

# Jae-Won Chung

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## Summary

I am a third year PhD candidate in CSE at the University of Michigan, working with Professor Mosharaf Chowdhury. I build efficient software systems for deep learning, with a recent focus on the efficient management of not only time, but also energy. I lead the [ML Energy initiative](#).

## Education

### University of Michigan

PH.D. CANDIDATE IN COMPUTER SCIENCE AND ENGINEERING

Ann Arbor, MI, USA

Sep 2021 - present

### University of Michigan

M.S. IN COMPUTER SCIENCE AND ENGINEERING

Ann Arbor, MI, USA

Sep 2021 - Apr 2023

### Seoul National University

B.S. IN ELECTRICAL AND COMPUTER ENGINEERING

Seoul, South Korea

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

- **Perseus: Removing Energy Bloat from Large Model Training**, [Jae-Won Chung](#), Yile Gu, Insu Jang, Luoxi Meng, Nikhil Bansal, Mosharaf Chowdhury, Preprint, 2023
- **Chasing Low-Carbon Electricity for Practical and Sustainable DNN Training**, Zhenning Yang, Luoxi Meng, [Jae-Won Chung](#), Mosharaf Chowdhury, ICLR Workshop: Tackling Climate Change with Machine Learning, 2023
- **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

ADVISOR: MOSHARAF CHOWDHURY

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](#): A system for energy-efficient large model training. Cuts up to 30% energy without slowdown.
- [ML.ENERGY Leaderboard & Colosseum](#): The first systematic benchmark and interactive comparison service for LLM energy consumption.

### Software Systems for Machine Learning

Software Platform Lab, SNU

ADVISOR: BYUNG-GON CHUN

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.

### Online Model Specialization for Edge Video DNN Inference

Virtual Machine and Optimization Lab, SNU

ADVISOR: SOO-MOOK MOON

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

ADVISOR: KYOUNG MU LEE

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

ADVISOR: JONGHO LEE

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

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- **BERT4Rec-VAE-Pytorch** (☆312 ♪ 76), Implementation of BERT4Rec and Netflix VAE recommendation models. PyTorch.
- **Reason** (☆182 ♪ 4), A shell for research papers. Rust.
- **Zeus** (☆109 ♪ 14), An energy optimization framework for DNN training. Python and C++.
- **Pegasus** (☆26 ♪ 3), An SSH command runner with a focus on simplicity. Rust.

Number of stars and forks are as of January 17, 2024.

## Honors & Awards

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

## Talks

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|----------|---|--|
| Oct 2023 | <b>Energy-Efficient Software Systems for Machine Learning</b> | <i>Seoul National University</i>             |
| Oct 2023 | <b>Energy-Efficient Deep Learning with PyTorch and Zeus</b>   | <i>PyTorch Conference</i>                    |
| Sep 2023 | <b>Energy-Efficient Deep Learning with Zeus</b>               | <i>Massachusetts Institute of Technology</i> |

## Service

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- **Systems/Software Reading Group**, Paper reading group inside Michigan CSE, Organizer since Fall 2022

## Teaching

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- **Operating Systems (SNU, Spring 21)**, Lead TA, Managed Linux kernel hacking projects and led student team design reviews.
- **Computer Architecture (SNU, Fall 20)**, Peer tutor, Provided 30 hours of online lecture, **Best Tutor Award!**

## Skills

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