

# Changwoo Lee

Email: [cwoolee@umich.edu](mailto:cwoolee@umich.edu)

Website: [changwoolee.github.io](https://changwoolee.github.io)

## Research Interest

Machine Learning and Signal Processing, Unsupervised Learning,

## Education

**Ph.D. Candidate in Electrical and Computer Engineering**

Fall 2020 - Present

*University of Michigan, Ann Arbor, MI, USA*

**M.S. in Electronics and Computer Engineering**

2018 - 2020

*Hanyang University, Seoul, Republic of Korea*

**B.S. in Electronic Engineering**

2012 - 2018

*Hanyang University, Seoul, Republic of Korea*

## Publications

### Preprint

- [1] Bowen Liu, **Changwoo Lee**, Ang Cao and Hun-Seok Kim. "Unified Signal Compression Using a GAN with Iterative Latent Representation Optimization." *arXiv preprint arXiv:2109.11168*, 2021.

### International Conference

- [3] Zichen Fan, Hyochan An, Qirui Zhang, Boxun Xu, Li Xu, Chien-wei Tseng, Yimai Peng, Ang Cao, Bowen Liu, **Changwoo Lee**, Zhehong Wang, Fanghao Liu, Guanru Wang, Shenghao Jiang, Hun-Seok Kim, David Blaauw, Dennis Sylvester, "Audio and Image Cross-Modal Intelligence via a 10TOPS/W 22nm SoC with Back-Propagation and Dynamic Power Gating," accepted to IEEE Symposium on VLSI Circuits (VLSI-Symposium), 2022
- [2] Dong-Hee Kim, **Changwoo Lee** and Ki-Seok Chung. "A Confidence-Calibrated MOBA Game Winner Predictor." *IEEE Conference on Games*. Osaka, Japan (Virtual), 2020.
- [1] **Changwoo Lee** and Ki-Seok Chung. "GRAM: Gradient Rescaling Attention Model for Data Uncertainty Estimation in Single Image Super Resolution." *IEEE International Conference on Machine Learning and Applications (ICMLA)*. Florida, USA, 2019.(Regular Paper, 28.5%)

## Projects

### Graduate

**Deep Learning Framework for HVAC Systems**

August 2018 - July 2019

- ◇ Industrial project, supervised by Prof. Ki-Seok Chung.
- ◇ Worked with LG Electronics.
- ◇ Developed Deep Neural Network models and implemented transfer learning algorithms in C.
- ◇ Generated custom dataset (Korean food images with labels) for transfer learning.

**WGAN-GP in Tensorflow**

April 2018

- ◇ Personal project
- ◇ Implemented WGAN-GP in Tensorflow 1.x.
- ◇ Source code: [github.com/changwoolee/WGAN-GP-tensorflow](https://github.com/changwoolee/WGAN-GP-tensorflow) (Current stars: 21)

### Undergraduate

**Cool Vibe: Thermo-tactile Gloves for VR Environments**

June 2017 - October 2017

- ◇ Undergraduate Design Fair Team Project, supervised by Prof. Whoi-Yul Kim.
- ◇ Designed gloves for the thermal and tactile interface of VR applications, including interconnections and the controller.
- ◇ Developed demo VR games in the Unity and Steam VR environment. [\[videos\]](#)

**FPGA based LeNet-5 Accelerator**

March 2017 - July 2017

- ◇ Undergraduate Thesis, supervised by Prof. Ki-Seok Chung.
- ◇ Implemented a FPGA-based CNN Accelerator using High-level Synthesis, and demo application in Windows platform.
- ◇ Source code: [github.com/changwoolee/lenet5\\_hls](https://github.com/changwoolee/lenet5_hls) (Current stars: 149)

## Professional Skills

**Programming Languages:** Python, Matlab C, C++, C#, Java, and Verilog

**Frameworks:** Tensorflow, PyTorch, Darknet, High-level Synthesis, and Unity

**Platforms:** Linux, Android, FPGA, Windows, and Steam VR

## Honors and Awards

|  |             |
|--|-------------|
| Hanyang University TA Scholarship  | Spring 2019 |
| BrainKorea21 PLUS Scholarship (4 semesters)                                      | 2018-2019   |
| Hanyang Graduate School Scholarship (4 semesters)                                | 2018-2019   |
| Silver Award in Creative Design Fair (School of Engineering, Hanyang University) | 2017        |
| - <i>Cool Vibe: Thermo-tactile Gloves for VR Environments.</i>                   |             |
| Outstanding Paper Award in KICS Fall Conference                                  | 2017        |
| - <i>Implementation of an FPGA-based CNN Accelerator using SDSoc.</i>            |             |
| Hanyang Brain Scholarship (2 semesters)  | 2017        |
| Full Scholarship, Korean Government, Korea Student Aid Foundation                | Fall 2016   |
| Full Scholarship, Hanyang University (2 semesters)                               | 2012-2013   |

## Teaching Experience

### Teaching Assistant

- ◇ Embedded System — Spring 2019
- ◇ VLSI Design — Fall 2018
- ◇ SoC Design — Spring 2018

### Special Teaching Experience

- ◇ Advising undergraduate dissertation — March 2019 - September 2019
  - Advised 'A Sparsity-inducing Optimization Method for Convolutional Neural Networks via Elastic Net Regularization and Hyper-parameter Search.'
- ◇ Mentoring — Spring 2017
  - Mentored a foreign student to successfully finishing a Data Structure course.

## Volunteer Work

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|--|-------------------------------------|
| Student Volunteer, ICCV 2019, Seoul, Korea | October 27, 2019 - November 2, 2019 |
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## Leadership

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|--|---------------------------|
| Republic of Korea Army   | April 2014 - January 2016 |
| ◇ Honorably discharged upon completing military service as a sergeant, and a squad leader. |                           |

(Compilation date: August 16, 2022)