Yoon Ji Won

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Welcome to My CV!

I am a robotics researcher who enjoys understanding and designing systems through the lens of dynamics. From physical prototyping to simulation and control, I approach problems by grounding them in models that reflect how robots actually move, react, and interact with the world. My work integrates hands-on hardware development with model-based reasoning, and I'm particularly drawn to challenges where analytical structure and physical intuition come together.

Thank you for your interest in my work.

Education

Korea University, BS in Mechanical Engineering   Mar 2019 – Feb 2026

- GPA: 3.67/4.0(Overall), 3.74/4.0(Major)
- **Coursework: Robotics, Mechatronics, Dynamics, Microprocessor Programming, Numerical Analysis**
- Military Service: Republic of Korea Air Force (June 2021 – Mar 2023)

Experience

Research Internship, KIST–Korea Institute Science and Technology, Seoul   June 2024 – Aug 2025

- Robogram Lab(Advisor: Dr. Yong Seok Ihn)
- Built real-time control systems and applied optimal controllers (PID, LQR, MPC) for torque-controlled arms using EtherCAT and C++/MATLAB.
- Designed and fabricated a compact 2-DoF wrist module with high backdrivability, and validated the design through FEA and physical testing.

Publications

1. Optimization of Shoulder Joint Frame Angles for Torque and Energy Performance Improvement in 7-DOF Humanoid Arms.   Feb 2025

Jiwon Yoon, Yong Seok Ihn*

Korea Robotics Society Annual Conference (KRoC), Excellence Undergraduate Paper Award

2. Optimization Framework of the Shoulder Base Frame Initial Angle for Enhanced Dynamic Performance in a Humanoid Robotic Arm.   Oct 2025

Jiwon Yoon, Sujin Lee, Yong Seok Ihn*

International Conference on Intelligent Robots and Systems (IROS), Accepted for Oral Presentation

Projects

Dynamic Workspace Optimisation of KAPEX Humanoid Arm(KIST)   Nov 2024 – Mar 2025

- Developed and experimentally validated a multi-metric optimisation framework for adjusting the shoulder base angles of KIST's dual-arm humanoid robot (KAPEX), integrating torque efficiency, energy consumption, and overload ratio. Implemented effective workspace analysis using a hybrid MuJoCo–RBDL simulation to demonstrate an 18.4% workspace expansion and improved task performance. (Published at IROS 2025)
- Tools Used: Python, C++, MuJoCo, Isaac sim

Design and Prototyping of a Compact Parallel Wrist Module for KAPEX Humanoid Robots(KIST)   Nov 2024 – June 2025

- Designed, fabricated, and assembled a compact 2-DoF wrist module (75×45mm) featuring a parallel-drive architecture optimised for high backdrivability and joint torque efficiency. Developed a forward kinematics model for the non-conventional mechanism and validated the structural robustness through finite element analysis (FEA) prior to machining. Led full-cycle development from CAD modelling and tolerance specification

to part manufacturing, hardware integration, and functional testing on the KIST humanoid platform.

- Tools Used: SolidWorks, MuJoCo, Matlab

Real-Time Control System Development for Torque-Controlled Robotic Arms(KIST)
June 2024 - Sep 2024

- Built a real-time control architecture using EtherCAT communication, EPOS4/ELMO motor drivers, and BLDC actuators. Implemented DH-based forward kinematics and Jacobian computation in C++/MATLAB, and applied PID, LQR, and MPC controllers for trajectory tracking and stability improvement.
- Tools Used: C, C++, MATLAB-Simulink

Design and Control of a Low-Cost Quadruped Robot with SLAM and Obstacle Avoidance(Korea University CCP Project)
June 2024 - Jan 2025

- Led the mechanical and control system design of a custom-built quadruped robot equipped with Jetson Nano and Intel Realsense D435 for visual-inertial ORB-SLAM3-based localisation. Developed a motor control framework using ROS2 and ros2_control, and applied Simulink-based plant modelling to derive torque requirements, leading to optimal actuator selection. (Awarded the President's Prize)
- Tools Used: C, C++, Ros2, MATLAB-Simulink, SolidWorks

Design and Fabrication of a Sun-Tracking Smart Parasol(KU Creative Design Contest)
June 2023 - Sep 2023

- Developed a 2-DoF solar-tracking parasol system using light sensors and passive joint structures to autonomously adjust tilt based on solar position. Executed full-cycle development including CAD-based mechanical design, gear ratio calculation, shading area optimisation, and energy efficiency analysis. Independently acquired machining skills (welding, grinding) to fabricate and assemble the frame within budget constraints; awarded Bronze Prize for system integration and creativity.(Awarded the 3rd Prize)
- Tools Used: Nx, Creo, Arduino Mega

Awards and Scholarship

Semester High Honors, Korea Univesity	2023, 2025
3rd Place, Creative Design Contest, Korea Univesity	2023-2024
Project Excellence Award, HD Hyundai XiteSolution	2023
Award of Recognition, , Gyeonggi Provincial Council	2024
3rd Place, Inter-Department Basketball Tournament, Korea University	2024
Excellence Paper Award, Korea Robotics Society Annual Conference	2025
University President's Award, Creative Challenge Program, Korea University	2025
Merit-based Scholarship, Seoul Scholarship Foundation	2024
Korea University Student Excellence Scholarship, Korea University	2023-2025
Government National Scholarship, Korea Student Aid Foundation	2019, 2024-2025

Technologies

Languages: C, C++, Python, Matlab, Latex

Tools: SolidWorks, Nx, Creo, Matlab-Simulink, MuJoCo, Isaac sim, Ros2, Arduino, Jetson Nano