Yobel S. Lee

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Citizenship: United States and Republic of Korea

Robotics researcher with a mechanical engineering background in robot embodiment design, prototyping, and learning-based control. Developed custom robots from mechanism design through real-world validation. Built a PPO-based Unitree Go2 rough-terrain locomotion framework, including Actor–Critic observation and representation studies. Interested in body–policy co-design and morphology-conditioned predictive models that reason about how embodiment and actions shape future dynamics, toward task-optimized robot design and real-world validation.

EDUCATION

Bachelor of Science in Mechanical Engineering **2021.02 – 2025.02**
Sungkyunkwan University, Suwon

- GPA: 4.4/4.5, *Summa Cum Laude*
- Ranked **1st of 186** students in Mechanical Engineering

High School Diploma, Science Track **2018.02 – 2021.02**
Bugil Academy

EXPERIENCE

CATCH – Cute Anthropomorphic Torso-Tracked Convertible Humanoid **2026.07 – Present**
Independent Project

- Independently conceived, designed, fabricated, and assembled CATCH, a custom transformable humanoid integrating legged locomotion, tracked mobility, and lightweight manipulation within a single platform.
- Developing a design-to-learning pipeline spanning physics-based simulation, reinforcement-learning control, hardware deployment, and real-world validation.

Robotics Research Intern **2025.07 – 2026.01**
Lab. of Artificial Intelligence & Robotics, Sungkyunkwan University, Suwon

- Designed and evaluated five PPO-based Actor–Critic observation and encoding configurations for Unitree Go2 rough-terrain locomotion; using 32-D encoded terrain-scan latents for both Actor and Critic achieved the best overall performance across seven terrain types, including 80-cm gaps and 45-cm parkour steps. Project Repo
- Built a perceptive locomotion framework in NVIDIA Isaac Lab using heading-aware command sampling, ray-cast terrain sensing, and performance-based curriculum learning.

Robotics & ML Researcher **2025.02 – Present**
FineVT, Anyang · Alternative Military Service

- Developing the robot control layer for a Robot Control Agent system using a Jetson-based runtime and MCP/FastAPI interfaces to execute agent-generated target poses, verify inverse-kinematics feasibility, and return robot-state feedback.
- Developed and optimized a display-inspection segmentation model, achieving a best test IoU of 0.974 while improving data efficiency and real-time inference performance.
- Evaluated 432 preprocessing configurations and eight machine-learning models for hyperspectral internal-defect detection; Extra Trees achieved approximately 99.8% F1 across four fruit types, with improved robustness to illumination changes via brightness augmentation and SNV preprocessing.

Undergraduate Researcher **2024.01 – 2025.07**
Advanced Mobility and Robotics Lab, Sungkyunkwan University, Suwon

- Led the hardware design, prototyping, and control development of a worm-inspired colonoscopy robot using truss-based adhesive feet to enable alternating anchoring and slipping while maintaining continuous tissue contact.
- Experimentally validated continuous-contact horizontal crawling on ex vivo bovine colon tissue, with the robot reaching the distal end of the tested colon segment after 16 locomotion cycles; co-authored a manuscript under review.
- Led the development of a pipe-inspection robot combining soft materials and rigid structures, and designed a custom rack-and-pinion actuator that reduced actuator width by 7.8 mm; validated navigation and obstacle detection in dry, wet, and 30° inclined square pipes.

Makerspace Manager **2024.03 – 2025.02**
Center for Innovative Engineering Education, Sungkyunkwan University, Suwon

- Managed and operated advanced prototyping equipment including 3D printers, laser cutters, and other fabrication tools.
- Provided technical guidance and hands-on support to students using prototyping and manufacturing equipment.

Undergraduate Researcher **2024.07 – 2024.08**
Dynamic Robotics Systems Lab, Seoul National University, Seoul

- Designed and implemented a reinforcement-learning controller in C++ using ROS on Ubuntu 20.04.
- Adapted the controller for a 6-DoF Bolt bipedal robot in MuJoCo, focusing on sim-to-sim transfer from Isaac Gym.

Research Assistant **2023.09 – 2023.12**
Smart Factory Capstone Design Course, Sungkyunkwan University, Suwon

- Implemented and evaluated a 5-way 5-shot Prototypical Network on the CUB-200 dataset, comparing accuracy across varying numbers of training and validation episodes.
- Surveyed few-shot learning methods and industrial surface-defect datasets to assess practical approaches for data-efficient visual defect classification.
- Contributed to the literature review and Related Work section of a peer-reviewed conference paper on multi-optical machine-vision inspection for OLED manufacturing.

Intern, Sensor Development Team **2023.06 – 2023.09**
AIDIN, Anyang

- Contributed to the development of a custom magnetic absolute encoder utilizing an iC-Haus chip for enhanced resolution.
- Designed schematics and PCB layouts using Altium CircuitMaker.

Undergraduate Researcher **2022.12 – 2023.02**
Robotics and Intelligent System Engineering Lab, Sungkyunkwan University, Suwon

- Designed and implemented a PID control system with gravity compensation using Arduino to control the position and speed of a 1-DoF rigid body.
- Modeled and implemented a gearbox system using Simulink.

PUBLICATIONS & MANUSCRIPTS

A strain-triggered pseudo-gel transition for instantaneous and reversible adhesion switching
Cho, Y., Kim, M., Lee, J., Kim, H., Kim, J., **Lee, Y. S.**, Yeo, S., Choi, J., Lim, H., Kim, K., & Baik, S.
Manuscript under review, 2026.

Design and Implementation of AI Machine Vision Inspection System with Multi-Optical Images for OLED Film Manufacturing
Kim, T.-Y., Oh, S., Lee, S.-M., **Lee, S.**, Hwang, S., & Jeong, J.
2023 IEEE/ACIS 8th International Conference on Big Data, Cloud Computing, and Data Science (BCD), pp. 130–135, 2023.

TEACHING & OUTREACH

Special Lecturer: Autonomous Driving & Edge AI **2025.10 – 2025.11**
MAICON, Ministry of National Defense / Republic of Korea Air Force

- Co-developed and delivered a hands-on autonomous-driving curriculum using Omo Robots and Jetson Nano, covering dataset labeling, YOLOv8-based perception, and PID/sliding-window navigation.

AWARDS & HONORS

National Science and Technology Scholarship **2023.03 – 2025.02**
Korean Government

- Awarded to STEM students demonstrating outstanding academic performance during their freshman and sophomore years.
- Received full-tuition scholarship support through graduation ($3,500 per semester).

Highest Honor Award – Co-Deep Learning Project **2024.09 – 2025.01**
Center for Innovative Higher Education, Sungkyunkwan University

- Awarded the Highest Honor as team leader for innovation in system design, hardware integration, and field-navigation performance.

SKILLS

- **Programming & Machine Learning:** Python, C/C++, MATLAB, PyTorch
- **Robotics & Simulation:** ROS/ROS2, NVIDIA Isaac Lab, MuJoCo, Gazebo
- **Hardware Design:** Autodesk Inventor, Altium CircuitMaker
- **Prototyping:** 3D Printing, Laser Cutting