PyMouse: A low-cost, automated, high-throughput behavioral training system for mice

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ABSTRACT

Training mice to perform behavioral tasks is a laborious work that requires significant experimental and personnel resources, while reproducibility remains a challenge. Commercially available automated behavioral systems are expensive solutions and restrict the user to specific experimental designs. In this work we developed PyMouse, an open-source behavioral control framework based on python. PyMouse is a state control system responsible for all aspects of a behavioral experiment like creation/presentation of stimuli, hardware operation, and data acquisition/storage. PyMouse offers high flexibility by enabling the implementation of different experimental designs to be connected with a plethora of off-the-shelf, low-cost hardware components. Mice have been successfully trained in different types of discrimination tasks, using a variety of stimuli including visual, olfactory, auditory, and combinations of these. The automatic nature of PyMouse allows the minimization of the animal-experimenter interaction and coupled with its low cost, allows training of hundreds of mice in difficult tasks with little effort from the experimenter.