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, worked with Andrew Pavlo
- **Seoul National University**, Seoul, Korea *2017 - 2023*
  B.S. in Electrical and Computer Engineering
  Advisor: Jangwoo Kim, 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

- **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
- **Microsoft**, Redmond, Washington *Summer 2024, Summer 2025*
  Research Intern
  - *HIVF*: (In Progress) Vector index for GPU
- **FriendliAI**, Seoul, Korea *2022 - 2023*
  Research Intern
  - *BPipe*: Accelerating the training of LLMs by rebalancing memory utilizations
  - *GPU Kernel Optimization*: Optimized CUDA kernels for training LLMs
- **High Performance Computer System Lab**, Seoul, Korea *2021*
  Undergraduate Thesis Project Student
  - *GPUDiag*: Modeling GPGPU microarchitecture using automated microbenchmarks
  - *Multi-GPU gem5*: Extend gem5-APU to support multiple GPUs

- **Geolux**, Seoul, Korea *2017 - 2018*
  Software Engineering Intern
  - *Pothole Detector*: Trained AI models to detect potholes from driveway videos

Honors and Awards

- 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 (for high school students)* *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