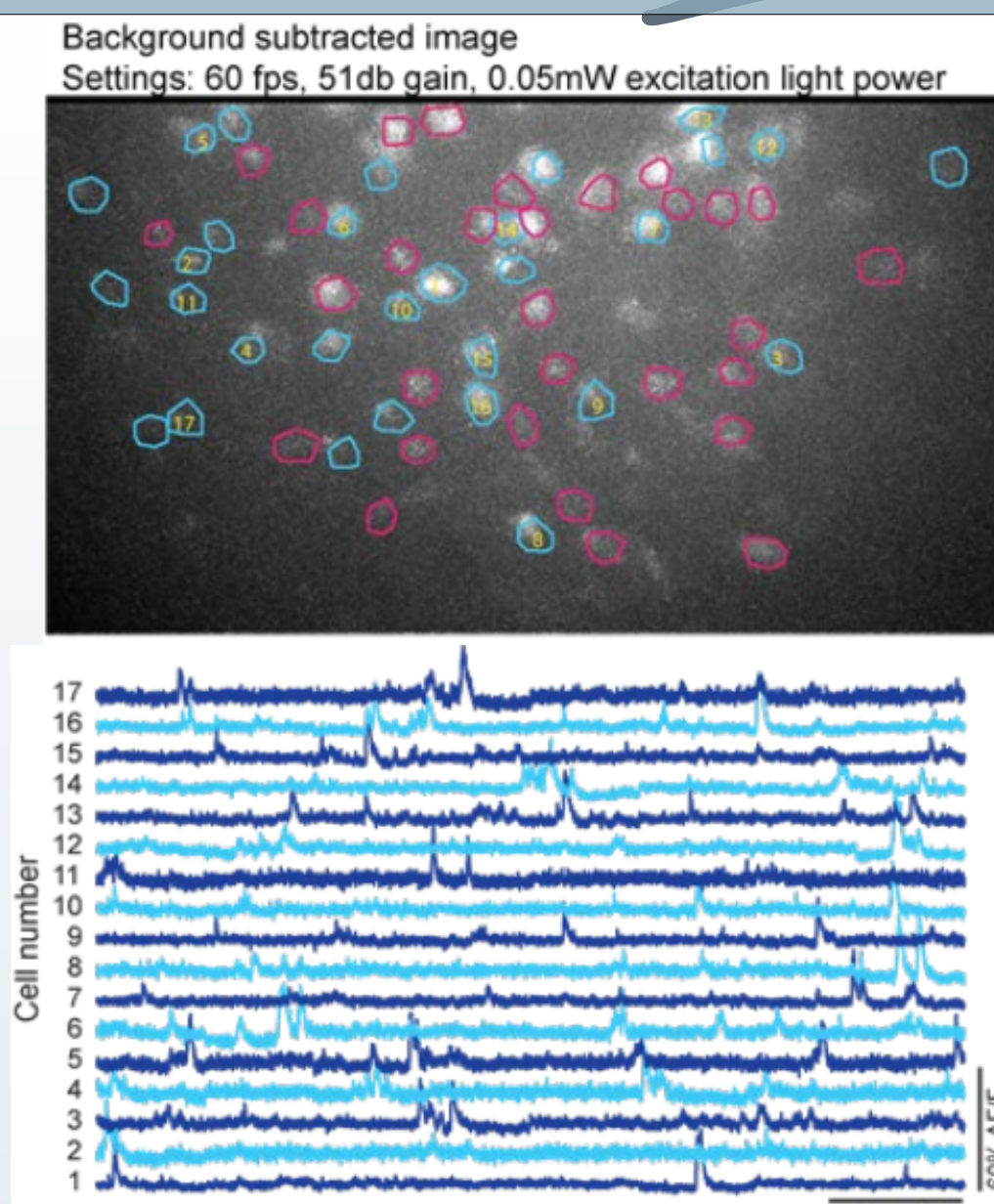
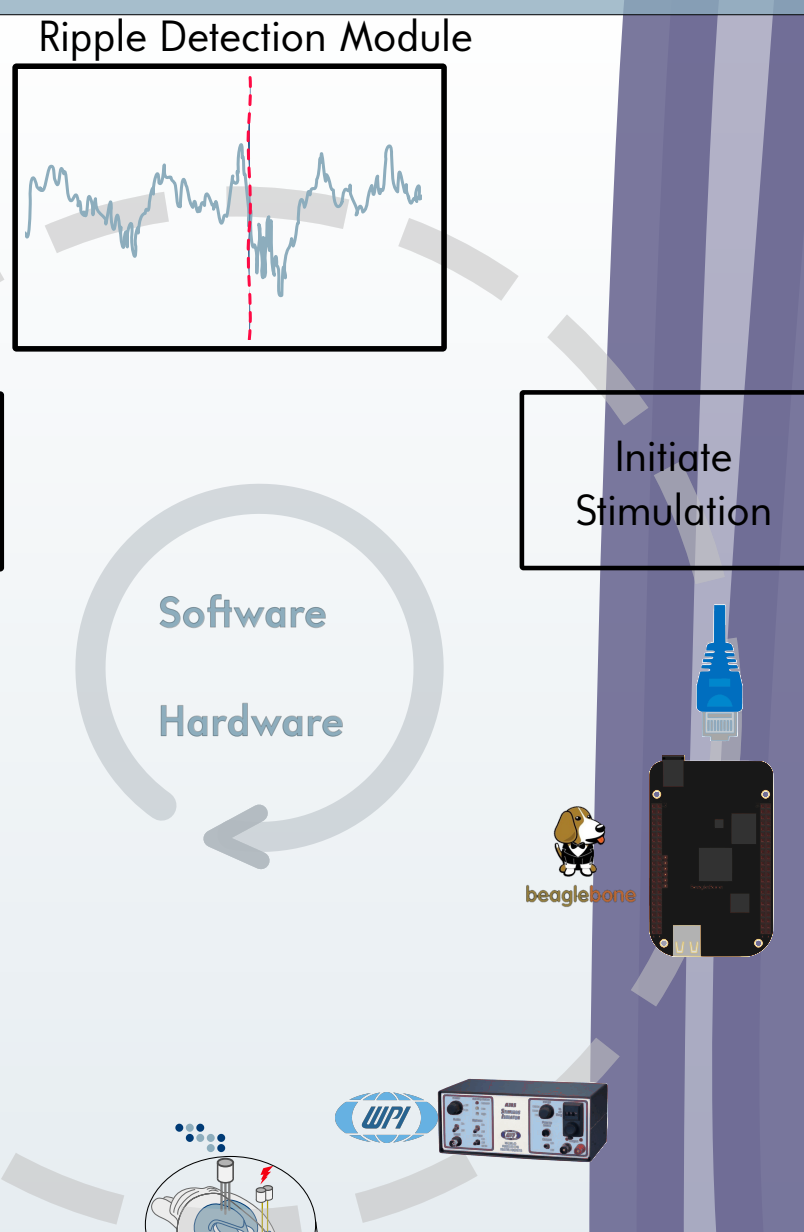
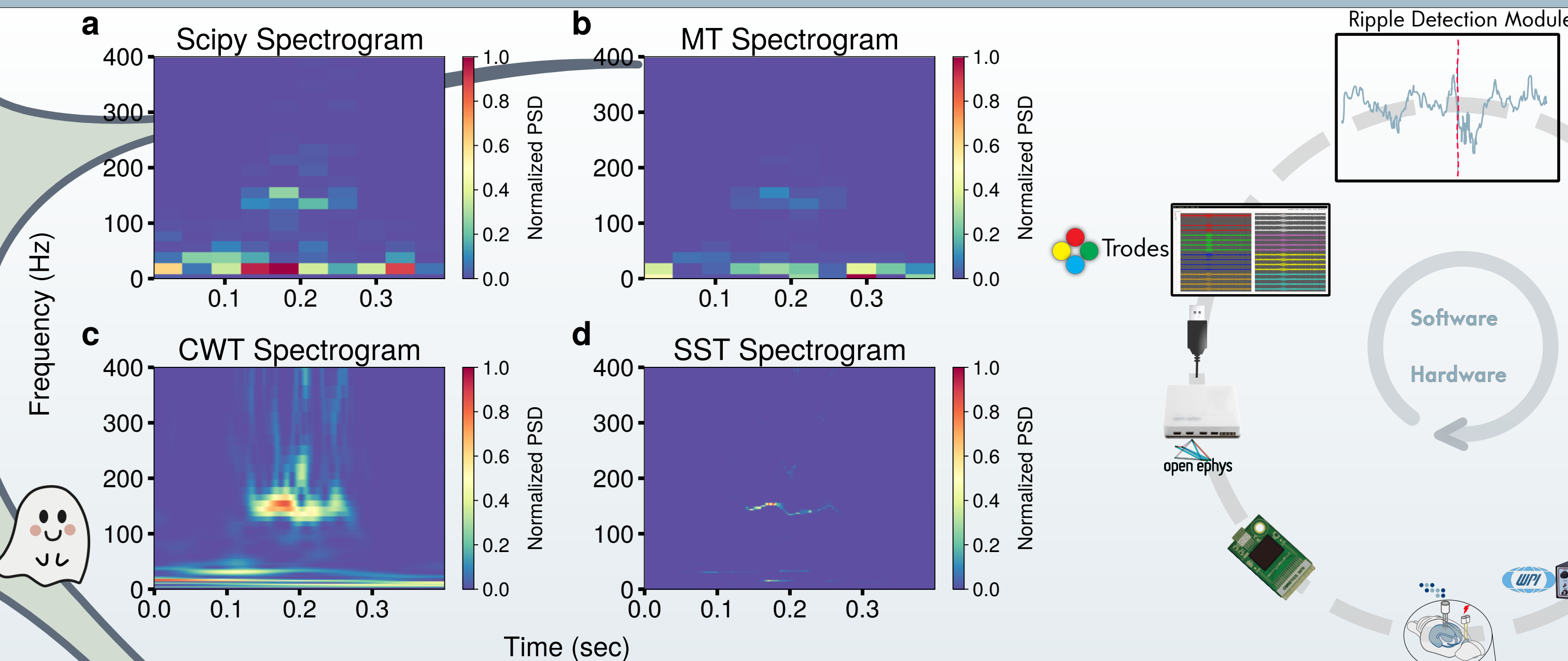
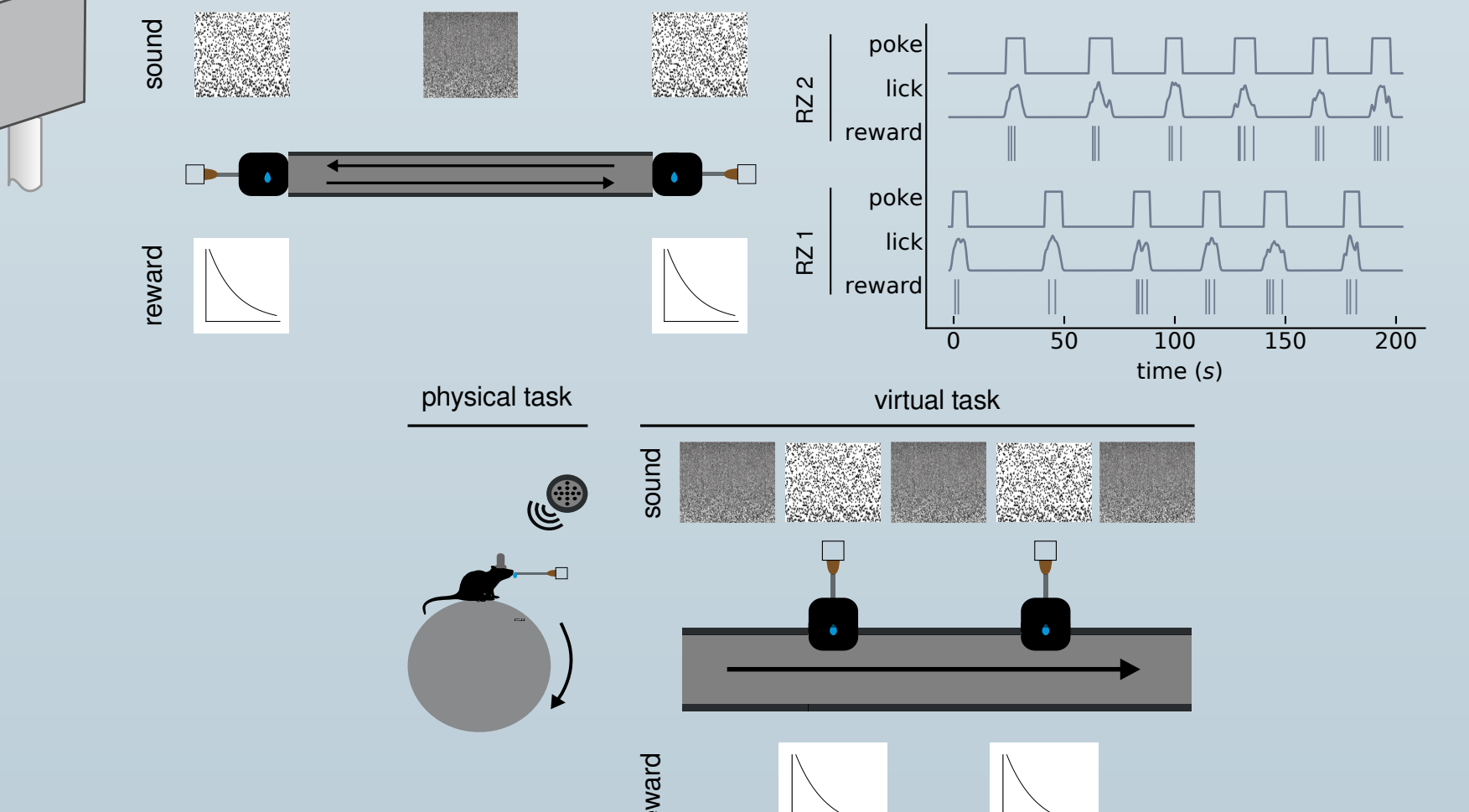
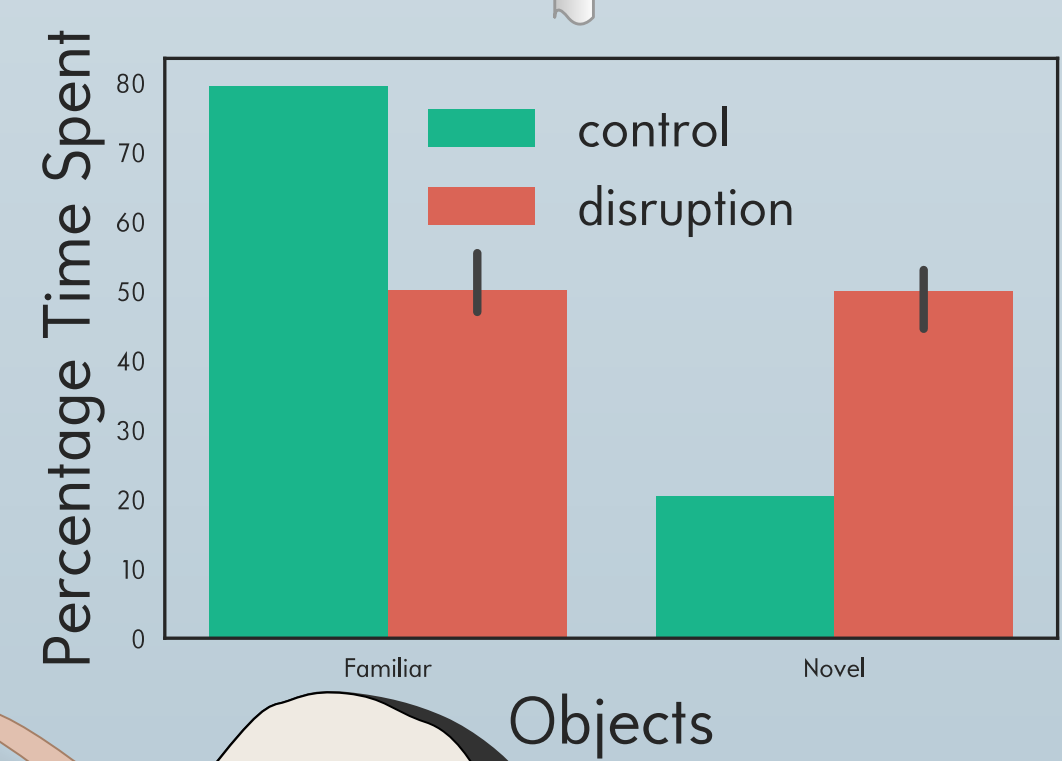
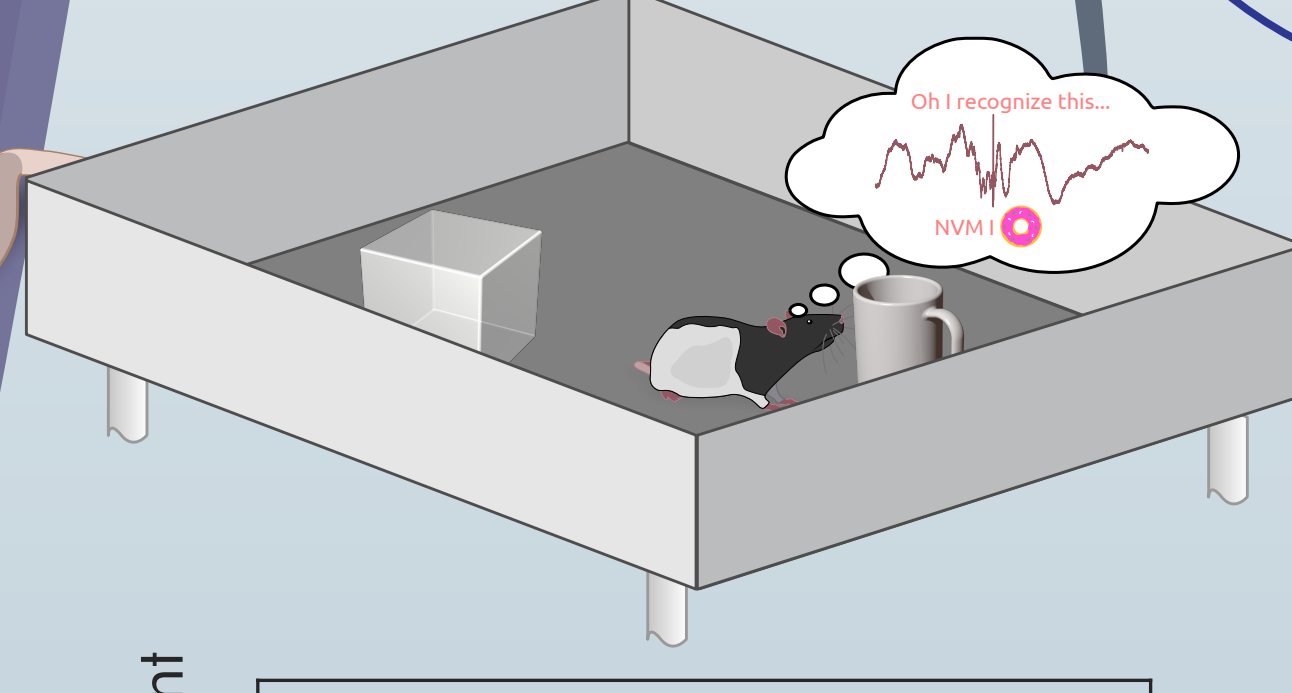
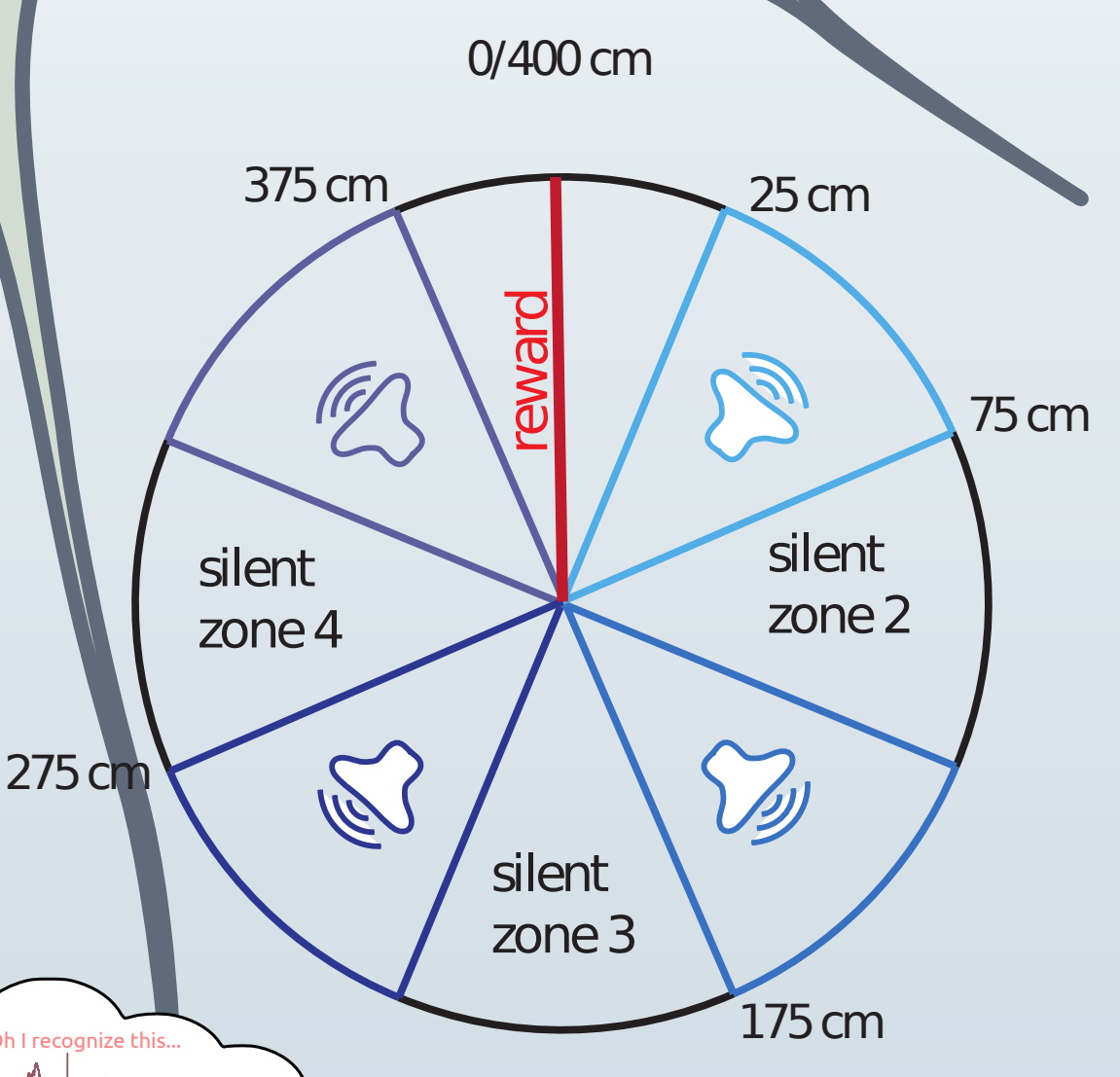
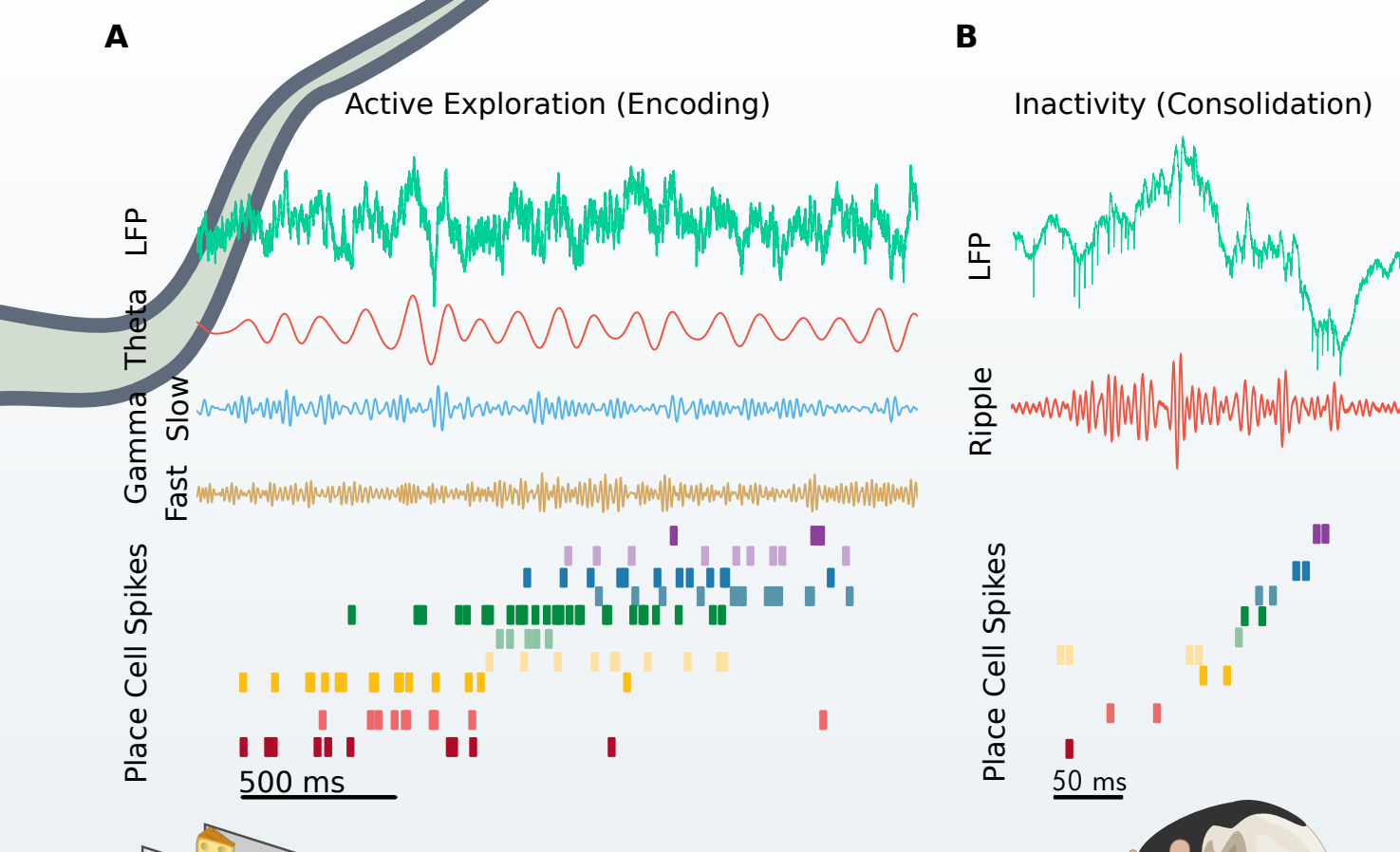


Open Source Tools



Experimental



Recording from the **hippocampus** and/or other brain areas involved in **learning and memory**, we interrogate the **neural substrates** associated with **decision making processes, learning, and memory consolidation** as well as trace of memories within throughout the brain.
Gao, ..., Kemere IEEE EMBS 2020

We develop scientific computing software for **expeditious and efficient analyzing of large neural datasets** that can perform well even on **resource-constrained systems**. Additionally, advanced signal processing implementations can uncover deeper insights!

We build, modify and optimize neural data acquisition **hardware and software** for **realtime closed-loop** neural interrogation to **establish causality** within the brain!

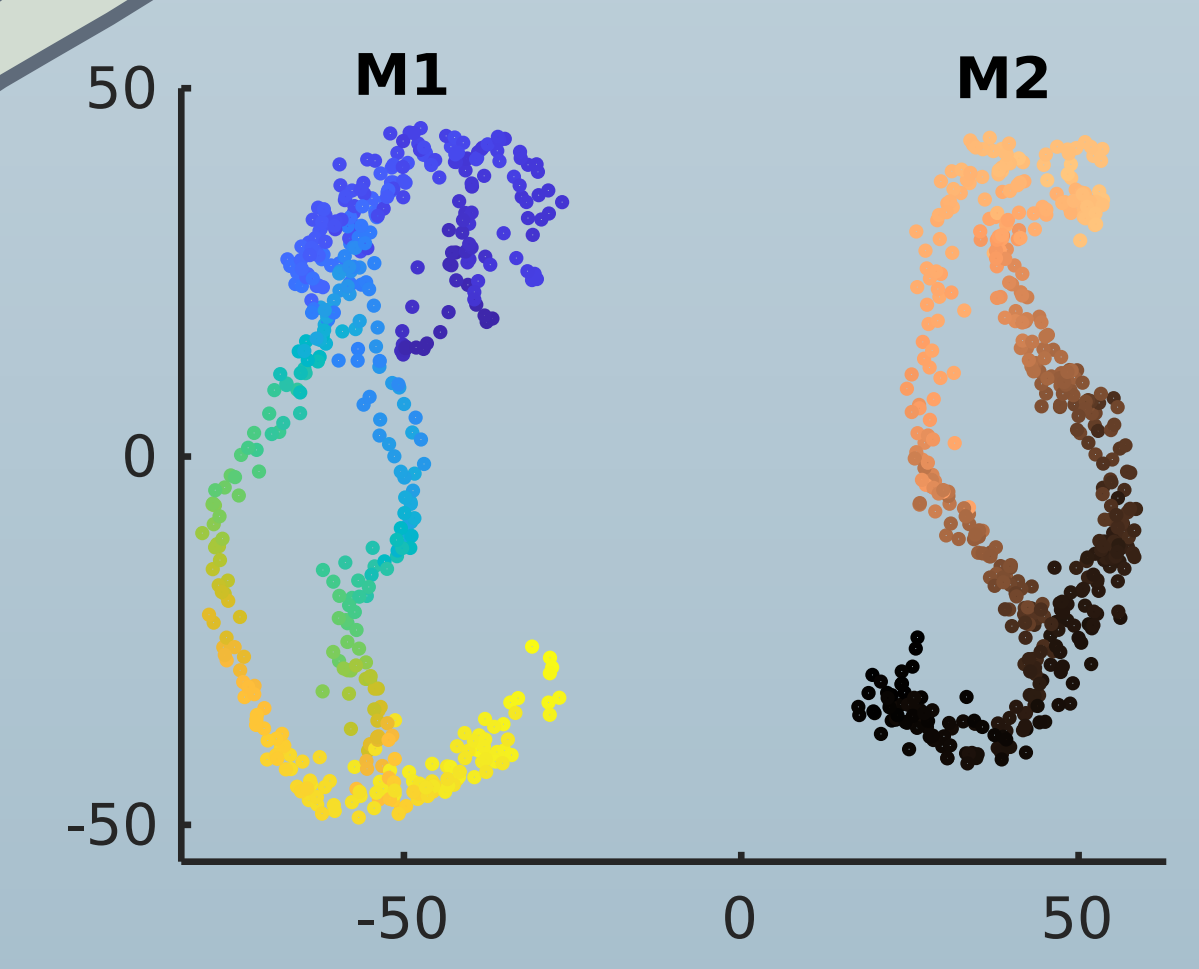
We prototype & advance imaging hardware for **increased fps** with increased spatial resolution & higher signal to noise ratio at dimmer excitation lights enabling us to illuminate more neurons!

Juneau, ..., Kemere Under Review

Chu & Kemere *ENeuro*, 2021
Dutta, Ackermann & Kemere *JNE*, 2018

Learning & Memory

We contribute to **neuroscientific computing** with the development of **electrophysiological neural data object models** with easy to use analysis in-built. Taking advantage of this software and **machine learning** techniques (latent space models), we can **further understand what neurons are encoding** that may not be achievable with traditional Bayesian decoding approaches! Additionally, we perform **clusterless decoding** of neural activity to take advantage of all spikes recorded as opposed to just clusterable units!
Ackermann, ..., Kemere, Diba *Elife*, 2018
Ackermann, Kemere, Cunningham *bioRxiv*, 2019



Modeling

We are developing models to describe and decode the latent dynamics of neural ensembles in the hippocampus. By applying and tailoring dimensionality reduction techniques for neural signal processing, we aim to decode neural activity in an unsupervised learning manner. This can reveal the neural dynamics during both learning and memory consolidation.

