Hyung-gun **Chi**

PHD STUDENT · SOFTWARE ENGINEER

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Research Interests

My research interests lie at the intersection of Computer Vision and Robotics, focusing on 3D Geometric Deep Learning and Temporal Action Anaylsis. In this area, I apply Machine/Deep Learning algorithms for Augmented/Virtual Reality and Smart Factory.

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

Skills

Language	Python, Matlab, C/C++, SQL, JavaScript, HTML, CSS, PHP
Machine/Deep Learning	PyTorch, TensorFlow, Keras
Web Programming	MYSQL/mongoDB, Flask/Node.js
CAD Tool	Creo Parametric, SolidWorks, AutoCAD
ETC	GAZEBO, ROS

Publications and Patents

Conference Proceedings

- [**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, accepted.
- [**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, accepted.

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* (2020): 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

One-Shot Weakly-Supervised Learning for Temporal Action Localization

C-Design LAB, Purdue Univ.

GRADUATE RESEARCH ASSISTANT — *Mar. 2020 - Present*

- Propose a novel architecture to segment temporal boundaries of action in untrimmed videos with single training data for each class.
- Redefine action localization problem as a Reinforcement Learning (RL) problem and design the RL pipeline to improve the performance.

A Large-scale Mechanical Component Benchmark Dataset [*C2*]

C-Design LAB, Purdue Univ.

GRADUATE RESEARCH ASSISTANT — *Feb. 2019 - Mar. 2020*

- Introduce large-scale mechanical components a benchmark for the classification and retrieval tasks named Mechanical Components Benchmark.
- Develop a data collecting pipeline including annotation interface and database.
- Benchmark 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 - Mar. 2020*

- Propose a novel hand dataset by fusing RGB-D and thermal data for hand segmentation.
- Develop 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*

- Build 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.
- Introduce 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*

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

Visual Programming Language for Mobile Robots and IoT Nodes *C-Design LAB, Purdue Univ.*

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

- Propose 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.
- Develop a virtual world using the Robotic Operating System (ROS) and GAZEBO which simulates the interaction between mobile robots and IoT devices.

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

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

- Propose an evaluation method for 3D Deep Neural Networks by visualizing the impact of each voxel of each 3D object.
- Develop 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.
- Develop 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*

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

Academic Activities

Reviewer The British Machine Vision Conference (BMVC) 2020.

References

Karthik Ramani Professor, Purdue University ramani@purdue.edu

Soo-Hong Lee Professor, Yonsei University shlee@yonsei.ac.kr