

Jeon Ho Kang

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RESEARCH INTERESTS

Robot Learning, Robotic Manipulation, Vision for robotic autonomy, Human-robot Interaction for collaborative manufacturing tasks, Task and Motion Planning

EDUCATION

University of Southern California

Ph.D. in Mechanical Engineering (Robotics)

MAY 2027 (Expected)

University of Southern California

Master of Science, Mechanical Engineering – Robotics and Automation

MAY 2023

GPA: 3.90/4.00

University of Southern California

Bachelor of Science, Mechanical Engineering

MAY 2022

GPA: 3.77/4.00 (major), 3.50/4.00 (overall)

PUBLICATIONS

- **J.H. Kang**, P. Limcaoco, N. Dhanaraj, S.K. Gupta. Safe Robot to Human Tool Handover to Support Effective Collaboration. ASME Mechanisms and Robotics in Engineering Conference, Boston, MA, August 2023
- **J.H. Kang**, N. Dhanaraj, S. Wadaskar, and S.K Gupta, Using Large Language Models to Generate and Apply Contingency Handling Procedures in Collaborative Assembly Applications, 2024 IEEE International Conference on Robotics and Automation (ICRA), Yokohama, Japan, 2024
- **J.H. Kang**, N. Dhanaraj, O. Manyar, S. Wadaskar, and S.K. Gupta. A Task Allocation and Scheduling Framework to Facilitate Efficient Human-Robot Collaboration in High-mix Assembly Applications. ASME Manufacturing Science and Engineering Conference, Knoxville, TN, June 2024 [**Best Paper Award Second Place**]
- N. Dhanaraj, **J. H. Kang**, A. Mukherjee, H. Nemlekar, S. Nikolaidis, and S.K. Gupta. Multi-robot task allocation under uncertainty via hindsight optimization. IEEE International Conference on Robotics and Automation, Yokohama, Japan, May 2024
- **J.H. Kang**, R. Shukla, M. Mehta and S.K. Gupta, A Learning Framework for Enabling Robots to Autonomously Dispense Granular Material On-demand. ASME Computers and Information in Engineering Conference, Washington, DC, August 2024.
- **J.H. Kang**, S. Joshi, R. Huang and S.K. Gupta, Robotic Compliant Object Prying Using Diffusion Policy Guided by Vision and Force Observations. IEEE Robotics and Automation Letters.

PROJECTS

Compliant Object Prying for Battery Disassembly | Video: [Link](#) APR 2024 – Present

- Used Diffusion model to enable robot learning of compliant object prying using vision and force feedback
 - First attempt in the literature to apply vision and force feedback for manufacturing task
 - Achieved 55% improvement compared to vision-only baseline
- Project Website: [Link](#)

Robotic Granular Material Scooping

SEP 2023 – APR 2024

- Successfully implemented the development of robotic motion planning algorithms, enabling precise mg-scale scooping of granular materials with high accuracy and minimal tolerance.

Human-Robot Team Task Allocation and Failure Recovery | Video: [Link](#)

JAN 2023 – OCT2023

- Developed a full ROS pipeline for task scheduling and failure recovery for human and multi-robot teams enabling real-world robotic cell deployment with the industry partners

- Designed and developed a GUI using QT software, allowing industry partners to easily manage and visualize Hierarchical Task Networks for the robotic assembly cell

Human-Robot Interaction: Safe Manufacturing Tool Handover | Video: [Link](#) JAN 2022 – AUG 2022

- Conducted research on safe human-robot interaction with tool affordance aware pick and place pipeline and systems to ensure safe robot to human tool handover
- Developed full robotic pipeline from servo-actuated gripper to UR5 motion planning package
- Developed point cloud segmentation algorithm to detect 6-DOF pose
- Trained deep neural network object detection and segmentation for tool-end localization and angle detection using Pytorch
- Proposed a novel hybrid soft and rigid gripper design for gripping objects with irregular shapes

Demo Video: [Link](#)

EXPERIENCE

Realization of Robotic Systems Lab, USC AUG 2021 – MAY 2022
Graduate Research Assistant (Center for Advanced Manufacturing) Los Angeles, CA

- Developed cross-attention mechanism that boosts the performance of sensory fusion between force and vision in robotic policy learning using diffusion model
- Integrated Large Language Model (LLM) with Hierarchical Task Network for failure recovery in resilient factory demonstrated in Isaac sim with mobile vehicle navigation and robot arm motion planning
- Trained and deployed Mask-RCNN and YOLO object detection model for smart robotic assistant application for fetching tools for human operator

Versa Products Inc FEB 2022 – MAY 2022
Engineering Intern Los Angeles, CA

- Reduced shipping cost by 20 percent by implementing a corrugated box-only design for desks using a Gerber machine.

REPUBLIC OF KOREA ARMY JUN 2017 – FEB 2019
Sergeant DMZ, Korea, Republic of

- Served in the military in a demilitarized zone in South Korea as a Thermal Observational Device operator.

TECHNICAL SKILLS

Programming: C/C++, Python, Linux

Libraries: Pytorch, TensorFlow, MoveIt, ROS/ROS2, OpenCV, Open3D

Simulation Software: Isaac Sim, Mujoco, Webots, Gazebo

Robots: KUKA LBR iiwa, UR5/10, Yasakawa, ABB IRB

Developer Tools: Git, CUDA, Docker

TEACHING EXPERIENCE

Aerospace and Mechanical Engineering Dpt. - USC AUG 2023 – DEC 2023
Teaching Assistant for Foundation of Manufacturing Automation Los Angeles, CA

Aerospace and Mechanical Engineering Dpt. - USC AUG 2022 – DEC 2022
Teaching Assistant for Thermodynamics Los Angeles, CA

HONORS & AWARD

- Best Conference Paper Award (Second Place). Won the conference-wide Best Paper Award at the (ASME MSEC 2024)
- Selected as the recipient of the NSF Travel Award for the 2024 NAMRC/MSEC Conferences
- Dean's List for consecutive semesters from Spring 2020 to Spring 2022 (University of Southern California)