

585 Purdue Mall ME3171, West Lafayette, IN 47907

🗷 hgchi@purdue.edu | 🏕 engineering.purdue.edu/people/hyung.gun.chi.1 | 🞧 stnoah1 | 🛅 hyung-gun | 🎓 Hyung-gun Chi

# Research Interests

My research interests are primarily focused on the intersection of Computer Vision and Machine Learning, with a particular emphasis on Representation Learning for human actions, 3D Computer Vision techniques, and their practical applications. I aim to explore the development and integration of advanced algorithms for human action recognition, 3D scene understanding, and object detection, specifically for use in Virtual Reality (VR) / Augmented Reality (AR) devices and Autonomous Vehicles.

# **Education**

**Purdue University** West Lafayette, IN, USA

PhD in Electrical and Computer Engineering

Aug. 2018 - Dec. 2023 (Expected)

Aug. 2018 - Dec. 2022

Jan. 2023 - May. 2023

- Thesis: Advancements in Human Action Recognition by Learning Human Skeleton Representations
- Advisor: Prof. Karthik Ramani

**Purdue University** West Lafayette, IN, USA

MS IN ELECTRICAL AND COMPUTER ENGINEERING

· Advisor: Prof. Karthik Ramani

**Yonsei University** Seoul, South Korea

BS IN MECHANICAL ENGINEERING Mar. 2010 - Feb. 2017

- · Advisor: Prof. Soo-hong Lee
- 2-year military service (2011-2013)

# **Professional Experience**

#### **Toyota Research Institute** Los Altos, CA, USA

RESEARCH INTERN May. 2023 - Aug. 2023

• Conducted human-robot interaction research (Host: Dr. Thomas Kollar).

#### **Honda Research Institute USA** San Jose, CA, USA

RESEARCH INTERN

· Conducted human motion prediction research for autonomous vehicles (Host: Dr. Kwonjoon Lee). **Honda Research Institute USA** San Jose, CA, USA

RESEARCH INTERN May. 2022 - Aug. 2022

· Conducted research on future action forcasting task for autonomous vehicles (Host: Dr. Chiho Choi).

# **Convergence Design Lab, Purdue University**

GRADUATE RESEARCH ASSISTANT Aug. 2018 - Present

· Conducted skeleton-based human action recognition and pose estimation research (Advisor: Prof. Karthik Ramani).

**HeumLabs Corporation** Seoul, South Korea

SOFTWARE ENGINEER & CEO Sep. 2016 - Dec. 2017

- Founded and managed a start-up company as a CEO.
- Developed an office automation system specifically for automating office works.

# **Knowledge-based Design Lab, Yonsie University**

Seoul, South Korea

West Lafayette, IN, USA

Undergraduate Research Assistant

Jan. 2016 - Aug. 2016

• Participated on the 3D computuer vision research (Advisor: Prof. Soo-Hong Lee).

# **Publications and Patents**

## **Journal Papers**

- [J4] H. Lee, J. Lee, S. Kwon, K. Ramani, H. Chi, and D. Mun. 3D CAD Model Simplification for Mechanical Parts Using Generative Adversarial Networks. In Computer-Aided Design, under revision.
- [J3] S. Kim, H. Chi and K. Ramani. Object synthesis by learning part geometry with surface and volumetric representations. In Computer-Aided Design (2021): 102932.
- [J2] S. Kim, N. Winovich, H. Chi, G. Lin, and K. Ramani. Latent transformations neural network for object view synthesis. In The Visual Computer (2019): 1-15.
- [J1] H. Hwang, S. Lee, H. Chi, N. Kang, H. Kong, J. Lu, and H. Ohk. An Evaluation Methodology for 3D Deep Neural Network using Visualization in 3D Data Classification. In Journal of Mechanical Science and Technology 33, no. 3 (2019): 1333-1339.

#### **Conference Proceedings**

- [C9] W. Roh, S. Lee, W. Ryoo, G. Oh, J. Lee, S. Hwang, H. Chi, and S. Kim. Functional Hand Type Prior for 3D Hand Pose Estimation & Action Recognition from Egocentric View Monocular Videos, *British Machine Vision Conference* (BMVC), 2023. Submitted.
- [C8] H. Chi, S. Chi, Q. Huang, and K. Ramani. Skeleton-ODE: Learning Representation by Predicting the Future for Online Skeleton-based Action Recognition, *International Conference on Computer Vision (ICCV)*, 2023. Submitted.
- [C7] S. Kim, S. Seo, H. Chi, K. Ramani, J. Kim, and S. Kim. Higher-order Relation Reasoning for Trajectory Prediction, *International Conference on Computer Vision (ICCV)*, 2023. Submitted.
- [C6] H. Chi, K. Lee, N. Agarwal, K. Ramani, and C. Choi. AdamsFormer for Spatial Action Localization in the Future, In proceedings of Conference on Computer Vision and Pattern Recognition (CVPR), 2023.
- [C5] Y. Xu, A. Bazarjani, H. Chi, C. Choi, and Y. Fu. Uncovering the Missing Pattern: Unified Framework Towards Trajectory Imputation and Prediction, In proceedings of Conference on Computer Vision and Pattern Recognition (CVPR), 2023.
- [C4] H. Chi\*, S. Chi\*, S. Chan, and K. Ramani. Pose Relation Transformer: Refine Occlusions for Human Pose Estimation, In proceedings of *IEEE International Conference on Robotics and Automation (ICRA*), 2023.
- [C3] H. Chi\*, M. Ha\*, S. Chi, S. Lee, Q. Huang, and K. Ramani. InfoGCN: Representation Learning for Human Skeleton-based Action Recognition, In proceedings of *Conference on Computer Vision and Pattern Recognition (CVPR*), 2022.
- [C2] H. Chi\*, S. Kim\*, X. Hu, Q. Huang, and K. Ramani. A Large-scale Annotated Mechanical Components Benchmark for Classification and Retrieval Tasks with Deep Neural Networks, In proceedings of *European Conference on Computer Vision (ECCV)*, 2020.
- [C1] S. Kim, H. Chi, X. Hu, A. Vegesana, and K. Ramani. First-Person View Hand Segmentation of Multi-Modal Hand Activity Video Dataset, In proceedings of *British Machine Vision Conference* (*BMVC*), 2020.

#### **Preprinted papers**

• S. Kim, J. Bae, **H. Chi**, S. Hong, B.S. Koh, and K. Ramani. Egocentric View Hand Action Recognition by Leveraging Hand Surface and Hand Grasp Type. *arXiv preprint arXiv:2109.03783*, 2021.

#### Patents

- [P5] H. Chi, K. Lee, Y. Xu, and C. Choi. System and Method for Providing Spatio-Temporal Action Localization in the Future. US Patent Application.
- [P4] Y. Xu, A. Bazarjani, H. Chi, and C. Choi. Trajectory Imputation and Prediction, US Patent Application.
- [P3] K. Ramani, H. Chi, and S. Chi. Pose Relation Transformer Refine Occlusions for Human Pose Estimation. US Patent Application.
- [P2] K. Ramani, S. Kim, and H. Chi. Pixel-wise Hand Segmentation of Multi-modal Hand Activity Video Dataset. US Patent 11,562,489 B2.
- [P1] H. Chi. Computer Input System for Office/Factory Automation. WO Patent 2018/074729 Al.

# Academic Services\_

#### **Conference Reviewers**

- Conference on Neural Information Processing Systems (NeurIPS) 2023
- The IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) 2023
- The IEEE/CVF International Conference on Computer Vision (ICCV) 2023
- The British Machine Vision Conference (BMVC) 2020 2023
- The IEEE Conference on Artificial Intelligence (CAI) 2023

### **Journal Reviewers**

- Journal of Visual Communication and Image Representation (JVCI)
- Journal of Computing and Information Science in Engineering (JCISE)
- Computer Vision and Image Understanding (CVIU)

# **Invited Talks**

# **Sungkyunkwan University**Seoul, South Korea

Guest Lecturer: Advancements in Human Action Recognition by Learning Skeleton Representations

May. 2023

**Keymuyng University**Deagu, South Korea

Guest Lecturer: Representations Learning for Recognizing Human Activity

Apr. 2023

**Yonsei University** Seoul, South Korea

Guest Lecturer: Representation for Human Activities Apr. 2023

Hongik University Seoul, South Korea

Dec. 2022

Guest Lecturer: Learning Representation for Human Action Recognition

## Awards and Honors

2022 <b>Travel Grants</b> , Purdue Graduate Student Government West Lafa	
	yette, IN, USA

2016 Edison Challenge – Computer Aided Design Section Seoul, South Korea

2016 CDE (Korea Society for Computational Design and Engineering) President's Award,
CDE Challenge – Computational Design and Engineering Tools Section

Daejeon, South Korea

**Skills** 

**Research and Development Stacks** 

Major Languages Python, C/C++

Machine LearningPyTorch, TensorFlow, KerasWeb FrameworksDjango, Flask, Node.jsComputer VisionOpenCV, OpenGL

**Web Languages** Nginx, React, HTML5, PHP, JavaScript, CSS

**Database** MySQL, PostgreSQL, SQLite, MongoDB

**Other Tools and Skills** 

**Text Editors** Neovim & Vim

Other Langauges Shell Scripts(bszh, zsh), Matlab(Octave), R
Operating Systems macOS, Linux Debian/Ubuntu, Windows

IDE VSCode, Eclipse, IDEA

chiho1.choi@samsung.com

**Softwares** SolidWorks, Catia, AutoCAD

VCS Git

**References** 

Karthik RamaniProfessor, Purdue Universityramani@purdue.eduSoo-Hong LeeProfessor, Yonsei Universityshlee@yonsei.ac.kr

**Chiho Choi** Senior Staff Engineer, Samsung Semiconductor USA