

Jeonghan Kim

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Research Interests

My research interests focus on robot path and motion planning for high-dimensional, constraint-rich environments. I aim to research real-time planning and control methods related to optimization-based planning, diffusion-based planners, and constraint-aware approaches under equality and inequality constraints.

Education

Hanyang University(ERICA)

B.S. in Robot Engineering, minor in Electronic Engineering

- GPA: 3.91 / 4.5; Major GPA: 4.13 / 4.5

Ansan, South Korea

Mar. 2018 - Feb. 2024

Professional Experience

Roboe Technologies

Software Engineer, Motion Algorithm Team

- Developed reachability-based workspace analysis and optimization tooling for conveyor-mounted mobile robots.
- Implemented conveyor jamming detection and optimized PointCloud2 filtering to operate at 20 Hz.
- Built a Behavior Tree-based motion-task framework for modular pick-and-place execution.
- Deployed a production pick-and-place system with throughput of 250-300 boxes per hour.
- Implemented C++ motion planning algorithms for moveL and moveJ trajectories in virtual controllers.

Seoul, South Korea

Mar. 2024 - Present

Gole Robotics

Intern, Autonomous Driving Software

- Implemented a packet-based serial communication library aligned with embedded controller protocols.
- Benchmarked IMU, LiDAR, ToF, and barometer candidates using mean/variance analysis and PlotJuggler to support sensor selection.
- Standardized the team development environment with Docker, Docker Compose, VS Code, Git, ROS, and ROS2.

Seoul, South Korea

Aug. 2023 - Oct. 2023

Research Experience

RAISE Lab (Prof. Youngmoon Lee)

Undergraduate Researcher

- Conducted undergraduate research on manipulator-based HRI systems, focusing on robot motion planning, control, and system integration.
- Developed perception and planning modules for a mobile-robot patrol project under Prof. Youngmoon Lee's supervision.

Hanyang University

Jan. 2023 - Feb. 2024

Publications

Snapbot: Enabling Dynamic Human-Robot Interactions for Real-Time Computational Photography

C. Choi, J. Kim, Y. Nam, and Y. Lee

- Developed an end-to-end HRI system integrating perception, control, and computational photography for dynamic camera composition.
- Designed a control loop that minimizes the angular difference between human head pose and the robot TCP direction using head pose estimation.
- Implemented manipulator velocity control based on pseudo-inverse Jacobian formulation for smooth camera motion.

ACM/IEEE HRI 2024

Boulder, USA

Separable Integrated Drone-Mobile Robot System for Unmanned Patrol

J. Kim, J. Park, H. Lee, S. Park, Y. Nam, G. Kwon, W. Jung, and Y. Lee

- Proposed a cooperative drone-mobile robot platform enabling energy-efficient patrol and terrain coverage.
- Paper received the Undergraduate Best Paper Award, ICROS 2023.

ICROS 2023

Samcheok, South Korea

Selected Projects

Planning - Python 3D Path Planning Library

GitHub (Open Source)

Creator & Main Contributor

Sep. 2025 - Present

- Built a Python path-planning library with a unified planner architecture and Viser-based visualization for RRT, RRT-Connect, RRG, RRT*, Informed RRT*, PRM, and PRM*.
- Extended the library with N-dimensional planning support, terrain-aware Riemannian metric costs, and diffusion-based trajectory planning examples.

Snapbot: Computational Photography and HRI Robot

Hanyang University

Manipulator Control & Perception

Sep. 2023 - Dec. 2023

- Developed a manipulator-based computational photography robot that tracks people and selects camera poses for dynamic human-robot interaction.
- Built a YOLO/depth-based human perception pipeline to estimate the relative TF between the robot and a detected person.
- Implemented inverse-kinematics closed-loop manipulator control with filtering and damped pseudo-inverse singularity avoidance.
- Contributed to system implementation and experiments for KROC 2024 and ACM/IEEE HRI 2024 papers.

Separable Drone-Mobile Robot System for Unmanned Patrol

Hanyang University

Project Lead

Jan. 2023 - Jun. 2023

- Led development of an integrated drone-mobile robot system where a ground robot carries, charges, and deploys a drone for last-mile patrol over rugged terrain.
- Designed ROS architecture, indoor/outdoor autonomous operation, app-to-ROS interface, and point-cloud based terrain perception modules.
- Fused IMU, GNSS, and wheel odometry with Kalman filtering to reduce localization error to 0.5%.
- Presented the work as an ICROS 2023 workshop paper and received the ICROS 2023 Undergraduate Best Paper Award.

ERIC_A: Indoor Autonomous Delivery Robot

Hanyang University

Project Lead

Sep. 2022 - Dec. 2022

- Led an 8-member indoor delivery robot project integrating web order dispatch, ROS navigation, and YOLO-based human detection.
- Improved odometry error from 5–10% to 1% through IMU/encoder Kalman-filter fusion.
- Achieved 30 mm \pm 1 destination accuracy at 0.5 m/s average robot speed.

Honors & Awards

DOMESTIC AWARDS

Nov. 2023 **IITP President Award**, SW Talent Festival (National Capstone Competition)

South Korea

Jun. 2023 **Top Award**, Intelligent Robot AI Idea Competition

South Korea

Aug. 2022 **2nd Place**, Ansan Young Innovators Design Thinking Workshop

South Korea

Jul. 2022 **1st Prize**, Cancer Patient Care and Health Product Idea Competition

South Korea

Aug. 2021 **1st Prize**, ODA Idea Competition

South Korea

Teaching & Service

IIEP Tanzania International Science Volunteer

Arusha, Tanzania

Volunteer

Jan. 2024

- Participated in an international science volunteer program.
- Contributed to science education.

HYMEC - Robot Making Club

Ansan, South Korea

Management Lead / Club President

Jan. 2021 - Dec. 2022

- Served as management lead and later club president for the robotics club.
- Organized mobile-robot mission hackathons and peer robotics activities.

Tutoring Mentor

Ansan, South Korea

- Mentored students in Git, ROS/ROS2, and Docker.

Technical Skills

Programming C/C++, Python

Robotics ROS2, ROS1, MoveIt2, motion planning, collision detection

Perception & Geometry PointCloud2 processing, Open3D

Tools Git, Docker, Ray, PyTorch, pytest, mypy, ruff, uv

Robot Platforms UR e-Series, RB20, TM20, HDR20-17, mobile robots