Hyung-gun **Chi**

PHD STUDENT · SOFTWARE ENGINEER

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Research Interests

My research interests lie in the fields of Cokmputer Vision and Machine Learning. More specifically, I am interested in Geometric 3D Deep Learning, Human Action Representation Learning, and Generative Adversarial Network.

Education

Purdue University — *West Lafayette, IN, USA*

PhD in Electrical and Computer Engineering — *Aug. 2018 - PRESENT*

- Advisor: Professor Karthik Ramani

Yonsei University — *Seoul, South Korea*

BS in Mechanical Engineering — *Mar. 2010 - Feb. 2017*

- Advisor: Professor Soo-Hong Lee
- 2011-2013, 2-year military service

Publications and Patents

Conference Proceedings

- [**C3**] **H. G. Chi**, S. Chi, A. Unmesh, S. Chan, and Karthik Ramani. In *International Conference on Computer Vision (ICCV)*, 2021. Submitted
- [**C2**] **H. G. Chi**, S. Kim, X. Hu, Q. Huang, and Karthik Ramani. A Large-scale Mechanical Components Benchmark for Deep Neural Networks. In proceedings of the 16th *European Conference on Computer Vision (ECCV)*, 2020.
- [**C1**] S. Kim, **H. G. Chi**, and Karthik Ramani. First-Person View Hand Segmentation of Multi-Modal Hand Activity Video Dataset. In proceedings of the 31st *British Machine Vision Conference (BMVC)*, 2020.

Journal Papers

- [**J3**] S. Kim, **H. G. Chi** and Karthik Ramani. Object synthesis by learning part geometry with surface and volumetric representations. In *Computer-Aided Design* (2021): 102932.
- [**J2**] S. Kim, N. Winovich, **H. G. Chi**, G. Lin, and K. Ramani. Latent transformations neural network for object view synthesis. In *The Visual Computer* (2019): 1-15.
- [**J1**] H. T. Hwang, **H. G. Chi**, N. K. Kang, H. B. Kong and Soo-Hong Lee. An Evaluation Methodology for 3D Deep Neural Network using Visualization in 3D Data Classification. In *Journal of Mechanical Science and Technology (JMST)* 33, no. 3 (2019): 1333-1339.

Patents

- [**P1**][**PDF**] **H. G. Chi**. *Computer Input Automation System*. KR Patent (2017): 10-1745330.

Research Projects

Human Skeleton Represetnation Learning [*C3*] — *C-Design LAB, Purdue Univ.*

Graduate Research Assistant — *Aug. 2020 - Present*

- Proposed a novel skeleton joint representation method which effectively represents human skeleton using Transformer Self-Attention.
- Captured joint representation improves skeleton pose-related tasks such as skeleton-based action recognition and human pose estimation.

A Large-scale Mechanical Component Benchmark Dataset [*C2*] — *C-Design LAB, Purdue Univ.*

Graduate Research Assistant — *Feb. 2019 - Mar. 2020*

- Introduced large-scale mechanical components a benchmark for the classification and retrieval tasks named Mechanical Components Benchmark.
- Developed a data collecting pipeline including annotation interface and database.
- Benchmarked state-of-the-art 3D Deep Neural Networks for classification and retrieval tasks to explore the descriptor for mechanical components.

Hand segmentation with RGBD-T data [*C1*] — *C-Design LAB, Purdue Univ.*

Graduate Research Assistant — *Jul. 2019 - May. 2020*

- Proposed a novel hand video dataset with RGB, Depth, and Themral images for hand segmentation.
- Developed a method which segment hands and objects with a multi-modal Deep Neural network dealing with RGBD-T data.

Part Geometry Net (PGNet) [*J3*] — *C-Design LAB, Purdue Univ.*

Graduate Research Assistant — *Oct. 2018 - Aug. 2019*

- Proposed a Generative Adversarial Network (GAN) that synthesize 3D objects given a discrete category condition and continuous instance-level attributes by fusing the various types of geometric information.
- Consturcted a part identifier module which learns part geometry to preserve part properties of 3D objects.

Latent Transformation Neural Network (LTNN) [*J2*] *C-Design LAB, Purdue Univ.*

Graduate Research Assistant *Aug. 2018 - April. 2019*

- Proposed a fully-convolutional conditional generative network which is capable of view synthesis using a light-weight neural network suited for real-time applications.
- Developed conditional transformation unit which is designed to learn the latent space transformations corresponding to specified target views.

Interpretable 3D Deep Neural Network [*J1*] *Knowledge-Based Design LAB, Yonsei Univ.*

Undergraduate Research Assistant *Feb. 2016 – Jul. 2017*

- Proposed an uncerntainty evaluation method for 3D Deep Neural Networks by calculating the prediction difference of every voxel.
- Developed a web-based 3D CAD search engine using a 3D Deep Neural Network for demonstration.

Working Experience

Software Engineer and CEO *Seoul, South Korea*

NEIL LAB Corporation *Sep. 2016 - Dec. 2017*

- Found and lead a start-up company as a CEO and Software Engineer. The company was funded $ 30,000 by the SeongNam Industry Promotion Agency.
- Developed an office automation system specifically for automating office tasks such as sending an e-mail or issuing receipts.
- Designed a back-end system and database for customer web-service which automatically scrap and integrate customer's financial and personal data. (*Relevant patent: [**P1**]*)

Mechanic and Squad leader *Inje, South Korea*

Republic of Korea Army *Apr. 2011 – Jan. 2013*

- Conducted maintanance of military weapons and equipment including firearms and vehicles.
- Led a squad as a squad leader; honored as a distinguished soldier.

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 Langauges	Shell Scripts(bszh, zsh), Matlab(Octave), R
Operating Systems	macOS, Linux Debian/Ubuntu, Windows
IDE	VSCode, Eclipse, IDEA
Softwares	SolidWorks, Catia, AutoCAD
VCS	**Git**

Academic Activities

Reviewer The British Machine Vision Conference (BMVC) 2020, 2021.

References

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