YoungChae Son



I am **YoungChae Son**, a Ph.D. student at Dongguk University in Seoul, working with Prof. Soo-Chul Lim in the Interactive Robotics Lab. My research focuses on robot learning and planning with vision-language foundation models, including Vision-Language Models (VLMs) and Vision-Language-Action (VLA) models. I am particularly interested in enabling robots to make adaptive decisions in real-world environments where task-relevant information may be incomplete, ambiguous, or change during execution. My work explores multimodal perception, task planning, and adaptive manipulation, with an emphasis on integrating and prioritizing sensory observations for long-horizon execution on real robotic systems.

+82-10-4038-7473 | yc991122@naver.com | youngchae912.github.io | Seoul, South Korea

Education

2025 – Present
Dongguk University — *Seoul, South Korea*
Ph.D. in Mechanical Engineering
Interactive Robotics Lab | **Advisor:** Prof. Soo-Chul Lim

2023 – 2025
Dongguk University — *Seoul, South Korea*
M.S. in Mechanical Engineering
Interactive Robotics Lab | **Advisor:** Prof. Soo-Chul Lim

2021 – 2023
Tech University of Korea — *Siheung, South Korea*
B.S. in Mechatronics Engineering
[2018 – 2021] Seoul National University of Education, Self-Education in Home Economics

Publications

Journal Article 2026
See Selectively, Act Adaptively: Dual-Level Structural Decomposition for Bimanual Robot Manipulation
Yoon-Ji Choi, **YoungChae Son**, Soo-Chul Lim*
Under Review

Journal Article 2026
Task-Aware Modality Selection for Multimodal VLA in Robotic Manipulation
YoungChae Son†, Jung-Woo Lee†, Yoon-Ji Choi, Dae-Kwan Ko, Soo-Chul Lim*
Under Review

Journal Article 2026
ThermoAct: Thermal-Aware Vision-Language-Action Models for Robotic Perception and Decision-Making
YoungChae Son†, Dae-Kwan Ko†, Yoon-Ji Choi, Soo-Chul Lim*
IEEE Robotics and Automation Letters (RA-L)

Conference Paper 2026
A Nonmagnetic Stepper Motor for the Automatic Evaluation of Magnetic Field Uniformity in Helmholtz Coils
YoungChae Son†, Sung-Jung Joo†, Po-Gyu Park, Changjin Yun, Soo-Chul Lim*, Hyung-Kew Lee*
IEEE Conference on Precision Electromagnetic Measurements (CPEM)

Journal Article 2026
MulPlanLM: Multimodal Robotic Task Planning with Vision-Language Models and Physical Feedback
YoungChae Son, Dong-Han Lee, Soo-Chul Lim*
Intelligent Service Robotics

Conference Paper 2022
The Remote Robotic Arm Control Using Inertial Sensor and Image Recognition
Ki-Jun Han, **YoungChae Son**, Yang-Hee Lee*
Korean Society for Precision Engineering (KSPE)

Conference Poster 2022
High SNR and High Frame Rate Analog Front-End ICs with Active Stylus for Capacitive Touch Screen Panels
YoungChae Son, Jae-Sung Ahn*
Europe-Korea Conference on Science and Technology (EKC), Marseille, France

Funded Research Projects

Jul. 2025 – Present

Development of Intelligent Autonomous Manipulation Technology for Humanoids with Reduced Dependency on Real-World Data

Humanoid Manipulation, Data-Efficient Learning, Robot Foundation Models | **Agency:** Ministry of Science and ICT (MSIT)

• Developing data-efficient humanoid manipulation models that reason about task intent and context using limited real-world demonstrations.
• Targeting a 90% reduction in real-world training data compared to conventional imitation learning, with validation across at least five everyday service tasks.

Mar. 2025 – Present

Robot Motion Generation AI Based on Multimodal Vision/Tactile Information Driven by Language Model

Multimodal Robot Learning, Vision/Tactile Perception, Language Models | **Agency:** National Research Foundation of Korea (NRF)

• Constructing multimodal manipulation datasets integrating 2D/3D vision, force/torque, tactile sensing, and robot state information.
• Developing language-conditioned robot foundation models for physically grounded manipulation of rigid and deformable objects.

Aug.–Dec. 2024

Collecting Large-Scale Robot Manipulation Data in Physical Environment

Robot Data Collection, Manipulation, NVIDIA Isaac Gym | **Agency:** National Information Society Agency (NIA)

• Constructed over 216,000 multimodal data pairs covering more than 200 object types in real-world and Isaac Gym simulation environments.
• Compiled over 100,000 Korean/English manipulation descriptions (1M+ tokens), alongside visual, 3D point cloud, force/torque, and tactile data.

Personal Projects

Technical

Task Integration with a VLM Planner and VLM Monitor

Long-Horizon Manipulation, VLM Planning, Execution Monitoring [Video]

• Integrated a VLM-based planner and execution monitor with reusable VLA skills for long-horizon robot manipulation.
• Developed skill-sequencing and step-wise execution monitoring in collaboration with Yoon-Ji Choi, Dae-Kwan Ko, and Jung-Woo Lee.

Technical

Real2Sim Digital Twin for VLA Data Collection

NVIDIA Isaac Sim, Robot Teleoperation, VLA Data Collection [Video]

• Built a digital twin of a real tabletop manipulation scene in NVIDIA Isaac Sim.
• Used Meta Quest Pro teleoperation with eye tracking to collect multi-view demonstrations for VLA training.

Technical Skills

Programming & Tools	C++, Python, PyTorch, ROS 2, Hugging Face Transformers
Robot Learning	VLMs, VLAs, Imitation Learning, Multimodal Learning, LoRA Fine-Tuning
Robotics & Simulation	UR5e, RBY1 Humanoid, Kinova Gen3 Lite, NVIDIA Isaac Sim, Isaac Gym, XR Teleoperation (Meta Quest Pro)
Perception & Sensing	Force/Torque Sensing, Tactile Sensing, Thermal Sensing, Eye Tracking

Patents

Apr. 2026

Multimodal Robot System for Task-Context-Based Selective Sensory Utilization

Korean Patent Application No. 10-2026-0073734

Apr. 2026

Method, Apparatus, System, and Computer-Readable Recording Medium for Robot Control Using Thermal Image Information

Korean Patent Application No. 10-2026-0067117

Presentations

Dec. 2026
GazeProjectionVLA: Multi-View Gaze Guided Attention for Humanoid Robot Manipulation
The 6th Military Robotics Society Annual Conference, Jeju, Republic of Korea

Oct. 2026
ThermoAct: Thermal-Aware Vision-Language-Action Models for Robotic Perception and Decision-Making
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Pittsburgh, PA, USA

Jun. 2026
Selective Perception for Robot: Task-Aware Attention in Multimodal VLA
Robot Learning Research Group Workshop, Korea Institute of Industrial Technology (KITECH), Republic of Korea

Feb. 2026
ThermoAct: Thermal-Aware Vision-Language-Action Models for Robotic Perception and Decision-Making
Locomotion & Manipulation / Robot Learning Research Groups, Korea Robotics Conference (KRoC), Pyeongchang, Republic of Korea

Honors & Awards

Sep. 2025 – Present
Global Outstanding Talent Scholarship
Full tuition waiver for Ph.D., Dongguk University

2026
Best Paper Award
BK21 FOUR AIMS Center Winter Conference, Dongguk University

2022
Grand Prize (1st Place), Transfer Student Mentoring Testimonial
Tech University of Korea

2022
Grand Prize (1st Place), English Presentation Contest
Tech University of Korea

Teaching & Work Experience

Spring '24, '25, '26
Teaching Assistant, Autonomous Robotics
Dongguk University | *Autonomous driving lab using ROS 2 and TurtleBot3 Burger*

Fall 2024
Teaching Assistant, Computational Mechanics
Dongguk University

Fall 2023
Teaching Assistant, Fluid Mechanics
Dongguk University

Oct. 2022 – Jun. 2023
Interactive Robotics Lab, Dongguk University
Undergraduate Research Intern