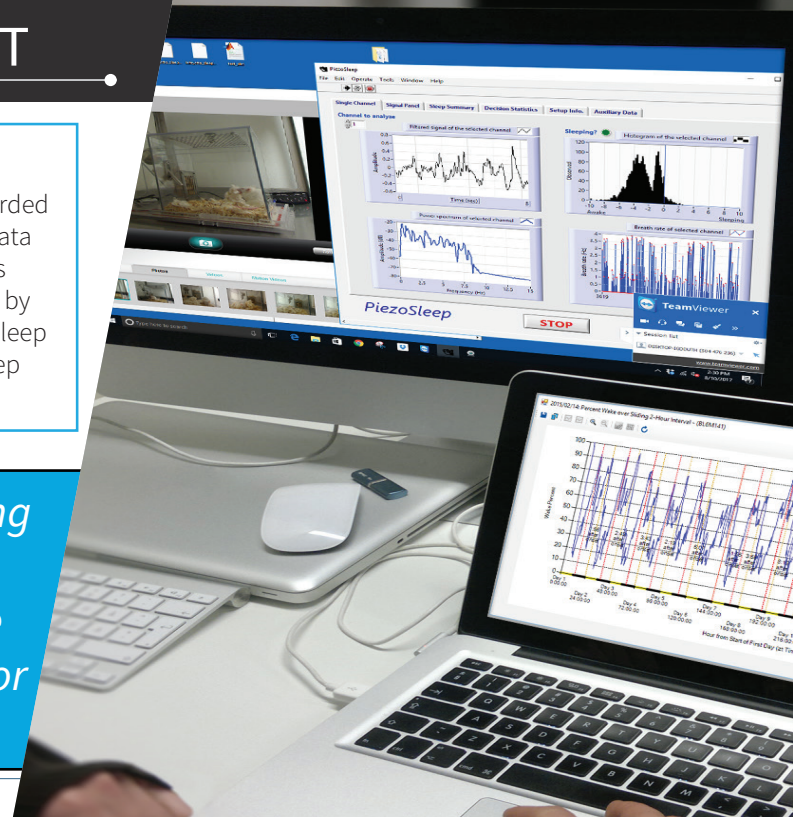# NONINVASIVE + AUTOMATED = COST & TIME EFFICIENT

Non-invasive Alternative to EEG/EMG Sleep Scoring

SleepStats analysis software classifies the piezoelectric signal into "Sleep" or "Wake" every 2 seconds. A combination of features, extracted from the piezo signal, are used to classify the data into the two states. System Validation: The classifier was validated by comparing its results against the gold standard method of human sleep scoring of EEG/EMG.

Simultaneous piezoelectric and EEG/EMG data was recorded for twenty-four hours from twenty mice. The EEG/EMG data was independently scored by two trained human scorers and compared against the sleep/wake scores generated by SleepStats. Recall/sensitivity for detection is **91.4%** for sleep and **92.3%** for wake. Specificity of calls is **91.4%** for sleep and **92.3%** of wake.

The PiezoSleep Behavioral Tracking System integrates piezoelectric sensor, data acquisition hardware and software with custom cages for automated sleep/wake scoring.

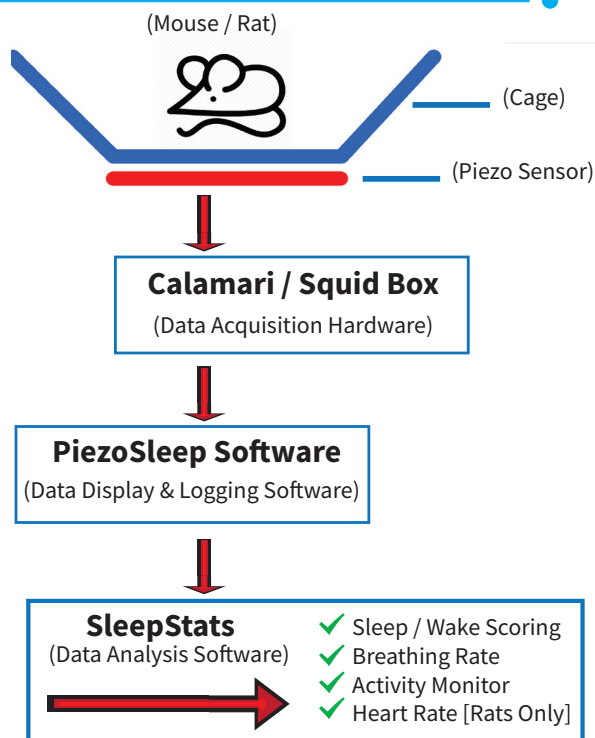## PiezoSleep Behavioral Tracking System Applications

Currently Being Used for

✓ Sleep studies:
- *Basic research*
- *Disease models*
- *Preclinical drug testing*

✓ Sleep phenotyping
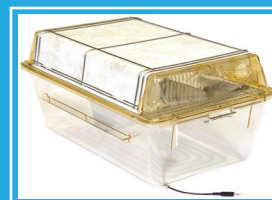✓ Respiratory rate tracking
✓ Activity tracking

Potential System Uses and Features

✓ Providing real-time feedback control for:
- *Targeted sleep disruption*
- *Sleep apnea simulation*
- *Optogenetics applications*

✓ Heart rate tracking
✓ Seizure detection

System Basics

(Mouse / Rat)

(Cage)

(Piezo Sensor)

Calamari / Squid Box
(Data Acquisition Hardware)

PiezoSleep Software
(Data Display & Logging Software)

SleepStats
(Data Analysis Software)

✓ Sleep / Wake Scoring
✓ Breathing Rate
✓ Activity Monitor
✓ Heart Rate [Rats Only]

What's New

Rat System
Complete Piezo system now available for rats

Mouse System
System modified for use with traditional mouse housing

MouseQwake
Non-invasively detects targeted behavioral states & shakes the cage to disrupt behavior. Adjustable amplitude & frequency.