Synapse is an integrative approach for your neuroscience research. This software includes customized applications for electrophysiology, fiber photometry, optogenetics, behavioral control, electrical stimulation, and auditory presentation, as well as version control of experimental paradigms, a database of subjects, and a digital lab notebook.

Design

Synapse has built-in mini apps ("Gizmos") for building your experiments and controlling your subjects. Each Gizmo is an application that runs on the TDT hardware to visualize, process, and control your neural recordings, optical signals, or stimulation paradigms.

Manage

Synapse provides an easy user interface for visualizing, controlling, and managing experiments. Access experimental and subject parameters both online and offline. Synapse organizes your projects into a searchable database using the experiment and the recorded subject. Quickly find the project, the subject, and the recording session for offline analysis.

Collect

TDT's real-time processors are fully integrated for all your stimulation and recording needs. These processors have high-precision, microsecond resolution. With this flexible interface, users can view acquired signals, control signal parameters, perform online spike sorting algorithms, drive stimulation, and integrate behavior paradigms.
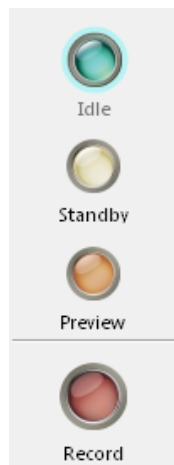
Synapse Licensing

Synapse licensing simplifies and customizes software purchases, so users only purchase the components needed for their research. The five packages are described below:

Synapse Base
Required for all TDT systems. Perform basic neural recording, signal acquisition, filtering, and data saving. Includes Gizmos for real-time signal processing for triggering external devices for optogenetic stimulation or single channel electrical stimulation.

Fiber Photometry
Use with the RZ10x (and RZ5P) to control LED drivers and measure fluorescence from standard biosensors for fiber photometry. Includes integrated lock-in amplification and real-time calculation of ΔF/F. Use the digital I/O to receive TTLs from 3rd-party behavioral devices for time-locked recordings.

Single-Unit Neurophysiology
Experience real-time spike sorting with PCA-based, box, and tetrode clustering algorithms. Create and customize digital referencing of neural signals and process real-time sort codes for complex closed-loop control.

Stimulation
Design simple and complex waveforms for electrical and auditory stimulation. Generate mono- and biphasic pulses, sine waves for tone pips, noise, and arbitrary waveforms from uploaded .wav files. Combine with the Subject Interface multi-channel stimulator and the switching headstage to integrate electrical stimulation.

Pynapse Coder
A Python-based programming environment with built-in autocomplete to assist with coding. Control event-driven behavior and closed-loop studies and process incoming signals for tight closed-loop control. Combine with TDT's iCon interface hardware for behavior control.

Gizmos are the programming component of Synapse. Each Gizmo has a unique set of functions for processing and controlling acquired signals, generated waveforms, and logic. Multiple Gizmos can be linked together to build complex and parallel signal processing chains. Each Gizmo has predefined controls that can be fixed during experiment design or adjusted during runtime in the Synapse software.

Synapse Base Package

Base has all the necessary Gizmos to acquire, filter, and process neural signals in real-time and to communicate with third-party devices via Digital Triggers. It includes all Gizmos in the following categories:

- Logic – including timers, TTLs, and digital sequence generators (e.g. Pulse Generator)
- Signal conditioning – including artifact blockers, rms calculations for analysis, and real-time control over signal parameters
- Signal routing for parallel processing
- Data storage
- Digital oscilloscope

It also contains the following Gizmos:
- **Neural Stream Processer** for acquiring, filtering, and storing neural signals
- **MRI Recording Processor** for artifact rejection
- **Parameter Sequencer** for real-time control over signal parameters and input sequences
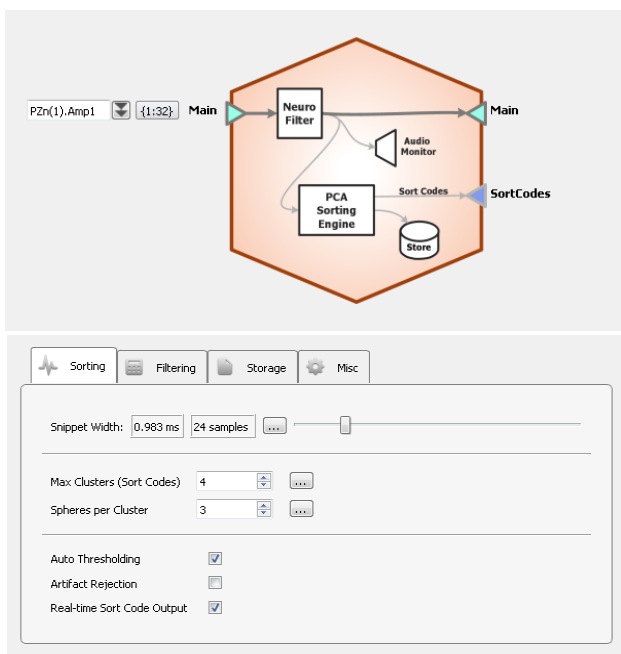
Additional Gizmo Packages

TDT offers several additional Gizmo packages for your different experimental needs:

Fiber Photometry
- Fiber Photometry

Single-Unit Neurophysiology
- PCA Spike Sorting
- Tetrode Spike Sorting
- Box Spike Sorting
- Sort Binner
- Neural Signal Referencer

Stimulation
- Electrical Stimulation Driver
- Audio Stimulation
- Ultrasonic Stimulation
- File Stimulation

Pynapse Coder
- Python Coding

More information at:
tdt.com/synapse

System Recommendations:

- Microsoft® Windows® 10
- 2.0GHz or faster processor (Intel® Core™2 Duo or AMD Phenom® II processor; 64-bit support recommended)
- 4 GB of RAM (or more)
- 1 GB of available hard-disk space for installation (dependent on the number of channels and research requirements)
- 1024×768 display (1280×800 or higher recommended) with OpenGL-compatible graphics card, and 64MB of VRAM (128MB or higher recommended)
- TDT Optibit or UZ3 interface
- Full height PCIe slot (if connecting to TDT Hardware) or USB 3.0 port (if using UZ3)

Have a question? Contact us!
sales@tdt.com | +1.386.462.9622