

Interests	Computational modeling, neurotechnology, translational neuroscience, neural signal processing, machine learning, psychiatric disorders, philosophy of mind.	
Education	<i>B.S. Statistics and Data Science, Biomathematics Minor</i> University of California, Los Angeles, CA	Expected 2024 3.9 GPA
	Relevant Coursework: Neural Signal Processing, Cellular Neurophysiology, Computational Neuroscience, Neuroengineering, Neural Networks and Deep Learning, Machine Learning, Computer Vision, Monte Carlo Methods, Systems and Signals, Behavioral Neuroscience, Proof-based Linear Algebra, Probability, Mathematical Statistics, Linear Models, Computational Statistics, Computational and Systems Biology, Differential Equations, Experimental Design	
Research Experience	<i>Research Assistant</i> Wilke Lab, Department of Psychiatry, University of California, Los Angeles Advisor: Scott A. Wilke, M.D., Ph.D.	July 2021 – Present
	<ul style="list-style-type: none"> • Focus: the role of medial prefrontal cortex circuitry in decision-making • Techniques: rodent behavior analysis, optogenetics, calcium imaging, transcranial magnetic stimulation 	
Programming Languages	Languages: Python, R, MATLAB, C++, Java, HTML, CSS, Javascript Libraries: scikit-learn, PyTorch, tensorflow, NumPy, SciPy, Seaborn, pandas, tidyverse (dplyr, ggplot2, stringr), tidymodels, readr	
Other Skills	Software: OpenBCI, BehaviorDEPOT, DeepLabCut, Minian, ImageJ, Adobe Photoshop, Adobe Illustrator, QGIS Platforms: Anaconda, Web, Arduino Other: LaTeX, Piano Performance, Music Education, Music Theory	
Selected Projects	<i>Analysis of Miniscope calcium imaging data</i> Wilke Lab	July 2021 – Present
	<ul style="list-style-type: none"> • Analyzed relationship between neural signals and mouse behavior using signal processing, statistical methods, and machine learning to find patterns in circuitry specific to decisions that require effort expenditure. • Extracted neural signals from UCLA Miniscope calcium imaging recordings of the mouse anterior cingulate cortex using the Minian analysis pipeline. • Aligned mouse behavioral epochs to signals using pose estimation software (DeepLabCut) and the BehaviorDEPOT behavior analysis toolbox. • Developed software for verifying signal quality and visualizing individual neuron recordings and population activity aligned to specific behaviors. 	
	<i>Computer-controlled, automated barrier T-maze</i> Wilke Lab	June 2022 – August 2023
	<ul style="list-style-type: none"> • Developed software for fully automated barrier T-maze designed to expedite rodent behavior experiments investigating effort-based decision-making. • Designed Arduino-based communication system that uses GUI-inputted parameters to control PIR sensors, air pressure-operated doors, and reward dispenser pumps. The system is capable of precisely controlling task parameters, continuously running hundreds of trials, and collecting mouse position data with minimal experimenter interaction. 	

EEG-based P300 Truth Elicitor
CruX UCLA, natHACKS

Sep. 2023 – Nov. 2023

- Worked in team to create "CLUE" board game-based brain-computer interface that detects the truth from a subject concealing information.
- Designed deception paradigm for eliciting P300 signals upon presentation of different faces, one being a person the subject chose without the experimenter's knowledge.
- Developed original software for collecting EEG signals through an OpenBCI headset and detecting P300 event-related potentials, and original hardware for synchronizing data stream with visual stimuli presentation.
- Created bootstrap signal correlation algorithm for differentiating P300 signals across different stimuli.

Alzheimer's Disease Neuromodulation Treatment Research Proposal
In Transcription Biohackathon

June 2023

- Proposed experimental design to test efficacy of multimodal gamma stimulation (optogenetics, DREADDs, LIFUP, TMS) on rodent AD models.
- Developed rodent Alzheimer's Disease (AD) symptom metric using rodent cognitive/behavioral assay performance, A β -load, and statistical modeling.
- Simulated data for visualization of model fitting and experimental design.

Posters

Gupta, TA,* Kashay, AQ, Sanchez-Fuentes, A, Fernandez, MF, **Umaguing, M**, Veenker, F, & Wilke, SA. Neural activity in the anterior cingulate cortex is required for effort-based decision-making. *Society for Neuroscience Annual Meeting (Nov 2023)*, Washington, DC

*presenting author

Umaguing, M.,* Walkiewicz, J.,* & Umaguing, L. Exploring Differential Effects of Gamma Stimulation on Alzheimer's Disease. *In Transcription Biohackathon (June 2023)*, Los Angeles, CA

*presenting authors

Veenker FN,* Junaidi CV,* Qi A,* Ranawat AJ,* Ahmed RN,* Kashay AQ, Li KY, Yang AJ, **Umaguing MAC**, & Wilke SA. The Role of Anterior Cingulate Cortex Neuronal Subpopulations in Effort-Based Decision-Making. *UCLA Semel Undergraduate Research Conference (May 2023)*, Los Angeles, CA

*presenting authors

Umaguing, M.,* Aggarwal, A.,* Boughanem, H.,* Lee, P., Nagaraj, S.,* Ngai, A.,* Rayasam, S.,* Thalamati, A.,* & Vawter, D. Real-time remote control of a car with an SSVEP-based BCI. *California Neurotechnology Conference (April 2023)*, Los Angeles, CA

*presenting authors

Kashay AQ,* Cheung JY, Vaknalli RN, Delaney JM, Navarro MB, Junaidi C, Qi A, Lei C, Veenker F, Gupta TA, Neuwirth ME, **Umaguing M**, and Wilke SA. Neural Activity in the Anterior Cingulate Cortex is Required for Effort-Based Decision Making. *Society for Neuroscience Annual Meeting (Nov 2022)*, San Diego, CA

*presenting author

Oral
Presentations

Veenker FN,* Junaidi CV,* Qi A,* Ranawat AJ,* Ahmed RN,* **Umaguing MAC**,* Kashay AQ, Li KY, Yang AJ, & Wilke SA. The Role of Anterior Cingulate Cortex Neuronal Subpopulations in Effort-Based Decision-Making [Slide Presentation]. *UCLA Undergraduate Research and Creativity Showcase (May 2023)*, Los Angeles, CA

*presenting authors

CruX UCLA General Workshops – November 2023

Workshop Lecture: *Machine Learning*

CruX UCLA Advanced Workshops – October 2023

Workshop Lecture: *EEG Signal Processing Techniques*

CruX UCLA Advanced Workshops – October 2023

Workshop Lecture: *Data Visualization*

Awards

1st Place Standard Division – natHacks Hackathon

Nov. 2023

- Received 1st place in NeurAlbertaTech's inaugural industry professional-judged brain-computer interface hackathon, Canada's largest neurotechnology competition.
- Competed in teams amongst 500+ international students.
- Project: EEG-based P300 Truth Elicitor

Biohackathon Runner-Up – In Transcription Biohackathon

June 2023

- Received 2nd place in a UCLA faculty-judged biological project competition between undergraduate and graduate students from multiple universities. Projects included research proposals, algorithm designs, hardware designs, and business proposals.
- Project: Alzheimer's Disease Neuromodulation Treatment Research Proposal

Extra-

curriculars

Technical Coordinator; BCI Project Lead

Sep. 2022 – Present

CruX UCLA

- Designed and delivered weekly neurotechnology workshops focusing on neuroscience, signal processing (digital filtering, independent components analysis, wavelet transforms), and machine learning (neural networks, main concepts) for up to 200 undergraduate members in preparation for brain-computer interface development.
- Attended peer-, industry-, and faculty-led talks on neurotechnology research, experimental design, and NIH grant-writing.