Colorado Science and Engineering Fair

2025 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: The Poly Cracker 2.0: A size- and weight-controlled birdhouse

Finalist's Name: Solomon Charlton-Jones

School and City: Flagstaff Academy, Longmont, Colorado

Sponsor's Name: Lauren Liedtke

Category: Environmental Engineering

Division: Junior (grades 6 - 8)

Abstract (250 words or less):

Native birds are in decline due in part to nest predation from invasive bird species and rodents. Nest predation is the invasion and/or destruction of bird nests. One way to combat this problem is through the design of a birdhouse that will prevent nest predation upon native bird species.

I determined that a birdhouse restricting entry by animals that do not match the size and weight of the occupant would be one solution to combat nest predation. The Poly Cracker can control for size through the use of differently sized inserts that can be placed in the entrance of the birdhouse, which blocks animals larger than the occupant from entering. Weight regulation is achieved using a movable platform at the entrance that is attached to an adjustable counterweight on the back. The front entrance plate, which is attached to the platform, is designed to close the entrance if an animal too heavy or light attempts to enter. I designed the birdhouse using a CAD program and 3d printed the pieces for assembly.

The initial design functioned as intended and proved that the concept is feasible. Some problems with the design were structurally unstable walls and weather-vulnerable pulleys. I improved the design with walls made up of fewer separate pieces and grooves in the top to replace the pulleys. Future designs would include a better integrated counterweight system, an emergency exit, weatherproof materials, and temperature control features. Another design could integrate a solar-powered AI bird identification software to control entry.

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.**