Yunsoo Seo

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Research Interest

My research interests lie at the intersection of **robotics and control, with a particular focus on humanoid locomotion, model based planning/control(e.g., MPC, DDP, MPPI) and multi-contact dynamics**. I am motivated by the challenge of enabling humanoid robots to operate effectively in real-world, dynamic environments by achieving **robust, whole-body motion and balance**. I believe that for robots to collaborate safely and effectively with humans, especially in household or disaster-response settings, expanding their mobility and physical interaction capabilities will be essential.

I'm interested in these topics:

- Humanoid Robot Locomotion Control
- Footstep planning for Humanoid Robots
- Optimal Control and Collision Avoidance
- Dealing with Model Uncertainty and Reinforcement Learning

Education

MS **Korea Univeristy**, Electrical Engineering — Mar. 2024 – Feb. 2026

- GPA: 4.5/4.5
- **Advisor**: Myo Taeg Lim
- **Coursework:** Computer Controlled System, Advanced Robotics, Reinforcement Learning and Mathematics

BS **Dongguk University**, Mechanical, Robotics and Energy Engineering — Mar. 2020 – Feb. 2024

- GPA: 3.69/4.5
- **Coursework:** Calculus1,2, Engineering Applications of Linear Algebra, Soft Robotics, Control Theory
- **Exchange Student Program** — *2021 Spring*
  University of Wisconsin–River Falls

Publications

Whole Body MPPI for Real-time Control of a 3-DoFs Leg system — Jan 2025

Yunsoo Seo, Myo Taeg Lim, Yisoo Lee

INSTITUTE OF CONTROL, ROBOTICS AND SYSTEMS (ICROS)

Extremely Fast Computation of CoM Trajectory Generation for Walking Leveraging MPPI Algorithm — Dec 2023

Yunsoo Seo, Dongwhan Kim, Jaewan Bak, Yonghwan Oh, Yisoo Lee

IEEE-RAS 22nd INTERNATIONAL CONFERENCE ON HUMANOID ROBOTS(HUMANOIDS)

Research Experience

<Korea Institute of Science and Technology(KIST)> — Student Researcher, June 2022 - Present

- **Humanoid whole body controller:** Developing a whole-body controller for humanoid robots based on Model Predictive Path Integral
- **Humanoid footstep planner:** Implemented a ROS-based footstep planner to generate ZMP and CoM trajectories, which were integrated into a weighted whole-body controller for stable and coordinated humanoid walking

- **Humanoid CoM trajectory generator(MPPI & MPC):** Conducted research on Center of Mass(CoM) trajectory generation for humanoid robots using Model Predictive Path Integral and Model Predictive Control

<Machanical Automatic Control(MAC) research society, University of Dongguk> — Project leader, Sep 2022 – Dec 2023

- **Capstone Design Track-Project:** 6-DOF Manipulator Design and Motion Control, Mobile Manipulator's Trajectory Generation for Path Planning
- **Soft Robotics term project:** In charge of Origami Gripper Fabrication
- **Engineering Education FESTA 2022:** 6-DOF Manipulator Motion Control, Mobile Manipulator's Trajectory Generation for Path Planning

Awards and Honors

- Mentoring Program Scholarships, University of Korea, BK21 Center (2024 Fall)
- Industry-Academia Internship Scholarship, University of Dongguk, Scholarship Office for Educational Activity Assistance, Korea (Mar. 2023)
- **Engineering Education FESTA 2022**, Korea Institute for Advancement of Technology , Korea (Oct. 2022)
- University Innovation Program Scholarship, University of Dongguk, National Off-Campus Scholarship, Korea (Sep. 2022)
- **Exchange Program Tuition Scholarship**, University of Dongguk, Global Scholarship Office, Korea (Mar. 2022)
- **Academic Excellence Award**, 2020 Fall, University of Dongguk, Korea (Jan. 2021)

Leadership and Teaching Experience

KROS Locomotion Manipulation Research Group Workshop — Seminar Presenter, Apr 2024

- Presented a seminar titled "Real-Time MPC via Improvement of MPPI Sampling Techniques"

Korea Institute of Science and Technology (KIST) — Intern Researcher, Jul 2022 – Jul 2023

- Worked as a Intern researcher focusing on the development of the Center of Mass (CoM) trajectory generator for humanoid robots

Machanical Automatic Control(MAC) Club — Member, Mar 2022- Jan 2024

- Participated in projects and activities related to mechanical automation and control systems(manipulator control, soft robot- origami gripper)

Korean Student Association — Treasurer, 2022 Spring semester

- University of Wisconsin–River Falls
- Contributed to planning and executing cultural and community-building events

DoDream Collaborative Learning Study Group — Team Leader, Sep 2021 – Dec 2022

- University of Dongguk
- Organized study sessions focused on robotics, kinematics, path planning algorithms

Eduplex Academy — Teacher, Aug 2020 – Jan 2022

- Instructed Mathematics, English, and Science to grades 7–11

Technologies

Programming Languages: Python, C++, MATLAB, CUDA

Developer Tools: Eigen, RBDL, ROS, Git, MuJoCo, qpOASES

Unity Languages: Korean (Native), English (Fluent)

References

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