

JOON KIM

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EDUCATION

University of California, Berkeley

May 2027 (Expected)

B.S. Electrical Engineering & Computer Science, GPA: 4.00/4.00

Current Coursework [SP26]: CS194-198(Network Theory), CS189(ML), CS294–308(Sum-of-Squares & Semidefinite Programming)

TCS: CS270(Graduate Algorithms), CS294-180(Partition Functions: A+), CS174(Randomized Algorithms), CS170(Algorithms: A+), CS177(Algorithmic Economics), CS294-284(Constraint Satisfaction Problems & PCP Theorem)

Computational Science: CS194-302(Comp. Immunology: A+), EECS249B(Cyber-Physical Systems), CS176(Comp. Bio), CS188(AI/RL)

Fundamentals: CS61A/B(SCIP, Data Structures: A+), CS70(Discrete & Probability: A+), EECS16A/B (Circuits, Control & Lin. Alg: A+)

RESEARCH INTERESTS

Theoretical computer science (Approximations, Statistics, Sublinear Algorithms) and computational sciences (Comp. Bio, ML-Physics)

RESEARCH EXPERIENCE

Independent Theoretical CS Research

Berkeley, CA

Independent Researcher

Dec. 2025 - Current

- Investigating approximate Maximum Weighted Matching (MWM) and its dynamic matching variant; advised by Prof. Satish Rao
- In progress of proposing a simple extension to a [Multiplicative Auction algorithm](#) to accommodate fully dynamic matching

Lawrence Berkeley Laboratory - Perlmutter Group

Berkeley, CA

Undergraduate Researcher

Sep. 2025 - Current

- Modeling the Carousel Lens to constrain cosmology using the multi-GPU node implementation of [GIGA-Lens](#), an ML pipeline
- Implemented and experimenting Stochastic Variational Inference with Gaussian Mixtures; advised by Prof. Xiaosheng Huang

University of Florida REU: Secure and Sustainable Transportation

Gainesville, FL

Undergraduate Researcher, First Author

May. 2025 - Aug. 2025

- Explored network-level bit flipping attacks on 5G Connected and Automated Vehicles (CAV); advised by Prof. Sandip Ray
- Verified bit-flipping attack feasibility; proposed a keystream based shuffling defense that drastically lowers attack success rate
- Simulated CAV in OpenAirInterface (OAI) and proposed an error correction based defense; preparing conference submission

Berkeley Artificial Intelligence Research - C.H.E.N. Lab

Berkeley, CA

Undergraduate Researcher

Jul. 2024 - Feb. 2025

- Designed zero-shot LLM pseudo-label pipeline to improve semi-supervised learning accuracy; advised by Prof. Irene Chen
- Experimented mainly on images; investigated LLM agents for image labeling such as CLIP and ViT, showed results on CIFAR-100
- Worked on RadQA dataset; implemented FixMatch and our new proposed method on a non-inference task for comparison

JLK Group

Seoul, South Korea

Research Intern, First Author

Feb. 2024 - May. 2024

- Developed Federated Learning models reaching near identical performance to commercially deployed U-Net models using Python
- Collaborated with four M.D. professionals to investigate the use of Federated Learning in medicine; advised by Dr. Wi-Sun Ryu

Keimyung University

Daegu, South Korea

Independent Researcher

Feb. 2023 - Jul. 2024

- Proposed a randomized masking Federated Learning algorithm as an obfuscation technique against Deep Leakage for images
- Designed experiments to compare performance-privacy trade-offs amongst SOTA defense algorithms; advised by Prof. Sejin Park

Studio.geo @ UC Berkeley

Berkeley, CA

Undergraduate Researcher

Feb. 2022 - May. 2022

- Experimented Progressive-GAN on the Savio cluster to generate artificial maps using Python; advised by Prof. Clancy Wilmott
- Pictures of 4x4 grid of generated maps of 256x256 pixels trained on real colored maps included in Prof. Wilmott's book proposal

Independent Biomedical Research

Independent Researcher

Seoul, South Korea

Jan. 2020 - Jun. 2020

- Proposed a microarray analysis model for screening early schizophrenia with RNA genetic samples; overcame the lack of public RNA data with oversampling techniques and elected a Deep Neural Network model for inference; advised by Ph.D. Taehyun Kim
- Verbally presented research findings at the 2020 Society of Interdisciplinary Business Research Conference as a representative

PUBLICATIONS

- **Network-Level Bit-Flipping Attacks on Cooperative Adaptive Cruise Control in 5G Environment** (*Submitted to VTC2026-Spring*); C. Duan, J. Kim, S. Ray; Proposed an efficient message recovery algorithm that defends the previous paper on 5G network bit-flipping attack for Cooperative Adaptive Cruise Control (CACC) systems; developed a novel pattern-matching mechanism
- **Bit-Flipping Attack Exploration and Countermeasure in 5G Network** (*IEEE MASS 2025*); J. Kim, C. Duan, S. Ray; Identified the vulnerability of 5G networks without costly integrity protection and designed a man-in-the-middle that either succeeds in flipping one bit or denies service; implemented a keystream-based method as a runtime-efficient alternative defense compared to NIA
- **In-Silo Federated Learning vs. Centralized Learning for Segmenting Acute and Chronic Ischemic Brain Lesions** (*Intelligence-Based Medicine*); J. Kim, H. Lee, W. Ryu, et al.; Comparative analysis of Federated and Centralized Learning on real-life non-i.i.d. brain lesion datasets of ~10,000 patients over 9 medical institutions; Poster at International Conference STROKE UPDATE 2024
- **Random Gradient Masking as a Defensive Measure to Deep Leakage in Federated Learning** (*Arxiv*); J. Kim, S. Park; Compared the efficacy of randomly masking gradients from Federated Learning submissions against other defenses against Deep Leakage from Gradients such as Pruning, Compression, and Noising on Convolution Neural Networks; Proposed masking as an effective defense

RESEARCH PROJECTS & TECHNICAL REPORTS

- **CS294-180:** [Final Report](#) and 70-minute lecture on [Sublinear Sampling of Spanning Trees via Entropic Independence](#)
- **CS194-302:** [Final Project](#) on modeling drug-induced resistance continuum with a Hill-function modulated CTMC
- **CS194-302:** [Class presentation](#) on Cohort Studies; explained [MrVI](#), a double-layered VAE model for single-cell biology
- **EECS249B:** [Final Project](#) on the runtime monitoring of stochastic contracts; mainly researched Scenario Optimization
- **CS176:** [Literature Review](#) on [Cassiopeia](#), a parsimony-based phylogeny algorithm hybridizing ILP and Greedy methods

PROFESSIONAL EXPERIENCE

Impact AI

Data Engineering Intern

Seoul, South Korea

Jul. 2022 - Aug. 2022

- Developed a data preprocessing pipeline to pattern-match raw datasets of various formats from multiple companies using Python
- Contributed in designing SQL-like UI/UX features for the main page of web and native applications deployed to client companies

TEACHING EXPERIENCE

CS70 Course Staff

UCS1

Berkeley, CA

Jan. 2026 - Current

- 4 hours of grading and 4 hours of discussion section assistance and office hours for CS70 (Discrete Mathematics and Probability)

Computer Science Mentors

CS70 Junior Mentor

Berkeley, CA

Aug. 2025 - Dec. 2025

- Lead a group of five undergraduates in hour-long review sessions twice a week for CS70 (Discrete Mathematics and Probability)

AWARDS

- **Korean Honor Scholarship 2025:** Received \$1500, selected 71 out of 356 students based on academic achievements

TECHNICAL SKILLS

- LaTeX, Python, Java, C, PyTorch, TensorFlow, Flower(Federated Learning Framework), Docker, AWS