Hyoungjoo Kim

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https://hyoungjook.github.io

Research Interests

I'm interested in designing **Database Systems** for **Novel Hardwares**.
My current research explores the potential of **Processing-in-Memory** on **Transaction Processing** by pushing code towards data. I have also worked on other Databases (Analytical, Vector), Machine Learning Systems, and GPUs.

Education

- **Carnegie Mellon University**, Pittsburgh, Pennsylvania *2023 - Present*
  Ph.D. Student in Computer Science
  Advisor: Phillip B. Gibbons, also worked with Andrew Pavlo
- **Seoul National University**, Seoul, Korea *2017 - 2023*
  B.S. in Electrical and Computer Engineering
  Advisor: Jangwoo Kim, also worked with Byung-Gon Chun
  GPA: 4.28/4.3 (2nd/148)
  The period includes two years of mandatory military service in South Korea.

Publications

- Taebum Kim, Hyoungjoo Kim, Gyeong-In Yu, Byung-Gon Chun
  BPipe: Memory-Balanced Pipeline Parallelism for Training Large Language Models
  International Conference on Machine Learning (ICML), 2023 (Oral Presentation)
- Hyoungjoo Kim
  Modeling the GPU Instruction Scheduling Performance using Microbenchmarks
  Bachelor's Thesis, Seoul National University, 2023 (Advised by Jangwoo Kim)

Research and Work Experiences

- **Microsoft**, Redmond, Washington *Summer 2024, Summer 2025*
  Research Intern
  - HIVF: (In Progress) Vector index for GPUs
- **Parallel Data Lab** & **CMU Database Group**, Pittsburgh, Pennsylvania *2023 - Present*
  Graduate Research Assistant
  - OLTPim: (In Progress) Fast and efficient OLTP DBMS for Processing-in-Memory
- **FriendliAI**, Seoul, Korea *2022 - 2023*
  Research Intern
  - BPipe: Accelerating the training of LLMs by rebalancing memory utilizations
  - Optimizing GPU kernels for training LLMs
- **High Performance Computer System Lab**, Seoul, Korea *2021*
  Undergraduate Thesis Project Student
  - GPUDiag: Modeling GPU microarchitecture using automated microbenchmarks
  - Extending gem5-APU to support multiple GPUs

- **Geolux**, Seoul, Korea *2017 - 2018*
  Software Engineering Intern
  - Training AI models to detect potholes from driveway videos

Honors and Awards

- Northrop Grumman Fellowship - Computer Science *2024 - 2025*
- Overseas PhD Scholarship, Korea Foundation for Advanced Studies (KFAS) *2023 - 2028*
- The Presidential Science Scholarship, Korea Student Aid Foundation (KOSAF) *2017 - 2023*
- Gold Medal, International Physics Olympiad (IPhO) *2016*
- Silver Prize, Samsung Humantech Paper Award *2016*

Intra- and Extracurricular Projects

- Query execution engine for OLAP database systems *Spring 2024*
- Cache simulator for x64 binaries using pintool *Fall 2023*
- Linux kernel hacking to impelement custom scheduler, lock, and file system *Spring 2022*
- Compiler frontend for custom grammar rules using lex and yacc *Fall 2021*
- CNN accelerator that can process conv, fc, and maxpool using Verilog and FPGA *Fall 2021*
- CPU simulator for pipelined CPU with branch predictor and cache using Verilog *Spring 2019*
- IoT system on the car fender that alarms the driver of safety incidents *2019*
- IoT system in the billiards ball that evaluates the cueing accuracy *2018*
- 3D territory game that adds 3D graphics to the given game logic *Spring 2018*
- Robotic car that follows the path and escape from the maze *Fall 2017*
- Robotic arm that mimics human arm movement *2017*
- Robotic arm using thermally-driven super-coiled-nylon artificial muscles *2015 - 2016*

Teaching Experiences

- Teaching Assistant, 15-445 “Intro Database Systems”, Carnegie Mellon University *Spring 2025*
- Teaching Assistant, “Operating Systems”, Seoul National University *Spring 2023*

Skills

- C, C++, Python, CUDA, Verilog, Linux Kernel, SQL, PyTorch, ZSim
- Computer Architecture and Simulation, GPUs, Machine Learning Systems, Memory Systems, Operating Systems, System Programming
- Database Systems, Transaction Processing, Vector Indexes