USE CASE

a division of Harvard Bioscience, Inc.

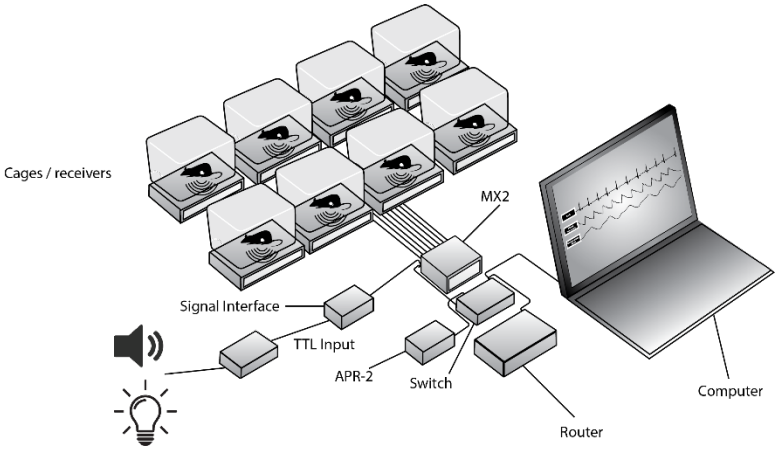
Signal Interface and Evoked Field Potential (ERP)

An evoked potential is the electrical response of the brain to a sensory stimulus. The sensory stimulation can be visual, auditory, or somatosensory.

Evoked potential amplitudes tend to be low (~1.0 microvolt) compared to tens of microvolts for EEG. To resolve these low-amplitude potentials against the background EEG and ambient noise, signal averaging of multiple responses is required.

To obtain evoked potentials, researchers must have the ability to apply stimuli, such as light flashes, auditory tone bursts or electrical stimulation, multiple times and place a mark on the EEG signal indicating when each stimulus was applied. During this time period, individual responses are recorded and then averaged to create measurements of latencies, amplitudes, and frequency content.

As each stimulus is applied, a TTL pulse can be sent to DSI's Signal Interface to be recorded as an event in Ponemah, synchronizing the timing of the occurrence with the EEG data. Physiologic data immediately following the stimuli may be analyzed for time to each peak and peak amplitudes.



Physiological Endpoints

- Averaged EEG waveform response to repeated stimuli*
- Video
- Temperature
- Activity

Events to Synchronized

- Timing of applied stimuli; i.e. TTL pulse

The following outlines exemplify adjacent applications where collection of stimulus occurrence synchronized with EEG data is ideal for data analysis.

Use Case – Electroretinograph

Electroretinography is a test that measures the electrical activity of the retina's rods and cones in response to light stimulation. It is used with animal models of retinal disease to assess the status of the retina to diagnose disease. The basic method of recording is to attach electrodes to the surface of the cornea to detect electrical impulses on the retina when a beam of light is flashed onto the retina. The intense flash of light elicits a biphasic waveform.

Use Case – Mismatch Negativity

Mismatch negativity (MMN) is a branch of event-related potentials (ERP) where subjects are exposed to a stimulus and changes in brain electrical activity are studied. For MMN, subjects are exposed to a repetitive stimuli sequence, typically sound or light, then a rare deviation from the sequence is interspersed within the repetition series to generate a response. For example, with sound, a change in frequency, intensity, duration or real/apparent spatial locus of origin may spontaneously occur within a duration of a standard sound being played.

Recent Publications

The following recent publications highlight how evoked field potential can be combined with telemetry.

Conscious Wireless Electroretinogram and Visual Evoked Potentials in Rats

https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0074172

Mismatch Negativity (MMN) in Freely-Moving Rats with Several Experimental Controls

https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0110892

DSI

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*Ponemah EDF Export module may be used to bring data into 3rd party tools for analysis.