



## Colorado Science and Engineering Fair

## 2024 Individual 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: Beyond Pegs & Holes: Building an Improved Chessboard for Blind and Low Vision Chess Players

Finalist's Name: Omar Manshad

School and City: West Ridge Academy, Greeley

Sponsor's Name: Muhanad Manshad

Category: Behavioral & Social Sciences (BEHA)

Division: Junior (6th - 8th grades)

Abstract (250 words or less):

Chess is recognized by the United Nations as engaging approximately 8% of the global population, with about 70% of adults in countries such as the US, UK, Germany, Russia, and India having played at least once in their lives, translating to 605 million adults who play regularly. This game offers significant social and cognitive benefits. However, traditional chessboard designs pose substantial barriers for blind and low-vision individuals. This project seeks to bridge this gap by introducing innovative chessboard designs tailored for these players. Through two usability studies with 29 and 30 participants, respectively, we discovered a strong preference (79.31%) for chessboards with magnetic features, pinpointing 4x10mm magnets as the ideal magnetic strength for piece manipulation. These insights led to the creation of a pioneering magnetic accessible chessboard. Advancing this work, we developed a smart accessible magnetic chessboard that combines preferred magnetic functionalities with multimodal feedback. Usability Study #3 is in progress, comparing this new smart board against conventional peg-and-hole designs, focusing on metrics such as piece-moving time and error rates, alongside player preferences. This investigation not only aims to enhance the chess experience for blind and low-vision players but also to guide the inclusive design of other board games, promoting broader social integration and mental health benefits for all players.

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

Finalist'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 you Finalist Verification/Permission Form. A signed copy of this form must be included in your notebook.