



ASEF

Alabama Science & Engineering Fair

Alabama Science and Engineering Fair Guidelines 2021-2022

Deadline for Paperwork Submission

The Alabama Science and Engineering Fair (ASEF) timeline has been set based on the project paperwork submission deadline for the International Science and Engineering Fair (ISEF). **The dates below are hard deadlines.** Regional Fair Administrators should use these for planning their regional fairs. School/District Fairs should be made aware of regional dates to allow for plan their fairs accordingly.

February 18 – deadline to submit video links, virtual display boards and finalize winners in Scienceteer who are advancing to GEARSEF

March 3 – GEARSEF @Auburn University (may switch to virtual due to COVID)

March 21 – deadline to submit video links, virtual display boards and finalize winners in Scienceteer who are advancing to ASEF

April 4-8 – ASEF (virtual) **pending ISEF approval

April 10 – deadline to submit paperwork for all projects advancing to ISEF

Project Video Submission Guidelines

The purpose of the project video submission is to provide Category Judges as well as Special Award Judges with materials to review on their assigned Judges' Preview Day. Reviewing these projects prior to an in-person interview allows judges more time to study the projects and plan their line of questions for the student(s) interview. In the event that a student experiences technical difficulties on the day of their interview, the use of videos and virtual display boards can also serve as a backup system. Judges will be encouraged to follow the rubric and score projects based on the content presented in the video and on the display board. **Projects will not be judged based on the quality or creativity of the video submission.** The video serves as an opportunity for the student(s) to give a brief overview of their project, focusing on key components of their research plan. Videos should address:

1. Relevance/significance of the topic and how this is applicable to the real world
2. Demonstration of authentic student work
3. Creative/accurate/appropriate methodology used for data collection
4. A brief summation of the results and conclusions from the project

CREATING YOUR VIDEO

ASEF recognizes that each school may have access to different resources that can be used to create their videos. Some students may choose to film themselves presenting their display board using an iPhone/iPad while others may choose to do a screen recording of themselves presenting via Zoom/WebEx and simply sharing their screen to show their display board. Depending on the size and structure of the school/district some fairs may only be advancing 3 projects, while others may be advancing 10-15 projects. Therefore, the video creation guidelines are very loose. Regardless of the production method, videos should adhere to the following time limits:

1. Junior Division Projects – no more than 5 minutes in length
2. Senior Division Projects – no more than 7 minutes in length

VIDEO SUBMISSION GUIDELINES

Due to concerns surrounding student privacy, file size limitations, file shareability for prompt review, the following protocol will be used to submit student project videos.

1. School/District Fair Administrators are asked to create a **private** YouTube Channel for their school/district fair. This can be accomplished easily using any Gmail account. If you are unsure how to do this – feel free to watch the online video tutorial for instructions: <https://www.youtube.com/watch?v=r74p6y4uKbw> .
 - a. If you are creating a new YouTube account for your fair – please be sure the name of the channel is the name of your fair.
2. All project videos advancing from a school/district should be uploaded to a single YouTube channel.
3. All individual project video titles should follow the format below:
 - a. Division (J or S) - Student(s) name – “Project Title”
 - b. Ex. J – Janie Marino - “Which type of music promotes growth in bean plants?”
4. When the school/district channel contains all project videos, School/District Fair Administrators are asked to provide the link to the school/district channel to your Regional Fair Director. Regional Fair Directors will forward links on to ASEF Assistant Director, Janie Marino at jgm0010@auburn.edu.

ALL YOUTUBE CHANNEL SUBMISSIONS ARE DUE TO ASEF BY MARCH 21, 2022.

- a. School/District Fair Administrators should temporarily change the YouTube channel settings from private to public until ASEF Awards Ceremony is complete.
- b. Once ASEF is complete, all School/District Fair Administrators should change the YouTube channel settings from public back to private.

Project Virtual Display Board Guidelines

This year’s Alabama Science and Engineering Fair (ASEF) will be held virtually in our ASEF Virtual Exhibit Hall. Regional Directors, Fair Administrators and Teachers are welcome to tour last year’s exhibit hall to get an idea of how this process will work. All users are encouraged to watch the short [Virtual Exhibit Hall tutorial video](#) which will explain how to navigate through the space as well as how projects will be divided on the day of the event. Users can then go and tour [the 2020-2021 GEARSEF Virtual Exhibit Hall](#) in order to move about the space in live time. From this experience, Fair Administrators, Teachers and students will be able to see projects that followed guidelines as well as some that did not.

CREATING VIRTUAL DISPLAY BOARDS

The Virtual Exhibit Hall has been designed to display a single PowerPoint slide with the dimensions of **3456 x 2592**. Students should use this exact dimension to ensure that their poster will be displayed correctly. A [Virtual Display Template File](#) can be downloaded in the exact dimensions needed. Students should modify this template as they see fit in order to professionally and effectively communicate their research. Students are responsible for checking the [ISEF Project Display Rules](#) to ensure that their display board is in compliance.

UPLOADING VIRTUAL DISPLAY BOARDS

The Scienteer software system will allow students to directly upload their Virtual Display Board to their Scienteer account. When Regional Fair Administrators finalize the list of winners who are advancing to ASEF, all project paperwork and virtual display board files will be sent automatically. Keep in mind, **Scienteer will not check the file dimensions to ensure compliance with our Virtual Exhibit Hall. Students are responsible for this.** ASEF staff will not be able to correct file dimensions once these files are received. It is imperative that students set their file dimension space correctly BEFORE they begin designing their Virtual Display Boards.

EXAMPLES OF VIRTUAL DISPLAY BOARD ISSUES

Virtual Display Board Template:

Science Project Title

Sciencert Project #

<h4 style="background-color: #003366; color: white; padding: 2px;">Problem / Question</h4> <p>Enter your question here (statement of the problem)</p>	<h4 style="background-color: #003366; color: white; padding: 2px;">Materials</h4> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #003366; color: white;">Quantity (indicated by #)</th> <th style="background-color: #003366; color: white;">Material (be specific)</th> </tr> </thead> <tbody> <tr><td>Amount</td><td>Item</td></tr> <tr><td>Amount</td><td>Item</td></tr> <tr><td>Amount</td><td>Item</td></tr> <tr><td>Amount</td><td>Item</td></tr> <tr><td>Amount</td><td>Item</td></tr> <tr><td>Amount</td><td>Item</td></tr> </tbody> </table>	Quantity (indicated by #)	Material (be specific)	Amount	Item	Amount	Item	Amount	Item	Amount	Item	Amount	Item	Amount	Item	<h4 style="background-color: #003366; color: white; padding: 2px;">Photos</h4>	<h4 style="background-color: #003366; color: white; padding: 2px;">Results</h4> <p>Include results based on your experiments</p> <p>Result 2</p> <p>Result 3</p>
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<h4 style="background-color: #003366; color: white; padding: 2px;">Hypothesis</h4> <ul style="list-style-type: none"> Write hypothesis before you begin the experiment This should be your best educated guess based on your research If you are doing an engineering project, this section should be your Engineering Goal 	<h4 style="background-color: #003366; color: white; padding: 2px;">Procedure</h4> <ol style="list-style-type: none"> Write out all steps in your procedure in a numbered list This should be step 2 	<h4 style="background-color: #003366; color: white; padding: 2px;">Charts</h4>	<h4 style="background-color: #003366; color: white; padding: 2px;">Conclusion</h4> <p>Brief summary of what you discovered based on results</p> <p>Indicate and explain whether or not the data supports your hypothesis</p>														
<h4 style="background-color: #003366; color: white; padding: 2px;">Variables</h4> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="background-color: #003366; color: white;">Controlled variables</th> <th style="background-color: #003366; color: white;">Independent variable</th> <th style="background-color: #003366; color: white;">Dependent variable</th> </tr> </thead> <tbody> <tr> <td>These are kept the same throughout your experiments</td> <td>The one variable you change and test</td> <td>The measure of change observed because of independent variable</td> </tr> <tr> <td></td> <td></td> <td>Decide how you will measure the change</td> </tr> </tbody> </table>	Controlled variables	Independent variable	Dependent variable	These are kept the same throughout your experiments	The one variable you change and test	The measure of change observed because of independent variable			Decide how you will measure the change	<h4 style="background-color: #003366; color: white; padding: 2px;">Data / Observations</h4> <ul style="list-style-type: none"> Observation 1 Observation 2 Observation 3 	<h4 style="background-color: #003366; color: white; padding: 2px;">Graphs</h4>	<h4 style="background-color: #003366; color: white; padding: 2px;">Works Cited</h4> <p>Include print and electronic sources in alphabetical order</p>					
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<h4 style="background-color: #003366; color: white; padding: 2px;">Background Research</h4> <p>Add a brief overview of the background research for your project.</p>	<h4 style="background-color: #003366; color: white; padding: 2px;">Photo Credit</h4> <p>All photos, images, and graphics were done by the researcher or parent unless otherwise stated. IF YOU TOOK IMAGES FROM A WEBSITE, GIVE THEM CREDIT ON YOUR BOARD.</p>																

Virtual Display Board Template that has been customized by student(s):

Plastic on the Roads

Lily Vilardi 8th Grade

Sciencert Project # 15005

<h4 style="background-color: #003366; color: white; padding: 2px;">Problem / Question</h4> <p>The purpose of this project is to find a way to reduce the used plastic in landfills and ocean waste by using it to make roads and other concrete structures stronger.</p>	<h4 style="background-color: #003366; color: white; padding: 2px;">Materials</h4> <p>Plastic containers Plastic grocery bags Plastic milk containers Water Quikrete Rebar Mixing shovel Measuring cup Sissors and Marker 10 bag cement for testing Ear Protection</p>	<h4 style="background-color: #003366; color: white; padding: 2px;">Photos</h4>	<h4 style="background-color: #003366; color: white; padding: 2px;">Results</h4> <p>When testing the 30% plastic bags #2 held up the best. The plastic bags #2 held up better than all of the examples. The 20% of the plastic an untreated about 300 PSI on the first test and 1300 psi before cracking on the second test. All other sample types broke on impact.</p>																													
<h4 style="background-color: #003366; color: white; padding: 2px;">Hypothesis</h4> <p>If plastic is added to the Quikrete mixture then the concrete will be able to handle more pressure than the concrete by itself, and the concrete with added rebar because the plastic will make a good alternative to aggregate because of its small size and flexibility. This will give the concrete some give preventing cracking.</p>	<h4 style="background-color: #003366; color: white; padding: 2px;">Procedure</h4> <ol style="list-style-type: none"> Get the materials together Put the plastic into 1/2 pieces or smaller Cut the rebar for the size of the container. Label containers. Divide the Quikrete equally into the labeled containers. Mix additives into labeled containers. Allow to set up and dry. Pressure test each sample (wear ear protection) Compare results. Repeat Test 	<h4 style="background-color: #003366; color: white; padding: 2px;">Charts</h4>	<h4 style="background-color: #003366; color: white; padding: 2px;">Conclusion</h4> <p>In conclusion the 20% of each plastic additive held up the best. The plastic bags #2 held up better than all of the examples. My hypothesis was correct, the plastic improved the strength of the samples. If a plastic waste was used with cement for roads, sidewalks and buildings, we would benefit from the better strength in the material and also reduce of plastic waste in the environment. This would greatly help and protect the environment.</p>																													
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<h4 style="background-color: #003366; color: white; padding: 2px;">Background Research</h4> <p>Cement concrete is a powder mixed with water to make bricks, concrete made of cement is used on roads, sidewalks, in buildings, and many other places. It can be made by hand, but is also combined with other things for a variety of uses.</p> <p>Additives to cement - rebar rebar is a steel bar that is used to improve the strength in concrete. Rebar increases the tensile strength in concrete.</p> <p>Plastics in the environment - as of 2018 only 8.5 percent of plastic is recycled, which means the other 91.5 percent goes in the ocean, on the ground as litter, or in a landfill.</p> <p>Recycling of plastic- things like plastic bowls and other water bottles can be recycled. However, plastic bags are not able to be recycled, they can be returned to the store, or they often end up as part of the 91.5 percent.</p>	<h4 style="background-color: #003366; color: white; padding: 2px;">Photo Credit</h4> <p>All photos, images, and graphics were done by the researcher or parent unless otherwise stated. IF YOU TOOK IMAGES FROM A WEBSITE, GIVE THEM CREDIT ON YOUR BOARD.</p>																															

Development of an Electric Wheelchair with a Wireless Electroencephalography-Based Control System

Ashraf Mansour - Auburn High School

<h4 style="background-color: #003366; color: white; padding: 2px;">Introduction</h4> <p>Electroencephalography, or EEG, deals with the monitoring of brain activity through electric signals. Data from an EEG headset can be parsed into different frequencies representing a mental state. It also produces other data values, such as aSense Attention, aSense Meditation, and the less commonly used RAW Wave Value (16-bit). This project builds on previous research by applying the last value in controlling an electric wheelchair.</p>	<h4 style="background-color: #003366; color: white; padding: 2px;">Statistical Analysis</h4> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>Observed</th> <th>Expected</th> </tr> </thead> <tbody> <tr> <td>Intended</td> <td>11</td> <td>11</td> </tr> <tr> <td>Unintended</td> <td>3</td> <td>4</td> </tr> </tbody> </table> <p>Construct a 95% confidence interval for proportions modeling the true control accuracy (intended action/total actions)</p> <p>Where</p> <ul style="list-style-type: none"> $\hat{p} = 26/33$ to represent control accuracy proportion $n = 33$ for number of trials $\hat{p} \pm 1.96 \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$ <p>Below Required to satisfy the normal sampling condition:</p> $n\hat{p} = 33 \left(\frac{26}{33}\right) = 26 \geq 5$ $n(1-\hat{p}) = 33 \left(1 - \frac{26}{33}\right) = 7 \geq 5$ <p>Figure 5: projection with 95% confidence that the true probability of accurate control lies between 0.8 and 93.7%.</p>		Observed	Expected	Intended	11	11	Unintended	3	4																
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<h4 style="background-color: #003366; color: white; padding: 2px;">Engineering Goal</h4> <p>Design an electric wheelchair with an intuitive EEG-derived control system at an affordable price.</p>	<h4 style="background-color: #003366; color: white; padding: 2px;">Materials and Methods</h4> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Description</th> <th>Open EEG</th> <th>Force Trainer</th> <th>Mindflex</th> <th>Wheelchair</th> </tr> </thead> <tbody> <tr> <td>Plans and software for building building Uncle Mitts</td> <td>Yes</td> <td>Yes</td> <td>Yes</td> <td>Yes</td> </tr> <tr> <td>Attention to Meditation app</td> <td>Yes</td> <td>Yes</td> <td>Yes</td> <td>Yes</td> </tr> <tr> <td>EEG Power Band Release</td> <td>Yes (using user VET)</td> <td>No</td> <td>Yes (with modifications)</td> <td>Yes</td> </tr> <tr> <td>Raw wave values</td> <td>Yes</td> <td>No</td> <td>Yes (with modifications)</td> <td>Yes</td> </tr> </tbody> </table> <p>Mindflex was chosen due to affordability and the ability to provide raw wave values</p>	Description	Open EEG	Force Trainer	Mindflex	Wheelchair	Plans and software for building building Uncle Mitts	Yes	Yes	Yes	Yes	Attention to Meditation app	Yes	Yes	Yes	Yes	EEG Power Band Release	Yes (using user VET)	No	Yes (with modifications)	Yes	Raw wave values	Yes	No	Yes (with modifications)	Yes
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<h4 style="background-color: #003366; color: white; padding: 2px;">Discussion and Conclusion</h4> <p>The lack of false negatives is indicative of brief handing by the control algorithm, as false negatives have the potential to lead to the safety hazard of the driver being caught "off-gear".</p> <p>While the algorithm was found to be reasonably accurate as is, future improvements to it may include the use of AI to dynamically calibrate the raw wave threshold for changing states, analysis of other variables from the headset (ie aSense Attention), and utilizing a higher quality EEG headset.</p>	<h4 style="background-color: #003366; color: white; padding: 2px;">Photo Credit</h4> <p>All photos, images, and graphics were done by the researcher or parent unless otherwise stated. IF YOU TOOK IMAGES FROM A WEBSITE, GIVE THEM CREDIT ON YOUR BOARD.</p>																									

Virtual Display Board Template that has been PARTIALLY modified by student:

Science Project Title
Sciencert Project #

Problem / Question
Can artificial blubber keep hands warm in icy water?

Hypothesis
If blubber keeps Arctic animals warm in icy water, then imitation blubber will keep my hand warm in icy water because it will act as an insulator.

Variables

Controlled variables	Independent variable	Dependent variable
Room temperature of hand	Imitation blubber being added to hand as an insulator	Temperature of hand before and after adding blubber

Background Research

- Animals like polar bears all have a thick layer of fat, called blubber, that keeps them warm in the icy water.
- Blubber is used to store energy and insulate heat.
- Blubber is a thick layer of fat that lies underneath the skin of many mammals.
- Some whales only eat for a few months out of the year and then live on their blubber the rest of the year.
- Polar bears have black skin underneath two layers of fur that help trap the heat when they are on land.

Materials

Quantity (estimated list)	Materials (be specific)
2	Latex Gloves
1	Crisco Crisco
1	Digital Thermometer
1	Large Bowl
1	Ice
2	Gallons
1	Cold Water
1	Ice
1	Recording Notebook

Procedure

- First you need to take your hand temperature and write it down.
- Second you need to take a big bowl and put cold water and ice in it then you put it in the fridge while you prepare everything else.
- Third you take out your Crisco, latex glove and thermometer.
- Next put your glove on and cover it with a thick layer of Crisco and stick your hand in the water for one minute.
- Once your hand is out of the water put the thermometer on your hand and write the temp down on a sheet of paper and save it for later.
- Now take the glove and Crisco off and put your hand in the water for one minute and take it out then check the temp of your hand.
- Last you compare your temperature with and without the blubber then write down the temperature.

Data / Observations

- I have observed that my hand stayed warm while my hand was in the icy water while using blubber. The temperature only went down 2 degrees.
- When I put my hand in the water its temperature went from 92 degrees to 90 degrees.

Photos

Charts

	Before	After
Bare Hand	92	90
Insulated Hand	92	90

Graphs

Results

I observed that the Crisco had my hand warmer. The blubber looks in the body heat and keeps the heat in. Therefore I can conclude the blubber will keep humans warm just as it keeps Arctic animals warm in icy water.

Conclusion

In conclusion, my hypothesis was proven. Blubber in how Arctic animals stay warm in icy water and imitation blubber will keep humans warm as well. The results of this experiment might have been changed by using a different material for gloves or blubber. It would be interesting to see if results would change if the blubber was put inside the glove instead of outside of the glove.

Works Cited

1. [How Animals Stay Warm in Winter](#). [https://www.nature.com/scienceexplains/animals/animals-stay-warm-in-winter](#)

2. [Blubber: How Animals Stay Warm in Winter](#). [https://www.nature.com/scienceexplains/animals/animals-stay-warm-in-winter](#)

3. [Blubber: How Animals Stay Warm in Winter](#). [https://www.nature.com/scienceexplains/animals/animals-stay-warm-in-winter](#)

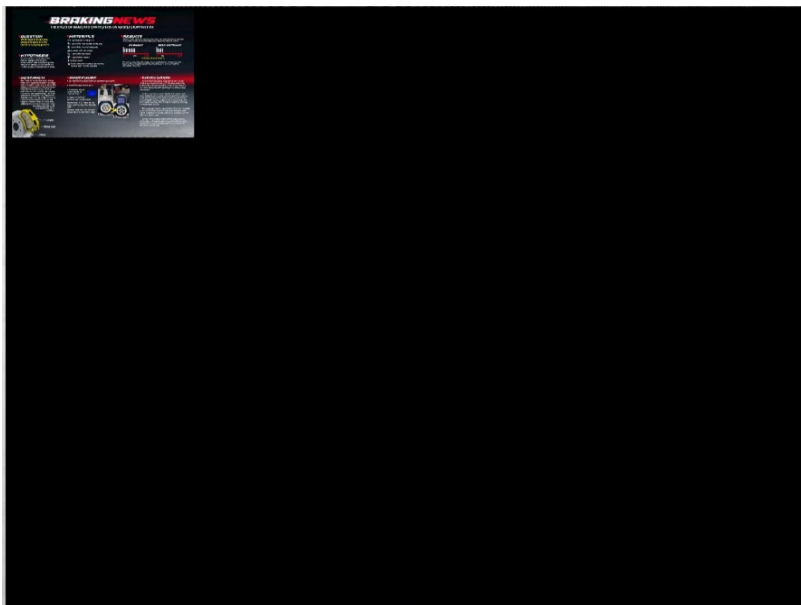
4. [Blubber: How Animals Stay Warm in Winter](#). [https://www.nature.com/scienceexplains/animals/animals-stay-warm-in-winter](#)

5. [Blubber: How Animals Stay Warm in Winter](#). [https://www.nature.com/scienceexplains/animals/animals-stay-warm-in-winter](#)

Photo Credit

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Virtual Display Board Template that has been created with incorrect dimensions:



Student Interview Guidelines

The student interview portion of judging is a pivotal part of the science fair experience. Students' ability to communicate what they did and why is just as important as the results and conclusions compiled. A panel of highly qualified judges will be assembled for each ASEF category. Students will be scheduled to meet at a specific time with a panel of judges for a 15 minute interview in a secured Zoom session. This session will be easily accessed directly from the Virtual Exhibit Hall. It is imperative that students work with their teachers to practice throughout the year using various functional tools of Zoom including screen sharing, chat box function, testing audio connections etc.