# Jae-Won **Chung**

📞 +1 (734) 496-1803 | ✉ jwnchung@umich.edu | 🏠 jaewonchung.me | 🐙 jaywonchung | 💼 jae-won-chung-cs

## Summary

I am a second year PhD candidate in CSE at the University of Michigan, working with Professor Mosharaf Chowdhury. My research interest is in the intersection of software systems and deep learning, with a recent focus on sustainability aspects such as energy consumption and carbon footprint. I lead the ML Energy initiative.

## Education

**University of Michigan**                                                   *Ann Arbor, MI, USA*
Pʜ.D. sᴛᴜᴅᴇɴᴛ ɪɴ Cᴏᴍᴘᴜᴛᴇʀ Sᴄɪᴇɴᴄᴇ ᴀɴᴅ Eɴɢɪɴᴇᴇʀɪɴɢ                           *Sep 2021 - present*

**Seoul National University**                                                *Seoul, South Korea*
B.S. ɪɴ Eʟᴇᴄᴛʀɪᴄᴀʟ ᴀɴᴅ Cᴏᴍᴘᴜᴛᴇʀ Eɴɢɪɴᴇᴇʀɪɴɢ                                  *Mar 2015 - Aug 2021*

- GPA: 4.04/4.3 (overall) 4.15/4.3 (major), Summa Cum Laude
- Period includes two years of military service.

## Publications

- **Zeus: Understanding and Optimizing GPU Energy Consumption of DNN Training**, Jie You*, Jae-Won Chung*, Mosharaf Chowdhury, Symposium on Networked Systems Design and Implementation (NSDI), 2023 (Acceptance rate = 18.38%)

- **ShadowTutor: Distributed Partial Distillation for Mobile Video DNN Inference**, Jae-Won Chung, Jae-Yun Kim, Soo-Mook Moon, International Conference on Parallel Processing (ICPP), 2020 (Acceptance rate = 28.99%)

**\* Equal contribution**

## Experience

**Energy-Efficient Systems for Machine Learning**                            *SymbioticLab, UMich*
Aᴅᴠɪsᴏʀ: Mᴏsʜᴀʀᴀf Cʜᴏᴡᴅʜᴜʀʏ                                                   *Sep 2022 - Present*

- *Zeus*: Discovered the trade-off between DNN training time and energy. Designed a Multi-Armed Bandit solution for time-energy optimization.
- *Perseus (WIP)*: Towards Zero Energy Bloat in Large-Scale Distributed DNN Training
- Mentoring two MS students who work on expanding Zeus to various training scenarios.

**Software Systems for Machine Learning**                                    *Software Platform Lab, SNU*
Aᴅᴠɪsᴏʀ: Bʏᴜɴɢ-Gᴏɴ Cʜᴜɴ                                                       *Apr 2020 - Jun 2022*

- *Crane*: A GPU cluster manager for AutoML workloads. Built a Kubernetes backend that scaled to 288 GPUs. Contributed core features such as automatic bootstrapping on Docker Swarm and Kubernetes and log streaming through the EFK (Elasticsearch - Fluent Bit - Kibana) stack.
- Participated in the writing process of Terra (NeurIPS'21), Revamper (ATC'21), and Nimble (NeurIPS'20).

**Online Model Specialization for Edge Video DNN Inference**                 *Virtual Machine and Optimization Lab, SNU*
Aᴅᴠɪsᴏʀ: Sᴏᴏ-Mᴏᴏᴋ Mᴏᴏɴ                                                        *Dec 2019 - Jun 2020*

- *ShadowTutor*: Knowledge distillation from the server to the edge device reduced network data transfer by 95% and increased throughput by 3x.

**Few-Shot Learning with Meta-Learning**                                     *Computer Vision Lab, SNU*
Aᴅᴠɪsᴏʀ: Kʏᴏᴜɴɢ Mᴜ Lᴇᴇ                                                        *Jun 2019 - Dec 2019*

- Designed improved meta-initialization methods for Model-Agnostic Meta-Learning (MAML) with neural memory modules and convex programs.

**Quantitative Susceptibility Mapping with Deep Learning**                   *Lab of Imaging Science and Technology, SNU*
Aᴅᴠɪsᴏʀ: Jᴏɴɢʜᴏ Lᴇᴇ                                                           *Jun 2019 - Aug 2019*

- Designed and implemented a full deep learning pipeline for QSM, a vision task for medical diagnostics with 3D MRI field data, including preprocessing (background removal, phase unwrapping, and patch slicing), augmentation (adding fake calcifications) and modeling (CAD-QSMNet).

## Open Source Projects

- **BERT4Rec-VAE-Pytorch** (☆232 ⑂ 68), PyTorch implementation of BERT4Rec and Netflix VAE
- **Reason** (☆121 ⑂ 2), A shell for research papers
- **Zeus** (☆51 ⑂ 7), An energy optimization framework for DNN training
- **Pegasus** (☆19 ⑂ 2), An SSH command runner with a focus on simplicity

*Numbers as of January 5, 2023.*

## Honors & Awards

| | | |
|---|---|---|
| Nov 2022 | **Carbon Hack '22 Second Best Solution**, Carbon-Aware DNN Training with Zeus, $25,000 | *Green Software Foundation* |
| Jul 2021 | **Kwanjeong Overseas Scholarship**, $100,000 over four years | *Kwanjeong Educational Foundation* |
| Mar 2019 | **Kwanjeong Undergraduate Scholarship**, $20,000 over two years | *Kwanjeong Educational Foundation* |

## Teaching

- **Spring 2021 Operating Systems**, Main TA, Managed course projects and led group design reviews.
- **Fall 2020 Computer Organization (Undergraduate architecture)**, Peer tutor, Provided 30 hours of online lecture, **Best Tutor Award!**

## Skills

| | |
|---|---|
| **Language** | Python, Rust, CUDA, C++, Verilog, C, Bash |
| **Framework** | PyTorch, Pandas, Matplotlib, FastAPI |
| **Methodology** | Machine Learning, Deep Learning, Multi-Armed Bandit |
| **Tool** | Docker, Kubernetes, KubeFlow, LaTeX |
| **English** | TOEFL 120 (Perfect score), GRE 167/170/4.5 |