Yunsoo Seo

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Research Interest

My research interests lie at the intersection of **robotics and control, with a particular focus on locomotion, model based planning/control(e.g., MPC, DDP, MPPI) and multi-contact dynamics**. I am motivated by the challenge of enabling legged 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:

- Locomotion Control
- Footstep planning
- 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) ↗
Selected for recommendation for submission to the Journal of 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 (Ongoing):** Developing a robust controller for humanoid robots using Model Predictive Path Integral and Reinforcement Learning integrated with MJPC (MuJoCo MPC).
- **Humanoid footstep planner:** Implemented a ROS-based footstep planner to gen-

erate 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)
  Granted for outstanding academic performance and participation in a competitive internship program.
- **Engineering Education FESTA 2022**, Korea Institute for Advancement of Technology , Korea (Oct. 2022)
  Grand Prize winner for 6-DOF dual-arm manipulator project in a national engineering competition.
- 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)
  Awarded to students selected for academic exchange based on academic merit.
- **Academic Excellence Award**, 2020 Fall, University of Dongguk, Korea (Jan. 2021)
  Granted for achieving a GPA above 4.0/4.5 (top academic performance, equivalent to Dean's List).

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, TOEFL iBT 107 - R:26, L:29, S:28, W:24)

References

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