Yunsoo Seo

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Research Interest

My research focuses on **locomotion**, with an emphasis on **stochastic optimization** and **reinforcement learning**. I am broadly motivated by the challenge of enabling robust and adaptive motion for robots operating in dynamic and unstructured environments of daily life. Recently, I have been particularly interested in **combining reinforcement learning with model-based control** to integrate the efficiency of structured models with the flexibility of learning-based approaches.

Education

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

- **GPA**: 4.5/4.5 (WES: 4.0/4.0)
- **Advisor**: Myo Taeg Lim, Yisoo Lee (KIST)
- **Thesis:**
- **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 (WES: 3.42/4.0)
- **Coursework:** Calculus 1,2, Engineering Applications of Linear Algebra, Soft Robotics, Control Theory
- **Exchange Student Program** — Spring 2022
  University of Wisconsin–River Falls (**advisor:** Joseph Shakal)

Publications

Real-Time Model Predictive Control of Nonlinear Coupled Joints Using MPPI: Application to Humanoid Ankle Joints (submitted) — Sep. 2025
Gunoo Park, ***Yunsoo Seo***, Jaewan Bak, Eunchcol Im, Hoseok Lee, Jongbok Lee, Jongwon Lee, Yisoo Lee
IEEE INTERNATIONAL CONFERENCE ON ROBOTICS AND AUTOMATION (ICRA)

Real-time MPPI Control of a 3DoF Leg System with Contact Constraints Projected into Whole-Body Dynamics (submitted) — Aug. 2025
Yunsoo Seo, Myo Taeg Lim, Yisoo Lee
JOURNAL OF INSTITUTE OF CONTROL, ROBOTICS AND SYSTEMS (JICROS)

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, Jul. 2022 - Present

- Center for Humanoid Research
- **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 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

Mechanical Automatic Control(MAC), Dongguk University — 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, Korea University, BK21 Center (Fall 2024)
- Industry-Academia Internship Scholarship, Dongguk University, Scholarship Office (Mar. 2023)
  Granted for outstanding academic performance and participation in a competitive internship program.
- **Engineering Education FESTA 2022**, Korea Institute for Advancement of Technology (Oct. 2022)
  Grand Prize winner for 6-DOF dual-arm manipulator project in a national engineering competition.
- University Innovation Program Scholarship, Dongguk University, National Off-Campus Scholarship (Sep. 2022)
- **Exchange Program Tuition Scholarship**, Dongguk University, Global Scholarship Office (Mar. 2022)
  Awarded to students selected for academic exchange based on academic merit.
- **Academic Excellence Award**, 2020 Fall, Dongguk University (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

- Locomotion and Manipulation Research Group, Korean Robotics Society (KROS)
- 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

- Center for Intelligent & Interactive Robotics
- Worked as an intern researcher focusing on the development of the Center of Mass (CoM) trajectory generator for humanoid robots

Mechanical Automatic Control (MAC) — Member, Mar. 2022- Jan. 2024

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

Korean Student Association — Treasurer, Spring 2022

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

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

- Dongguk University
- Organized study sessions focused on robotics, 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

Languages: Korean (Native), English (Fluent, TOEFL iBT 107 - R:26, L:29, S:28, W:24)

References

MyoTaeg Lim, Professor
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Yisoo Lee, Principal Research Scientist
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