METRIS

SONOTRACK™

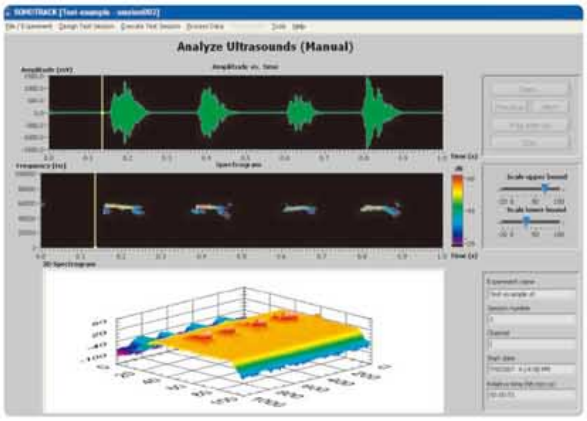
SONOTRACK is the first full spectrum ultrasound recording, analysis and playback system on the market, specifically designed for use in animal research laboratories. SONOTRACK is easy to use and opens possibilities to distress, measure pain, anxiety, comfort, social interaction and general animal welfare based on ultrasonic vocalizations (USV).

The SONOTRACK system

SONOTRACK is a non-invasive measurement system that uses the latest technology to record and analyze the full range of ultrasounds from 15 kHz to 125 kHz. SONOTRACK applies highly sensitive microphones, low-noise amplifiers and the latest acquisition hardware to detect USV's that can be weak to very loud. In contrast to bat detector based systems SONOTRACK doesn't require pre-tuning and has an extremely good signal to noise ration that is not obtained with bat detectors.

The recorded signals can be analyzed with the powerful visualization and quantification tools in the SONOTRACK software. This includes several graphical presentations of the USV's, playback of ultrasonic signals in audible signals for humans, automatic USV counting in user definable frequency bands and powerful result summaries of your total experiment.

The optional Ultrasound Playback hardware and software enables you to playback recorded USV's as well as artificial sound patterns to your animals and use them as Ultrasound stimulus signals.



SONOTRACK can be used to monitor animal well-being and interaction between animals based on the ultrasonic vocalizations of the animals

Typical research areas:

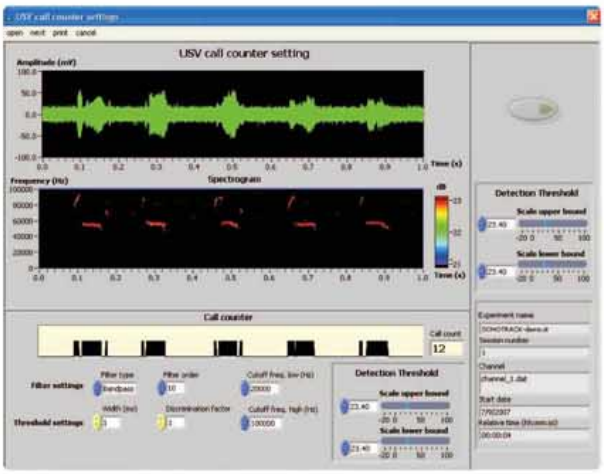
- Pain Research
- Anxiety Research
- Stress Research
- Memory Studies
- Depression Studies
- Sexual Interaction
- Social interaction (mother -pup, male -female, etc.)
- Developmental toxicity
- Animal Welfare Studies

Modular and Multi purpose system with **9** different research applications

The meaning of Ultrasonic Vocalizations

Ultrasonic Vocalizations are sounds that are well beyond the mostly in the range of 15 kHz to 125 kHz. These vocalizations erve several purposes, amongst others: navigation (bats), communication and expression of the emotional well being (for example by rodents).
Rats and mice produce ultrasonic vocalizations in a variety of situations, for instance in response to stress, anxiety and pain (22 kHz) or during social interaction like sexual behavior (50 kHz). Mouse and rat pups emit ultrasounds in response to separation from their mother and litter mates. These ultrasonic vocalizations can be used as an indicator of emotional and motivational status. In animal models of stress, anxiety, pain or sexual behavior, but also in studies of well-being of animals, USV is an accepted and sensitive parameter.

Recording, Analysis & Playback of Ultrasonic Vocalizations



Unique Features of SONOTRACK

Full Spectrum Analysis:
SONOTRACK digitizes and stores the complete ultrasound signal, creating several unique possibilities of in-depth analysis.

Multi-channel continuous recording and playback:
SONOTRACK records up to 4 independent channels and can be set to record only signals above a user defined threshold.
SONOTRACK plays back up to 2 independent channels of prerecorded Ultrasound signals (or artificial signals). Playback and recording can be done simultaneously.

High Performance microphones and amplifiers:
Sensitive microphones and low noise amplifiers guarantee detection of both low and high level USV's. Microphones can be chained together to cover bigger areas such as big cages or open field arenas.

High Performance 50W amplifier and speaker:
Wideband amplifiers and speakers enable realistic playback of ultrasound signals to your animals.

Powerful USV visualization tools:

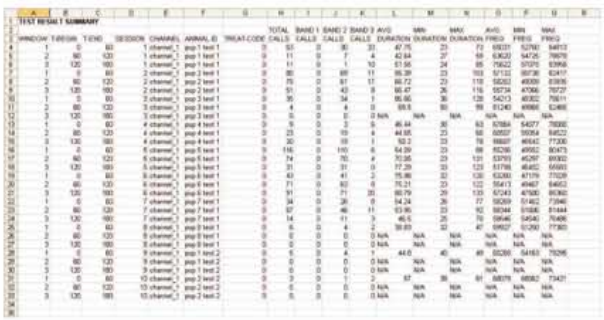
The USV's can be analyzed by means of several graphical presentations such as 2D and 3D sonograms, frequency plots and tables can be easily copied and pasted in other applications such as Mircosoft Excel. Ultrasounds can be converted to make them audible for humans and can be saved in the commonly used .AVI format.

Automatic USV counter:

Flexible USV counter that can be adjusted to your experiment and can quickly determine the most important USV parameters over large data sets.

Result Summary Generator:

Creates a compact summary of large datasets that will enable you to do efficient statistical analysis of your USV data and to get quickly to the end points of your research.



SONOTRACK Publications

2011

- Snoeren, E.; Ågmo, A.
  The incentive value of female 50-kHz vocalizations for male rats

2010

- De Groot, D.; Swierstra, J.; Damsteegt, L.; v.d. Horst, L.; v.d. Wiel, H.; Blauw, L.; Otto, M.; Bulthuis, R.; Rubingh, C.
  Ultrasonic Vocalisations (USVs) in rat pups. An animal friendly marker for neurotoxicity during development.
- Akcali, D.; Sayin1, A.; Sara, Y.; Bolay, H.
  Does single cortical spreading depression elicit pain behaviour in freely moving rats?

2009

- Takahashi, A.; Yap, J.J.; Zitzman Bohager, D.; Clayton, T.; Cook, J.M.; Faccidomo, S.;Miczek, K.A.
  Glutamatergic and GABAergic modulations of ultrasonic vocalizations during maternal separation distress in mouse pups
- Williams, S.N.; Undieh, A. S.
  Brain-derived neurotrophic factor signaling modulates cocaine induction of reward-associated ultrasonic vocalization in rats