

# ANNUAL REPORT



# 2023

BAY AREA SCIENCE AND ENGINEERING FAIR

sponsored by:

Primary Fluid Systems Inc.



**Big ideas ...  
Infinite possibilities**

**Bay Area Science and  
Engineering Fair**

c/o  
143 Hyde Park Ave.,  
Hamilton ON,  
L8P 4M8

basef@basef.ca  
<https://www.basef.ca/>

Registered Charity #  
11895 1565 RR0001

## **Land Acknowledgement:**

The Bay Area Science & Engineering Fair (BASEF) acknowledges its presence on the traditional territories of the Mississauga and Haudenosaunee nations, and within the lands protected by the “Dish with One Spoon” wampum agreement.

The catchment area of BASEF is home to many Indigenous Peoples from across Turtle Island. We respect the longstanding relationships with local Indigenous communities, the Mississaugas of the Credit First Nation and the Six Nations of the Grand River. BASEF recognizes that we must do more to learn about the rich history of this land so that we can better understand our roles as residents, neighbours, partners and caretakers. For more information, visit [www.native-land.ca](http://www.native-land.ca).

## **OUR MISSION:**

BASEF inspires young people to positively impact the world through science, technology, engineering and mathematics. BASEF provides opportunities for students to showcase their innovations and discoveries.

Student images provided by BASEF.

Cover image and page side images provided by:  
<https://pixabay.com/>

**BASEF 2023 Annual Report**

# A Challenging Year

This year, the Bay Area Science and Engineering Fair (BASEF) celebrated its 63rd year. Since 1961, the fair has provided a platform for tens of thousands of students in grades 7 – 12 to showcase their passion for science, technology, engineering, and mathematics, with opportunities to progress to national and international competitions. Many BASEF alumni have moved on to become world-class researchers, doctors, engineers, and successful business owners in their pursuits of excellence!

We were pleased to be able to return to an in-person event after three years of a virtual fair. We had 283 students representing 222 projects competing. We were thrilled to see so many students come together to share their love of science and showcase their projects. We would further like to acknowledge that for many of the participants this was their first time competing in-person and experiencing a competition of this scope. Going forward, we look forward to the development of this new wave of students as they continue through their science fair journey.

Students, parents, teachers, committee members, volunteers, judges, and of course our sponsors and benefactors all contribute to the wonder that is BASEF, and we are thankful to each and everyone involved for their support. Year after year, you are helping to inspire young people to positively impact the world through science.

I would also like to send a special thank you to Mohawk College for their support over the years and hosting the 2023 fair. Next year we will be moving the location of the fair to Hillfield Strathallan College and we look forward to welcoming students to this new venue.

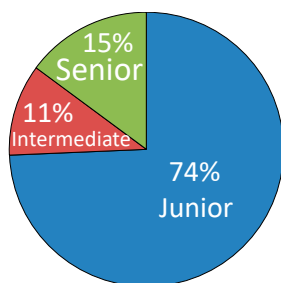
2023 BASEF Co-Chairs

Dana Bee & David Reed

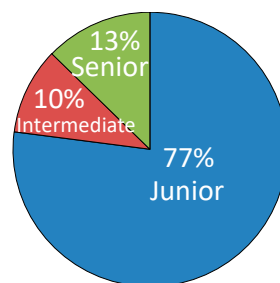
# Results

## 2023 Participation

**222 projects**



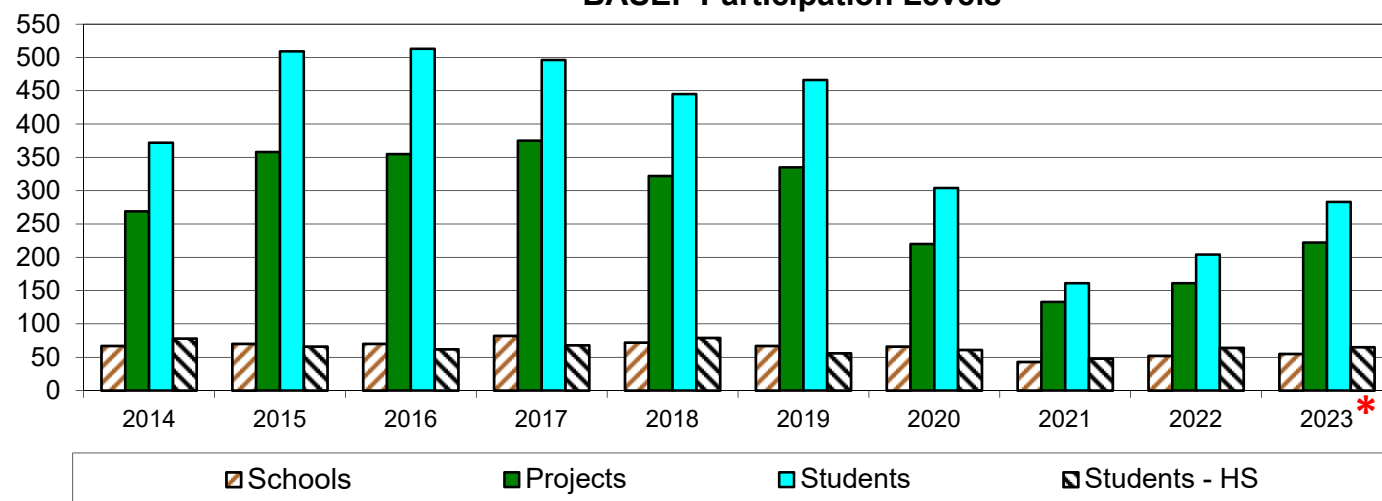
**283 students**



**55 schools from  
6 school Boards**

French Public  
Grand Erie Public  
Halton Catholic  
Halton Public  
Hamilton-Wentworth  
Hamilton-Wentworth Catholic  
and several Independent/Private Schools

### BASEF Participation Levels



\* The pandemic continued to have a negative affect on fair participation due to the lack of school and board fairs. However, there was a noticeable improvement in participation levels compared to previous years.

**BASEF 2023 Annual Report**



# Best In Fair Pinnacle Awards

FIRST - **Anthony Saturnino**  
Primary Fluid Systems Pinnacle Best in Fair

*"Pothole Patrol: An Innovative Robotic Solution for Road Maintenance Using Sustainable Materials"*  
Bishop Ryan Secondary School, Hamilton

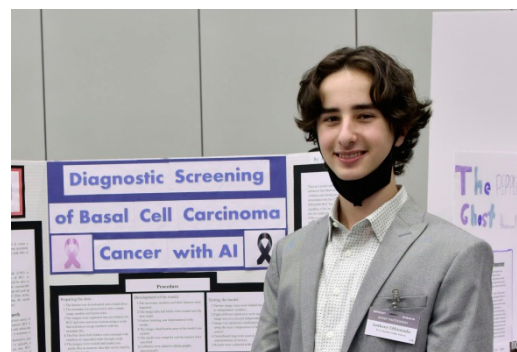


SECOND - **Isra Bashir**  
Primary Fluid Systems Pinnacle Second Best in Fair

*"Sugar High! – Integrating glucose and ketone testing in a novel design to improve prevention of DKA"*  
Westdale Secondary School, Hamilton

THIRD - **Anthony Efthimiadis**  
Primary Fluid Systems Pinnacle Third Best in Fair

*"Development of an AI Convolutional Neural Network for Diagnostic Screening of Basal Cell Carcinoma"*  
W. H. Morden Public School, Oakville



**BASEF 2023 Annual Report**

# Awards: Merit and Special

## Merit Awards

Presented by ArcelorMittal Dofasco G.P.

Merit awards recognize the tremendous amount of thought and effort that has gone into the projects entered into BASEF. They are a result of an extensive judging process undertaken by over 150 volunteer merit judges who have come from educational institutions, local governments, business and industry in our regions.



All participants in BASEF were eligible to win Merit Awards. Each merit award winner received a cash prize and a \$1,000 entrance scholarship that may be used toward first year tuition at either Mohawk College or Sheridan College.

Merit awards were earned by 120 students; a total of \$7,120 in cash and \$120,000 in scholarships:

Gold – 10 projects by 11 students

Silver – 33 projects by 37 students

Bronze – 58 projects by 72 students

## Special Awards

Special Awards are donated by families, individuals, companies, organizations and groups to recognize deserving projects that deal with topics of interest to the donor.

51 Special Award donors provided 150 special awards

\$28,170 in prize money

Scholarships worth \$14,500

## Total awards given out in excess of \$170,000

# International Fair Team

As an affiliated fair, BASEF may send up to five high school projects to the Regeneron International Science and Engineering Fair (ISEF).



Bashir, Isra  
Westdale Secondary  
School, HWDSB

*"Sugar High! – Integrating glucose and ketone testing in a novel design to improve prevention of DKA"*

Li, Zixuan  
Ridley College,  
Independent

*"Bionic Squid-Inspired Robot Facilitating Underwater Monitorization and Preservation of Coral Reefs"*

4<sup>th</sup> in Category–Robotics and Intelligent Machines

Pacifici, Nicholas  
St. Mary Secondary School,  
HWCD

*"The COVID Cardiac Connection: A Novel Pre-participation Screening Tool"*

Saturnino, Anthony  
Bishop Ryan Secondary  
School, HWCD

*"Pothole Patrol: An Innovative Robotic Solution for Road Maintenance Using Sustainable Materials"*

International Council on Systems Engineering (INCOSE) Honorable Mention

# National Fair Team



Thanks to the generous support of its sponsors, each year BASEF selects students to represent our region at the Canada-Wide Science and Engineering Fair.

|   |  |
|---|--|
| Aahaan Maini<br>Oakville Trafalgar High School, HDSB      | <i>"Circulate: Designing an Algorithmic Blood Distribution System to Tackle the Independentian Blood Shortage"</i><br>Silver<br>(1)Grand Award -Youth Can Innovate Award (\$7,000+ \$1,000),<br>(2)Digital Moment Innovation Award (\$1,000),<br>Entrance Scholarship : Western University Silver Medallist; Dalhousie University Faculty of Science Senior Silver Medallist; University of Alberta Bronze Medallist; University of New Brunswick Senior Silver Medallist; and University of Ottawa Entrance Scholarship Senior Silver Medallist |
| Alia Wahban<br>Hillfield Strathallan College, Independent | <i>"Replacing Natural Gas with Hydrogen Fuel to Power Ontario"</i><br>(1) Centre for Canadian Nuclear Sustainability (\$750)   |
| Anthony Efthimiadis<br>W. H. Morden Public School, HDSB   | <i>"Development of an AI Convolutional Neural Network for Diagnostic Screening of Basal Cell Carcinoma"</i><br>Silver<br>Entrance Scholarships: Western University Silver Medallist; and University of Alberta Bronze Medallist  |
| Brain Yin<br>Iroquois Ridge High School, HDSB             | <i>"Student Engagement Rewards System"</i><br>Bronze<br>Entrance Scholarships: Western University Silver Medallist; and University of Alberta Bronze Medallist   |
| Imran Allarakhia<br>W. H. Morden Public School, HDSB      | <i>"Social Robots in the Classroom: Detection and Active Support for Student Emotions"</i><br>Bronze<br>Entrance Scholarships: Western University Silver Medallist; and University of Alberta Bronze Medallist   |
| Jacob LeBlanc<br>Pilgrim Wood Public School, HDSB         | <i>"Sustainability Metrics For Consumer Products Using Open Source Data, Python and QR Code Technology"</i><br>Silver<br>Entrance Scholarships: Western University Silver Medallist; and University of Alberta Bronze Medallist  |
| Jason Bae<br>King's Christian Collegiate, Independent     | <i>"ADHD Treatment: Finding the Effectiveness of Fine Motor Learning on Attention Levels"</i><br>Silver<br>Entrance Scholarship: Western University Silver Medallist; Dalhousie University Faculty of Science Senior Silver Medallist; University of Alberta Entrance Bronze Medallist; and University of New Brunswick Senior Silver Medallist  |
| Jeffrey Ion<br>Trinity Christian School, Independent      | <i>"Think Fast!"</i><br>Bronze<br>Entrance Scholarships: Western University Silver Medallist; and University of Alberta Bronze Medallist   |



|   |  |
|---|--|
| Jordan LeBlanc<br>St. Matthew<br>Elementary School,<br>HCDSB        | <i>"Transferring Pollen Using a Mechanical Bee"</i><br>Gold<br>(1)Challenge Award – Agriculture, fisheries and Food<br>(2)Technology in Agriculture (\$500)<br>Entrance Scholarships: Western University Silver Medallist; and University of Alberta Bronze Medallist  |
| Kadhir Ponnambalam<br>Hillfield Strathallan<br>College, Independent | <i>"Electrotaxis Of The Tardigrade Species Hypsibius. Sp"</i><br>Silver<br>Entrance Scholarships: Western University Silver Medallist; and University of Alberta Bronze Medallist  |
| Maria Chzhen<br>Westdale Secondary<br>School, HWDSB                 | <i>"Comparison of regression algorithms for multivariable drought analysis"</i><br>Bronze<br>Entrance Scholarships: Western University Silver Medallist; Dalhousie University Faculty of Science Senior Silver Medallist; University of Alberta Bronze Medallist; and University of Ottawa Senior Silver Medallist   |
| Maya LeBlanc<br>Abbey Park High<br>School, HDSB                     | <i>"Nitrous Oxide Reduction in an Industrial Wet Scrubber Utilizing NosZ Reductase and P. denitrificans"</i><br>Bronze<br>Entrance Scholarships: Western University Silver Medallist; and University of Alberta Bronze Medallist   |
| Misimi Sanni<br>Appleby College,<br>Independent                     | <i>"Emerging Prosthetics"</i><br>Bronze<br>Entrance Scholarships: Western University Silver Medallist; University of Alberta Bronze Medallist; and University of Ottawa Senior Bronze Medallist  |
| Sam Bae<br>King's Christian<br>Collegiate,<br>Independent           | <i>"Creating bioplastic that has the most effective adsorption on atmospheric aerosol particles"</i><br>Silver<br>Entrance Scholarships: Western University Silver Medallist; Dalhousie University Faculty of Science Senior Silver Medallist; University of Alberta Bronze Medallist; University of New Brunswick Senior Silver Medallist; and University of Ottawa Senior Silver Medallist |
| Ziang Li<br>Ridley College,<br>Independent                          | <i>"Inverse Cooking Model 2"</i><br>Bronze<br>Entrance Scholarship: Western University Bronze Medallist; University of Alberta Bronze Medallist; and University of Ottawa Senior Bronze Medallist  |
| Yuewen Li and<br>Siqi Tan<br>W. H. Morden Public<br>School, HDSB    | <i>"CRISPR: Ensuring a Memorable Future"</i>   |

## From the Judge-In-Chief

After three years of remote judging BASEF was able to return to an in-person fair. I was happy to welcome returning and new judges to evaluate the projects of hundreds of area students.

COVID left us with some best practices to carry forward to in-person judging, including remote training sessions. Two training sessions were held giving an opportunity for judges to interact with each other and with the judging committee, questions were answered and tips were shared by the Judge in Chief, Category Chairs and previous merit judges. The Judges Training presentation was made available on the BASEF website. We were able to provide merit judges with their assignments and project abstracts prior to judging day which was new for in-person judging. The Category Chairs contacted their assigned merit before the Fair to introduce themselves, welcome them and answer any questions before judging.

On Judging day there were 120 Merit Judges in attendance. This included ten Category Chairs. Merit Judges were assigned 8-10 projects each. Judging without the students took place in the morning and interviews with the students occurred in the afternoon. Final scores were submitted online. Merit judges were invited to provide feedback to the students about their projects, these were collated by the Judge in Chief and sent to the student participants by the registrar after the awards ceremony.

Judges were glad to be able to discuss their work with the students directly once again.

A sincere thank you to each Judge and Category Chair for sharing their scientific expertise and supporting all student participants. Once again, I am humbled by the commitment of these volunteers.

We look forward to next year when we will be hosting BASEF 2024 in a new location!

BASEF Judging Committee:

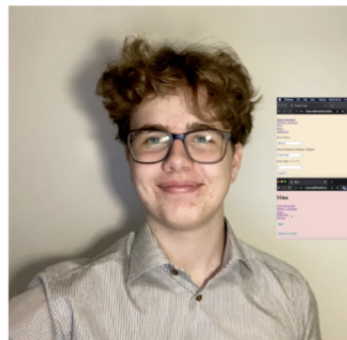
Donna Stack-Durward, Judge-in-Chief, BASEF 2023

# Student Advisors

Every year, students apply to volunteer as student advisors to our BASEF Organizing Committee. We thank this year's student advisors for all their input:



Maria Chzhen



Jeffrey Klinck (2022)



Isabella Lopes

## Outreach Program

The Infinite Possibilities Teacher Grant Program was piloted in 2021 and was offered again in 2022 and 2023. Teachers of science and technology classes in Grades 4 to 12 in publicly-funded school boards were eligible to receive \$1,000 to be used to enhance in-person experiential science & technology learning activities. In 2023, 26 grants were awarded.

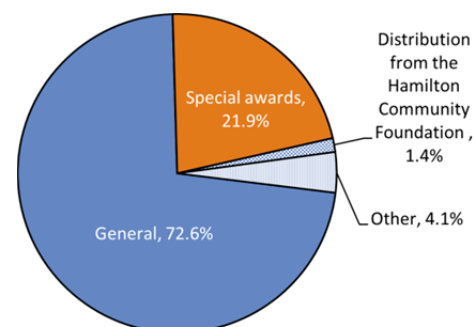
"I was able to purchase many wonderful resources to support both light and sound and rocks and minerals. I made sure to purchase resources that are not one-time use so they can be used for many years to come. This has helped build a strong base of resources at my school and I hope to be able to continue to build this resource bank in future years."

Ashley Buligan,  
Hamilton-Wentworth District School Board

# Financial Summary

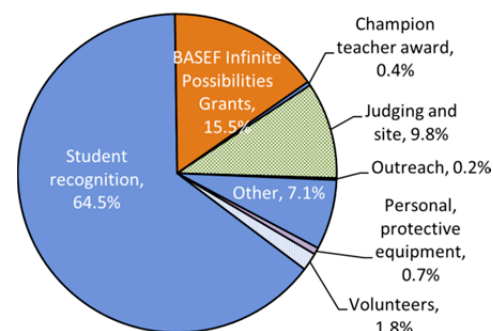
## Financial Highlights – Statement of Operations For the year ended August 31, 2023 (unaudited)

| Revenue   | 2023              | 2022              |
|---|-------------------|-------------------|
| General   | \$ 93,585         | \$ 103,807        |
| Special awards                                      | 28,220            | 27,050            |
| Distribution from the Hamilton Community Foundation | 1,807             | 2,021             |
| Other   | 5,297             | 1,236             |
|   | <u>\$ 128,909</u> | <u>\$ 134,114</u> |



### Summary of Expenses

|   |                    |                  |
|---|--------------------|------------------|
| Student recognition                                     | \$ 112,417         | \$ 66,399        |
| BASEF Infinite Possibilities Grants                     | 27,000             | 12,000           |
| Champion teacher award                                  | 637                | 1,239            |
| Judging and site  | 17,202             | 2,325            |
| Outreach  | 320                | 260              |
| Other   | 12,400             | 4,679            |
| Personal, protective equipment                          | 1,276              | -                |
| Volunteers  | 3,112              | -                |
|   | <u>\$ 174,364</u>  | <u>\$ 86,902</u> |
| Excess of (Expenses Over Revenue) Revenue Over Expenses | <u>\$ (45,455)</u> | <u>\$ 47,212</u> |



### Disbursements to Students




|                      |                   |
|----------------------|-------------------|
| CWSF trips           | \$ 45,092         |
| ISEF trips           | 26,313            |
| Merit awards         | 7,020             |
| Participation awards | 4,190             |
| Prize expenses       | 1,587             |
| Special awards       | 28,215            |
|                      | <u>\$ 112,417</u> |

### Other Expenses

|                                  |                  |
|----------------------------------|------------------|
| Administrative                   | \$ 4,104         |
| Bank charges                     | 274              |
| Ceremony and sponsor recognition | 2,880            |
| Marketing and publicity          | 706              |
| Professional fees                | 2,260            |
| Rent                             | 1,966            |
| Registration                     | 210              |
|                                  | <u>\$ 12,400</u> |



# Sponsors & Charitable Donors

| BASEF 2023 TITLE SPONSOR (\$25,000+)   |  |  |  |
|--|--|--|--|
|  <b>Primary Fluid Systems Inc.</b>   |  |  |  |
| Diamond (\$10,000+)  |  | Platinum (\$5,000+)  | Gold (\$2,500+)  |
|    |  | Alectra Utilities      McMaster University<br>Hamilton Spectator   | AYVA Educational Solutions<br>D.E.N.M. Engineering                   |
| Silver (\$1,000+)  |  | Bronze (\$500+)  | Friends (\$250+)   |
| Bay Area Health Trust<br>Burlington Hydro<br>Canadian Linen & Uniform Service<br>Halton Catholic DSB<br>Halton District School Board<br>Hamilton-Wentworth Catholic DSB<br>Hamilton-Wentworth DSB<br>Hillfield Strathallan College<br>Ontario Power Generation<br>Taylor Leibow Accountants & Advisors |  | CareGo Tek<br>Hamilton Amateur Astronomers<br>Hamilton Chamber of Commerce<br>Hamilton Police Retirees Association<br>MYSYS Limited<br>NewAE Technology Inc.<br>Synapse Life Science Consortium<br>Society of Tribologists & Lubrication Engineers<br>WalterFedy | Electrical Construction<br>Association of Hamilton<br>Talkit.ca Inc. |
| Charitable Donors*   |  |  |  |
| Banting & Best Level (\$1000+)   | Bondar Level (\$500+)  | Polanyi Level (\$200+)   | McGill Level (\$50+)   |
| Mike and Sue McNally<br>Peter Child  | Paul & Pam Lakin<br>Marvin Cohen<br>Lanhack Consultants<br>Cathy and Steve Hayman<br>Janet McNaught<br>Mantecon Partners<br>Peter and Susan Olynyk | Helen Barton<br>Dana Bee<br>Dan and Debbie Bowman<br>Kathy, Steven and Katie Brent<br>John and Eleanor O'Flynn<br>Dr. Nicola Simmons<br>Norman Young   | Jim Casey<br>Linda Millar  |
| * In addition to the donors listed, BASEF also has donors who wish to remain anonymous.  |  |  |  |