Colorado Science and Engineering Fair

2025 Team Project Abstract Form

Please print 2 copies of the completed form. Sign both copies, keep 1 for your notebook and submit 1 copy to your Regional Fair Director with your other paperwork.

Title of Project: Sympathetic Nervous System Activation Effects on Short-Term Memory in a Virtual Environment

Team Leader's Name: Calvin Johnson

Team Member 1: Aarnav Jain Team Member 2:

School and City: Peak to Peak Charter School, Lafayette

Sponsor's Name: Bayley Zubler

Category: Behavioral & Social Science Division: Senior (grades 9 - 12)

Abstract (250 words or less):

The classroom environment plays a critical role in shaping a students' learning and academic performance. Factors such as lighting, noise levels, and the ambiance of a room can influence how effectively students engage with material and, more importantly, how well they recall it. For mass testing days, the type of classroom different students find themselves in can affect how well they do on the test.

We utilized the Meta Quest 2 and Unity game engine to develop a simulation consisting of the three different environments to test this hypothesis. The environments include a control white space, relaxing meadow, and horror scene all designed to activate the parasympathetic or sympathetic nervous system. The game is a simple card memory game that the participants must complete before being displayed their score, time, flips, and proficiency.

We found that across all environments the average total flips was about 100, whereas the time to complete varied significantly and aligned with our hypothesis. In the horror environment participants took about 240 seconds, about 200 in the control, and about 180 in the meadow. Additionally through statistical analysis we found that participants proficiency has almost no correlation between time to complete and total flips.

From this we can conclude that students placed in more stressful environments will take longer to complete tasks and thus score worse on tests. Additionally these results also suggest the viability of continued virtual reality scientific research because participants' experience with VR did not impact their ability to complete the simulation.

We hereby certify that the above statements are correct and the information provided in the Abstract is the result of one year's research. We also attest that the above properly reflects our own work.

Team Leader's Signature:_____ Date:_____

Team Member 1's Signature:_____ Date:_____

Team Member 2's Signature:_____ Date:_____

In addition, all students must complete the ISEF Student Checklist (1A), Research Plan, Approval Form (1B), and Checklist for Adult Sponsor (1), and any other ISEF forms required for this type of project. See the International Rules and Guidelines for form requirements. Return COPIES of all of these forms to your Regional Fair Director with your Finalist Verification/Permission Form. **A signed copy of this form must be included in your notebook.**