



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: Reducing everyday light pollution with headlight filters.

Finalist's Name: Molly Odgren

School and City: Evergreen High School, Evergreen

Sponsor's Name: Stephanie SeEVERS

Category: Engineering (ENGR)

Division: Senior (9th - 12th grades)

Abstract (250 words or less):

Light pollution is a huge problem for many people and animals and affects them in many different ways. It messes up migratory patterns and sleep schedules of birds, bugs, and other animals. It can affect their circadian rhythms and disrupt food chains that function at night. Circadian rhythms are also messed up in humans which can have adverse effects on mental health. Light pollution is attributed to many factors but, focusing on car headlights is a good way to start. These filters aim to filter out blue light, slowly reducing light pollution to make a clearer night sky, and reducing the effects of astigmatisms in drivers. So the question I aimed to solve with engineering is how can the effects of everyday light pollution be reduced with headlight filters?

First, a preliminary design of the filter attachment was made in CAD programming to be printed and assembled as a model. Then using consistent light placement and imaging I used Photoshop editors to measure the level of blue light to find the most optimal filter type. This information will allow us to innovate a solid solution for this problem.

My results showed that the orange was most effective because it decreased the blue light emissions by an average of 47.54%, which may be lower than the 57.49% of both filters, but this solution was consistent across all different headlight types while both filters were not.

Moving forward testing orange-tinted materials that are more professional and sustainable would be a wonderful way to move forward toward a solution. So, the prototype could be utilized in everyday life given modifications, and would do a good job of achieving the goal of reducing light pollution.

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.