

James Kim

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EDUCATION

Cornell University

Ithaca, NY

Bachelor of Arts in Computer Science, Bachelor of Arts in Mathematics

Aug 2021 – May 2025

- *Relevant Coursework:* Advanced Linear Algebra, Nonlinear Dynamics and Chaos, Complex Analysis, Multivariable Calculus, Operating Systems, Applicable Algebra, Mathematical Proofs, Machine Learning, Computer System Organization, Robotics, Database Systems, Analysis of Algorithms, Data Science, Functional Programming, Discrete Structures, Object Oriented Programming and Data Structures, Backend Development, Probability and Statistics

RESEARCH EXPERIENCE

Computational Connectomics (CoCo) Lab @ Weill Cornell Medicine

New York, NY

Undergraduate Research Assistant under Professor Amy Kuceyeski

Jan 2024 – Present

- Developed a whole-brain predictive model integrating functional and structural connectivity to identify adolescents at risk for problematic drinking, pinpointing key brain regions for early intervention (*Citation* - [1])
- Built a ridge regression model to encode and predict voxel-wise activity in the amygdala, exploring the potential to modulate activity to alleviate symptoms of neuropsychiatric disorders

SciFi Lab @ Cornell University

Ithaca, NY

Undergraduate Research Assistant under Professor Cheng Zhang

Aug 2023 – May 2024

- Developed EchoWrist, a novel low-power wristband using active acoustic sensing to continuously estimate 3D hand poses and hand-object interactions, culminating in a publication in CHI '24 (*Citation* - [2])
- Spearheaded user studies to optimize microphone and speaker placement and helped train a custom CNN model to deduce hand poses from 20 finger joints

PUBLICATIONS

- [1] **James Kim**, Qingyu Zhao, Mert Sabuncu, Amy Kuceyeski. Predicting future alcohol-use via Connectome-behavior mapping. (*First-author manuscript in preparation*)
- [2] Chi-Jung Lee, Ruidong Zhang, Devansh Agarwal, Tianhong Catherine Yu, Vipin Gunda, Oliver Lopez, **James Kim**, Sicheng Yin, Boao Dong, Ke Li, Mose Sakashita, François Guimbretière, and Cheng Zhang. EchoWrist: Continuous Hand Pose Tracking and Hand-Object Interaction Recognition Using Low-Power Active Acoustic Sensing On a Wristband. *ACM Conference on Human Factors in Computing Systems (CHI) 2024*. doi:10.1145/3613904.3642910

PROFESSIONAL EXPERIENCE

Cornell Ann S. Bowers College of Computing and Information Science

Ithaca, NY

Course Consultant for CS3110 (Data Structures and Functional Programming)

Jan 2024 – Present

- Conduct weekly office hours tailored to facilitate students' comprehensive understanding of course material, offering personalized guidance on problem sets and programming assignments for approximately 320 students

Southern California Edison (SCE)

Rosemead, CA

Software Engineer Intern

May 2023 – Aug 2023

- Collaborated with cross-functional SCE teams to lead the development of a user-centric platform for 520K+ Solar customers which significantly reduced call volume to customer service (22K+ calls/month)
- Engineered a customer-facing GPT-powered virtual assistant for 15 million users across 430 California cities and an internal version for 13K+ SCE employees (Selected as winner of 2023 Intern Expo Competition out of 95 projects)

Cornell Hack4Impact

Ithaca, NY

Full Stack Software Engineer

Aug 2022 – Aug 2023

- Developed a full-stack psychiatrist-patient connection platform tailored for patients in Ghana and a rental listing platform to empower the homeless in Tompkins County to browse for available and affordable housing options

Wazzle

Dallas, TX

Software Engineer Intern

Apr 2022 – Aug 2022

- Engineered a mobile contact management application, used by 5000+ users across the Apple App Store and Google Play Store. Spearheaded iOS user experience enhancements, driving impactful feature and design improvements

LEADERSHIP & COMMUNITY INVOLVEMENT

MELBA Journal: Machine Learning for Biomedical Imaging

Mar 2024 – Present

Logistical Coordinator – Symposium Series

- Organized symposiums for MELBA, an open-source journal bridging machine learning and biomedical imaging
- Invited leading researchers to share insights and facilitated Q&A sessions to make complex research accessible to the public, promoting the democratization of knowledge

Splash! at Cornell

Apr 2024

Lecturer – ML in Medicine [Link]

- Delivered lectures on how machine learning relates to medicine to high school students, simplifying complex concepts to inspire STEM careers and highlight the accessibility of machine learning

Asian American InterVarsity

Jan 2022 – Present

Master of Ceremonies

- Lead weekly meetings by introducing guest speakers and engaging 70-80 students through humor and commentary, adapting to the audience's energy to enhance participation

Me & Korea, Inc.

Jun 2015 – Present

Bilingual Translator / Tour Guide / Language Instructor

- Spearhead the coordination of an annual two-week motherland tour in South Korea for 25-30 Korean adoptees, interpreting for birth-family reunions and translating sensitive adoption documents
- Co-founded Me&Korean, a virtual Korean language and culture course for 100+ adoptees and families across the US and Europe, leading and managing a team of 30-40 bilingual volunteers

AWARDS AND HONORS

Cornell Nominee for CRA Outstanding Undergraduate Researcher Award

Oct 2024

P&G Technical Excellence Award – 1st Place

Sep 2024

Cornell University – CS Course Staff Exceptional Service Award

May 2024

Cornell University – Arts & Sciences Dean's List

Received every semester

The President's Volunteer Service Award – Gold (6x)

2018 – '22, '24

The Jihoon Rim Foundation Scholarship

Apr 2024

Elks National Foundation – Most Valuable Student Scholarship

2021 – '25

Southern California Edison – 2023 Intern Expo 1st Place

Sep 2023

MEDIA

1. Summer program gives undergraduates a taste of research life, *Cornell Bowers CIS Spotlight*, August 2024
2. Wristband uses echos, AI to track hand positions for VR and more, *Cornell Chronicle*, April 2024

SKILLS & LANGUAGES

Languages: English (native), Korean (native), Spanish (limited working proficiency)

Software Languages: Java, Python, OCaml, C, JavaScript, TypeScript, HTML, CSS, Swift, Bash, SQL

Frameworks & Libraries: Pandas, NumPy, Node.js, React, React Native, Express.js, Next.js, Flask, Firebase, MongoDB, PostgreSQL, SQLite, SQLAlchemy

Developer Tools: Git, Linux, Docker, Postman, Google Cloud Platform, Microsoft Azure, OpenAI API

Background

My lifelong fascination with technology’s applications to human assistance and healthcare has led me to a deep interest in the dynamic interplay between artificial intelligence (AI) and neuroscience. I am captivated by how the brain’s remarkable adaptability and efficiency inspire new systems and algorithms, and how those developments, in turn, deepen our understanding of the brain.

My research thus far aims to strengthen this interplay by building more accurate models of brain-behavior relationships, holistically integrating both the brain’s functional and structural connections. At Columbia, I am eager to leverage computational advancements to further this exciting feedback loop of discovery: using AI to better understand the brain and subsequently drawing inspiration from the brain to develop more efficient AI algorithms. Through this iterative approach, I aim to enhance medical applications by refining disease prognosis, identifying reliable biomarkers, improving diagnostic accuracy, and supporting personalized treatment strategies.

Finding My Research Passions

My initial desire to pursue research was fueled by my curiosity to understand how humans can leverage AI to enhance interactions with the environment. This passion led me to study wearable sensing systems with Professor **Cheng Zhang** in Information Science at Cornell University, where I focused on using AI to continuously estimate 3D hand poses through active acoustic sensing—the reflection and diffraction of inaudible sound waves.

To achieve this, we developed EchoWrist¹, a wristband that emits inaudible sound waves towards the hand and captures the resulting echoes to identify various hand poses. I spearheaded user studies to optimize microphone and speaker placement and helped train a custom CNN model to deduce hand poses from 20 finger joints. Our work, published in CHI ’24, honed my ability to conduct independent, in-depth analysis within a research domain.

¹Chi-Jung Lee et al., "EchoWrist: Continuous Hand Pose Tracking and Hand-Object Interaction Recognition Using Low-Power Active Acoustic Sensing On a Wristband," *CHI '24: Proceedings of the CHI Conference on Human Factors in Computing Systems*: <https://doi.org/10.1145/3613904.3642910>

By reviewing pertinent literature, I identified our project’s limitations, distinguished existing wristband form factors from novel approaches, and uncovered potential applications.

While I was fascinated with EchoWrist’s potential for monitoring psychiatric disorders like Tourette Syndrome, I sought a more fundamental approach to treating and modulating neurological conditions before their onset, rather than focusing solely on observable phenotypes. This curiosity led me to collaborate with Professors **Amy Kuceyeski** and **Mert Sabuncu** in the Department of Radiology at Weill Cornell Medicine and ECE at Cornell Tech, where I became captivated with modeling the brain’s functional and structural connections.

In my first project, I built a ridge regression model to predict voxel-wise activations in the amygdala in response to natural scene images. We hypothesized that if we could predict the activation of voxels in the amygdala, which governs the fight-or-flight response, we could use the corresponding images to modulate voxel-wise activation, potentially alleviating symptoms of anxiety and depression. However, this project was halted due to high noise in amygdala activations, compounded by variability among subjects and scanners. Despite this setback, the enthralling potential to encode voxel-wise activity to predict and influence neurological outcomes deepened my fascination with modeling brain connectivity.

Recognizing the limitations of focusing on a single brain region, I shifted to a whole-brain connectivity approach to explore neurological vulnerability to heavy alcohol use in adolescents. Fascinated by the intricate interplay between the functional and structural connections within the connectome, which can be represented by connectivity matrices, I investigated whether combining these measures could predict the onset of problematic drinking. Our work identified both regional and network-level influences on future problematic drinking, offering potential targets for early clinical intervention. This research earned a P&G Technical Excellence Award, and I am currently preparing a first-author paper.

Leading this project independently was formative for me as a researcher. I learned that selecting the most suitable model requires careful evaluation of the research problem rather than architectural complexity. Starting with an interpretable logistic regression model, I

iteratively explored more complex architectures like CNNs and GNNs to effectively encode spatial locality information of brain regions in the connectome. Additionally, I strengthened my ability to seek timely feedback and distill complex challenges into clear, actionable steps, including addressing covariance between brain regions and reducing parameter space with upper-triangular connectome matrices.

Moreover, my involvement in a multidisciplinary lab, collaborating with neuroscience and ECE researchers from Weill Cornell Medicine and Cornell Tech, enhanced my ability to integrate insights from diverse fields. I gained valuable technical expertise from my engineering peers, while my neuroscience colleagues provided crucial context for applying these tools within the complexities of the brain, granting me a holistic perspective that I am eager to bring to future research endeavors.

Future Goals and Why Columbia

Building upon my research, I am eager to deepen my focus on the synergistic interplay between AI and neuroscience. I aim to expand my current work by developing models that map brain regions and structures to specific behaviors and neurological conditions. This will ultimately enhance diagnostic and therapeutic tools, while also identifying neuroimaging biomarkers to halt or delay disease progression. Simultaneously, I am curious about how this deeper understanding of the brain can inspire algorithms that mimic its outstanding adaptability.

Columbia's commitment to interdisciplinary research, exemplified by close collaborations across the Vagelos College of Physicians and Surgeons and the Zuckerman Mind Brain Behavior Institute, provides the ideal environment to pursue my synergistic interests. I am particularly drawn to Professor **Elham Azizi's** work on modulating cancer progression through computational tools, which aligns with my desire to bridge neuroscience and AI. Professor **Kaveri Thakoor's** work on automating biomedical image analysis to treat eye diseases also resonates with my interest in creating interpretable deep learning models for clinical applications. Additionally, I would be excited to work with Professor **Shalmali Joshi**

to advance the safe and equitable application of ML in personalized healthcare settings.

My undergraduate experiences have fostered a deep passion for tackling new challenges, collaborating with talented peers, and mentoring fellow students. Columbia's rigorous yet supportive environment offers the platform to pursue these passions at the highest level. As I strive to become a well-rounded researcher who deepens our understanding of AI and the brain to improve lives both within and beyond clinical settings, I would love to join a community that champions innovation and interdisciplinary collaboration at the forefront of AI and neuroscience.