics and Automation (ICRA)*, 2024. (Accepted)

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 : ROS, Crazyflie, Turtlebot, Raspberry Pi, Arduino, Solidworks, 3D Printing

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 Large Language Model (LLM)
· Satellite collision avoidance algorithm with uncertainty propagation in space debris trajectories
· Developed safe robot navigation algorithm in human crowded environment using human motion forecaster and distributionally robust controller
· Designed distributionally robust constrained reinforcement learning method in model-based offline setting
· Designed adaptive Teacher demonstration method considering Student's surprise in the Teacher-Student framework with different constraint

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
· Compared the performance gap between EKF and UKF on partially observable maneuvers
· Presented to the 2021 International Conference on Control, Automation, and Systems (ICCAS)

HIGHLIGHTED PROJECTS

AI System Design Contest Aug 2020 – Dec 2020
Seoul National University, Department of System Semiconductor Engineering for AI *Seoul, Korea*

· Trained YOLO-v3 object detection model with drone-captured images
· Worked on hyperparameter tuning and data augmentation
· Achieved 2nd highest mean Average Precision in the contest

2019 Spaceport America Cup Nov 2018 – Jun 2019
Avionics team member *Spaceport America, NM*

· Developed avionics system for 10,000ft solid rocket
· Implemented extended Kalman filter on Raspberry Pi module for fusing GPS, IMU, and altimeter

SERVICIES

Conference Reviewing

· Conference on Decision and Control(CDC) 2023

EXPERIENCES

SK Hynix Summer Internship Jul 2020 – Aug 2020
DRAM Packaging R & D Intern *Icheon, Korea*

· Improved dicing quality by proposing a new singulation process
· Inspected wafer with Auto-Visual-Inspection (AVI) and Scanning Electron Microscope (SEM)
· Presented "Low-k HBM Laser+Blade Saw Set up development" project

SNU Student Rocket Team HANARO Vice-President Sep 2017 – Aug 2018
Advised by Prof. Youngbin Yoon *Seoul, Korea*

· Developed a solid rocket system with target apogee 3,000ft, Organized design criteria and managed sub-teams
· Developed a new AN-based rocket propellant for high thrust rocket
· Achieved 1st Prize in 27th National Universities' Rocket Engineering Competition, 2018

AWARDS & HONORS

Scholarships

Robert Beatty Fellowships Aug 2022 - Present
Awarded to top incoming graduate students in UIUC Aerospace Engineering

National Science and Engineering Undergraduate Scholarship Mar 2018 - Aug 2022
Awarded by Korean Government (Full tuition)

International Research Intern Scholarship Oct 2021
Awarded by Polytechnique Motréal ($3,100)

Study Abroad Scholarship (Stanford Summer Session) Jun 2020
Funded by SNU the Office of International Affairs ($4,000)

Project Grants

Grant for Undergraduate Research Program Mar 2018
Funded by Research Affairs of SNU ($7,000)

Grant for Science Culture Activities (Space Challenger Camp) Apr 2017
Funded by Korea Foundation for the Advancement of Science & Creativity ($7,000)

TEACHING

Compressible Fluid Dynamics tutoring for Aerospace Engineering junior student Spring 2021

Calculus tutoring for College of Engineering freshmen Winter 2021

Space Challenger Camp Director Summer 2017

Developed Rocket Engineering Camp for high school students

Supported by Korea Foundation for the Advancement of Science & Creativity (KOFAC)