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 — *Wisconsin, USA*

Ph.D. Candidate in Computer Sciences — *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 — *Seoul, Korea*

M.S. in Mechanical Engineering — *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) — *Munich, Germany*

B.S. Exchange Student in Mechanical Engineering — *Spring 2014*

Korea University — *Seoul, Korea*

B.S. in Mechanical Engineering — *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

Google *Playa Vista, CA, USA*
Student Researcher *Sep. 2025 - Current*

Nokia Bell Labs *New Providence, NJ, USA*
Industrial Metaverse Intern *June 2025 - Aug. 2025*
- Selected as 1st Place Winner among 100+ global interns for project “Empowering Digital Twins with Precise Physical Registration and Language-Awareness,” rendering 3D scenes in real-time using 3D Gaussian Splatting with precise physical registration (scale and orientation) and language features enabling natural-language queries.

NVIDIA *Santa Clara, CA, USA*
Software Intern – Physics-Based Simulations *May 2024 - Aug. 2024*
- Developed age-augmented 3D face models and framework for inferring 3D face geometry from single portrait images.

University of Utah *Salt Lake City, UT, USA*
Graduate Research Assistant *Sep. 2019 - Jun. 2021*
- Project “Capturing Detailed Deformations of Moving Human Bodies” published at SIGGRAPH 2021. [code] [paper]

Korea Institute of Science and Technology (KIST) *Seoul, Korea*
Research Intern *Mar. 2019 - Aug. 2019*
- Project “Adaptive Precision-Enhancing Hand Rendering for Wearable Fingertip Tracking Devices” published at IROS 2020. [paper] [video]

Republic of Korea Army (ROKA) *Seoul, Korea*
Military Service *Jun. 2011 - Mar. 2013*
- Completed full 21 months of mandatory military service as a military English interpreter.

Korea Advanced Institute of Science and Technology (KAIST) *Seoul, Korea*
Instructor for KAIST New Education *Sep. 2014 - Feb. 2015*
- Taught ”Arduino-based Exploration Robot” and ”Developing Android Service App” classes to middle and high school students.

Teaching Assistant

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*