Tay Kim

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Education

New York University, Courant Institute of Mathematical Sciences, New York, NY — Sep 2024 - May 2026
Master of Science, Computer Science (Concentration in Systems and Security), GPA: 3.90/4.0
Courses: Multicore Architecture, Compilers, Operating Systems, Computer Networks, Database Systems, Distributed Systems, Applied Cryptography and Network Security

Dartmouth College, Hanover, NH — Sep 2017 - Jun 2023
Bachelor of Arts, Computer Science, summa cum laude, GPA: 3.97/4.0
Courses: Computer Architecture, Software Design and Implementation, Algorithms, Machine Learning, Deep Learning, Robotics

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Technical Skills

Programming Languages: C, C++, Python
Systems: Virtual Memory, Concurrency, Socket Programming, TCP/IP
Linux & Developer Tools: Bash, Git, GDB, Make
Web Development: MongoDB, Express, React, Node.js
Certification: Amazon Web Services (AWS) Solutions Architect - Associate

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Work Experience

Research Assistant, Dartmouth College Linguistics Department, Hanover, NH — Jun 2022 - Jun 2023

- Contributed to Indigenous language preservation initiatives by training speech recognition models to transcribe Indigenous speech.
- Led manual data annotation and preprocessing workflows using audio tagging software, producing high-quality speech datasets totaling 3.3 hours of transcribed audio.
- Supported experiments on fine-tuning large speech recognition models for small target languages, including a transfer learning setup that reduced word error rate from 76% to 70%.
- Co-authored “Multilingual Models for ASR in Chibchan Languages” (NAACL 2024, Track: Languages of Latin America).

Projects

Memory Allocator

- Implemented a glibc-style memory allocator in C supporting malloc, free, calloc, and realloc with dynamic interposition via LD_PRELOAD on Linux.
- Organized free lists into size classes for faster chunk lookup; reduced lock contention through multiple arenas and thread-local caching.
- Evaluated allocator on an 8-thread JSON parsing workload; measured 18× throughput versus a single-arena, no thread-caching baseline on a 16-logical-CPU machine.
- Built a comprehensive test suite to validate correctness under single-threaded and concurrent workloads.

Graph-Coloring Register Allocator

- Optimized the backend of a baseline compiler written in OCaml that compiles a C-like toy language into RISC-V.
- Performed static analysis on input programs to construct variable interference graphs, then implemented graph-coloring register allocation to minimize register conflicts and memory spills.
- Reduced average RISC-V execution time by 35% across 9 benchmark programs compared to the naive baseline.

GPU Roofline Modeling for Neural Network Training

- Profiled ResNet training using NVIDIA’s GPU profiler, collecting kernel-level compute and memory throughput metrics.
- Aggregated profiler outputs to compute overall FLOP/s and arithmetic intensity per training workload, then generated roofline plots to classify each workload as compute-bound or memory-bound.
- Systematically evaluated the impact of model and batch size on GPU utilization, identifying configurations with low compute or memory utilization.

Other Experience

PcapPlusPlus, Open Source Contribution — Sep 2026 - Oct 2026

- Contributed three merged pull requests to an open-source C++ packet capture library by updating deprecated API usage and corresponding documentation webpages.
- Gained hands-on experience with modern C++ features, including smart pointers and move semantics, along with development tools such as CMake, clang-tidy, and clang-format.

Republic of Korea Army, Sergeant and Squad Leader — Dec 2018 - Jun 2020

Dartmouth College, Teaching Assistant — Sep 2022 - Jun 2023

- Led weekly office hours to help students break down advanced concepts in Linear Algebra and Natural Language Processing.

Coder Dojo, Volunteer Instructor — Jan 2022 - Jun 2023

- Led classroom activities to teach Python and R to local high school math classes in the Hanover, NH area.