2021 Junior and Elementary Awards

Special Awards

Lemelson Early Inventor Prize

- Creating a promising solution to real-world problems
  - Winner receives $100

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- Creating a promising solution to real-world problems
  - Winner receives $100

- Elizabeth Wells
  - You've Got Mail!

U.S. Metric Association

- Outstanding use of the metric system

U.S. Metric Association

- Outstanding use of the metric system

- Matlyn Miller
  - Determining Impact Force on an Infant Head in a Collision

US Navy and Marine Corps

- Excellence in Science, Technology, Engineering and Math

FLINT REGIONAL SCIENCE & ENGINEERING FAIR

US Navy and Marine Corps

- Excellence in Science, Technology, Engineering and Math

  - Muhammad Adnan Najjar
    - Button Battery Burns: Examining Ingestion Injuries and Reducing the Rate and Severity of Damage
  - Mohamad Hashem Jafari
    - Make your Mask your Best Friend, Not your Worst Enemy!
  - Anna Hansen
    - School Bus Head Trauma in a Low Speed Collision
  - Matlyn Miller
    - Determining Impact Force on an Infant Head in a Collision
  - Hana Aftab
    - Efficacy of Various Mask Types in Blocking Microparticles.

FLINT REGIONAL SCIENCE & ENGINEERING FAIR

Genesee County Medical Society

- Excellence in Medical Studies
  - Winner receives plaque

Genesee County Medical Society

- Excellence in Medical Studies
  - Winner receives plaque

- Junior Division:
  - Zara Kanjwal
    - What is the Effect of Exercise on Sleep?

- Elementary Division:
  - Raneem Galal
    - Ouch, my tooth hurts!

Hurley Medical Center

- Excellence in Medical Studies
  - Winner receives a trophy

Hurley Medical Center

- Excellence in Medical Studies
  - Winner receives a trophy

- Junior Division:
  - Olivia Wagner
    - Circumvent the Vent: Using filters and hacking a BiPAP to circumvent a shortage of ventilators for a COVID-19 pandemic
- Elementary Division:
  - Hamza Ahmad
    - Which mask style is most effective?

Flint Regional Science and Engineering Fair

- Board of Directors Award for Excellence in STEM
  - $50 Award

Flint Regional Science and Engineering Fair

- Board of Directors Award for Excellence
  - $50 Award

- Cecelia Pastor
  - Flower and Food Dye

City of Flint – Mayor's Office

- Outstanding achievement in the Flint Science Fair
  - Winner receives certificate

Matthew Bauerle Mathematics Award

- Excellence in Mathematics
  - 1st Award: $25 Gift Card

Matthew Bauerle Mathematics Award

- Excellence in Mathematics
  - 1st Award: $25 Gift Card

- Olivia Wagner
  - Using filters and hacking a BiPAP, to circumvent a shortage of ventilators for a Covid pandemic

Michigan Association of Hazardous Material Professionals

- Excellence in Environmental Science and Engineering
  - Winners receives plaque, $100 Award

Michigan Association of Hazardous Material Professionals

- Excellence in Environmental Science and Engineering
  - Winners receives plaque, $100 Award

- Junior Division:
  - Mohamad Hashem Jafari
    - Make Your Mask Your Best Friend, Not Your Worst Enemy!!
- Elementary Division:
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FLINT REGIONAL SCIENCE & ENGINEERING FAIR

MIDHHS Explore Lab Science

- Creativity and exploration
  - Winners receive a medallion and certificate

MIDHHS Explore Lab Science

- Creativity and exploration
  - 3rd Award: Bronze medallion and certificate

- Junior Division:
  - Mohamad Hashem Jafari
    - Make Your Mask Your Best Friend, Not Your Worst Enemy!!
- Elementary Division:
  - Zara Kanjwal
    - What is the Effect of Exercise on Sleep?

MIDHHS Explore Lab Science

- Creativity and exploration
  - 2nd Award: Silver medallion and certificate

- Junior Division:
  - Matlyn Miller
    - Determining Impact Force on an Infant Head in a Collision
- Elementary Division:
  - Anna Hansen
    - School Bus Head Trauma in a Low Speed Collision

MIDHHS Explore Lab Science

- Creativity and exploration
  - 1st Award: Gold medallion and certificate

- Junior Division
  - Olivia Wagner
    - Circumvent the Vent, Using Filters and Hacking a BiPAP to circumvent a Shortage of Ventilators for a COVID pandemic
- Elementary Division:
  - Muhammad Adnan Najjar
    - Button Battery Burns: Examining Ingestion Injuries and Reducing the Rate and Severity of Damage

Ascension / Genesys

- **Excellence in Areas of Science**
  - Winners receive a certificate.

Ascension / Genesys - Behavioral & Social Science

- **Excellence in Behavioral & Social Science**
  - Winner receives a certificate.

- Mia Asraf
  - Multitasking

Ascension / Genesys - Microbiology

- **Excellence in Microbiology**
  - Winner receives a certificate.

- Helena Inga
  - How Does Temperature Affect Bacterial Growth?

Ascension / Genesys - Plant Science

- **Excellence in Plant Science**
  - Winner receives a certificate.

Ascension Genesys Hospital

- Nathaniel Tober
  - How Does Light Color Affect Plant Growth?

FLINT REGIONAL SCIENCE & ENGINEERING FAIR

Ascension / Genesys - Medicine & Health Sciences

- **Excellence in Medicine & Health Sciences**
- Winner receives a certificate.

- Michaela Witgen
  - Fungi vs. Preservatives

Ascension / Genesys - Cellular & Molecular Biology

- **Excellence in Cellular & Molecular Biology**
  - Winner receives a certificate.

- Harith Al-Harbi
  - Bacteria Be-Gone

Ascension / Genesys - Biochemistry

- **Excellence in Biochemistry**
  - Winner receives a certificate.

- Akhilesh Kanmanthreddy
  - Fantastic bioplastic : testing the efficiency of a hand crafted bioplastic in landfill and subtorial ocean conditions

FLINT REGIONAL SCIENCE & ENGINEERING FAIR

Ascension / Genesys - Chemistry

- **Excellence in Chemistry**
  - Winner receives a certificate.

- Amaya Shahzad
  - What is enzymatic browning and how can it be slowed down?

Ascension / Genesys - Earth & Planetary Science

- **Excellence in Earth & Planetary Science**
  - Winner receives a certificate.

- Gabriella Peel
  - Fire Up The Grill!!!

Ascension / Genesys - Environmental Management

- **Excellence in Environmental Management**
  - Winner receives a certificate.

- Laney Wolschleger
  - Bridge Safety: Which Bridge is Best

McLaren Health

- **Outstanding Achievement in Science**
  - Winners receive a certificate.

McLaren Health - Behavioral and Social Science

- **Outstanding Achievement in Behavioral and Social Science**
  - Winner receives a certificate.

- Mohamad Hashem Jafari
  - Make your Mask your Best Friend, Not your Worst Enemy!

McLaren Health - Microbiology

- **Outstanding Achievement in Microbiology**
  - Winner receives a certificate.

- Sivani Mamillapalli
  - Double vs. Triple Antibiotic Ointment

McLaren Health - Plant Sciences

- **Outstanding Achievement in Plant Sciences**
  - Winner receives a certificate.

- Logan Bowles
  - Plant growth from fertilizers

McLaren Health - Medicine & Health Sciences

- **Outstanding Achievement in Medicine & Health Sciences**
  - Winner receives a certificate.

- Hana Aftab
  - Efficacy of Various Mask Types in Blocking Microparticles.

McLaren Health - Cellular & Molecular Biology

- **Outstanding Achievement in Cellular & Molecular Biology**
  - Winner receives a certificate.

- Cole Burke
  - Bacteria vs Wipes

McLaren Health - Biochemistry

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  - Fantastic bioplastic : testing the efficiency of a hand crafted bioplastic in landfill and subtorial ocean conditions

McLaren Health - Earth & Planetary Science

- **Outstanding Achievement in Earth & Planetary Science**
  - Winner receives a certificate.

- Gabriella Peel
  - Fire Up The Grill!!!

Gupta Family Foundation

- Excellence in STEM

- 1st Award: $150
- 2nd Awards: $100

Gupta Family Foundation

- Excellence in STEM

- 1st Award: $150
  - Erik Moffitt

- 2nd Awards: $100
  - Zeya Holden
  - Sam Kless

Erik Jones Racing

- Prize Pack
  - Signed shirt and diecast car
  - Hat and ticket holder

- Quinn McCrocklin

Educator of the Year

- Student Nominated
- $250 Prize

Educator of the Year

- Kirk Hansen
  - Davison Middle School

- April Keefover
  - Genesee Academy

Elementary Awards

6th Award

- $200 Cash

6th Award

- $200 Cash

- Ola Abdalla
- Zakariyya Ahmed
- Ismail Fofana
- Adam Shah

5th Award

- $300 Cash

5th Award

- $300 Cash

- Hamza Ahmad
- Femi Almaroof
- Basil Ibrahim
- Faris Zineddin

4th Award

- $350 Cash

4th Award

- $350 Cash

- Jude Aboudan
- Alexander Ostrander
- Abdul Waleed

3rd Award

- $400 Cash

3rd Award

- $400 Cash

- Abigail Hansen
  - Here Comes the Sun. It's Not Alright

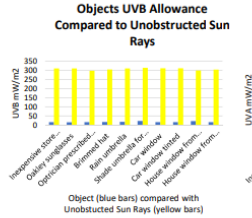
Here Comes the Sun…It's NOT Alright

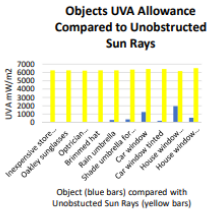
EL-PSE-112, PSE, Junior

Research Question:

I want to understand what the best objects are for providing protection. Will wearing a hat or staying in the shade protect my eyes as well as wearing sunglasses? What everyday common object protects your eyes best from the sun's harmful rays?

Data Analysis & Results





Methodology:

- First we selected objects to test - several types of sunglasses, car and house windows, umbrellas, and a hat.
- Created data chart for date, time, UVA, & UVB for each object.
- Positioned the sensor pointed at the sun to see how well the objects block the sun's rays.
- We took data for the sun with no obstructions as our control group.
- Recorded data with Vernier UVA & UVB sensors with Logger Pro on the laptop computer.
- Recorded the date, time, and data on the printed charts for each test day

Interpretation & Conclusion

The data shows that sunglasses perform the best for blocking both UVA & UVB rays. Also, the data shows that the inexpensive store bought sunglasses performed as well as the expensive prescription sunglasses for blocking UVA rays and better for UVB rays.

As expected, low e house windows provide much more protection from the sun than regular glass windows. Tinted car windows preformed much better for UVA protection than regular car windows. Surprisingly, the data shows the untinted car windows blocked about the same amount of UVB rays as the tinted windows.

There were several sources of possible errors in the data I collected. I may not have held the sensor at the exact same angle for each measurement. We may not have waited long enough for the sensor to settle into the best reading before recording the data. Clouds kept us from getting a few measurements on our test days so some of our objects had fewer data points to average.

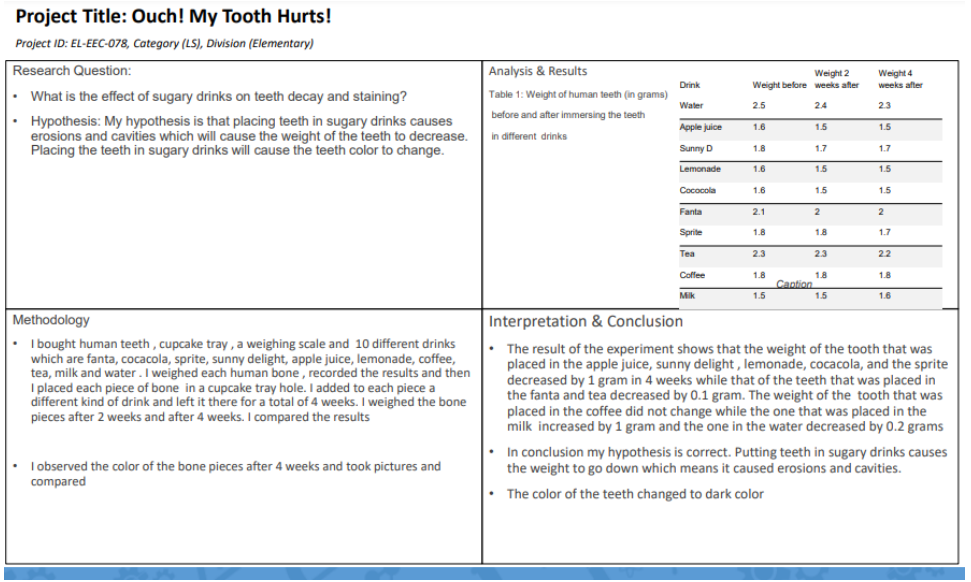
2nd Award

- $500 Cash

2nd Award

- $500 Cash

- Raneem Galal
  - Ouch, my tooth hurts!



Project Title: Ouch! My Tooth Hurts!

Project ID: EL-EEC-078, Category (LS), Division (Elementary)

Research Question:

- What is the effect of sugary drinks on teeth decay and staining?
- Hypothesis: My hypothesis is that placing teeth in sugary drinks causes erosions and cavities which will cause the weight of the teeth to decrease. Placing the teeth in sugary drinks will cause the teeth color to change.

Analysis & Results

Table 1: Weight of human teeth (in grams) before and after immersing the teeth in different drinks

Drink	Weight before	Weight 2 weeks after	Weight 4 weeks after
Water	2.5	2.4	2.3
Apple juice	1.6	1.5	1.5
Sunny D	1.8	1.7	1.7
Lemonade	1.6	1.5	1.5
Cocoola	1.6	1.5	1.5
Fanta	2.1	2	2
Sprite	1.8	1.8	1.7
Tea	2.3	2.3	2.2
Coffee	1.8	1.8	1.8
Milk	1.5	1.5	1.6

Caption

Methodology

- I bought human teeth , cupcake tray , a weighing scale and 10 different drinks which are fanta, cocacola, sprite, sunny delight, apple juice, lemonade, coffee, tea, milk and water . I weighed each human bone , recorded the results and then I placed each piece of bone in a cupcake tray hole. I added to each piece a different kind of drink and left it there for a total of 4 weeks. I weighed the bone pieces after 2 weeks and after 4 weeks. I compared the results
- I observed the color of the bone pieces after 4 weeks and took pictures and compared

Interpretation & Conclusion

- The result of the experiment shows that the weight of the tooth that was placed in the apple juice, sunny delight , lemonade, cocacola, and the sprite decreased by 1 gram in 4 weeks while that of the teeth that was placed in the fanta and tea decreased by 0.1 gram. The weight of the tooth that was placed in the coffee did not change while the one that was placed in the milk increased by 1 gram and the one in the water decreased by 0.2 grams
- In conclusion my hypothesis is correct. Putting teeth in sugary drinks causes the weight to go down which means it caused erosions and cavities.
- The color of the teeth changed to dark color

1st Award

- $550 Cash
- Certificate from the Mayor of Flint

1st Award

- $550 Cash
- Certificate from the Mayor of Flint

- Benjamin Wells
  - Some Like It Hot, Some Like It Cold: An Off-Grid Pool Heating System Using Solar Technology

Some Like It Hot, Some Like It Cold

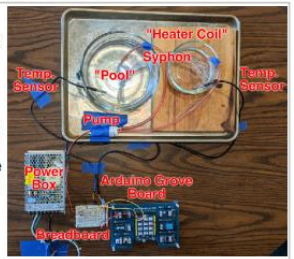
EL-PSE-104, PSE, Elementary Division

Engineering Problem & Objectives

- People with cold urticaria need a warm pool or else they swell and get sick. My sister has cold urticaria, and I would like to help her spend more time in the pool with us. I would like to do this using cheap, renewable energy.
- I am making a pool heater that will passively heat water using a solar collector made out of black irrigation pipe. The pump system is controlled by an Arduino micro controller. The pump system is powered by SLA batteries charged with a solar panel.

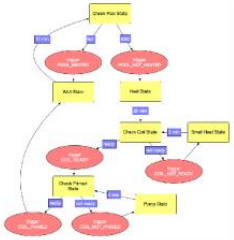
Results

- The prototype on the left will demonstrate what our final build will do.
- We used a syphon in the prototype, in our final build we will use a closed system and will not need a syphon.



Project Design

- We used a Finite State Machine (FSM) to run the motor, check the sensors, and give the user feedback
- We used the Arduino from the FRSEF sensors class to control the system.
- We put together existing programing libraries to make our code



Conclusion

- A Finite State Machines (FSM) helps the coding process become easier
- You have to be careful when you are connecting wires because they can shock you, damage your board, or start a fire
- You sometimes have to check the libraries you use for BUGS
- I made a working prototype in the kitchen (as shown above); a final build will occur when the weather permits.

Junior Awards

Honorable Mention

Honorable Mention

- Jinan Ahmed
- Mia Asraf
- Cooper Austin
- Arianna Bolin
- Addison Calvert
- Braelynn Camp
- Caleb Cottongim
- Zoe Darnton
- Madison Dunk
- Logan Foster
- Carson Garner
- Abdulhadi Hammami
- Lauren Hennagir
- Andrew Hilal
- Zeyland Holden
- Helena Inga
- Hamzah Jondy
- Sam Kless
- Haydn Kotowski
- Jake Layman
- Maxwell Loxton
- Avery Marble
- Vaughn Murphy
- Julia Porcek
- Mikey Roof
- Rylan Ross
- Amelia Schlegelmilch
- Nathaniel Shannon
- Ibrahim Toure
- Ronald Traver
- Nathan Trempe
- Owen Walker
- Daniel Watts
- Jadon Woznek
- Grant Young

FLINT REGIONAL SCIENCE & ENGINEERING FAIR

Research Fellow

Research Fellow

- Mustafa Akhtar
- Alharith Al-Harbi
- Leena Almansour
- Betool Alouh
- Kaya Arnold
- Lucas Byrd
- Natalie Church
- Jordan Gaiter
- Ryan Garrett
- Finley Garrett
- Samantha Hartline
- Ryan Hayes
- Zeya Holden
- Cole Houser
- Bryce Johns
- Zara Kanjwal
- Ethan Kulhanek
- Quinn McCrocklin
- Cyril McInerney
- Erik Moffitt
- Ciara Moore
- Paris Ngo
- Cecilia Pastor
- Anna Petrach
- Breeann Powell
- Diya Ramakrishnan
- Connor Rose
- Alejandro Sarmiento-Miller
- Quinn Sitko
- Rewa Tarakji
- Leiana Trumble
- Elizabeth Wells
- Kelsey Whalen
- Laney Wolschleger

FLINT REGIONAL SCIENCE & ENGINEERING FAIR

6th Award

- $250 Cash

6th Award – Earth / Environment / Chemistry

- $250 Cash

- Brandon Bishop
- Jayden Dixon
- Mariam Nounou
- Gabriella O’Toole
- Kya Proctor
- James Spiot
- Luke Tedrick

6th Award – Life Sciences

- $250 Cash

- Hana Aftab
- Cole Burke
- Miriam Haddad
- Brooklyn Hughson
- Dylan Richardson
- Pranav Sitlani
- Peyton Smuzeski

6th Award – Physical Sciences / Engineering

- $250 Cash

- Justin Argue
- Tyler Glasco
- Thomas Hoffa
- Bryce Hunsinger
- Xavier Laffoon
- Arjya Misra
- Josie Rogers

5th Award

- $350 Cash

5th Award

- $350 Cash

- **Earth / Environment / Chemistry**
  - Manuel Mireles
  - Gabriella Peel
- **Life Sciences**
  - Race Eckles
  - Saiyan Tabrej
- **Physical Sciences / Engineering**
  - Anna Hansen
  - Jenna Woolman

4th Award

- $400 Cash

4th Award

- $400 Cash

- **Earth / Environment / Chemistry**

- Nasir Ali
- Ayaan Cheema

- **Life Sciences**

- Sivani Mamillapalli
- Isabella Monk

- **Physical Sciences / Engineering**

- Matlyn Miller
- Jeff Soukhojak

3rd Award

- $575 Cash

3rd Award

- $575 Cash

- **Earth / Environment / Chemistry**
- Maximus Harwell

- **Life Sciences**
- Michaela Witgen

- **Physical Sciences / Engineering**
- Akhilesh Kanmanthreddy

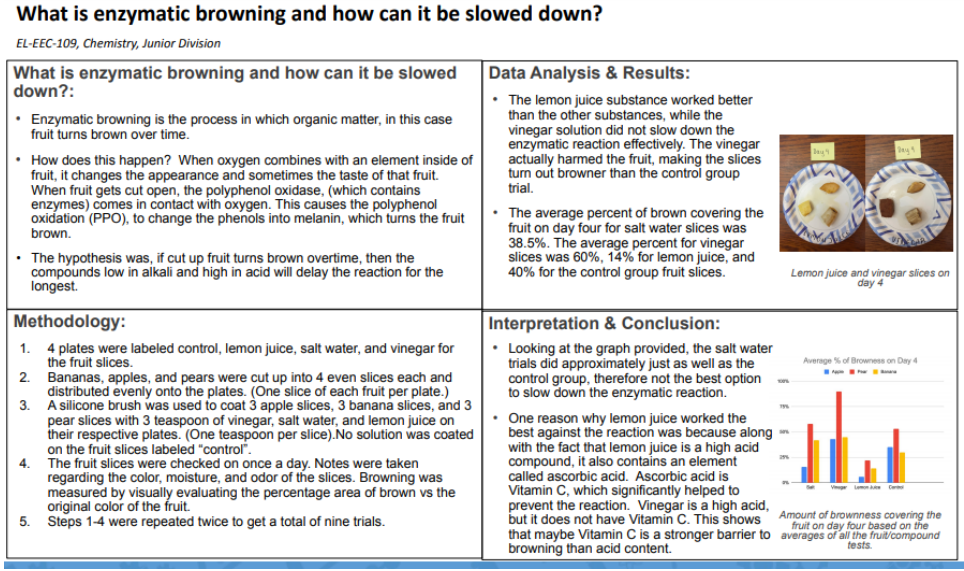
2nd Award

- $800
  - $500 Cash
  - $300 Scholarship

2nd Award – Earth / Environment / Chemistry

- $800
  - $500 Cash
  - $300 Scholarship

- Amaya Shahzad
  - What is enzymatic browning and how can it be slowed down?



What is enzymatic browning and how can it be slowed down?

EL-EEC-109, Chemistry, Junior Division

What is enzymatic browning and how can it be slowed down?:

- Enzymatic browning is the process in which organic matter, in this case fruit turns brown over time.
- How does this happen? When oxygen combines with an element inside of fruit, it changes the appearance and sometimes the taste of that fruit. When fruit gets cut open, the polyphenol oxidase, (which contains enzymes) comes in contact with oxygen. This causes the polyphenol oxidation (PPO), to change the phenols into melanin, which turns the fruit brown.
- The hypothesis was, if cut up fruit turns brown overtime, then the compounds low in alkali and high in acid will delay the reaction for the longest.

Methodology:

1. 4 plates were labeled control, lemon juice, salt water, and vinegar for the fruit slices.
2. Bananas, apples, and pears were cut up into 4 even slices each and distributed evenly onto the plates. (One slice of each fruit per plate.)
3. A silicone brush was used to coat 3 apple slices, 3 banana slices, and 3 pear slices with 3 teaspoon of vinegar, salt water, and lemon juice on their respective plates. (One teaspoon per slice).No solution was coated on the fruit slices labeled "control".
4. The fruit slices were checked on once a day. Notes were taken regarding the color, moisture, and odor of the slices. Browning was measured by visually evaluating the percentage area of brown vs the original color of the fruit.
5. Steps 1-4 were repeated twice to get a total of nine trials.

Data Analysis & Results:

- The lemon juice substance worked better than the other substances, while the vinegar solution did not slow down the enzymatic reaction effectively. The vinegar actually harmed the fruit, making the slices turn out browner than the control group trial.
- The average percent of brown covering the fruit on day four for salt water slices was 38.5%. The average percent for vinegar slices was 60%, 14% for lemon juice, and 40% for the control group fruit slices.

Lemon juice and vinegar slices on day 4

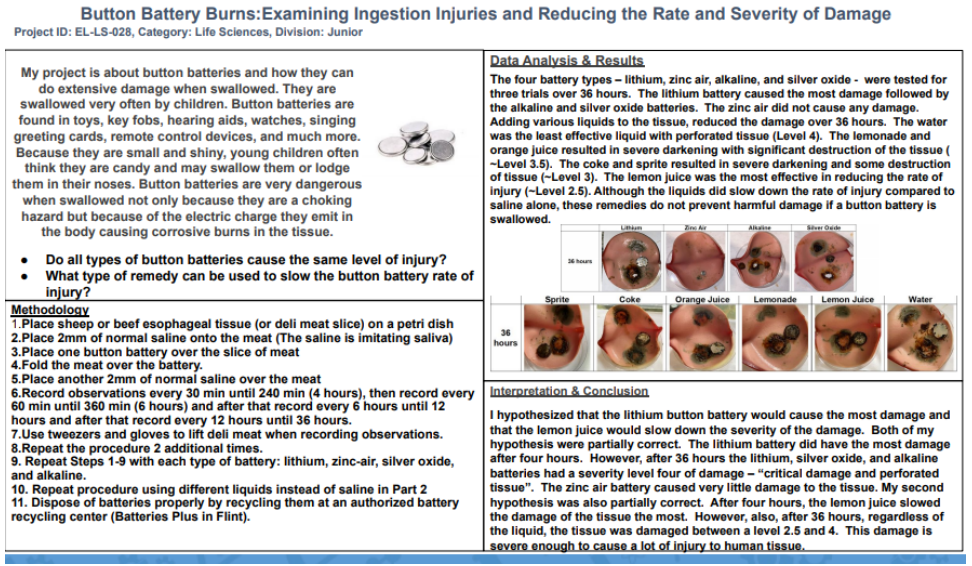
Interpretation & Conclusion:

- Looking at the graph provided, the salt water trials did approximately just as well as the control group, therefore not the best option to slow down the enzymatic reaction.
- One reason why lemon juice worked the best against the reaction was because along with the fact that lemon juice is a high acid compound, it also contains an element called ascorbic acid. Ascorbic acid is Vitamin C, which significantly helped to prevent the reaction. Vinegar is a high acid, but it does not have Vitamin C. This shows that maybe Vitamin C is a stronger barrier to browning than acid content.

Amount of brownness covering the fruit on day four based on the averages of all the fruit/compound tests.

2nd Award – Life Sciences

- $800
  - $500 Cash
  - $300 Scholarship



Button Battery Burns:Examining Ingestion Injuries and Reducing the Rate and Severity of Damage

Project ID: EL-LS-028, Category: Life Sciences, Division: Junior

My project is about button batteries and how they can do extensive damage when swallowed. They are swallowed very often by children. Button batteries are found in toys, key fobs, hearing aids, watches, singing greeting cards, remote control devices, and much more. Because they are small and shiny, young children often think they are candy and may swallow them or lodge them in their noses. Button batteries are very dangerous when swallowed not only because they are a choking hazard but because of the electric charge they emit in the body causing corrosive burns in the tissue.

- Do all types of button batteries cause the same level of injury?
- What type of remedy can be used to slow the button battery rate of injury?

Methodology

1.Place sheep or beef esophageal tissue (or deli meat slice) on a petri dish
2.Place 2mm of normal saline onto the meat (The saline is imitating saliva)
3.Place one button battery over the slice of meat
4.Fold the meat over the battery.
5.Place another 2mm of normal saline over the meat
6.Record observations every 30 min until 240 min (4 hours), then record every 60 min until 360 min (6 hours) and after that record every 6 hours until 12 hours and after that record every 12 hours until 36 hours.
7.Use tweezers and gloves to lift deli meat when recording observations.
8.Repeat the procedure 2 additional times.
9. Repeat Steps 1-9 with each type of battery: lithium, zinc-air, silver oxide, and alkaline.
10. Repeat procedure using different liquids instead of saline in Part 2
11. Dispose of batteries properly by recycling them at an authorized battery recycling center (Batteries Plus in Flint).

Data Analysis & Results

The four battery types – lithium, zinc air, alkaline, and silver oxide - were tested for three trials over 36 hours. The lithium battery caused the most damage followed by the alkaline and silver oxide batteries. The zinc air did not cause any damage. Adding various liquids to the tissue, reduced the damage over 36 hours. The water was the least effective liquid with perforated tissue (Level 4). The lemonade and orange juice resulted in severe darkening with significant destruction of the tissue (~Level 3.5). The coke and sprite resulted in severe darkening and some destruction of tissue (~Level 3). The lemon juice was the most effective in reducing the rate of injury (~Level 2.5). Although the liquids did slow down the rate of injury compared to saline alone, these remedies do not prevent harmful damage if a button battery is swallowed.

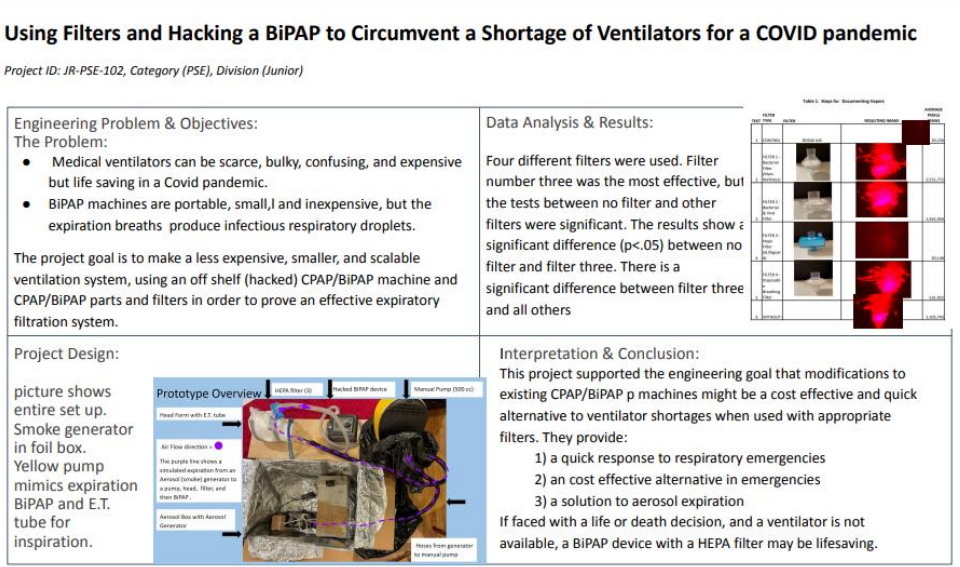
Interpretation & Conclusion

I hypothesized that the lithium button battery would cause the most damage and that the lemon juice would slow down the severity of the damage. Both of my hypothesis were partially correct. The lithium battery did have the most damage after four hours. However, after 36 hours the lithium, silver oxide, and alkaline batteries had a severity level four of damage – "critical damage and perforated tissue". The zinc air battery caused very little damage to the tissue. My second hypothesis was also partially correct. After four hours, the lemon juice slowed the damage of the tissue the most. However, also, after 36 hours, regardless of the liquid, the tissue was damaged between a level 2.5 and 4. This damage is severe enough to cause a lot of injury to human tissue.

- Muhammad Adnan Najjar
  - Button Battery Burns: Examining Ingestion Injuries and Reducing the Rate and Severity of Damage

2nd Award – Physical Sciences / Engineering

- $800
  - $500 Cash
  - $300 Scholarship



Using Filters and Hacking a BiPAP to Circumvent a Shortage of Ventilators for a COVID pandemic

Project ID: JR-PSE-102, Category (PSE), Division (Junior)

Engineering Problem & Objectives:
The Problem:

- Medical ventilators can be scarce, bulky, confusing, and expensive but life saving in a Covid pandemic.
- BiPAP machines are portable, small,l and inexpensive, but the expiration breaths produce infectious respiratory droplets.

The project goal is to make a less expensive, smaller, and scalable ventilation system, using an off shelf (hacked) CPAP/BiPAP machine and CPAP/BiPAP parts and filters in order to prove an effective expiratory filtration system.

Data Analysis & Results:

Four different filters were used. Filter number three was the most effective, but the tests between no filter and other filters were significant. The results show a significant difference ($p<.05$) between no filter and filter three. There is a significant difference between filter three and all others

Project Design:

picture shows entire set up. Smoke generator in foil box. Yellow pump mimics expiration BiPAP and E.T. tube for inspiration.

Prototype Overview

Interpretation & Conclusion:

This project supported the engineering goal that modifications to existing CPAP/BiPAP p machines might be a cost effective and quick alternative to ventilator shortages when used with appropriate filters. They provide:

1) a quick response to respiratory emergencies
2) an cost effective alternative in emergencies
3) a solution to aerosol expiration

If faced with a life or death decision, and a ventilator is not available, a BiPAP device with a HEPA filter may be lifesaving.

- Olivia Wagner
  - Using filters and hacking a BiPAP, to circumvent a shortage of ventilators for a Covid pandemic

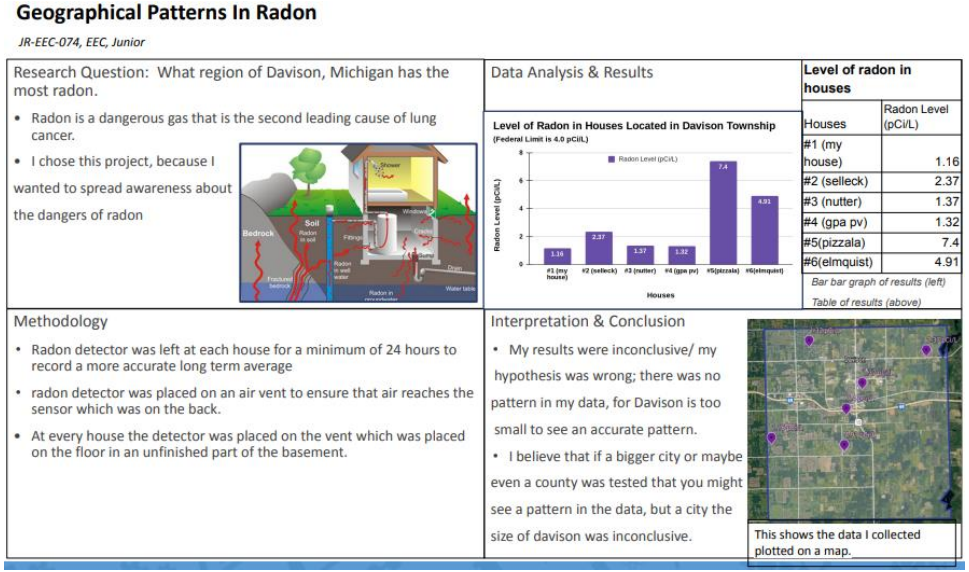
FLINT REGIONAL SCIENCE & ENGINEERING FAIR

1st Award

- $1000
  - $500 Cash
  - $500 Scholarship
- Certificate from the Mayor of Flint

1st Award – Earth / Enivronment / Chemistry

- $1000
  - $500 Cash
  - $500 Scholarship
- Certificate from the Mayor of Flint



Geographical Patterns In Radon

JR-EEC-074, EEC, Junior

Research Question: What region of Davison, Michigan has the most radon.

- Radon is a dangerous gas that is the second leading cause of lung cancer.
- I chose this project, because I wanted to spread awareness about the dangers of radon

Data Analysis & Results

Level of Radon in Houses Located in Davison Township
(Federal Limit is 4.0 pCi/L)

Level of radon in houses	
Houses	Radon Level (pCi/L)
#1 (my house)	1.16
#2 (selleck)	2.37
#3 (nutter)	1.37
#4 (gpa pv)	1.32
#5(pizzala)	7.4
#6(elmquist)	4.91

Bar bar graph of results (left)
Table of results (above)

Methodology

- Radon detector was left at each house for a minimum of 24 hours to record a more accurate long term average
- radon detector was placed on an air vent to ensure that air reaches the sensor which was on the back.
- At every house the detector was placed on the vent which was placed on the floor in an unfinished part of the basement.

Interpretation & Conclusion

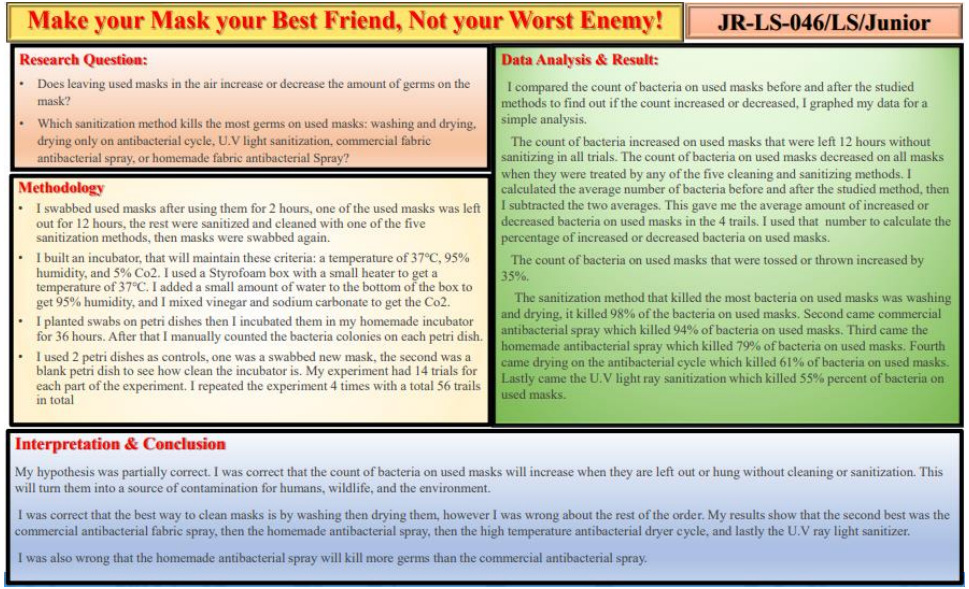
- My results were inconclusive/ my hypothesis was wrong; there was no pattern in my data, for Davison is too small to see an accurate pattern.
- I believe that if a bigger city or maybe even a county was tested that you might see a pattern in the data, but a city the size of davison was inconclusive.

This shows the data I collected plotted on a map.

- Jaelyn Peavyhouse
  - Geographical Patterns In Radon

1st Award – Life Sciences

- $1000
  - $500 Cash
  - $500 Scholarship
- Certificate from the Mayor of Flint



Make your Mask your Best Friend, Not your Worst Enemy! | **JR-LS-046/LS/Junior**

Research Question:

- Does leaving used masks in the air increase or decrease the amount of germs on the mask?
- Which sanitization method kills the most germs on used masks: washing and drying, drying only on antibacterial cycle, U.V light sanitization, commercial fabric antibacterial spray, or homemade fabric antibacterial Spray?

Methodology

- I swabbed used masks after using them for 2 hours, one of the used masks was left out for 12 hours, the rest were sanitized and cleaned with one of the five sanitization methods, then masks were swabbed again.
- I built an incubator, that will maintain these criteria: a temperature of 37°C, 95% humidity, and 5% Co2. I used a Styrofoam box with a small heater to get a temperature of 37°C. I added a small amount of water to the bottom of the box to get 95% humidity, and I mixed vinegar and sodium carbonate to get the Co2.
- I planted swabs on petri dishes then I incubated them in my homemade incubator for 36 hours. After that I manually counted the bacteria colonies on each petri dish.
- I used 2 petri dishes as controls, one was a swabbed new mask, the second was a blank petri dish to see how clean the incubator is. My experiment had 14 trials for each part of the experiment. I repeated the experiment 4 times with a total 56 trails in total

Data Analysis & Result:

I compared the count of bacteria on used masks before and after the studied methods to find out if the count increased or decreased, I graphed my data for a simple analysis.

The count of bacteria increased on used masks that were left 12 hours without sanitizing in all trials. The count of bacteria on used masks decreased on all masks when they were treated by any of the five cleaning and sanitizing methods. I calculated the average number of bacteria before and after the studied method, then I subtracted the two averages. This gave me the average amount of increased or decreased bacteria on used masks in the 4 trails. I used that number to calculate the percentage of increased or decreased bacteria on used masks.

The count of bacteria on used masks that were tossed or thrown increased by 35%.

The sanitization method that killed the most bacteria on used masks was washing and drying, it killed 98% of the bacteria on used masks. Second came commercial antibacterial spray which killed 94% of bacteria on used masks. Third came the homemade antibacterial spray which killed 79% of bacteria on used masks. Fourth came drying on the antibacterial cycle which killed 61% of bacteria on used masks. Lastly came the U.V light ray sanitization which killed 55% percent of bacteria on used masks.

Interpretation & Conclusion

My hypothesis was partially correct. I was correct that the count of bacteria on used masks will increase when they are left out or hung without cleaning or sanitization. This will turn them into a source of contamination for humans, wildlife, and the environment.

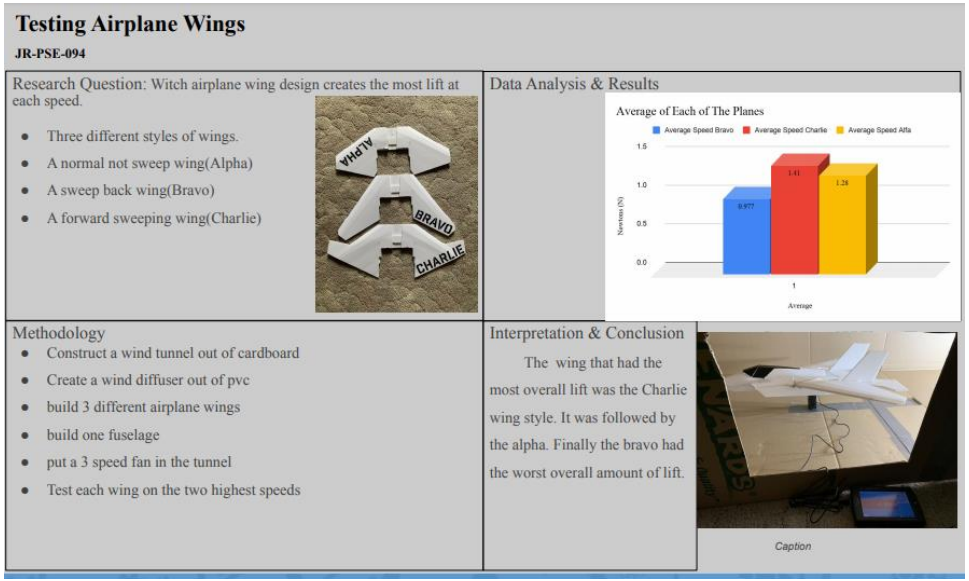
I was correct that the best way to clean masks is by washing then drying them, however I was wrong about the rest of the order. My results show that the second best was the commercial antibacterial fabric spray, then the homemade antibacterial spray, then the high temperature antibacterial dryer cycle, and lastly the U.V ray light sanitizer.

I was also wrong that the homemade antibacterial spray will kill more germs than the commercial antibacterial spray.

- Mohamad Hashem Jafari
  - Make Your Mask Your Best Friend, Not Your Worst Enemy!!

1st Award – Physical Sciences / Engineering

- $1000
  - $500 Cash
  - $500 Scholarship
- Certificate from the Mayor of Flint



Testing Airplane Wings

JR-PSE-094

Research Question: Witch airplane wing design creates the most lift at each speed.

- Three different styles of wings.
- A normal not sweep wing(Alpha)
- A sweep back wing(Bravo)
- A forward sweeping wing(Charlie)

Data Analysis & Results

Methodology

- Construct a wind tunnel out of cardboard
- Create a wind diffuser out of pvc
- build 3 different airplane wings
- build one fuselage
- put a 3 speed fan in the tunnel
- Test each wing on the two highest speeds

Interpretation & Conclusion

The wing that had the most overall lift was the Charlie wing style. It was followed by the alpha. Finally the bravo had the worst overall amount of lift.

Caption

- Blaise Maliskey
  - Testing Airplane Wings

Broadcom MASTERS

- Premier science competition for middle schoolers in the world
  - Operated by Society for Science (same as ISEF)
  - Top 10% of students at the FRSEF
  - 300 semi-finalists across the United States
  - 30 finalists compete in Washington D.C.

- Online registration
  - You will receive more information in the coming days
  - FRSEF has had many semi-finalists and finalists

Broadcom MASTERS

- Nasir Ali
- Ayaan Cheema
- Race Eckles
- Anna Hansen
- Maximus Harwell
- Mohamad Hashem Jafari
- Akhilesh Kanmathreddy
- Blaise Maliskey
- Sivani Mamilapalli
- Matlyn Miller
- Manuel Mireles
- Isabella Monk
- Muhammad Adnan Najjar
- Jaelyn Peavyhouse
- Amaya Shahzad
- Jeff Soukhojak
- Olivia Wagner
- Michaela Witgen

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