

# 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

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

## Honors

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

## 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

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### 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

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### 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

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

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