



2022

ANNUAL REPORT



**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 people 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.

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.

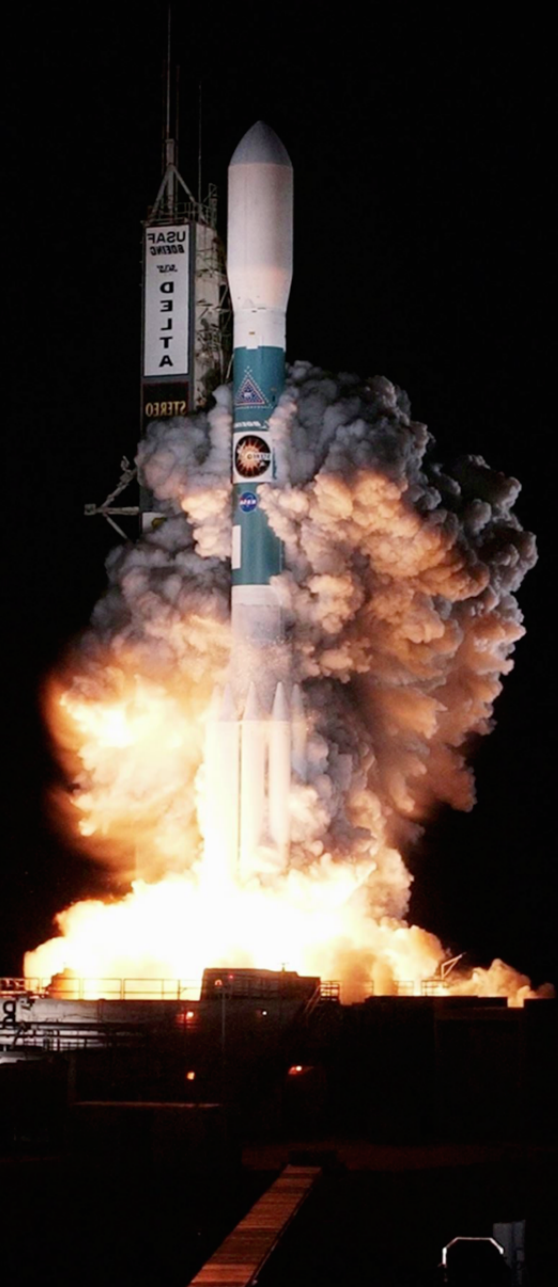
Student images provided by the students.

Images on pages 2 to 11 provided by:
<https://www.pxfuel.com/>

BASEF 2022 Annual Report

CELEBRATING 62 YEARS OF SCIENCE EXCELLENCE!

A Challenging Year



This year, the Bay Area Science and Engineering Fair (BASEF) celebrated its 62nd Fair. 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 levels. Many BASEF alumni have moved on to become world-class researchers, doctors, engineers, and successful business owners in their pursuits of excellence!

For the third year in a row, BASEF held an online fair with over 200 students taking part and representing 161 projects. As always, we were thrilled with the caliber of projects that students submitted and presented online. A variety of topics were explored related to mask wearing, the pandemic, global climate change and health, among many others. Our students thought locally and globally about how science can tackle real world problems and enhance day to day living.

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 BASEF and our community to inspire young people to positively impact the world through science, technology, engineering and mathematics, as well as providing opportunities for the students to further their reach in showcasing their innovations and discoveries.

We hope to be holding an in-person fair at Mohawk College for the 2023 fair, but will adapt to the situation at hand.

“If at first you don’t succeed, try two more times so that your failure is statistically significant”

Unknown

2022 BASEF Co-Chairs

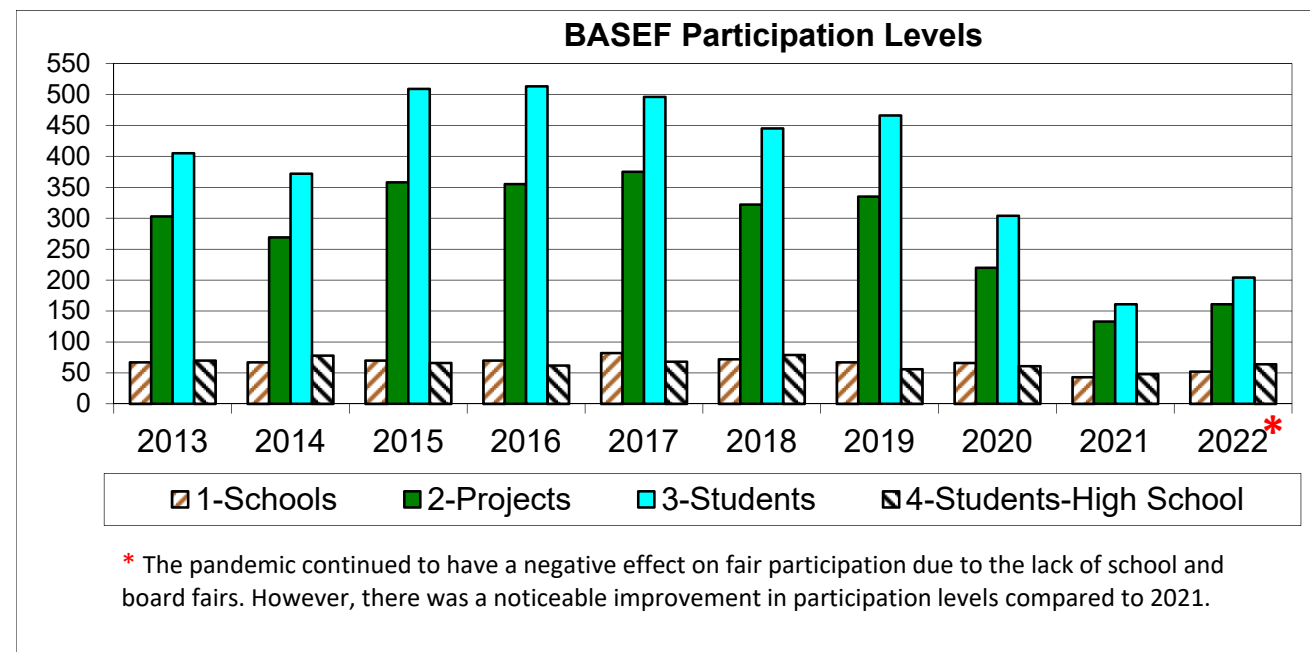
Dana Bee, Dan Bowman & David Reed

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Results

2022 Participation

- 161 projects
- 204 students
 - 111 grades 7 & 8 15 grades 9 & 10 38 grades 11 & 12
 - 120 female students 84 male students
- 52 schools



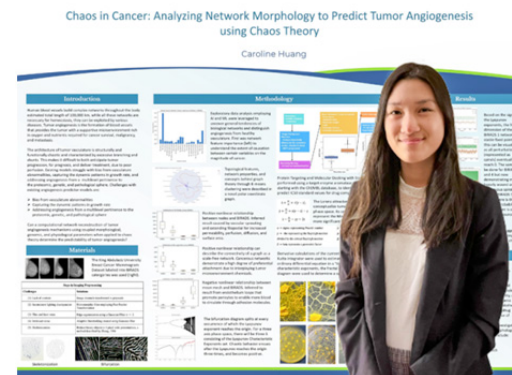
Best In Fair Pinnacle Awards

FIRST - **Caroline Huang**

Primary Fluid Systems Pinnacle Best in Fair

"Chaos in Cancer: Analyzing Network Morphology to Predict Tumor Angiogenesis using Chaos Theory"

Abbey Park High School, Halton District School Board



SECOND - **Anthony Saturnino**

Primary Fluid Systems Pinnacle Second Best in Fair

"A concrete structure climbing robot that uses deep learning (convolutional neural) to detect cracks"

Bishop Ryan Secondary School, Hamilton-Wentworth Catholic District School Board

THIRD - **Arianna Mastrolonardo**

Primary Fluid Systems Pinnacle Third Best in Fair

"Exploring the Antibacterial Effect of Microwave-Assisted Biosynthesized Ag₂O & CuO NPs on S.aureus"

King's Christian Collegiate, Independent



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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 receives 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 108 students; a total of \$9,875 in cash and \$108,000 in scholarships:

Gold – 8 projects by 9 students

Silver – 31 projects by 35 students

Bronze – 48 projects by 64 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.

47 Special Award donors provided 174 special awards

\$26,500 in prize money Scholarships worth \$14,500

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

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International Fair Team

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



Caroline Huang
Abbey Park High School,
HDSB

"Chaos in Cancer: Analyzing Network Morphology to Predict Tumor Angiogenesis using Chaos Theory"

3rd in Computational Biology & Bioinformatics

Arianna Mastrolonardo
King's Christian Collegiate,
Independent

"Exploring the Antibacterial Effect of Microwave-Assisted Biosynthesized Ag₂O & CuO NPs on S. aureus"

Anthony Saturnino
Bishop Ryan Secondary
School, HWCD

"A concrete structure climbing robot that uses deep learning (convolutional neural) to detect cracks."

2nd in Robotics & Intelligent Machines

INCOSE 2nd place and King Abdulaziz & his Companions Foundation for Giftedness & Creativity 1st place

Maria Chzhen
Westdale Secondary
School, HWDSB

"Multiple factor regression analysis of vegetation changes and land degradation in drylands"

3rd in Earth & Environmental Sciences

Isra Bashir
Westdale Secondary
School, HWDSB

"Sweet! - Integrating glucose and ketone testing to improve efficiency in the treatment of diabetes"

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.

Iman Ali Chris Hadfield Public School, HDSB	<i>"Bauxite Bot: The Saga Continues"</i>
Jason (Jaesung) Bae King's Christian Collegiate, IND	<i>"A device that allows people to have healthy sitting habits during a sedentary lifestyle"</i>
Sam (Jaeho) Bae King's Christian Collegiate, IND	<i>"A device that allows people to have healthy sitting habits during a sedentary lifestyle"</i>
Becca Barbera Cathedral High School, HWCD	<i>"QSAR Model for the Inhibition of A-Beta1-42 Peptide: Molecular Dynamics and Bioinformatics Study"</i> Silver Senior
Katie Barbera Cathedral High School, HWCD	<i>"Modeling of Hyperbolic Geometry and Investigation of its Underlying Principles and Applications"</i>
Gurnirmal Kaur North Park Collegiate and Vocational School, GEDSB	<i>"EzerBot: Detecting Phrases Indicative of Emotional Distress Within Online Platforms"</i> Gold Senior Challenge Award In the Health and Wellness Division – Best Senior Youth Can Innovate Award
Jeffrey Klinck Oakville Trafalgar High School, HDSB	<i>"MediRecord: a Quasi-Permissioned Blockchain Medical Record Verification System"</i> Bronze Senior
Maya LeBlanc Abbey Park High School, HDSB	<i>"Carbon Capture Depletion Using Catalyzed Photosynthesis To Promote Crop Growth"</i> Intact Climate Change Resilience Award Bronze Intermediate
Teddy Mao Oakville Christian School, IND	<i>"Transparent Wood: A Window to the Future?"</i> Silver Junior
Ariana Mehr Chris Hadfield Public School, HDSB	<i>"Bauxite Bot: The Saga Continues"</i>
Sophia Mokhtari King's Christian Collegiate, IND	<i>"Hydrogen Fuel Cells: The New Source Of Power"</i>
Kibo Nagasaki Other, IND	<i>"Survival of Indigenous Ancestors"</i> Gold Intermediate
Nicholas Pacifici St. Bernadette, HWCD	<i>"Head On A Swivel 2.0: Brace For Impact"</i> Bronze Junior
Kadhir Ponnambalam Hillfield Strathallan College, IND	<i>"Effect Of Electrical Field On Tardigrades In A Microfluidic Environment"</i> Silver Intermediate
Ava Romano W. H. Morden Public School, HDSB	<i>"Can CAR T-Cell Therapy Cure Alzheimer's Disease"</i> Bronze Junior
Isaiah Sienna St. Augustine, HWCD	<i>"The Effects of Plastic Contamination in Plastic Water Bottles Due to Environmental Variables"</i> Bronze Junior
Vihaan Vashishtha W. H. Morden Public School, HDSB	<i>"Using Stratospheric Aerosol Injection to Combat Climate Change"</i>

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Comments from the Judge-In-Chief

For the third year, the judging of student projects occurred electronically- students conducted research and performed experiments, submitted reports, and created videos. Projects were reviewed upon submission by a panel of BASEF committee members and students were allowed to (re)submit any components that were missing or could not be opened.

To address issues when judging remotely three Question and Answer Zoom meetings were held for merit judges. These sessions provided 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 video was available to all merit judges on the BASEF website, which outlined the online judging process.

We had an overwhelming response from those who have judged at BASEF before – over 150 individuals registered. This year we had dedicated merit judges from across Canada including Vancouver, Calgary, and Montreal sharing their expertise. Because of the large number of merit judges, all projects were judged a minimum of 4 times, many were judged 5 times.

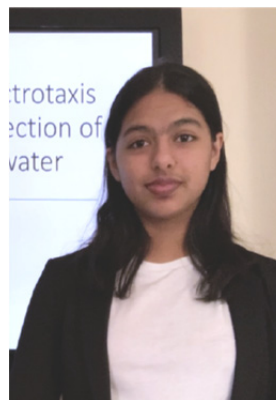
A sincere thank you to each judge and category chair for sharing their expertise and supporting all student participants. Once again, I am humbled by the commitment of these volunteers. Let's hope we can get back to an in-person fair in the near future!

Donna Stack-Durward,

BASEF Merit Judge-In-Chief

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:



Neha Gupta



Caroline Huang



Sabrina Mogus

Outreach Program

The **Infinite Possibilities Teacher Grant Program** was piloted in 2021 and was offered again in 2022. 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 2022, 12 grants were awarded.

"I used the grant funds to purchase science materials that would not have been readily available to me otherwise. I purchased pulleys and gears (an entire toolkit) that students used to create and test out their own pulley and gear systems (cranes, elevators...). I also purchased a light and sound exploration tool kit that I will be using in our next unit to explore and test out [ideas]/do experiments in class to further our learning/understanding."

Alessandra Travali,
Halton Catholic District School Board

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Financial Summary

Financial Highlights – Statement of Operations For the year ended August 31, 2022 (unaudited)

Revenue	2022	2021
General	\$ 103,807	\$ 106,797
Special awards	27,050	30,050
Canada Summer Jobs Grant	-	4,264
Distribution from the Hamilton Community Foundation	2,021	1,506
Other	1,236	1,652
	<u>\$ 134,114</u>	<u>\$ 144,239</u>

Summary of Expenses

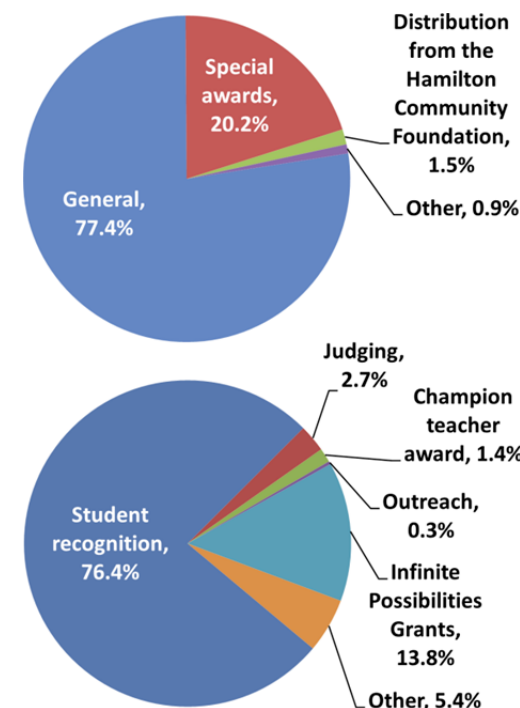
Student recognition	\$ 66,399	\$ 64,067
BASEF Infinite Possibilities Grants	12,000	16,000
Champion teacher award	1,239	1,191
Judging	2,325	2,774
Outreach	260	-
Other	4,679	8,548
	<u>\$ 86,902</u>	<u>\$ 92,580</u>
Excess of Revenue Over Expenses	<u>\$ 47,212</u>	<u>\$ 51,659</u>

Disbursements to Students

CWSF trips	\$ 16,770
ISEF trips	6,138
Merit awards	9,675
Participation awards	3,472
Prize expenses	3,381
Student activities	618
Special awards	26,345
	<u>\$ 66,399</u>



Other Expenses

Administrative	\$ 1,748
Bank charges	262
Professional fees	2,178
Rent	492
	<u>\$ 4,679</u>



Sponsors & Charitable Donors



BASEF 2022 TITLE SPONSOR (\$25,000+)		
 Primary Fluid Systems Inc.		
Diamond (\$10,000+)	Platinum (\$5,000+)	Gold (\$2,500+)
	Enbridge Hamilton Spectator McMaster University Mohawk College	Imperial Oil
Silver (\$1,000+)	Bronze (\$500+)	Friends (\$250+)
Bay Area Health Trust Burlington Hydro Halton District School Board Hamilton-Wentworth Catholic DSB Hamilton-Wentworth DSB Hillfield Strathallan College NSERC Ontario Power Generation Posner Metals Taylor Leibow Accountants & Advisors	CareGo Tek Halton Catholic District School Board Hamilton Amateur Astronomers Hamilton Chamber of Commerce Hamilton Community Awareness and Emergency Response (CAER) Hamilton Police Retirees Association Rotary Club of Hamilton AM Society of Tribologists & Lubrication Engineers WalterFedy	Electrical Construction Association of Hamilton Hamilton Association for the Advancement of Literature, Science and the Arts NewAE Technology Inc. Talkit.ca Inc.

Charitable Donors*			
Banting & Best Level (\$1000+)	Bondar Level (\$500+)	Polanyi Level (\$200+)	McGill Level (\$50+)
DENM Engineering Ltd. Mike and Sue McNally Marvin Cohen and Janet McNaught	Paul & Pam Lakin Lanhack Consultants Mantecon Partners Peter and Susan Olynyk	Helen Barton Kathy, Steven and Katie Brent John and Eleanor O'Flynn Dr. Nicola Simmons Norman Young	Renato and Enza DeTina Linda Millar

* In addition to the donors listed, BASEF also has donors who wish to remain anonymous.

Note: Sponsors donating in-kind services help us provide an exceptional experience for BASEF participants. Key in-kind donations include: Printing, posters, newspaper advertising, trip winners' jackets, photo ID tags, accounting, and web hosting.