

# Hyojoon Park

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## Introduction

- My research focuses on the synergistic application of **Machine Learning** to **Computer Graphics** and **Computer Vision**. I have extensive experience building end-to-end systems that combine physics based simulation, geometry, and image/video processing.
- My work spans various domains, including **3D reconstruction** of the face, body, and hands, as well as **XR (VR/AR)** and **haptics**. With deep technical expertise across diverse domains, I have peer-reviewed publications in both Computer Graphics and Medical Imaging.
- Currently, I focus on efficient **deep learning based 4D medical image and video compression** to make high dimensional data practical for storage and analysis.

## Education

### University of Wisconsin-Madison

Ph.D. Candidate in Computer Sciences

Wisconsin, USA

Sep. 2021 - Current

- Research area: Synergistic integration of machine learning in physics-based simulation for computer graphics and medical imaging
- Advisor: Professor Eftychios Sifakis, Co-advisor: Professor Kevin Eliceiri

### Seoul National University

M.S. in Mechanical Engineering

Seoul, Korea

Mar. 2017 - Feb. 2019

- Research area: Rendering and transparent control of high-performance haptic system
- Thesis: Dental Simulator with Increased Z-width of Haptic Rendering (also presented at AsiaHaptics 2018)
- Selected for Outstanding MS Thesis Presentation Award [[M.S. thesis presentation](#)]
- Advisor: Professor Dongjun Lee

### Technical University of Munich (TUM)

B.S. Exchange Student in Mechanical Engineering

Munich, Germany

Spring 2014

### Korea University

B.S. in Mechanical Engineering

Seoul, Korea

Mar. 2010 - Feb. 2017

- Military service: Jun. 2011 - Mar. 2013

## Publications

### Near-realtime Facial Animation by Deep 3D Simulation Super-Resolution

**Hyojoon Park**, Sangeetha Grama Srinivasan, Matthew Cong, Doyub Kim, Byungsoo Kim, Jonathan Swartz, Ken Museth, Eftychios Sifakis  
ACM Transactions on Graphics (TOG), 2024 (Presented at SIGGRAPH ASIA 2024) [[paper](#)] [[code](#)]

- Achieves high-resolution facial animation 115x faster (at 18 FPS) than traditional methods while maintaining simulation quality, generalized to unseen expressions and dynamics.

### Collagen Fiber Centerline Tracking in Fibrotic Tissue via Deep Neural Networks with Variational Autoencoder-based Synthetic Training Data Generation

**Hyojoon Park\***, Bin Li\*, Yuming Liu, Michael S. Nelson, Helen M. Wilson, Eftychios Sifakis, and Kevin W. Eliceiri (\*equal contributions)  
Medical Image Analysis, 2023 [[paper](#)][[code](#)]

- Facilitates training of deep learning models with limited annotated data by generating diverse synthetic datasets via a novel property-controllable variational autoencoder.

### Capturing Detailed Deformations of Moving Human Bodies

He Chen, **Hyojoon Park**, Kutay Macit, and Ladislav Kavan  
SIGGRAPH, 2021 [[paper](#)][[code](#)]

- Enables accurate, detailed 3D reconstruction of moving human bodies using a novel motion capture system with a specially designed low-cost suit, utilizing deep neural networks and geometric algorithms.

### Adaptive Precision-Enhancing Hand Rendering for Wearable Fingertip Tracking Devices

**Hyojoon Park** and Jung-Min Park  
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2020 [[paper](#)][[video](#)]

- Enhances visual plausibility and precision of 3D hand rendering in VR using motion retargeting and novel hinge constraints for real-time inverse kinematics.

- **Dental Simulator with Increased Z-width of Haptic Rendering**  
*Hyojoon Park, Myungsin Kim, and Dongjun Lee*  
AsiaHaptics, 2018 [\[paper\]](#) [\[video\]](#)
  - Achieves up to 10x greater maximum stiffness (Z-width) from virtual teeth using commercially available haptic devices.
- **Rigid-body Collaborative Manipulation among Remote Users with Wearable Cutaneous Haptic Interfaces**  
*Myungsin Kim, WonHa Lee, Hyojoon Park, Junghan Kwon, Yong-Lae Park, and Dongjun Lee*  
AsiaHaptics, 2018 [\[paper\]](#) [\[video\]](#)
  - Introduces a remote multiuser collaboration system via wearable cutaneous haptic interfaces, leveraging passivity-based simulations for stable and realistic interactions.
- **Stretchable Skin-Like Cooling/Heating Device for Reconstruction of Artificial Thermal Sensation in Virtual Reality**  
*Jinwoo Lee, Heayoun Sul, Wonha Lee, Kyung Rok Pyun, Inho Ha, Dongkwan Kim, Hyojoon Park, Hyeonjin Eom, Yeosang Yoon, Jinwook Jung, Dongjun Lee, and Seung Hwan Ko*  
Advanced Functional Materials, 2020 [\[paper\]](#)
  - Introduces a stretchable, bi-functional skin-like thermo-haptic (STH) device for VR, capable of precise cold and hot sensations with a single structure and 230% stretchability.
- **Wearable Cutaneous Haptic Interface with Soft Sensors and IMUs**  
*Yongjun Lee, Myungsin Kim, Yongseok Lee, Hyojoon Park, and Dongjun Lee*  
Korea Robotics Society Annual Conference, 2018
- **Design and Performance Evaluation of Wearable Haptic Interfaces**  
*WonHa Lee, Myungsin Kim, Hyojoon Park, and Dongjun Lee*  
International Conference on Control, Automation and Systems, 2018

## Work Experience

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<b>Google</b>	Playa Vista, CA, USA
Student Researcher	Sep. 2025 - Current
<ul style="list-style-type: none"> <li>• (in progress)</li> </ul>	
<b>Nokia Bell Labs</b>	New Providence, NJ, USA
Industrial Metaverse Intern	June 2025 - Aug. 2025
<ul style="list-style-type: none"> <li>• Built real-time 3D Gaussian Splatting scenes with precise physical registration (scale and orientation) and language features for natural language queries as part of “Empowering Digital Twins with Precise Physical Registration and Language Awareness.” The project was selected as the 1st place winner among 100+ global interns.</li> </ul>	
<b>NVIDIA</b>	Santa Clara, CA, USA
Software Intern – Physics-Based Simulations	May 2024 - Aug. 2024
<ul style="list-style-type: none"> <li>• Worked on age augmented 3D face models by expanding the training data with synthetic faces spanning from infants to the elderly, so the model covers a much wider age range. Also developed a single portrait 3D face reconstruction framework that can infer age along with geometry, enabling re-aging and de-aging of the reconstructed face.</li> </ul>	
<b>University of Utah</b>	Salt Lake City, UT, USA
Graduate Research Assistant	Sep. 2019 - Jun. 2021
<ul style="list-style-type: none"> <li>• Worked on “Capturing Detailed Deformations of Moving Human Bodies” (SIGGRAPH 2021 / TOG), which captures 1,000+ uniquely labeled body points from multi-camera images using a patterned suit and neural networks that localize corners and recognize codes, robust to stretching and self-occlusion. Open-sourced the multi-camera calibration pipeline used in the project (MultiCamCalib), including checkerboard corner detection and bundle adjustment. <a href="#">[code]</a> <a href="#">[paper]</a></li> </ul>	
<b>Korea Institute of Science and Technology (KIST)</b>	Seoul, Korea
Research Intern	Mar. 2019 - Aug. 2019
<ul style="list-style-type: none"> <li>• Worked on “Adaptive Precision Enhancing Hand Rendering for Wearable Fingertip Tracking Devices” (IROS 2020), improving visual plausibility and precision of real-time 3D hand rendering in VR using motion retargeting and real-time inverse kinematics. <a href="#">[paper]</a> <a href="#">[video]</a></li> </ul>	
<b>Republic of Korea Army (ROKA)</b>	Seoul, Korea
Military Service	Jun. 2011 - Mar. 2013
<ul style="list-style-type: none"> <li>• Completed full 21 months of mandatory military service as a military English interpreter.</li> </ul>	
<b>Korea Advanced Institute of Science and Technology (KAIST)</b>	Seoul, Korea
Instructor for KAIST New Education	Sep. 2014 - Feb. 2015
<ul style="list-style-type: none"> <li>• Taught “Arduino-based Exploration Robot” and “Developing Android Service App” classes to middle and high school students.</li> </ul>	

## Teaching Assistant

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Computer Graphics (CS559) *University of Wisconsin-Madison*

*Spring 2022*

Computer Graphics (CS559) *University of Wisconsin-Madison*

*Fall 2021*

Interactive Computer Graphics (CS6610) *University of Utah*

*Spring 2021*

Computer Graphics (CS4600) *University of Utah*

*Fall 2020*

System Analysis in Mechanical Engineering *Seoul National University*

*Spring 2018*