

# Chaerim Moon

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## Research Area

**Design and implementation of heterogeneous robotic system architectures** that account for robot morphologies, task requirements, and environmental constraints; validated in simulation and on robotic hardware.

Representative research project domains include:

- Whole-body coordination for quadruped locomotion
- Human-in-the-loop multi-limb manipulation [🔗 project page](#)
- Human-robot non-verbal communication [🔗 project page](#)
- Wearable and industrial robot mechanism design

## Education

<b>University of Illinois Urbana-Champaign, Champaign, IL</b> (GPA: 4.0/4.0)	Aug 2022 – Present
PhD candidate in Mechanical Science and Engineering	
Dissertation (proposed): Constraint-Driven Motion Planning Architectures for Heterogeneous Robotic Systems	
<b>Korea University, Seoul, Korea</b> (GPA: 4.0/4.0)	Mar 2020 – Feb 2022
MS in Mechanical Engineering	
Dissertation: A lower-back exoskeleton with a four-bar linkage structure for providing extensor moment and lumbar traction force	
<b>Korea University, Seoul, Korea</b> (GPA: 4.0/4.0 (major), 3.92/4.0 (overall))	Mar 2016 – Feb 2020
BS in Mechanical Engineering; Graduated with <b>Great Honor</b>	
Exchange program: Western University, ON, Canada (Fall 2018 – Spring 2019)	

## Honors

<b>Kwanjeong Overseas Fellowship, Kwanjeong Educational Foundation</b>	Fall 2022 – Present
Selected as the representative scholarship recipient	
Delivered the representative address at the award ceremony	
<b>Korea Technocomplex Scholarship, Korea Technocomplex</b>	Spring 2020 – Fall 2020
Awarded to top-ranked incoming graduate students	
<b>National Science and Engineering Scholarship, The Government of Korea</b>	Spring 2018 – Fall 2019
Awarded to selected STEM students nationwide; full tuition coverage	
<b>Hyunsong Scholarship, Hyunsong Educational and Cultural Foundation</b>	Spring 2017 – Fall 2019
Awarded upon department nomination for academic excellence	

## Publications

- [1] **Chaerim Moon** and Joohyung Kim, "Strategies for Moment Compensation in Supernumerary Robotic Limbs Manipulation Tasks", *IEEE International Conference on Robot and Human Interactive Communication (RO-MAN)*, 2024. [🔗 paper](#) [🔗 video](#)  
■ *Keywords: human-in-the-loop manipulation, physical HRI, multi-limb coordination*
- [2] **Chaerim Moon** and Joohyung Kim, "Assessing the Physical Impact of Supernumerary Limbs on a Human Subject: A Simulation Study", *46th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, 2024. [🔗 paper](#)  
■ *Keywords: human-in-the-loop manipulation, physical HRI, dynamic analysis*
- [3] **Chaerim Moon** and Joohyung Kim, "Coordinated Motion Planning of a Wearable Multi-Limb System for Enhanced Human-Robot Interaction", *Workshop on Multilimb Coordination in Human Neuroscience and Robotics: Classical and Learning Perspectives at IROS*, 2023. [🔗 paper](#)

Keywords: human-in-the-loop manipulation, physical HRI, multi-limb coordination

[4] **Chaerim Moon**<sup>†</sup>, Sean Taylor<sup>†</sup>, Kevin Gim, Sankalp Yamsani, Kazuki Shin, Kyungseo Park, and Joohyung Kim, "Robotic Backpack System with Pluggable Supernumerary Limbs", *Demo Session, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2023. [[paper](#)] [[video](#)]

Keywords: human-in-the-loop manipulation, teleoperation, human pose estimation

[5] **Chaerim Moon**, Sankalp Yamsani, and Joohyung Kim, "Development of a 3-DOF Interactive Modular Robot with Human-like Head Motions", *IEEE International Conference on Robot and Human Interactive Communication (RO-MAN)*, 2023. [[paper](#)] [[video](#)]

Keywords: human-robot non-verbal communication, human subject tracking, robotic head module

[6] **Chaerim Moon**, Jangho Bae, Jaewon Kwak, and Daehie Hong, "A lower-back exoskeleton with a four-bar linkage structure for providing extensor moment and lumbar traction force", *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, 2022. [[paper](#)]

Keywords: wearable robot mechanism design, exoskeleton, kinematic synthesis

[7] **Chaerim Moon** and Daehie Hong, "Calculation of reduced back moments with a back support exoskeleton", *International Symposium on Precision Engineering and Sustainable Manufacturing*, 2021.

Keywords: wearable robot mechanism design, exoskeleton, kinematic synthesis

[8] **Chaerim Moon**, Oh Young Kwon, Jaemyung Huh, and Daehie Hong, "Design of a double-scissor lift for heavy-duty automated guided vehicles", *KSPE 2021 Spring Conference*, 2021.

Keywords: industrial robot mechanism design, dynamic analysis

[9] **Chaerim Moon** and Daehie Hong, "Biomechanical design and control of supernumerary robotic arms for enhancing the ladder work safety", *International Symposium on Precision Engineering and Sustainable Manufacturing*, 2020.

Keywords: wearable robotic system design, workspace analysis, biomechanics

[10] **Chaerim Moon** and Daehie Hong, "Biomechanical design criteria of extra robotic upper limbs for construction workers", *KSPE 2020 Conference*, 2020.

Keywords: wearable robotic system design, workspace analysis, biomechanics

## Teaching Experiences

### Graduate Teaching Assistant, UIUC

Dynamics (TAM 212)	Fall 2025
Introduction to Humanoid Robotics (ECE 598 JK)	Spring 2025
Robotics Project (ECE 398 JK)	Fall 2024

### Graduate Teaching Assistant, Korea University

AI Seminar Series for Future Industries	Fall 2021
Dynamics	Spring 2020 – Spring 2021

## Professional Services

### Reviewer

IEEE International Conference on Robotics and Automation (ICRA)  
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)  
IEEE-RAS International Conference on Humanoid Robots (Humanoids)

## Skills

**Programming Languages:** C++, Python, MATLAB

**Software Tools:** ROS, MuJoCo, OpenCV, OpenSim, SolidWorks