Neuro Tracker - William Zhao

Affecting over a million young minds across Canada, Attention Deficit Hyperactivity Disorder (ADHD) is one of the most widespread neuropsychiatric disorders. Characterized by impulsivity and hyperactivity, children with this disorder will have their academic achievements and mental well being severely affected. Current treatment for ADHD involves medication that is non-pharmacological like methylphenidate which include side effects such as appetite loss and mood changes. A more recent treatment, software-based digital therapy such as video games have been introduced. While these can support emotional and behavioral skills, concerns remain about the risks of increased screen time, such as eye strain. This challenge inspires my invention, the Neuro Tracker, a robotic treatment system designed to improve attention span, impulse control, and physical health in children with ADHD. The prototype (Appendix A) is built using a Raspberry Pi 5, LEGO components, and custom 3D-printed parts.This device is a stationary machine that shoots colored balls and is equipped with facial recognition to track the child's position. The task for the user is to only catch the balls that are blue and to avoid the red balls that are in a random sequence. Studies show that tasks requiring selective responses can help improve impulse control in ADHD patients. Intuitive to play, this interactive game should improve focus, reaction time, and impulse control through real-world physical movement, better than the digital treatment that relies on a screen. In the last 3 months, I have developed 3 prototypes. Each improving the range of motion, accuracy, and the strength of the design. I got consent from my friends and family (ages 16-53) to participate in a 10 minute session and complete a short survey. The average response confirms that this design is easy to use and can extend the user's attention span. For future developments, I plan to integrate a progress tracking system that monitors the child's performance, such as reaction speed and focus duration. These enhancements will make the system more personalized, offering a variety of long-term support to children with ADHD.

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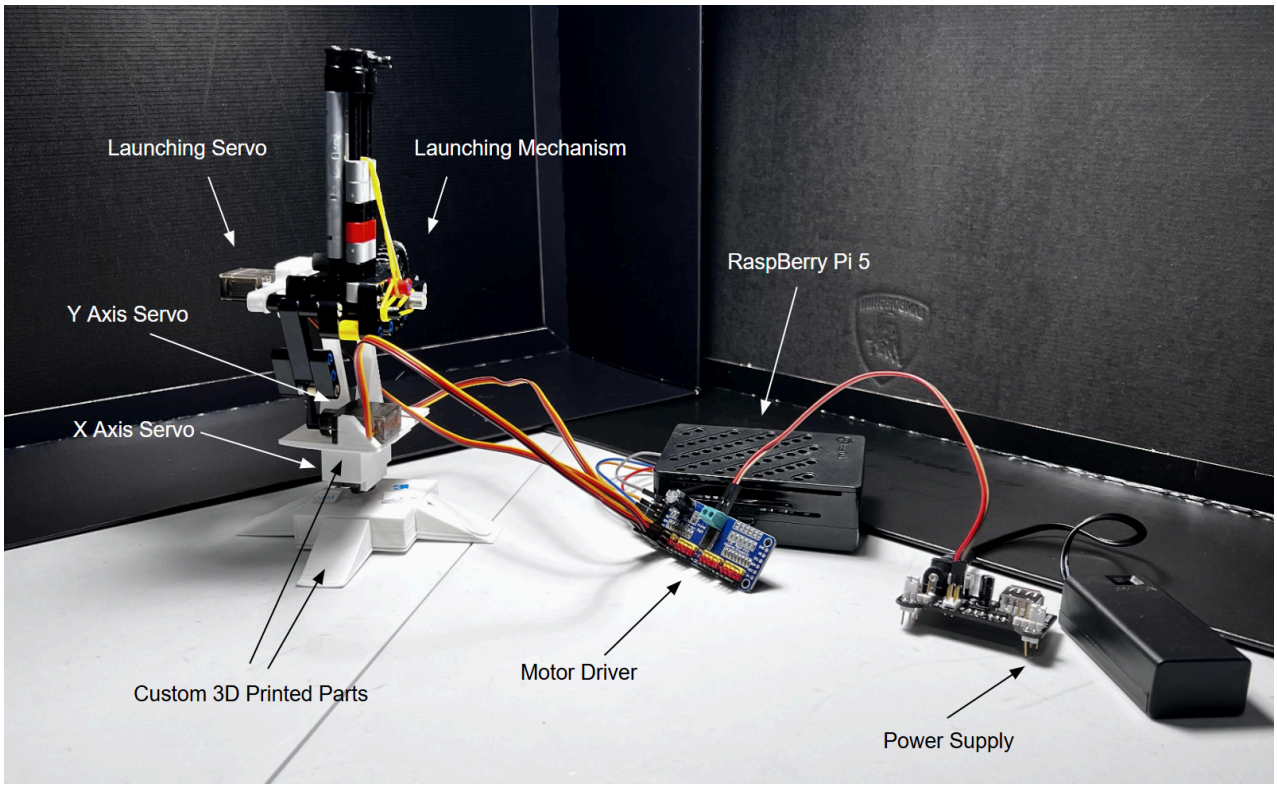
Appendix A


Launching Servo
Launching Mechanism
RaspBerry Pi 5
Y Axis Servo
X Axis Servo
Custom 3D Printed Parts
Motor Driver
Power Supply