



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: That's So F.I.R.E.! The Forefront in Inferno Research Equipment

Finalist's Name: Galileo Hannigan

School and City: Centaurus High School, Lafayette

Sponsor's Name: Nicholas Cady

Category: Environmental Engineering (ENEV)

Division: Senior (9th - 12th grades)

Abstract (250 words or less):

I have designed a drone that will autonomously track the plume of a wildfire to keep measurement equipment within the plume. Wildfire smoke is incredibly dangerous to human health and the environment at large, especially PM2.5 (particulate matter less than 2.5 micrometers in diameter). PM2.5 gets into lungs and is small enough to obstruct the alveoli from transmitting gasses in and out of the bloodstream. If we know the chemical composition of PM2.5, we will be able to track the source of the pollution back to the fuel source. This would allow us to know the health and environmental impacts of a fire before it affected people. We don't have a method for getting the pre-existing equipment to measure pollutants in the right place to collect them. This drone keeps the equipment within the plume for collection. I have approached it from two directions. I have programmed a preexisting drone to prove that my search protocol can be operated autonomously based on sensor inputs from an outside source. The second part was, through the use of Solidworks, creating a design for the final prototype, and testing its aerodynamic properties as well as its ability to prevent the creation of vortexes that would disturb data collection. Through the proof of concept with autonomous tracking based on real-time sensor input combined with a physical model of the prototype, I can prove that with the resources, this drone is a viable and incredibly valuable solution to fill a gigantic gap in scientific knowledge.

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: *Galileo Hannigan*

Date: *3/4/24*

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.