

# Sungjun Lee

HARDWARE DESIGN ENGINEER

□ (+82) 10-9351-0324 | □ sungjun1107@g.skku.edu | □ jun117

*"The Only Easy Day Was Yesterday."*

## Education

### Department of Intelligent Robotics, Sungkyunkwan University

MASTER STUDENT

Suwon, S.Korea

Mar. 2025 - Present

- Robotics Innovatory Lab under the supervision of Prof. Hyouk Ryeol Choi
- Total GPA of 4.33 / 4.5 (Credits taken: 15 / 24)

### School of Mechanical Engineering, Sungkyunkwan University

B.S. IN MECHANICAL ENGINEERING

Suwon, S.Korea

Feb. 2021 - Feb. 2025

- Total GPA of 4.0 / 4.5 (Credits taken: 132 / 130)
- Major GPA of 4.0 / 4.5 (Credits taken: 71 / 63)

## Research Interests

Mechanism Design for Multi-jointed Robots (Humanoid & Quadruped)

## Internships

### Robotics Innovatory Lab, Sungkyunkwan University

Suwon, S.Korea

Jun. 2023 - Oct. 2024

UNDERGRQDUATE RESEARCHER

- Development of a Small-Sized Quadruped Robot
- Methodology for Moment of Inertia Estimation for Precision Dynamic Control

## Research Experience

### Development of a 21-DoF Adult-Sized Humanoid Robot

Suwon, S.Korea

Mar. 2025 - Present

MASTER PROGRAM | TEAM LEAD (2026) / MEMBER (2025) & HARDWARE DESIGN ENGINEER

- Designed an 11-DoF humanoid upper body comprising two 4-DoF arms, a 1-DoF torso, and a 2-DoF neck, utilizing structural optimization for mass reduction.
- Designed custom PCBs for robust power distribution, regulating a 48V main supply into multiple voltage levels to support actuators and onboard electronic systems.
- Achieved whole-body system integration of the 21-DoF humanoid by combining the 11-DoF upper body with a 10-DoF lower body.
- Currently conducting bipedal locomotion experiments using various control strategies, including Model Predictive Control (MPC), Reinforcement Learning, and Imitation Learning.
- Planning to integrate wrist joints and 8-DoF robotic hands while developing an XR-based teleoperation system for upper body control.

### Force Feedback Leader Arm for High Quality Demo Data using F/T Sensor

Suwon, S.Korea

Mar. 2025 - Feb. 2026

MASTER PROGRAM | TEAM MEMBER & HARDWARE DESIGN ENGINEER

- Developed a Force-Feedback Leader Arm system to acquire high-quality demonstration data for Imitation Learning, overcoming the sensory limitations of vision-only teleoperation in contact-rich tasks.
- Assisted in Leader Arm hardware design and developed URDF models for both Leader and Follower systems to enable precise kinematic synchronization.
- Integrated F/T sensors, cameras, and grippers into the Follower URDF, ensuring accurate digital twin representation for multi-modal data acquisition.

### Methodology for Moment of Inertia Estimation for Precision Dynamic Control

Suwon, S.Korea

Jul. 2024 - Oct. 2024

UNDERGRADUATE PROGRAM | TEAM MEMBER & HARDWARE DESIGN ENGINEER

- Developed an MoI estimation system to bridge discrepancies between CAD models and actual fabricated components.
- Mathematically modeled force distribution across four load cells to map sensor data to physical properties.
- Implemented a three-stage Kalman Filter system to precisely estimate total weight, Center of Gravity (CoG), and  $I_{xx}$ ,  $I_{yy}$ ,  $I_{zz}$ .

## Development of a Mobile Manipulator for Medical Assistance

Suwon, S.Korea

UNDERGRADUATE PROGRAM | TEAM MEMBER & HARDWARE DESIGN ENGINEER

Mar. 2024 - Oct. 2024

- Developed an Arduino-based, 3D-printed mobile manipulator featuring a 3-DoF manipulator and autonomous line-tracking system.
- Validated performance by executing a full-cycle task: autonomous navigation followed by 200g payload object pick-and-place.
- Achieved high operational reliability with a manipulation error rate of under 10%, meeting all initial design specifications.

## Development of a Small-Sized Quadruped Robot

Suwon, S.Korea

UNDERGRADUATE PROGRAM | TEAM MEMBER & HARDWARE DESIGN ENGINEER

Jun. 2023 - Jun. 2024

- Designed a 30kg quadruped robot capable of climbing stairs and high-speed travel (2.5 km/h) with a 5kg payload.
- Calculated joint torques and angular velocities using Bezier curve gait trajectories to optimize motor selection.
- Designed an actuator pack equipped with a first-stage planetary gear system featuring an 11:1 reduction ratio.

## Honors & Awards

---

**First Prize (President's Award of KIRIA)** RED (Robot Engineering & Design) Show, KRoC 2026

Pyeongchang, S. Korea

## Conferences

---

### KRoC 2026 (Korea Robotics Society Annual Conference)

Pyeongchang, S.Korea

FIRST AUTHOR & POSTER PRESENTER FOR <OPTIMAL DESIGN OF A 9-DOF UPPER BODY FOR A HUMANOID ROBOT>

Feb. 2026

- Proposed an optimized 9-DoF upper body mechanism to enhance the range of motion and structural stability of a humanoid robot.
- Engineered multi-jointed systems and strategic actuator placement to achieve high-performance upper body manipulation.

## Teaching Experience

---

### Robotics Innovative Lab, Sungkyunkwan University

Suwon, S.Korea

UNDERGRADUATE RESEARCH MENTOR

Jan. 2026 - Present

- Supervising undergraduate students on the design and control of wrist & hand mechanisms for humanoid robots.
- Providing technical guidance on mechanical design, C++, and robot teleoperation.

### School of Mechanical Engineering, Sungkyunkwan University

Suwon, S.Korea

GRADUATE TEACHING ASSISTANT (DESIGN LAB ON VIBRATION AND DYNAMIC SYSTEMS)

Sep. 2025 - Dec. 2025

- Supervising undergraduate students on a term project involving basketball-robot development using Arduino and LEGO EV3 kits.
- Administered overall management responsibilities for the assigned laboratory section.

## Leadership & Activities

---

### School of Mechanical Engineering, Sungkyunkwan University

Suwon, S.Korea

GRADUATE RESEARCH ASSISTANT (BK21 PROGRAM)

Jan. 2026 - Present

- Coordinated administrative operations for the BK21 (Brain Korea 21) FOUR project.
- Spearheaded strategic planning and budget management for lab-wide participation in KRoC 2026.

### Student Council, School of Mechanical Engineering, Sungkyunkwan University

Suwon, S.Korea

HEAD OF SECRETARY DEPARTMENT (2024) / STAFF (2022 - 2023)

Mar. 2022 - Dec. 2024

- Planned and executed various departmental events and initiatives, contributing to overall student community engagement.
- Supported a wide range of tasks across multiple divisions, providing comprehensive operational assistance beyond departmental boundaries.

### Office of Student Affairs, Sungkyunkwan University

Suwon, S.Korea

ADMINISTRATIVE ASSISTANT (SCHOLARSHIP DIVISION)

Dec. 2023 - Aug. 2024

- Managed scholarship databases and assisted in the selection process for various financial aid programs.
- Provided administrative support to students and faculty regarding scholarship policies.

## Skills & Certifications

---

**Robotics/CAD** SolidWorks, Inventor, Nastran, ROS (Noetic)

**Programming** C/C++, MATLAB

**Certifications** Driver's License (2nd Class Ordinary)

**Languages** Korean (Native), English (Working Proficiency)