Hyung-gun **Chi**

Software Engineer · Master Student

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Research Interests

My research interests lie at the intersection of Computer Vision and Robotics, focusing on 3D Geometric Deep Learning for recognizing and synthesizing 3D objects. In this area, I applied machine learning (deep learning) algorithms for Augmented/Virtual Reality and Smart Factory.

Education

Purdue University — *West Lafayette, IN, USA*

Master of Science in Mechanical Engineering — *Aug. 2018 - PRESENT*

- Advisor: Karthik Ramani, Donald W.Feddersen Professor of Mechanical Engineering

Yonsei University — *Seoul, South Korea*

Bachelor of Science in Mechanical Engineering — *Mar. 2010 - Feb. 2017*

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

Skills

Programming Python, Matlab, C/C++, SQL, JavaScript, HTML, CSS, PHP

Frameworks TensorFlow, PyTorch, Keras, ROS, OpenCV

Software Creo Parametric, SolidWorks, HyperWorks, GAZEBO

Publications and Patents

Journal Papers

- [**J4**][**PDF**] S. Kim, **H. G. Chi** and Karthik Ramani. "Object synthesis by learning part geometry with surface and volumetric representations" (2019) *Computer-Aided Design*, submitted.
- [**J3**][**PDF**] S. Kim, N. Winovich, **H. G. Chi**, G. Lin and and Karthik Ramani. "Latent Transformations Neural Network for Object View Synthesis" (2019) *The Visual Computer*, accepted
- [**J2**][**PDF**] 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" (2019) *Journal of Mechanical Science and Technology (JMST)*, 33(3), pp. 1333-1339.
- [**J1**][**PDF**] JIN YONGZHU, **H. G. Chi** and Soo-Hong Lee. "A Study on the Optimal Design of Pedestrian Robots Using Jansen Mechanism". (2016) *Korean Journal of Computational Design and Engineering*, 22(2), pp. 18-22.

Conference Proceedings

- [**C3**][**PDF**] L.Paredes, X. Qian, **H. G. Chi** and Karthik Ramani. "ControllAR: Design and Fabrication of a Universal Parametric Low-Profile Hand Wearable for Augmented Reality Interactions" (2019) *Proceedings of the SIGCHI conference on human factors in computing systems*, submitted.
- [**C2**][**PDF**] H. Hwang, **H. G. Chi**, S. H. Lee. "A Research about 3D Design Data Classification with 3D Convolutional Neural Network" (2017) *Proceedings of the Society for Computational Design and Engineering Conference*, pp. 441-442.
- [**C1**][**PDF**] M. H. Woo, S. H. Kim, **H. G. Chi**, M. W. Park, J. K. Kim and S. H. Lee. "Development of Web-based, Module Structure Platform for Surgical Workflow Management". (2016) *Proceedings of the Society for Computational Design and Engineering Conference*, pp. 439-441.

Patents

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

Research Experience

Hand motion prediction with RGBD-T data — *C-design LAB, Purdue Univ.*

Graduate Assistant — *Jul. 2019 - Present*

- Proposed a novel dataset by fusing RGB-D and thermal data for action recognition.
- Developed a method which predicts hand motion by segmenting hands and objects with a 3D Deep Neural network dealing with RGBD-T data.

A Large-scale Engineering Part Benchmark Dataset — *C-design LAB, Purdue Univ.*

Graduate Assistant — *Feb. 2019 - Present*

- Collected massive mechanical component CAD data with a web-scrapper, and expanded the data for dense data distribution using Creo Parametric and SolidWorks API.
- Developed a web-based 3D CAD search engine using a 3D Deep Neural Network and PostgreSQL database.
- Benchmarked state-of-art 3D Deep Neural Network for classification and segmentation task to evaluate the dataset.

Part Geometry Net (PGNet)

C-design LAB, Purdue Univ.

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

- Built a Generative Adversarial Network which generates 3D objects given a discrete category condition and continuous instance-level attributes by fusing the various types of geometric information.
- Introduced a part identifier module which learns part geometry to preserve part properties of 3D objects. (*Relevant publication: [**J4**]*)

Latent Transformation Neural Network (LTNN)

C-design LAB, Purdue Univ.

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

- Developed a fully-convolutional conditional generative network which is capable of view synthesis using a light-weight neural network suited for real-time applications. Introduced the conditional transformation unit which is designed to learn the latent space transformations corresponding to specified target views. (*Relevant publication: [**J3**]*)

Visual Programming Language for Mobile Robots and IoT Nodes

C-design LAB, Purdue Univ.

Graduate Assistant — *Aug. 2018 - Feb. 2019*

- Proposed a web-based visual and spatial programming language that allows novice users and small industries to program mobile robots and IoT Nodes to execute planned tasks.
- Developed a virtual world using Robotic Operating System(ROS) and GAZEBO which simulates interaction between mobile robots and IoT devices.

ControllAR

C-design LAB, Purdue Univ.

Graduate Assistant — *Aug. 2018 - Dec. 2018*

- Proposed a parametrizing interface, simple and accessible fabrication workflow, and a pressure sensor using a soft piezoresistive elastomer material. Also, developed embedded system using Arduino and analyzed signals from different sensors and materials. (*Relevant publication: [**C3**]*)

3D Deep Neural Network evaluation method

Knowledge-Based Design LAB, Yonsie Univ.

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

- Proposed an evaluation method for 3D Deep Neural Networks by visualizing the impact of each voxel of each 3D objects and also a web-based 3D CAD search engine using a 3D Deep Neural Network for demonstration. (*Relevant publication: [**J2**][**C2**]*)

Web-based Surgical Workflow Management Platform

Knowledge-Based Design LAB, Yonsie Univ.

Undergraduate Research Assistant — *Feb. 2016 – Aug. 2016*

- Developed a web-based interface and database for integrated surgical information, to optimize surgical procedures and reduce the medical loss caused by communication errors and lack of information. (*Relevant publication: [**C1**]*)

Working Experience

Python Developer

Seoul, South Korea

Financial Insight — *Jan. 2018 - Jul. 2018*

- Worked as a Python developer in an early-stage startup company. Developed a web-scrapper and database for collecting financial data of the Korean stock market.

Python Developer and CEO

Seoul, South Korea

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

- Developed an office automation system using Python specifically for automating tasks such as sending an e-mail or issuing receipts, and 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**]*)
- Founded and led a startup company as a CEO for a year and also worked as a Python developer. The company was funded $ 30,000 by the Seongnam Industry Promotion Agency.

Mechanic and Squad leader

Inje, South Korea

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

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

Extracurricular Activity

Habitat for Humanity Korea Campus Chapter

South Korea

Member & President — *Mar. 2010 – Aug. 2016*

- Constructed new houses for the homeless and renovated old houses, served more than 500 hours.
- Led and managed a volunteer group for a year; received the first honor from 2014 Yonsei Club Evaluation.

Korea Food for the Hungry International - campus volunteer group

South Korea

Member — *Apr. 2013 – Nov. 2013*

- Mentored preschool children and elementary school students at the Seoul Children's Center

Honors & Awards

2016	**KISTI (Korea Institute of Science and Technology Information) President's Award**, 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*