

Master internship project

Title:

Rodent behavior and emotion: multimodal measurement and analysis

Supervisor:

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Background:

For the foreseeable future, the discovery and development of new therapies for human brain disorders requires preclinical research on animals, in particular mice and rats. Full understanding of an animal's behavioral phenotype, i.e. the response of animals to internal or external stimuli, requires measurement of all relevant biomarkers: visible (behavior), audible (sounds, vocalizations) and physiological parameters (cardiovascular, respiratory, brain, muscles, and other biosignals). The interest in ultrasonic vocalizations (USVs) of rodents is growing, illustrated by dedicated USV conferences and growing numbers of publications. In recent years, the field of bioacoustics has seen major technical breakthroughs, including the use of deep learning for vocal pattern classification and the use of dense microphone arrays for sound source localization. These technologies are now being productized and integrated into automated behavioral observation systems. The result will be a multimodal test environment, in which the relationships between visible behavior and audible emotion (ultrasonic vocalizations) of rodents can be studied in a non-invasive manner.

Goal of research project:

During this project, you will use novel tools for video tracking, behavior recognition and experiment automation (EthoVision, www.noldus.com/ethovision) and ultrasonic vocalization recording and analysis (UltraVox, www.noldus.com/ultravox) to determine the optimal hardware and software configuration for multimodal studies, and the added value of integrated measurement compared with unimodal testing. That is, does the concurrent tracking of behavior and vocalizations deliver insights that cannot be obtained by measuring either behavior or vocalizations? You will perform the measurements on mice or rats that are subjects in ongoing animal studies.

Requirements:

- Knowledge: basic understanding of video tracking, bioacoustics, signal processing, pattern recognition
- Skills: excellent written and spoken English
- Interest: animal behavior, animal models of human brain disorders, preclinical research

Practical information:

- Duration: 4-6 months
- Start: January 2025 or later
- Location of work: Central Animal Facility (Centraal Dierenlaboratorium) on the Radboud University campus