

Mateo Amado Cabusao Umaguino

INTERESTS	Computational modeling, neurotechnology, translational neuroscience, neural signal processing, machine learning, philosophy of mind, psychiatric disorders.	
EDUCATION	<i>B.S. Statistics and Data Science, Biomathematics Minor</i> UCLA, Los Angeles, CA	Expected 2024 3.9 GPA
	Relevant Coursework: Neural Signal Processing, Cellular Neurophysiology, Neuro-engineering, Neural Networks, 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 Principle Investigator: Scott A. Wilke, MD, PhD	July 2021 - Present
	<ul style="list-style-type: none">• Focus: the role of medial prefrontal cortex (mPFC) circuitry in decision-making behavior.• Techniques learned: rodent behavior analysis, optogenetics, calcium imaging, fiber photometry, brain slice microscopy.	
SELECTED PROJECTS	See also my GitHub page.	
	<i>Miniscope Analysis</i> Wilke Lab	July 2021 - Present
	<ul style="list-style-type: none">• Extracted neural signals from UCLA Miniscope calcium fluorescence imaging recordings of the mouse anterior cingulate cortex (ACC) using the Minian miniscope analysis pipeline.• Aligned mouse behavioral epochs to fluorescence using pose estimation software (DeepLabCut) and the BehaviorDEPOT behavior analysis toolbox.• Developed software for visualizing individual neuron recordings and population activity aligned to specific behaviors and verifying signal quality.• Analyzed relation between calcium fluorescence and mouse behavior to discuss hypotheses of ACC involvement with effort-based decision-making using signal processing, statistical methods, and machine learning.	
	<i>Continuous T-Maze</i> Wilke Lab	June 2022 - August 2023
	<ul style="list-style-type: none">• Developed software for fully automated 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 minutely controlling task parameters, continuously running hundreds of trials, and collecting mouse position data with minimal experimenter interaction.	
	<i>EEG-based P300 Truth Elicitor</i> natHACKS, CruX UCLA	Sept. 2023 - Nov. 2023
	<ul style="list-style-type: none">• Worked in team to create "CLUE" board game-based brain-computer interface that elicits the truth out of a subject concealing information.	

	<ul style="list-style-type: none"> • Developed original software for collecting EEG signals and detecting P300 event-related potentials through an OpenBCI headset. • Designed deception paradigm for eliciting P300 signals upon inquisition. • Created bootstrap correlation algorithm for detecting hidden information from P300 signals. • Competed in natHACKS Canadian neurotechnology hackathon amongst 400+ international students and received first place.
	<p><i>Alzheimer's Disease Neuromodulation Treatment Research Proposal</i> June 2023</p> <ul style="list-style-type: none"> • Developed rodent Alzheimer's disease (AD) symptom metric using rodent cognitive/behavioral assay task performance, Aβ-load, and statistical modeling. • Proposed experimental design to test efficacy of multimodal gamma stimulation (optogenetics, DREADDs, LIFUP, TMS) on rodent AD models. • Simulated data for visualization of model fitting and experimental design. • Presented research proposal at faculty-judged competition between undergraduates and graduates from multiple universities and received second place.
PROGRAMMING LANGUAGES	<p>Languages: Python, R, MATLAB, C++, Java, HTML, CSS, JavaScript</p> <p>Libraries: scikit-learn, PyTorch, tensorflow, NumPy, SciPy, Seaborn, pandas, tidyverse (dplyr, ggplot2, stringr), tidymodels, readr</p>
OTHER SKILLS	<p>Softwares: OpenBCI, BehaviorDEPOT, DeepLabCut, Minian, ImageJ, Adobe Photoshop, Adobe Illustrator, QGIS</p> <p>Platforms: Anaconda, Web, Arduino</p> <p>Other: L^AT_EX, Piano Performance, Music Education, Music Theory</p>
FIRST AUTHOR POSTERS	<p>Umaguig, 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. <i>California Neurotechnology Conference, 2023</i>, Los Angeles, CA</p> <p>Umaguig, M., Walkiewicz, J., & Umaguig, L. Exploring Differential Effects of Gamma Stimulation on Alzheimer's Disease. <i>In Transcription Biohackathon, 2023</i>, Los Angeles, CA</p>
ORAL PRESENTATIONS	<p>Veenker, F.N., Junaidi, C.J., Ranawat, A.J., Ahmed, R.N., Yang, A.J., Umaguig, M.A. The Role of Anterior Cingulate Cortex Neuronal Subpopulations in Effort-Based Decision-Making. <i>UCLA Undergraduate Research Week, 2023</i>, Los Angeles, CA</p> <p>CruX UCLA General Workshops - Fall 2023 Workshop Lecture: <i>Machine Learning</i></p> <p>CruX UCLA Advanced Workshops - Fall 2023 Workshop Lecture: <i>Data Visualization</i></p> <p>CruX UCLA Advanced Workshops - Fall 2023 Workshop Lecture: <i>EEG Signal Processing Techniques</i></p>
EXTRA- CURRICULARS	<p><i>Technical Coordinator, BCI Project Lead</i> Sept. 2022 - Present</p> <p>CruX UCLA</p>

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