Sean Berg

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Education

B.S. in Neurobiology, Physiology, and Behavior — Davis, CA
University of California, Davis — *Sep. 2021 – Mar. 2024*

A.A. in Liberal Arts: Natural Science — Gilroy, CA
Gavilan College / Gilroy Early College Academy - Concurrent — *Aug. 2017 – May. 2021*

Work Experience

Junior Specialist — Aug. 2024 – Present
The Silverman Translational Neuroscience Lab — *Sacramento, CA*

- Engineered a novel behavioral assay integrating wireless EEG collection with operant conditioning touchscreen tasks; independently designed and fabricated custom acrylic platforms (SOLIDWORKS) and TTL-based synchronization system, saving >$20K in vendor costs (n=16 mice, ongoing).
- Developed Python pipelines for analyzing continuous wireless EEG in awake behaving mice (ERP, multitaper spectrograms, 72-hour recordings); integrated within the core lab data analysis platform (involving approx. 100 mice/year).
- Characterized seizure phenotypes within an epilepsy susceptible mouse model (n=28 mice), contributing key data to a manuscript currently in review at Brain while presenting preprint data at SfN 2025.
- Achieved 100% survival rate across 45 wireless EEG implantation surgeries; independently managed perioperative care and behavioral follow-up with findings contributing to 3 manuscripts in late-stage preparation.
- Reestablished primary neuronal culture pipeline for NDD mouse models in collaboration with 2 UC Davis labs; validated workflow via dendritic arborization analysis (72 wells, 50–100k cell density); contributing to 3 manuscripts in preparation.

Undergraduate Researcher — Aug. 2023 – Jul. 2024
The Sensorimotor Integration Lab — *Davis, CA*

- Collected and analyzed sensorimotor trajectory data from force perturbation tasks in human subjects (n=11) to assess multisensory elements involved in short-term motor learning to identify challenges in forelimb prosthetic development regarding upper-limb reaching kinematics.
- Contributed findings to a manuscript in preparation and presented results at the UC Davis 2024 Undergraduate Research Conference.

Projects

Prototype Motor Imagery Brain-Computer Interface — Jul. 2025 – Present
Independent Project — *Davis, CA*

- Built complete binary motor imagery BCI from hardware (AD620 instrumentation amplifier, TL084CN op. amplifier for analog signal filtering stages) to software (Python-based real-time signal processing and classification)
- Implemented synchronized PsychoPy task paradigm and logistic regression decoder with stratified k-fold cross-validation
- Validating signal acquisition pipeline; iterating on analog filtering and additional electrode implementation to improve SNR and classification performance while refactoring classification to support vector machine classes

Spectral Visualizer of Multi-model Synchronization Task — Mar. 2023 – Jun. 2023
UC Davis Neurobiology Lab Course — *Davis, CA*

- Led experimental design within a student group and coordinated with course staff to develop multimodal EEG-motor assay; discovered correlation between human cortical oscillations and auditory stimulus onset (n=6).
- Implemented EEG time-frequency domain analysis procedure in MATLAB for identifying task-related cortical activity.

Skills & Expertise

Assays: EEG/ERP, operant conditioning, NOR, SAT, EPM, light-dark, seizure induction (electro/chemoconvulsive, febrile)

Techniques: Stereotaxic surgery, EEG implantation, perfusions, primary neuronal culture, histology, colony management

Technical: Python (MNE, NumPy, SciPy, Scikit-Learn), NEURON, SolidWorks, MATLAB, 3D Slicer