Neural Data Exploration

This is a take-home challenge designed to evaluate your neural engineering skills. It is deliberately open-ended in scope, so you should spend your time where you feel it's most valuable!

Please find attached:

- A broadband neural data file in .ns6 format, starting at **2025-03-25T9:22:53Z** (for data alignment purposes, you should refer to the Time Origin field in the header of this file, rather than timestamps attached to individual data packets, which are extremely high precision but more than a month behind in wall clock time)
- A csv of behavioral signals, starting at **2025-03-25T9:22:28Z**

The neural data was collected from a 96-channel Utah array implanted in the hand knob area of contralateral M1 in a cynomolgus macaque. The macaque is trained to use a joystick to play Center Out, a simple 2D cursor game with 8 targets in a ring. The cursor starts every trial in the center of the ring, and 127 successful trials were completed during this recording. The pedestal we are recording from uses the standard channel mapping for 96-channel Utah arrays.

Your task is to make sense of this data however you'd like–spikes, spike band power, and LFP are all valid features to consider, and plotting different aspects of gameplay may also lend insight. Be creative! There may not be a straightforward path to a high R^2 offline decode of instantaneous cursor velocity here, as often there is not, but there *is* real information to be extracted from this dataset, and your goal is to extract as much of it as possible.

Please submit:

- Any visualizations you find illuminating
- Any models that are predictive of some aspect of behavior
- The code or methods you used to generate them
- A short summary of things you believe to be true of this dataset after working with it

You are encouraged to use LLMs, other people's code (including spike sorters), OpenEphys, models on HuggingFace, and in general any tools available to you that you would ordinarily use to interrogate neural or behavioral data!