

MINGI KANG

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EDUCATION

Bowdoin College, ME

B.A. in Computer Science, Minor in Mathematics
Overall GPA: 3.71 / 4.00

August 2022 - Present

Aquincum Institute of Technology, Budapest, Hungary

Computer Science Study Abroad Semester

August - December 2024

PUBLICATIONS, PRESENTATIONS, MEDIA

Publications

- [1] ZiLU Activation Function for Vision and Language Models
Mingi Kang, Zai Yang, Jeová Farias Sales Rocha Neto In Preparation
2025
- [2] Attention Via Convolutional Nearest Neighbors
Mingi Kang, Jeová Farias Sales Rocha Neto Under Review
2025
[arXiv preprint arXiv:2511.14137](https://arxiv.org/abs/2511.14137)
- [3] Parallel qMRI Reconstruction from 4x Accelerated Acquisitions
Mingi Kang Preprint
2025
[arXiv preprint arXiv:2511.18232](https://arxiv.org/abs/2511.18232)
- [4] Structures and process-level lexical interactions in memory search: A case study of individuals with cochlear implants and normal hearing
Abhilasha A. Kumar, Mingi Kang, William G. Kronenberger, Michael N. Jones, David B. Pisoni Conference Publication
2024
CogSci 2024. Proceedings of the 46th Annual Meeting of the Cognitive Science Society (Vol. 46).
DOI: <https://escholarship.org/uc/item/7vn9q9hh>

Presentations

- [1] Parallel qMRI Reconstruction from 4x Accelerated Acquisitions
Mingi Kang Oral
July 2025
McKelvey School of Engineering Summer Symposium, St. Louis, MO
- [2] Convolutional Nearest Neighbors: Reinterpreting Convolution Through K-Nearest Neighbor Selection
Mingi Kang Poster
October 2025
IEEE MIT Undergraduate Research Technology Conference (MIT URTC), Cambridge, MA
- [3] Parallel qMRI Reconstruction from 4x Accelerated Acquisitions
Mingi Kang Poster
July 2025
McKelvey School of Engineering Poster Palooza, St. Louis
- [4] Structures and process-level lexical interactions in memory search: A case study of individuals with cochlear implants and normal hearing
Mingi Kang Poster
July 2024
Annual Conference of the Cognitive Science Society 2024, Rotterdam, Netherlands

Media

- [1] Mingi Kang '26: Advancing Computers' Ability to See and Understand Our World (November 2025) School Article
[Bowdoin Article Link](#)

RESEARCH EXPERIENCE

Independent Deep Learning Research Group

Undergraduate Research Assistant (Advisor: Prof Jeova Farias)

August 2025 - Present
Brunswick, ME

- Developed **ZiLU** activation function that generalizes ReLU, GELU, and SiLU with learnable parameters for fine-grained control.

- Implemented modular GPT2 architecture allowing plug-and-play activation function swapping, training on OpenWebText to evaluate performance via perplexity metrics.
- Demonstrated 1-2% improvements on image classification on CIFAR-10/100 with VGG19 and ResNet34 compared to baseline ReLU, GELU, and SiLU activations, with consistent gains across architectures.

Senior Honors Thesis in Computer Science

Honors Candidate (Advisor: Prof Jeova Farias)

August 2025 - Present
Brunswick, ME

- Finalizing **ConvNN**, a unified framework bridging convolution and attention through k -nearest neighbor selection, with first-author paper submitted and currently under review.
- Architected hybrid branching layers combining spatial (Conv2d) and feature-based (ConvNN) aggregation, achieving 4-8% accuracy improvements on CIFAR-10/100 with VGG-11 architecture.
- Demonstrated effective and robust performance across CNN and Transformer architectures through systematic ablation studies on neighbor selection strategies.

Computational Imaging Group, Washington University in St. Louis

McKelvey Summer Engineering Fellow (Advisor: Prof Ulugbek S. Kamilov)

May - August 2025
St. Louis, MO

- Redesigned deep unfolding U-Net architecture for parallel qMRI reconstruction, achieving 4x parameter reduction while maintaining reconstruction quality (37 dB PSNR, 0.923 SSIM) on 4x accelerated scans.
- Developed normalization techniques (ACS region-specific and coil-instance) for undersampled k-space preprocessing, validated on patient dataset from WashU Medical School.

Independent Deep Learning Research Group

Undergraduate Research Assistant (Advisor: Prof Jeova Farias)

January - May 2025
Brunswick, ME

- Developed **Convolutional Nearest Neighbor Attention (ConvNN-Attention)**, an efficient attention mechanism using hard k -NN and convolutional aggregation, reducing computational cost by 18% (GFLOPS) with accuracy improvement (2.4%) on CIFAR-10/100.
- Implemented modular PyTorch layers compatible with standard Transformer and Vision Transformer architectures, enabling drop-in replacement for self-attention.

Christenfeld Summer Research Fellowship

Research Fellow (Advisor: Prof Jeova Farias)

January - August 2024
Brunswick, ME

- Developed **Convolutional Nearest Neighbors (ConvNN)** algorithm integrating norm-based k -NN pixel selection into standard convolutional operations for spatial feature learning.
- Built modular PyTorch implementation (1D/2D) with configurable sampling strategies (random, spatial), pixel-shuffling, and positional encoding.

Lexicon Lab, Bowdoin College

Undergraduate Research Assistant (Advisor: Prof Abhilasha Kumar)

December 2022 - May 2024
Brunswick, ME

- Investigated lexical retrieval processes in prelingually deaf cochlear implant users through computational cognitive modeling, contributing to published CogSci 2024 conference proceedings paper (second author).
- Extended Python package, *Forager* with joint semantic embeddings (word2vec, speech2vec) for quantitative analysis, revealing differential reliance on speech-derived representations.

TEACHING/MENTORING EXPERIENCE

Bowdoin College Baldwin Center for Learning and Teaching

Quantitative Tutor

August 2025 - Present
Brunswick, ME

- Provide one-on-one tutoring in computer science (algorithms, data structures, AI), mathematics (linear algebra, probability, statistics), and economics (microeconomics, macroeconomics).
- Support students in debugging code, understanding theoretical concepts, and developing problem solving strategies for quantitative coursework.

Bowdoin College Mathematics Department

Learning Assistant (Teaching Assistant) for Statistics and Data Science

August 2025 - Present
Brunswick, ME

- Conduct weekly learning assistant hours supporting 20+ students with R programming, statistical analysis, hypothesis testing, data visualization, and data cleaning.

- Guide students through applied projects involving real-world datasets, emphasizing statistical thinking and reproducible analysis.

Bowdoin College Computer Science Department

Learning Assistant (Teaching Assistant) for Intro to Computer Science

January 2025 - Present
Brunswick, ME

- Lead weekly learning assistant hours for 40+ students covering Python fundamentals and object-oriented programming.
- Mentor students on debugging techniques, code organization, and developer best practices.

Bowdoin College Career Exploration and Development Group

Sophomore Bootcamp Leader & Pod Leader

January 2025, January 2026
Brunswick, ME

- Design and deliver workshops on career development for 400+ sophomores, covering resume, writing, behavioral interviews, internship navigation, personal finance, academic research, graduate school, and fellowships.
- Train and manage a team of 7 senior mentors, overseeing their preparation to deliver specialized workshops and career curricula to the sophomore class.
- Mentored 5 student teams in inaugural Sophomore Bootcamp Hackathon, providing technical guidance on full-stack development, API integration, and project management.

RELEVANT COURSEWORK

Computer Science: Deep Learning for Computer Vision, Operating Systems, Artificial Intelligence, Computer Systems, Algorithms, Data Structures, Data Science, Cryptography, Computational Game Theory

Mathematics: Linear Algebra, Multivariable Calculus, Probability, Statistics, Mathematical Reasoning, Advanced Probability and Statistics

TECHNICAL SKILLS

Programming Languages	Python, R, Java, C, SQL, JavaScript, Kotlin
ML & DL	PyTorch, TensorFlow, Keras, Scikit-Learn, NumPy, Pandas, SciPy, OpenCV
Visualization	Matplotlib, Seaborn, ggplot2
Developer Tools	Git, GitHub, Bash, Overleaf/LaTeX, Markdown
HPC	Slurm (sbatch), IBM LSF (bsub)
Languages	English (Native), Korean (Native), German (Conversational)

AWARDS AND HONORS

1. CRA Outstanding Undergraduate Researcher Award, Honorable Mention
National Computing Research Association
December 2025
- Prestigious honor recognizes undergraduate students at North American colleges and universities who demonstrate exceptional potential in computing research.
2. John L. Roberts Fall Research Award (\$ 2,463)
Bowdoin College
October 2025
- Awarded for senior honors project on Convolutional Nearest Neighbors & Convolutional Nearest Neighbors Attention
3. Best Poster Presentation Award from McKelvey Engineering Summer Research (\$ 100)
Washington University in St. Louis
July 2025
- Awarded for excellence in summer research presentation.
4. McKelvey Engineering Summer Research Fellowship (\$ 7,200)
Washington University in St. Louis
May 2025
- Awarded to conduct 10-week full time research with the Computational Imaging Group.
5. Allen B. Tucker Computer Science Research Prize (\$ 50)
Bowdoin College
May 2025
- Awarded to a computer science student for excellence in summer research.
6. CRA Undergraduate Award (\$ 4,000)
Last Mile Education
April 2025
- Awarded for supplemental assistance for summer research in computer science at Washington University in St. Louis.
7. NYC Stem Award (\$ 1,500)
Last Mile Education
March 2025
- Awarded merit-based grant for technical equipment and research support.

8. Google AI 2024 Award (\$ 595) *Local*
Last Mile Education January 2025
- Awarded for semester research, building on prior work from Bowdoin College Christenfeld Summer Research Fellowship.
9. Christenfeld Summer Research Fellowship (\$ 4,800) *Institutional*
Bowdoin College April 2024
- Awarded to conduct 8-week full time research in computer vision and deep learning under faculty mentorship.
10. NSF Student Faculty Research Fellowship (\$ 1,800) *National/Institutional*
Bowdoin College, National Science Foundation January 2024
- Awarded for computational cognitive science research focused on modeling search and retrieval within the mental lexicon.
- II. QuestBridge National College Match Finalist *National*
QuestBridge September 2021
- Recognized as a finalist for the QuestBridge program, which connects high-achieving students from low-income, first-generation backgrounds with full scholarships to top colleges.