

# Woohyeon Baek

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Website: <https://whnbaek.github.io>

## EDUCATION

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### Seoul National University (SNU)

*B.S. in Computer Science and Engineering (CSE); Summa Cum Laude (2nd out of 64)*

Seoul, Korea

*Mar 2017 - Feb 2023*

## PUBLICATIONS

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- **Woohyeon Baek\***, Jonghyun Bae\*, Donghyun Lee, Hyunwoong Bae, Yeonhong Park, Jae W. Lee. **Liquid: Mix-and-Match Multiple Image Formats to Balance DNN Training Pipeline.** APSys '23
- Jonghyun Bae, **Woohyeon Baek**, Tae Jun Ham, Jae W. Lee. **L3: Accelerator-Friendly Lossless Image Format for High-Resolution, High-Throughput DNN Training.** ECCV '22

## RESEARCH EXPERIENCE

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### SNU Software Foundations Lab

*Undergraduate Research Assistant*

Seoul, Korea

*Mar 2022 - Feb 2023*

- Devised greedy coloring-based register allocation for custom ISA by using chordality of interference graph in SSA-form
- Built custom LLVM backend for custom ISA with phi node coalescing, reducing up to 90% of the unnecessary move operations
- Implemented eight programs and added 255 test cases to verify the correctness and performance of the custom LLVM compiler

### SNU Architecture and Code Optimization Lab

*Undergraduate Research Assistant*

Seoul, Korea

*Jan 2021 - Oct 2022*

- Proposed a lightweight, lossless image format for DNN training, achieving up to 9.3× data preparation throughput gain
- Designed a new system for efficient DNN training pipeline by mixing multiple data formats to balance data loading and decoding throughput, showing up to 3.1× throughput improvement

### SNU Computer Theory and Applications Lab

*Undergraduate Research Assistant*

Seoul, Korea

*Jul 2018 - Dec 2018*

- Developed SNU Graph Analysis Library that quickly analyzes statistics on large-scale graphs, assisting researchers to optimize their target graphs

## TEACHING EXPERIENCE

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- Peer Tutoring for International Students in SNU *Sep 2022 - Feb 2023*
- Teaching Assistant for Principles and Practices of Software Development (M1522.002400) *Mar 2022 - Jun 2022*

## PROJECTS

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### SNUCSE ID | *JavaScript, SQL*

*Jun 2023 - Aug 2023*

- Developed Open ID Connect Provider of SNUCSE integrated account system, allowing thousands of the department members to log in to all services, including webpages, community site, and lab servers

### SNUCSE GPU Service | *Rust, YAML*

*Mar 2023 - Aug 2023*

- As a project leader of 8, introduced a container-based job submission system by Kubernetes, enabling more than 30 students to use the service for their research per semester
- Developed resource quota controller and connected it to Google form, allowing students to apply for their resource quota
- Applied Grafana and Prometheus to monitor resource usage and prevent malicious use

### RL-based Shot Selection | *Python*

*Sep 2022 - Dec 2022*

- Proposed a way to select few shots via reinforcement learning, improving GPT-2 performance up to 12.2% on average

### ArchPresser | *C++, Python*

*Sep 2021 - Dec 2021*

- Developed a library that reconstructs 3D CT images into 2D panoramic images in collaboration with Osstem Implant
- Proposed thickness-aware ray-sum to non-developable bivariate B-spline surface to minimize image distortion

## TECHNICAL SKILLS

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**Languages:** C/C++, Java, Scala, Python, Rust, Shell Script, Verilog, Assembly, Ocaml, JavaScript, TypeScript, SQL

**Frameworks and Libraries:** PyTorch, Tensorflow, Nvidia DALI, Huggingface, Node.js, Koa, STL, OpenMP, OpenCL, OpenGL, OpenCV, CUDA, MPI, LLVM

**DevOps Tools:** Kubernetes, Docker, Git, Github, PostgreSQL, Terraform, Argo CD, Grafana, Cloudflare, AWS, GCP

## AWARDS

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- SNU College of Engineering Alumni Association Best Graduation Award *Feb 2023*
- SNUCSE Excellent Thesis Award *Feb 2023*
- SNUCSE Excellent Poster Presentation Award *Feb 2023*

## SCHOLARSHIP

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- Jeongheon Foundation Academic Excellence Scholarship *Sep 2020 - Aug 2022*
- SNU Academic Excellence Scholarship *Mar 2018 - Feb 2019*

## EXTRACURRICULAR ACTIVITIES

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- Educational Volunteer at Hanuri Child Welfare Center *Dec 2022 - Mar 2023*
- Educational Volunteer at Guangdong Child Welfare Center *Mar 2018 - Jun 2018*
- Educational Volunteer at Haesung Child Welfare Center *Jun 2017 - Aug 2017*
- ACM-ICPC Asia Daejeon Regional Contest, 19th place (First Round, 5th place) *Sep 2017 - Nov 2017*
- IOI (International Olympiad in Informatics) National Team Reserve *Jul 2014*