Mateo Umaguing

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Education

- **UCLA** — Los Angeles, CA
  Statistics B.S. | Data Science Engineering Minor | 3.9 GPA — *Expected March 2024*
  - **Relevant Courses**: Neural Signal Processing, Neuroengineering, Machine Learning, Computer Vision, Signals and Systems, Proof-based Linear Algebra, Probability, Mathematical Statistics, Linear Models, Monte Carlo Methods, Data Analysis and Regression, Design and Analysis of Experiment, Statistical Models and Data Mining, Oral Communication

Experience

- **CruX UCLA, Neurotech Organization** — Los Angeles, CA
  Workshop Coordinator, BCI Project Lead, Member — *September 2022 - Present*
  - **Workshops**: Designed and delivered **BCI project development workshops** (neuroscience, machine learning, signal processing, statistics, circuit theory) for undergraduate members.
  - **Project Management**: Led engineering design process for the creation of a **brain-computer interface (BCI)** to wirelessly control a remote vehicle using electroencephalography (EEG) signals.
  - **Talks**: Attended industry- and faculty-led workshops and seminars focusing on neurotechnology research and development, **experimental design**, and **NIH grant-writing**.
- **Wilke Lab** — Los Angeles, CA
  Research Assistant — *June 2021 - Present*
  - **Data Analysis**: Extracted neural signals from Miniscope (**calcium imaging**) data via MIN1PIPE and Minian pipelines, performed analyses on data in **MATLAB and Python**, and presented work to multiple research labs. Utilized behavior-tracking software to relate effort-based decision-making behavior to neural signals.
  - **Research Techniques**: Reviewed literature, performed microscopy, and conducted rodent behavior experiments.

Selected Projects (see also GitHub page)

- **Alzheimer's Disease Neuromodulation Treatment Proposal**
  Research, Neuroscience, Python, Statistics, Data Visualization — *May 2023 - June 2023*
  - **Experimental Design**: Proposed research study on various gamma stimulation treatment effects on Alzheimer's Disease symptoms. Provided literature review, methodology, data analysis, wet-lab techniques (surgeries, optogenetics, chemogenetics, neuroimaging, histology, electrophysiology, mechanical engineering) and simulated expected results.
- **Brain-controlled remote vehicle** — CruX UCLA, Neurotech Organization
  Electroencephalography, Python, Machine Learning, Arduino, Signal Processing — *January 2023 - Present*
  - **R&D**: Researched Steady-State Visual-Evoked Potentials (SSVEPs), and signal processing and machine learning algorithms (filter design, independent component analysis, canonical correlation analysis, continuous wavelet transform, support vector machines) for BCI development. Developed prototype with simulated EEG signals and Arduino.
  - **Mentorship**: Trained team members in BCI project development and neurotechnology background. Assisted students in obtaining research positions and selecting and completing coursework.
- **Continuous T-Maze** — Wilke Lab
  Arduino, C++, Circuit Design — *June 2022 - Present*
  - **R&D**: Developed code for and maintained fully automated Arduino-based rodent maze designed to expedite rodent behavior experiments investigating the role of the mPFC in effort-based decision-making.
- **Modeling Heart Disease and Election Data** — Statistics 101C, UCLA
  Machine Learning, Statistics, Data Visualization — *June 2022*
  - **Statistical Modeling**: Tested and applied several machine learning algorithms(support vector machines, XGBoost, neural networks) to classify heart disease diagnosis and voter selection data.
  - **Kaggle Competition**: Applied algorithms to unseen test data and placed first in a classification competition among 15 other teams.

Skills Summary

- **Languages**: Python, R, MATLAB, Java, C++, HTML, CSS, JavaScript
- **Libraries**: scikit-learn, PyTorch, NumPy, Seaborn, pandas, tidyverse (dplyr, ggplot2, stringr), tidymodels
- **Platforms**: Web, Windows, Arduino, OpenBCI
- **Software**: LaTeX, ImageJ, Adobe Photoshop, Adobe Illustrator, DeepLabCut, QGIS
- **Other Skills**: Research, Leadership, Public Speaking, Piano Performance, Music Education, Music Theory

Selected Conferences/Events

- **In Transcription BioHackathon** — Los Angeles, CA
  Research Lead, Poster Presenter, Attendee — *June 2023*
  - Poster: "Exploring Differential Effects of Gamma Stimulation on Alzheimer's Disease"
  - **Second Place Award**: Competed with 12 other teams comprising STEM undergraduate and graduate students from around the United States. Projects judged by bio-science faculty and staff.
- **Semel Undergraduate Student Research Conference** — Los Angeles, CA
  Poster Co-author, Attendee — *May 2023*
  - **Poster**: "The role of anterior cingulate cortex neuronal subpopulations in effort-based decision-making"
  - **Outstanding Poster Award**: 1 of 4 (first) out of 60 posters selected. Posters judged by UCLA Semel Institute for Neuroscience and Behavior staff and graduate students.
- **California Neurotechnology Conference** — Los Angeles, CA
  Poster Presenter, Attendee — *April 2023*
  - **Poster**: "Real-time remote control of a car with an SSVEP-based BCI"

Extracurriculars

- **Bruins Piano Together** — Los Angeles, CA
  Board Member, Performer — *May 2023 - Present*
  - **Leadership**: Organized UCLA's second music performance-based organization for pianists.
  - **Piano Performance**: Performed *Mephisto Waltz No. 1* in 2023 end-of-year recital. Connected and played music with other pianists/musicians in informal settings.
- **Bruin Chamber Musicians** — Los Angeles, CA
  Founder, Ensemble Pianist — *June 2021 - June 2022*
  - **Leadership**: Founded and organized UCLA's first music performance-based organization for non-music majors.
  - **Ensemble Rehearsal**: Rehearsed chamber music with undergraduate and graduate students in a piano quartet.
  - **Graphic Design**: Created graphics for organization social media and recruitment pages using Adobe Creative Cloud and Microsoft Office.