Taekseung "Andy" Kim

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Education

Carnegie Mellon University **2019 - 2025**

Bachelor's in Computer Science, Minor in Mathematics, ***University Honors*** *3.70/4.0 GPA*

- Graduated May 2025 with College Honors
- Relevant coursework: Parallel and Concurrent Algorithms, Algorithm Design and Analysis, Parallel Computer Architecture and Programming, Multimedia and Data Mining, Computer Systems, Mechanical and Logical Reasoning, Combinatorics, Real Analysis, Matrix Theory(Honors), Probability(Math), Set Theory, Machine Learning for CS major, Database Systems(audit)

Carnegie Mellon University **2025 - 2026**

Master's in Computer Science *Currently Enrolled*

- Expected graduation: May 2026

Publications

Range Retrieval with Graph-Based Indices **Jan 2025**

- Published on arXiv (arXiv:2502.13245). Co-authored with Magdalen Dobson Manohar and Guy E. Blelloch
- Developed novel algorithms for range search problems in high-dimensional spaces, introducing doubling search methodology
- Demonstrated significant performance improvements over state-of-the-art FAISS library implementations

CMU Undergraduate Thesis **May 2025**

- Participated in undergraduate thesis presentation competition in CMU, delivering a poster session with 15 minute talk and 8-page thesis.
- Worked on better IVF methods for ANN(Approximate nearest neighbor) search problem, implementing two round clustering for better performance with 30 times speed boost

Additive s-Functional INEQUALITIES AND DERIVATIONS ON BANACH ALGEBRAS **2019**

- Published on Journal of Computational Analysis and Applications. Advised under Professor Choonkil Park
- Solved s-functional inequality, and proved yers-Ulam stability of linear derivations on Banach algebras

Honours and Awards

Putnam Competition **Jan 2020**

- Math competition, Ranked 114th among 4000+ U.S university participants

Kwanjeong Scholarship **May 2019**

- Scholarship for 60000 USD annually. Awarded to only 10 undergraduates in South Korea

Experience

Carnegie Mellon University **Pittsburgh, PA**

Researcher, Advised by Professor Guy Blelloch *Jan 2024 -*

- Currently working on the parallel tree decomposition problem. Reviewed literature in Database query processing, query optimization, hypertree decompositions, going over more than 10 years of papers in PODS conference
- Worked with Magdalen Dobson Manohar, working on ParlayANN(Parallel ANN)library
- Optimized nearest neighbor search utilizing graph-based search (Vamana algorithm). Improved speed of nearest neighbor search by 30% to 60% based on recall
- Identified key distinctions between different billion-sized and high-dimensional datasets, and diagnosed the limitations of the range search algorithm for specific applications

Carnegie Mellon University Tepper School of Business **Pittsburgh, PA**

Researcher, Advised by Professor Taewan Kim *May 2025 -*

- Building simulation models and mining data to prove concept of Kantian filter for behavioral economics research
- Developing computational frameworks to test philosophical economic theories through empirical data analysis

ZuzLab, Carnegie Mellon University **Pittsburgh, PA**

Researcher, Advised by Professor Seth Goldstein *Feb 2021 - Dec 2021, Sep 2023 - Nov 2023*

- Engineered an Agent-Based Model in Python to accurately simulate a multi-currency local economy

- Enhanced and optimized a Reinforcement Learning model to autonomously enable agents to select their currency, incorporating stochastic features to ensure realistic simulations

Republic of Korea Army **Bundang, Korea**

Researcher, Sergeant *Dec 2021 - Jun 2023*

- Crafted and deployed security-related educational software using C++ and Rust, utilized by the Republic of Korea Army to train over 200 personnel. Works here are classified

Carnegie Mellon University **Pittsburgh, PA**

Peer Tutor *Sep 2020 - Dec 2020, Sep 2023 - May 2024*

- Mentored over 20 students struggling with introductory math and CS courses, including Mathematical Concepts (21128) and computer programming (Python, C), delivering more than 200 hours of targeted instruction

Projects

Multiple Sequence Alignment with Speculative Parallelism **Pittsburgh, PA**

Project Page — *GitHub* *Dec 2024*

- Implemented speculative parallel version of randomized iterative Berger-Munson algorithm for multiple sequence alignment using C++ and OpenMPI
- Achieved near-linear speedup on computational biology datasets by parallelizing between iterations using speculative computation
- Identified theoretical upper bounds on speedup and analyzed divergence limitations in parallel processing for biological sequence alignment
- Developed comprehensive performance analysis including profiling, load balancing, and bottleneck identification

TeraHAC: Hierarchical Agglomerative Clustering for Big Dataset **Pittsburgh, PA**

Implementation *April 2024*

- Implemented the TeraHAC methodology for parallel hierarchical agglomerative clustering for large datasets using C++ and ParlayLib
- Optimized parallel processing capabilities during cluster construction for enhanced performance and efficiency

Eulerian Trail **Pittsburgh, PA**

Game Project *Dec 2021*

- Developed a graph theory-based game that dynamically generates graphs for players to find shortest paths or complete drawings in one session using Python

Skills and Interests

Programming: C++, C, Python, Rust, SML, Haskell
Skills: ParlayLib, OpenMP, MPI, Git, NumPy, CUDA, LaTeX
Languages: English(Fluent), Korean(Native), Japanese(Elementary)