Automation of a Lick Port for Neuroscience Experiments

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Automation has emerged as a crucial, time-saving, and accurate technique for researchers across various fields. It ensures consistency in project requirements across different contexts by enabling computer analysis of targets under diverse conditions. In this study, we address the issue of inaccurate lick port positioning, which is vital for measuring fear learning in mice using water as a reward. Traditional manual setups of lick port are inflexible and inefficient for researchers to operate during each neural recording session, which makes an automated lick port positioning system becomes essential. Therefore, we propose the design and construction of a movable, highly accurate lick port to significantly enhance experimental outcomes. Our innovative approach challenges traditional manual lick port control, which can introduce variability and reduce the comprehensiveness of neural circuitry measurements in adaptive learning system studies. Our lick port system for mouse experiments is done by integrating an electric motor with a MATLAB-operated PID control system to control the lick port's position. The circuit board connected the motor and the computer, enabling user input to control the lick port's movements. An accurate positioning based on user input is measured as a key measure of success.