

Hyung-gun Chi

PHD CANDIDATE

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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, 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)

- 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

Aug. 2018 - Dec. 2022

- 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 US

San Jose, CA, USA

RESEARCH INTERN

Jan. 2023 - May. 2023

- Conducted human motion prediction research for autonomous vehicles (Host: Dr. Kwonjoon Lee).

Honda Research Institute US

San Jose, CA, USA

RESEARCH INTERN

May. 2022 - Aug. 2022

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

Convergence Design Lab, Purdue University

West Lafayette, IN, USA

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

UNDERGRADUATE RESEARCH ASSISTANT

Jan. 2016 - Aug. 2016

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

Publications and Patents

Journal Papers

- [J6] S. Lee, G. Oh, **H. Chi**, W. Byeon, S. Yoon, J. Kim, and S. Kim. Robust Sound-Guided Image Manipulation. In *Neural Network*, under revision.
- [J5] A. Unmesh, R. Jain, J. Shi, VK Chaitanya, **H. Chi**, S. Chidambaram, A. Quinn and K. Ramani. Interacting Objects: A dataset of object-object interactions for richer dynamic scene representations. In *IEEE Robotics and Automation Letters*, submitted.
- [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* (2023): 103577.
- [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, Y. Xu, 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 A1.

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

- IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)
- 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

Keimyung University

Daegu, 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

Guest Lecturer: LEARNING REPRESENTATION FOR HUMAN ACTION RECOGNITION

Dec. 2022

Awards and Honors

2023	Conference Travel Funds , Purdue Engineering Graduate Program	<i>West Lafayette, IN, USA</i>
2023	Travel Grants , Purdue Graduate Student Government	<i>West Lafayette, IN, USA</i>
2016	KISTI (Korea Institute of Science and Technology Information) President's Award , Edison Challenge – Computer Aided Design Section	<i>Seoul, South Korea</i>
2016	CDE (Korea Society for Computational Design and Engineering) President's Award , CDE Challenge – Computational Design and Engineering Tools Section	<i>Daejeon, South Korea</i>

Skills

Research and Development Stacks

Major Languages	Python, C/C++
Machine Learning	PyTorch, TensorFlow, Keras
Web Frameworks	Django, Flask, Node.js
Computer Vision	OpenCV, OpenGL
Web Languages	Nginx, React, HTML5, PHP, JavaScript, CSS
Database	MySQL, PostgreSQL, SQLite, MongoDB

Other Tools and Skills

Text Editors	Neovim & Vim
Other Languages	Shell Scripts(bash, zsh), Matlab(Octave), R
Operating Systems	macOS, Linux Debian/Ubuntu, Windows
IDE	VSCode, Eclipse, IDEA
Softwares	SolidWorks, Catia, AutoCAD
VCS	Git

References

Karthik Ramani	Professor, Purdue University	ramani@purdue.edu
Soo-Hong Lee	Professor, Yonsei University	shlee@yonsei.ac.kr