

**REGENERON**

**ISEF**

A PROGRAM OF  
**SOCIETY FOR SCIENCE**

**VIRTUAL | 2021**

# **FUTURE FORWARD**

**REGENERON INTERNATIONAL SCIENCE AND ENGINEERING FAIR**  
**May 16 – 21, 2021**

# SPONSORS

## REGENERON



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# Table of Contents

## REGENERON INTERNATIONAL SCIENCE AND ENGINEERING FAIR 2021

<b>Welcome from Regeneron</b>	<b>2</b>
<b>Welcome from Society for Science</b>	<b>3</b>
<b>About ISEF</b>	<b>4</b>
<b>Grand Awards</b>	<b>6</b>
<b>Special Award Organizations</b>	<b>8</b>
<b>Schedule</b>	<b>10</b>
<b>Opening Ceremony Keynote</b>	<b>11</b>
<b>Excellence in Science and Technology Panel</b>	<b>13</b>
<b>Innovation and Entrepreneurship Panel</b>	<b>15</b>
<b>Women in STEM Panel</b>	<b>17</b>
<b>Social Innovation Panel</b>	<b>19</b>
<b>Finalist Directory</b>	<b>28</b>
<b>Society for Science Staff</b>	<b>175</b>
<b>In Recognition</b>	<b>176</b>
<b>ISEF College Fair Exhibitors</b>	<b>180</b>

# Welcome from Regeneron



## REGENERON

**GEORGE D. YANCOPOULOS, M.D., PH.D.**

SCIENTIFIC FOUNDER, PRESIDENT & CHIEF SCIENTIFIC OFFICER  
SCIENCE TALENT SEARCH 1976

**LEONARD S. SCHLEIFER, M.D., PH.D.**

CO-FOUNDER, PRESIDENT & CHIEF EXECUTIVE OFFICER  
SCIENCE TALENT SEARCH 1970

Dear Finalists,

Congratulations on being chosen as a finalist for the 2021 Regeneron International Science and Engineering Fair. We hope your experience, while virtual, lived up to your expectations of this distinguished event. Many brilliant and important STEM leaders have passed through ISEF's halls, and now you are among this next generation of inventors, entrepreneurs and educators. We are proud of all that you have accomplished, especially during a uniquely challenging year.

Regeneron is honored to sponsor the International Science and Engineering Fair, which celebrates the world's top young science talent and showcases the critical role science plays in advancing society.

Supporting ISEF is a natural extension of Regeneron's mission.

We both got our start with science research in high school, as part of the then Westinghouse Science Talent Search (now known as the Regeneron Science Talent Search), the oldest science and math competition for high school seniors in the United States.

It was this positive experience that helped set us on our paths and gave us the confidence to become physician-scientists and entrepreneurs. Since founding our biotechnology company more than 30 years ago, we have worked to turn groundbreaking science into medicines that improve human lives, including our treatments for blindness-causing diseases, numerous cancers, allergic diseases, COVID-19 and Ebola. In this spirit, we are committed to supporting the young scientists who will keep improving our world and public health for generations to come. We believe that you will be making the important discoveries of tomorrow.

This year, we've seen more than ever that science and other STEM fields are critically important. Pursuing your research in the face of adversity during a global pandemic took fortitude and ingenuity—and was more necessary than ever. We enjoyed learning about your projects during ISEF and watching as you spent the week celebrating innovation, competing for top honors and making friends.

At Regeneron, we've built a culture that shares much of this energy—one of curiosity, scientific excellence and camaraderie. The dream was to create a company where scientists are the heroes. Your work at ISEF helps extend this dream even further: you are our heroes, and we can't wait to see what you do next to improve the world! Congratulations once again, and good luck.

Sincerely,

A handwritten signature in black ink, reading "L. Schleifer".

**Leonard S. Schleifer, M.D., Ph.D.**

Co-founder, President & Chief Executive Officer  
Science Talent Search 1970

A handwritten signature in black ink, reading "G. Yancopoulos".

**George D. Yancopoulos, M.D., Ph.D.**

Scientific Founder, President & Chief Scientific Officer  
Science Talent Search 1976

# Welcome from Society for Science



## SOCIETY FOR SCIENCE

MAYA AJMERA  
PRESIDENT & CEO  
PUBLISHER, *SCIENCE NEWS*

Congratulations on being a finalist at the Virtual Regeneron International Science and Engineering Fair 2021! Our biggest fair ever!

Tens of millions of students compete in science fairs every year around the globe, with nearly 2,000 finalists this year competing for \$5 million in awards and scholarships! ISEF alumni have gone on to win some of the most prestigious awards, including the Nobel Prize and MacArthur Fellowship, they have gone on to launch companies and they have joined academia to teach the next generation of scientists and engineers.

In a year in which the Society was not certain what to expect in terms of science fair participation, we saw student scientists around the globe inspired to help make the world a better place through science, technology, engineering and math. It's clear: 2020 and 2021 have been tremendous years for science. We have witnessed, first hand, the amazing impact that science has on our everyday lives. We have seen scientists work collaboratively at breakneck speed to learn more about the COVID-19 virus and discover new treatments and vaccines. In a year that has been bleak, science has given us hope.

Through virtual Regeneron ISEF 2021, Society for Science extended that sense of hope to you—our finalists—as well as the general public.

Our virtual science fair enabled people around the world to hear from top scientists, engineers and entrepreneurs, including Michio Kaku (STS 1964; ISEF 1963), futurist, physicist and author; George Yancopoulos (STS 1976), Regeneron Scientific Founder, President and Chief Scientific Officer; Frances Arnold, winner of the Nobel Prize in Chemistry; H. Robert Horvitz, winner of the Nobel Prize in Physiology or Medicine; Monika Schleier-Smith (STS 2001), MacArthur Fellow; Roderic Pettigrew (ISEF 1967), winner of the Vannevar Bush Award; Heidi Williams (ISEF 1999), MacArthur Fellow; Huda Zoghbi, Breakthrough Prize Winner; and many others.

We also showed the world the amazing research projects taking place by student scientists and engineers, by showcasing your work in our virtual Finalists' Hall. You are poised to solve our world's most intractable challenges.

I hope you enjoyed Virtual Regeneron ISEF finals week and continue to celebrate your accomplishments. I also encourage you to thank the people who helped you get here—your teachers, parents and mentors who supported you through the years. It takes a true community to develop talent like yours!

Thank you to all our sponsors, volunteers, judges and interpreters who made this event possible. I hope to see you next year for Regeneron ISEF 2022!

Sincerely,

A handwritten signature in black ink that reads "Maya Ajmera". The signature is fluid and cursive.

**Maya Ajmera**  
President & CEO  
Society for Science  
Publisher, *Science News*  
Science Talent Search 1985

# REGENERON INTERNATIONAL SCIENCE AND ENGINEERING FAIR



## ABOUT ISEF

The Regeneron International Science and Engineering Fair (Regeneron ISEF), a program of Society for Science for over 70 years, is the world's largest global science competition for high school students. Through a global network of local, regional and national science fairs, millions of students are encouraged to explore their passion for scientific inquiry. Each spring, a group of these students is selected as finalists and offered the opportunity to compete for approximately \$5 million in awards and scholarships.

In 2019, Regeneron became the title sponsor of ISEF to help reward and celebrate the best and brightest young minds globally and encourage them to pursue careers in STEM as a way to positively impact the world. Regeneron ISEF is supported by a community of additional sponsors, including Broadcom Foundation; Johnson & Johnson; National Geographic Society; Akamai Foundation; Jacobs; King Abdulaziz & his Companions Foundation for Giftedness & Creativity; Microsoft; Microsoft Azure Sphere; Richard F. Caris Foundation; Rise, an initiative of Schmidt Futures and the Rhodes Trust; Siegel Family Endowment; West Pharmaceutical Services; Cesco Linguistic Services; Gordon and Betty Moore Foundation; Insaco and Zeiss. Previously, ISEF was sponsored for 20 years by Intel.

ISEF alumni have gone on to have world-changing careers in science and engineering and have earned some of the most esteemed honors. Our alumni include National Medal of Science recipients, MacArthur Foundation Fellows, National Academy of Sciences and National Academy of Engineering inductees and a range of entrepreneurs.

Learn more at <https://www.societyforscience.org/isef>



# IS SCIENCE IN YOUR DNA?

**F**or 100 years, the Society for Science's flagship magazine, *Science News*, has been a trusted source for journalism on the latest scientific research and discoveries. *Science News for Students* continues this tradition of excellence by providing age-appropriate science news to students, parents and educators.

For 80 years, the Society has inspired the next generation of scientists and engineers through our world-class STEM competitions, including the International Science and Engineering Fair. Those competitions helped launch the careers of more than 70,000 young people.

More recently, the Society launched a range of programming aimed at ensuring that every young person has an opportunity to pursue their passion in STEM.

## **LET'S MEET OUR FUTURE CHALLENGES TOGETHER**

Today, we face global challenges, including the pandemic and climate change. Evidence-based science journalism and new generations of innovative scientists and engineers are essential to meeting these and other challenges of the next century.

**100** SOCIETY FOR SCIENCE  
CELEBRATING A CENTURY

Please visit us at [www.societyforscience.org](http://www.societyforscience.org)

# Grand Awards—2021 Winners

## GRAND AWARDS AT REGENERON ISEF 2021



### **George D. Yancopoulos Innovator Award—\$75,000**

**Michelle Hua**  
Bloomfield Hills, Michigan  
Dilated Silhouette Convolutional Neural Network  
Booth ROBO033

Regeneron and Society for Science are pleased to present an award of \$75,000 to the top First Place project. The George D. Yancopoulos Innovator Award recognizes the best of the best among the outstanding students from around the world who participate in Regeneron ISEF. The winning project is selected on the basis of outstanding and innovative research, as well as on the potential impact of the work—in the field and on the world at large.



### **Regeneron Young Scientist Awards—\$50,000**

**Catherine Kim**  
Jericho, New York  
Hierarchical Prediction of Adverse Drug Reactions  
CBIO080



**Daniel Shen**  
Raleigh, North Carolina  
AI-Powered Facial-cue Control Module  
SOFT012

Regeneron and Society for Science are pleased to present \$50,000 to two First Place projects. These finalists are selected for their commitment to innovation in tackling challenging scientific questions, using authentic research practices and creating solutions to the problems of tomorrow.



### **Gordon E. Moore Award for Positive Outcomes for Future Generations—\$50,000**

**John Benedict Allasas Estrada**  
Fresno, California  
AI Model for Drought Stress Assessment in Plants  
PLNT012

In recognition of Gordon E. Moore's continued legacy of honoring the best at the International Science and Engineering Fair, the Gordon and Betty Moore Foundation is providing the \$50,000 Gordon E. Moore Award for Positive Outcomes for Future Generations. The Gordon E. Moore Award is given to the project that best demonstrates the founding principle of the Gordon and Betty Moore Foundation to make an enduring difference for future generations through rigorous scientific inquiry and a passion for discovery and invention. The award will be used by the winner to cover post-secondary educational expenses.

# Grand Awards—2021 Winners



## **Craig R. Barrett Award for Innovation—\$10,000**

**Arya Tschand**

**Lincroft, New Jersey**

**Low-Cost, High-Efficiency Irrigation Network  
ENMC072**

Society for Science is proud to present the Craig R. Barrett Award for Innovation. This \$10,000 award is given to the finalist who best demonstrates an innovation in Science, Technology, Engineering and Math, recognizing that research and innovation are dependent on the integration of these disciplines, as well as the impact they collectively have on our everyday lives. The award will be used by the winner to cover post-secondary educational expenses.



## **H. Robert Horvitz Prize for Fundamental Research—\$10,000**

**Neha Mani**

**New York, New York**

**Diagnostic Method Based on Bacterial Motion  
MCRO043**

H. Robert Horvitz is the 2002 Nobel Prize Winner in Medicine or Physiology. He served as the Chair of the Society for Science's Board of Trustees from 2010-2019. In recognition of his scientific excellence and service and contributions to the Society, the \$10,000 H. Robert Horvitz Prize for Fundamental Research is given to the project that represents the best in fundamental research that furthers our understanding of science and/or mathematics and promotes the understanding of natural phenomena without clearly defined applications towards processes or products in mind. The award will be used by the winner to cover post-secondary educational expenses.



## **Peggy Scripps Award for Science Communication—\$10,000**

**Franklin Wang**

**Palo Alto, California**

**Asteroid Discovery with Synthetic Data & ConvNets  
PHYS050**

Society for Science is proud to celebrate its Centennial through a \$10,000 award honoring Peggy Scripps who was a science journalist who served as a writer and editor of Science Newsletter for many years. This award is given to the finalist who is best able to communicate their project to the lay public, explaining both the science and its potential impact on society. The award will be used by the winner to cover post-secondary educational expenses.

## **Grand Awards are presented in each of the 21 ISEF categories, as follows:**

- 1st Place Award: **\$5,000** cash award
- 2nd Place Award: **\$2,000** cash award
- 3rd Place Award: **\$1,000** cash award
- 4th Place Award: **\$500** cash award

# ISEF Special Award Organizations

**Each year, Special Award Organizations (SAOs) representing a wide variety of scientific disciplines provide awards, scholarships, internships and other prizes to hundreds of ISEF finalists.**

**Thank you to these 2021 SAOs!**

Acoustical Society of America

Aerojet Rocketdyne Foundation

Air Force Research Laboratory on behalf of the United States Air Force

American Chemical Society

American Committee for the Weizmann Institute of Science

American Institute of Aeronautics & Astronautics

American Mathematical Society

American Meteorological Society

American Psychological Association

American Statistical Association

Arizona State University

Association for Computing Machinery

Association for the Advancement of Artificial Intelligence

ASU Rob and Melani Walton Sustainability Solutions Service

Central Intelligence Agency

China Association for Science and Technology (CAST)

Drug, Chemical & Associated Technologies Association (DCAT)

Edison International

Embark China

Florida Institute of Technology

Fondazione Bruno Kessler

IEEE Foundation

# ISEF Special Award Organizations

Innopolis University

International Council on Systems Engineering – INCOSE

K. Soumyanath Memorial Award

King Abdulaziz & his Companions Foundation for Giftedness and Creativity

Mu Alpha Theta, National High School and Two-Year College Mathematics  
Honor Society

National Anti-Vivisection Society

National Oceanic and Atmospheric Administration – NOAA

National Taiwan Science Education Center

NC State College of Engineering

Office of Naval Research on behalf of the United States Navy and Marine Corps

Oracle Academy

Patent and Trademark Office Society

Potamkin Prize

Raytheon Technologies Corporation

Ricoh USA, Inc.

Serving Society Through Science

Shanghai Youth Science Education Society

Sigma Xi, The Scientific Research Honor Society

SPIE, the international society for optics and photonics

The Susie and Gideon Yu Awards for Innovation in Sustainability

U.S. Agency for International Development

United States Environmental Protection Agency

University of Arizona

Wolfram Research, Inc.

YM American Academy

Zeiss

# Schedule

## VIRTUAL REGENERON INTERNATIONAL SCIENCE AND ENGINEERING FAIR 2021 PROGRAM

### FRIDAY, MAY 14

10:00 a.m. Eastern	Finalists Orientation/Enter Platforms	ProjectBoard and Event Farm
	Finalists only	
11:00 a.m.–1:00 p.m. Eastern	College Fair Live	ProjectBoard
	Finalists only	
1:00 p.m.–3:00 p.m. Eastern	STEM Career Hall Live	ProjectBoard
	Finalists only	

### SUNDAY, MAY 16

5:00 p.m.–7:00 p.m. Eastern	College Fair Live	ProjectBoard
7:00 p.m.–8:00 p.m. Eastern	Opening Ceremony   Sponsored by Regeneron	ProjectBoard
Welcome Remarks, Maya Ajmera, President & CEO, Society for Science; Publisher, <i>Science News</i> Remarks from George Yancopoulos, Scientific Founder, President & Chief Scientific Officer, Regeneron Keynote Address, Michio Kaku, Futurist, Physicist, Author "Around the World" Dance Video featuring Regeneron ISEF 2021 finalists		
8:30 p.m.–10:00 p.m. Eastern	Student Pin Exchange   Sponsored by National Geographic Society	Event Farm
	Finalists only networking event	

### MONDAY, MAY 17

5:00 p.m.–7:00 p.m. Eastern	College Fair Live	ProjectBoard
5:00 p.m.–7:00 p.m. Eastern	STEM Career Hall Live	ProjectBoard
7:00 p.m. Eastern	Excellence in Science and Technology Panel   Sponsored by Society for Science	ProjectBoard

Moderated by Joe Palca, Science Correspondent, National Public Radio  
Featuring:

- **Frances Arnold**  
Linus Pauling Professor of Chemical Engineering  
California Institute of Technology  
Nobel Prize in Chemistry 2018
- **H. Robert Horvitz**  
David Koch Professor, Department of Biology  
Massachusetts Institute of Technology  
Investigator, Howard Hughes Medical Institute  
Nobel Prize in Physiology or Medicine 2002

# Opening Ceremony Keynote



**MICHIO KAKU, PH.D.**  
**FUTURIST, PHYSICIST, AUTHOR**

Henry Semat Chair in Theoretical  
Physics at the City University of New York  
Science Talent Search 1964  
International Science and Engineering Fair 1963

Dr. Michio Kaku is one of the most widely recognized figures in science in the world today. He has written four *New York Times* best sellers.

He graduated summa cum laude in physics from Harvard in 1968, graduating first in his physics class. He received his Ph.D. from the University of California, Berkeley in 1972. He has taught at City College of the City University of New York for 45 years and holds the Henry Semat Chair in Theoretical Physics at CCNY.

Dr. Kaku is an internationally recognized authority in two areas. The first is Einstein's unified field theory, which Dr. Kaku is attempting to complete. The other is to predict trends affecting business, medicine, finance and our way of life, based on the latest research in science.

Dr. Kaku is the science correspondent for CBS This Morning TV. His weekly science radio show is heard in 100 cities across the country. He has 3 million fans on Facebook and one million people follow him on Twitter. He has hosted numerous science specials on the Discovery Channel and Science Channel, BBC-TV, and has appeared on the David Letterman Show, Good Morning America, Today Show, HBO, Stephen Colbert Report, CNN, the History Channel, PBS-TV, National Geographic and all the major news media.



# Schedule

- **Roderic Pettigrew**  
Chief Executive Officer, Engineering Health  
Executive Dean for Engineering Medicine  
Texas A&M University  
Vannevar Bush Award 2020  
ISEF 1967
- **Monika Schleier-Smith**  
Associate Professor, Physics  
Stanford University  
MacArthur Fellow 2020  
STS 2001

<b>8:30 p.m. Eastern</b>	<b>Innovation and Entrepreneurship Panel   Sponsored by Society for Science</b>	<b>ProjectBoard</b>
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Moderated by Maya Ajmera, President & CEO, Society for Science; Publisher, *Science News*  
Featuring:

- **Omar Abudayyeh**  
Fellow, McGovern Institute  
ISEF 2008
- **Eden Full Goh**  
Founder & CEO, Mobot  
ISEF 2007–2008
- **Michael Li**  
Founder, The Data Incubator and President for data at Pragmatic Institute  
STS 2003; ISEF 2003
- **David Schlesinger**  
CEO & Co-founder, Mendelics  
ISEF 1997

## TUESDAY, MAY 18

<b>9:00 a.m.–6:00 p.m. Eastern</b>	<b>Public Exhibition of Projects</b>	<b>ProjectBoard</b>
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Finalists will be asked to be at their projects for 2 hours, as their schedule allows.

<b>9:00 a.m. Eastern</b>	<b>STEM Experiential Hall</b>	<b>ProjectBoard</b>
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<b>10:00 a.m.–11:00 a.m. Eastern</b>	<b>National Leadership Council Meet &amp; Greet</b>	<b>Event Farm</b>
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What do a Harvard professor, entrepreneurs in AI, health, and aviation, a Venture Capitalist and more have in common? They're all members of the Society's National Leadership Council, or NLC, a body of ISEF and STS alumni from our science competitions (just like you!). Finalists can join us on Event Farm to meet them "in-person."

Featuring:

- **Shantanu Gaur**  
Co-founder and CEO, Allurion Technologies  
ISEF 2003–2004
- **Felipe Gómez del Campo**  
CEO of FGC Plasma Solutions Inc.  
Visiting Scientist at MIT RGD Lab  
ISEF 2012
- **Catherine Havasi**  
CEO and Co-founder of Dalang Health  
Co-founder and Board Advisor of Luminoso Technologies, Inc.  
STS 1999; ISEF 1998–1999



# EXCELLENCE IN SCIENCE AND TECHNOLOGY PANEL

Sponsored by Society for Science



**FRANCES ARNOLD**

- Linus Pauling Professor of Chemical Engineering, California Institute of Technology
- Nobel Prize in Chemistry 2018



**H. ROBERT HORVITZ**

- David Koch Professor, Department of Biology, Massachusetts Institute of Technology
- Investigator, Howard Hughes Medical Institute
- Nobel Prize in Physiology or Medicine 2002



**MONIKA SCHLEIER-SMITH**

- Associate Professor, Physics, Stanford University
- MacArthur Fellow 2020
- STS 2001



**RODERIC PETTIGREW**

- Chief Executive Officer, Engineering Health
- Executive Dean for Engineering Medicine, Texas A&M University
- Vannevar Bush Award 2020
- ISEF 1967

**Moderated by**



**JOE PALCA**

Science Correspondent,  
National Public Radio

# Schedule

- **Michael Li**  
Founder, The Data Incubator and President for data at Pragmatic Institute  
STS 2003; ISEF 2003
- **Kate Lowry**  
Science Director of Science Philanthropy Alliance  
STS 2006
- **Rajen Sheth**  
Vice President, Google Cloud AI and Industry Solutions, Google  
STS 1994; ISEF 1992–1994

**11:30 a.m. Eastern**

**Women in STEM Panel | Sponsored by Johnson & Johnson**

**ProjectBoard**

Moderated by Nancy Shute, Editor in Chief, *Science News*

Featuring:

- **Dapo Ajayi**  
Vice President, Technical Operations and Supply Chain Strategy  
Johnson & Johnson
- **Heidi Williams**  
Charles R. Schwab Professor of Economics  
Stanford University  
MacArthur Fellow 2015  
ISEF 1999
- **Dawn Wright**  
Chief Scientist  
ESRI
- **Huda Zoghbi**  
Professor  
Baylor College of Medicine  
Investigator, Howard Hughes Medical Institute  
Breakthrough Prize in Life Sciences 2017

**1:00 p.m. Eastern**

**Social Innovation Panel | Sponsored by Rise, an Initiative of Schmidt Futures and the Rhodes Trust**

**ProjectBoard**

Moderated by Cheryl Dorsey, President, Echoing Green

Featuring:

- **Pelagia Majoni**  
Grace Hopper Award Winner  
Haverford College  
ISEF 2017
- **Sahithi Pingali**  
Founder & CEO, WaterInsights  
Stanford University  
ISEF 2017
- **Nathan Wang**  
Policy Entrepreneur  
Johns Hopkins University  
ISEF 2019
- **Ryan Westcott**  
Founder & President  
Aeronautics Northwest  
ISEF 2017–2020



# INNOVATION AND ENTREPRENEURSHIP PANEL

Sponsored by Society for Science



**OMAR ABUDAYYEH**

- Fellow, McGovern Institute
- ISEF 2008



**EDEN FULL GOH**

- Founder & CEO, Mobot
- ISEF 2007-2008

**Moderated by**



**MAYA AJMERA**

- President & CEO, Society for Science
- Publisher, *Science News*
- STS 1985



**MICHAEL LI**

- Founder at The Data Incubator and President for data at Pragmatic Institute
- STS 2003; ISEF 2003



**DAVID SCHLESINGER**

- CEO & Co-founder, Mendelics
- ISEF 1997

# Schedule

5:00 p.m.–6:00 p.m. Eastern

National Leadership Council Meet & Greet

Event Farm

What do a Harvard professor, entrepreneurs in AI, health, and aviation, a Venture Capitalist and more have in common? They're all members of the Society's National Leadership Council, or NLC, a body of ISEF and STS alumni from our science competitions (just like you!). Finalists can join us on Event Farm to meet them "in-person."

Featuring:

- **Kevin Heller**  
Executive Vice President Research and Development, Jasper Therapeutics  
STS 1989
- **Elyse Hope**  
Section Manager, Health, Genome British Columbia  
STS 2006; ISEF 2004–2006; DCYSC 2002
- **Scott Duke Kominers**  
MBA Class of 1960 Associate Professor, Harvard Business School  
Faculty Affiliate, Department of Economics, Harvard University  
STS 2005; ISEF 2005
- **Meredith M. Lee**  
Chief Technical Advisor, UC Berkeley Computing, Data Science, & Society  
ISEF 2000
- **Willie T. Reaves Jr.**  
Chief Business Strategy Innovation Officer, Biotechnology Innovation Organization (BIO)  
ISEF 2007–2008
- **Sheel Tyle**  
Founder and CEO, Ampla  
ISEF 2006–2008; DCYSC 2005

## WEDNESDAY, MAY 19

8:00 a.m.–8:00 p.m. Eastern

Category Receptions

Event Farm

Finalists will be invited to meet with representatives from the sponsor of their category as well as their fellow finalists during receptions, which will take place throughout the day.

## THURSDAY, MAY 20

Symposia

9:00 a.m.–10:00 a.m. Eastern

Beyond the Lab with National Geographic Young Explorers

ProjectBoard

Hear from three former ISEF finalists (now National Geographic Young Explorers!) working on projects that take science to the next level.

10:00 a.m.–11:00 a.m. Eastern

US Patent and Trademark Office

ProjectBoard

Learn how intellectual property tools (patents, trademarks, copyrights, trade secrets) can help protect your science and engineering projects and help you continue on the path to innovation.

11:00 a.m.–12:00 p.m. Eastern

Answering the Call of Science with Regeneron

ProjectBoard

Regeneron experts answer questions from Regeneron ISEF finalists about biotechnology, scientific breakthroughs, emerging technologies, COVID-19 and more. Hear what's on the minds of young innovative thinkers from around the world.

Johnson & Johnson

# WOMEN IN STEM PANEL

Sponsored by Johnson & Johnson



**DAPO AJAYI**

- Vice President, Technical Operations, Supply Chain Strategy, Johnson & Johnson



**HEIDI WILLIAMS**

- Charles R. Schwab Professor of Economics, Stanford University
- MacArthur Fellow 2015
- ISEF 1999



**DAWN WRIGHT**

- Chief Scientist, Esri



**HUDA ZOGHBI**

- Professor, Baylor College of Medicine
- Investigator, Howard Hughes Medical Institute
- Director, Neurological Research Institute
- Breakthrough Prize in Life Sciences 2017

**Moderated by**



**NANCY SHUTE**

- Editor in Chief, *Science News*

# Schedule

**2:00 p.m.–3:00 p.m. Eastern**

**Using Your Talents to Build a Better World with Rise**

**ProjectBoard**

Join this session to learn about Rise—a global talent program that finds extraordinary young people who need opportunity and supports them for life as they use their talents to serve others. An initiative of Schmidt Futures and the Rhodes Trust, Rise is building a global community of future leaders, connecting everyone who applies with a network of peers, learning resources and additional opportunities from Rise partners around the world.

**3:00 p.m.–4:00 p.m. Eastern**

**Regeneron Science Talent Search**

**ProjectBoard**

Learn about the United States' oldest and most prestigious STEM competition (and a chance to win \$250,000). The 2022 application will open June 1, 2021 for rising U.S. high school seniors.

**6:00 p.m.–7:00 p.m. Eastern**

**AI Research and Industry: What It's Like and What Comes Next**

**Zoom Webinar**

Join us for a live conversation with pioneers in Artificial Intelligence from OpenAI, Google and comma.ai as they walk you through a day-in-the-life and what big ideas are on the horizon. The conversation will be led by ISEF alumnus and National Leadership Council member David Holz, CTO and Co-founder of Leap Motion (now UltraLeap).

**8:00 p.m. Eastern**

**Special Awards Ceremony**

**ProjectBoard**

## **FRIDAY, MAY 21**

**10:00 a.m.–11:30 a.m. Eastern**

**Grand Awards Ceremony**

**ProjectBoard**



# SOCIAL INNOVATION PANEL

Sponsored by Rise, an Initiative of Schmidt Futures  
and the Rhodes Trust



**PELAGIA MAJONI**

- Grace Hopper Award Winner
- Haverford College
- ISEF 2017



**SAHITHI PINGALI**

- Founder & CEO, WaterInsights
- Stanford University
- ISEF 2017



**NATHAN WANG**

- Policy Entrepreneur
- Johns Hopkins University
- ISEF 2019



**RYAN WESTCOTT**

- Founder & President, Aeronautics Northwest
- ISEF 2017–2020

**Moderated by**



**CHERYL DORSEY**

President, Echoing Green

# In Case You Missed It

You can still explore Regeneron ISEF's amazing programming. The opening ceremony, panel discussions and symposia are all available on our YouTube channel

**[www.youtube.com/SocietyforScience](https://www.youtube.com/SocietyforScience)**

Don't miss an opportunity to hear from top scientists, engineers and entrepreneurs like

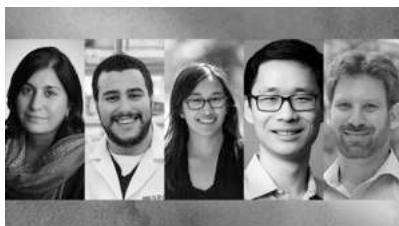
- **Frances Arnold**, Nobel Prize in Chemistry
- **H. Robert Horvitz**, Nobel Prize in Physiology or Medicine
- **Roderic Pettigrew**, Vannevar Bush Award
- **Heidi Williams**, MacArthur Fellow
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In 2021, the Society for Science is celebrating 100 years of championing science. Founded in 1921 as Science Service by journalist Edward W. Scripps and zoologist William Ritter, the Society communicates, fosters and advances the public understanding of science. In its first century of service, the organization published accurate, objective journalism in its *Science News* magazine, advised government agencies, cultivated the nation's top science talent and ignited a passion for science in generations of students.

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CELEBRATING A CENTURY

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TO THE GEORGE D. YANCOPOULOS  
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In the Category of  
**Robotics and Intelligent  
Machines**

**MICHELLE HUA**

Bloomfield Hills, Michigan

**Dilated Silhouette  
Convolutional Neural  
Network**

Booth ROBO033

**Regeneron** applauds the winner of the  
George D. Yancopoulos Innovator Award.

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# CONGRATULATIONS

## TO THE REGENERON YOUNG SCIENTIST AWARD WINNERS

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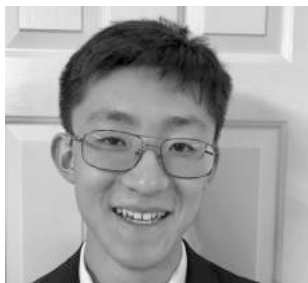
### CATHERINE KIM

Jericho, New York

**Computational Biology  
and Bioinformatics**

Hierarchical Prediction  
of Adverse Drug Reactions

Booth CBIO080



### DANIEL SHEN

Raleigh, North Carolina

**Systems Software**

AI-Powered Facial-cue  
Control Module

Booth SOFT012

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**Regeneron** applauds the winners of the  
Regeneron Young Scientist Award.

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# CONGRATULATIONS

TO OUR GORDON E. MOORE AWARD WINNER



**Plant Sciences**

**JOHN BENEDICT  
ALLASAS ESTRADA**

Fresno, California

**AI Model for Drought  
Stress Assessment  
in Plants**

Booth PLNT012

**Gordon and Betty Moore Foundation** applauds  
the winner of the Gordon E. Moore Award  
for Positive Outcomes for Future Generations.

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**CRAIG R. BARRETT  
AWARD  
FOR  
INNOVATION**



**ARYA TSCHAND**  
Lincroft, New Jersey  
**Engineering Mechanics**  
Low-Cost, High-  
Efficiency Irrigation  
Network  
Booth ENMC072

**H. ROBERT  
HORVITZ PRIZE  
FOR FUNDAMENTAL  
RESEARCH**



**NEHA MANI**  
New York, New York  
**Microbiology**  
Diagnostic Method  
Based on Bacterial  
Motion  
Booth MCRO043

**PEGGY SCRIPPS  
AWARD FOR  
SCIENCE  
COMMUNICATION**



**FRANKLIN WANG**  
Palo Alto, California  
**Physics & Astronomy**  
Asteroid Discovery  
with Synthetic Data  
& ConvNets  
Booth PHYS050

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**Society for Science** applauds these finalists  
for their achievements.



**SOCIETY  
FOR SCIENCE**

# Finalist Directory

## COUNTRIES, REGIONS, AND TERRITORIES PARTICIPATING IN VIRTUAL REGENERON ISEF 2021

### LEGEND

- Each # next to the finalist's name indicates previous ISEF participation
- "T" precedes the name of the Teacher-Sponsor of the finalist
- A "T" after the project ID number indicates a team project

### AMERICAN SAMOA

Pago Pago, American Samoa, TEAS01, American Samoa Science Fair

- BCHM031**    **How are Enzyme Reaction Rates Affected by Temperature and pH Levels?**  
Princess Jazzelle Franco Viesca, 15, Freshman, Princess Jazzelle Franco Viesca, 15, Freshman, Fa'asao Marist High School, Pago Pago, American Samoa, T: Cassandra Garcia
- EAEV119**    **Calculating Evapotranspiration on Tutuila Island with Python**  
# Victor Ruohao Chen, 18, Senior, Victor Ruohao Chen#, 18, Senior, Pacific Horizons School, Pago Pago, American Samoa, T: Karen Dizon
- MCRO061**    **How Effective are Expired Antibiotics in Killing *Escherichia coli*?**  
Gabrielle Vicencio Gayapa, 14, Freshman, South Pacific Academy, Pago Pago, American Samoa, T: Cecilia Tuionoula
- PLNT048**    **Determining the Effects of Moringa oleifera Leaves on the Growth and Yield of *Solanum melongena***  
Pearl Eunice Miranda Munoz, 16, Junior, Fa'asao Marist High School, Pago Pago, American Samoa, T: Cassandra Garcia

### ARMENIA

Yerevan, Armenia, ARMO02, Armenia Science Fair

- BMED060T**    **Diabetes Mellitus and Alcohol**  
Ani Geghamyan, 16, Junior, Anna Ghazaryan, 16, Junior, Anna Taroyan, 18, Senior, High School #118 after A. Yernknyan, Yerevan, Armenia, T: Nune Kocharyan
- EBED024T**    **Differentiation of Scents and Gases Using Neural Network**  
Davit Gyulamiryan, 18, Senior, Robert Simonyan, 18, Senior, Karen Aleksanyan, 18, Senior, Quantum College, Yerevan, Armenia, T: Grigor Aghababyan

### AUSTRALIA

Sydney, Australia, AUS002, Young Scientist

- ANIM006**    **The Survival of the Fairy: An In-Depth Survey into the Behavior and Life Cycle of the Sand Fairy Cicada, Year 3**  
Antonio Shane Rajaratnam, 18, Senior, Redeemer Baptist School, North Parramatta, NSW, Australia, T: Stuart Garth
- BEHA013**    **A Randomized Controlled Trial Evaluating the Differential Efficacy of *Ginkgo biloba*, Ginseng, *Curcuma longa* Linn. and Vinpocetine on Spatial Learning and Memory in Mice**  
Sarah Elise Hens, 19, Senior, Menai High School, Illawong, New South Wales, Australia, T: Ann Hanna
- CBIO001**    **Full versus Partial Vaccination for Meningococcal Meningitis: A Mathematical Model**  
Jemmima Grace Schembri, 18, Senior, Inaburra School, Bangor, New South Wales, Australia, T: Amy Homola

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# Finalist Directory

- CHEM006** **Determining the Rate Law of Crystal Violet and Sodium Hydroxide Using Alternative Methods**  
Yiting Shen, 18, Senior, Kambala School, Rose Bay, NSW, Australia, T: Kathryn Hillier
- EAEV001** **The Effect of pH on RNA Absorption and Liberation on Mineral Surfaces**  
Sarah Nolan, 18, Senior, Brigidine College Randwick, Randwick, NSW, Australia, T: Luke Steller
- ENBM012** **Cold Capping for Chemotherapy Patients**  
Safi Wheeldon, 18, Senior, Wenona School, North Sydney, NSW, Australia, T: Jan McNally
- ENMC001** **The CycleHub—A Prototype for the Future of Cycling**  
Liam Robert Davies, 19, Senior, Gosford High School, Gosford, NSW, Australia, T: Luke Shelley
- MATSO02** **Investigating the Relationship Between Carburising Time and Case Depth in Steel Case Hardened by Pack Carburising, Gas Carbonitriding and Cyaniding Techniques**  
Conrad Alexander Petrovic, 18, Senior, Broughton Anglican College, Menangle Park, NSW, Australia, T: Rahmi Jackson
- PHYS005** **A General Vector Theory of the Dynamics of a Rapidly Rotating Top**  
Alexander Simon Gray, 19, Senior, Barker College, Sydney, New South Wales, Australia, T: Matthew Hill
- Melbourne, Australia, AUS003, BHP Foundation Science and Engineering Awards**
- BCHM002** **Investigating the Effects of Disaccharides and Monosaccharides on the Rate of Respiration in *Saccharomyces cerevisiae* (*S. cerevisiae*)**  
Raihanah Nurul Jannah Pranggono, 18, Senior, Glenunga International High School, Glenunga, SA, Australia, T: Alex Turnbull
- CHEM007** **Thrown, but Will It Break Down?—A Study of the Correlation of the pH of Soil and Its Effect on the Rate at which Biodegradable Materials Decompose and the Application of the Findings of this Experiment in Landfills**  
Hadia Bizhan, 15, Freshman, Lyneham High School, Lyneham, ACT, Australia, T: Julie Collins
- EAEV007T** **An Investigation into *Salix fragilis* and the Subsequent Environmental Impacts of Its Introduction to the Tasmanian Landscape**  
Caitlin Marr, 16, Sophomore, Emily Walter, 17, Sophomore, St. Mary's College, Hobart, Tasmania, Australia, T: Heather Omant
- ENBM014** **The Giraffe Walker**  
Rebecca Paratz, 14, Freshman, LabRats Science Club, Wantirna, VIC, Australia, T: Caitlin Ingham
- PLNT002** **Variation in Flammability of Flora in the Sydney Sandstone Vegetation Community**  
Maja Dalby-Ball Olson, 18, Senior, Barrenjoey High School, Avalon, NSW, Australia, T: Milena Driscoll
- ROBO001** **RoboBall**  
Hannah Elizabeth Jones, 18, Senior, St Columba Anglican School, Port Macquarie, New South Wales, Australia, T: Justin Munro

## azerbaijan

### Baku, Azerbaijan, AZR001, Azerbaijan Science and Engineering Fair

- BMEDO08** **NIRS: An Innovative Approach to the Diagnosis of Neonatal Seizures**  
Faik Gasimov, 15, Sophomore, Baku European Lyceum, Baku, Absheron, Azerbaijan, T: Kamala Alasgarova
- BMEDO13T** **EMG Based Device that Converts Face Muscle Activity into Speech**  
Murad Mammadzade, 14, Freshman, Banuchichak Karimli, 16, Junior, High School #11, Sumgayit, Azerbaijan, T: Leyla Taghizade

# CONGRATULATIONS TO TOMMOROW'S SCIENTIFIC AND ENGINEERING LEADERS

**Rise**, a global community of exceptional young leaders, applauds all the 2021 finalists on their hard work, creativity, and dedication to further the fields of science, technology, engineering, and math.



# Finalist Directory

- CBIO012T**     **Chimeric RNAs and Proteins**  
Tamilla Suleymanova, 15, Sophomore, Rafsan Habibullayev, 15, Sophomore, Young Talents Lyceum, Baku, Azerbaijan, T: Ilham Shahmurodov
- MATH014**     **Solving Some of the Algebraic Equations Using Trigonometry**  
Rafiq Gasimov, 17, Junior, The Modern Educational Complex in Honour of Heydar Aliyev, Baku, Nasimi Region, Azerbaijan, T: Vugar Sardarov
- MATS003**     **The Hitchhiker's Guide to the Periodic Table: Which Superhard Inorganic Compounds Are Missing the Market?**  
Emin Khalifayev, 16, Junior, Educational Complex 132-134, Baku, Absheron, Azerbaijan, T: Francis Mang-Benza Dit Manthota
- ROBO010**     **Army Bot**  
Mahammad Abbasli, 15, Freshman, Lyceum Named after Academician Zarifa Aliyeva, Baku, Azerbaijan, T: Zaur Balagadashov
- SOFT007T**     **Creation and Application of Virtual Laboratory in Teaching**  
Ilkin Samedov, 15, Sophomore, Ali Akberzade, 15, Sophomore, High School #260, Baku, Azerbaijan, Young Talents Lyceum, Baku, Azerbaijan, T: Mubariz Khalilov

## BRAZIL

**Novo Hamburgo, Brazil, BRA001, International Fair of South America – MOSTRATEC**

- ANIM017T**     **Proprioceptive Treadmill with Sensors for Dogs**  
Isadora Luisa Scheffler Kortz, 19, Junior, Eduarda Schmachtenberg Farias, 19, Sophomore, Fundacao Escola Tecnica Liberato Salzano Vieira da Cunha, Novo Hamburgo, Rio Grande do Sul, Brazil, T: Julio Volmann Machado
- BEHA020**     **Reason and Passions in Hume's Morality**  
Lorenza Pabst Botton, 19, Senior, Instituto Federal de Educacao, Ciencia e Tecnologia do Rio Grande do Sul – Campus Bento Goncalves, Bento Goncalves, Rio Grande do Sul, Brazil, T: Franco Soares
- BEHA021T**     **Depression, the Great Evil of the Century: Evaluation of the Antidepressant Effect of the Macromolecule WRKY26 from Musa Paradisiaca Peel through Computer Programs**  
Ana Carolina Rossa Burato, 19, Senior, Artur Alano Daniel, 18, Senior, Colegio Murialdo, Ararangua, Santa Catarina, Brazil, T: Carlos Martins T: Carlos Martins
- BEHA022T**     **From the Valley of Poverty to the Valley of Opportunities: Transforming through Education**  
Jaqueline Lourenco Campos, 18, Junior, Larissa Tiemi Daikubara, 18, Junior, Instituto Federal de Educacao, Ciencia e Tecnologia de Sao Paulo, Campus Registro, Registro, Sao Paulo, Brazil, T: Ellen Batista
- EAEV054T**     **Package Reading and Interpretation, Agroxic Labels with the Use of Multimodal Texts**  
Samuel Cavalcante Silva#, 15, Sophomore, Gustavo Alves da Silva, 15, Sophomore, Sophia Lira de Paula Pinto, 15, Senior, Luiz Nunes de Oliveira, Palmas, Buritirana, Brazil, T: Rosielson Soares de Souza
- ENBM027T**     **Wise Hands: Tonic-Clonic Epileptic Crisis Alert Device**  
Isabella Correa Bauer, 19, Senior, Andressa Pinheiro Franca, 19, Senior, Fundacao Escola Tecnica Liberato Salzano Vieira da Cunha, Novo Hamburgo, Rio Grande do Sul, Brazil, T: Diego Moreira
- MATS009**     **Development of Biodegradable Packaging Foam Type from Different Starches, Phase II**  
Amanda Vitoria Elgert Becker, 15, Sophomore, Colegio Estadual Jardim Porto Alegre, Toledo, Brazil, T: Dioneia Schauen
- MATS010**     **Nanotechnology Biobased on the Petiole of (*Mauritia flexuosa*) for Application in Sustainable Design**  
Ana Beatriz Castro Silva, 16, Junior, Centro Educacional ArteCeb, Imperatriz, Maranhão, Brazil, T: Zilmar Soares

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# Finalist Directory

**TMED012T**     **Evaluation of Gherkin's (*Cucumis anguria* L.) Bioactive Potential Against Non-communicable Chronic Diseases**  
 Andre Victor Oliveira Avellar, 19, Senior, Victoria Barros dos Santos, 19, Senior, Instituto Federal de Educacao, Ciencia e Tecnologia do Rio de Janeiro, Rio de Janeiro, RJ, Brazil, T: Vivian Silva

**Sao Paulo, Brazil, BRA002, FEBRACE – Feira Brasileira de Ciencias e Engenharia**

**BEHA034**     **FIDERE: Circular Economy App to Support Thrift Stores and Women's Associations in the South of Brazil**  
 Victorya Leal Silva, 17, Junior, Instituto Federal de Educação, Ciência e Tecnologia do Rio Grande do Sul (IFRS)–Campus Osório, Osorio, Rio Grande do Sul, Brazil, T: Flavia Twardowski

**ENBM055**     **System for Inertial Data Collection and Data Visualization for Individualized Medicine with Focus on Parkinson's Disease**  
 Wanghley Soares Martins, 18, Senior, Instituto Federal de Educacao, Ciencia e Tecnologia de Brasília–Campus Brasília, Brasília, Distrito Federal, Brazil, T: Fabio Henrique Monteiro Oliveira

**ENEV055T**     **Using *Zophobas morio* to Build a Biodigester for Polymers Decomposition**  
 Alaide Hellen Silva, 17, Junior, Katrina Medeiros Viana, 17, Junior, Antonio Danilo Golncalves do Vale, 16, Junior, Escola de Ensino Medio Joaquim de Figueiredo Correia, Iracema, Ceara, Brazil, T: Karla Nobre de Oliveira

**ENEV056**     **Automated Water Analysis: A Water Drone Developed with Microcontrollers**  
 Rafaela Curcio, 18, Senior, ETEC Benedito Storani, Jundiaí, Sao Paulo, Brazil, T: Jose Cunha, Jr.

**ENMC065**     **The Development of a Low-Cost Open-Source Underwater Remotely Operated Vehicle for Coral Mapping**  
 Guilherme Beyruti Suranyi, 17, Senior, Colegio Santa Cruz, Sao Paulo, Sao Paulo, Brazil, T: Nathan Rabinovitch

**MATS027T**     **Evaluation of the Repellent Potential of Noni (*Morinda citrifolia*) Fruit Extract Applied in Food Packaging to Inhibit Weevils (*Sitophilus spp.* and *Tribolium castaneum*)**  
 Igor Guissani Bruno, 17, Senior, Diego Soares Soares Ribeiro, 18, Sophomore, Joao Victor Ramos Sidronio dos Santos, 17, Senior, Escola do SESI Aparecida do Taboado, Aparecida do Taboado, Mato Grosso do Sul, Brazil, T: Vinicius Machado

**MCRO034**     **Fungitoxic Potential of Different Plant Extracts on the *in vitro* Development of the Fungus that Causes Anthracnose in Banana Fruits, Phase IV**  
 Ana Carolina Goncalves Selva, 17, Senior, Colegio Estadual Jardim Porto Alegre, Toledo, Brazil, T: Dioneia Schauben

**PLNT023T**     **Alternative Technology for Crop Improvement and Potentiation of Secondary Metabolites in Coriander Plants through Dunaliella Salina Biomass Incorporated in Bioplastic Films, Phase II**  
 Nicole Melo de Almeida, 18, Senior, Yasmin Barreto Teles Fonseca, 19, Senior, Escola Djalma Pessoa –Sesi Bahia, Salvador, Bahia, Brazil, T: Fernando Moutinho

**SOFT033**     **Development of Immersive Technologies Applied to Astrobiology Teaching**  
 Henrique Rodrigues Hissa Amorim, 16, Senior, Colegio Dante Alighieri, Sao Paulo, São Paulo, Brazil, T: Tiago Bode

## BULGARIA

**Sofia, Bulgaria, BGR001, Bulgarian Science and Innovation Fair**

**BEHA006**     **Voice Emotion Recognition with Audio Data Analysis and Machine Learning Algorithms**  
 Gabriela Kunova Chavgovala, 18, Junior, Model High School of Mathematics "Akademik Kiril Popov", Plovdiv, Bulgaria, T: Stoyanka Zaharieva

**MATH009**     **Ranking of the Vertices in a Weighted Graph**  
 Anna Rosenova Mihalkova, 18, Senior, Sofia High School of Mathematics, Sofia, Bulgaria, T: Elena Kiselova

# CONGRATULATIONS TO OUR CATEGORY FINALISTS

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## Animal Sciences

Serena Ahmad	Amiris Guerrios Toledo	Natricha Punyainkaew
Ramiz Akbar	Alexandria Harper	Maiya Raghu
Lamya Al Handhali	Grace Helle	Antonio Rajaratnam
Marwa Al Handhali	Ann Itakura	Simren Samba
Jaiba Tahir Ali	Bryce Jacobs	Isabella Sanchez
Kellen Apuna	Laiba Fatima Kanchwala	Carissa Scheel
Nanami Arimura	Rohini Kilaru	Nathalie Schelin
Zarrin Askari	Fiona Kinney	Olga Scieszka
Kelsie Avery	Chloe Kirk	Jesse Shepherd
Caroline Bayer	Isadora Kortz	Isabel Sierra
Natthida Benjapiyaporn	Naipaphon Kumhom	Thanakorn Silaphan
Kristi Biswas	Shan Lateef	Trinity Skaggs
Madison Carson	Eva Ledvina	Joanna Sohn
Jenna Cecrle	Iling Low	Nonthaporn Srikha
Ying-Ru Chen	Varun Madan	Sarah Stutsman
Celyn Chng	Teeradon Manasviyoungkul	Li Ann Tay
Agnes Cho	Krish Mathur	Warakorn Thammawong
Braden Collard	Margaret Mattson	Talia Thornton
Kaitlyn Culbert	Ratchanon Metheesitthikun	Harmony Tracy
Aniruddha Das	Avery Miles	Pattarapoom Tubtim
Zack Dupre	Riko Nakajima	Ellie Vaserman
Karin Ebey	Wakana Nakayama	Swetha Velayutham
Eduarda Farias	Mateus Nascimento	Emily Weimer
Sharon Fernandez	Warinyupa Ngamjarenwong	Nanthawat Wiwatpisit
Lilly Figueroa	Clayton Nyiri	Thanyakorn Yantarasart
Nathan Foo	Avery Orth	Ella Yoder
Kyri Forman	Andrew Paget	
Anna Gibling	Vyshnavi Poruri	

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**Society for Science** applauds  
the finalists in Animal Sciences.



**SOCIETY FOR SCIENCE**

# Finalist Directory

- ROBO011**      **Limited Query Black-box Adversarial Attacks in the Real World**  
Hristo Todorov Todorov, 18, Junior, High School of Mathematics and Natural Sciences  
"Professor Emanuil Ivanov", Kyustendil, Bulgaria, T: Kamen Kotev
- ROBO014**      **Neural Abstract Reasoner**  
# Victor Stilianov Kolev, 18, Senior, Sofia High School of Mathematics, Sofia, Bulgaria,  
T: Elena Kiselova
- SOFT008**      **Heimdall: Detecting Malicious Behavior in USB Mass Storage Devices**  
# Ivan Petrov Zlatanov, 18, Senior, National Trade and Banking High School, Sofia,  
Bulgaria, T: Ana Yakimova

## CANADA

**Hamilton, Canada, CAN001, Bay Area Science and Engineering Fair**

- CHEM059**      **Diffusion Mechanism of Pu+3 in Sedimentary Repository Conditions: Ab Initio Molecular Dynamics Study**  
Becca Barbera, 16, Junior, Cathedral High School, Hamilton, Ontario, Canada,  
T: Vincent Lepore
- EAEV113**      **Predicting Mechanisms of Flood Vulnerability for Southeast Asia Using Statistical Percolation Theory**  
# Caroline Huang, 16, Sophomore, Abbey Park High School, Oakville, Ontario, Canada,  
T: Natasha Yhard
- EAEV115**      **A Novel and Low-cost Microfluidic-based *C. elegans* Electrotaxis Assay for Screening of Toxic Chemicals in Water**  
Neha Gupta, 16, Junior, Westdale Secondary School, Hamilton, Ontario, Canada,  
T: Bhagwati Gupta
- EGSD049T**      **Microwave Irradiation with Submerged Ultrasonication: A Novel Lignocellulosic Pretreatment Method**  
Julia Anne Seymour, 17, Senior, Rylan Quinn Donohoe, 17, Senior, Saint Ignatius of Loyola Catholic Secondary School, Oakville, Ontario, Canada, T: Erin Stewart
- ROBO079**      **FS HIVE MRK 12: An Autonomous Swarm Robotics Fire Suppression System**  
## Joseph Carmelo Saturnino, 18, Senior, Bishop Ryan Catholic Secondary School,  
Hannon, Ontario, Canada, T: George Geczy

**Pickering, Canada, CAN002, Youth Science Canada – Team Canada**

- BMED035T**      **Analysis of the Correlation Between Immunogenomic Phenotype and Patient Outcomes for Prostate Cancer**  
Haolin Li, 16, Sophomore, Jason Junwen Teng, 14, Freshman, Crescent School, Toronto, Ontario, Canada, T: Michael Jansen
- EAEV112T**      **A Novel Approach to Bio-Friendly Microplastic Extraction with Ascidians**  
Yuntong Li, 17, Junior, Rowan David Ross, 16, Junior, Burnaby North Secondary School, Burnaby, British Columbia, Canada, T: Mati Bernabei T: Jilly Shim
- MCRO035**      **Smiglacide-C: A Novel Antibacterial Saponin from *Annona muricata***  
## Dheiksha Sivashree Jayasankar, 16, Junior, Sir Winston Churchill Secondary School, St. Catharines, Ontario, Canada, T: Julie Bedard
- PHYS046**      **An Investigation of a Dark Sector Interaction Model to Solve the Hubble Tension**  
Angela Zitian Zhou, 16, Junior, Magee Secondary School, Vancouver, British Columbia, Canada, T: Colin Mayer
- ROBO049**      **FyreWatch: Deep Learning for Accurate Wildfire Environmental Conditions Detection**  
Gurik Mangat, 17, Junior, Semiahmoo Secondary School, Surrey, British Columbia, Canada, T: Susan Hunter
- TMED047**      **TeleAEye: Low-Cost Automated Eye Disease Diagnosis Using a Novel Smartphone Fundus Camera with AI**  
Tienlan Sun, 17, Junior, Eric Hamber Secondary School, Vancouver, British Columbia, Canada, T: Jayme Derrah

# Finalist Directory

## Montreal, Quebec, Canada, CAN004, Montreal Regional Science and Technology Fair

- CBIO074 Computer-Based miRNA Predictions to Inhibit SARS-Cov-2 Replication**  
Laurence Liang, 19, Senior, Marianopolis College, Westmount, Quebec, Canada,  
T: Angela Keane
- EBED025 Hide and Seek Help: Improved Key-Finder System for Visually Impaired People**  
Maria Bayder, 14, Freshman, West Island College, Dollard-Des Ormeaux, Quebec,  
Canada, T: Allan Tabatchnick
- SOFT045 MediGraph: A Novel Clinical Assistant from Automated Biomedical Literature  
Extraction and Knowledge Graphs**  
# Jordan Levett, 19, Senior, Vanier College, Saint-Laurent, Quebec, Canada,  
T: Lissiene Neiva

## CHINA

### China, CHN001, China Adolescents Science and Technology Invention Contest

- BCHM008 A Research on Natural Acne Ointment Based on Yam Mucin**  
Letong Jiang, 16, Junior, No. 2 High School of East China Normal University, Shanghai,  
China, T: Feng Qian
- BMED018 Adolescent Physical Fitness Improvement Training System**  
Jiayi Zheng, 16, Senior, Hefei No. 8 Senior High School, Hefei, Anhui, China, T: Lan Rong
- CBIO021 The Pattern of Age-related Height Loss: Evidence from a Study of Deep-learning  
Derived Phenotypes Based on Large-scale DXA Images**  
Yuhao Lu, 14, Sophomore, Shanghai Experimental School, Shanghai, China, T: Ming Pei
- CBIO023 Determination of the Key Parameters in SIR Compartment Model for Novel  
Coronavirus Pneumonia Propagation**  
Jiayi Zhai, 16, Junior, Hefei No 6 High School, Hefei City, Anhui Province, China,  
T: Kangsheng Bao
- CBIO032 The Early Control of China's COVID-19 Pandemic and Its Enlightenment**  
Ziyuan Su, 16, Junior, Nanjing Foreign Language School, Nanjing, Jiangsu, China,  
T: Zichun Hua
- CELL013 Changing Region on AAV-PHP.eB Brings Negative Effects on Human AAVR Binding**  
# Zhengjia Yuan, 17, Junior, Capital Normal University High School, Beijing, Beijing, China,  
T: Ling Li
- CHEM008 Photocatalysis Degradation of Oil-Polluted Water Enhancement via Pickering  
Emulsion Stabilized by TiO<sub>2</sub>**  
Mingyi Zhang, 18, Senior, The Experimental High School Attached to Beijing Normal  
University, Beijing, Beijing, China, T: Bo Li
- CHEM009T Zwitterionic Nanogel Grafted Polymer Porous Membrane for Emulsified Oil/Water  
Separation**  
Yu Ren, 18, Senior, Jingze Fang, 17, Senior, Ziye Xiao, 18, Senior, Suzhou No.10 High  
School of Jiangsu Province, Suzhou, Jiangsu, China, T: Xiaomin Qian
- EAEV011 Study on Protein Precipitation Methods of Wastewater in Sweet Potato Food  
Processing**  
Jinyi Xu, 16, Junior, No. 2 High School of East China Normal University, Shanghai, China,  
T: Yao Qu
- EAEV027 Effects of Elevated Temperatures on the Photodegradation of Pyrethroid Insecticides  
on Vegetable Leaves**  
Yixiao Yang, 16, Junior, The Experimental High School Attached to Beijing Normal  
University, Beijing, China, T: Xinghui Xia
- EBED007 Intelligent Infusion Detection and Accompanying System for Children**  
Chuqi Hu, 17, Junior, Xian Gao Xin No 1 High School, Xi'an, Shannxi, China,  
T: Gongen Han

# Finalist Directory

- EGSD013**  
# **Preparation of Ionic Liquids Modified Cathode Catalysts for PEMFC**  
Guo Li, 16, Junior, Beijing No. 166 High School, Beijing, China, T: Fan Zhang
- EGSD022**  
# **E-waste Derived Copper-based Catalysts Derived Toward Carbon-Neutral Electrochemical CO<sub>2</sub> Reduction**  
Juntao Wu, 17, Junior, Shanghai High School, Shanghai, China, T: Gengfeng Zheng
- ENBM028**  
# **Dual Mode Soft Wrist-Fingers Exoskeleton for Hand Rehabilitation and Assistance: Novel Soft Wrists, Optimized Soft Fingers, Multi-functional Rehabilitation**  
Keyu Wan, 16, Junior, Shanghai Pinghe Bilingual School, Shanghai, China, T: Jun Wu
- ENBM029**  
# **A Novel, Multifunctional Tracheal Tube Based on Directive Sound Wave Monitoring Technique**  
Yuqian Zhang, 18, Senior, The Affiliated High School of South China Normal University, Guangzhou, Guangdong, China, T: Xiaolan Yang
- ENEVO23**  
# **Filter-Free Air Filtration System Based on Nano Steam Technology**  
Ruixi Zhang, 16, Junior, Guangzhou No.16 Middle School, Guangzhou, Guangdong, China, T: Le Yang
- ENEVO24**  
# **Research on Aquaponics System Based on Artificial Intelligence**  
Runmin Wang, 17, Junior, Beijing 101 Middle School, Beijing, China, T: Lixia Ma
- ENEVO25**  
# **Enhancing Effectiveness of Medical Equipment for Filtrating and Sterilizing Aerosol**  
Zhiyu Cao, 17, Junior, The Affiliated High School of South China Normal University, Guangzhou, Guangdong, China, T: Xiaolan Yang
- ENMC018**  
# **Theoretical Simulation and Practical Fabrication of a Novel Vertical Axis Fan**  
Muyao Li, 17, Junior, No. 2 High School of East China Normal University, Shanghai, China, T: Zhenfeng Wang
- ENMC025**  
# **Using Semi Flexible and Deformable Bionic Crawler Robot to Adapt Complicated Terrains**  
Jiarong Sheng, 15, Sophomore, Shanghai Pinghe Bilingual School, Shanghai, China, T: Yinghe Lv
- ENMC026**  
# **The Underwater Magic Carpet: A Movable Underwater Platform Based on Bionic Cownose Ray**  
Tianqi Dai, 17, Junior, Beijing No. 4 High School, Beijing, China, T: Liyan Kong
- MATH021**  
# **A Linear Constraints Based Mathematical Model for Optimizing the Production Plan of a Mask Factory**  
Tingxi Zhang, 16, Junior, The Affiliated High School of South China Normal University, Guangzhou, Guangdong, China, T: Xiaolan Yang
- MATH022**  
# **Period-3 Point of Generalized Tent Mapping: Orbit Type and Stability Analysis**  
Yi Shuai, 18, Senior, Huayang High School, Chengdu, Sichuan, China, T: XiaoRong Zhang
- MATH024**  
# **The Mathematical Analysis of Claude Monet's Impressionistic Masterwork — Haystack**  
Ziyue Jiang, 15, Junior, Beijing No. 8 High School, Beijing, China, T: Laifu Liu
- MATSO08**  
# **Construction of Thermal Conductivity Measurement Platform Based on 3-Omega Method**  
Rundong Zhou, 16, Junior, Chongqing Bashu Secondary School, Chongqing, China, T: Xiaoyuan Zhou
- MCRO014**  
# **Exploring the Mechanism of Bacterium in Tumor Therapy: Comparison of Immuno-activity of Lipopolysaccharide from *Salmonella enterica* and *Salmonella typhimurium***  
Mingjiu Zhao, 17, Junior, Shanghai Foreign Language School Affiliated to SISU, Shanghai, China, T: Wei Ma
- MCRO015**  
# **Effects of *Pseudoxanthomonas* Combined with Other Beneficial Bacteria Against Pepper Fusarium Wilt**  
Yuhang Shen, 16, Junior, Beijing No. 4 High School, Beijing, China, T: Shuai Kang

# CONGRATULATIONS TO OUR CATEGORY FINALISTS

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## Behavioral and Social Sciences

Ahmad Al Mseidein	Rakin Faruk	Natalia Leon-Diaz	Brenda Romero-Torres
Zeina Al Sharaydeh	Mandy Feuerman	Aditya Mangalampalli	Samuel Rosner
Myrto Alexopoulou	Carly Friedman	Dante Martinez	Ana Rossa Burato
Layla Alkhatib	Ishani Ghosh	Emilin Mathew	Stefan Salaices
Noor Alkhatib	Bru Gomez Bonilla	Eden Maxwell	Madeline Santoso
Tamara Almubiden	Estella Guerin	Arjun Mazumdar	Sharanya Sharma
Rasha AlQahtani	Anika Halappanavar	Natalia McMorris	Aleksei Shremzer
Emam Alsaodi	Kathleen Hammett	Athifah Millati	Akul Shrivastava
Hamzeh Arabiyat	Sarah Hens	Gomana Mohammed	Victorya Silva
Omar Arafah	Noor Naila Himam	Jood Mohammed	Tuffy Simon
Ariana Arroyo Salazar	Phuc Hoang	Lauren Morgan	Malavika Singh
Mazyar Azmi	Jennifer Hu	Malak Naimi	Pranav Somani
Arjun Barrett	Chih-Hsien Huang	Adeline Norgaard	Isabella Souza
Blake Bernhardt	Kailani Ibanez	Divya Nori	Amalia Toutziaridi
Lorenza Botton	Mira Issa	Elenith Pacheco Ramos	Aditya Tummala
Lia Bu	Kadek Januarta	Wahyu Padma Baskara	Kosha Upadhyay
Rachel Buksbaum	Maria Jimenez Rojas	Tanvi Palsamudram	Ixlianis Valentin-Morales
Jaqueline Campos	Raeed Kabir	Vidhi Patel	Alexander Van der Merwe
Amanda Cao	Alexander Kesin	Sidhya Peddinti	Mai Vu
Karina Castaneda	Ju eun Kim	Bethany Poirier	Ibrahim Wahdani
Gabriela Chavgova	Seo Yeon Kim	Maieasha Rashid	Abigail Weaver
Larissa Daikubara	Yvonne Kim	Aranyo Ray	Nethmi Withanage
Artur Daniel	Naci Konar-Steenberg	Pavlina Refene	Paulina Wodarz
Anwasha Das	Dustin Kraft	Paola Rivera-Soto	Cheng-Ying Yu
Lucianna Davis	Alexander Lan	Alinne Romero-Torres	Bill Zhang

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**Society for Science** applauds  
the finalists in Behavioral and Social Sciences.



## SOCIETY FOR SCIENCE

# Finalist Directory

- MCRO016 Maintenance Mechanism of Health Nests of Pet Harvest Ants**  
Jiutong Wang, 16, Junior, Beijing No. 8 High School, Beijing, China, T: Yue Hou
- PHYS013 A Multifunctional Hamiltonian Mechanics Simulator and Some of Its Application Examples**  
Youqiu Zhan, 17, Junior, High School Affiliated to Shanghai Jiao Tong University, Shanghai, China, T: Qian Shao
- PHYS014 Non-linear Dynamics of Confined Leidenfrost Droplet: A Video-based Analysis**  
Tianrui Wu, 18, Senior, Hangzhou Foreign Languages School, Hangzhou, Zhejiang, China, T: Yan Xu
- PHYS022 Why Do Beginners Produce Noise Instead of Music When They Play Musical Instruments?—Taking Erhu for Example**  
Wanjia Fu, 16, Junior, Shanghai Foreign Language School Affiliated to SISU, Shanghai, China, T: Xiaoyuan Hou
- ROBO017 Cross-Age Face Recognition Based on Deep Neural Network with Multi-Stage Feature Decomposition**  
Xinyun Jiang, 17, Senior, Hangzhou Foreign Languages School, Hangzhou, Zhejiang, China, T: Yuntao Qian
- ROBO027 The Mind of Pixels: Video Aesthetic Feature Analysis Based on Graph Representation of Pixel Block Relations**  
Xiru Hou, 17, Junior, The High School Affiliated to Renmin University of China, Beijing, China, T: Xin Jiang
- ROBO028 Home Support System for ALS Patients Based on the Internet of Things**  
Jiayun Liu, 17, Junior, Quanzhou No.5 High School, Quanzhou, Fujian, China, T: Chunxu Haung
- ROBO029 Golf Swing Correction Based on Deep Learning Body Posture Recognition**  
Gaoyue Sun, 17, Junior, The High School Affiliated to Renmin University of China, Beijing, Beijing, China, T: Dan Wan
- SOFT010 CDD Model: A Cylinder Detector and Dewarper**  
Haoyun Qin, 16, Junior, Shanghai Foreign Language School Affiliated to SISU, Shanghai, China, T: Xiaoyang Wang
- SOFT016 A Hash Algorithm for Directory Tree**  
Linzhou Jiang, 17, Senior, Chengdu No. 7 High School, Chengdu, Sichuan, China, T: Hongyou Li
- SOFT017 Magic-Beijing-Mirror: Facilitating Beijing Opera via a Real-Time Interactive Opera Making up System**  
Shirui Gao, 16, Sophomore, Beijing No. 2 Middle School, Beijing, China, T: Kai Gao
- SOFT018 A Two-Step Approach to Effectively Find Analogies in Knowledge Graphs**  
Xuerui He, 16, Junior, No. 2 High School of East China Normal University, Shanghai, China, T: Beiyu Ye
- TMED014 A Hopeful SSc Drug: Immune Regulation of Astragalus (Huangqi) in the Treatment of Systemic Sclerosis (SSc)**  
Yexin Li, 17, Junior, Shanghai Foreign Language School Affiliated to SISU, Shanghai, China, T: Jiucun Wang
- Chengdu, China, CHN008, Sichuan Science Fair**
- CBIO026 MULTI-DEEPNet: A Novel Weakly-Supervised Multi-Task and Multi-View Deep Learning Model for COVID-19 Diagnosis from CT Images**  
Richard Xue, 16, Sophomore, Shanghai American School—Puxi Campus, Shanghai, China, T: Yi Guo
- ENBM033T Test of Gross Motor Development: Evaluation through AI Image Processing and Wearable Sensors**  
Emma Aiming Li, 17, Junior, Sophie Ge Li, 15, Sophomore, Shanghai High School International Division, Shanghai, China, T: Lin Chen

# Finalist Directory

- MCRO009** **Potential Probiotic Therapy of Inhibitory Commensal *S. epidermidis* on Decolonization/Treatment of MRSA and *C. acnes* and Their Infections**  
# Vincent Zhong Xin, 17, Junior, Shanghai American School—Puxi Campus, Shanghai, China, T: Gregory Rose
- SOFT019** **An Intelligent Assistive Human Emotion Recognition and Adjustment System**  
Yixiu Li, 17, Junior, Shanghai SMIC Private School, Shanghai, China, T: Jamie Hutt
- TMED019T** **An Atypical Cure for Atopic Dermatitis: Investigating the Effects of L-Histidine on Filaggrin Expression**  
Chaejeong Hyun, 17, Senior, Ivan Lee, 18, Senior, Concordia International School Shanghai, Pudong, China, T: Daniel Barrientes

## CHINA, HONG KONG SPECIAL ADMINISTRATIVE REGION

Hong Kong, China, Hong Kong Special Administrative Region, HKG001, Hong Kong S&T Invention Contest

- BMEDO05T** **Leukemia War: Rise of White Grape-Tea**  
Ka Hei Wong, 17, Junior, Wai Ming Bella Lam, 16, Junior, Hoi Ching Yeung, 17, Junior, The Chinese Foundation Secondary School, Hong Kong, China, Hong Kong Special Administrative Region, T: Tik Shun Ho
- ENEVO40T** **A Practical Alginate-based Synthetic Differentially Permeable Membrane for Metal Ions Separation**  
Chiu Ming Kwan, 17, Junior, Ka Pui Ngan, 17, Junior, Mingxin Liu, 16, Junior, King's College, Hong Kong, China, Hong Kong Special Administrative Region, T: Bob Lui
- MATH004** **An Innovative Conversion from Decimal to Gray Code: Inspired by Chinese Rings**  
Tsz Tung Tsei, 19, Senior, Maryknoll Fathers' School, Hong Kong Special Administrative Region, T: Yuen Man To
- ROBO006** **Magnetically-Powered Multi-Segment Degradable Microswimmer**  
Michael Ho-Cheung Sun, 17, Junior, King George V School, Hong Kong, Hong Kong, China, Hong Kong Special Administrative Region, T: Dong Sun
- ROBO007** **COVID-19 Chest X-ray Images: Lung Segmentation and Diagnosis Using Neural Networks**  
Alan Zhang, 17, Senior, Chinese International School, Hong Kong, China, Hong Kong Special Administrative Region, T: Chong Chen

## CHINA, MACAO SPECIAL ADMINISTRATIVE REGION

Macao, China, Macao Special Administrative Region, MAC001, Macao Region Science Fair

- BMEDO29T** **4-Cryptochlorogenic Acid Positively Regulates Pigmentation via Inducing Melanoblast Specification and Melanin Synthesis in Zebrafish Embryos and B16F10 Cell**  
Run Ying Li, 16, Junior, Lok Hei Gu, 15, Sophomore, Chi Kei Lam, 15, Sophomore, Escola Kao Yip, Macao, China, T: Wai Lam Chao
- EGSD005** **Modulating Surface Reconstruction of Nickel Cobalt Phosphide by Iron Incorporation Enhancing ORR/OER for Hybrid Sodium-air Battery**  
# Jeremy Hu, 18, Senior, Pui Ching Middle School, Macao, China, Macao Special Administrative Region, T: Ka Kong Chan
- ENEVO46T** **A New Concept of Packaging – Solving the Problem of Excessive Plastic**  
Chi Mei Lam, 15, Sophomore, Helen Ngie#, 15, Sophomore, Weng Hei Lau, 15, Sophomore, The Affiliated School of the University of Macao, China, Macao Special Administrative Region, T: Ka Man Wong
- ENMC012T** **An Analysis and Optimization of Double Parallelogram Lifting Mechanism**  
# Su Fong, 17, Junior, Keng Hang Tang, 16, Sophomore, Hei I Lei#, 17, Senior, Pui Ching Middle School, Macao, Macao, China, Macao Special Administrative Region, T: Hao Nian Min

# Finalist Directory

- MATS021T**     **Supramolecular Aggregation and Fusion of Lysosomes for Improving Cellular Defense Against Bacteria**  
 # Sap Tou Lao, 16, Junior, Hong U Fong#, 16, Junior, Pui Ching Middle School, Macao, Macao, China, Macao Special Administrative Region, T: Weng Si Kou
- ROBO008T**     **A Self-Adaptive Intelligent Inspection System for Polar Palaeoenvironment Research**  
 Hou Hei Lam, 17, Junior, Chi Weng Fong, 17, Junior, Maggie Xie, 16, Junior, The Affiliated School of the University of Macao, Macao, China, Macao Special Administrative Region, T: Yan Long Lin

## Chinese Taipei

Taipei, Chinese Taipei, TWN001, Taiwan International Science Fair

- ANIM024**     **Exploring the Role of Frazzled in *Drosophila* Neural Circuit Assembly and Foraging Behavior**  
 Ying-Ru Chen, 17, Junior, The Affiliated Senior High School of National Taiwan Normal University, Taipei City, Chinese Taipei, T: Suewei Lin
- BEHA019T**     **Investigate the Assimilation and Contrast Effects on Color Induction with Color Discrimination Paradigm**  
 Cheng-Ying Yu, 17, Junior, Chih-Hsien Huang, 17, Junior, Taipei First Girls High School, Taipei City, Chinese Taipei, T: Yi-Yi Hsu
- BMED015T**     **Anti-inflammatory Effects of the Biflavonoid Biflata on Macrophage**  
 Chian-Ruei Chen, 18, Senior, Yun-Ting Yeh, 18, Senior, Taipei First Girls High School, Taipei, Taiwan, T: Yu Ling Lin
- CHEM016T**     **A Pentiptycene-Anthracene Hybrid Smart Fluorescent Material**  
 Catriona Tingsea Wu, 17, Junior, Jeannine Lee, 17, Junior, Taipei First Girls High School, Taipei, Taiwan, T: Jye-Shane Yang
- EAEV020**     **Rotation of Inner Eyewall within Double-Eyewall Typhoons**  
 Yi-Sin Tsang, 18, Senior, The Affiliated Senior High School of National Taiwan Normal University, Taipei City, Chinese Taipei, T: Hung-Chi Kuo
- EGSD012**     **Toward Designing an Omni-directional Vertical Axle Wind Turbine**  
 Ting-Ru Chen, 18, Senior, Taipei First Girls High School, Taipei, Taiwan, T: Chien Li Hsien
- MATH011**     **Enumeration of Polygon Dissections with Prescribed Conditions**  
 Tzu-Hsuan Chiu, 17, Junior, Taipei First Girls High School, Taipei, Taiwan, T: Pei-Kai Liao
- MATH012**     **Turning Grids into Forests**  
 Ting-Yun Su, 17, Junior, Taipei Municipal Jianguo High School, Taipei City, Chinese Taipei, T: Huang Shih-Yin
- PHYS019**     **A Laser Spot as a Line Thermal Gradient Sensor for Non-Equilibrium Complexes**  
 Yu-You Luo, 17, Junior, National Chiayi Senior High School, Chiayi City, Taiwan, T: Wen-Teng Lee
- ROBO022**     **Non-invasive Autonomous Anemia Screening Using Conjunctival Images**  
 I-Ning Tsai, 16, Junior, Taipei Municipal Zhongshan Girls High School, Taipei City, Chinese Taipei, T: Sheng-Lung Huang

## COLOMBIA

Medellin, Colombia, COL001, Colombia Science & Engineering Fair

- EGSD017T**     **Obtainment of Briquettes Made of Coffee Husk as an Alternative of Heat Energy to the Use of Coal**  
 Juan Camilo Soto Marulanda, 17, Junior, Ana Maria Garcia, 17, Junior, Santiago Vallejo, 17, Senior, Institucion Educativa Colegio Loyola para la Ciencia y a Innovacion, Medellin, Antioquia, Colombia, T: Robinson Salazar Diaz

# CONGRATULATIONS

## TO THE FIRST PLACE CATEGORY WINNER

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**Biochemistry**



**MAYA SONAL BUTANI**

Moorestown, New Jersey

Novel Plant-Derived Tissue  
Engineering Scaffolds

Booth BCHM028

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**Regeneron** applauds the finalists  
in Biochemistry.

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# Finalist Directory

## CZECH REPUBLIC

Prague, Czech Republic, CZE001, Students' Professional Activities (SPA)

**CELLO08**      **Examining the Effect of Fibroblast Growth Factors on Development of Mammary Gland in 3D Cultures**

Ema Grofova, 18, Junior, Gymnazium Matyase Lercha, Brno, Moravia, Czech Republic,  
T: Martin Krejci

**ENMC021**      **Improving Print Quality, Precision and Repeatability of Open Source MSLA 3D Printer**

Adam Schuppler, 19, Junior, Gymnazium a SOS Plasy, Plasy, Plzensky kraj, Czech Republic, T: Libor Jelinek

**PLNT007**      **The Role of Phytochromes in Regulation of Auxin Transporter Expression in Hypocotyls of *Solanum lycopersicum* L.**

Anna Hyskova, 19, Senior, Gymnazium J. A. Uhersky Brod, Czech Republic,  
T: Martin Fellner

Prague, Czech Republic, CZE002, AMAVET Czech Republic Science Fair

**BCHM027**      **Assessment of Selected Fatty Acids in Human Breast Milk Using GC-FID**

Tereza Jaklova, 18, Senior, Gymnazium Aloise Jiraska v Litomysli, Litomyse, Pardubicky kraj, Czech Republic, T: Martina Kunderova

**SOFT050**      **Development of Procedurally Generated Game from Scratch Elenova**

Daniel Tefr, 20, Senior, Gymnazium Aloise Jiraska v Litomysli, Litomyse, Pardubicky kraj, Czech Republic, T: Martina Kunderova

## EGYPT

Cairo, Egypt, EGY001, Egypt Science and Engineering Fair — Cairo & Upper Egypt

**BEHA067**      **The Social and Psychological Problems that Facing Talented Involved Students in the Middle Schools**

# Gomana Abdelnaser Mohammed, 16, Sophomore, S.T.E.M. Luxor School, Luxor, Egypt,  
T: Sohair Ali

**BMED027**      **X Linked Retinitis Pigmentosa and Age-related Macular Treatment by Induced Pluripotent Stem Cells AMD / XLRP >> IPSC**

Maria Emad Youssef, 16, Junior, Azza Zidan Experimental School for Languages, El fayoum, Egypt, T: Enass Fathy

**CHEM055**      **Reuse CO<sub>2</sub> in Cement Industry to Decrease Its Effect as Greenhouse Gas as well as Using the Waste from Marble Cutting and Steel Slag instead of Polluting the Environment**

Zyad Emad Emad, 17, Junior, Red Sea STEM, Hurgada, Egypt, T: Malak Fahmy

**EGSD042T**      **Microbial Fuel Cells in Water**

Farah Ibrahim Abdelkader, 18, Junior, Alaa Maher Gaballah, 17, Junior, Maadi STEM School for Girls, Cairo, Egypt, T: Tarek Ibrahim

**ENBM070T**      **Medical Sensor**

Omar Mostafa Mahmoud Sharaf, 16, Junior, Saif Ahmed Abd El-Fattah, 17, Junior, 6 of October STEM Egypt School, Giza, Egypt, T: Esraa Mohamed

**ENBM081**      **SIMON Smart Deaf Speaker Device**

Sandy Salem Anwar, 17, Junior, Pioneer Integrated Schools, Cairo, Cairo, Egypt,  
T: Shaimaa El Badawi

**ENEV063**      **COD Decrement, Water Forever**

Mohamed Ashraf Abdelrazek, 17, Junior, Obour STEM School, Obour, Kalubya, Egypt,  
T: Shaimaa El Sayed

**TMED054T**      **Mom Care**

Steven Adel Ata Adel, 18, Senior, Abdel- Rahman Khaled Mohamed Mahmoud, 17, Senior, S.T.E.M. Luxor School, Luxor, Egypt, T: Mohamed Shahat T: Mohamed Nader

# Finalist Directory

## Alexandria, Egypt, EGY002, Bibliotheca Alexandrina Science and Engineering Fair – Alexandria

- BCHM021     The Usage of Moringa Seeds in Sewage Purification for Agriculture and Clean Energy Production**  
Fatma Ali Elbanna, 17, Junior, STEM School of Alexandria, Alexandria, Egypt, T: Eman Ali
- EAEV098     Enhancement of Binary Geothermal Power Plants by Using Nanoparticles and It's Application in Egypt**  
Yasmin Osama Hegy, 16, Junior, Kafrawy Language School, New Damietta, Damietta, Egypt, T: Eman El Dahshan
- ENEV067     Smart Electrical Device for Contamination Detection and Drinking Water Quality Monitoring**  
Omar Walid Elbehiry, 17, Senior, Abo Bakr Elsdeek Secondary School, New Damietta, Damietta, Egypt, T: Doaa Elemam
- ROBO062     Hard Mission Robot**  
Abd Elrahman Ahmed Draz, 17, Junior, Future International Schools Sadat City Branch, Sadat City, El Sadat, Egypt, T: Mohamed Elkaforay
- SOFT043T     Utilizing Computer Vision and Machine Learning Systems to Develop an Algorithm Helping Physically Disabled People to Use Computer**  
#  
Gasser Mohamed Galal, 17, Mostafa Ahmed Abdelmohymen#, 18, Senior, Elnasr Boys' School, Alexandria, Egypt, T: Effat Nasr

## ESTONIA

### Tartu, Estonia, EST001, Estonian Young Scientist Contest

- ENEV034T     The Use of Peat in Eliminating Environmental Pollution from Bodies of Water**  
Ats Oskar Laansalu, 19, Senior, Henri Pihelgas, 19, Senior, Tallinna Mustamäe Gümnaasium, Tallinn, Harju County, Estonia, T: Heli Stroom

## FINLAND

### Helsinki, Finland, FIN001, Finland National Science & Engineering Fair

- BCHM033     Investigating How Temperature Affects the Rate of Decomposition of Hydrogen Peroxide in the Presence of Catalase**  
Klaara Aurora Huima, 17, Senior, Helsingin Suomalainen Yhteiskoulu, Helsinki, Finland, T: Katariina Yliheikkilä
- MATH052     Understanding the Four Color Theorem and Attempts to Prove It**  
Alexander Liedtka, 18, Senior, Ressun Lukio IB World School, Kalevankatu 8-10, Helsinki, Finland, T: Chong Su
- PLNT052     Manifestations and the Evolutionary Background of the Fibonacci Sequence and the Golden Ratio in Plants**  
Sisu Lauri Henrikki Kiuru, 17, Junior, Classical High School in Tampere, Tampere, Finland, T: Elina Luoma-aho

## GEORGIA

### Tbilisi, Georgia, GEO002, Leonardo da Vinci Fair

- EGSD023T     Automated Hydrogen Generator for Perspective Fuel Cell**  
Nikoloz Tavidshvili, 19, Senior, Rostomi Nioradze, 17, Junior, The Georgian Patriarchate Tbilisi School of St. Ilia The True, Tbilisi, Georgia, Cervantes Gymnasium AIA-GESS, Tbilisi, Georgia, T: Teimuraz Chichua
- ENMC042T     Queue Control System**  
Nia Norakidze, 15, Sophomore, Dimitri Gulua, 17, Senior, Gigi Gugunava, 16, Junior, Cervantes Gymnasium AIA-GESS, Tbilisi, Georgia, St. Alexi Shushania's School-Gymnazium, Senaki, Samegrelo Zemo-Svaneti, Georgia, T: Davit Solgulashvili

# Finalist Directory

## GHANA

Accra, Ghana, GHA001, MISE Research Program

**CBIO009T Predicting the Likelihood of a Patient Developing Mild or Severe COVID-19 Symptoms Using Machine Learning**

Michael Mitchell, 18, Senior, Senam Ama Anaglate, 18, Senior, SOS-Hermann Gmeiner International College, Tema, Greater Accra Region, Ghana, T: Kwasi Adu-Berchie

**ROBO012 Optimizing Human Feedback in Reward Modelling**

Chioma Stella Opara, 14, Junior, Nigerian Tulip International Colleges, Abuja, Abuja, Nigeria, T: David Krueger

**ROBO013 Generating Police Sketches Using a Generative Machine Learning Algorithm**

Jangwon Seo, 18, Senior, SOS-Hermann Gmeiner International College, Tema, Greater Accra Region, Ghana, T: Karan Grewal

## GREECE

Athens, Greece, GRC001, Athens Science Festival

**BEHA071T FeelWrite: An Application to Improve our Mood and Mental Health**

Amalia Christina Toutziaridi, 16, Sophomore, Myrto Vasiliki Alexopoulou, 15, Sophomore, Pavlina Refene, 15, Sophomore, Athens College, Athens, Attica, Greece, T: Andreas Karampelas

**EGSD043T Solar Park with Photovoltaic 3D-printed Trees: Technology Allies with Nature**

Charikleia Moraitaki, 16, Junior, Maria-Eleni Batatoudi, 17, Junior, Athens College, Athens, Attica, Greece, T: Evangelos Kotronis

## GUAM

Mangilao, Guam, TEGU01, Guam Island-Wide Science Fair

**MATSO46 Developing a Flexible, Stretchable, and Conductible Polyurethane/Liquid Metal Composite for Future Electronics**

Kasey Xu, 16, Sophomore, St. John's School, Upper Tumon, Guam, T: Robert Alvarez

**PHYS077 Optimizing Astrophotography and Image Analysis of the Orion Nebula, Milky Way Stars, and the Moon in Guam**

Enqi Joseph Yang, 17, Junior, Harvest Christian Academy, Mongmong Toto Mai, Guam, T: Leah Bere

**PLNT047 Preventing Pseudococcidae Infestation by Strategical Plant Placement Based Upon the Photosynthates, Alcohol Content, and Acidity Level of *Solanum melongena*, *Abelmoschus esculentus*, *Citrofortunella microcarpa*, and *Origanum vulgare***

# Anica Bejerana Camacho, 16, Junior, Academy of Our Lady of Guam, Hagatna, Guam, T: Yvette Camisura

## HAITI

Port-au-Prince, Haiti, HTIO01, Expo-Sciences Haiti

**EAEV104T The Transformation of Household Waste into Combustible Briquettes**

Rolains Benjamin, 18, Senior, Ravelito Oculte, 19, Senior, Petit Seminaire College Saint-Martial, Port-au-Prince, Ouest, Haiti, T: Jude Pean

**ENEVO66T EcoAir: Biochar Low-cost Portable Purifier for Indoor Pollution**

Noah Araya Bigio, 16, Sophomore, Chloe Laplanche, 15, Sophomore, Nathalia Michelle Succar, 15, Sophomore, Union School Haiti, Petionville, Port-au-Prince, Haiti, T: Katarina Lafortune

**ROBO054T Smart Irrigation**

Christelle Marie Dheliene Jean, 16, Junior, Isabelle Marie Fredana Jean, 16, Junior, Tanoah Marcelin, 16, Junior, Institution du Sacre-Coeur de Turgeau, Port-au-Prince, Ouest, Haiti, T: Succes Auguste

# CONGRATULATIONS

## TO THE FIRST PLACE CATEGORY WINNERS

### Biomedical and Health Sciences



**ASHWIK AGRawal**

Cupertino, California

An Apparatus for  
Assessment of  
Respiratory Health

Booth BMED054



**ISABELLA MARY LILLIAN  
HEFFERNAN**

Riverside, Rhode Island

Peanut Allergy: Butyrate  
Therapy, Better Diagnoses

Booth BMED069

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**Regeneron** applauds the finalists  
in Biomedical and Health Sciences.

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# Finalist Directory

## HUNGARY

Budapest, Hungary, HUN001, Innovation Contest for Young Scientists

- ENMC037** **Making a Remote-controllable Mars Rover with the Main Functions of the Real Rovers**  
Matyas Rozsavolgyi, 18, Senior, Perintparti Szo-Fogado Szombathelyi Waldorf Ovoda, Altalanos Iskola, Gimnazium es Alapfoku Muveszeti Iskola, Szombathely, Vas, Hungary, T: Laszlo Meszaros
- MATH015** **The Contraharmonic Mean: Connections, Relations to Number Theory, Possible Generalizations**  
Sara Hargitai, 18, Senior, Godolloi Reformatus Liceum Gimnazium, Godollo, Hungary, T: Tamas Unyi
- SOFT025** **Rip Current Detection: An Orientation-aware Machine Learning Approach**  
Boglarka Ecsedi, 18, Senior, Istvan Bocskai Secondary Grammar School in Hajduboszormeny, Hajduboszormeny, Hajdu-Bihar, Hungary, T: Tibor Olah

## INDIA

New Delhi, India, INDO01, IRIS (Initiative for Research and Innovation in STEM)

- ANIM009T** **Experimentation on Larvicidal Activities of *Acacia auriculiformis* Dry Fruit Extracts on Different Life Cycle Stages of *Anopheles sp*, *Culex sp*, *Chironomus sp* and *Clogmia sp* for Showing Its Potential Ability as a Natural Sewage Treatment Agent**  
Aniruddha Das, 16, Sophomore, Ramiz Akbar, 16, Sophomore, Kaitha High School, Nalhati, Birbhum, West Bengal, India, T: Syed Ahmed
- BEHA009T #** **Autest: Culturally Adapted Risk Assessment Game for Autism Spectrum Disorder**  
Aranyo Ray, 18, Senior, Anwesha Das, 18, Senior, Kalyani Public School, Kolkata, West Bengal, India, Delhi Public School-Kalyanpur, Kanpur, Kanpur, Uttar Pradesh, India, T: Simran Bhatti
- BEHA010** **Using Response Times to Investigate the Face Recognition Mechanism in Developmental Prosopagnosia**  
Tanvi Palsamudram, 18, Senior, The International School of Bangalore (TISB), Bangalore, Karnataka, India, T: Joseph DeGutis
- BMED009** **Postpartum Cup: A Lifesaving Innovation for Realtime and Accurate Estimation of Obstetric Blood Loss in Postpartum Haemorrhage**  
Archit Rahul Patil, 15, Freshman, Kashinath Palod Public School, Jalgaon, Maharashtra, India, T: Sangeeta Khanna
- CBIO010** **ResPred: Biomarker Discovery and Antibiotic Resistance Prediction Through Machine Learning-based Genomic Analysis of *Neisseria gonorrhoeae***  
Rushank Goyal, 15, Sophomore, Rajeev Gandhi Higher Secondary School, Bhopal, Madhya Pradesh, India, T: Rashmi Chowdhary
- EAEV009** **Earthquake Magnitude and b Value Prediction Model Using Extreme Learning Machine**  
Gunbir Singh Baveja, 16, Junior, Delhi Public School, Dwarka, Delhi, India, T: Jaspreet Arora
- EAEV111T** **Forest Guard: An Integrated Sensor cum AI-based Fire-prone Area Mapping and Early Forest Fire Detection System with Real-time Fire Tracking and Prediction of the Direction of Spread through a Mobile User-app Interface**  
Utkarsh Mittal, 16, Junior, Rudransh Agnihotri, 16, Junior, Birla Vidya Niketan, New Delhi, Delhi, India, T: Navin Rajput
- EBED015** **"Raksha": System for Prevention of Electrocution and the Hazardous Effects of Short Circuits**  
Efraem Joji, 17, Senior, Devamatha CMI Public School, Thrissur, Kerala State, India
- ENBM016** **StethoDoc: Screening for Lung Disorders with an Augmented Reality Guided Smart Stethoscope**  
Aria Narayan Vikram, 16, Junior, National Public School, Indiranagar, Bangalore, Karnataka, India, T: B. Ramachandra

# Finalist Directory

**ENBM021 JTremor3D: A Wearable Tremor Profiling Device for Patients with Parkinson's Disease**  
Jui Abhijit Kesar, 15, Freshman, The Orchid School, Pune, Maharashtra, India,  
T: Sangeeta Kapoor

**ENBM048T Creating a Haptic 4D Model along with Machine Learning Analysis by Developing a Non-invasive Pressure Mapping Method to Screen Genital Skin Cancer**  
Aasimm Aarif Khan, 17, Junior, Sidharth Shekhar Jain#, 17, Junior, Jamnabai Narsee International School, Mumbai, Maharashtra, India, T: Reetu Jain

**ENEV012T Safe Disposal of Sanitary Napkins (Mensuburner)**  
Kritika Singh, 17, Junior, Presentation Public School, Jugial, Punjab, India,  
T: Kanchan Guleria

**MATH010 Cracking the Infinite Shuffle: Solving the Kimberling Sequence Problem**  
Niranjan Baskaran, 16, Junior, Gateway International School, Chennai, Tamil Nadu, India,  
T: Sangeetha Solomon

**MATH027 Diophantus Equations and Partially Ordered Sets**  
Addea Gupta, 18, Senior, Sanskriti School, New Delhi, Delhi, India,  
T: Roohollah Ebrahimian

**MATS005 Unique Sensor for Radiation Detection Applications**  
# Sahilkrishna Vazhathodiyil, 16, Junior, BVM Global Bollineni Hillside, Chennai, Tamilnadu, India, T: Latha Parameswaran

**PHYS007 Visual Appearance of Extended Objects in Special Relativity**  
Utkarsh Bajaj, 17, Senior, DPS International, New Delhi, Delhi, India, T: Seema Rawat

**PLNT003 In silico Genome-wide Study of NAC Gene Family in Brassica juncea (L.) for the Prediction of Abiotic-stress Responsive Genes**  
Shivam Rawat, 16, Senior, Jaycees Public School, Rudrapur, Uttarakhand, India,  
T: Savita Mehta

**SOFT029T A Web Application to Examine the Environmental Impact of Consumer Textiles and Provide Climate-conscious Recommendations**  
Siva Sainath Reddy Bandi, 15, Freshman, Anish Krishnan Ganesh, 17, Junior, Silver Oaks International School-Hyderabad, Hyderabad, Telangana, India, M.C.T.M Chidambaram Chettyar International School, Chennai, Tamilnadu, India, T: Neelima Valveti

**TMED003 Diagnosing the Stage of COVID-19 Using Machine Learning on Breath Sounds**  
Chinmayi Ramasubramanian, 15, Freshman, Sri Kumaran Children's Home-CBSE, Bangalore, Karnataka, India, T: Panish Ramakrishna

**TMED004 ADiag: Graph Theory and Deep Learning Based Diagnosis of Alzheimer's Disease**  
Vishnu Ram Sampathkumar, 17, Junior, National Public School, Indiranagar, Bangalore, Karnataka, India, T: Prizilla Fernandez

## INDONESIA

Jakarta, Indonesia, IDN001, Youth Science Competition

**BEHA025T The Impact of Women Flying Kites Community "Rare Angon Srikandi" to Teenager Girl's Attention on Gender Equality Education in Denpasar City**  
Kadek Januarta, 18, Senior, Wahyu Padma Baskara, 18, Senior, SMA Negeri 4 Denpasar, Denpasar, Bali, Indonesia, T: Ni Margiani

**EAEV031 Analysis of Potential Groundwater Availability Using Euclidean Distance in Yogyakarta Suburban City**  
Valencio Evanio Sahasika Kusumadyas, 17, Junior, SMA Negeri 3 Yogyakarta, Yogyakarta, D.I. Yogyakarta, Indonesia, T: Didik Purwaka

**EAEV043T Identification of Microplastics in Baby Fish Tuna (*Euthynnus affinis*) in Manis Market Purwokerto**  
Amira Kumala Syifa, 16, Junior, Edenia Evelina Larisa, 16, Junior, Al Irsyad Al Islamiyyah Senior High School Purwokerto, Purwokerto, Central Java, Indonesia, T: Nur Fitriani

# Finalist Directory

- ENEV033T    Synthesis of GO-CS (Graphene Oxide-Chitosan) Microparticle Composite as Pb (II), Zn (II), and Mn (II) Adsorbent**  
Christian Agung Novianto, 17, Senior, Steven Mathias Holme, 18, Senior, Regina Pacis High School, Bogor, West Java, Indonesia, T: Silvia Monica
- MATS019    Synthesis and Analysis of Graphene and Carbon Quantum Dots (CQDs) Composites Based on Epoxy Matrix**  
Mochamad Sutrimo Raharjo, 18, Senior, MAN 2 Kudus, Kabupaten Kudus, Central Java, Indonesia, T: Sri Indrawati
- MCRO019T    Algae Facade Technology in Improving Air Quality and Building Health: Analysis of Microclimate and Growth of *Aspergillus* sp**  
Muhammad Haikal Algifari, 18, Senior, Ridzik Malky Daniel, 16, Junior, SMA Sukma Bangsa Lhokseumawe, Lhokseumawe, Aceh, Indonesia, T: Fauza Azima
- SOFT021    3D Memory Bank: Memory Visualization Application with Open 3D Creation Software**  
Muhammad Atpur Rafif, 16, Junior, SMA Negeri 2 Depok, Depok, Jawa Barat, Indonesia, T: Mahmudah Cahyaningrum
- SOFT028T    Systematic Web-based Assessment of Medical Records and Mammography Image for Breast Cancer Likelihood Prediction**  
Azizah Auliani Rahma, 18, Senior, Sona Regina Salsabila, 19, Senior, SMA Negeri 1, Yogyakarta, D.I. Yogyakarta, Indonesia, T: Muhammad Yassirroni
- TMED023T    Primary Culture of Colorectal Cancer Cells from BALB/C Model Mice Induced by Diet High in Fat and 7,12-Dimethylbenz(a)anthracene (DMBA)**  
Siti Andriyani, 19, Senior, Nisrinah Nur Syarafina, 17, Senior, Madrasah Aliyah Negeri 2 Kota Malang, Malang, East Java, Indonesia, T: S. Fatiyatur Rahmah
- Jakarta, Indonesia, IDN002, Olimpiade Penelitian Siswa Indonesia**
- BEHA008T    Optimizing Students' Working Memory Capacity with Binaural Beats: An Experimental Study on SMA Negeri 28 Jakarta Students**  
Athifah Qonita Millati, 17, Senior, Noor Naila Imtinan Himam, 17, Senior, SMA Negeri 28 Jakarta, Jakarta Selatan, DKI Jakarta, Indonesia, T: Eri Yudatama
- EBED004T    Vanilla Breeding Smart Detector Gun**  
I Gusti Ngurah Sucahya Satria Adi Pratama, 17, Junior, Ni Putu Ari Budiani, 17, Junior, SMA Negeri Bali Mandara, Buleleng, Bali, Indonesia, T: Kadek Artama
- MCRO025T    Woplastic: Innovation of Self Degradable Plastic Diaper Wrappings**  
Hafidza Fatma Yona, 17, Senior, Siti Andriyani, 19, Senior, Madrasah Aliyah Negeri 2 Kota Malang, Malang, East Java, Indonesia, T: Fathor Rahman

## IRELAND

**Dublin, Ireland, IRL001, BT Young Scientist & Technology Exhibition**

- MATH046T    Analytical Solutions of Compartmental Epidemic Models and Their Application to Parameter Estimation**  
Yaduvir Harhangi, 17, Junior, Marton Andras Goz, 17, Junior, Synge Street CBS, Dublin, Leinster, Ireland, T: Kate Walsh

**Dublin, Ireland, IRL002, SciFest**

- EAEV076 Using Machine Learning to Improve Numerical Weather Prediction**  
Conor Timothy Casey, 18, Senior, Pobalscoil Inbhear Sceine, Kenmare, Kerry, Ireland, T: Sarah Abbott
- ENBM056T    Specs: A Wearable Smart Device for Dementia Patients**  
Dara Padraig Newsome, 17, Junior, Conor Patrick Bradshaw, 17, Junior, David Patrick Hughes, 17, Junior, Mercy Secondary School, Mounthawk, Tralee, Kerry, Ireland, T: Eimear Nolan
- ENBM059    Image Analysis of Rehabilitating Patients' Exercise to Measure and Improve Recovery**  
Caoimhin Iarlaith O'Leary, 17, Junior, Ardscoil na Mara, Tramore, Waterford, Ireland, T: Niamh Shannon

# CONGRATULATIONS

## TO OUR FIRST PLACE CATEGORY WINNERS

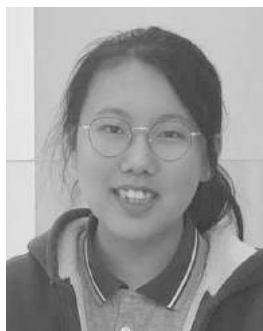
### Biomedical Engineering



**ISHAAN S. BRAR**

Bakersfield, California

Tesla Valve and Microporous  
Membrane Catheter  
Booth ENBM047



**KEYU WAN**

Shanghai, China

Dual Mode Soft  
Wrist-Fingers Exoskeleton  
Booth ENBM028

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**Johnson & Johnson** applauds the finalists  
in Biomedical Engineering.

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# Finalist Directory

## ISRAEL

Jerusalem, Israel, ISRO01, The Israeli Young Scientists Contest

**BMED048 Development of a Protocol for Simultaneously Sequencing Multiple Inherited Retinal Diseases' Founder Mutations**  
Sapir Shalom, 17, Senior, Israel Arts and Science Academy, Jerusalem, Israel,  
T: Mor Hanany

**BMED049 The Future of Cancer Treatment: Cancer Derived Exosomes In Angiogenesis**  
Guy Rosenfarb, 17, Senior, Shimon Ben Zvi High School, Givatayim, Israel,  
T: Shira Chorny

**CHEM042 Novel Ultra-Low-Density Nickel Aerogel**  
Omer Eyal, 17, Senior, The Hebrew University Secondary School, Jerusalem, Israel,  
T: Orli Metzger-Kahane

**EGSD037 Future Generation Batteries: Solid State Batteries**  
Ariel Gat, 18, Senior, Tamar Ariel (Shapira) School, Netanya, Tel Aviv District, Israel,  
T: Itzik Gvili

**PHYS048 Search for Bennu-like Main Belt Asteroids**  
Ariel Priel, 17, Junior, Yeshivat Bnei Akiva Givat Shmuel, Givat Shmuel, Central District, Israel, T: Orna Zeira

**SOFT035 Automated Conjecturing in Continued Fractions**  
Yahel Manor, 17, Senior, Leo Baeck Education Center, Haifa, Israel, T: Ruth Ash-Argyle

## ITALY

Milano, Italy, ITAO01, I Giovani e le Scienze

**CHEM021T CASH-LOCK: A Way to Find Out What You Are Wearing**  
# Alberto Racerro, 18, Senior, Elisa Destro#, 19, Senior, Bibiana Dellavalle#, 18, Senior, Istituto Superiore Ascanio Sobrero, Casale Monferrato, Italy, T: Federica Borasi

**ENBM083 EyesDrive: A Novel, Non-invasive, Brain-Computer Interface for Paralysis Sufferers**  
Federico Runco, 19, Senior, Istituto Superiore Ascanio Sobrero, Casale Monferrato, Italy, T: Monica D'Urso

**ENEV075T Healir: An Innovative Smart and Intelligent Air Filter**  
Matteo Grondona, 16, Senior, Martina Rattini#, 16, Senior, Edward Levi Burns#, 17, Junior, I.I.S.A.Maserati, Voghera, Pavia, Italy, T: Marialuisa Castoldi

**PLNT030T Hybrid Autonomous Living System**  
Joao Vitor Sinigardi, 18, Senior, Matteo Bigi, 18, Senior, Luca Giuliani, 19, Senior, IS "Enrico Fermi", Mantova, Italy, Istituto Superiore "Enrico Fermi", Mantova, Italy, T: Mauro Grandi

**ROBO050T N.I.M.P.H.A. (Neural Network Interface for Monitoring Plants via Hybrid Aircraft)**  
Matteo Girelli, 18, Senior, Nicola Bormolini, 18, Senior, Istituto Rainerum – Salesiani Don Bosco, Bolzano, Bolzano, Italy, T: Stefano Monfalcon

**ROBO081 Machine Perception: How Robots Navigate and Map the World**  
Patrick Turricelli, 18, Senior, Liceo Rinaldo Corso, Correggio, Italy, T: Erick Turricelli

## JAPAN

Tokyo, Japan, JPN001, Japan Students Science Awards

**ANIM021T Where Are They from? The Origin of Alien Cicada (*Graptopsaltria bimaculata*) in Izumi, Kagoshima, Japan**  
Nanami Arimura, 18, Senior, Riko Nakajima, 18, Senior, Ann Itakura, 18, Senior, Kagoshima Prefectural Kokubu High School, Kirishima City, Kagoshima, Japan, T: Katsuki Komizo

**CHEM035 A New Method for the Selective Synthesis of Indirubins**  
Shun Tanaka, 16, Freshman, Fuzoku Middle School Attached to Naruto University of Education, Tokushima City, Tokushima, Japan, T: Yukitaka Hayafuji

# Finalist Directory

**EAEV032      How Do We Save Our Lives? Discovery of Realistic Evacuation Issues and a Proposal of New Solution**

Koya Takahashi, 18, Junior, Tosa High School, Kochi, Kochi, Japan, T: Fumio Takeda

**PHYS024T      Mechanism of Supernumerary Rainbows**

Takuto Murata, 17, Junior, Kenta Mizuyoshi, 18, Junior, Saitama Prefectural Yono High School, Saitama, Japan, T: Toshio Ishii

**PLNT024      Mushrooms Wear Sand Grains for Survival: A Strategy of *Marasmiellus mesosporus* on Beach**

Shohei Wada, 19, Senior, Kobe Gakuin University High School, Kobe-shi, Hyogo, Japan, T: Takamasa Takada

**SOFT022      Supporting People Working with Disabled People Towards an Inclusive Society**

Keidai Toyoshima, 19, Senior, Senior High School at Komaba, University of Tsukuba, Setagaya-ku, Tokyo, Japan, T: Chiyoko Hayakashi

Tokyo, Japan, **JPN002, Japan Science & Engineering Challenge**

**ANIM022      How Do Butterfly Wings Repel Water? The Relationship between Super-Hydrophobicity and the Fine Structure Common to Butterflies**

Wakana Nakayama, 18, Senior, Kobe University Secondary School, Kobe, Hyogo, Japan, T: Takuya Yamamoto

**CHEM022T      Improvement of Hydrolysis Efficiency of Cellulose Using Ionic Liquids for Efficient Bioethanol Production**

Yuri Muto, 18, Senior, Nanami Kanzaki, 18, Senior, Kazuki Toida, 18, Senior, Aichi Prefectural Ichinomiya Senior High School, Ichinomiya-City, Aichi-Pref., Japan, T: Masaki Inamori

**CHEM030T      Separation and Nondestructive Identification of Solid Particles by NeFeB Permanent Magnets with Microgravity: Toward "Solid-State Version Chromatography"**

Keita Maishi, 19, Senior, Yuichirou Okuno, 18, Senior, Mai Fujitani, 18, Junior, Kasugaoka Senior High School of Osaka Prefecture, Ibarakishi, Osaka, Japan, Otemae Senior High School The Evening Course, Osaka City, Osaka Prefecture, Japan, T: Keiji Hisayoshi

**EGSD016T      Photochemical Hydrogen Production Using Tea Leaf Residue and Iron Ions**

Rio Tanimoto, 17, Junior, Ryo Mochizuki, 17, Junior, Hibiki Tanaka, 17, Junior, Shizuoka Kita High School, Shizuoka-City, Shizuoka-Pref., Japan, T: Yuji Takagi

**MATH025      An Expansion of "Buffon's Needle" to Higher Dimensions: Computational Theory of Probability Using Figures and Its Application to Geometry**

Haruki Sato, 18, Senior, Nara Women's University Secondary School, Nara-City, Nara-Pref., Japan, T: Shinji Kawaguchi

**PHYS025T      Performance Evaluation of a Supercomputer Made from Discarded PCs**

Kosuke Oya, 17, Junior, Toshifumi Komatsu, 17, Junior, Yasutaka Tokumaru, 17, Junior, Makuhari Senior High School, Chiba, Chiba, Japan, T: Bunji Suzuki

**PHYS026T      Designing Cups to Adjustable to the Changing Temperatures of Viscous Liquids**

Mana Kawano, 18, Senior, Motoka Nagata, 19, Senior, Hiroshima University High School, Hiroshima, Japan, T: Kosei Kajiyama

**PHYS042T      Measurement of Film Thickness of Antibubble Using Interference of Transmitted Light**

Chika Enomoto, 18, Senior, Yui Tokimoto, 18, Senior, National Institute of Technology, Tsuyama College, Tsuyama City, Okayama, Japan, T: Makoto Sato

## JORDAN

Amman, Jordan, **JOR001, Science Fair of The Jordanian Ministry of Education**

**BEHA029      Be Better**

Ibrahim Ahmad Wahdani, 16, Junior, Jubilee School, Amman, Jordan, T: Sawzan Abu Jammaah

# Finalist Directory

- BEHA040T    Silence: A Novel Method of Communication for MND and MS Patients Using Eye Movements**  
Hamzeh Yahia Arabiyat, 16, Junior, Omar Mazen Arafeh, 17, Junior, Jubilee School, Amman, Jordan, T: Sawsan Abu Jammaah
- BEHA041T    Smart Wallet for Blind People**  
Noor Nasser Alkhatib, 15, Sophomore, Layla Nael Alkhatib, 15, Sophomore, Al-Hoffaz Academy, Amman, AlMoqablain, Jordan, T: Sajedah Mansour
- BEHA042T    Application for Screening Attention Deficit Disorder (Inattentive ADHD (ADD))**  
Zeina Ahed Al Sharaydeh, 17, Junior, Jood Faisal Mohammed, 16, Junior, Jubilee School, Amman, Jordan, T: Sawsan Abu Jamaah
- BEHA043T    Down Syndrome Smart Watch**  
Emam Ahmad Alsaodi, 14, Freshman, Ahmad Talib Al Mseidein, 14, Freshman, Abu Baker Al Sdeeq, Tafilah, Jordan, T: Khalid Al Zadaneen
- BEHA068    Early Diagnosis of Children Developmental Delay**  
Tamara Rasmi Almubiden, 12, Freshman, Alridwan Schools, Amman, Amman, Jordan, T: Basma Diab
- CHEM031T    High Efficiency Adsorption of Methane Using Modified Activated Carbon and Modified Clinoptilolite**  
Sarah Osama Abdallah, 16, Junior, Fares Amer Qtaishat, 16, Junior, Jubilee School, Amman, Jordan, T: Sawsan Abu Jammaah T: Sawsan Abujammaah
- ENBM058T    SFAD: Spoiled Food and Allergy Detector**  
Salma Omar Al-Shaghnobi, 13, Freshman, Jana Kamal Al-alaween, 14, Freshman, Bunat Alghad Academy, Amman, Jordan, T: Liza Al-Adwan
- ENBM092T    Medical Car**  
Diya'a Alhaq Abdullah Meza'l Al-Shabatat, 15, Sophomore, Hazem Nader Alsawalqah, 16, Sophomore, King Abdullah II School for Excellence, At-Tafilah, At-Tafilah, Jordan, T: Ahmad Alshabatat
- ENBM103T    Measuring Blood Glucose Level by Acetone Concentration in Exhaled Air**  
Salma Abdulmajeed Al-Amr, 17, Junior, Noor Kamal Almasri, 16, Junior, Jubilee School, Amman, Jordan, T: Sawsan Abu Jammaah
- ENBM106    Smart Prosthetic Hand Helper**  
Mohammad Alzoubi, 17, Junior, Alramtha Secondary School, Irbid, Jordan, T: Omar Alzoubi
- ENEV045    Smart Green Organic Farm**  
Saja Obeidat, 17, Senior, Um-Alsummaq Southern Secondary School, Amman, Jordan, T: Ola Amr
- ENEV049T    A Robot Ultrasonic Pest Repellent**  
Mohammad Yahya Ismail Hammoudeh, 17, Junior, Wafa' Eslam Mohammed Hassan AlHayek, 17, Junior, Jubilee School, Amman, Jordan, T: Sawsan Abu-Jamma'ah
- MATS030T    Magnetite Nanoparticles Coated with Oleic Acid for Removal of Toxic Elements**  
Farah Fawwaz AlZaatreh, 17, Junior, Nagham Ala'a AlHourani, 17, Junior, King Abdullah II School for Excellence – Maddaba, Maddaba, Jordan, T: Mohammad Aljdou
- PHYS041    Alive Rover Wheel**  
AbdelRahman Iyad AlHroob, 16, Junior, Jubilee School, Amman, Jordan, T: Sawsan Abu Jammaah
- TMED036T    Liver Disease Artificial Intelligence Diagnosis through Fingernails**  
Suhaib Saeed Al-Fawara, 16, Junior, Mohammad Moayyad Ghanem, 17, Junior, Jubilee School, Amman, Jordan, T: Sawsan Abu Jammaah

# CONGRATULATIONS

## TO THE FIRST PLACE CATEGORY WINNER

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**Cellular and Molecular Biology**



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# Finalist Directory

## KAZAKHSTAN

Nur-Sultan city, Kazakhstan, KAZ001, DARYN National Junior Science Projects Competition

- MATH047 Ramanujan Congruences for Tangent Numbers**  
Medet Jumadildayev, 16, Sophomore, Nazarbayev Intellectual School of Physics and Math, Almaty, Kazakhstan, T: Ramazan Sultan
- ROBO085 Visual Sign Language Translator**  
Ilyas Serikovich Umurbekov, 18, Senior, Nazarbayev Intellectual School of Physics and Mathematics in Kokshetau, Kokshetau, Aqmola Region, Kazakhstan, T: Faizal Bhula

## LATVIA

Riga, Latvia, LVA001, National Centre for Education of the Republic of Latvia

- CHEM060 Local Strontium Ranelate Delivery Systems**  
Samanta Cvetkova, 18, Junior, Nereta Janis Jaunsudrabins' High School, Nereta, Aizkraukle District, Latvia, T: Viktorija Truksa
- ENBM082 Recombinant Expression of NT-2Rep-CT SpiderSilk Minispidroin**  
Marta Vecziedina, 18, Junior, Riga State 3rd Gymnasium, Riga, Riga, Latvia, T: Anita Rozenblate

## LUXEMBOURG

Luxembourg, Luxembourg, LUX001, National Contest "Jonk Fuerscher"

- CHEM050 Sulfur Dioxide Quantification: Improvements to the Classical Ripper Titration Using Colorimetric Analysis**  
Sarah Mackel, 17, Senior, International School of Luxembourg, Luxembourg, Luxembourg, T: Morgan Smith
- ENBM071 Device for Analysing Coughing Patterns to Diagnose and Monitor Asthmatic Patients**  
Elias Fizesan, 17, Junior, St. Paul's School, London, Barnes, United Kingdom, T: Tomi Herceg

## MALAYSIA

Federal Territory Putrajaya, Malaysia, MYS001, National Schools Science Innovation and Engineering Competition

- CHEM013 A Combination of nNeem and Clove in the Form of Cream Against *Tetraponera rufonigra***  
Yu Zhe Chu, 16, Sophomore, Chung Ling High School Penang, Georgetown, Penang, Malaysia, T: Whey Cheng Heah
- ENBM023T Stroke Rehabilitation Using Artificial Intelligence K.A.K.I (Kinesthetic Augmented Kinematic Inference)**  
Saan Cern Yong, 15, Sophomore, Sheng Ze Yeoh, 14, Freshman, Sekolah Menengah Kebangsaan Katholik, Petaling Jaya, Selangor, Malaysia, T: Voon Siew Yong
- ENMC022T Ferro-Oil Capsule (Encapsulated Recycle Oil with Ferric Oxide for Self-Healing Potholes)**  
# Nik Nurfarahana Tengku Rosman, 17, Junior, Nurul Fayyadhah Ahmad Zainudin#, 16, Junior, Sekolah Menengah Kebangsaan Kubang Bemban, Pasir Mas, Kelantan, Malaysia, T: Nor Zaihan Shamsudin T: Nor Zaihan Shamsudin
- MCRO065T EX-BAC: The Extraction of Chitin and Chitosan from the Waste of Shrimp Shells and Potato Peels Mix with  $\text{TiO}_2$  as an Eco-friendly and Effective Bacteriostatic Agent**  
Eugene Lim, 16, Junior, Daniel Yi Heng Leong, 16, Junior, Chung Ling High School Penang, Georgetown, Penang, Malaysia, T: Whey Cheng Heah
- PLNT008T Garlic and Ginger Combined Crude Extract as a Novel, Cost-Effective and Eco-Friendly Locust Repellent**  
Bo Wei Lai, 17, Junior, Chuen Keat Tan, 16, Junior, Chung Ling High School Penang, Georgetown, Penang, Malaysia, Chung Ling High School, Ayer Itam, Penang, Malaysia, T: Whey Cheng Heah

# Finalist Directory

- TMED011T**    **Plectra Gold: Herbal Honey Formulation as an Effective Relief for Common Respiratory Diseases such as Flu, Cough and Sore Throat**  
Abhirami Ramachandran, 15, Sophomore, Mahisha Kaur Dalvendar Singh, 15, Sophomore, Kanimolee Saminatha Kumaran#, 15, Freshman, Sekolah Menengah Kebangsaan Jalan Empat, Bandar Baru Bangi, Selangor, Malaysia, T: Sumathy Raghavan

## MEXICO

**Puebla, Mexico, MEX003, Mexico National Science Cup**

- BMED085T**    **Flours Prepared Without Gluten “Mezky”**  
Laisha Vázquez Murrieta, 16, Freshman, Alexia Sarahi Cerezo Cruz, 17, Freshman, Colegio de Estudios Científicos y Tecnológicos del Estado de Puebla, Tecamachalco, Puebla, Mexico, T: Marycarmen Alducin Jiménez
- BMED086T**    **Hypoglycemic Gummy from Prickly Pear, Nopal, Gelatin, and Aloe as a Supplement Alternative for Type II Diabetes Mellitus**  
Aylin Lizeth Mendoza Lopez, 18, Freshman, Jezabed Alexandra Gómez Flores, 18, Freshman, Annex School to the Normal High School of Teotihuacan, Estado de Mexico, Teotihuacan, Mexico, T: Magdalena Hernandez Aguilar
- EAEV126T**    **Biodegradable Film Based on Banana Peel, Cornstarch and Glycerin**  
Daniel Rodriguez, 16, Junior, Dannai Rojas, 17, Junior, Colegio de Estudios Científicos y Tecnológicos del Estado de Puebla Plantel Magdalena, Acajete, Puebla, Mexico, T: Oscar García
- EAEV127T**    **Edible Spoon Made from Cereals, Seeds and Natural Gums**  
Diego Castillo, 17, Senior, Colegio de Estudios Científicos y Tecnológicos del Estado de Puebla Plantel Cholula, Cholula, Estado, Mexico, T: Paulina Albores

## NIGERIA

**Benin City, Nigeria, NGA003, Genius National Science Expo**

- ENMC078T**    **The Smart Electric Pressing Iron**  
Jimisola Somtochukwu Balogun, 15, Junior, Isaac Ayomide Olufunmiyi, 13, Junior, Doregos Private Academy, Lagos, West Africa, Nigeria, T: Oluseyi Lawal
- TMED063T**    ***Fiscus exasperata vahl*: A Therapeutic Approach to Hypertension and Diabetes**  
Colette Onyinyechukwu Eyemonu, 15, Junior, Oluseyi Esther Olufunmiyi, 12, Sophomore, Doregos Private Academy, Lagos, West Africa, Nigeria, T: Oluseyi Lawal

## NORWAY

**Oslo, Norway, NOR001, Norwegian Contest for Young Scientists**

- MATH030**    **Representing the Curvature of a Chain as a Graph Using High School Math and Physics**  
Victor Yash Klippgen, 19, Senior, Blindern VGS, Oslo, Norway, T: Emmanuelle Bjerkem
- MATH032**    **A Statistical Analysis of the Assumptions of Normality and Independence of Returns of the Black-Scholes Option Pricing Formula**  
Simran Sahajpal, 18, Senior, Lillestrom High School, Lillestrom, Viken, Norway, T: Siren Veflingstad

## OMAN

**Muscat, Oman, OMN001, The Omani National Science Faire**

- ANIM059T**    **Herbal Nanoparticles (Plant Crystals) and Extract—A Safe Alternative to Combat *Anopheles culicifacies* and *Aedes aegypti***  
Marwa Khalifa Al Handhali, 16, Junior, Lamya Hamed Al Handhali, 16, Junior, Habiba Mohammed Al Handhali, 17, Junior, Al-Ghubra Basic Education School for Girls, Ibra, North Sharqia, Oman, T: Asila Al Sibayi

# Finalist Directory

- ENEV083T**     **Employing Artificial Intelligence to Protect the Ras AL Hadd Turtle Reserve**  
Laila Khamis AlMukhaiti, 16, Junior, Sheyam Nasser Al-Ghailani, 17, Junior, Lubaba Bint Al-Harith, Sur, South Sharqiyah, Oman, T: Habiba AlKathiri

## PAKISTAN

Islamabad, Pakistan, PAK001, National Science and Engineering Fair Pakistan

- ANIM043T**     **Saving Cats from Dehydration by Balancing Their Diet**  
# Laiba Fatima Kanchwala, 16, Junior, Jaiba Tahir Ali#, 17, Junior, Aga Khan Higher Secondary School, Karachi, Sindh, Pakistan, T: Shaista Abid
- EBED021**     **Clozer: Brings You Closer to Your Loved Ones**  
Ali Raza, 18, Senior, Aga Khan Higher Secondary School, Karachi, Sindh, Pakistan, T: Irfan Abdullah
- EBED034**     **Assistive Tongue Operated Mouse**  
Saad Zahid, 16, Freshman, PakTurk International Schools and Colleges- Lahore, Lahore, Punjab, Pakistan, T: Bazla Sarwar
- ENEV086**     **Compostable Flame-resistant Hydrophilic Psyllium Paper with Strengthening Fibers of Banana and Paddy Husk**  
Maya Sohail, 15, Freshman, Pak Turk Maarif International Schools and Colleges, Karachi, Sindh, Pakistan, T: Shaista Mehmood
- ENMC053**     **Design and Implementation of a Quadcopter Flight Controller with Non-uniform Hardware to Cater for Third-World Supply-Chain Issues**  
Muhammad Muazzam Salman, 16, Junior, Lahore American School, Lahore, Punjab, Pakistan, T: Sajida Bokhari
- MATS031T**     **An Experimental Approach to Construct an Organic Slab**  
Maha Khan, 17, Junior, Umme Barira, 16, Junior, PakTurk International Schools and Colleges, Gulshan-e-Iqbal Girls Campus, Karachi, Sindh, Pakistan, T: Hira Bashir
- MCRO044**     **The Anti Eczemel (Anti Fungal) Oil : A Herbal Medical Cure to Eczema**  
Syed Sibtey Hasan, 16, Sophomore, Sultan Mahomed Shah Aga Khan School, Karachi, Sindh, Pakistan, T: Sana Zaib

## PALESTINE

Ramallah, Palestine, PSE001, Palestine Science and Technology Fair

- BEHA075T**     **Save Life. Be a Hero**  
Mira khader Issa, 17, Junior, Malak Samer Naimi, 16, Junior, Alawda Secondary School for Girls, Bethlehem, Bethlehem, Palestine, T: Rana Khair
- EBED035T**     **Smart Phone Speaks Hand Movements**  
Ali Salah, 18, Senior, Ahmad Salah, 17, Senior, Alkhader Secondary School for Boys, Bethlehem, Bethlehem, Palestine, T: Mahmoud Abdeh
- ENMC074**     **Transferring Bodies Movements to a Computer**  
Nada Basil Abuissa, 18, Senior, Slafeet Girls Secondary School, Salfeet, Salfeet, Palestine, T: Walaa Shtayah
- MATS047**     **Enhancing the Competence of the Artificial Stone**  
# Saif Maher Jabari, 17, Senior, Al Hussein Bin Ali Secondary School, Hebron, Palestine, T: Mohammed Alkaraki
- ROBO083**     **Motherhood Guide**  
Layali Nemer Khatib, 15, Sophomore, Um Dar and Alkhuljan Girls Secondary Girls School, Jenin, Palestine, T: Rana Sadi

# CONGRATULATIONS TO OUR CATEGORY FINALISTS

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## Chemistry

Sarah Abdallah	Jingze Fang	Sarah Mackel	Yiting Shen
Dana AL Rogaiti	Kiara Fenn	Anh Mai	Alexander Shliakhturov
Laura AlAmiri	Mai Fujitani	Keita Maishi	Smriti Somasundaram
Abdullah AlGhamdi	George Hasnah	Sapol Maison	Raghav Sriram
Zane Alsebai	Shanley Ho	Ryan McGinnis	Savannah Stephens
Zakhar Balandin	Yehyun Hwang	Prepelita Mihaela	Settan
Becca Barbera	Nouraldean Ibrahim	Grace Moeller	Suangburanakul
Aditi Bhaskar	Elijah Jones	Yuri Muto	Alanna Sun
Eric Bi	Yeonsu Kang	Sathvik Nallamalli	Kevin Sun
Hadia Bizhan	Nanami Kanzaki	Kijjakarn	Shun Tanaka
Jacie Boelhower	Vedant Karalkar	Namsawangrungrueng	Thiti Thaloengboonsiri
Dawit Boonyakitnotai	Sanjna Kedia	Yuichirou Okuno	Yadiel Tirado-Laboy
Mehmet Cekuc	Amna Khan	Ratislav Ozhiganov	Kazuki Toida
Hyunjun Chang	Min Jae Kim	Kacper Pajak	Laura Townner
Soumya Chauhan	Min jung Kim	Hiren Parekh	Aaron Trinh
Vivian Chinoda	Se Ryeon Kim	Anyia Patidar	Dev Rishi Udata
Alexandru Chivulescu	Brian Lee	Stepan Portnov	Marius Vrabie
Yu Zhe Chu	Jeannine Lee	Suphawit Promkhot	Catriona Wu
Samanta Cvetkova	Bryan Lee Chong Han	Fares Qtaishat	Ziye Xiao
Bibiana Dellavalle	Dillion Lim	Alberto Racero	Carly Yang
Elisa Destro	Andrew Lipton	Vaidehi Rathod	Kaia Yang
Tam Do	Shawn Lokshin	Yu Ren	Zhi-Wei Zeng
Tianyu Dong	Natalia Lonescu	Adam Roberge	Jason Zhang
Zyad Emad	Genesis Lopez-Aviles	Eva Savin	Lisa Zhang
Omer Eyal	Alexis MacAvoy	Lingbo Shen	Mingyi Zhang

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**Society for Science** applauds  
the finalists in Chemistry.



## SOCIETY FOR SCIENCE

# Finalist Directory

## PANAMA

Panama City, Panama, PAN001, Feria Científica del Ingenio Juvenil

- EGSD026T** **Osiris: The Study and Evaluation of Piezoelectric Effect as a Renewable, Clean Electric Energy Source through an Energy Harvesting Footsteps-Powered Platform**  
Isabella Marie Rodriguez, 16, Junior, Franklin Omar Lopez, 16, Junior, Academia Interamericana de Panama sede Cerro Viento, Panama City, Panama, Panama, T: Anela Gough

## PERU

Lima, Peru, PER001, Peru Science and Engineering Fair

- BEHA060** **Violence Against Women in Peru During the COVID-19 Pandemic**  
Ariana Isabel Arroyo Salazar, 15, Sophomore, La Asuncion, Huancayo, Junin, Peru, T: Luis Atencio Olivares
- BEHA061** **Andean Popular Participation in the Huancavelican Route for the Cause of Emancipation; Towards the Bicentenary**  
Elenith Brithney Pacheco Ramos, 16, Junior, Javier Heraud, Churcampa, Huancavelica, Peru, T: Luis Torres Perez
- BEHA062** **Level of Depression, Anxiety and Stress in Adolescents Due to the Effect of the Pandemic COVID-19 in the I.E. Victor Manuel Maurtua Parcona, ICA-2020**  
Maria Claudia Jimenez Rojas, 16, Sophomore, Victor Manuel Maurtua, Parcona, Ica, Peru, T: Samuel Espinoza Jeronimo
- EBED027** **Implementing the OSTEC System for COVID Detection by Measuring Oxygen Saturation in Blood and Body Temperature and Sending Data to a Database in the Cloud in the Chalhuanca District**  
Estrella Esquivel Romero, 15, Freshman, High Performance College of Apurimac, Chalhuanca, Apurimac, Peru, T: Pablo Ataucusi Romero
- ENEV071** **Coffee Pulp Ecoboards in the High Yurinaki Annex — 2020**  
Alexandra Nancy Lima Quispe, 18, Senior, Jorge Basadre, Perene, Junin, Peru, T: Raquel Caparachin Casachagua
- ENEV072** **CEC, pH, Electric Conductivity and ESP Study in Sodic Loam Clay Soils**  
Maira Flor Stefany Cruz Ore, 16, Junior, High Performance College of Apurimac, Chalhuanca, Apurimac, Peru, T: Lilian Huallpa Tito

## POLAND

Gdynia, Poland, PLD001, E(x)plory Science Fair

- ANIM012** **Preferences of *Varroa destructor* in Controlling Brood Raised on Young and Old Bee Combs**  
Olga Scieszka, 18, Senior, XL Liceum Ogólnokształcące z Oddziałami Dwujęzycznymi im. Stefana Żeromskiego w Warszawie, Warsaw, Mazowieckie, Poland, T: Kamil Kwiecien
- BMED014** **Hyperhomocysteinemic Diet Promotes Amyloid Beta Accumulation in Brains of a Mouse Model of Alzheimer's Disease**  
Robert Kaptur, 18, Senior, Akademia High School, Warsaw, Mazovia, Poland, T: Joanna Suszyska-Zajczyk
- CHEM071** **Hydrothermal Synthesis of Copper Sulphide Nanoparticles, Analysis of Their Physical-Chemical Properties and Cytotoxicity *in vitro***  
Kacper Julian Pajak, 19, Senior, III LO im. Adama Mickiewicza, Katowice, Slaskie, Poland, T: Monika Galkiewicz
- ENBM024T** **Oxilium : Olfactory Examination Procedure of Detecting Cancer Cells Based on the Smell of Honey Bees**  
Dorian Oliwier Zarna, 19, Senior, Wiktor Marcin Kus, 19, Senior, IX Liceum Ogólnokształcące imienia Tadeusza Nowakowskiego z Oddziałami Dwujęzycznymi, IB World School 2988, Bydgoszcz, Kujawsko-Pomorskie, Poland, T: Agata Opaska

# Finalist Directory

- ENBM067T** **Dosimetric Verification of Cancer Patient's Treatment Plan Using Antropomorphic, 3D-Printed Phantom**  
Kacper Waluk, 19, Senior, Jakub Jaroslaw Pietrzak, 19, Senior, XVIII Liceum Ogólnokształcące im. Jana Zamoyskiego, Warsaw, Mazowieckie, Poland, T: Beata Brzozowska T: Beata Brzozowska-Wardecka
- ENMC024T** **Autonomous Hybrid Drone System for Human Rescue**  
Franciszek Mikołajczyk, 18, Junior, Ludwik Skowronek, 19, Senior, Zygmunt Skowronek, 16, Sophomore, V Liceum Ogólnokształcące im. Augusta Witkowskiego, Krakow, Malopolskie, Poland, Jagiellonian University in Cracow, Krakow, Malopolskie, Poland, Zespół Szkół Łączności im. Obrońców Poczty Polskiej w Gdańsku w Krakowie, Krakow, Malopolskie, Poland, T: Jakub Niewiedzial
- ENMC044T** **CPS – Custom Printed Submarine: A Community Based Approach to Designing Unmanned Underwater Vehicle Systems Using 3D Printing and Widely Available Production Methods**  
Filip Mikołaj Bulawa, 19, Senior, Piotr Domanowski, 19, Senior, Marcin Jerzy Hnat, 18, Senior, I Liceum Ogólnokształcące Dwujęzyczne im. Edwarda Dembowskiego w Gliwicach, Gliwice, Slaskie, Poland, T: Michał Kwiatkowski
- SOFT013** **A Novel Method of Creating Block Ciphers Provably Immune to Linear and Differential Cryptanalysis**  
Szymon Perlicki, 15, Freshman, Szkoła Podstawowa nr 28 im. Generała Leopolda Okulickiego we Wrocławiu, Wrocław, Województwo Dolnośląskie, Poland, T: Aurelia Ceglowska

## PORTUGAL

**Porto, Portugal, PRT001, Portuguese Contest for Young Scientists**

- MCRO022T** **The Relationship Between Fe Availability and the Capacity of CO<sub>2</sub> Sequestration by *Tetraselmis chuii***  
Beatriz de Almeida Fernandes, 19, Senior, Joana Espirito Santo Couto, 18, Senior, Diogo Filipe Rosa Heleno, 18, Senior, Escola Secundaria Engenheiro Acacio Calazans Duarte, Marinha Grande, Leiria, Portugal, T: Rui Fernandes
- PHYS033** **Study of the Statistical Effect of Data Whitening and Anomalous Behaviour in Gravitational Wave Events**  
# Joao Dinis Ribeiro Machado de Carvalho Alvares, 19, Senior, Escola Secundaria Dona Maria II, Braga, Portugal, T: Joao Vieira
- PHYS034T** **Radio Watching: Modelling of Radio Wave Fire Detection**  
Andre Amorim Ribeiro, 19, Senior, Larissa Pereira Andrade, 18, Senior, Agrupamento de Escolas Clara de Resende, Porto, Norte, Portugal, T: Helena Rodrigues  
T: Maria Rodrigues
- SOFT014T** **SandSpace**  
Nuno de Figueiredo Brito e Castro, 18, Senior, Bruno Dylan Pinto Ferreira, 18, Senior, Jorge Miguel Fernandes Correia, 19, Senior, Escola Secundária Dr. Serafim Leite, São João da Madeira, Portugal, T: Maria de Fatima Gomes Pais Ferreira T

## PUERTO RICO

**San Juan, Puerto Rico, TEPRO1, Puerto Rico Math Fair**

- MATH028** **Analyzing Computer Generated Collatz-type Fractals (Phase 2)**  
## Hector Manuel Lugo, 17, Junior, CROEM HS, Mayaguez, Puerto Rico, T: Edwin Benvenuti
- MATH029T** **Domain Specific Language for Differential Equations with Scott-Strachey Semantics**  
Benjamin Philippe, 18, Senior, Jan-Paul Vincent Ramos#, 18, Senior, University Gardens High School, San Juan, Puerto Rico, T: José Cruz

# Finalist Directory

## Caguas, Puerto Rico, TEPRO4, Caguas Regional Science Fair

- BEHA069**     **Emotional Effect of Virtual Classes and the New School Schedule on High School Students**  
Ixlianis Valentin-Morales, 18, Senior, Specialized School of Science and Mathematics Genaro Cautiño Vázquez, Guayama, Puerto Rico, T: Haydee Laporte-Berrios

- MCRO026**     **Bioprospects Capable of Inhibiting the Proliferation of Pathogens (fungi) Affecting *Musa acuminata* x *Musa balbissiana***  
Mireilis Rodríguez-Reyes, 18, Senior, Specialized School of Science and Mathematics Genaro Cautiño Vázquez, Guayama, Puerto Rico, T: Haydee Laporte-Berrios

## Humacao, Puerto Rico, TEPRO5, Humacao Regional Science Fair

- CHEM045T**     **H<sub>2</sub>O as a Method of Sustainable Fuel for a Bus**  
Genesis Noelia Lopez-Aviles, 17, Senior, Yadiel Omar Tirado-Laboy, 17, Senior, Centro Residencial de Oportunidades Educativas de Ceiba, Ceiba, Ceiba, Puerto Rico, T: Wilmayris Alvira-Concepcion

- EGSD038**     **Use of Anaerobic Biodigestion to Produce Energy, Reduce the Amount of Waste Generated, and Eliminate the Emission of Greenhouse Gases in Agricultural Projects**  
Mirelys Dailene Santana-Rivera, 17, Senior, Centro Residencial de Oportunidades Educativas de Ceiba, Ceiba, Ceiba, Puerto Rico, T: Wilmayris Alvira-Concepcion

- ENBM063**     **Functionalized Biosensor for Tissue Plasminogen Activator (tPA) Detection**  
Paolina Morales-Lopez, 17, Senior, Escuela Superior Dr. Juan Jose Mauney Pimentel, Naguabo, Puerto Rico, T: Elianid Espinosa

## Ponce, Puerto Rico, TEPRO6, Ponce Regional Science Fair

- CELL028**     ***Averrhoa carambola* in the Oxidative Stress of *Caenorhabditis elegans***  
Angelys Marie Rivera-Hernandez, 17, Senior, Centro Residencial de Oportunidades Educativas de Villalba, Villalba, Puerto Rico, T: Rocío Hernandez-Quinones

- EGSD039**     **Generating an Electrical Power System from a Static Bicycle**  
Sebastian Negron-Collazo, 16, Senior, Centro Residencial de Oportunidades Educativas de Villalba, Villalba, Puerto Rico, T: Rocío Hernandez

- PHYS053**     **Spatial Distribution of Known Exoplanets and Potentially Habitable Exoplanets within 100- Light Years from Earth**  
Mirelys Mendez-Pons, 18, Senior, Escuela Superior Josefa Velez Bauza, Penuelas, Puerto Rico, T: Vicmaris Lugo

## Mayaguez, Puerto Rico, TEPRO8, Mayaguez Regional Science Fair

- CBIO083**     **A Novel Approach to Increase Testing with Contact Tracing Apps in COVID-19 Pandemic**  
Edrick Ernesto Aponte, 17, Senior, CROEM HS, Mayaguez, Puerto Rico, T: Brenda Cabrera

## San Juan, Puerto Rico, TEPRO9, San Juan Regional Science Fair

- BEHA063**     **The Perception of Adolescents on the Effects of Social Media in Their Attention Span**  
Natalia Isabel Leon-Diaz, 16, Junior, Escuela Secundaria de la Universidad de Puerto Rico (UHS), San Juan, Puerto Rico, T: Keyla Soto-Hidalgo

- ENBM079**     **New Design of a Biomechanical Prototype of an Obstetric Delivery Table**  
Beatriz Cristina Fuentes, 16, Junior, University Gardens High School, San Juan, Puerto Rico, T: Nelson Ruiz

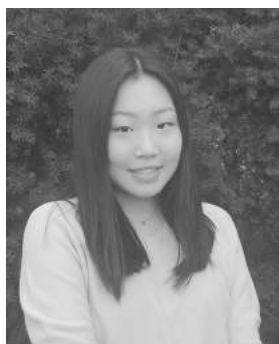
## San Juan, Puerto Rico, TEPR12, Puerto Rico Metropolitan Science Fair

- ANIM050**     **Development of a Mobile Application that Facilitates Temperature Monitoring of the Honeybee (*Apis mellifera*) for Beekeeping in Rural Areas**  
Amiris Yarit Guerríos Toledo, 16, Junior, The San Juan Math, Science and Technology Center, San Juan, Puerto Rico, T: Jonathan Perez

- BEHA048**     **Development of a Device to Improve Dysphasia in 3- to 6-Year-Old Children**  
Paola Cristal Rivera-Soto, 17, Senior, The San Juan Math, Science and Technology Center, San Juan, Puerto Rico, T: Jonathan Perez

# CONGRATULATIONS TO THE FIRST PLACE CATEGORY WINNERS

## Computational Biology and Bioinformatics



**CATHERINE KIM**

Jericho, New York

Hierarchical Prediction  
of Adverse Drug  
Reactions  
Booth CBIO080



**NATTHAKAN SAENGNIL**

Rayong, Thailand

EGFRNet: Drug  
Discovery of Cancers  
for EGFR Family  
Booth CBIO084T



**PURI VIRAKARIN**

Rayong, Thailand

EGFRNet: Drug  
Discovery of Cancers  
for EGFR Family  
Booth CBIO084T

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**Regeneron** applauds the finalists  
in Computational Biology and Bioinformatics.

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# Finalist Directory

- CBIO069**     **CRISPR Cas9 as a Possible Mechanism to Modify Influenza Viral Mutation**  
Natalia Isabel Acosta-Laboy, 15, Junior, Colegio Rosa-Bell, Guaynabo, Guaynabo, Puerto Rico, T: Yajaira Torres de Jesus
- EAEV081T**     **Phenotypic Analysis on Trichoptera Larvae Behavior to Assess a Stream Quality and Changes in Flow**  
Lorraine Sophia Rosario Pizarro, 16, Junior, Rubén A. Rosario Pizarro, 16, Junior, Colegio Rosa-Bell, Guaynabo, Guaynabo, Puerto Rico, T: Yajaira Torres
- EAEV082**     **Design and Creation of an Artificial CaCo3 Porous Reef Prototype as a Support Structure for the Adaptation Capacity of the Marine Ecosystem**  
Claudia Renta Ortiz, 17, Junior, Escuela Especializada en Ciencias, Matemáticas y Tecnología, Caguas, Puerto Rico, T: Shierly Martinez
- ENBM065T**     **Design and Development of an Alert Prototype to Assist People with Simple Motor Seizures Events Using Triaxial Micro-sensors**  
Endrick Y. Garcia-Torres, 17, Junior, Savdiel Ducret, 16, Junior, Colegio Rosa-Bell, Guaynabo, Guaynabo, Puerto Rico, T: Yajaira Torres-De Jesus
- PLNT044T**     **Use of *Manihot esculenta* as an Alternative for Phytoremediation of Soil**  
Amanda Sofia Aviles de Leon, 15, Sophomore, Daniela Rodriguez-Veguilla, 16, Sophomore, The School of San Juan, San Juan, Puerto Rico, T: Edna Guzman
- SOFT039**     **Safe Woman: Creation and Development of an Innovative Mobile Application for the Safety of Women**  
Alejandra Kristina Garcia-Baez, 17, Senior, The San Juan Math, Science and Technology Center, San Juan, Puerto Rico, T: Jonathan Perez Rivera

## QATAR

Doha, Qatar, QAT001, The National Student Research Fair

- BMED041T**     **The Interesting Reality of Stress Granules Formed in Regulating Stem Cell Fate: A Step Towards Successful Personalized Medicine**  
Adam Al-Shawagfeh, 16, Senior, Waleed Alsuwaidi, 17, Senior, Ahmad Bin Mohammad Al-thani Secondary School, Doha, Doha, Qatar, T: Ammar Othman
- EAEV067T**     **Remote Monitoring System for Swimming Pools Water Quality (IOT)**  
Ahmad Tayseer Makableh, 17, Senior, Mohammed Abdulrahman Alshaibi, 17, Senior, Ahmad Bin Hanbal Secondary School, Doha, Qatar, T: Tawfiq Alwaked
- EGSD031T**     **Smart and Robust Nanocomposite Fibers for Self-Powering Electronic Devices**  
Abdullah Abdulrahim Al-Janahi, 17, Junior, Abdullah Khalid Al-Nasr, 17, Junior, Qatar Science and Technology Secondary School for Boys, Doha, Ain Khalid, Qatar, T: Mohammed Salameh
- MATS023T**     **The Fabrication of Nano Sensor Technology to Detect Blood Glucose Levels in the Breath of Diabetic Patient**  
# Sama Ayoub, 18, Senior, Noor Al Thani, 17, Junior, Qatar Academy Senior School, Doha, Al-Rayyan, Qatar, T: Jason Maraku
- MATS024**     **Polymeric Nanocomposite Coatings for the Corrosion Protection of Steels**  
Anfal Jabr Al-Sulaiti, 16, Junior, Zubaida Secondary School for Girls, Al-Doha, Qatar, T: Heba Mohamed
- PLNT020T**     **Hydrogel Sensors for the Agricultural Applications**  
Tamim Fahad Alrashid, 17, Senior, Yousef Al-Mahmoud, 19, Senior, Qatar Banking School for Boys, Doha, Qatar, T: Ahmed Shawer

## REPUBLIC OF MOLDOVA

Chisinau, Republic of Moldova, MDA001, Moldova Science and Engineering Fair

- CHEMO41T**     **Valorification Potential of Wormwood (*Artemisia absinthium* L.) for the Preparation of the Broad-Spectrum "HOPE" Spray**  
Prepelita Mihaela, 18, Senior, Marius Vrabie, 18, Senior, Theoretical Lyceum Ion Creanga-Ungheni, Ungheni, Republic of Moldova, T: Alina Buga

# Finalist Directory

**SOFT034T     Augmenting Under-Researched Medical Domains with an Intuitive Querying System on Resourceful Crowd-Collected Data**

Ana Vizitiv, 18, Junior, Madalina Griza, 17, Junior, Da Vinci School, Chisinau, Chisinau, Republic of Moldova, Theoretical High School "Orizont, Durlesti," Chiainau, Republic of Moldova, T: Svetlana Golubev

## ROMANIA

Suceava, Romania, ROM001, Romania Science and Engineering Fair

**CHEM046     Strong Electric Field Electroosmosis: Physical Principles and Measurements in the Strongly Nonlinear Regime**

Natalia Lonescu, 17, Junior, Mihai Viteazul National College, Bucharest, Bucharest, Romania, T: Mircea Ignat

**CHEM047T     Aspects Regarding Electrochemical Actuation**

Alexandru Adrian Chivulescu, 18, Senior, Eva Maria Savin, 18, Senior, Mihai Viteazul National College, Bucharest, Bucharest, Romania, T: Mircea Ignat

**ENBM026T     Study of Microbiological Structures with the Purpose of Creating MEMS Actuators with Various Applications in Medicine**

Andreea Magdalena Sovei, 18, Junior, Robin Cristian Bucur-Portase, 17, Junior, Mihai Viteazul National College, Bucharest, Bucharest, Romania, T: Mircea Ignat

**ENBM068T     Designing Bionic Mechanisms Inspired by the Legs of Insects**

Mihai Mitrea#, 19, Senior, Eric Gabriel Drutu-Danciu#, 19, Senior, International Computer High School of Bucharest, Bucharest, Romania, T: Mircea Ignat

**ENBM080     Finger Biometrics with Applications in Psychiatry**

Iulia Costache, 19, Senior, Colegiul National "Spiru Haret", Bucharest, Romania, T: Mircea Ignat

## RUSSIAN FEDERATION

Nizhny Novgorod, Innopolis City, Russian Federation, RUS001, ROST

**BEHA011     SMART CUBES: Interactive Tactile and Sound Set for Blind Children**

Aleksei Shremzer, 15, Freshman, Gymnasium #32, Nizhnekamsk, Republic of Tatarstan, Russian Federation, T: Elena Garanina

**CHEM026T     Determination of Optimal Conditions for Hydrogenolysis of Sulfur Compounds to Improve Efficiency of Jet Fuel Production**

Alexander Shliakhturov, 17, Sophomore, Zakhar Balandin, 16, Sophomore, State School "Lyceum #86", Yaroslavl, Yaroslavl, Yaroslavl Oblast, Russian Federation, T: Anton Petrov

**MATH013     Generalized Solution of the Fibonacci Problem**

Nikita Poplevin, 16, Freshman, Municipal School #1, Severomorsk, Murmansk Region, Russian Federation, T: Ludmila Niryan

**MATH016     Simple Closed Geodesic Lines on Catalan Solids**

#

Stepan Akinshin, 17, Junior, Moscow South-Eastern School Named After V. I. Chuikov, Moscow, Russian Federation, T: Yaroslav Abramov

**PHYS009     Improving the Dipole Trap: The Way to Ultracold Gas**

Dmitrii Khitrin, 17, Senior, Lyceum #40, Nizhny Novgorod, Nizhny Novgorod Region, Russian Federation, T: Kirill Karpov

Moscow, Russian Federation, RUS002, Junior – I

**CBIO087     A Study of Cas9 Protein of Mollicutes Bacteria on the Example of *M. gallisepticum***

Sofya Maksyuta, 16, Junior, School #1553 named after V. I. Vernadskiy, Moscow, Russian Federation, T: Mikhail Litvinov

**CHEM044     All-Stretchable Electrodes: Experiments on Non-industrial Manufacturing**

Stepan Vyacheslavovich Portnov, 18, Junior, Higher School of Economics Lyceum, Moscow, Moscow, Russian Federation, T: Elvira Kiva

# Finalist Directory

- MATH038**     **Braid Theory and Classification of Periodic Orbits of the Three-Body Problem**  
Adelina Kildeeva, 17, Junior, School #17, Shcholkovo, Moscow Oblast, Russian Federation, T: Natalia Batkhina
- PHYS051**     **Blood Glucose Monitoring Using a Biosensor Based on Porous Silicon (pSi)**  
Vladimir Sidorov, 17, Junior, Municipal School #148, Samara, Samara Oblast, Russian Federation, T: Olga Spirina
- PHYS052T**     **The Research of the Dynamics of Charged Particles in a Quadrupole Paul Trap**  
Leonid Shmyrkov, 18, Senior, Kirill Klimeshov, 17, Junior, Lyceum No. 1511 Affiliated with MEPhI, Moscow, Russian Federation, T: Sergei Derevyashkin
- Moscow, Russian Federation, RUS003, Russian Youth Program "Step Into the Future"**
- ANIM030**     **Ishim and its Surroundings Horsefly Species Range Study with the Use of a Variety of Traps**  
Anna Evgenievna Gibler, 14, Freshman, Secondary School No. 7 of the City of Ishim, Ishim, Tyumen region, Russian Federation, T: Vitaly Stolbov
- EAEV118**     **The Dynamics of Vegetation of the Re-cultivated and Eco-Restored Anthropogenically-Altered Landscapes in Krasnoye Settlement and in Its Vicinity (the Nenets Autonomous Area, 2016-2020)**  
Anastasia Stepanovna Soboleva, 17, Sophomore, Krasnovskaya Secondary School, Krasnoye, Nenets Autonomous Okrug, Russian Federation, T: Natalia Panarina
- ENBM057**     **Making an Inexpensive Bionic Hand Prosthesis Using Additive Technologies**  
Vladislav Olegovich Medvedev, 16, Sophomore, Lyceum #1, Bratsk, Irkutsk Region, Russian Federation, T: Egor Davidovich
- ENMC071T**     **Underwater Vehicle "Poseidon"**  
Gerard Olegovich Ismagilov, 16, Freshman, Pavel Dmitrievich Smolin, 17, Junior, Lyceum #31, Chelyabinsk, Chelyabinsk Oblast, Russian Federation, T: Dmitry Lovchikov
- ROBO087**     **Development of a Robotic System for Installing Various Devices**  
Vsevolod Valeryevich Shkodskikh, 17, Junior, Lyceum 11 of Chelyabinsk, Chelyabinsk, Chelyabinskaya Oblast, Russian Federation, T: Dmitriy Ovsyanitskiy
- St. Petersburg, Russian Federation, RUS004, Baltic Science and Engineering Fair**
- ENMC013**     **New Method for Measuring the Viscosity of Liquids**  
Matvei Kuznetsov, 17, Junior, State School "Lyceum #86", Yaroslavl, Yaroslavl, Yaroslavskaya Oblast, Russian Federation, T: Anton Petrov
- MATH005**     **On Geometry of Central Extension of Klein Bottle Group**  
Oleg Chistov, 17, Sophomore, School 564, St. Petersburg, Russian Federation, T: Ruslan Magdiev
- MATH006**     **Commutator Lengths of Free Group Orbits and Their Squares**  
Lev Andreevich Mukoseev, 16, Sophomore, School 564, St. Petersburg, Russian Federation, T: Sergey Ivanov
- MATH007**     **New Classes of Finitely Separable Finitely Generated Commutative Rings**  
Elkhan Kachabekov, 17, Junior, School 564, St. Petersburg, Russian Federation, T: Stanislav Kublanovskii
- SOFT005**     **Software Package for the Analysis of Spectra of Substances for Low-field Low-resolution NMR Spectrometers**  
# Vladimir Kirilenko, 17, Junior, Vorobyovy Gory School, Moscow, Russian Federation, T: Vladimir Suhotskii
- Moscow, Russian Federation, RUS005, Avangard**
- BCHM030T**     **Synthesis of Analogues of S-adenosyl-L-methionine for Identification of WBSCR27 Substrate**  
Anna Milovanova, 17, Junior, Mikhail Andreevich Losev, 17, Junior, Moscow South-Eastern School Named After V. I. Chuikov, Moscow, Russian Federation, T: Sophia Maryasina

# CONGRATULATIONS TO OUR CATEGORY FINALISTS

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## Earth & Environmental Sciences

Rudransh Agnihotri	Daniel Dusevic	Amy King	Christian Nichols	Aniyah Shen
Ayush Agrawal	Adrie Earl	Madelyn Kirklín	Anna Nielsen	Vlada Shevchenko
Hiba Ali	Shrika Eddula	Kiersten Knobbe	Sophia Nielsen	Thanaphone Shields
Mohammed Alshaibi	Lauren Egaas	Samuel Koda	Emma Noble	Lily Sikorski
Kenna Anderson	Marisol Enguidanos	Emma Kratcha	Sarah Nolan	Ridhima Singh
Michelle Arguello	Blake Enwiller	Gavin Kratcha	Kajsa Norman	Talia Smith
Ayaan Bargeer	Tarini Eswaran	Christopher Kwok	Ravelito Oculite	Anastasia Soboleva
Avi Bagchi	Caleb Grow	Nicholas Kwok	Marta Pambukhchyan	HeeGyu Son
Morgan Barnes	Claire Gu	Alexander LaFortune	Geunhee Park	Hyeokju Song
Gunbir Baveja	Neha Gupta	Edenia Larisa	Madeline Phuong	Mason Sufnarski
Rolains Benjamin	Nevan Hanford	Lucia Lavallee	Melanie Quan	Amira Syifa
William Berry, IV	Ishraq Haque	Jaeyoung Lee	Alyse Radle	Koya Takahashi
Rithik Bhushan	Annalie Haralson	Junsung Lee	Mireya Ramirez	Sriya Teerdhala
Brett Bober	Jordan Harrow	Yuchen Li	Liv Nilsson Rapping	McKayla Tingey
Claire Bucklin	Vivien He	Yuntong Li	Aseel Rawashdeh	Yi-Sin Tsang
Nicole Camilliere	Sydney Hefty	James Licato	Camille Rawinski	Richard Usdin
Diego Castillo	Yasmin Hegy	Stephan Lindenthal	Joshua Rennekamp	Brooke Vachal
Cameron Carter	Sanjana Hiremath	Eleanor Little	Daniel Rodriguez	Alexa VanSuch
Conor Casey	Cameron Holder	Ahmad Makableh	Lorraine Rosario	Breanna Vaughan
Angela Chen	Chelsea Hu	Sharlene Faye	Pizarro	Emily Walter
Victor Chen	Caroline Huang	Manlongat	Rubén Rosario Pizarro	Jason Wang
Marlvern Chimbwanda	Jennifer Huang	Angela Mao	Claudia Renta Ortiz	Hajin Woo
Rhea Choudhary	Vedant Janapaty	Caitlin Marr	Dannai Rojas	Alex Xu
Madeline Christensen	Ishaan Javali	Katherine McCarthy	Isabel Ross	Jinyi Xu
Rachel Christensen	Shrey Joshi	Natalie McGee	Rowan Ross	Rosemary Yahne
Johan DeMessie	Eliana Juarez	Ellery McQuilkin	Ashley Roth	Jessica Yan
Saketh Dhulipalla	Julia Kagiłery	Echo Mitchell	Valencio Sahasika	Yixiao Yang
Jack Dougherty	Harriet Kallberg	Emily Mitchell	Kusumadhyas	Sunny You
Anna Du	Shreya Khullar	Utkarsh Mittal	Ashton Ryan	Joseph Young
Aahana Dugar	Gyunho Kim	Kai Mottley	Lila Schweinfurth	Any Zhang
Camille Duma	Minseong Kim	Rithika Narayan	Cameron Sharma	

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Welcome to **#GenGeo**, a community of young people who are committed to exploring connections, taking action for our planet, and inspiring a sustainable future.



# Finalist Directory

- CHEM070**     **Synthesis of S-Adenosyl-L-homocysteine Analogs for Structural Studies of Methyltransferases**  
Ratislav Maksimovich Ozhiganov, 17, Junior, Moscow South-Eastern School Named After V. I. Chuikov, Moscow, Russian Federation, T: Alexander Rudenko
- MATH049**     **Arithmetic and Algebraic Methods for Solving Multiplicative Quadratic Congruences**  
Dmitry A. Sukhotin, 18, Junior, Higher School of Economics Lyceum, Moscow, Moscow, Russian Federation, T: Alexander Kuptsov
- Moscow, Russian Federation, RUS006, Scientists of the Future Fair**
- EAEV006**     **The Luch-2 Lava Cave in the Zvezda Crater, Tolbachik Volcanic Complex, Kamchatka Peninsula**  
Vlada Shevchenko, 16, Freshman, The Specialized Educational Scientific Center on Physics, Mathematics, Chemistry and Biology of Novosibirsk State University, Novosibirsk, Novosibirsk Oblast, Russian Federation, T: Elena Kruk
- ENEV043**     **Optimization of Sorption of Porous Materials**  
Anastasia Shenkova, 17, Junior, The Advanced Education Science Center Kolmogorov Boarding School of the Moscow State University, Moscow, Moscow Region, Russian Federation, T: Klim Sladkov
- ENMC014T**     **Platform for Omnidirectional Traffic**  
Mikhail Satleykin, 17, Junior, Pavel Kuznetsov, 18, Junior, Advanced Educational Scientific Centre, A.N.Kolmogorov Boarding School, Moscow, Moscow, Russian Federation, T: Sergey Pankov
- SOFT004**     **Search for Algorithmic Errors in the Program Code Using Machine Learning Methods**  
Dmitrii Vasilchenko, 17, Junior, Lyceum 1533 of Information Technologies, Moscow, Russian Federation, Russian Federation, T: Alexander Giglavy
- SOFT011**     **Wavenote: Smart Notepad for Musicians**  
Fedor Sedov, 18, Junior, School #1329, Moscow, Moscow, Russian Federation, T: Pavel Stepanov
- Kemerovo, Russian Federation, RUS007, Children's Scientific Competition of The Andrey Melnichenko Foundation**
- EBED018**     **A Non-invasive Electromyographic Interface for Hand Gesture Recognition with Active Noise Suppression Using a Combined Biosignal Processing Algorithm**  
Vadim Sannikov, 18, Junior, The Andrey Melnichenko Foundation, The Centre for the Development of Children's Creativity in Science and Engineering at the Kuzbass State Technical University, Kemerovo, Kemerovo, Russian Federation, T: Vladislav Nemov
- ENEV014**     **Post-pyrolysis Processing of Mixed Polymeric Waste to Obtain Useful Organic Raw Materials**  
#     Nikita Korzienko, 17, Senior, The Andrey Melnichenko Foundation, The Center for the Development of Children's Creativity in Science and Engineering (Novomoskovsk), Novomoskovsk, Tula, Russian Federation, T: Elena Kostyleva
- ROBO018T**     **An Improved Method for the Stable Transmission of Quantitative Information through Human Skin, Characterized by Low Error Rates and Long-term Reliability**  
Kirill Ovsyannikov, 17, Junior, Aleksandr Savin, 17, Junior, The Andrey Melnichenko Foundation, The "Heirs of Polzunov" Centre for the Development of Children's Creativity in Science and Engineering, Barnaul, Altai Region, Russian Federation, T: Anton Duda"
- SAUDI ARABIA**
- Riyadh, Saudi Arabia, SAU001, Mawhiba Science & Engineering Fair**
- BEHA050**     **A Novel Video Game Feature for Psychological Diagnosis of Generalized Anxiety Disorder in Adolescence**  
Rasha Mohammed AlQahtani, 18, Senior, Riyadh School for Boys and Girls, Riyadh, Saudi Arabia, T: Sahar Aldhaheri

# Finalist Directory

- BMED079**     **Mitigating Digestive-related Obstructions and Other Risks Caused by Hard Particles of Stuffed Toys through Creating a Coated Beeswax**  
Faisal Fahad Almohaish, 15, Freshman, Alkifah Academy, Al Hufuf, Eastern Province, Ahsaa, Saudi Arabia, T: Maha Alkhalaf
- CBIO072**     ***In-silico* Prediction of Desoxyhavannahine as a Potential Novel Inhibitor of SARS-COV-2 with Minimal Side Effects**  
Lana Abujamil, 17, Senior, Manarat Al-Madinah National School, Madinah, Madinah, Saudi Arabia, T: Hisham Al-Tayeb
- CBIO073**     **Identification of a Potential Beta-site Amyloid Precursor Protein Cleaving Enzyme-1 Inhibitor as a Disease Modifying Agent for Alzheimer's Disease**  
Mawaddah Omar Ali, 16, Junior, Umm Salamah, Makkah, Makkah, Saudi Arabia, T: Hisham Altayeb
- CHEM048**     **Tunable NiFe-LDH Electrocatalyst Synthesis via Benzyl Alcohol Solvation for Enhanced Water-splitting**  
Abdullah Abdulaziz AlGhamdi, 16, Junior, Alhussan Private School, Dammam, Eastern Province, Saudi Arabia, T: Rady Saad
- CHEM049**     **The Use of Activated Carbon Prepared from Tires Waste Filled with Nano Zinc and Nano Molybdenum to Remove Sulfur from Petroleum Products**  
Laura Hani AlAmiri, 17, Senior, AlBassam Schools, Dammam, Saudi Arabia, T: Rawan Abahussain
- CHEM066**     **Graphene Cyclodextrin Nanosheets as a Potential Corrosion Inhibitor for Oil and Gas Pipelines**  
Dana Ziyad AL Rogaiti, 16, Sophomore, AL Bassam-IGCSE, Dammam, Eastern, Saudi Arabia, T: Muna AL Ghamdi
- EBED023**     **Increasing the Power Efficiency for Communication Between IoT Devices Using Source and Channel Coding**  
Hussain Hani AlSaif, 16, Junior, Rowad Alkhaleej International School, Dammam, Eastern Province, Saudi Arabia, T: Alan Hood
- EGSD040**     **Advanced Synthesis of Potent Photocapacitor Based on Novel 3D-Hierarchical BiVO<sub>4</sub> and Self-Synthesized Carbon**  
Mansour Al Marzooqi, 17, Junior, Riyadh School for Boys and Girls, Riyadh, Saudi Arabia, T: Prof. Zain Yamani
- EGSD041**     **Cost-effective Green Hydrogen Production: Single-step Synthesis of Nickel Cobaltite Nanostructures Electrode**  
Abdullah AlShangiti, 17, Senior, Riyadh School for Boys and Girls, Riyadh, Saudi Arabia, T: Zahra Abu
- EGSD048**     **Enhancing the Efficiency of Solar Steam Turbine by Adding a Thermoelectrical Generator for Renewable Clean Energy Generation**  
Anas Arafat, 16, Junior, Riyadh School for Boys and Girls, Riyadh, Saudi Arabia, T: Maryam Alsufyani
- EGSD052**     **Novel Perovskite-based Photo-rechargeable Supercapacitor**  
Tala Saad Al-Qahtani, 16, Junior, KFUPM Schools, Dhahran, Eastern Province, Saudi Arabia, T: Idris Popoola
- ENBM069**     **Enhancing Communication and Music Sensory Perception for the Hearing Impaired through Haptic Feedback in an Improved Tactile Glove**  
Ruby Rajab, 16, Senior, Manarat Al-Riyadh, Riyadh, Saudi Arabia, T: Habib Farooq
- ENEV059**     **A Novel All-In-One Membrane for Microplastics Removal, Oil-Water Separation, and Organic Dyes Photodegradation in Wastewater**  
Ahmed H. AlBadrani, 17, Senior, Ibn Al-Nafees High School, Yanbu RCY, Alamdina, Saudi Arabia, T: Talal Qahtan
- ENEV060**     **Green Chemistry for Plastic Waste Circulations and Its Application**  
# Layan Zaid AlHamashi, 18, Senior, The First Secondary School in Hail, Hail, Central Province, Saudi Arabia, T: Ahmed Alotaibi

# Finalist Directory

- ENEV061**      **Efficient Visible Light Removal of Organic Pollutants in Water Using Novel Synthesis of g-C<sub>3</sub>N<sub>4</sub>-CdS Nanocomposite by Pulsed Laser Ablation in Liquid**  
Norah Thamer AlHarbi, 17, Junior, University Schools, Dhahran, Eastern Province, Saudi Arabia, T: Adil Hawsawi
- ENEV062**      **Design a Multi-functional Smart Chimney to Eliminate the Byproducts of Combustion Processes and Reduce Global Warming by Using Innovative Technologies**  
Nada Abdulrahman Alhajri, 15, Sophomore, The Third High School in Abha, Abha, Asir, Saudi Arabia, T: Nasser Awwad
- MATS032**      **A Novel Hard/Soft Spinel Ferrite Nanocomposite as Potential Electrode Material for a Supercapacitor**  
Dana Fahad AlDahmash, 17, Senior, AlBassam Schools, Dammam, Saudi Arabia, T: Mona Alghamdi
- MATS033**      **Novel Approach to Enhance Oil Recovery Using Superhydrophobic/Oleophilic Self-Cleaning PP/MWCNT/WO<sub>3</sub> Material**  
Jana Mohammad AlSinan, 14, Freshman, Dhahran Ahliyya School, Dammam, Eastern Province, Saudi Arabia, T: Sara Sajjad
- MATS034**      **Fabrication of Self-charging Supercapacitor Using LASER-assisted Self-synthesized Carbon Quantum Dots**  
Arwa Niyazi, 17, Senior, University Schools, Dhahran, Eastern Province, Saudi Arabia, T: Mohammed Khan
- MCRO055**      **Anti-VOCs and Antimicrobial Activity of Natural Palm Waste Cellulose Fibers/ZnO Nanoparticles Biocomposite for Use in Face Masks: The GBV99**  
Lama Abdulrahman AlQahtani, 16, Junior, AlBassam Schools, Dammam, Saudi Arabia, T: Mona AlGhamdi
- PHYS055**      **Study of Ultraviolet Light on Graphene Oxide/Nitrocellulose Films for Surface Protection**  
Sultanah Omar AlEssa, 16, Junior, AlBassam Schools, Dammam, Saudi Arabia, T: Layla AlGhamdi
- PHYS056**      **Stained Barriers Influence on InGaAsN Quantum Well Laser Diodes**  
Hussam Mohammad J. Ashour, 18, Senior, Dar Althikr Private School, Jeddah, Mecca, Saudi Arabia, T: Mohammed Alghamdi
- PHYS057**      **A New Model to Explore the Quarks' Inner Structure in the Proton State Using the 3D Isotropic Harmonic Oscillator**  
# Lana Fahad AlAbbasi, 17, Senior, 18th Secondary School, Jeddah, Western Region, Saudi Arabia, T: Abdulla Abdulsalam
- PLNT033**      **Effective Use of Krypton and Argon Pumping Model KAP in Controlling Temperature in Plant Greenhouse**  
Shatha Mohammad AlAhmadi, 18, Senior, The 24th Secondary School at Madinah-marrat, Madinah, Madinah, Saudi Arabia, T: Nadia Alkaff
- PLNT038**      **A Study of the Effect of Alcoholic and Aqueous Extract of *Salvia officinalis* on the Disease of the Plant Fungus *Fusarium***  
Juman Abdullah AlHarbi, 16, Junior, Mother of Believers Aisha, May Allah be Pleased with the Talented, Buraydah, Al-Qassim, Saudi Arabia, T: Afaf AlHarbi
- ROBO053**      **Diagnosis of COVID-19 Using Deep Learning and Data Augmentation from Chest CT-Scan Images**  
Raghad Mohammed Alasiri, 16, Junior, The Third High School in Abha, Abha, Asir, Saudi Arabia, T: Nada Alomare
- TMED044**      **Photobiomodulation by High Power Pulsed Nd:YAG Laser as a Novel Approach for the Treatment of Colorectal Cancer**  
Juwain Assahafi, 18, Senior, Umm Salamah, Makkah, Makkah, Saudi Arabia, T: Bassem Refaat

# CONGRATULATIONS TO OUR CATEGORY WINNERS

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## **Embedded Systems**

### **FIRST PLACE**

Vadim Sannikov

### **SECOND PLACE**

Anushka Dhaya Sridhar

Pranav Sehgal

Tim C. Solberg

### **THIRD PLACE**

Roy Gross

Milidu Jayaweera

John William Madland

### **FOURTH PLACE**

I Gusti Ngurah Sucahya

Satria Adi Pratama

Haluk Baran Akbulut

Emre Akman

Karen Aleksanyan

Ni Putu Budiani

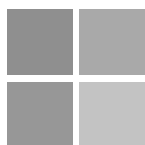
Tyler Burt

Davit Gyulamiryan

Robert Simonyan

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**Azure Sphere** applauds the finalists  
in Embedded Systems.



Microsoft

# Finalist Directory

- TMED045**     **Development of Monodispersed Hollow Silica Nanospheres Loaded with 5-Fluorouracil to Enhance the Drug Delivery on Breast Cancer Cell Line MCF-7**  
Lena AlQahtani, 14, Freshman, AL Bassam-IGCSE, Dammam, Eastern, Saudi Arabia, T: Layla AlGhamdi
- TMED046**     **Improving Image Contrast in MRI 7T for Early Diagnosis and Disease Detection**  
Asaad Bandar Basamad, 18, Senior, Qurtuba High School, Jeddah, Western, Saudi Arabia, T: Mohammed Bassiouni

## SINGAPORE

Singapore, Singapore, SGP001, Singapore Science and Engineering Fair

- ANIM056T**     **Supplementation of *Lactobacillus casei* Reduces Beta-amyloid Accumulation in Alzheimer *Drosophila melanogaster***  
Li Ann Tay, 17, Junior, Ling Low, 17, Junior, Celyn Chng, 17, Junior, Raffles Girls School (Secondary), Singapore, Singapore, T: Ai Khim Lim
- CBIO092**     **Novel Open Time to Event (OTTE) Model for Low-cost and Long term Marine Population Abundance Estimates from Remote Underwater Video (RUV) Stations**  
Jishnu Talukdar, 17, Senior, Anglo-Chinese School (Independent), Singapore, Singapore, T: Jonas Chow
- CHEM067**     **Novel Coating of Porous Cu as Heat Pipe for Thermal Management**  
Lingbo Shen, 19, Senior, National Junior College, Singapore, Singapore, T: Si Ling Ang
- CHEM068T**     **Intricate Study of Hydrothermally-synthesized Hexagonal K<sub>2</sub>W<sub>4</sub>O<sub>13</sub> Nanowires for the Adsorption and Photodegradation of Organic Dyes and Heavy Metal Ions**  
Dillion Lim, 16, Junior, Bryan Lee Chong Han, 17, Junior, Shanley Ho, 17, Junior, Hwa Chong Institution, Singapore, Singapore, Singapore, T: Sow-Peh Yoke Keow
- ENBM097**     **Wearable Strain Sensors with Silver Nanowires for Health Monitoring**  
Huiyan Huang, 17, Senior, Hwa Chong Institution, Singapore, Singapore, T: Erkan Polatdemir
- ROBO080**     **Liar Liar Pants on Fire: A Computer Vision Approach to Deception Detection**  
Nathaniel Xin Rui Tan, 18, Senior, Raffles Institution, Singapore, Singapore, T: Guoxian Tan

## SLOVAKIA

Bratislava, Slovakia, SVK002, AMAVET-Slovak Association for Youth, Science & Technology

- ROBO036**     **Effective Object Detection Neural Network on an Autonomous Robotics Platform Applied on TPU and Other Systems**  
Jakub Gal, 18, Senior, Stredna Priemyselna Skola Strojnicka a elektrotechnicka, Nitra, Nitra, Slovakia, T: Michal Mada

## SLOVENIA

Ljubljana, Slovenia, SVN001, Slovenia Science and Engineering Fair

- MCRO001T**     **Bacteriophages in a Fight Against *Serratia marcescens***  
Misa Pintaric, 18, Junior, Kaja Zupanic, 17, Junior, Gradbena Sola in Gimnazija Maribor II Gimnazija Maribor, Maribor, Stajerska, Slovenia, T: Jure Skraban
- SOFT001**     **Breaking the Substitution Cipher: Coding an Automatic Cipher Solver**  
Jasa Knap, 18, Senior, Gimnazija Bežigrad, Ljubljana, Slovenia, T: Jasna Kos

## SOUTH AFRICA

Johannesburg, South Africa, ZAF001, Expo for Young Scientists—South Africa

- BEHA005**     **Can We Differentiate Between Computer Generated and Human Art? Spot the Fake!**  
Alexander Brink Van der Merwe, 16, Sophomore, Paul Roos Gymnasium, Stellenbosch, Western Province, South Africa, T: Alta Cilliers

# Finalist Directory

- ENBM002**     **Non-invasive Blood Glucose Level Monitoring**  
 #     Hritik Mitha, 18, Senior, Bryanston High School, Johannesburg, Gauteng, South Africa, T: Megan Lester
- ENMC003**     **ThembaBot: Mine Surveying Robot**  
 Muhammed Hassen, 17, Junior, Greenside High School, Johannesburg, Gauteng, South Africa, T: Melusi Shezi
- ENMC007**     **A Robotic System for Temperature Scanning and Sanitizing**  
 Suhaan Singh, 16, Junior, Saint Dominic's Newcastle, Newcastle, Kwa-Zulu Natal, South Africa, T: Catherine Klopers

## SOUTH KOREA

Seoul, South Korea, KOR001, Korea Code Fair

- ENMC061**     **Cleaning Clip Applying the Principle of Acoustic Levitation**  
 Seung won Lee, 17, Senior, Yeosu High School, Yeosu-si, Jeollanam-do, South Korea, T: Saet Byeol Moon
- ENMC062**     **SAFEARM**  
 JeongHun Im, 15, Freshman, Posan Middle School, Daegu, Dalsung, South Korea, T: Kwon Ohil
- ROBO063**     **PedGUARD: Pedestrian's Guiding Utility – Avoid Road Danger**  
 Jaewoong Jeong, 18, Senior, Chadwick International School, Incheon, South Korea, T: Sharon Moore
- SOFT047**     **Emergency Disaster Framework: Utilizing Textual Analysis to Estimate Daily COVID Patients**  
 #     Taeuk Kang, 17, Junior, Korea International School, Jeju Campus, Seogwipo-si, Jeju-do, South Korea, T: Joseph Catron

Seoul, South Korea, KOR002, YSC (National Science Research Competition)

- BEHA073T**     **Looking for Sema's Sound**  
 Seo Yeon Kim, 16, Junior, Ju eun Kim, 17, Junior, SEMA Highschool, Osan-si, Gyeonggi-do, South Korea, T: Aejin Jeong
- CHEM065T**     **A Study on the Production of Kit to Detect Nickel Ion in Waste Water Using Luminol**  
 Yehyun Hwang, 17, Junior, Se Ryeon Kim, 16, Junior, Min Jung Kim, 16, Junior, Incheon Jinsan Science High School, Incheon, South Korea, T: Insook Park
- EAEV109T**     **Operation and Verification of Weather Prediction System for Marine Vessels Using NOAA Polar Orbit Satellites**  
 Hajin Woo, 18, Senior, Geunhee Park, 17, Senior, Hyeokju Song, 17, Senior, Kyeongbuk Science High School, Pohang, Gyeongsangbuk-do, South Korea, T: Beomseok Kim
- EAEV117T**     **The Production of Bioplastics Using Persimmon Pruned Branches**  
 Gyunho Kim, 17, Junior, HeeGyu Son, 17, Junior, Minseong Kim, 18, Junior, Masan Yongma High School, Masan, Gyeongsangnam-do, South Korea, T: Yeong Hee Heo
- ENBM095T**     **Wearable Ringer Device Using Static Load Spring**  
 Woojin Jeong, 17, Senior, Jeongbin Park, 17, Senior, Sejong Academy of Science and Arts, Sejong, Chungcheong, South Korea, T: Gildong Jang
- ENEV076**     **A Study on Eco-friendly Removal Method of Plastic Cup Printing Ink**  
 SeungHyeon Noh, 17, Senior, Yeosu High School, Yeosu-si, Jeollanam-do, South Korea, T: Saetbyeol Moon
- MATH050**     **Perfect Triangle Research and Exploration of Expansion to Four Dimensions with Using Code Design**  
 Geonheung Jang, 17, Senior, Chung-Buk Science High School, Cheongju-Si, Chungcheongbukdo, South Korea, T: Youngtec Kwon
- MATH051T**     **Curve Optimization Using Curvature Based Models with Calculus of Variations**  
 Hyungwon Han, 17, Senior, Dohyeon Kim, 17, Senior, Hyunjun Cho, 17, Senior, Korea Science Academy of KAIST, Busan, Busan, South Korea, T: Jongsool Choi

# Finalist Directory

- PHYS069T    A Learning Tool that Can Explain the Principle of Equation of Time**  
Jun Hyeok Park, 17, Senior, SangHyun Ju, 17, Senior, Sehun Lim, 17, Senior, Daejeon Science High School, Daejeon, Daejeon, South Korea, T: Woo Kyum Kim
- PHYS070T    Manufacture of Diffraction Grating Spectroscope and Development of Automatic Spectrum Analysis System**  
Uicheol Park, 17, Senior, Yunseo Lee, 18, Senior, Sejong Park, 17, Senior, Kyeongbuk Science High School, Pohang, Gyeongsangbuk-do, South Korea, T: Beomseok Kim
- PLNT046T    Research on the Antibacterial Activity of Jeju Seaside Lichen**  
Yujin Kim, 16, Junior, Yewon Jwa, 17, Junior, Yuna Seo, 16, Junior, Namnyeong High School, Jeju, South Korea, T: Jongmun Lee
- SOFT053T    Remote Learning Reminding Buddy (RLRB): Class Schedule, Attendance, Homework Management App. for Distance Learning**  
Dong Hyun Kim, 16, Sophomore, Joon Sung An, 16, Sophomore, SuWan Kim, 15, Sophomore, Hyundai Senior High School, Seoul, Seoul, South Korea, Hankuk Academy of Foreign Studies, Yongin, Gyeonggido, South Korea, Sangmoon High School, Seoul, Seocho, South Korea, T: Taeseon Yoon
- Seoul, South Korea, KOR003, Korea Science Fair**
- BMED075    Characterization of Brown Pine Needle Extract for the Treatment of Acne and Atopic Dermatitis**  
Kyoungun Kim, 16, Junior, Daegu Science High School, Daegu-si, South Korea, T: Youngran Kim
- CHEM062T    Invention of a Novel Detection Kit Based on Thiourea Doped Cellulose for Antibacterial Film's Validity**  
Adam Roberge, 18, Senior, Hyunjun Chang, 17, Senior, Cheongshim International Academy, Seoul, South Korea, T: Eun Gyeong Kim
- CHEM064T    A Novel Metal-Ligand Complex System Based on Uric Acid Ligands and Its Application on Gout Early Detection**  
Min Jae Kim, 17, Senior, Yeonsu Kang, 17, Senior, Cheongshim International Academy, Seoul, South Korea, T: Hyeon Soo Ryu
- EGSD050    Study on the Electric-potential Properties of Nanotubes Using Computational Simulations**  
Byoungyun Lee, 16, Sophomore, North London Collegiate School Jeju, Seogwipo-si, Jeju-do, South Korea, T: Hyung Joon Kim
- ENBM087T    The Power of Twisted Strings: A Portable Elbow CPM Machine with Twisted String Actuator**  
Joonseo Kim, 17, Senior, Doyoon Kim, 17, Senior, Jaewoo Park, 17, Senior, Incheon Academy of Science and Arts, Incheon, Incheon, South Korea, T: Daeki Cho
- ENBM088T    Improving the Accuracy of the FSR Insole Sensor by Inserting Intermediate Layer Material (Which Can Diagnose Parkinson's Disease)**  
Moosung Kim, 18, Senior, Gyugwang Lee, 18, Senior, Nayeon Kim, 18, Senior, Incheon Academy of Science and Arts, Incheon, Incheon, South Korea, T: Cho Daegi
- ENEV070    Research on the Resourceization of Jellyfish Gelatin Using Its Adhesive Component**  
June-Hue Koo, 18, Senior, Sejong Science High School, Seoul, South Korea, T: Jiah Lee
- ENEV073T    High Efficiency Wet Scrubbing System Utilizing Impeller**  
Seung Chan Lee, 17, Senior, Jooyoung Lee, 18, Senior, Hyunjae Cheon, 17, Senior, Korea Science Academy of KAIST, Busan, Busan, South Korea, T: Jong-In Han
- ENEV077T    Research on Hydrophobicity and Lipophilicity of Wood Decomposed by Brown Rot Fungi and Its Potential Application as an Oil Absorbent**  
Sunmin Lee, 17, Junior, Sanghyun Na, 17, Senior, Seoul International School, Seoul, Gyunggi-Do, South Korea, Hankuk Academy of Foreign Studies, Yongin, Gyeonggido, South Korea, T: David Bonar T: Taesun Yoon

# CONGRATULATIONS

## TO OUR FIRST PLACE CATEGORY WINNER

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**Energy: Sustainable Materials and Design**



**MARGARET YANG**

Bloomfield Hills, Michigan

**Engineering Biocatalysts  
for Biofuel Production**

Booth EGSD015

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**King Abdulaziz & his Companions Foundation  
for Giftedness & Creativity** applauds the finalists  
in Energy: Sustainable Materials and Design.

مؤسسة الملك عبدالعزيز ورجاله للموهبة والإبداع  
King Abdulaziz & his Companions Foundation for Giftedness & Creativity



# Finalist Directory

- MATSO41**      **Study on Exceptional Hydrogen Storage in High Entropy Alloys**  
# Jihye Heo, 17, Junior, Seoul International School, Seoul, Gyunggi-Do, South Korea,  
T: Byungmin Ahn
- MATSO44T**      **A Study on the Improvement of Contact Angle and Anti-Condensation Performance by Nano-Coating Treatment of Metal Surfaces**  
Hyunwoo Bae, 17, Senior, Dongmin Sim, 18, Senior, Dongmin Kim, 18, Senior, Incheon Jinsan Science High School, Incheon, South Korea, T: Changjae Lee
- MCRO054T**      **Enhancement of Flavor and Taste by Fermenting Coffee Beans with Six Mixed Microbes from Traditional Korean Liquors**  
Sae Rom Pak, 18, Senior, Sung Jun Lim, 18, Senior, Saeng Myong Cho, 18, Senior, Chung-Buk Science High School, Cheongju-Si, Chungcheongbukdo, South Korea, T: Kyung Ha Hwang
- PHYS076T**      **Real Orbital Implementation of Visual Binary through an Analysis of the Orbital Elements**  
Myoungbo Shim, 18, Senior, Joon Soo Lee, 18, Senior, Do Gyun Han, 18, Senior, Incheon Jinsan Science High School, Incheon, South Korea, T: Hyun Jung Park
- ROBO076T**      **Omni-wheel Based Circular Orbit Flight Simulator for G-Force Generation**  
Hyun Woo Kim, 16, Sophomore, Seungwon Yoo, 16, Sophomore, North London Collegiate School Jeju, Seogwipo-si, Jeju-do, South Korea, T: Hyung Joon Kim

## SPAIN

Barcelona, Spain, SPNO01, Exporecerca Jove

- BEHA076**      **Relationships Between Fluid and Crystallized Intelligence and Hippocampus Subareas' Volumes: An MRI Study with Standardized Testing**  
Bru Gomez Bonilla, 17, Senior, Institut Manuel de Cabanyes, Vilanova i la Geltru, Barcelona, Spain, T: Eduard Juanmartí
- CELL036**      **Saccharomyces cerevisiae as a Model Organism to Study Hog1 and Mammalian Homologous P38 Pathway**  
Andrea Cami Bonet, 17, Senior, Escola Mare de Deu de la Salut, Sabadell, Barcelona, Spain, T: Sergi Bonet Martínez
- EGSD053**      **The Cleanest Energy: Microbial Fuel Cells**  
Marti Cousillas, 18, Senior, Institut de Vilafant, Vilafant, Girona, Spain, T: Eulalia Amoros
- ENEV085T**      **Kombucha Microbial Cellulose: the Sustainable Alternative to Paper Industry**  
Guillermo Canosa, 18, Senior, Pedro Gefaell, 17, Senior, Colegio Retamar, Pozuelo de Alarcon, Madrid, Spain, T: Javier Fernandez-Portal
- PHYS078**      **Formulation and Implementation of a Support Vector Machine on D-Wave's Quantum Annealer**  
Carla Caro Villanova, 17, Senior, Aula Escola Europea, Barcelona, Catalunya, Spain, T: Jordi Mazón

## SWEDEN

Stockholm, Sweden, SWE001, Utställningen Unga Forskare

- BMED064**      **Adiponectin and BAT: Structure and Morphology of Brown Adipose Tissue in Adiponectin Transgenic Mice**  
Nils Grimbeck, 19, Senior, Goteborgs Hogre Samskola, Gothenburg, Vastragotalands regionen, Sweden, T: Ingrid Wernstedt Asterholm
- EAEV095**      **The Environmental Impact of Clothing: A Comparative Study Between Cotton and Lyocell from an Environmental, Economical and Quality Perspective**  
Liv Nilsson Nilsson Rapping, 18, Senior, Vagga Gymnasieskolan, Karlshamn, Blekinge, Sweden, T: Louise Rietz
- EAEV108T**      **What Underwater Sounds Does a Small Boat Make and Do the Dominant Frequencies in the Noise Coincide with Fish Calls?**  
Harriet Birgitta Kallberg, 18, Senior, Kajsa Helena Norman, 19, Senior, Lugnetgymnasiet, Falun, Dalarna, Sweden, T: Gunnar Kihlberg

# Finalist Directory

- MATH041**     **Robinson-Schensted Correspondence and Standard Young Tableaux**  
Clara Sofia Linnea Ekback, 18, Senior, Berzeliussskolan, Linköping, Östergötland, Sweden, T: Axel Hultman
- MCRO047**     **The Antimicrobial Effect of Beehive Products: The Effect of Honey, Propolis Extract and Royal Jelly on Gram-Positive and Gram-Negative Bacteria**  
Amela Peco, 18, Senior, Sjolins Gymnasium Södermalm, Stockholm, Stockholm, Sweden, T: Rabeeh Najafi
- SOFT046**     **Using Artificial Intelligence and Algorithms for Natural Language Processing to Analyze the Emotions of Gender in Literature and Songs**  
Alice Louise Heiman, 17, Junior, Viktor Rydbergs Gymnasium Odenplan, Stockholm, Stockholm, Sweden, T: Tobias Ericson

## SWITZERLAND

**Bern, Switzerland, CHE001, Swiss Youth in Science**

- ENBM105**     **Using Fluorescence Imaging to Investigate the Organisation of Human Brain Organoids**  
Nathalie Weibel, 20, Senior, University of Zurich, Zurich, Switzerland, T: Annina Denoth
- ENMC079**     **Development of a Rotor with Improved Aerodynamics to Propel a Quadcopter – Design and Manufacture According to the Laws of the Propeller Theory by Betz and Schmitz**  
Max Schaldach, 18, Senior, Freies Gymnasium Zurich, Zurich, Switzerland, T: Jean-Charles Demierre

## THAILAND

**Bangkok, Thailand, THA001, SST-NSM National Science Projects Competition**

- ANIM005T**     **Behavior Study and Development of Artificial Nest for Nurturing Assassin Bugs (*Sycanus indagator* Stal.) Beneficial in Biological Pest Control**  
Nonthaporn Srikha, 16, Sophomore, Natthida Benjapiyaporn, 17, Junior, The Demonstration School of Khon Kaen University (Modindaeng), Muang Khonkaen, Khonkaen, Thailand, T: Kultida Thongnum
- ANIM013T**     **Lac Insect Cultivation on Local Weeds for Increasing Lac Production**  
Ratchanon Metheesithikun, 15, Sophomore, Natnicha Punyainkaew, 16, Sophomore, Warakorn Thammawong, 16, Sophomore, Huayso Wittayakhom Rachamangkhalaphisek, Chiang Khong, Chiang Rai, Thailand, T: Keerati Thuyen
- ANIM020T**     **Development of Lady Beetle Cultivation for Pest Control**  
Warinyupa Ngamjarenwong, 15, Sophomore, Naipaphon Kumhom, 14, Freshman, Thanakorn Silaphan, 14, Freshman, The Demonstration School of Khon Kaen University (Modindaeng), Muang Khonkaen, Khonkaen, Thailand, T: Akkarawat Srisawat
- ANIM031T**     **The Mystery behind Burrowing of Mole Crickets**  
Thanyakorn Yantarasart, 17, Junior, Nanthawat Wiwatpisit, 16, Junior, Teeradon Manasviyoungkul, 17, Junior, Montfort College, ChiangMai, ChiangMai, Thailand, T: Junjira Chaiinseard
- CHEM028T**     **Structurally Modified Chlorophyll a as a Natural-Based Pigment for Dye-Sensitized Solar Cells**  
Sapol Maison, 17, Junior, Settanan Suangburanakul, 16, Junior, Suphawit Promkhot, 17, Junior, Kamnoetvidya Science Academy, Rayong, Thailand, T: Prasongporn Ruengpirasiri
- MATS007T**     **The Development of Helicoid-Shaped Model for Increasing Flow Rate of Removing Blood Clots in Medical Treatments**  
Pittinun Harnsingkun, 18, Senior, Patcharapol Rujipornpong, 18, Senior, Nonthanat Wetthayanon, 17, Senior, Princess Chulabhorn Science High School Phetchaburi, Cha-Am, Phetchaburi, Thailand, T: Saknarin Channark

# Finalist Directory

- PLNT009T** **Imitation of Fig Wasp Pollination: An Innovation for Efficient Production of Cluster Fig (*Ficus racemosa*)**  
Karit Keereekeaw, 17, Junior, Teerateep Boonlert, 17, Junior, Kornkanok Promruk, 17, Junior, Damrongratsongkroh School, Muangchiangrai, Chiangrai, Thailand, T: Kiettisak Inrajsadon
- PLNT013T** **The Relationship Between Sweetness and Internode Feature of Sugarcane**  
Panchanok Leela, 17, Senior, Rutsiripol Putson, 18, Senior, Kowit Sukchai, 18, Senior, Princess Chulabhorn Science High School Phetchaburi, Cha-Am, Phetchaburi, Thailand, T: Sita Taweekan
- ROBO023** **A Web Application for Skin Diseases Classification with a Small Dataset Using Deep Learning**  
Waranthorn Chansawang, 18, Senior, Princess Chulabhorn Science High School Pathumthani, Ladlumaew, Pathumthani, Thailand, T: Khunthong Klaythong
- Bangkok, Thailand, THA002, Young Scientists Competition**
- BMED071T** **Extraction and Preparation of Prebiotic from Oil Palm Polysaccharide for Application in Functional Product**  
Fatin Meesa, 17, Junior, Narathorn Duangsodsri, 17, Junior, Demonstration School of Prince of Songkla University, Mueang Pattani, Pattani, Thailand, T: Pochanart Kanjan
- BMED072T** **Rapid Osteoporosis Risk Assessment: Non-invasive Detection Kit of Calcium, Phosphate and pH in Human Sweat**  
Krit Kasikpan, 17, Senior, Korrawee Leelaadisorn, 17, Senior, Patt Phurthivilai, 18, Junior, Mahidol Wittayanusorn School, Nakhon Pathom, Nakhon Pathom, Thailand, T: Kiattipoom Rodpun
- CBIO084T** **EGFRNet: Transfer and Multi-task Learning Based on Graph Convolutional Network Toward Multi-target Drug Discovery Against Cancers for EGFR-Family Proteins**  
Natthakan Saengnil, 17, Junior, Puri Virakarin, 16, Junior, Kamnoetvidya Science Academy, Rayong, Thailand, T: Bundit Boonyarit
- CBIO085** **Meta-analyses to Identify Master Regulatory Elements with Potential to Induce a Pre-implantation State in Human Endometrial Cells *in vitro***  
Koravit Poyungnoen, 17, Junior, Triam Udom Suksa, Pathumwan, Bangkok, Thailand, T: Chanati Jantrachotechatchawan
- CHEM056T** **Development of Multi-sensor Paper-Based Test Kit for Heavy Metal Detection**  
Kijjakarn Namsawangrungrueng, 16, Junior, Dawit Boonyakitnotai, 17, Junior, Thiti Thaloengboonsiri, 17, Junior, Kamnoetvidya Science Academy, Rayong, Thailand, T: Suranan Anantachaisilp
- PHYS066** **Development of New Theory for Superior Mirage and Fata Morgana Mirage**  
Kamonsap Sapmee, 19, Senior, Benjamarachutit School, Mueng Nakon Si Thammarat, Nakhon Si Thammarat, Thailand, T: Chanat Chamthong
- ROBO072T** **Karyogram for the Primary Diagnosis of Human Chromosomal Abnormalities**  
Kiartisak Seangarthan, 17, Junior, Siwasit Saengnikun, 17, Junior, Princess Chulabhorn Science High School Mukdahan, Mukdahan, Thailand, T: Theerawut Chantapan

## TURKEY

Ankara, Turkey, **TURO02, Tubitak Fair**

- CBIO050** **A Helical Wheel Based Coiled Coil Prediction Algorithm and Its Application to Disease**  
Ahmet Enis Guven, 17, Junior, Malatya Erman Ilıcak Fen Lisesi, Malatya, Yesilyurt, Turkey, T: Mehmet Arslan
- CHEM003** **Artificial Photosystems : New Approach to the Synthesis of Boron-Doped Carbon Material from Plastic Wastes for Solar Energy Conversion Applications**  
# Mehmet Sertac Cekuc, 19, Senior, Kartal Anadolu Imam Hatip High School, Istanbul, Turkey, T: Ersin Erturk

# CONGRATULATIONS TO OUR CATEGORY FINALISTS

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## Engineering Mechanics

Nathaniel Abrams	Dimitri Gulua	Brian Minnick	Suhaan Singh
Nada Abuissa	Adam Guthrie	Nur Hazwani Sahira Mohd	Ludwik Skowronek
Ishan Ahluwalia	Muhammed Hassen	Nissham	Zygmunt Skowronek
Fawaz Ahmad	Matthias Hefty	Logan Murray	Pavel Smolin
Nurul Fayyadhah Ahmad	Charlotte Hively	Julius Neumann	Shaylee Stanger
Zainudin	Marcin Hnat	An Nguyen	Kierstyn Stanley
Jimisola Balogun	JeongHun Im	Brayden Noh	Bronte Stump
Kerem Bayhan	Gerard Ismagilov	Nia Norakidze	Lauren Suzuki
Guilherme Beyruti	Andres Iturregui	Max Oberg	William Sweeney
Suranyi	Henry Jacobson	Isaac Olufunminiyi	Aaban Syed
Aidan Blenker	Chandni Jain	Dakota Perry	Imaad Syed
Filip Bulawa	Natalie Janzaruk	Linh Pham	Keng Hang Tang
Caleb Chakmakjian	Luke Joufflas	Elijah Plattner	Nik Nurfarahana Tengku
Jay Chavakula	Ashutosh Kandala	Holden Rice	Rosman
Joseph Cinquemani	Daniel Kim	George Richards	Arya Tschand
McKenna Collins	Alexander Kmetko	Matyas Rozsavolgyi	Seth Turna
Tianqi Dai	Wills Kookogey	Landon Runion-Driskel	Antonio Velasco
Liam Davies	Matvei Kuznetsov	Jack Saito	Steven Vokoun
Piotr Domanowski	Pavel Kuznetsov	Muhammad Muazzam	Sydney Vokus
Rebekah Dorminy	Seung won Lee	Salman	Ryan Wans
Timothy Drinkall	Hei I Lei	Vivek Sandrapaty	Isabella Weiner
Owen Emerich	Jennifer Lew	Mikhail Satleykin	Ethan Wong
Su Fong	John Lewis	Max Schaldach	Jack Woods
Luke Foye	Muyao Li	Tate Schrock	Ken Yaguchi
Crawford Fuzzell	Kenzie Madrid	Adam Schuppler	Rygel Tristen Yance
Ao Gai	Mitchel Masters	Christopher Schweitzer	Kristina Yu
Ved Ganesh	Anika Mathur	Cayden Shaffer	
Gigi Gugunava	Franciszek Mikolajczyk	Jiarong Sheng	

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**Society for Science** applauds  
the finalists in Engineering Mechanics.



**SOCIETY FOR SCIENCE**

# Finalist Directory

- EBED002T** **Poly-open LIDAR: Fast and High Resolution Adaptive LIDAR with Original Multi-Opening Polygon Mirror System**  
Emre Akman, 18, Senior, Haluk Baran Akbulut, 17, Senior, Ankara Fen Lisesi, Ankara, Turkey, T: Askin Unal
- EGSD002T** **Recovery of Lithium and Cobalt from Waste Li-ion Batteries with a Newly Developed Method**  
Zeynep Bayindir, 17, Junior, Beliz Kargi, 18, Senior, TED Antalya Collage Foundation Private High School, Antalya, Muratpasa, Turkey, T: Gulay Demirci
- EGSD003** **Investigation of Spectral Response and Efficiency of Boron and Nitrogen-doped Diamond-like Carbon as the Top Junction in Multijunction Silicon Solar Cells**  
Feridun Balaban, 18, Senior, Malatya Bilim ve Sanat Merkezi, Malatya, Malatya, Turkey, T: Savas Zafer Guler
- ENBM005** **Application of 3D-Bioprinting and Electromagnetic Field for the Development of Artificial Bone from Stem Cell-Laden Bioink Incorporating Sepiolite and Eggshell**  
# Tan Elcin, 19, Senior, Ted Ankara College Foundation Private High School, Ankara, Golbasi, Turkey, T: Demet Izgu
- ENBM010T** **The Design of Microfluidic Pump (MFP) for Medical Field**  
Lara Yucebas, 18, Senior, Sila Karakusoglu, 17, Senior, Cakabey Schools, IZMIR, Turkey, T: Aysenur Ozdemir
- ENEV036** **The Investigation of the Limitations of Toxic Dye Biosorption by *Pyrracantha coccinea***  
# Idil Buyukgolcigezli, 16, Junior, Bilkent Erzurum Laboratory School, Erzurum, Turkey, T: Onur Sozudogru
- ENMC004** **Proposal of an Electro-Mechanical System to Reduce the Fatality of Car Underride Crashes**  
Kerem Bayhan, 17, Junior, Izmit Bilim ve Sanat Merkezi, Izmit, Kocaeli, Turkey, T: Nefize Tunali
- MATH003** **The Arbelos in Three-Dimensional Space and the Archimedean Spheres**  
Bilgenaz Altiparmak, 18, Senior, Izmir Ozel Ege Lisesi, Izmir, Bornova, Turkey, T: Okan Aciksoz
- MATH036** **Proposal for an Algorithm for Finding the Crossing Number of a Graph**  
# Olcay Oransoy, 16, Junior, Izmir Bahcesehir College 50. Year Science and Technology High School, Izmir, Izmir, Turkey, T: Mehmet Kurt
- ROBO002** **SUMRO (Symmetric Upper-limb Mapping Robotic Prosthesis)**  
Dilay Dal, 17, Senior, Ozel Enka Mesleki ve Teknik Anadolu Lisesi, Dilovasi, Kocaeli, Turkey, T: Omer Alemdar
- ROBO037T** **Assistive Glasses for the Vision Impaired: Continuation**  
# Okan Demir Baykal, 17, Senior, Tankut Cekic#, 18, Senior, Izmir Ozel Ege Lisesi, Izmir, Bornova, Turkey, T: Atajan Rovshenov
- SOFT003T** **MRyze: A Web Application that Analyzes MR Images to Detect and Segmentate Brain Tumor for Both Doctors and Patients**  
Eren Ekrem Kallikci, 19, Senior, Huseyin Kaan Kucukturan, 18, Junior, Antalya Bilim ve Sanat Merkezi, Antalya, Kepez, Turkey, T: Hatice Kupeli

## UKRAINE

Kyiv, Ukraine, **UKR001, Eco-TechnoUkraine**

- BCHM006** **In silico Research of the Potential Role of a Number of Compound Class N-acyl ethanolamines as Inhibitors of E-protein Coronavirus SARS-CoV-2**  
Adam Trach, 16, Junior, Specialized School #89, Kyiv, Ukraine, T: Volodimir Nazarenko
- CELLO10** **Obtaining of Transgenic Broccoli Plants with Alpha-2B Leucocyte Interferon Gene**  
Antonina Shkrobiak, 16, Sophomore, Vysheve Secondary School #1, Vyshneve, Kyiv Oblast, Ukraine, T: Nataliia Shcherbak

# Finalist Directory

- ENEVO20**      **Method of Bacterial Cellulose Production from Plant Waste Substrates**  
Olena Klimova, 17, Junior, Mariupol Technical Lyceum, Mariupol, Ukraine,  
T: Viacheslav Ponomarchuk
- MATH020**      **Specialized Digital Signatures Based on the Paillier Cryptosystem**  
# Valentyna Zinkova, 16, Junior, Technic Lyceum of NTUU "KPI", Kyiv, Ukraine,  
T: Serhii Yakovliev
- PHYS020**      **Investigation of Self-Oscillations in Hydrodynamic Systems**  
Viktor Ulanov, 17, Junior, Dnipro Lyceum of Information Technologies at DNU, Dnipro,  
Dnipropetrovsk Oblast, Ukraine, T: Oleh Orlianskyi

## UNITED STATES OF AMERICA

### ALABAMA

Auburn, USAL01, Greater East Alabama Regional Science and Engineering Fair

- EAEV077**      **Environmental Conservation: Calculation of Irregular Surface Area Utilizing the Monte Carlo Method and the Law of Large Numbers**  
# Jaeyoung Lee, 18, Senior, Auburn High School, Auburn, Alabama, T: Jacque Middleton
- EGSD044**      **Harvesting Energy from Everyday Movements by Developing a Two-Dimensional MXene-Based Triboelectric Nanogenerator**  
Naeim Mahjouri, 16, Sophomore, Auburn High School, Auburn, Alabama,  
T: Jacque Middleton

- ENMC052**      **Supercapacitor Assisted Hybrid Electric Vehicle Powertrain and Power Selection Using Fuzzy Rule-Based Algorithm**  
### Brayden Noh, 19, Senior, Auburn High School, Auburn, Alabama, T: Jacque Middleton

Birmingham, USAL02, Central Alabama Regional Science and Engineering Fair

- ANIM016**      **Factors that Affect Bird Activity and Diversity In Jefferson County in the Morning vs. the Afternoon**  
Eva Noel Ledvina, 15, Freshman, Jefferson County International Baccalaureate, Irondale, Alabama, T: Ryan Reardon

- BMED019**      **Intratumoral Heterogeneity in Gene Expression within Single Glioblastoma Tumors**  
Mayu Nakano, 16, Sophomore, Indian Springs School, Indian Springs, Alabama,  
T: Tessa Magnuson

- EBED016T**      **Sensor Notification System for Tail-Light Failure**  
Wesley Drew McDowell, 17, Senior, Elijah Tate Muncher, 18, Senior, Hewitt Trussville High School, Trussville, Alabama, T: Jason Dooley

- ENBM030**      **Processing of Sensory Information from a Bio-Inspired Flexible Artificial Skin Using a Kohonen Artificial Neural Network**  
Catherine Kung, 16, Junior, Indian Springs School, Indian Springs, Alabama,  
T: Christina Tetzlaff

- ENEVO26**      **Dye Removal with GO Reinforced Nanocomposite MOFs**  
Amitis Moradkhani, 16, Junior, Indian Springs School, Indian Springs, Alabama,  
T: Tessa Magnuson

- ROBO025**      **An Investigation in Precipitation Prediction with Machine Learning**  
Emma Seidel, 18, Senior, Alabama School of Fine Arts, Birmingham, Alabama,  
T: Anton Spraul

Huntsville, USAL03, North Alabama Regional Science and Engineering Fair

- BCHM019**      **Application of Bayesian Inference for the Deconvolution of Nuclear Magnetic Resonance Spectra to Assess Metabolic Alterations and Type I Diabetes Susceptibility**  
# Yewon Lee, 17, Junior, James Clemens High School, Madison, Alabama, T: Leah McRae

# Finalist Directory

- ENBM060 Scalable Track, Trace, and Isolate Solution for Pandemic Contagion and Risk Management**  
Neha Singhal, 15, Sophomore, James Clemens High School, Madison, Alabama,  
T: Leah McRae
- ENBM061 Personalized Implantable Scaffolds for Wound Treatment and Management**  
Ashwin Prabhakar, 16, Sophomore, Bob Jones High School, Madison, Alabama,  
T: Jessye Gaines
- Mobile, USALO4, Mobile Regional Science Fair**
- CELLO06 *Escherichia coli* Growth Inhibition through Dose Treatments of Pomegranate, Lemon, Ginger, and Turmeric Extracts**  
Dev Vipul Mehta, 17, Junior, WP Davidson High School, Mobile, Alabama,  
T: Aimee Tucker
- EBED006 Machine Learning-Optimized Filters for Wireless, Low-Error Networks**  
Cary Xiao, 17, Senior, Alabama School of Mathematics and Science, Mobile, Alabama,  
T: Grey Gaillard
- ENMC019 Reduction of Tsunami Impacts on Coastal Inhabitants and Infrastructure by Armoring Shorelines Using Hydrodynamics**  
Dakota Kaitlyn Perry, 14, Freshman, WP Davidson High School, Mobile, Alabama,  
T: Ryan Moody
- MATH019 Classification of Small Orthomodular Posets in Quantum Logic through Clique Structures of Dacey Graphs**  
Gregory Li, 18, Senior, Alabama School of Mathematics and Science, Mobile, Alabama,  
T: Ethan Sussman
- Huntsville, USAL50, Alabama Science and Engineering Fair**
- CBIO093 Through the Looking Glass: Uncovering the Molecular Mechanisms of Phytochemical Treatment for the Prevention of Age-Related Macular Degeneration**  
Rishab Samant, 16, Sophomore, Vestavia Hills High School, Vestavia Hills, Alabama,  
T: Rajeev Samant
- ENBM084 A Low-Cost Approach to EEG based Mind-Controlled Prosthetic Arm Using Brain-Computer Interface**  
Madhushalini Balaji, 15, Freshman, James Clemens High School, Madison, Alabama,  
T: Leah Mcrae
- MATS045 Targeted Core-Shell Nanoassembly Composed of a Mesoporous Silica Core, Liposome Shell, and GE11 Peptide as a Drug Delivery Nanocarrier**  
Kailyn Rhyah Grant, 16, Junior, Bob Jones High School, Madison, Alabama, T: Torri Clay
- ROBO073 Computationally Light Tree Species Classification Using RGB Bark Images**  
Longji Jerry Chen, 17, Senior, Alabama School of Fine Arts, Birmingham, Alabama,  
T: Vincent Spraul

## ALASKA

### Anchorage, USAK50, Alaska Science and Engineering Fair

- EGSD036 Can Juneau Sustain a Complete Transition to Green Technology?**  
Annabella Noel Williams, 17, Junior, Thunder Mountain High School, Juneau, Alaska,  
T: Kathleen Galau
- ENEV064 Storm Drain Oil Filtration Device with a Flexible Tyvek Material Container**  
Kate Renee Marie Deering, 14, Freshman, IDEA Homeschool, Anchorage, Alaska,  
T: Michele Deering

# CONGRATULATIONS TO OUR CATEGORY WINNERS

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## Environmental Engineering

### FIRST PLACE

Sahil Azad  
Haoyu Bradley Wang

### SECOND PLACE

Autumn Ann-Marie Kim  
Alden James Kruse  
Aesha Shah  
Julius Yoh  
Xenia Zhao

### THIRD PLACE

Sean Brooks  
Guillermo Canosa  
Rafaela Curcio  
Pedro Gefaell  
Jack Hlavka  
Sunmin Lee  
Sanghyun Na  
Kyle P. Tianshi  
Max Cole Watchmaker

### FOURTH PLACE

Idil Buyukgolcigezli  
Zoe Francesca  
Diederich  
Omar Walid Elbehiry  
Olena Klimova  
Chiu Ming Kwan  
Chi Mei Lam  
Weng Hei Lau  
Mingxin Liu  
Charlotte Lenore  
Michaluk  
Nathan Muszynski  
Ishika Nag  
Ka Pui Ngan  
Helen Ngie

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**Jacobs** applauds the finalists  
in Environmental Engineering.

**Jacobs**

Challenging today.  
Reinventing tomorrow.

# Finalist Directory

## ARIZONA

### Sierra Vista, USAZ02, SSVEC's Youth Engineering and Science Fair

**BMEDO28T    The Bacteria Between Us: The Connection Between Classrooms, Ventilation, and Airborne Bacteria**  
Zoe Elizabeth Lynn, 17, Junior, Angelina Stilwell, 17, Senior, Veritas Christian Community School, Sierra Vista, Arizona, T: Daniel Doyle

**CELLO19      Environmental Effects on Mitosis**  
Sofia Grossi, 17, Senior, Veritas Christian Community School, Sierra Vista, Arizona, T: Daniel Doyle

**ENEVO50T    Bags to Bridges: A Use for Polythene Plastic Bags**  
Manuel Alejandro Castillo, 15, Sophomore, Joseph Ezra Schmidt, 16, Sophomore, Veritas Christian Community School, Sierra Vista, Arizona, T: Melissa Bravenec  
T: Melissa Bravenec

### Tucson, USAZ03, Southern Arizona Research, Science and Engineering Fair

**BMEDO20    Effects of *Prosopis glandulosa* Leave Extract on Lowering the Antibiotic Resistance of *Escherichia coli*, *Sarcina lutea*, and *Staphylococcus epidermidis***  
Andrea Romero, 16, Sophomore, Harvest Preparatory Academy, Yuma, Arizona, T: Alfred Santos

**CBIO025      mRNA Sequence Analysis to Determine Genes Causing Unilateral Incompatibility in *S. lycopersicum* and *S. pennellii***  
# Alexander Clinton Nelson, 17, Junior, Nelson Home School, Tucson, Arizona, T: Sandra Nelson

**CELLO12      In Amyotrophic Lateral Sclerosis (ALS) Patient Tissue, UG Rich RNA Is Not Preferentially Soluble as Predicted**  
# Karah Michelle Mayer, 17, Junior, Tanque Verde High School, Tucson, Arizona, T: Grazyna Zreda

**CHEM020    The Feasibility of the Extraction of (2E)-3-phenylprop-2-enal from *Cinnamomum cassia* Bark Using Water and Aqueous Ethanol as Solvents in Distillation**  
Aaron Xiang Trinh, 17, Senior, Canyon del Oro High School, Oro Valley, Arizona, T: Jill Christman

**EAEVO28    Green Infrastructure Impacts on Carbon Cycling: Evaluating Changes in Soil Microbial Composition and Function**  
Isabel Kay Ross, 17, Junior, Cienega High School, Vail, Arizona, T: Lisa Baker

**EGSD014    Making a Saguaro H.A.W.T. (Horizontal Axis Wind Turbine)**  
Amanda Ruth Whalen, 17, Senior, Veritas Christian Community School, Sierra Vista, Arizona, T: Daniel Doyle

**ENBM032    Fabrication of a Bioprinted Scaffold Cuff: Implications for Tissue Engineering of an Implantable Organ**  
Ethan N. Lee, 17, Senior, University High School, Tucson, Arizona, T: Elyse Wexler

**MCRO017    Viral Abundance in Terrestrial Cyanobacteria Differs as a Function of Host Ecology**  
Esha Mathur, 18, Senior, University High School, Tucson, Arizona, T: Elyse Wexler

### Phoenix, USAZ50, Arizona Science and Engineering Fair

**ANIM046    Investigation on Amino Acid DL-Phenylalanine's Ability as a Cognitive Stimulant in *V. costata***  
Zarrin Askari, 17, Junior, Cibola High School, Yuma, Arizona, T: Patricia Garcia

**BCHM024    A Novel Approach to Treating Burn Wound Infections Using Flavonoids: Exploring the Interaction between Antibiotics and Flavonoids**  
Michelle Zahra Sheikh, 17, Senior, Arizona College Preparatory- Erie, Chandler, Arizona, T: Rachna Nath

**CBIO086    De Novo Design of Ubiquitin Substrate for Neuritic Plaque-Busting**  
Khushi Parikh, 16, Junior, Gilbert Classical Academy, Gilbert, Arizona, T: Erik Gillman

# Finalist Directory

<b>CELLO34</b>	<b>A Novel Method for Measuring Cell Permeability as a Number of Viable Pores Using Spectroscopy and Pore Relaint Antibiotics</b> Bailey Bree Tischler, 16, Junior, San Tan Charter School, Gilbert, Arizona, T: Christopher Newton
<b>EAEV089T</b>	<b>The Degradation of Polystyrene (Styrofoam) by Tenebrio Beetles and Their Larvae</b> Aahana Dugar, 17, Junior, Nevan Jacob Hanford, 17, Junior, Blake Enwiller, 16, Junior, Arizona College Preparatory- Erie, Chandler, Arizona, T: Rachna Nath
<b>ENBM075</b>	<b>Wearable Risk Indicator via Sugar Tracking (WRIST): A Novel, Wearable, Non-Invasive Glucose Monitoring System via Quantitative Spectroscopy Analysis</b> Roshan Ravi Pillai, 18, Senior, BASIS Scottsdale, Scottsdale, Arizona, T: Ryan Carey
<b>ENEV074</b>	<b>Rethinking Food Waste: Optimizing the Food Bank Supply Chain to Tackle Food Waste and Food Insecurity</b> Xenia Zhao, 18, Senior, Hamilton High School, Chandler, Arizona, T: Debbie Nipar
<b>MATH040</b>	<b>A Novel Approach to Estimate the Number of Asteroids in Different Belts Using Weighted Regression</b> Chloe Feiyang Zhan, 14, Freshman, Hamilton High School, Chandler, Arizona, T: Debbie Nipar
<b>MATS037T</b>	<b>InnovaStrip: Fast, Comprehensive, Small-Volume Blood Diagnostics via an Algorithm for Handheld Analysis of Rapidly Solidified Drops into Thin Films</b> Thilina Navod Balasooriya, 17, Junior, Wesley Peng, 17, Junior, Nikhil Suresh#, 18, Senior, Hamilton High School, Chandler, Arizona, BASIS Scottsdale, Scottsdale, Arizona, T: Debbie Nipar
<b>PHYS065T</b>	<b>Mathematical Analysis of an Effective Negative Mass Rocket Propulsion System Along a Linear Trajectory to Mars</b> Medha Ninad Tambe, 16, Junior, Taneesha Rajiv Kapadia, 17, Junior, Hamilton High School, Chandler, Arizona, T: Debbie Nipar
<b>ROBO055</b>	<b>HemaVision: A Deep Learning and Computer Vision-Based Mobile Screening System for Rapid, Inexpensive, and Automated Diagnosis of Hematological Diseases</b> Ella Yue Wang, 17, Junior, BASIS Chandler, Chandler, Arizona, T: Joseph Bostaph
<b>ROBO059</b>	<b>Detecting Microbial Contaminants in Water Using Artificial Intelligence and Deep Learning Algorithms in order to Prevent the Spread of Waterborne Illnesses</b> Anshul Verma, 16, Junior, Hamilton High School, Chandler, Arizona, T: Sara Loutzenheiser
<b>SOFT049</b>	<b>qGenerator: A Novel Way to Create Qudit Quantum Error Correction Codes</b> Arun J. Moorthy, 16, Sophomore, BASIS Scottsdale, Scottsdale, Arizona, T: Kay Yoo
<b>TMED052</b>	<b>ImmunoNet: A Novel <i>in-silico</i> Platform to Personalize Immunotherapy for Breast Cancer Treatment</b> Arjun Kumar Moorthy, 18, Senior, BASIS Scottsdale, Scottsdale, Arizona, T: Ryan Carey

## ARKANSAS

Little Rock, **USAR01, Ouachita Mountains Regional Science & Engineering Fair**

<b>EAEV021</b>	<b>Water Energy Usage</b> Joseph Douglas Young, 15, Freshman, Mountain Pine High School, Mountain Pine, Arkansas, T: Bobby Young
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Fayetteville, **USAR03, Northwest Arkansas Regional Science and Engineering Fair**

<b>ROBO041</b>	<b>Improving Alzheimer's Disease Diagnosis Using AI-Based Artificial Neural Networks</b> Chandra Kiran Suda, 14, Freshman, Bentonville High School, Bentonville, Arkansas, T: Cynthia Cardwell
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# Finalist Directory

## Jonesboro, USAR04, Northeast Arkansas Regional Science Fair

**EAEV022 Quantifying Soybean CO<sub>2</sub> Exchange with Chlorophyll Content**  
Cameron B. Holder, 16, Sophomore, Nettleton High School, Jonesboro, Arkansas,  
T: Bryant Fong

**EAEV035 Seasonal Abundances of Macroinvertebrate Orders in an Intermittent Ozark Headwater Stream**  
# Echo Jordan Mitchell, 15, Sophomore, Rural Special High School, Fox, Arkansas,  
T: Ty Pitcock

## Little Rock, USAR05, Central Arkansas Regional Science and Engineering Fair

**BMED016 Deciphering the Cellular Effects and Bioavailability of *Moringa oleifera* Leaf Extract**  
Bhavana Sridharan, 15, Freshman, Little Rock Central High School, Little Rock, Arkansas,  
T: Patrick Foley

**CHEM017 Synthesis & Characterization of Phosphorus/Nitrogen Co-Doped Carbonized Waste Cigarette Filters: Application as Textile Dye Adsorbents & Oxygen Reduction Electrocatalysts**  
# Zane Abdeen Alsebai, 17, Junior, Little Rock Central High School, Little Rock, Arkansas,  
T: Patrick Foley

**EAEV023 Plant Based Water Purification**  
Tarini Eswaran, 14, Freshman, Little Rock Central High School, Little Rock, Arkansas,  
T: Tarsha Parker

**EAEV056 The Impact of Root Depth in Regards to Carbon Dioxide Absorption in *Brassica rapa* Subspecies *Pekinensis* Plants**  
Rhea Choudhary, 14, Freshman, Pulaski Academy, Little Rock, Arkansas, T: Katie Parson

**ROBO026 Heuristic Oncological Prognosis Evaluator (HOPE): A Novel Approach Implementing a Deep Learning Convolutional Neural Network Framework to Detect Brain Cancer, Breast Cancer, Colorectal Cancer, and Lung Cancer**  
# Anu Iyer, 16, Sophomore, Little Rock Central High School, Little Rock, Arkansas,  
T: Lee Conrad

## Hot Springs, USAR07, West Central Regional Science fair

**CBIO018 Application of EEG Signal Analysis and Machine Learning on Neonatal Seizure Prediction**  
# Daye Kwon, 18, Senior, Arkansas School for Mathematics, Sciences and the Arts, Hot Springs, Arkansas, T: Brian Monson

**MCRO011 The Surprise in the Slime: Sulfate-Reducing Bacteria and Iron-Related Bacteria in Public-Use Fountain Biofilms in Hot Springs National Park**  
Alyssandra Perez Navarro, 18, Senior, Arkansas School for Mathematics, Sciences and the Arts, Hot Springs, Arkansas, T: Whitney Holden

**PLNT006 The Effect of Soil Composition on Competition between Native and Invasive Plants**  
Cameryn Dawn Berryhill, 17, Junior, Arkansas School for Mathematics, Sciences and the Arts, Hot Springs, Arkansas, T: Whitney Holden

## Conway, USAR50, Arkansas State Science Fair

**ANIM049 A Study of the Abundance and Diversity of Pollinators in Eureka Springs Urban Gardens and Black Bass Lake Park for Use in the Native Pollinator Conservation Effort**  
Chloe Kirk, 18, Senior, Arkansas School for Mathematics, Sciences and the Arts, Hot Springs, Arkansas, T: Brian Monson

**BEHA072 Memory Treachery: How False Memories Are Formed**  
Akul Shrivastava, 15, Freshman, Little Rock Central High School, Little Rock, Arkansas,  
T: Melissa Donham

**CHEM057 Synthesis, Characterization and *in vitro* Cytotoxicity of Tunable Sized Chemo-PTT Combination Nanomedicines for Cancer Therapy**  
## Amna Khan, 17, Junior, Little Rock Central High School, Little Rock, Arkansas,  
T: Patrick Foley

# CONGRATULATIONS TO OUR CATEGORY WINNERS

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## Materials Science

### FIRST PLACE

Ethan Mark Zentner

### SECOND PLACE

Vedanth Iyer

Jacqueline Prawira

Stephen Xia

### THIRD PLACE

Thilina Navod Balasooriya

Naisha Anaum Chowdhury

Kailyn Rhyah Grant

Howard Tang Hua

Wesley Peng

Nikhil Suresh

### FOURTH PLACE

Jihye Heo

Christopher Changhoon Huh

Kelly Sanae Mukai

Arwa Niyazi

Sohi Sanjay Patel

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**West Pharmaceutical Services** applauds the  
finalists in Materials Science.



# Finalist Directory

- CHEM058      The Effect of pH on Dye Degradation by Titanium (IV) Dioxide Nanoparticles**  
Soumya Chauhan, 16, Junior, Arkansas School for Mathematics, Sciences and the Arts, Hot Springs, Arkansas, T: Brian Monson
- ENMC064      Facile and Green Assembly of a Novel Photovoltaic Array Cooling Mechanism: A Study Preventing Hot Spot Damage Using a Sealed Liquid Cooling Unit within a Hydrophobic Encasement**  
Landon Patrick Runion-Driskel, 17, Senior, Little Rock Central High School, Little Rock, Arkansas, T: Melissa Donham
- SOFT051      Visualizing Fractals with Three Dimensional Turtle**  
William Lawson Smith, 17, Junior, Arkansas School for Mathematics, Sciences and the Arts, Hot Springs, Arkansas, T: Nicholas Seward

## CALIFORNIA

### Costa Mesa, USCA01, Orange County Science and Engineering Fair

- EAEV070      Assessing Grass Water Use Efficiency through Smartphone Imaging and ImageJ Analysis**  
Aniyah Xu Shen, 16, Sophomore, University High School, Irvine, California, T: Shannon Bunch
- ENBM076      The Fabrication and Optimization of an Integrated Microfluidic Test Strip for Prothrombin INR Testing**  
Firas Qureshi, 16, Junior, Yorba Linda High School, Yorba Linda, California, T: Greg Walls
- ENMC068      A Novel Approach to Utilizing Collapsible Origami Structures in Weight Bearing Applications**  
Ashutosh Kandala, 17, Junior, Irvine High School, Irvine, California, T: Joseph Elmasri
- MATH031      The Structure of the Positive Monoid of Integer-Valued Polynomials Evaluated at an Algebraic Number**  
# Andrei Mandelshtam, 17, Senior, University High School, Irvine, California, T: Tim Smay
- PHYS060      EXoplanet ConfIrmaTIon throuGH transits (EXCITING): Determining False Positives for Exoplanet Candidates**  
Haedam Im, 18, Junior, University High School, Irvine, California, T: Tim Smay
- TMED033      OCULI: Smartphone-based Screening Application and Low-Cost Lens that Identifies the Risk for Cataracts**  
Shaivi Shah, 16, Junior, Tesoro High School, Las Flores, California, T: Nathaniel Ritscher

### Los Angeles, USCA02, Los Angeles County Science and Engineering Fair

- CBIO053      Refined Genome-wide Prediction of Transgenerational Epimutations and an Ensemble-based Solution to the Imbalanced Class Problem in Epigenetics**  
Jason Apostol, 18, Senior, Palos Verdes Peninsula High School, Rolling Hills Estates, California, T: Melissa Klose
- CHEM029      Removal of Microplastics from Watery Environments with 3D Printed Wax Filters**  
George Hasnah, 16, Sophomore, Cabrillo Marine Aquarium, San Pedro, California, T: Andres Carrillo
- EAEV049      Polar Vortex and Long-Duration Events: Climate Change in the U.S. and Canada**  
Jason Wang, 16, Sophomore, Walnut High School, Walnut, California, T: Garrett Lim
- EAEV074      Leachate-Filtering Efficacy of Varied Liners**  
Marta Pambukhchyan, 15, Sophomore, Crescenta Valley High School, La Crescenta, California, T: Orenda Tuason
- ENMC035      Proverse Yaw Characteristics of a Powered Blended Wing Body Aircraft of a Novel Design and Manufacture**  
# Ethan Wong, 17, Junior, Arcadia High School, Arcadia, California, T: Bill Chapman
- PLNT016      When Two Problems Meet: Analysis and Prediction of the Spread of Invasive Plant Species in Relation to the Changing Environment**  
Sarah Cao, 17, Junior, Palos Verdes Peninsula High School, Rolling Hills Estates, California, T: Melissa Klose

# Finalist Directory

**TMED029** ***In silico* High Throughput Identification of Novel Alpha-Synuclein Aggregation Inhibitors for Parkinson's Disease Treatments**  
Amrutha Srivatsav, 16, Junior, Palos Verdes Peninsula High School, Rolling Hills Estates, California, T: Melissa Klose

## Fresno, USCA03, Fresno County Science Fair

**CBIO033** **CanceRNA: A Computational Method for Colorectal Cancer Diagnostic Biomarker Detection and Treatment Prediction**  
Pratham Hombal, 17, Junior, Floyd B. Buchanan High School, Clovis, California, T: Kendia Herrington

**CBIO043** **The Development of an Artificial Intelligence Model to Predict Weekly COVID-19 Cases Using Important Socioeconomic Variables**  
Deepro Fazlul Pasha, 17, Senior, Clovis North High School, Fresno, California, T: Kay Barrie

**EGSD018** **Replacing Lithium-ion Batteries with Graphene Based Supercapacitors**  
# Maya Martine Tovar, 16, Junior, Sierra High School, Tollhouse, California, T: Karen Low

**PLNT012** **Development of a Novel AI Drought-Stress Assessment (AIDA) Model in Bell Pepper (*Capsicum annuum*) Plants Using a Custom-Built Robotic RGB + Infrared (IR) Camera**  
John Benedict Allasas Estrada, 16, Sophomore, Clovis North High School, Fresno, California, T: Kay Barrie

## Sacramento, USCA04, Sacramento Regional Science and Engineering Fair

**EGSD032** **Spira Aer: A Novel Hurricane-Inspired Logarithmic Spiral Fan Design for HVAC System Applications**  
Jordan Prawira, 14, Freshman, Mountain House High School, Mountain House, California, T: Micah Wynn

**MATS025** **Cyclo.Plas 2: A Dual Focus Development as Alternative Materials to Plastic by Upcycling Fish Scale Waste Components**  
# Jacqueline Prawira, 16, Junior, Mountain House High School, Mountain House, California, T: Kristin Olson

**PLNT021** **Identification and Characterization of a Gene Controlling Tomato Growth and Branching**  
Ayesha Mahfuz, 17, Junior, Vista del Lago High School, Folsom, California, T: Julin Maloof

## San Diego, USCA05, Greater San Diego Science and Engineering Fair

**CBIO046** **Molecular Dynamics Simulation of Novel *Klebsiella pneumoniae* Treatment Disrupting the Outer Membrane**  
Eleanor S. Jung, 15, Sophomore, Mt. Carmel High School, San Diego, California, T: Amy Klingborg

**EAEV062** **Detection of Arsenic Contamination Using Satellite Imagery and Machine Learning**  
Ayush Agrawal, 16, Junior, Canyon Crest Academy, San Diego, California, T: Wendy Slijk

**ENEV047** **NEREID: Microplastic Detector Using Laser Microscopy and Image Processing Powered by the Raspberry Pi**  
Kyle P. Tianshi, 14, Freshman, The Cambridge School, San Diego, California, T: Melissa Mayne

**PHYS038** **Evolution of the Cat's Eye Nebula Revealed through Morpho-Kinematic and Hydrodynamic Modeling**  
Ryan A. Clairmont, 16, Junior, Canyon Crest Academy, San Diego, California, T: Wendy Slijk

**PHYS039** **The Age of the Coma Ber Cluster Constrained Using Amateur Data**  
Andrew Li, 16, Sophomore, Canyon Crest Academy, San Diego, California, T: Wendy Slijk

**TMED056** **Kawasak.AI: A Robust Deep Ensemble Network with Joint Detection for Differential Diagnosis of Kawasaki Disease**  
# Ellen Xu, 15, Sophomore, Del Norte High School, San Diego, California, T: Andrea Callicott

# Finalist Directory

## San Francisco, USCA06, Golden Gate STEM Fair

**CBIO047     A Novel Deep Learning System for Scoliosis Assessment: Automatic Extraction of Skeletal Maturity Using Region Proposal and Compound Scaling Convolutional Neural Networks**

Audrey Y Ha, 16, Junior, Menlo-Atherton High School, Atherton, California,  
T: Matthew Sandora

**EAEV050T     Modifying the Activity of Hydrogenase and Carbonic Anhydrase Enzymes in Chaetomorpha to Mitigate Ocean Acidification**

Christopher Sammy Kwok, 16, Sophomore, Nicholas Sammy Kwok, 16, Sophomore, Sequoia High School, Redwood City, California, T: Te Ton

**MATS022     Anisotropy and Angles: A Novel Approach to Thermoelectric Energy**

Charlotte Bree MacAvoy, 15, Freshman, San Mateo High School, San Mateo, California,  
T: Kyle Odom

## San Jose, USCA07, Synopsys Silicon Valley Science and Technology Championship presented by the Santa Clara Valley Science and Engineering Fair Association

**BMED054     A Low-Cost Computer-Aided Lung Auscultation Apparatus and Automated Diagnosis of Respiratory Illnesses**

Ashwika Agrawal, 15, Sophomore, Cupertino High School, Cupertino, California,  
T: Stuart Hamilton

**BMED055     Novel Stage Optimized Image Processing to Improve Deep Learning Driven Diagnosis of Early Stage Diabetic Retinopathy**

Ella Yee, 15, Freshman, The Harker School, San Jose, California, T: Anu Datar

**CBIO054     A Novel Transformation of Genetic Information into Images for Improved Primary Cancer Classification**

#  
Sidra Yang Xu, 17, Senior, The Harker School, San Jose, California,  
T: Chris Spenner

**CBIO062     FastFold: Streamlining End-to-End Deep Learning Protein Domain Prediction on COVID-19 Mutations and Other Universal Applications**

Tim Jing, 16, Junior, Lynbrook High School, San Jose, California, T: Bradley Fulk

**CBIO064     Style Transfer Augmentation: A Novel Deep Learning Approach to the Classification of Cancer Subtypes Using Genetic Status in Histopathology Images**

Snikitha Banda, 15, Sophomore, Notre Dame High School San Jose, San Jose, California,  
T: Christine Koltermann

**EAEV061     An Accessible, Low Cost Tool for Citizen Scientists: Using Remote Sensing Techniques to Predict Fire Damage Propensity**

Vedant V. Janapaty, 15, Freshman, Silver Creek High School, San Jose, California,  
T: Bich Nguyen

**MATH045     A Novel and Efficient Method of Persistent Homology to Detect and Remove Topological Errors in Triangle Mesh Data**

#  
Alexander Zhang, 16, Junior, Lynbrook High School, San Jose, California,  
T: Jeremy Dybdahl

**MATS035     Investigation and Design of Two-Dimensional Nanomaterial Biosensors for Breath-Based COVID-19 Detection Using Density Functional Theory**

Stephen Xia, 15, Sophomore, The Harker School, San Jose, California, T: Xuan Luo

**PHYS050     The Fast and Inconspicuous: New Near Earth Asteroids Discovered Using Deep Learning and Synthetic Data Are Fainter and Move Faster than Those Previously Discovered**

Franklin Wang, 17, Junior, Palo Alto Senior High School, Palo Alto, California,  
T: Cynthia Chen

# CONGRATULATIONS TO OUR CATEGORY WINNERS

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## **Mathematics**

### **FIRST PLACE**

Alexander Zhang

### **SECOND PLACE**

Tzu-Hsuan Chiu

Shoshana Sarah Elgart

Jessica Jihang Zhang

### **THIRD PLACE**

Dev Mayur Chheda

Addea Gupta

Nathan Richard Krause

William Li

### **FOURTH PLACE**

Oleg Chistov

Sara Hargitai

Adelina Kildeeva

Gregory Li

Andrei Mandelshtam

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**Akamai Foundation** applauds the finalists  
in Mathematics.



# Finalist Directory

<b>SOFT037</b>	<b>vAssist: A Device for the Visually Impaired to Improve In-Store Shopping Using Computer Vision and AI-enabled Routing</b> Shrinandan Krishna Narayanan, 16, Junior, Cupertino High School, Cupertino, California, T: Hugo Steemers
<b>SOFT038T</b>	<b>Towards Malware Classifiers Robust to Adversarial Malware</b> Andy Phung, 16, Sophomore, Suryabhan Mohapatra, 16, Junior, Mihir Baviskar, 18, Senior, Independence High School, San Jose, California, T: Larry Winterlin
<b>TMED037</b>	<b>Diagnosing and Classifying Aphasia: Employing Deep Learning to Accelerate Recovery in Aphasic Stroke Victims</b>
<b>#</b>	Marek David Pinto, 18, Senior, Santa Teresa High School, San Jose, California, T: Channy Cornejo
<b>TMED055</b>	<b>Formulating a Gene Signature for Diagnosis of Autoimmune and Infectious Diseases</b> Riya Gupta, 17, Junior, Saratoga High School, Saratoga, California, T: Janny Cahatol
<b>Contra Costa County, USCA08, Contra Costa County Science and Engineering Fair</b>	
<b>BCHM012</b>	<b>CarC SPY: Non-Invasive Early Stage Multi-Cancer Detection Using AI-based Electrochemical Biosensor to Detect Circulating Tumor Cells (CTCs)</b> Jyothikaa Ramann, 16, Junior, Dougherty Valley High School, San Ramon, California, T: Katherine Huang
<b>EAEV034</b>	<b>Analysis of Plastic Pellet Distribution in the Environment Using Citizen Science Nurdle Patrol Data and Batch Identification to Differentiate Spills</b>
<b>###</b>	Melanie Elise Quan, 18, Senior, Las Lomas High School, Walnut Creek, California, T: Maria Laws
<b>ENBM040</b>	<b>Interpretable Automation of Pulmonary Embolism Diagnosis</b> Nisha Balaji, 17, Senior, Dougherty Valley High School, San Ramon, California, T: Tim Duong
<b>ENBM041</b>	<b>Accessible Correlative Diagnostic Solution for Multi-Organ Dysfunction Caused by SARS-CoV-2: The Future of Home-Based, AI-Enabled Telemedicine</b> Gatik Trivedi, 14, Freshman, Dougherty Valley High School, San Ramon, California, T: Patrick Estes
<b>TMED020</b>	<b>A Novel Hybrid Deep Learning Model to Predict Acute Kidney Injury Using Patient Record Data and Ultrasound Kidney Images</b> Sophia Shi, 17, Junior, Dougherty Valley High School, San Ramon, California, T: Philip Nho
<b>Hayward, USCA09, Synopsys Alameda County Science &amp; Engineering Fair</b>	
<b>BEHA059</b>	<b>Analyzing Eye-Movement Data to Evaluate Motor Cognition Functionality for Early Detection of Neurological Conditions Using Deep Learning</b> Aditya Jagannadha Sai Mangalampalli, 17, Junior, Mission San Jose High School, Fremont, California, T: Charles Brucker
<b>BEHA081T</b>	<b>An Audiovisual Emotion Classification Platform Powered By Deep Neural Networks and Optimized for Individuals with Autism Spectrum Disorder</b>
<b>#</b>	Arjun Barrett, 15, Sophomore, Alexander Lan#, 16, Sophomore, The Harker School, San Jose, California, T: Anuradha Datar
<b>CBIO048</b>	<b>Accelerated Protein Evolution in Bacteria to Facilitate Environmental Adaptation: Efficient Bioinformatics Algorithms to Discover Diversity-Generating Retroelements (DGRs)</b> Anakha Ganesh, 16, Junior, James Logan High School, Union City, California, T: Andromeda Stockwell
<b>CBIO089T</b>	<b>Quantifying Model Variation in Assessing Cardiac Function</b> Ishan Jain, 16, Junior, Neeraj Rattehalli, 17, Senior, Mission San Jose High School, Fremont, California, Menlo-Atherton High School, Atherton, California, T: Charles Brucker

# Finalist Directory

- ENBM046**     **Building a Low Cost Hearing Device with User Customized Frequency Response for the Hearing Impaired**  
Elizabeth Koh, 16, Sophomore, Dublin High School, Dublin, California,  
T: Brad Vereen
- TMED043**     **An Application to Monitor Freezing of Gait in Parkinson's Disease**  
#     Nitya Ayyagari, 17, Junior, Amador Valley High School, Pleasanton, California,  
T: Phillip Becker
- Palos Verdes Peninsula, USCA10, Palos Verdes Peninsula Unified School District Science and Engineering Fair**
- EAEV083**     **A Consumer Internet-of-Things Device for On-Site and Regional Earthquake Early Warning**  
Vivien He, 17, Junior, Palos Verdes Peninsula High School, Rolling Hills Estates, California, T: Melissa Klose
- ENMC010**     **SafeBuild: Risk-Based Analysis of Overhead Electric Distribution Facilities**  
Jennifer Lew, 17, Junior, Palos Verdes Peninsula High School, Rolling Hills Estates, California, T: Melissa Klose
- PHYS004**     **Optimization of Phased Array Antenna Systems for 3D Surfaces**  
Akash Anand, 17, Junior, Palos Verdes Peninsula High School, Rolling Hills Estates, California, T: Melissa Klose
- ROBO038**     **COV-AID: An Efficient and Interpretable Machine Learning Ensemble for COVID-19 Diagnosis, Prognosis, Abnormality Localization, and Severity Assessment**  
#     Aksh Garg, 17, Senior, Palos Verdes Peninsula High School, Rolling Hills Estates, California, T: Melissa Klose
- Santa Cruz, USCA11, Santa Cruz County Science and Engineering Fair**
- MCRO032**     **Investigating Magnetotactic Effects on the Selection and Evolution of Motile Bacteria**  
#     Michelle Melody Nazareth, 18, Senior, Georgiana Bruce Kirby Prep School, Santa Cruz, California, T: David Deamer
- Salinas, USCA12, Monterey County Science and Engineering Fair**
- EAEV051**     **Utilization of Spirulina for Phytoremediation of Cadmium Pollution in Waterways**  
Rithik Bhushan, 14, Freshman, Monterey High School, Monterey, California, T: Jason Nicholson
- PHYS040**     **Earthquakes in the Inner Ear: A Novel Finite Element Simulation Modelling the Mechanism of the Basilar Membrane & Hair Cells**  
Hannah T. Shu, 15, Sophomore, Carmel High School, Carmel-By-The-Sea, California, T: Silvia Mazzoni
- San Bernardino, USCA13, San Bernardino, Inyo, Mono, (SIM) Science and Engineering Fair**
- EAEV036**     **Quantifying Volume of the Dana Glacier Using Field Measurements and 3D Modeling**  
##     Ellery Alice Barngrove McQuilkin, 16, Junior, Lee Vining High School, Lee Vining, California, T: Andrew Sindel
- PHYS023**     **Quantum Cosmology: An Exploration of the Origins of the Universe and Quantum Physics**  
Komal Kaur, 17, Junior, Chino Hills High School, Chino Hills, California, T: Chirichan Tasanont
- SOFT020**     **Optimizing the Keyboard Layout Using Genetic Algorithms and a Heuristic Approach**  
#     Matthew Fogel, 18, Senior, Yucaipa High School, Yucaipa, California, T: Leslie Robertson

# Finalist Directory

- SOFT023     Quantifying Census Tract Level COVID-19 Vulnerability and Risk Using Computational Methods**  
Varun Srivastava, 15, Sophomore, Redlands High School, Redlands, California, T: Paea LePendu
- Riverside, USCA15, Riverside County Science and Engineering Fair**
- ANIM025     Auto-dissemination: A Novel and Effective Tool in Mosquito Control?**  
Sarah Stutsman, 15, Sophomore, Corona High School, Corona, California, T: Coleen Holtz
- BCHM017T     Analyzing the Efficacies of Potential Inhibitors of Drug Targets Human Receptor ACE2 and Viral Replication Enzyme RdRp Against SARS-CoV-2**  
Hedy Bian, 17, Junior, Aditya Sandip Desai, 16, Junior, Martin Luther King High School, Riverside, California, T: Michele Hampton
- CBIO034     A Deep Learning Approach to Correlating Neurodegenerative Disease, Chronic Illness, and Environmental Factors**  
## Dimple Amitha Garuadapuri, 17, Junior, Eleanor Roosevelt High School, Eastvale, California, T: Doloumar Bergen
- CHEM023     Structural Determination of a Bioinspired Perchlorate Reduction Catalyst through Chemical Modeling**  
Eric Yunpeng Bi, 17, Junior, Martin Luther King High School, Riverside, California, T: Michele Hampton
- MCRO021     The Premises of Applying Computational Algorithms to Enhance Microbiological Studies through Stimulation of Laplacian of Gaussian (LoG) Kernels**  
Audrey Mae Theresa Meadows, 17, Junior, Martin Luther King High School, Riverside, California, T: Michele Hampton
- Bakersfield, USCA16, Kern County Regional Science Fair**
- ENBM047     Designing, Prototyping and Testing a Novel Urinary Catheter with Tesla Valves and a Microporous Membrane**  
# Ishaan S. Brar, 18, Senior, Stockdale High School, Bakersfield, California, T: Jill Reynolds
- SOFT042T     PACK It In, PACK It Out: An Experimental File Compression Method**  
Joseph Angelo Cestone, 17, Senior, Kevindeep Singh Dhese, 17, Senior, Ridgeview High School, Bakersfield, California, T: Robert Shahan
- Los Angeles, USCA50, California Science & Engineering Fair**
- BEHA077     Analyzing Text Corpora to Determine the Emotional State of Humans**  
Paulina Felicity Wodarz, 15, Sophomore, University High School, Irvine, California, T: Bre Eagleson
- CBIO094     Using Machine Learning to Repurpose FDA-Approved Drugs to Treat Cancers and Inflammatory Diseases**  
Aakarsh Vermani, 16, Junior, Westview High School, San Diego, California, T: My-Nga Ingram
- CHEM069     Investigating the Efficiency of *Carpobrotus edulis*, Kelp, and Walnut Shell Bioethanol in Comparison to Corn Ethanol Using Percent Yield and Mass Fractionation**  
Alexis Téa MacAvoy, 16, Sophomore, San Mateo High School, San Mateo, California, T: Jimmy Ikeda
- EBED031     Designing and Building a Custom Phased Array Network Using Software-Defined Radio**  
Roy Gross, 16, Sophomore, Henry M. Gunn High School, Palo Alto, California, T: Catherine Cohn

# CONGRATULATIONS

## TO THE FIRST PLACE CATEGORY WINNER

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**Microbiology**



**NEHA MANI**

New York, New York

Diagnostic Method Based  
on Bacterial Motion

Booth MCRO043

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**Regeneron** applauds the finalists  
in Microbiology.

***REGENERON***®

# Finalist Directory

- ENBM098     A Novel 3D Printed Ventilator for COVID-19**  
Harjaisal Singh Brar, 15, Freshman, Stockdale High School, Bakersfield, California,  
T: Jill Reynolds
- MATH048     Classification of Tight Contact Structures on a Solid Torus**  
Jessica Jihang Zhang, 17, Senior, Proof School, San Francisco, California, T: Kathy Lin
- MCRO059     Plasmids of *Curtobacterium*: A Nexus of Carbohydrate Utilization Genes**  
Pranav Sudarshan Moudgalya, 17, Junior, University High School, Irvine, California,  
T: David Knight

## COLORADO

### Alamosa, USCO01, San Luis Valley Regional Science Fair, Inc.

- EAEV042     Analyzing the Effects of Spruce Beetles on Aquatic Ecosystems through Macroinvertebrate and Water Quality Sampling in Conejos County, Colorado**  
Camille Paige Rawinski, 17, Junior, Monte Vista High School, Monte Vista, Colorado,  
T: Loree Harvey
- EGSD024     Synthesizing Renewable Energy from Water Using Sunlight**  
Chinmay Narayana Jayanty, 17, Junior, Sargent High School, Monte Vista, Colorado,  
T: Rafe Paulson

### Durango, USCO02, San Juan Basin Regional Science Fair

- ANIM003     Investigation on High Twinning Rates in Cattle Using Sanger Sequencing**  
Lilly Bell Figueroa, 16, Sophomore, Mancos High School, Mancos, Colorado,  
T: Sensa Wolcott

### Brush, USCO03, Morgan-Washington Bi-County Science Fair

- ENMC011     Autonomous Surveillance UAV**  
# Tate Schrock, 17, Junior, Arickaree School, Anton, Colorado, T: Don Myers

### Colorado Springs, USCO04, Pikes Peak Regional Science Fair

- ENEV001     Separating Microplastics from Beach Sand Using a Fluidized Air Bed**  
Sean Brooks, 17, Junior, Pine Creek High School, Colorado Springs, Colorado,  
T: Kyle Gracia
- ENEV011     Something in the Water: Creating an Origami Microfluidic Device for Developing Communities**  
Alden James Kruse, 17, Senior, Schullandheim Homeschool, Colorado Springs, Colorado, T: Tamara Kruse
- PHYS008     Investigating Chaotic Convection Using a Lorenz Water Wheel and a Model of the Lorenz Attractors in R**  
### Kathryn Tsi-Pak Kummel, 17, Senior, William J. Palmer High School, Colorado Springs, Colorado, T: Nathaniel Lohmann

### Greeley, USCO06, Longs Peak Science and Engineering Fair

- EGSD055     Experimenting with the Radiative Cooling Effect to Generate Electricity from the Night Sky**  
Julia Michelle Warnock, 17, Junior, PSD Global Academy, Fort Collins, Colorado,  
T: Andrew Warnock
- TMED002     Connection ICU: A Novel Mobile Application to Prevent Delirium in the Intensive Care Unit**  
Ava Angeline Steger, 15, Sophomore, Rocky Mountain High School, Fort Collins, Colorado, T: Elizabeth Peebles

### Sterling, USCO08, Northeast Colorado Regional Science Fair

- TMED001     Unmasking the Truth: Factors Impacting the Monitoring of Temporal Temperatures**  
Kinley Marie Eyring, 17, Junior, Yuma High School, Yuma, Colorado, T: Amy Melby

# Finalist Directory

## Boulder, USCO09, Corden Pharma Colorado Regional Science Fair

- ANIM064**     **Compartmentalization in Lepidopteran Development: Anterior Posterior Boundary Location and Interaction in Genus Morpho**  
Margaret Mattson, 18, Senior, Fairview High School, Boulder, Colorado, T: Paul Strode
- EAEV024T**   **Hidden Signals in Paleoclimate Records: Investigating the Importance of the Sun to Earth's Climate**  
Annalie Brienne Haralson, 17, Senior, Maddie Fox, 18, Senior, Lauren Egaas, 18, Senior, Monarch High School, Louisville, Colorado, T: Katharine Ellis
- TMED006**     **A Pharmacokinetic/Pharmacodynamic Analysis of delta-9-Tetrahydrocannabinol and Cannabidiol**  
# Cooper Joseph Hanley, 17, Senior, Monarch High School, Louisville, Colorado, T: Katharine Ellis

## Denver, USCO10, Denver Regional Science and Engineering Fair

- BMED006**     **Breakdown of Gluten Proteins Using a Newly Identified Combination of Fruit Derived Enzymes to Alleviate Symptoms of Gluten Intolerance**  
Aditi Avinash, 14, Freshman, Rock Canyon High School, Littleton, Colorado, T: Sussane Petri
- EAEV123**     **The Environmental Effect on Aquatic Ecosystems of Run-Off from Wildfires Where Fire Retardant Slurry Was Used**  
Rachel Elizabeth Christensen, 17, Senior, Evergreen Senior High School, Evergreen, Colorado, T: Stephanie Seevers
- EBED003**     **A Novel Mask Insert to Reduce Habitual Particle Transmission**  
Tyler Burt, 17, Senior, Wheat Ridge Senior High School, Wheat Ridge, Colorado, T: Charles Sprague

## Fort Collins, USCO50, Colorado Science and Engineering Fair

- ENBM036**     **XRCT-Net: Development of a Novel Sparse View Deep Learning Framework for Safer, Cheaper, and More Accessible CT Imaging**  
Siddharth Bharthulwar, 17, Senior, Fairview High School, Boulder, Colorado, T: Paul Strode
- ENBM099**     **Early Diagnosis of Parkinsonism via a Smartphone Application**  
# Matthew William Anderson, 16, Junior, Cherry Creek High School, Greenwood Village, Colorado, T: Ethan Dusto
- PHYS006**     **Mapping the Extent of Neutral Hydrogen Cloud Near Sagittarius A\* at 1420 MHz**  
Elizabeth Sundheim, 18, Senior, Berthoud High School, Berthoud, Colorado, T: Scott Kindt
- ROBO084**     **Fusing LiDAR and Camera Data for Advanced Context Recognition in Autonomous Navigation Sensory Systems through Multidimensional Deep Neural Network Architectures**  
Emily Sihan Zhang, 17, Junior, Cherry Creek High School, Greenwood Village, Colorado, T: Timothy Donahue
- TMED018**     **Effects of Cannabidiol Exposure on Cortisol Levels in *Danio rerio* Embryos with Heat Induced Stress**  
Reese Catherine Titensor, 18, Senior, Rock Canyon High School, Littleton, Colorado, T: Shawndra Fordham

## CONNECTICUT

### Cromwell, USCT50, Connecticut Science & Engineering Fair

- ANIM029**     **Evaluating the Intraspecific Relationship and Reciprocal Reaction Within Group Learning Shark Behavior Patterns**  
Clayton Joseph Nyiri, 17, Senior, Bridgeport Regional Aquaculture Science and Technology Education Center, Bridgeport, Connecticut, T: Kirk Shadle

# Finalist Directory

- BMED025**     **Linking Continued Exposure to E-Cigarette Vapor Constituents with Chronic Obstructive Pulmonary Disease**  
Hannah Goldenberg, 17, Senior, Greenwich High School, Greenwich, Connecticut,  
T: Andrew Bramante
- CBIO042**     **Application of K-Means and Hierarchical Agglomerative Machine Learning Algorithms to Cluster Wolbachia Genomes based on Host Organism's Phylum**  
Sean Y. Lee, 16, Junior, Loomis Chaffee School, Windsor, Connecticut,  
T: Koby Osei-Mensah
- ENEV041**     **Design of a Fe3O4/Bentonite/Graphite Coated Polyurethane Sponge for Economical and Eco-Friendly Oil Spill Recovery**  
Autumn Ann-Marie Kim, 18, Senior, Greenwich High School, Greenwich, Connecticut,  
T: Andrew Bramante
- ENMC039**     **Increasing Aerofoil Lift via Artificial Amplification of the Coanda Effect Using Heat**  
Timothy Drinkall, 18, Senior, Greenwich High School, Greenwich, Connecticut,  
T: Andrew Bramante
- TMED026**     **Colorimetric Smartphone-Based Detection of Salivary SOD2 on Photonic Opal Structures for the Rapid Diagnosis of Hepatocellular Carcinoma**  
Halla Clausi, 17, Senior, Greenwich High School, Greenwich, Connecticut,  
T: Andrew Bramante
- TMED028**     **Rapid, Noninvasive, Fluorescence-Based Detection for Elevated Levels of Nitric Oxide in Exhaled Breath, as a Marker for Hazardous PM2.5 Exposure**  
Ambika Grover, 15, Sophomore, Greenwich High School, Greenwich, Connecticut,  
T: Andrew Bramante

## FLORIDA

### Avon Park, USFL01, Heartland Regional Science and Engineering Fair

- CELLO04**     **Assessing the Expression of Angiogenesis-Related Receptors in Endothelial Cell RNA**  
Angela Huang, 15, Sophomore, Sebring High School, Sebring, Florida, T: Amy Bubb
- CELLO17**     **Talking Planimlas! Identifying Genes Associated with Coral Bioacoustics**  
## Camila Rimoldi Ibanez, 18, Senior, Sebring High School, Sebring, Florida,  
T: James Hawker

### Bradenton, USFL02, Manatee STEM Competition

- CBIO029**     **Unmasking the Truth: The Effects of Safety Mask Usage on the Infection and Mortality Rates of a Simulated Pathogen**  
Madison L. Barendse, 16, Junior, Southeast High School, Bradenton, Florida,  
T: Steven Craig

### DeLand, USFL04, Tomoka Regional Science and Engineering Fair

- EAEV015**     **Coagulation Flocculation Sedimentation Filtration of Microplastics**  
Amy King, 15, Freshman, Burns Science and Technology Charter School, Oak Hill, Florida, T: Barbara Hawes

### Fort Myers, USFL05, Thomas Alva Edison Kiwanis Science and Engineering Fair

- EAEV016**     **Analyzing *In-situ* Environmental Impacts on Long Term Durability, Cohesivity, and Viability Sodium Alginate Immobilized *Chlorella vulgaris* Bioremediation Units (A Novel Third Year Study)**  
# Morgan Taylor Barnes, 16, Sophomore, Canterbury School, Fort Myers, Florida,  
T: Kelly Percivall
- ENBM018**     **A Novel Approach to the Comparative Analysis of Natural Polymer-based Biomimetic Neural Scaffolds: Using the Toxic Response of Fungal Mycelium to Model Cell Response and Repair in Peripheral Nerve Gap Injuries such as the *Medulla spinalis* in Paraplegics**  
Michelle Avery Barnes, 16, Sophomore, Canterbury School, Fort Myers, Florida,  
T: Kelly Percivall

# CONGRATULATIONS TO OUR CATEGORY FINALISTS

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## Physics and Astronomy

Lana AlAbbasi  
Matthew Alcantara  
Sultanah AlEssa  
AbdelRahman AlHroob  
Joao Dinis Alvares  
Akash Anand  
Larissa Andrade  
Hussam Ashour  
Pratham Babaria  
Utkarsh Bajaj  
Lane Braun  
Carla Caro Villanova  
Ethan Chandra  
Aditi Chandrashekar  
Camille Chiu  
Sam Christian  
Ryan Clairmont  
Susana Cuadra  
Rafael de Farias  
Melanie Deville  
Chika Enomoto  
Sydney Feldbush  
Taylor Fox  
Wanjia Fu  
Leon Garcia

Jue Gong  
James Gonzalez  
Alexander Gray  
Do Gyun Han  
Emily Hauser  
Makaylee Haynes  
William Hejtmanek  
Joshua Hilbig  
Austin Hunter  
Haedam Im  
Phillip Ionkov  
SangHyun Ju  
Taneesha Kapadia  
Komal Kaur  
Mana Kawano  
Dmitrii Khitrin  
Emma King  
Kirill Klimeshov  
Madeline Knox  
Toshifumi Komatu  
Tarun Kota  
Vance Kreider  
Kathryn Kummel  
Joon Soo Lee  
Yunseo Lee

Brody Leisinger  
Anthony Lestone  
Andrew Li  
Sehun Lim  
Yu-You Luo  
Mirelys Mendez-Pons  
Kenta Mizuyoshi  
Ashini Modi  
Jaci Moss  
Takuto Murata  
Motoka Nagata  
Jack Nowinski  
Rohan Ojha  
Kosuke Oya  
Jasmine Palma  
Jun Hyeok Park  
Michelle Park  
Sejong Park  
Uicheol Park  
Jianglu Ping  
Kathryn Postiglione  
Ariel Priel  
Timothy Qian  
Andre Ribeiro  
Kenta Sakamoto

Kamonsap Sapmee  
Myoungbo Shim  
Leonid Shmyrkov  
Hannah Shu  
Vladimir Sidorov  
Lucas Staten  
Elizabeth Sundheim  
Aakash Sunkari  
Medha Tambe  
Yui Tokimoto  
Yasutaka Tokumaru  
Gustavo Toledo  
Maxwell Tsai  
Viktor Ulanov  
Annika Vaidyanathan  
Dennis van Hoesel  
Franklin Wang  
Michelle Wu  
Tianrui Wu  
Enqi Yang  
Christine Ye  
Stephanie Yoshida  
Youqiu Zhan  
Angela Zhou

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**The Richard F. Caris Foundation** applauds  
the finalists in Physics and Astronomy.

Richard F. Caris  
Foundation

# Finalist Directory

- ENEV029**     **A Comparison of Domestic Dryer Contributions to Previous Domestic Washer Data of Microplastic Fiber Emissions in Waste Water Generated from Synthetic Textiles**  
Heidi Kinsey, 17, Junior, Fort Myers High School, Fort Myers, Florida, T: Cathy Tucker
- ENMC017**     **The Utilization of Dimples to Reduce Wind Load on Parabolic Structures**  
Jay Chavakula, 17, Senior, Canterbury School, Fort Myers, Florida,  
T: Kelly Mahan-Percivall
- MCRO012**     **Testing the Antibacterial Effectiveness of Yunnan Baiyao, Propolis, Turmeric, and Tea Tree Oil on the Growth of *Escherichia coli* (*E. coli*) and *Bacillus subtilis* in Comparison to Antibiotics on an Agar Plate**  
Vanessa Kinley, 16, Sophomore, Bonita Springs High School, Bonita Springs, Florida,  
T: Melissa Jasczak
- PLNT017**     **Speed of Photosynthesis in Relation to Surface Area**  
Bryce Krohnfeldt, 16, Sophomore, Estero High School, Estero, Florida, T: Cody Rimes
- Port St Lucie, USFL06, St. Lucie County Regional Science and Engineering Fair**
- MCRO029**     **How Does Endophytic Bacteria Affect the Growth of Plant Pathogenic Fungi?**  
Madison Nicha Adkins, 16, Sophomore, Lincoln Park Academy, Fort Pierce, Florida,  
T: Deborah Lookabill
- PLNT025**     **Multinutrient Biofortification of Microgreens for Human Health**  
# Lilian Crawford, 17, Junior, Lincoln Park Academy, Fort Pierce, Florida,  
T: Deborah Lookabill
- Fort Walton Beach, USFL07, Panhandle Regional Science and Engineering Fair**
- EAEV078**     **Is It Possible to Create a Self-sufficient Solar Powered Filtration System to Reduce Coral Bleaching Using Natural Resources (Year 3)?**  
Marisol Rose Enguidanos, 15, Freshman, Niceville High School, Niceville, Florida,  
T: Gina Emery
- ENEV015**     **Development and Implementation of a Bio-based Filter to Mitigate the Effusion of Harmful Pollutants from Internal Combustion Engines and Combustion Processes**  
Jonathan Clayton Walker, 17, Junior, Rutherford High School, Panama City, Florida,  
T: Steven Neely
- Gainesville, USFL08, Alachua Region Science and Engineering Fair**
- MATH001**     **College Football Playoff Expansion: A Statistical Analysis via Monte Carlo Simulation**  
Jeffrey Jiayuan Xue, 16, Junior, F. W. Buchholz High School, Gainesville, Florida,  
T: Marc Moody
- Ft Lauderdale, USFL09, Broward County Science Fair**
- ANIM053**     **The Effects of the Modulation by Melatonin on the Pathogenesis of Systemic Lupus Erythematosus on *Drosophila melanogaster***  
Sharon A. Fernandez, 15, Freshman, American Heritage School, Plantation, Florida,  
T: Leya Joykuty
- BMED080**     **Investigating Differences in DRD4 Expression in a Comparison Analysis Between Young, Old, and Alzheimer's Frontal Cortex Brain Tissues**  
Mahdere M. Yared, 18, Senior, Pine Crest School, Fort Lauderdale, Florida,  
T: Jennifer Gordinier
- CBIO090**     **Determining the Optimal MRI Sequence for the Automatic Segmentation of Multiple Sclerosis Using Convolutional Encoder Networks**  
Shaurnav Ghosh, 17, Junior, Pine Crest School, Fort Lauderdale, Florida,  
T: Jennifer Gordinier
- CELL035**     **Identification and Analysis of Key Candidate Genes and Pathways in Lung Adenocarcinoma by Integrated Bioinformatics**  
Prateek Gupta, 17, Junior, American Heritage School, Plantation, Florida,  
T: Leya Joykuty

# Finalist Directory

- ENBM096 Using Electrical Stimulation to Provide Reliable Haptic Feedback in Virtual Object Classification Tasks**  
Sierra Stocker, 18, Senior, Pine Crest School, Fort Lauderdale, Florida,  
T: Jennifer Gordinier
- Jacksonville, USFL10, Northeast Florida Regional Science and Engineering Fair**
- CBIO013 Machine Learning to Predict Response to Anti-PD1 in Melanoma Using Genetic Biomarkers**  
Sarah Elizabeth Barksdale, 18, Senior, Episcopal School of Jacksonville, Jacksonville, Florida, T: Marion Zeiner
- EAEV005 Demonstrating *D. pulex* as Environmental Buffers to Acetylcholinesterase Inhibitors on *H. littoralis***  
Jordan Harrow, 18, Senior, Episcopal School of Jacksonville, Jacksonville, Florida,  
T: Marion Zeiner
- EAEV010 # The Creation and Practical Application of Industry Standards Water Analysis via PXRF**  
Julia Marie Kagiliery, 18, Senior, Episcopal School of Jacksonville, Jacksonville, Florida,  
T: Marion Zeiner
- PLNT043 Dissolved Oxygen Augmentation Effects on the Hydroponic Cultivation of *Eruca sativa* in a NFT System**  
Nicole Elizabeth Stover, 17, Junior, Samuel W. Wolfson High School, Jacksonville, Florida, T: Todd Steele
- ROBO039 Engineering a Robot Arm with Computer Vision and Simulated Grabbing for Manipulation of Objects**  
George Daniel Delong, 16, Junior, Episcopal School of Jacksonville, Jacksonville, Florida,  
T: Marion Zeiner
- Lake City, USFL11, Suwannee Valley Regional Science and Engineering Fair**
- EGSD001 Utilizing Eukaryotic *Saccharomyces cerevisiae* as an Electricigen in Both Pure & Co-Culture in the Anode of a Microbial Fuel Cell**  
Jasmine Diane Bryan, 18, Senior, Madison County High School, Madison, Florida,  
T: Amanda Phillips
- Bartow, USFL12, Polk Region Science and Engineering Fair**
- BCHM001 Starch Concentrations in Different Varieties of Rice**  
Jasmin Kaur Pruthi, 17, Junior, Haines City IB East, Lake Wales, Florida, T: Madhu Thomas
- PLNT001 Image Analysis of Herbivory and Leaf Area of Infected and Uninfected Invasive Air Potato Leaves**  
Noah John Peracciny, 15, Sophomore, Lakeland Christian School, Lakeland, Florida,  
T: Matthew Croxton
- Melbourne, USFL13, Brevard South Science and Engineering Fair**
- ANIM004 Utilization of Mechanically Simulated Kangaroo Care as a Novel Homeostatic Method to Treat Mice Carrying a Remutation of the Ppp1r13l Gene as a Model for Humans with Cardiomyopathy**  
## Nathan Jie Cheng Foo, 17, Senior, West Shore Junior/Senior High School, Melbourne, Florida, T: Mary Schropp
- ANIM018 "Tri-pawed": Canine Prosthesis**  
Isabel Elena Sierra, 18, Senior, Edgewood Junior Senior High School, Merritt Island, Florida, T: Ryan Ciltsick
- PHYS003 The Use of an Inkjet Printer to Dispense Chlorophyll Photosynthetic Dye onto the Cell Substrate to Aid the Creation of the Cell**  
Sydney Elizabeth Feldbush, 17, Junior, West Shore Junior/Senior High School, Melbourne, Florida, T: Mary Schropp

# Finalist Directory

## Satellite Beach, USFL14, Brevard Intracoastal Regional Science and Engineering Fair

**CELL001 Customized Cancer Cell Weapons: Using CRISPR dCas9 Genetic Engineering to Modify MCF7 Human Breast Cancer Cells into Double Agent Treatment Vectors, Year III**

Neil Reddy, 17, Junior, Satellite High School, Satellite Beach, Florida,  
T: Magdalena Molledo

**PHYS001 Underwater Golf: An Evaluation of the Effects of Organized Surface Irregularities on the Hydrodynamic Efficiency of Underwater Projectiles**

Gustavo Andres Toledo, 17, Senior, Edgewood Junior Senior High School, Merritt Island, Florida, T: Ryan Cilsick

## Miami, USFL15, South Florida Science and Engineering Fair

**BEHA001 The Effect of Constraining Eye Movements on Learning Gains and Retention**

Dante Amadeo Martinez, 17, Junior, Westminster Christian School, Palmetto Bay, Florida,  
T: Lisa Garrido

**CBIO003 Molecular Docking Study of the Ebolavirus Surface Glycoprotein to Develop Anti-Ebola Drug**

Anna Maria Beck, 15, Sophomore, Coral Reef Senior High School, Miami, Florida,  
T: Lauriann Carbajal

**EAEV003 A Novel Deep Learning Model for Estimating Tropical Cyclone Intensity from Satellite Images**

Sunny You, 14, Freshman, Miami Palmetto Senior High School, Pinecrest, Florida,  
T: Pamela Shlachtmann

**ENBM003 A Mathematically Generated Bessel Function Based Ultrasonic Waveform Tractor Beam for Optimizing Blood Circulation**

### Isabela Victoria Perdomo, 18, Senior, MAST at FIU Biscayne Bay Campus, North Miami, Florida, T: Cristina Madrigal

**ENEV002 An Efficient and Cost-Effective Cooling System for Nuclear Power Plants**

## Zoe Francesca Diederich, 16, Junior, Maritime and Science Technology Academy, Miami, Florida, T: Claudia Torres

**PHYS002 Visualization of Three-Dimensional Aerospike Nozzle Flow Using Schlieren Photography**

Melanie Deville, 17, Junior, Westminster Christian School, Palmetto Bay, Florida,  
T: Lisa Garrido

## Ocala, USFL16, Big Springs Regional Science Fair

**BMED002 Face Coverings: Which Are Friends, and Which Are Foes?**

Luke David Meiers, 16, Sophomore, West Port High School, Ocala, Florida,  
T: Michelle Miller

**EAEV004 Utilization of *Manihot esculenta* Peels, Used Coffee Grounds, and Eggshells from *Gallus gallus* to Create Biodegradable Polymers**

Camille Aguilera Duma, 14, Freshman, Vanguard High School, Ocala, Florida,  
T: Christina Davis

**ENBM006 Development of an Improved High Intensity Off-Grid Phototherapy System to Provide Treatment in Remote Regions of the World**

### Haylee Adelaide Darling, 17, Senior, Forest High School, Ocala, Florida,  
T: Korie-Lanette Grimsley

**ENMC032 A Novel Computer Simulation of a Deployable Parachute System with Aerial Detachment of the Cabin for Commercial Airplane Crashes, Year Two**

# Vivek Sai Sandrapaty, 16, Sophomore, West Port High School, Ocala, Florida,  
T: Janice David

# CONGRATULATIONS TO OUR CATEGORY FINALISTS

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## Plant Sciences

Shatha AlAhmadi	Luca Giuliani	Noah Peracciny
Juman AlHarbi	Andrew Grine	Kornkanok Promruk
Yousef Al-Mahmoud	Anna Hyskova	Rutsiripol Putsorn
Tamim Alrashid	Yewon Jwa	Shivam Rawat
Amanda Aviles de Leon	Karit Keereekaew	Joseph Reamsnyder
Camden Barger	Yujin Kim	Beth Robinson
Yasmin Barreto Teles Fonseca	Sisu Kiuru	Daniela Rodriguez-Veguilla
Emelyn Beaster	Aravind Krishnan	Laboni Santra
Cameryn Berryhill	Bryce Krohnfeldt	Yuna Seo
Mary Biggs	Bo Wei Lai	Cindy Shen
Matteo Bigi	Sophia Landry	Joao Sinigardi
Tyler Bissoondial	Panchanok Leela	Nicole Stover
Teerateep Boonlert	Blake Lippman	Kowit Sukchai
Anica Camacho	Ayesha Mahfuz	Chuen Keat Tan
Sarah Cao	Behruz Mahmudov	Bailey Vanderwall
Michael (Mac) Chaloupka	Abbigail Matthews	Zach Vazhekatt
Caylee Combs	Brynn McGrail	Shohei Wada
Lilian Crawford	Nicole Melo de Almeida	Daniel Wamsley
Maja Dalby-Ball Olson	Jordynn Michael	Kayla Wang
Malee Davis	Pearl Eunice Munoz	Regan Williams
Beverly Eborn	Katherine Opria	Katherine Winchester
John Benedict Estrada	Alyssa Park	Nicole Xiao
Aubrey Evilsizer	Joonwoo Park	Jacob Zajkowski

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**Society for Science** applauds  
the finalists in Plant Sciences.



**SOCIETY FOR SCIENCE**

# Finalist Directory

## Orlando, USFL17, Dr. Nelson Ying-Orange County Science Exposition

- ANIM011**      **Year 4: Developing a Multiple Linear Regression Model to Predict the Specific Effects of Various Lactic Acid Bacteria Dosages on the Overall Honey Bee Gut Microbiota and *Nosema ceranae* Reduction**  
**##**              Varun Raj Madan, 16, Junior, Lake Highland Preparatory School, Orlando, Florida,  
 T: Darin Hughes
- CBIO007**      **A Novel Computational Approach to Drug Discovery through Drug Repositioning**  
 Krithik Seela, 15, Sophomore, Lake Highland Preparatory School, Orlando, Florida,  
 T: Darin Hughes
- CBIO017**      **Implementation of Time Frequency Analysis for Seizure Localization, Phase II**  
 Asha Reddy, 16, Junior, Lake Highland Preparatory School, Orlando, Florida,  
 T: Zasha Mickey
- ROBO019**      **Using A Novel Semi-Supervised Machine Learning Method to Improve Image-based Lung Cancer Diagnostic Algorithms**  
 Alexander C. Wang, 16, Junior, Trinity Preparatory School, Winter Park, Florida,  
 T: Elmarie Mortimer

## Bushnell, USFL18, Sumter County Regional Science Fair

- ANIM001**      **Shrimply Clean: Effects of Mussels and Prawn on Water Quality**  
 Trinity Kadance Skaggs, 17, Junior, Wildwood High School, Wildwood, Florida,  
 T: Emily Keeler
- BMED001**      **The Effects of Ketone Supplements on Reducing Postprandial Glucose Levels**  
**##**              Cheyenne Rashelle Shirley, 16, Junior, South Sumter High School, Bushnell, Florida,  
 T: Shelby Wiley
- CHEM002**      **Do Oranges Gain or Lose Vitamin C After Being Picked?**  
 Savannah Stephens, 16, Sophomore, South Sumter High School, Bushnell, Florida,  
 T: Stephanie Yarbrough
- ENEV004**      **Substituting Plastic**  
 Michael Vick, 17, Junior, Wildwood High School, Wildwood, Florida, T: Emily Keeler
- MCRO003**      **Sugar and Spice, Aren't They Nice? Is Garlic, Ginger, Cinnamon, or Honey More Effective than Antibiotics against Bacteria?**  
 Kadie Mariano, 15, Freshman, Wildwood High School, Wildwood, Florida, T: Emily Keeler

## Pensacola, USFL20, West Panhandle Regional Science and Engineering Fair

- ENEV005**      **Using a Positive Charged Media to Remove Different Heavy Metal Ions from Contaminated Water Samples**  
**#**              Claire Jinbei Han, 16, Junior, Pensacola High School, Pensacola, Florida, T: Cheri Stephens

## Saint Augustine, USFL21, St. Johns County Science Fair

- EGSD004**      **Designing and Testing a Novel 25% Degree of Reaction Steam Turbine**  
 Benjamin Michael York, 15, Freshman, Creekside High School, Saint Johns, Florida,  
 T: Amy Eardley

## Sanford, USFL23, Seminole County Regional Science, Mathematics & Engineering Fair

- BEHA084**      **Artificial Voice Intelligence in Memory Retention; Does A.I. Anthropomorphism Impact Auditory Memory Recall?**  
 Naman Doad, 15, Sophomore, Oviedo High School, Oviedo, Florida, T: William Furiosi
- EGSD034**      **Characterizing the Electrical and Thermal Performance of a Circular Exhaust Pipe Thermoelectric Generator**  
 Taehee Um, 18, Senior, Oviedo High School, Oviedo, Florida, T: William Furiosi
- ENEV037**      **Development of a Combinatory Filtration System for Pollution and Virus Abatement**  
 Ishika Nag, 15, Sophomore, Oviedo High School, Oviedo, Florida, T: William Furiosi II

# Finalist Directory

- MCRO010**     **Prevention of Healthcare Associated Infections Using Antibacterial Boron Carbonitride Nanoparticle Coating on Medical Devices**  
#     Varsha Naga, 17, Junior, Winter Springs High School, Winter Springs, Florida, T: Christopher Adamson
- ROBO040**     **Utilizing Machine Learning to Identify Metastatic Tissue in Histopathologic Scans of Lymph Node Sections**  
Siddharth Kini, 15, Freshman, Crooms Academy of Information Technology, Sanford, Florida, T: Josue Urbina
- Stuart, USFL25, Martin County Regional Science and Engineering Fair**
- ENMC059**     **Creation of a Highly Efficient Surface ROV Invoking Cylindrical Solar Panels, Year 5**  
Steven Craig Vokoun, 18, Senior, South Fork High School, Stuart, Florida, T: Mark Turull
- Tallahassee, USFL26, Capital Regional Science and Engineering Fair**
- CELLO02T**     **Extrathymic T-Cell Development in the Mesenteric Lymph Nodes of Mice**  
Sandhya Kumar, 17, Junior, Surabhi Kumar, 17, Junior, Lawton Chiles High School, Tallahassee, Florida, T: Angela Breza-Pierce
- ROBO004**     **Convolutional Neural Network Approaches for Smartphone-Based Rapid Detection of Tomato Diseases Supporting Mitigation of Unwarranted Pesticide Usage**  
Sruthi Sentil, 16, Sophomore, James Rickards High School, Tallahassee, Florida, T: Paula Hall
- Tampa, USFL27, Hillsborough Regional Science Fair**
- CHEM051**     **Silica-Supported Perovskite Oxides for Low Temperature Carbon Dioxide Conversion**  
#     Anya Kirit Patidar, 17, Junior, C. Leon King High School, Tampa, Florida, T: Daniel McFarland
- MCRO062**     ***In vitro* Evaluation of a Herbal Bionematicide and Its Effect on the Management of Nematodes in *Solanum lycopersicum***  
Shloke Nirav Patel, 15, Sophomore, Hillsborough High School, Tampa, Florida, T: Mishell Thomas-King
- Viera, USFL28, Brevard Mainland Regional Science and Engineering Fair**
- ENMC033**     ***In situ* Resource Utilization of Martian Regolith for Construction, Year Four**  
Isabella Weiner, 17, Senior, Holy Trinity Episcopal Academy, Melbourne, Florida, T: Terrie Segal
- MCRO008**     **A Multi-Factor Study Deriving a Comprehensive Evaluation of Natural Antibiotic Hybrids Bound to Novel Nanoreactors in an Inorganic Model of an *Enterococcus faecalis* Infected Jejunum Cross-Analyzed through Static Biofilm Production and Quorum Sensing (Year 5)**  
#     Om Dipakkumar Patel, 17, Junior, Eau Gallie High School, Melbourne, Florida, T: Chelsea George
- ROBO015**     **Novel Architectures for the Artificial Neural Network: Implementation of Virtual Neurotransmitters**  
Nikhil Hari Iyer, 17, Junior, Edgewood Junior Senior High School, Merritt Island, Florida, T: Ryan Cilsick
- West Palm Beach, USFL29, Palm Beach Regional Science and Engineering Fair**
- ANIM044**     **The Effect of Putative Beneficial Microorganisms for Coral (pBMC) in the Prevention of Disease and Bleaching (Year Two)**  
Emily Joy Weimer, 18, Senior, Palm Beach Central High School, Wellington, Florida, T: William Bartenslager
- BCHM025**     ***Sargassum sp.* Reductive, Polyphenol Extract Modulates *D. dorotocephala* Regeneration by Reduction of ROS, and Has Potential as an Anti-Inflammatory Agent**  
Julianna Lian, 17, Junior, Florida Atlantic University High School, Boca Raton, Florida, T: Alexandra Lolavar

# Finalist Directory

- BEHA053**     **An Examination of the Association Between Empathy as a Disposition and Adherence to Covid-19 Safety Guidelines**  
Mandy Brooke Feuerman, 17, Senior, American Heritage School of Boca Delray, Delray Beach, Florida, T: Iris Thompson
- ENEV068**     **Artificial Neural Network Modeling of Harmful Algal Blooms in Lake Okeechobee**  
Ashesh Amatya, 16, Junior, Alexander W. Dreyfoos School of the Arts, West Palm Beach, Florida, T: Stephen Anand
- MCRO048**     **Testing the Extent of Synergistic Anti-biofilm Activity of *Galla chinensis* and Potentially Adjuvant Chemicals on *Escherichia coli* Biofilm Formation and Reformed Biofilm**  
Angelina Ning, 16, Junior, American Heritage School of Boca Delray, Delray Beach, Florida, T: Iris Thompson
- ROBO064**     **Improved Classification and Prediction of Head and Neck Squamous Cell Carcinomas Using a Novel Generative Adversarial Network Model**  
Ashwin Parthasarathy, 16, Junior, American Heritage School of Boca Delray, Delray Beach, Florida, T: Iris Thompson
- TMED049**     **Determining the Effect of a Disulfiram Copper Complex on Drug Resistance through Deletion of ALDH1 in Metastatic Breast Cancer Cells (A Three Year Study)**  
Diane Altidor, 18, Senior, Palm Beach Central High School, Wellington, Florida, T: Willam Bartenslager
- Land O' Lakes, USFL30, Pasco Regional Science and Engineering Showcase**
- BEHA003**     **Jewish Identity Formation Processes within Reform Adolescents**  
Rachel Elizabeth Buksbaum, 17, Senior, Wiregrass Ranch High School, Wesley Chapel, Florida, T: Branden Anglin
- BMED003**     **The Influence of Temperature on the Concentration of Hemoglobin in *Lumbricus terrestris* and *Eisenia fetida* Erythrocytes**  
Bianca Rose Nicholas, 18, Senior, Wiregrass Ranch High School, Wesley Chapel, Florida, T: Branden Anglin
- CBIO005**     **An Analysis of the Regulatory Role of Small Nuclear and Nucleolar RNA Expression Pathways in the Pathogenesis of Preeclampsia**  
Cemre Su Kayisli, 17, Junior, Wiregrass Ranch High School, Wesley Chapel, Florida, T: Branden Anglin
- ENEV030**     **The Utilization of *Bambusa vulgaris* Biochar to Address Runoff Contamination Following Intense Forest Fires**  
Rachel Anne Forgas, 18, Senior, Wiregrass Ranch High School, Wesley Chapel, Florida, T: Branden Anglin
- Vero Beach, USFL31, Indian River Regional Science and Engineering Fair**
- EAEV025**     **A Novel Model of Microplastics Pollution for Terrestrial Environments in *Drosophila melanogaster***  
Stephan Oscar Lindenthal, 17, Junior, Saint Edward's School, Vero Beach, Florida, T: Kerryane Monahan
- Sarasota, USFL32, Sarasota County STEM Summit**
- BEHA078**     **Impact of Protective and Risk Factors on Adolescent Responses to COVID-19**  
Lauren Xiao Shuang Morgan, 18, Senior, Sarasota High School, Sarasota, Florida, T: Andrew Harshman
- EAEV116T**     **Secretion of Microplastics on the Seafloor**  
Lily Sikorski, 18, Senior, Alexa VanSuch, 18, Senior, Sarasota High School, Sarasota, Florida, T: Andy Harshman
- Mount Dora, USFL34, Lake County Regional Science & Engineering Fair**
- ENBM011**     **Biomaterial Fabrication Technique: Using Decellularized Plants as Perfusable Engineering Scaffolds**  
Kaitlyn R. Dunn, 16, Junior, Tavares High School, Tavares, Florida, T: Courtney Stokes

# CONGRATULATIONS

## TO OUR FIRST PLACE CATEGORY WINNERS

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### **Robotics and Intelligent Machines**

**MICHELLE HUA**

Bloomfield Hills, Michigan

Dilated Silhouette Convolutional  
Neural Networks

Booth ROBO033

**ELLA YUE WANG**

Chandler, Arizona

HemaVision Blood Disease  
Screening System

Booth ROBO055

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**Siegel Family Endowment** applauds the finalists  
in Robotics and Intelligent Machines.



# Finalist Directory

## Green Cove Springs, USFL35, Clay Rotary Regional Science and Engineering Fair

**CELL003**      **Enzymatically Treated Cellulosic Packaging Waste Utilized to Release Fermentable Sugars for the Production of Bioethanol: A Second Year Study**

#      Serenity Renee Derosie, 17, Junior, Ridgeview High School, Orange Park, Florida, T: Devan Skapetis

**ENBM009**      **Muscle Controlled Exoskeleton**

Sebastian David Kouchakjy, 17, Senior, Orange Park High School, Orange Park, Florida, T: Amanda George

## Virtual, USFL50, State Science and Engineering Fair of Florida – Ying Scholars

**ANIM007**      **Novel Geotaxic Data Show Botanical Therapeutics Slow Parkinson's Disease in A53T and ParkinKO Models**

Kristi Biswas, 16, Sophomore, Paxon School for Advanced Studies, Jacksonville, Florida, T: Emma Gallagher

**BEHA064**      **Digital Phenotyping Autism: Investigating Objective Vocal and Movement Quantification for Characterizing Autism Severity**

Emilin Maria Mathew, 16, Junior, American Heritage School, Plantation, Florida, T: Leya Joykutty

**BMED073**      **Differential Expressions of Wnt Pathway Proteins of Colorectal Carcinoma Metastases to Liver versus Lung**

Madeline E. Huberman, 16, Junior, West Shore Junior/Senior High School, Melbourne, Florida, T: Paula Ladd

**CHEM061**      **Fabrication of Naphthalimide Point-of-Care (POC) Chemosensor Using InkJet Printing on Cellulose Paper for Determination of Uric Acid (UA) in Synthetic Urine and Aqueous Solution of Grain Samples, and Chromium Metal (Cr) in Drinking Water**

Vedant Nilesh Karalkar, 16, Junior, Eastside High School, Gainesville, Florida, T: Adenike Akinyode

**EAEV090**      **Predictive Modeling of Tropical Cyclone Rapid Intensification by Analyzing Convective Patterns with Convolutional Neural Networks, Year Four**

Alexander Michael LaFortune, 18, Senior, Satellite High School, Satellite Beach, Florida, T: Magdalena Molledo

**PHYS017**      **Dynamic Contact Angle Measurements of Superhydrophobicity in Dip-Coated Face Masks to Minimize Exposure to COVID-19 Sized Nanoparticles**

Annika Maria Larsson Vaidyanathan, 16, Junior, Winter Springs High School, Winter Springs, Florida, T: Christopher Adamson

**PLNT042**      **Minimizing Food Waste Using a Nature-Derived Coating – An Innovative Step Towards Addressing Global Food Security**

###      Laboni Santra, 17, Senior, Oviedo High School, Oviedo, Florida, T: William Furiosi

**ROBO056**      **A Novel Approach to Citrus Disease Management: Leveraging Computer Vision, Machine Learning and Convolutional Neural Networks**

Arko Ghosh, 16, Junior, C. Leon King High School, Tampa, Florida, T: Daniel McFarland

## GEORGIA

### Atlanta, USGA03, Atlanta City Science & Engineering Fair

**CBIO057**      **Type 2 Diabetes and Ulcerative Colitis: Shared Gut Microbiome Dysbiosis, a Biomarker for Colorectal Cancer**

Sara Kapasi, 16, Junior, The Westminster Schools, Atlanta, Georgia, T: Florence Sumner

**ENBM102**      **Muscle Activity and Energetic Adaptation to Step Frequency**

#      Wendy Nevarez-Sanchez, 18, Senior, South Atlanta High School, Atlanta, Georgia, T: Andrea Pendergrass

# Finalist Directory

**MATH044T Using Advanced Predictive Modeling in a Nontraditional Discipline – The NFL Draft**  
Christopher Walker, 17, Junior, Nathan Rachwalski, 17, Junior, Henry W. Grady High School, Atlanta, Georgia, T: Rabieh Hafza

**SOFT006 Towards a Greener AI: Structured Pruning of Convolutional Neural Networks at Initialization**  
Sydney Faux, 17, Junior, Pace Academy, Atlanta, Georgia, T: Christina Snyder

**Stone Mountain, USGA04, Dekalb Science & Engineering Fair**

**SOFT002T Utilizing the Heuristic A\* Search Algorithm to Determine the Shortest Path Between Locations on a Floorplan**  
Avaye Raj Dawadi, 17, Junior, Sooriya Senthilkumar, 17, Junior, Alexander Charles Jovanovic, 17, Junior, Chamblee Charter High School, Chamblee, Georgia, T: Shaheen Begum

**McDonough, USGA06, Henry County Science and Engineering Fair**

**EBED001 VR but Better: Using Geomagnetic Fields, Bodily Electric Fields, and Pressure Distributions in VR**

# Yashua Evans, 18, Senior, The Academy for Advanced Studies, McDonough, Georgia, T: Charlena Raines

**ENMC002 Staying Dry: Notification System for Incontinence Underwear**

## Rebekah Grace Dorminy, 17, Senior, Sola Fide Home School, McDonough, Georgia, T: Ann Dorminy

**Milledgeville, USGA07, Georgia College & State University Regional Science and Engineering Fair**

**CHEM004 Removing Permanent Marker**

Laura Towner, 15, Sophomore, Georgia College Early College, Milledgeville, Georgia, T: Julia Reams

**MCRO004 Acne Medication Against *E. coli***

Tiffani Arnina McClain, 15, Freshman, Jasper County High School, Monticello, Georgia, T: Caleb Fontaine

**Savannah, USGA08, Savannah Regional Science and Engineering Fair**

**ANIM002 The Impact of Buildings on Loggerhead Sea Turtle Nests**

Michael William Wood, 16, Sophomore, Islands High School, Savannah, Georgia, T: Megan Heberle

**Griffin, USGA09, Griffin RESA Regional Science Fair**

**ENEV006 Sustainable Habitats for *Crassostrea virginica***

Emily Elizabeth White, 15, Sophomore, McIntosh High School, Peachtree City, Georgia, T: Seth Bishop

**ENMC005 Recycling Plastic for 3D Printing**

Cayden N. Shaffer, 16, Junior, Whitewater High School, Fayetteville, Georgia, T: Mary Clark

**ROBO005 3D Depth Mapping Vision System Worthy of an Extraterrestrial**

Marc van Zyl, 16, Sophomore, McIntosh High School, Peachtree City, Georgia, T: Seth Bishop

**Warner Robins, USGA10, Houston Regional Science and Engineering Fair**

**BCHM009 The Effect of Pulsed Ultraviolet Light on the Color of Beef, Chicken, and Pork Surfaces.**

Ishaan Vyas, 16, Junior, Northside High School, Warner Robins, Georgia, T: Leshan Ferguson

**Suwanee, USGA11, Gwinnett Regional Fair**

**BMED004 Using Seaweed in order to Protect Skin Cells from UV Rays**

Jessica Elise Borders, 16, Sophomore, Gwinnett School of Mathematics, Science, and Technology, Lawrenceville, Georgia, T: Jennifer Berry

# Finalist Directory

- EAEV066**     ***Galleria mellonella* Biodegradation of Polyethylene by Digestion**  
Mireya Carolina Ramirez, 16, Junior, North Gwinnett High School, Suwanee, Georgia,  
T: Charles Daab
- ENBM007T**     **Automated UVC Sanitizing of Money**  
Roshan Lukas Saigal, 15, Sophomore, Timothy Do Nguyen, 16, Sophomore, Nathaniel Morgan, 15, Sophomore, Gwinnett School of Mathematics, Science, and Technology, Lawrenceville, Georgia, T: Jennifer Berry
- ENEV039**     ***Acetobacter Xylinum* & the Development of an Alternative Biodegradable Textile**  
Ciara Ashley Mitchell, 17, Senior, Brookwood High School, Snellville, Georgia,  
T: Melissa Kim
- ENMC006T**     **Portable Method of Detecting Oncoming Fires**  
Anika Mathur, 16, Sophomore, Kristina Yu, 16, Sophomore, Gwinnett School of Mathematics, Science, and Technology, Lawrenceville, Georgia, T: Joanne Shaw
- ENMC023**     **Optimization of Navigating Intersections: A Research Project on Navigating Hallway Intersections During a Pandemic**  
Chandni Pari Jain, 18, Senior, Peachtree Ridge High School, Suwanee, Georgia,  
T: Patrick McClanahan
- Conyers, USGA12, Rockdale Regional Science & Engineering Fair**
- ENEV007**     **Use of *Tenebrio molitor* in Plastic Biodegradation**  
Dylan Edward Burkey, 16, Sophomore, Rockdale Magnet School for Science and Technology, Conyers, Georgia, T: Scott Bolen
- ENEV008**     **The Application of Mycoremediation upon Cigarette Filter Waste**  
Nylah Lillian Ductan, 17, Junior, Rockdale Magnet School for Science and Technology, Conyers, Georgia, T: Lynette Clark
- MATS014T**     **Comprehensive Analysis of Biomaterial for Medical Implementation**  
Madeline Lombard, 18, Senior, Ava Claire Bailey, 17, Senior, Rockdale Magnet School for Science and Technology, Conyers, Georgia, T: Scott Bolen T: Shelley Seagraves
- Atlanta, USGA13, Fulton County Regional Science & Engineering Fair**
- BEHA004**     **VapeSafe: Device and Multi-Factor App to Prevent Nicotine Poisoning via Real-Time Behavioral Analysis and Alternate Compound Identification**  
Divya Vani Nori, 17, Senior, Milton High School, Milton, Georgia, T: Catherine Riley
- CHEM005**     **Threitol Oligomers: Microbe-based Demulsifiers for Oil Extraction**  
Tianyu Dong, 16, Junior, Northview High School, Johns Creek, Georgia,  
T: Rebecca Bingham
- ENBM008**     **Autonomously Tracking Organisms at Microscopic Resolution in 3D**  
Priya Soneji, 17, Senior, Milton High School, Milton, Georgia, T: Catherine Riley
- Marietta, USGA14, Cobb/Paulding Regional Science Fair**
- MCRO005T**     **Prophylactic and Therapeutic Roles of *Glycyrrhiza glabra* in the Prevention and Treatment of COVID19**  
Abhinav Kona, 16, Junior, Abhishek Kona, 16, Junior, George Walton Comprehensive High School, Marietta, Georgia, T: Tobie Hendricks
- MCRO006T**     **Applications of Silver Nanoparticles to Flooring**  
Mehreen Sabah, 17, Senior, Cindy Pinedo, 17, Senior, Paulding County High School, Dallas, Georgia, T: Marc Pedersen
- Jonesboro, USGA15, Clayton County Regional Science & Engineering Fair**
- ENBM017T**     **How Can Vibration Detection Used to Determine Joint Health Monitoring?**  
Rodney Lamar Clark, 18, Senior, Deonte Antion Hambrick, 17, Senior, Martha Ellen Stilwell School of the Arts, Jonesboro, Georgia, T: Rajini Sundararaj

# CONGRATULATIONS TO OUR CATEGORY WINNERS

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## **Systems Software**

### **FIRST PLACE**

Daniel Shen

### **SECOND PLACE**

Aiden Yutong Bai

Shrinandan Krishna

Narayanan

Pravalika Gayatri Putalapattu

### **THIRD PLACE**

Alice Louise Heiman

Alexander Lyons

Peyton Schales

Arvind Seshan

### **FOURTH PLACE**

James Connor

Sydney Faux

Xuerui He

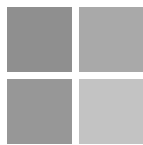
Jordan Levett

Haoyun Qin

Thomas Marshall Vielmetti

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**Microsoft** applauds the finalists  
in Systems Software.



Microsoft

# Finalist Directory

## Athens, USGA50, Georgia State Science and Engineering Fair

- CELLO39**     **Rewiring PAM Specificity of SpdCas9 for Gene Repression**  
Michelle Li, 16, Sophomore, North Oconee High School, Bogart, Georgia,  
T: Matthew Shuman
- ENEV087**     **Protecting Critical Aquatic Ecology with Deep Learning**  
Aesha Shah, 15, Sophomore, Northview High School, Johns Creek, Georgia,  
T: Rebecca Bingham
- MATS050**     **Year Two: Digital Light Processing Printing of Hierarchical Porous Carbon for Environmental Remediation and Water Desalination**  
# Howard Tang Hua, 18, Senior, Wheeler High School, Marietta, Georgia, T: Joel Howell
- TMED061**     **My Skin: A Deep Convolutional Neural Model for Skin Cancer Identification with Coarse-to-Fine Contextual Memory (CFCM)**  
Ameya Jadhav, 17, Junior, Denmark High School, Alpharetta, Georgia, T: Shelby Cochran

## HAWAII

### Honolulu, USHI01, Hawaii Association of Independent Schools Science and Engineering Fair

- BMED026**     **Testing Fabric and Mask Particle Filtration Efficacy**  
Logan Kekoa Lau, 17, Junior, Kamehameha Schools Kapalama Campus, Honolulu, Hawaii, T: Gail Ishimoto
- ROBO058**     **An AI-aided Solution to Open-angle Glaucoma Screening in Developing and Rural Countries**  
Jiacheng Dang, 19, Senior, Iolani School, Honolulu, Hawaii, T: Yvonne Chan

### Waipahu, USHI02, Leeward District Science and Engineering Fair

- CBIO035**     **In silico Screening and Analysis of Inhibitory, Anti-prion Ligands for Prevention of Pathogenic Prion Conversion**  
Emily Phanphongs, 17, Junior, Waipahu High School, Waipahu, Hawaii, T: Tanya Cobbin
- ENMC030T**     **Improving Autonomous Underwater Vehicle (AUV) Glider Efficiency: Wingspan**  
Antonio Samonte Velasco, 17, Junior, Lauren Kana Suzuki, 16, Junior, Pearl City High School, Pearl City, Hawaii, T: Anthony Ferro
- MATS015**     **Synthesizing c-Si3N4 from Extreme Temperature and Pressure Conditions**  
Jeyan Francis Cornelio, 18, Senior, Waipahu High School, Waipahu, Hawaii,  
T: Tessie Ford

### Wailuku, USHI03, Maui County Regional Science and Engineering Fair

- BEHA054**     **Studying the Effects of Mindfulness Meditations on Teens**  
Kailani Ibanez, 15, Sophomore, Henry Perrine Baldwin High School, Wailuku, Hawaii,  
T: Amy Ancheta
- ENBM045**     **Biomedical Engineering: Coronary Artery Disease and the Design Process of Medical Implants and Devices**  
Alara Berkmen, 16, Junior, Seabury Hall Upper School, Makawao, Hawaii, T: Moka Brown

### Lihue, USHI04, Kauai Regional Science & Engineering Fair

- EAEV037**     **Identifying Climate Change Refugia for Hawaii's Vulnerable Endemic Species with a Spatial-Temporal Model in GIS**  
Kai Elliot Mottley, 16, Junior, Kauai High School, Lihue, Hawaii, T: Kevin Johnson

### Hilo, USHI05, Hawaii District Science and Engineering Fair

- BCHM016**     **Investigating the Biochemical Activity of Organic *Curcuma caesia* and *Curcuma longa* (Turmeric) on Neuroblastoma Cancer Cells**  
Maya C. Oishi, 17, Junior, Hilo High School, Hilo, Hawaii, T: Pascale Pinner
- MCRO033**     **Structural Deduction and Environmental Analysis of Novel Tirofiban and Coumarin Derivatives Originating from the Endophytic Isolate FM1005 (*Xylaria* sp.)**  
# Lela C. DeVine, 17, Senior, Waiakea High School, Hilo, Hawaii, T: Whitney Aragaki

# Finalist Directory

## Kaneohe, USHI06, Windward District Science and Engineering Fair

- EGSD019**     **An Ocean Distillery for Distilled Water Run on Hydroelectric Power**  
Desirae Jeffers, 18, Senior, Kailua High School, Kailua, Hawaii, T: Sara Anglin
- ENMC031**     **Propeller Shroud Design: Testing the Effectiveness of Different Cambers**  
Jack Keiichi Saito, 16, Junior, James B. Castle High School, Kaneohe, Hawaii,  
T: Malia Vaughn

## Honolulu, USHI07, Central Oahu District Science and Engineering Fair

- CBIO044**     **High Accuracy Classification of Myopathy Electromyography Signals Using a ResNet50 Neural Network**  
Blaise Austin Swartwood, 17, Junior, Mililani High School, Mililani, Hawaii, T: Nel Venzon

## Honolulu, USHI08, Honolulu District Science & Engineering Fair

- EBED009**     **No CoViD Past this Point: Non-Contact Vital-sign Detection**  
# Lana Carmen Lubecke, 18, Senior, Kalani High School, Honolulu, Hawaii,  
T: Kenneth Okawa
- PHYS027**     **Mapping Dark Matter Signals**  
Kenta Milton Sakamoto, 17, Junior, President Theodore Roosevelt High School,  
Honolulu, Hawaii, T: Elizabeth Clemens
- ROBO035**     **Utilizing AI to Reduce the Risk of SIDS**  
Natalie Si-Chi Kuo, 16, Sophomore, Henry J. Kaiser High School, Honolulu, Hawaii,  
T: Garrett Hatakenaka

## Honolulu, USHI50, Hawaii State Science and Engineering Fair

- ANIM054**     **An Inventory of Forest Birds Along the 'Aiea Loop Trail, O'ahu, Hawai'i**  
Kellen Apuna, 16, Junior, Kamehameha Schools Kapalama Campus, Honolulu, Hawaii,  
T: Grant Yamashita
- CHEM063**     **Column Purification of Hawaiian Grown Mamaki Tea Extracts and Investigation of Associated Compound Stability in Simulated Intestinal and Gastric Fluids**  
Alanna Sun, 15, Sophomore, Waiakea High School, Hilo, Hawaii, T: Whitney Aragaki
- ENBM094**     **The Future of Prosthetics: Making Prosthetics with More Capabilities at a Lower Cost**  
Connor Tetsuo Lee, 17, Junior, Iolani School, Honolulu, Hawaii, T: Yvonne Chan
- ENEV080T**     **Managing Oysters to Maintain Our Islands (MOMI)**  
Andrew Kwon Dawson, 18, Senior, David Antonio Torres, 17, Senior, Ethan Hui, 17, Senior,  
Iolani School, Honolulu, Hawaii, T: Yvonne Chan
- MATS048**     **Engineering an Invasive Algae and Taro Based Bioplastic**  
Kelly Sanae Mukai, 18, Senior, Iolani School, Honolulu, Hawaii, T: Yvonne Chan
- PHYS075**     **Determining the Detectability of Planets Transiting Stars of Extragalactic Origin**  
# Stephanie Naphat Yoshida, 18, Senior, Punahou School, Honolulu, Hawaii,  
T: Johannes Adams
- TMED059**     **Identification of a Novel Anticancer Pathway in a Traditional Hawaiian Herb**  
# Rachel Tao, 15, Sophomore, Waiakea High School, Hilo, Hawaii, T: Whitney Aragaki

## IDAHO

### Coeur d'Alene, USID01, Northern Idaho Science & Engineering Fair

- PLNT026**     **Manipulation of the Novel hsp23.8: ZmCLA4 Gene Construction to Avoid Leaf Hyponasty (Upward Leaf Bending) Caused by Heat Stress**  
Nicole Li Xiao, 16, Junior, Moscow High School, Moscow, Idaho, T: Pat Blount
- PLNT027T**     **A Comparison of Growth in *Solanum lycopersicum* and *Brassica oleracea* Planted in Aquaponic and Hydroponic Systems**  
Bailey Elizabeth Vanderwall, 17, Junior, Camden Kay Barger, 17, Junior, Grangeville High School, Grangeville, Idaho, T: Shaun Bass

# Finalist Directory

## Boise, USIDO2, Western Idaho Science & Engineering Fair

- MCRO037** **Comparative Inhibition of *E. coli* Growth by Commercial and Homemade Hand Sanitizers**  
Jessica Lynn Douglass, 18, Senior, Emmett High School, Emmett, Idaho, T: Robin Wilson
- ROBO046** **Efficient Music Genre Classification with Deep Convolutional Neural Networks**  
Wency Suo, 16, Sophomore, Boise High School, Boise, Idaho, T: Reid Spain-Strombom

## Pocatello, USIDO3, Eastern Idaho Science & Engineering Fair

- ENMC047** **Mitigating Stresses to Migrating Ichthyoids Caused by Man-Made Obstructions**  
Seth L. Tuma, 15, Sophomore, Idaho Virtual Academy, Meridian, Idaho, T: Janna Privette
- MCRO038** **A Comparison of Bacterial Contamination of Nine Public Surfaces**  
Lindsey Holtom, 17, Junior, Hillcrest High School, Ammon, Idaho, T: Barbara Nelson

## ILLINOIS

### Chicago, USILO1, Chicago Public Schools Student Science Fair

- BMED030** **Investigating Bone Morphogenetic Protein 4 as a Potential Regulator of the Age Related Increase in Risk for Alzheimer's Disease: The Regulation of the Unfolded Protein Response and Apolipoprotein E Expression in Astrocytes**  
Sedona Kessler, 17, Junior, Walter Payton College Preparatory High School, Chicago, Illinois, T: Walter Kinderman
- BMED031** **Treating Blindness: The Role of Autophagy in Diabetic Retinopathy**  
Nina Fonseca, 17, Junior, Whitney M. Young Magnet High School, Chicago, Illinois, T: Lynne Muhammad
- EBED029** **Using RFID to Enhance a 2-Piece Puzzle**  
Sydney Ella Curran, 15, Sophomore, Lane Technical College Prep High School, Chicago, Illinois, T: Daniel Law
- MCRO027** **mRNA-based Vaccine for the Prevention of Yellow Fever**  
Maya Joshi, 16, Sophomore, Walter Payton College Preparatory High School, Chicago, Illinois, T: Walter Kinderman

### Edwardsville, USILO2, STEM Science and Engineering Research Challenge

- MCRO067** **To Dye or Not to Die: Bacterial Mutagenicity and Carcinogenesis**  
Tahlor Brené Johnson, 17, Senior, The Governor French Academy, Belleville, Illinois, T: Christine Stewart

### Springfield, USILO4, Illinois Junior Academy of Science Region X Science Fair

- EAEV079** **Zooplankton Studies in Lentic Ecosystems: Phase V – Cyclomorphosis**  
Ashton Timothy Ryan, 16, Junior, Rochester High School, Rochester, Illinois, T: Lyndell Robinson
- MCRO039** **Effect of Bacteria and Fungal Interactions on Mosquito Egg Hatching**  
Jadyn Lynne Henry, 18, Senior, Southeastern Junior/Senior High School, Augusta, Illinois, T: Sue Henry

### Skokie, USILO5, Illinois Junior Academy of Science North Suburban Region 6 Science and Engineering Fair

- EAEV099** **Math Model on the Effect of Deforestation and Anthropization on the Transmission Rates of Bat-Related Diseases**  
Sharlene Faye Zabat Manlongat, 18, Senior, Niles North High School, Skokie, Illinois, T: Christine Camel
- ENBM089** **Using 3D Printing to Engineer a Microcentrifuge for Open-Source Research**  
Keegan Teal, 18, Senior, Barrington High School, Barrington, Illinois, T: Polly Foley
- ENMC069** **Effect of Geometric Manipulation on the Main Combustion Chamber of a Full-Flow Staged Rocket Engine**  
Joseph Rosario Cinquemani, 18, Senior, Niles Township West High School, Skokie, Illinois, T: Parin Patel

# CONGRATULATIONS

## TO THE FIRST PLACE CATEGORY WINNER

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### Translational Medical Science



### TIENLAN SUN

Vancouver, Canada

TeleAEye: AI Fundus Camera  
for 2 Billion Eyes

Booth TMED047

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**Regeneron** applauds the finalists  
in Translational Medical Science.

# ***REGENERON***<sup>®</sup>

# Finalist Directory

- PHYS067**     **Effect of Surface Deformations on the Hydraulic Jump**  
Emily Flora Hauser, 17, Senior, Evanston Township High School, Evanston, Illinois,  
T: Mark Vondracek
- ROBO074**     **Automated Tracking of the Muscle Tendon Junction Using Modern Deep Learning**  
Hassam Uddin, 18, Senior, Niles North High School, Skokie, Illinois, T: Richard Thielsen

## INDIANA

### Evansville, USIN20, Hoosier Science and Engineering Fair Region 1

- CBIO061**     **Systematic Survey of Pathways Perturbed in Complex Diseases**  
James Yang, 15, Sophomore, Carmel High School, Carmel, Indiana, T: Zhaohui Qin
- CHEM040**     ***Staphylococcus aureus* Biofilm Dispersion: Computationally Analyzing Interactions between Nattokinase Binding-Partners via a Novel Stacked Generalization Machine Learning Approach**  
Raghav Sriram, 15, Sophomore, Carmel High School, Carmel, Indiana,  
T: Jennifer Drudge
- PHYS061**     **Jetting into the Future: Calculating Outlet Air Velocity to Optimize Convergent Nozzle Design for Subsonic Exhaust Flow Efficiency through Wind Tunnel Testing with Laminar Flow**  
Matthew Allen Alcantara, 16, Sophomore, Carmel High School, Carmel, Indiana,  
T: Jennifer Alcantara

### Fort Wayne/Angloa, USIN21, Hoosier Science and Engineering Fair Region 2

- MATS028**     **Mechanical Properties of Crayfish Claws: Getting Inspiration from Nature**  
Kunal Chawla, 14, Freshman, West Lafayette Junior/Senior High School, West Lafayette, Indiana, T: Brittany Croy
- TMED064**     **Identification of Predictive Biomarkers Against Cancer with Sparse Neural Networks**  
Minnie Liang, 16, Sophomore, West Lafayette Junior/Senior High School, West Lafayette, Indiana, T: Brittany Croy

### Indianapolis, USIN22, Hoosier Science and Engineering Fair Region 3

- BMED045**     **Which Cloth Is More Effective as a Mask?**  
Sama Zahran, 14, Freshman, Eman Schools, Fishers, Indiana, T: Elsayed Zahran
- CBIO075**     **A Deep Learning Approach to *de novo* Drug Design: Generating Multi-Target Drugs to Inhibit Amyloid-Beta with Applications in Neurodegenerative Disorders**  
##  
Sowmya Chundi, 17, Junior, Carmel High School, Carmel, Indiana, T: Craig Harper

### Muncie, USIN23, Hoosier Science and Engineering Fair Region 4

- ANIM041**     **The Effect of Different Protein Supplements on the Growth of Goat Kids**  
Kelsie Marie Avery, 15, Freshman, Northwestern High School, Kokomo, Indiana,  
T: Linda Wilson
- PLNT031**     **The Reduction of Tumors on *Glycine max* through the Application of Sulforaphane**  
#  
Aubrey Elaine Evilsizer, 16, Sophomore, Northwestern High School, Kokomo, Indiana,  
T: Linda Wilson

### Notre Dame, USIN24, Hoosier Science and Engineering Fair Region 5

- ANIM047**     **Feeding Modality and Saturation Response in the Jaws of New Zealand White Rabbits**  
Talia Thornton, 17, Senior, Marian High School, Mishawaka, Indiana, T: Ken Andrzejewski
- BCHM022**     **Nitrate Levels in Non-Organic and Organic Vegetables**  
Allison Dew, 15, Freshman, Marian High School, Mishawaka, Indiana,  
T: Ken Andrzejewski
- BEHA038**     **An Observational Study of Mask Usage in St. Joseph and Elkhart Counties**  
Abigail Mackenzie Weaver, 15, Freshman, Marian High School, Mishawaka, Indiana,  
T: Ken Andrzejewski

# Finalist Directory

## Greencastle, USIN25, Hoosier Science and Engineering Fair Region 6

- BEHA082**     **Analyzing Health Implications of Adverse Childhood Experiences (ACEs) on American Adults**  
Maieasha Shifa Rashid, 17, Junior, Greencastle High School, Greencastle, Indiana, T: Kristen Phillips
- BMED066**     **Correlating Sugar Consumption with Hormone Production Using Shmoo Formation in *S. cerevisiae***  
Samantha Winland, 18, Senior, Valparaiso High School, Valparaiso, Indiana, T: Heidi Krouse
- PLNT040**     **The Power of Plants: Comparing the Antifungal Effects of Different Forms of *Ocimum basilicum* (Sweet Basil) Against *Aspergillus niger***  
Mary Biggs, 18, Senior, Valparaiso High School, Valparaiso, Indiana, T: Heidi Krouse

## West Lafayette, USIN26, Hoosier Science and Engineering Fair Region 7

- BEHA039**     **Strenuous Sequencing: Exploring the Effect of Bilingualism on Executive Functioning in the Human Brain**  
Karina Renee Castaneda, 17, Senior, Frankfort High School, Frankfort, Indiana, T: Bret Rhea
- CELL022**     **Does HYPE AMPylation Affect BiP Translocation to the Cell Surface?**  
Jashun Paluru, 16, Junior, William Henry Harrison High School, West Lafayette, Indiana, T: Scott Powell
- CHEM038**     **Creating and Testing New Polymers to Remove the Environmental Toxin PFOA from Water**  
Andrew Lipton, 16, Junior, Lafayette Jefferson High School, Lafayette, Indiana, T: Alyce Myers
- ROBO066**     **PanCan Diagnosed (a miRNA Approach): Using Feature Selection, Ensemble Algorithms, and Interpretability for the Early Diagnosis and Personalized Medicine of Pancreatic Cancer**
- ##**     Siya Goel, 16, Junior, West Lafayette Junior/Senior High School, West Lafayette, Indiana, T: Brittany Croy

## Valparaiso, USIN27, Hoosier Science and Engineering Fair Region 8

- BCHM018**     **Comparative Effects of Various Flavonoids on Biofilm Formation of *S. marcescens***  
Ryan Norden, 16, Sophomore, East Noble High School, Kendallville, Indiana, T: Mark Liepe
- BMED046T**     **The Creation of Manganese (IV) Oxide Nanosheets as a Inexpensive and Effective Method of Measuring Blood Glucose**  
Pol Berger Romeu, 17, Junior, Nathan Frank, 17, Junior, Carmel High School, Carmel, Indiana, T: Eric Rauch
- EAEV068**     **The Effects of Different Turbine Blade Shapes on the Output of Hydroelectric Power**
- #**     Sydney Elaine Hefty, 18, Senior, DeKalb High School, Waterloo, Indiana, T: David Hefty
- ENMC050**     **Testing the Effectiveness of Wind-Resistant Construction Designs in Residential Settings**  
Christopher Isaac Schweitzer, 15, Freshman, DeKalb High School, Waterloo, Indiana, T: Kelsey Pierce

## Indianapolis, USIN50, Hoosier Science and Engineering Fair

- CBIO079**     **Comparing Outcomes of COVID-19 Positive Individuals with and without Chronic Kidney Disease Using Python and CoRDaCo**
- #**     Safiya Sankari, 16, Senior, Eman Schools, Fishers, Indiana, T: Mia Sankari
- EAEV075**     **Effect of Organic Materials Review Institute-Certified *Bacillus thuringiensis* Bio-insecticide on *Daphnia magna* Swimming Behavior**
- #**     Madeline Phuong, 16, Sophomore, Homestead Senior High School, Fort Wayne, Indiana, T: Diana Cronk

# Finalist Directory

- ENMC063**     **Hay Waste: The Financial Impact Due to Poor Design**  
Matthias David Hefty, 15, Freshman, DeKalb High School, Waterloo, Indiana,  
T: David Hefty
- MATS043**     **Magnetic Control of Arbitrarily Shaped Objects with Gallium-Based Transitional Ferrofluid**  
Jiashu Cheng, 18, Junior, Culver Academies, Culver, Indiana, T: Hongzhang Wang
- ROBO048**     **Computational Design of Optimal Machine Learning Algorithm for Cancer Detection in Histopathologic & PET Scans**  
Aisha Kokan, 16, Junior, University High School of Indiana, Carmel, Indiana,  
T: Mercedes Muniz-Peredo

## IOWA

**Cedar Rapids, USIA01, Eastern Iowa Science and Engineering Fair**

- CELLO20**     **Novel Mammalian Fibroblast Cell Culture Media Technique for Ultraviolet Cell Reduction**  
Jasmyn Mary Hoeger, 17, Junior, Beckman Catholic High School, Dyersville, Iowa,  
T: Cheryl Kluesner
- MCRO024**     **Comparison of Nickel Chelator to Current Standard Triple Antibiotic Therapy to Treat *Helicobacter pylori* Infection**  
### Meena Ramadugu, 17, Junior, John F. Kennedy High School, Cedar Rapids, Iowa,  
T: Bradley Horton

**Fort Dodge, USIA02, Western Iowa Science and Engineering Fair**

- EAEV059**     **UVClean or SODISgusting: Comparing the Effectiveness and Efficiency of an Ultra-Violet C (UVC) Sanitizer Box and the Solar Water Disinfection (SODIS) Method**  
Kiersten Jean Knobbe, 16, Sophomore, Guthrie Center High School, Guthrie Center, Iowa, T: Alexa Groff
- ENBM051**     **A New Treatment Option for Congenital Heart Defects, Phase 2**  
Justin David Reinhart, 16, Sophomore, Guthrie Center High School, Guthrie Center, Iowa, T: Alexa Groff

**Ames, USIA50, State Science and Technology Fair of Iowa**

- ANIM038**     **Organic and Traditionally Grown *Helianthus annuus* Seeds as a Protein Supplement for Grain Based Rations**  
Grace Frances Helle, 16, Sophomore, Beckman Catholic High School, Dyersville, Iowa,  
T: Cheryl Kluesner
- EAEV060**     **Predicting Harmful Algal Blooms in Green Valley Lake Using a Machine Learning Model**  
Claire Gu, 16, Sophomore, Valley High School, West Des Moines, Iowa,  
T: Karen Downing
- EAEV071**     **Dendrochronological Data Analysis to Measure Climate Sensitivity and to Develop Paleoclimate Reconstructions**  
Shreya Khullar, 17, Junior, West High School, Iowa City, Iowa, T: Carolyn Walling
- MCRO036**     **Efficacy of Antimicrobial Polylactic Acid Plastic Food Storage Films**  
Libby Mattea Knipper, 16, Sophomore, Beckman Catholic High School, Dyersville, Iowa,  
T: Cheryl Kluesner
- TMED057**     **Phase II: Predicting Early Onset Alzheimer's with Wearable Technology**  
# Shristi Sharma, 17, Senior, Maharishi School of the Age of Enlightenment, Fairfield, Iowa, T: Asha Sharma

## KANSAS

**Wichita, USKS50, Kansas State Science and Engineering Fair**

- BMED047**     **Prolonged Opioid Use After Surgery**  
Amanda Christine Mouer, 18, Senior, Eureka High School, Eureka, Kansas,  
T: Kimberly Ring



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- Major in NOAA mission fields, including STEM and social science

[noaa.gov/eppmsi-scholarship](https://noaa.gov/eppmsi-scholarship)



# Finalist Directory

- EAEV055**     **Per- and Polyfluoroalkyl Substances (PFAS) Uptake in Plants**  
Emma Noble, 16, Sophomore, Eureka High School, Eureka, Kansas, T: Anna Thornton
- ENMC051**     **Space Junk: Cleaning Up Orbital Debris While Saving Rocket Fuel**  
Julius A. Neumann, 15, Sophomore, Manhattan High School, Manhattan, Kansas,  
T: Janet Hanson
- TMED048**     **A Machine Learning Based Diagnostic Tool for the Early Detection of Colorectal Cancer**  
Abihith Kothapalli, 17, Senior, Blue Valley West High School, Overland Park, Kansas,  
T: Heather Hall

## KENTUCKY

Louisville, USKY02, Louisville Regional Science and Engineering Fair

- CBIO041**     **Does Brain Region Volume Change in Patients with Dementia?**  
Samyuktha S. Jaganathan, 16, Sophomore, Ballard High School, Louisville, Kentucky,  
T: Glenda Jones
- CELL011**     **Characterization of Insulin-degrading Enzyme: Using Molecular Visualization Systems to Understand Substrate Recognition in Type 2 Diabetes and Alzheimer's**  
# Aditi Kona, 17, Junior, North Oldham High School, Goshen, Kentucky, T: Cristy McMahan
- CHEM012**     **Novel Synthesis of Important Pharmaceutical Compounds Using Visible Light and a Photocatalyst**  
Jason Zhang, 17, Senior, The Carol Martin Gatton Academy of Mathematics and Science in Kentucky, Bowling Green, Kentucky, T: Cheryl Kirby-Stokes
- EGSD010**     **An Algorithm to Estimate Lithium-Ion Battery Lifetime**  
Andrew Samuel Park, 17, Junior, The Carol Martin Gatton Academy of Mathematics and Science in Kentucky, Bowling Green, Kentucky, T: Sam Park
- MCRO013**     **The Discovery, Analysis, and Characterization of Novel Mycobacteriophage PetiteSangsue**  
Samirah Salifu, 16, Junior, The Carol Martin Gatton Academy of Mathematics and Science in Kentucky, Bowling Green, Kentucky, T: Rodney King

Louisville, USKY03, Dupont Manual High School Regional Fair

- CELLO21**     **Atrazine vs. the Motor, Sensory, and Learning Behaviors of *Planaria***  
Kate Elise Quinn, 14, Freshman, duPont Manual High School, Louisville, Kentucky,  
T: Valerie Conti
- ENBM037**     **Using Polarized Light to Measure Blood Glucose Levels Non-invasively**  
Adam Josef Lapinski, 17, Junior, duPont Manual High School, Louisville, Kentucky,  
T: Belinda Hafell
- ENBM054**     **SpeakUp: A Machine Learning-Based Speech Aid to Enable Real-Time Silent Communication for the Paralyzed by Translating Neuromuscular EMG Signals to Speech**  
Varun Chandrashekar, 17, Junior, duPont Manual High School, Louisville, Kentucky,  
T: Keri Polevchak
- ROBO031**     **NextCare: An Intelligent System for the Early Diagnosis and Remote Monitoring of Parkinson's Disease Using Machine Learning, Signal Processing and a 3D Printed Wearable Device**  
Shreyas Kar, 16, Junior, duPont Manual High School, Louisville, Kentucky, T: Keri Polevchak
- TMED034**     **Mechanisms Responsible for the Greater Therapeutic Efficacy of Cardiac Mesenchymal Cells Cultured at Physiologic Oxygen Tension in Mice with Heart Failure Caused by Myocardial Infarction**  
## Robi Abella Bolli, 17, Junior, duPont Manual High School, Louisville, Kentucky,  
T: Kathy Fries

# Finalist Directory

## Highland Heights, USKY04, Science and Engineering Fair of Northern Kentucky

### ENMC016 **The Effect of Wrapping Space on Pressure Required for Bending in Fiber Reinforced Soft Actuators**

Natalie Justine Janzaruk, 16, Sophomore, Notre Dame Academy, Park Hills, Kentucky,  
T: William Stamm

## Lexington, USKY05, Central Kentucky Regional Science and Engineering Fair

### ENEV017 **Rewriting the Industry: A Novel Approach to 100% Biodegradable Ink Production and Recyclability**

Kiera Fehr, 15, Sophomore, Henry Clay High School, Lexington, Kentucky,  
T: Lora Thompson

### ROBO043 **Developing a Novel Autonomous Robot for Cleaning Oil Spills in Water**

Varun Hariprasad, 15, Sophomore, Paul Laurence Dunbar High School, Lexington, Kentucky, T: Karen Young

### SOFT009 **Natural Language Processing of Job Loss Related Tweets During the Pandemic**

Benjamin Chen, 17, Senior, Paul Laurence Dunbar High School, Lexington, Kentucky,  
T: Karen Young

## Prestonsburg, USKY06, East Kentucky Regional Science and Engineering Fair

### MATS026T **Synthesis of Carbon Quantum Dots and How Their Characteristics Allow for the Detection of Metal Impurities in Water**

Benjamin R McNamee, 18, Senior, Ryan Varney, 18, Senior, Belfry High School, Belfry, Kentucky, T: Haridas Chandran

## Richmond, USKY50, Kentucky Science and Engineering Fair

### EBED020 **Preventing Elevated Indoor Carbon Dioxide Levels Using an Arduino Based IoT System**

Aditi Arun Talegaonkar, 16, Junior, duPont Manual High School, Louisville, Kentucky,  
T: Keri Polevchak

### EGSD035 **Generating Renewable Power by Harvesting Energy in Rainfall**

Pranay Midha, 17, Junior, duPont Manual High School, Louisville, Kentucky,  
T: Keri Polevchak

### ENBM086 **Using Deep Learning to Categorize Abnormal Respiratory Sounds**

Ishani Tarkar, 14, Freshman, duPont Manual High School, Louisville, Kentucky,  
T: Keri Polevchak

### PHYS043 **The Effect of Annealing on Cluster Formation**

James Dave Gonzalez, 17, Junior, duPont Manual High School, Louisville, Kentucky,  
T: Dennis Kuo

### TMED038 **The Effect of Over-the-Head Listening Devices on Noise-Induced Hearing Loss (NIHL)**

Vedika Venkataramanan, 15, Freshman, duPont Manual High School, Louisville, Kentucky, T: Keri Polevchak

### TMED039 **Addressing the Need for Remote Patient Monitoring Applications**

Dylan Chen Li, 18, Senior, Paul Laurence Dunbar High School, Lexington, Kentucky,  
T: Karen Young

## LOUISIANA

## Baton Rouge, USLA01, Louisiana Region VII-Science and Engineering Fair

### CBIO022 **An Algorithmic Approach to Simulating Human Cortical Bone Microstructure and Remodeling**

Kalina Namikas, 16, Sophomore, Baton Rouge Magnet High School, Baton Rouge, Louisiana, T: Tiffany Moore

# Finalist Directory

- SOFT015      Designing a Flex Sensor-Based Posture Trainer and Determining Its Effect on Sedentary Posture**  
Grace Anne Crifasi, 16, Junior, Saint Joseph's Academy, Baton Rouge, Louisiana,  
T: Jacqueline Savoia
- Bossier City, USLA02, Bossier Parish Community College Louisiana Region I Science and Engineering Fair**
- ENBM020      Development and Optimization of a 3D Clinostat to Simulate Microgravity**  
Joseph L Clary, 18, Senior, Caddo Parish Magnet High School, Shreveport, Louisiana,  
T: Kris Clements
- MATH018      Origami Knots**  
Nhi Dao, 16, Sophomore, Caddo Parish Magnet High School, Shreveport, Louisiana,  
T: Kris Clements
- PHYS021      Computing the Atmospheric Mass Loss of Exoplanets from Stellar Wind of Main Sequence Stars**  
##  
Ashini Ashish Modi, 17, Junior, Caddo Parish Magnet High School, Shreveport, Louisiana, T: Kris Clements
- Houma, USLA03, Terrebonne Parish Science Fair**
- ANIM010      What an Egg-Cellent Diet!**  
Zack Michael Dupre, 16, Junior, South Terrebonne High School, Bourg, Louisiana,  
T: Chris Brown
- BMED010      Face Masks: The Key into Stopping the Spread**  
Yoselin Juliana Enriquez, 17, Junior, South Terrebonne High School, Bourg, Louisiana,  
T: Chris Brown
- New Orleans, USLA08, Greater New Orleans Science and Engineering Fair**
- BMED011      Comparative Analysis of Genetic Mutations and Overall Survival in Patients with Glioblastoma Multiforme: A Retrospective Cohort Study**  
Anita Rose Zahiri, 16, Junior, Benjamin Franklin High School, New Orleans, Louisiana,  
T: Teresa Burchette
- EAEV017      The Effect of CAFO Proximity on Water Quality of Inland Recreational Lakes in Southwest Michigan**  
Richard Lyle Usdin, 18, Senior, Benjamin Franklin High School, New Orleans, Louisiana,  
T: Sally Spahn
- PLNT014      How Do Various Pesticides Affect Soil Health and Plant Development?**  
Sophia Pilar Landry, 18, Senior, Isidore Newman School, New Orleans, Louisiana,  
T: David Kern
- ROBO020T      Hot Car Life Alarm**  
Dylan Daves Brace, 17, Junior, Brett Adam Steele, 18, Senior, Jesuit High School, New Orleans, Louisiana, T: Helen Swan
- Baton Rouge, USLA50, Louisiana Science and Engineering Fair**
- BEHA079      Mask Usage of New Orleans During the Pandemic SARS-CoV-2**  
Lia Pascale Bu, 18, Senior, Isidore Newman School, New Orleans, Louisiana,  
T: David Kern
- PHYS074      A Direct Impact of Astrophysics on Astronauts' Exposure/Humans Presence in Low Earth Orbit**  
Susana Fatima Cuadra, 16, Sophomore, St. Joseph's Academy, Baton Rouge, Louisiana,  
T: Jacqueline Savoia
- PLNT045      The Investigation of the Effects of Excess Boron on the Root Growth of *Arabidopsis thaliana* and *Schrenkiella parvula***  
Katherine Winchester, 16, Sophomore, St. Joseph's Academy, Baton Rouge, Louisiana,  
T: Jacqueline Savoia



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**This year, we are honored to recognize the achievements of Charikleia Moraitaki and Maria-Eleni Batatoudi.**

# Finalist Directory

## MAINE

### Orono, USME50, Maine State Science Fair

- ANIM052**     **How Animals Talk: Understanding Silk Moth Communication through Detection of Pheromones with an Electronic Nose**  
Mateus Borgonovi Nascimento, 17, Junior, Brunswick High School, Brunswick, Maine, T: Susan Perkins
- EBED033**     **Readily Implementable Fall Detection System for the Elderly Using Thermal Image Segmentation and Convolutional Neural Networks**  
# Vetri Senthil Vel, 16, Senior, Bangor High School, Bangor, Maine, T: Barbara Stewart
- ENEV079**     **Applications of Carbon Nanotube Based Sorbents for Removal of Arsenic from Polluted Well Water**  
Linh Nguyen, 18, Senior, Deering High School, Portland, Maine, T: Cyle Davenport

## MARYLAND

### Annapolis, USMD01, Anne Arundel County Regional Science and Engineering Expo

- ENMC027T**     **Biomedical Imaging with DVD OPU**  
## Aaban Ali Syed, 17, Junior, Imaad A Syed#, 18, Senior, North County High School, Glen Burnie, Maryland, T: Angela Tatum
- ENMC028T**     **Project Aeolus: Modernizing and Automating Drone Fleets**  
Ryan Wans, 16, Sophomore, Jack Woods, 16, Sophomore, South River High School, Edgewater, Maryland, T: Meijao Chen
- ENMC029**     **Getting into the Swing of Things**  
Rygel Tristen Daquigan Yance, 17, Junior, Chesapeake Science Point Public Charter School, Hanover, Maryland, T: Ashish Vadalia
- MATS036**     **Spectral and Waveform Properties of 3D-Printed Violins and How to Improve Upon Them**  
Colin Franklin Daugherty, 16, Sophomore, South River High School, Edgewater, Maryland, T: Monica Morgan

### Frederick, USMD02, Frederick County Science and Engineering Fair

- ENBM050**     **Vest One: A Hidden Markov Machine Learning Model Enabled Vest to Support Independent & Safe Living Among Older Adults**  
Amogh Kashyap, 16, Sophomore, Urbana High School, Ijamsville, Maryland, T: George Shearer
- ENMC040**     **SPIDER: Surface Probe Interplanetary Drill Exploring Regolith**  
# Charlotte Paige Hively, 18, Senior, Urbana High School, Ijamsville, Maryland, T: Donna Hashemzadeh

### Silver Spring, USMD03, ScienceMontgomery

- ENBM052**     **WAV: A Novel Subvocalization Interpretation Device**  
# Anjan Sesetty, 16, Sophomore, Poolesville High School, Poolesville, Maryland, T: Mark Estep
- PHYS047**     **Periodicity Felicity: Identification of Binary Black Hole Candidates through Robust Light Curve Analysis**  
Rohan Imhotep Ojha, 15, Junior, Montgomery Blair High School, Silver Spring, Maryland, T: Angelique Bosse
- PHYS054**     **Optimal Measurement of Field Properties with Quantum Sensor Networks**  
Timothy Chenglei Qian, 18, Senior, Montgomery Blair High School, Silver Spring, Maryland, T: Angelique Bosse
- ROBO052**     **A Biologically Inspired Game Theoretic Adversarial Training Method**  
Simon Lee, 15, Sophomore, Whittle School And Studios, Washington, District of Columbia, T: Balakrishnan Selvakumar

# Finalist Directory

## **Largo, USMD05, Prince George's Area Science Fair**

- BMED036**     **Effect of Scoliosis on a Swimmer's Performance**  
Athalia Groelsema, 17, Senior, Eleanor Roosevelt High School, Greenbelt, Maryland,  
T: Sean Brady
- CBIO036**     **Development of Transcriptomics Analysis Pipeline for mTOR Signaling  
in Human Cancer**  
Gabriela Catalina Holzer, 17, Senior, Eleanor Roosevelt High School, Greenbelt,  
Maryland, T: Sean Brady
- ENEV035**     **Deer Alert: A System to Reduce Deer-Related Crashes Using Motion Sensors in Areas  
with High Deer Traffic**  
Lauren Mae Labows, 16, Sophomore, Dr. James A. Forrest Career And Technology  
Center, Leonardtown, Maryland, T: Nathan Swick
- MATH026**     **Analyzing the Accuracy of Pre-lockdown Daily Covid-19 Reports Using Benford's Law**  
Yeabkal Bekele Abeje, 15, Sophomore, Eleanor Roosevelt High School, Greenbelt,  
Maryland, T: Sean Brady

## **Baltimore, USMD07, Morgan State University Science-Mathematics-Engineering Fair**

- BEHA083**     **The Effect of Saturated Lipid on Neurogenesis Following Acute Brain Injury**  
Ishani Ghosh, 15, Freshman, Centennial High School, Ellicott City, Maryland,  
T: Toni Ireland
- TMED062**     **Using SUMO Proteases (SENPS) as a Potential Cancer Biomarker  
for Future Drug Therapies**  
Nyla Leah Powell, 16, Junior, Baltimore Polytechnic Institute, Baltimore, Maryland,  
T: Nicole Rosen

## **MASSACHUSETTS**

### **Bridgewater, USMA01, Massachusetts Region V Science Fair**

- CELLO29**     **Obtaining Highly Purified 3a NS5A Protein of Hepatitis C Virus**  
Woojoo Kim, 17, Junior, Wayland High School, Wayland, Massachusetts,  
T: Laura Kreutter
- EAEV107**     **Identifying Invertebrate Fossils in the Field Utilizing Machine Learning  
with a Novel 3D Augmentation Approach**  
Christian Amari Nichols, 16, Junior, Brockton High School, Brockton, Massachusetts,  
T: David Mangus

### **Medford, USMA02, Massachusetts Region IV Science Fair**

- BMED058**     **Understanding Lung Cancer Survival Factors through Advanced Analytics**  
Daniel Opara, 18, Senior, Prospect Hill Academy Charter School High School,  
Cambridge, Massachusetts, T: Rachel Freedline
- SOFT041T**     **Melatect: A Machine Learning Approach for Identifying Malignant Melanoma  
in Skin Growths**  
Vidushi Meel, 16, Junior, Asritha Bodepudi, 17, Junior, Lexington High School, Lexington,  
Massachusetts, T: Glenn Allen

### **Fall River, USMA03, Massachusetts Region III Science Fair**

- BMED087**     **Impact of Medicinal Herbs on Aging and Its Implications Towards Treating  
Age Related Illnesses**  
Aracely Adelina Alicea, 17, Junior, Taunton High School, Taunton, Massachusetts,  
T: Amanda Machado

### **North Adams, USMA04, Massachusetts Region I Science Fair**

- ENMC055**     **Improving the Aerodynamic Efficiency and Decreasing the Drag Coefficient  
of an F1 in Schools Race Car Based on Further Evaluation of Aerodynamic Principles  
and Designs**  
Ao Gai, 16, Junior, Deerfield Academy, Deerfield, Massachusetts, T: Jennifer Taylor

# Finalist Directory

## Worcester, USMA05, Massachusetts Region II State Science Fair

- CBIO070**     **Network Biology Methods for Improved Drug Discovery in Brain Cancers**  
Shravya Aniseti, 16, Junior, Massachusetts Academy of Math and Science at WPI,  
Worcester, Massachusetts, T: Kevin Crowthers
- EAEV085**     **The Effect of ZnO Nanoparticles on *Arabidopsis* Growth in Elevated CO<sub>2</sub>**  
Talia Ruth Smith, 17, Junior, Massachusetts Academy of Math and Science at WPI,  
Worcester, Massachusetts, T: Kevin Crowthers
- TMED041**     **Development of an Innovative Alternative Model for Teratogenicity Testing:  
Effect of Hypervitaminosis A in Regenerating Planaria**  
Eva Bennet, 15, Freshman, Hopkinton High School, Hopkinton, Massachusetts,  
T: Kristen Murphy

## Boston, USMA06, Massachusetts Region VI Science Fair

- EAEV086**     **The Effect of Covid-19 on the Air Filtration Systems in the Train System**  
Alex Xu, 14, Freshman, Boston Latin School, Boston, Massachusetts, T: Scott Balicki

## Cambridge, USMA50, Massachusetts State Science & Engineering Fair

- BCHM026**     **Effects of Chaotropicity on the Efficacy of a DNA-Silica Adsorption Buffer**  
Justin Wang, 17, Junior, Massachusetts Academy of Math and Science at WPI,  
Worcester, Massachusetts, T: Kevin Crowthers
- CBIO095**     **QuantFold: Quantum Annealing with Turn Ancilla Encoding and Simulated Protein  
Folding for Drug Discovery Implications**  
Alice Liu, 17, Junior, Boston Latin School, Boston, Massachusetts, T: Scott Balicki
- CELLO32**     **Detecting Differential Transcription Factor Binding Using Single-Cell Sequencing**  
## John Lin, 18, Senior, Boston Latin School, Boston, Massachusetts, T: Kathleen Bateman
- CELLO33**     **The Impact of Disrupted Circadian Rhythms on Learning and Short-Term Memory on a  
*Drosophila melanogaster* Model of Alzheimer's Disease**  
Cara Mulcahey, 18, Senior, Saint Mark's School, Southborough, Massachusetts,  
T: Lindsey Lohwater
- EAEV110**     **Developing a 3D Trajectory Modeling System to Predict Ocean Floor Microplastic  
Aggregation Using a Voxel-Based Neural Network Approach**  
Anna Du, 15, Freshman, Phillips Academy, Andover, Massachusetts, T: Keith Robinson
- MCRO052**     **The Effect of Natural Antimicrobials on Ampicillin Resistant *E.coli* and *E.coli* K12**  
Kayla Isabella Parrett, 16, Junior, Taunton High School, Taunton, Massachusetts,  
T: Amanda Machado
- MCRO056**     **Short-Chain Fatty Acid Production: Predictive Functional and Genomic Analysis of  
the Microbiota in Crohn's Disease for Novel Plasmid-Based Therapy**  
Alice Khomski, 16, Junior, Boston University Academy, Boston, Massachusetts,  
T: Victoria Perrone
- PHYS064**     **Direct Energy Conversion in a Portable, High-Energy Quantum-Nuclear Reactor  
Based on Electrohydrodynamic Power Cell Dynamics**  
# Aakash Sunkari, 18, Senior, North Attleboro High School, North Attleboro,  
Massachusetts, T: Alexander Hatzberger
- PHYS068**     **Density Functional Theory Calculation of Electronic Structure of Fe-N-C, Fe-O-C, Fe-  
P-C, Fe-S-C Single-Atom Catalysts Systems**  
Jianglu Ping, 16, Sophomore, Northfield Mount Hermon School, Gill, Massachusetts,  
T: Haojun Jia

## MICHIGAN

### Detroit, USMI02, Science and Engineering Fair of Metropolitan Detroit

- BMED021**     **Evaluation of a Raman Spectroscopy Probe in the Diagnosis of Brain Tumors**  
Nicholas Kalkanis, 16, Junior, Detroit Country Day School, Beverly Hills, Michigan,  
T: Duha Fahmy



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## SCIENCE FOR DEVELOPMENT AWARDS

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# Finalist Directory

- ENBM038 Can a Glove Prevent a Heart Attack?**  
Akshith Reddy Pulgam, 16, Junior, Pioneer High School, Ann Arbor, Michigan,  
T: Stephen Armstrong
- ENBM039T Non-contact Continuous Cardiovascular Monitoring System**  
Angela J. Xu, 17, Junior, Ethan Chen, 17, Junior, Jonathan Chen, 15, Sophomore,  
Troy High School, Troy, Michigan, T: Rebecca Brewer
- ROBO032 Smart Robot to Purify, Humidify, and Disinfect the Air for Even Distribution**  
Mikul Saravanan, 16, Sophomore, Cranbrook Kingswood School, Bloomfield Hills,  
Michigan, T: Stephanie Kokoszka
- TMED016 Sputum-Based mRNA-Targeting Probes in Lung Cancer:  
A Noninvasive Early Diagnostic Tool**  
Diya Ramesh, 16, Sophomore, International Academy, Bloomfield Hills, Michigan,  
T: Renee Kiriazis
- TMED017 Investigating Differential Gene Regulation in the PBMC of Obese Adolescents**  
Pooja Kannappan, 15, Junior, Bloomfield Hills High School, Bloomfield Hills, Michigan,  
T: Noelle Collis
- TMED021 Developing an Opioid Painkiller Alternative Using the Epigenetic Correlation  
Between the Nav1 VGSC Family and miRNAs 30b & 182**  
# Audrey Gunawan, 18, Senior, West Bloomfield High School, West Bloomfield, Michigan,  
T: Inhan Lee
- Flint, USMI03, Flint Regional Science & Engineering Fair**
- ANIM028 The Physiological Effects of Turmeric and Ginger on Oxidative Stress in *C. elegans***  
Serena Syed Ahmad, 17, Senior, Saginaw Arts and Sciences Academy, Saginaw,  
Michigan, T: Matthew Miller
- CBIO049 Smartphone Capable Lightweight Convolutional Neural Network Model for Detecting  
COVID-19 in Chest X-rays: Addressing the Need of Resource-strapped Locations**  
Ayan Nair, 15, Sophomore, Okemos High School, Okemos, Michigan, T: Adam Alessio
- EAEV052 The Great Lakes Nonmetal Concentrations: Potential Causes of Harmful Algal Blooms**  
Katherine Olivia McCarthy, 18, Senior, Saginaw Arts and Sciences Academy, Saginaw,  
Michigan, T: Matthew Miller
- ROBO042 Lung Segmentation in Chest X-rays with Res-CR-Net**  
# Sinan Lal, 16, Junior, Port Huron Northern High School, Port Huron, Michigan,  
T: Domenico Gatti
- Kalamazoo, USMI07, Southwest Michigan Science & Engineering Fair**
- PLNT028T Public Perception and Accuracy of GMO Labels in the Southwest Michigan Area**  
Alyssa Mariah Park, 16, Junior, Katherine Ann Opria, 16, Junior, Kalamazoo Area  
Mathematics and Science Center, Kalamazoo, Michigan, T: Jennifer Richardson
- PLNT034 The Effect of Elevated CO<sub>2</sub> and Nitrogen Deposition on Constitutive and Induced  
Phenolic Levels in Pole Bean (*Phaseolus vulgaris*)**  
Malee Hee Davis, 18, Senior, Kalamazoo Area Mathematics and Science Center,  
Kalamazoo, Michigan, T: David Karowe
- Detroit, USMI50, Michigan Science and Engineering Fair**
- EGSD015 Engineering Multi-Enzyme Whole-Cell Biocatalysts for Biofuel Production**  
# Margaret Yang, 16, Junior, Cranbrook Kingswood School, Bloomfield Hills, Michigan,  
T: Stephanie Kokoszka
- ROBO033 Dilated Silhouette Convolutional Neural Network: A Novel Deep Learning Framework  
for Real-time Human Action Recognition**  
Michelle Hua, 16, Sophomore, Cranbrook Kingswood School, Bloomfield Hills,  
Michigan, T: Allwyn Cole

# Finalist Directory

## MINNESOTA

### Bemidji, USMN01, Northern Minnesota Regional Science Fair

- ENEV032T**     **Designing an Autonomous Solar Powered Robot Capable of Filtering out Excess Phosphorus and Nitrogen from Waterways to Naturalize the Process of Eutrophication**  
Abdullah J. Saidi, 16, Sophomore, Mohammed Omer, 15, Sophomore, Al-Amal School, Fridley, Minnesota, T: Hala Bazzi

### Duluth, USMN02, Northeast Minnesota Regional Science Fair

- ANIM014**     **Tough Turkeys: What Effect Does Climate Change Have on the Home Range of Wild Turkeys in Northeast Minnesota?**  
Harmony Grace Tracy, 17, Junior, Cloquet Senior High School, Cloquet, Minnesota, T: Cynthia Welsh
- ENEV021**     **Wastewater Treatment: The Use of Mealworm Gut Bacteria (*Tenebrio molitor*) to Isolate and Identify Bacteria that Can Biodegrade Polystyrene**  
Rowan Elisabeth Rock, 16, Sophomore, Cloquet Senior High School, Cloquet, Minnesota, T: Cynthia Welsh
- ENEV022**     **The Use of Different Concentrations of Tannic Acid Powder, St. Louis River Water, and Non-resistant *Staphylococcus aureus* on the Bioremediation of Motor Oil Contaminated Aquatic Systems**  
# Emily Grace Sapyta, 16, Sophomore, Cloquet Senior High School, Cloquet, Minnesota, T: Cynthia Welsh
- PLNT010**     **Using Phytoaccumulation to End Mineral Deficiencies**  
# Emelyn Claire Beaster, 16, Sophomore, East High School, Duluth, Minnesota, T: Cynthia Welsh

### Mankato, USMN03, Southern Minnesota Regional Science and Engineering Fair

- CHEM039**     **How Do Different Natural Dyes React with Variations in Fabric and pH?**  
Grace Moeller, 17, Junior, Lake Crystal Wellcome Memorial, Lake Crystal, Minnesota, T: Michelle Bergstad
- ENMC015**     **How Does the Number of Blades on a Wind Turbine Affect Its Power Output?**  
Mitchel Lee Masters, 14, Freshman, Lake Crystal Wellcome Memorial, Lake Crystal, Minnesota, T: Michelle Bergstad

### St. Paul, USMN04, Twin Cities Regional Science Fair

- CBIO014T**     **Upsurge of the Glycolytic Pathway in Cancer: A Dynamic Network Analysis of Oncogenic Mutations in Phosphofructokinase-1**  
Johnny Sheng Yue, 17, Junior, Sydney Peng, 17, Senior, Mounds View High School, Arden Hills, Minnesota, T: Damien Mathew
- CBIO030**     **Distinctive Mutation Profiles of SARS-CoV-2 Spike Protein in Different Geographic Regions of the United States**  
Ellen Guo, 14, Freshman, Mounds View High School, Arden Hills, Minnesota, T: Chunfang Spring Wang
- PHYS010**     **Detection and Characterization of Astronomical Dwarfs using CatWISE**  
Tarun Kota, 16, Junior, Eastview High School, Apple Valley, Minnesota, T: Steve Meyer

### Crookston, USMN05, Western Minnesota Regional Science Fair

- MATH008**     **Investigations in Topdrops**  
Nathan Richard Krause, 17, Junior, Park Christian School, Moorhead, Minnesota, T: Krista Holter

### Winona, USMN06, Southeast Minnesota Regional Science Fair

- CBIO002**     **Determining the Relationship Between Cross-Cultural Interpersonal Distance Preferences and Early COVID-19 Case Frequency Using Multivariate Regression Analysis**  
Gwenyth Eichfeld, 18, Senior, Shattuck-St. Mary's School, Faribault, Minnesota, T: Maren LaLiberty

# Finalist Directory

## Rochester, USMN07, Rochester Regional Science & Engineering Fair

### **BMED012 Cure of Breast Cancer, Year 4: First Discovery of Target Therapy for Aggressive Hormonal Breast Cancer using Clinical Database and 3D Model**

# Christine Song, 16, Sophomore, Mayo High School, Rochester, Minnesota,  
T: SeungBaek Lee

### **ENEV018 Where the Rubber Meets the Road: The Development of an Innovative, Reusable, and Energy-Efficient Filter for Microplastics Created through Tire Wear**

Jennifer Oettinger, 18, Senior, Mayo High School, Rochester, Minnesota, T: Aaron Larson

## St. Paul, USMN09, St. Paul Science Fair

### **BEHA012 Significant Zero: The Effect of Personality Questionnaires on Identity-Relevant Choices**

Naci Konar-Steenberg, 16, Junior, Saint Paul Academy and Summit School, Saint Paul, Minnesota, T: Karissa Baker

### **EBED005T SPYGLASS: Eye-controlled Camera Glasses**

Levi Preston Mellin, 18, Senior, Nikolas Liepins, 18, Senior, Saint Paul Academy and Summit School, Saint Paul, Minnesota, T: Karissa Baker T: Kate Lockwood

## St. Paul, USMN10, Western Suburbs Science Fair

### **ANIM036T Fruit Fly Frenzy: Investigating the Development of Insecticide Resistance in *Drosophila melanogaster***

Simren Samba, 18, Senior, Fiona Kinney, 17, Senior, Breck School, Golden Valley, Minnesota, T: Kati Kragtorp

### **PHYS011 Analyzing the Impact of Drafting in Cross Country Skiing with Computational Fluid Dynamics**

Austin James Hunter, 18, Senior, Minnetonka High School, Minnetonka, Minnesota,  
T: Kimberly Hoehne

### **TMED005 An Active Role for Machine Learning in the Diagnosis of Cardiac Arrhythmias, Year Two**

# Quentin Xander Hughes, 17, Junior, Minnetonka High School, Minnetonka, Minnesota,  
T: Betsy Hughes

### **TMED008 The Spread of Macroscopic Droplets from a Simulated Cough with and without the Use of Masks or Barriers**

Atreyus A. Bhavsar, 17, Junior, The Blake School, Minneapolis, Minnesota,  
T: Joseph Ruggiero

## St. Paul, USMN50, Minnesota Academy of Science State Science & Engineering Fair

### **BMED076 Investigating the Effect of the Severity of Activity-Based Anorexia in *Drosophila melanogaster* on the Gut Microbiome**

Peyton Isabella Crest, 18, Senior, Minnetonka High School, Minnetonka, Minnesota,  
T: Kimberly Hoehne

### **EBED032 WI-C.A.R.E: Wifi Computer-Assisted Remote Eldercare, Year 2**

Shreshth Shrivastava, 14, Freshman, Eden Prairie High School, Eden Prairie, Minnesota,  
T: Princessa Hansen

### **EGSD033 Pathway to a Sustainable Future: Economic and Technical Feasibility of a Hydrothermal Carbonization (HTC) Processing Plant**

Kyla Hoyan Fung, 16, Junior, Minnetonka High School, Minnetonka, Minnesota,  
T: Kim Hoehne

### **ENEV058 Treatment of Simulated Acid Mine Drainage with *Desulfovibrio* Desulfuricans**

Jack Hlavka, 17, Junior, Saint Paul Academy and Summit School, Saint Paul, Minnesota,  
T: Karissa Baker

### **ENEV078 Testing the Waters: Engineering an Innovative Method of Water Health Analysis, Year II**

# John Joseph Cardwell, 19, Senior, Breck School, Golden Valley, Minnesota,  
T: Kati Kragtorp

# Finalist Directory

**ENMC070T A.L.M.E. Assistive Lifting Machine for Elders: Engineering a Solution to Fall-Recovery-Related Injuries in Seniors and Caregivers**  
George Konrad Richards, 18, Senior, William Joseph Sweeney, 17, Senior, Breck School, Golden Valley, Minnesota, T: Kati Kragtorp

## MISSISSIPPI

### Cleveland, USMS03, Mississippi Region III Science and Engineering Fair

**ENEV051 Development of Filter Embedded with Silver Nanoparticles for Water Sanitation**  
Skylar Nguyen, 18, Senior, The Mississippi School for Mathematics and Science, Columbus, Mississippi, T: Tina Gibson

### Hattiesburg, USMS04, University of Southern Mississippi Region I Science and Engineering Fair

**BEHA028T The Analysis of the Differential Impacts of Material and Social Stressors on Mental Health During the COVID-19 Pandemic**  
Raeed Ayman Kabir, 17, Junior, Vidhi Patel, 16, Junior, The Mississippi School for Mathematics and Science, Columbus, Mississippi, T: Tina Gibson

**BMED084 Dietary Protein:Carbohydrate Ratio Impacts Development and Locomotion of *Drosophila melanogaster***  
# Emily Marie Hood, 17, Junior, Brookhaven Academy, Brookhaven, Mississippi, T: Leslie Hood

### Jackson, USMS05, Mississippi Region II Science and Engineering Fair

**CBIO015 Single-Cell Genomic Profiling of the Adult Human Heart and Transcriptomic Analysis of Differentially Expressed Genes (DEGs) in Myocardial Pathophysiology**  
Shanay Hitesh Desai, 17, Senior, The Mississippi School for Mathematics and Science, Columbus, Mississippi, T: Tina Gibson

**MCRO007 Using Bacteriophage Therapy to Combat Antibiotic Resistance**  
Abigail Espinosa Calimaran, 17, Senior, St. Andrew's Episcopal School, Ridgeland, Mississippi, T: Price Chadwick

### Mississippi State, USMS06, Mississippi Region V Science and Engineering Fair

**CBIO020 A Novel Evolution-Based Technique for Generating Anticancer Peptides (Year 2)**  
## Michael Lu, 18, Senior, The Mississippi School for Mathematics and Science, Columbus, Mississippi, T: Tina Gibson

**EAEV018 Reinforced Lignin Foams with Higher Adsorption Capabilities**  
Jessica Cindy Yan, 17, Junior, The Mississippi School for Mathematics and Science, Columbus, Mississippi, T: Tina Gibson

### Oxford, USMS07, Mississippi Region VII Science and Engineering Fair

**CBIO056 Potential Treatment Targets for Covid-19: A Virtual Screening**  
# Keerthin Karthikeyan, 16, Sophomore, Oxford High School, Oxford, Mississippi, T: Sarah Robinson

**ENMC043 Aircraft Redesigned: A Biomimicry Approach**  
# Fawaz Ahmad, 18, Senior, Oxford High School, Oxford, Mississippi, T: Sarah Robinson

### Cleveland, USMS50, Mississippi Science and Engineering State Fair

**CBIO076T Assessing the Efficacy of COVID-19 Policies Using Machine Learning**  
## Aaron Wan, 17, Senior, Andrew Yu, 17, Junior, The Mississippi School for Mathematics and Science, Columbus, Mississippi, Mississippi School for Mathematics and Science, Columbus, Mississippi, T: Tina Gibson

**EAEV091 Removing Harmful Nitrates from Bodies of Fresh Water through Biosorption**  
William Wells Berry IV, 16, Sophomore, Oxford High School, Oxford, Mississippi, T: Sarah Robinson

# Finalist Directory

## MISSOURI

### Cape Girardeau, USMO01, Southeast Missouri Regional Science Fair

**CELL009**      **Tolerance and Cell Viability of N-Hexanoyl-L-Homoserine Lactone within CRL-3342 Cell Line**

#                 Mallorie Nicole Coffee, 18, Senior, Jackson Senior High School, Jackson, Missouri,  
T: Leanne Thele

**CHEM014**      **Phase II: Towards the Total Synthesis of the Leishmanicidal Lindbergin E for the Development of an Enantioselective Phloroglucinol-Derived Polyketide Synthesis**

##                Elijah Lee Jones, 18, Senior, Jackson Senior High School, Jackson, Missouri,  
T: Leanne Thele

**CHEM015**      **Towards the Total Synthesis of the TRAIL-Resistance-Overcoming Cytotoxic Pannokin D for the Development of New Anticancer Pharmaceuticals and a Novel Regioselective Diprenylated Chromone-Derived Flavonoid Synthesis**

Hiren Parekh, 17, Junior, Saxony Lutheran High School, Jackson, Missouri,  
T: Brenda Etzold

### Joplin, USMO03, Missouri Southern Regional Science Fair

**EGSD054**      **Shaping the Future of Wind Energy: An Investigation of the Most Productive Blade Design for Horizontal Axis Wind Turbines**

Sydney Rachelle Stamps, 17, Senior, Thomas Jefferson Independent Day School, Joplin, Missouri, T: Christopher Rupar

### Kansas City, USMO04, Greater Kansas City Science & Engineering Fair

**ANIM055**      **A Comparison Between Merycoidodontidae Skull Morphology and the Skull Morphology of Miniocoerus**

Andrew Jordan Paget, 18, Senior, Olathe North High School, Olathe, Kansas,  
T: Marsha Skoczek

**CBIO097**      **The Dynamics of Brain Metastasis in Non-Small Cell Lung Cancer**

#                 Khushi Kohli, 17, Senior, Olathe North High School, Olathe, Kansas, T: Amy Clement

**ENBM101**      **The Influence of Conductivity and Mechanical Properties on the Neurogenic Differentiation of Dental Pulp Stem Cells**

Samuel Liu, 18, Senior, Olathe North High School, Olathe, Kansas, T: Amy Clement

**ENEV081**      **The Impact of Various Liquids on the Mobility and Energy Absorption of a Rotating Solar Tracker**

Demetrius Sean Bush, 17, Senior, Olathe North High School, Olathe, Kansas,  
T: Marsha Skoczek

### Saint Charles, USMO05, Missouri Tri-County Regional Science and Engineering Fair

**EGSD025**      **Efficiency of Laser-Induced HB11 Fusion Reaction Under Varying Methods of KiloTesla Magnetic Confinement**

#                 Ethan Joseph Dunsworth, 18, Senior, Wentzville Holt High School, Wentzville, Missouri,  
T: Jennifer Hess

### Springfield, USMO08, Ozarks Science and Engineering Fair

**ENBM042**      **The Synthesis of Au-Fe<sub>3</sub>O<sub>4</sub> Nanoparticles for the Purpose of Nonenzymatic Dopamine Sensing**

Jillian Bernabe, 17, Senior, Camdenton High School, Camdenton, Missouri,  
T: Christopher Reeves

**MCRO020**      **Evaluating Cinnamaldehyde as an Antibacterial Agent in a Produce Wash for Leafy Greens**

Allison Waive Drennan, 17, Junior, Lebanon High School, Lebanon, Missouri,  
T: Ryne Emerick

### Hillsboro, USMO09, Mastodon Art/Science Regional Fair

**MCRO064T**    **Effect of *Aquaspirillum itersonii* and *Aquaspirillum serpens* on Duckweed**

Brian Mills, 17, Senior, Maggie May Hopkins, 17, Junior, St. Clair High School, St. Clair, Missouri, T: Ben Martin T: Ben Martin



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# Finalist Directory

**PLNT049     Improving Sustainable Agriculture through Computer Generated Leaf Angle Measurements**

Daniel Wamsley, 15, Freshman, Timber Ridge Scholars, Pacific, Missouri,  
T: Pamela Wamsley

**Fayette, USMO10, Central Methodist Eagles Science and Engineering Fair**

**BMED023     Combined Artificial Intelligence and Nano-cell Internalization to Predict Cancer Aggressiveness**

Akhilan Elangovan, 16, Junior, Columbia-Rock Bridge Senior High School, Columbia, Missouri, T: James Meyer

## MONTANA

**Billings, USMT01, MSU Billings Science Expo**

**BMED088T     How Music Affects Muscle Contractions**

Emily Shumaker, 17, Junior, Alex Katelyn Williams, 17, Junior, Baker High School, Baker, Montana, T: Linda Rost

**Butte, USMT02, Montana Tech Regional Science and Engineering Fair**

**ANIM037     What Affects Bird Diversity in Urban-Rural Transition Zones?**

Braden Collard, 18, Senior, Hellgate High School, Missoula, Montana, T: Willow Affleck

**ENEV016     Colonizing Bryophytes Used as a Post-Wildfire Ecosystem Stabilization Treatment in Montana**

Claire Anne Downing, 18, Senior, Helena High School, Helena, Montana, T: Tyler Hollow

**Great Falls, USMT04, Great Falls College MSU Regional Science & Engineering Fair**

**BMED017     Regeneration Rates of *Dugesia japonica* Using Glucose Oxidase Enhanced Honey**

# Jeena Marie Alborano, 18, Senior, North Toole County High School, Sunburst, Montana, T: Amanda Nix

**EAEV026     Microplastic Contamination in Montana's Mountains**

Claire Yvonne Bucklin, 15, Freshman, North Toole County High School, Sunburst, Montana, T: Amanda Nix

**Missoula, USMT50, Montana Science Fair**

**BEHA015     The Natural Occurrence of a Visual Midline Shift in the General Population**

Eden Rynn Maxwell, 15, Sophomore, Hellgate High School, Missoula, Montana, T: Willow Affleck

**EAEV120T     Effect of *Lemna minor* on Caffeine Levels in Freshwater Ecosystems**

Emily Mitchell, 16, Sophomore, Kenna Renee Anderson, 15, Sophomore, Flathead High School, Kalispell, Montana, T: Renee Cordes

**EGSD051     Harnessing Household Water Potential**

Wyatt Manthey, 17, Junior, North Toole County High School, Sunburst, Montana, T: Amanda Nix

**MATS040     The Difference in Performance Between Sintered and Unsintered Ultra High Molecular Weight Polyethylene Runner Base**

Maria Anne Torgerson, 18, Senior, Bozeman High School, Bozeman, Montana, T: Summer Graber

## NEBRASKA

**Kearney, USNE01, Central Nebraska Science and Engineering Fair**

**ANIM042     Effects of 20-Hydroxyecdysone and Calcium Supplemented Prednisone on the Body Length of *Drosophila melanogaster***

Jenna Nicole Cecrle, 16, Sophomore, Adams Central Jr.-Sr. High School, Hastings, Nebraska, T: Jay Cecrle

# Finalist Directory

- CHEM032**     **Honey's Effect on Watercolor, Acrylic, and Oil Paint**  
Jacie Boelhower, 16, Sophomore, Adams Central Jr.-Sr. High School, Hastings, Nebraska, T: Jay Cecrle
- ENEV044**     **Efficacy of Algae Phytoremediation vs. Sand Filtration of Bisphenol-a Solution**  
Miah Gabrielle Therese Hoppens, 18, Senior, Ogallala High School, Ogallala, Nebraska, T: Jennifer Jones
- Nebraska City, USNE02, Greater Nebraska Science and Engineering Fair**
- EAEV072**     **The Effect of Biochar on Phosphorus Leaching in Chicken Manure**  
Breanna Lynn Vaughan, 16, Sophomore, Central City High School, Central City, Nebraska, T: Chelle Gillan
- MCRO040**     **Cross-species Transmission of *Drosophila melanogaster* Nora Virus in Other *Drosophila* Species and Effect on Geotaxis**  
Ella Grace Buhlke, 17, Junior, Central City High School, Central City, Nebraska, T: Chelle Gillan

## NEVADA

### Elko, USNV01, Elko County STEM Fair

- ENMC048**     **Operation Uplift: Custom Elevator Build**  
Philip John Neff, 16, Junior, Elko High School, Elko, Nevada, T: Kristin Birdzell
- SOFT026**     **Coding for Music Education**  
# Marlea Martens, 16, Junior, Elko High School, Elko, Nevada, T: Kristin Birdzell
- Las Vegas, USNV02, Beal Bank USA Southern Nevada Regional Science & Engineering Fair**
- EAEV041**     **Delineation of Capture Zones for Springs in Southern Great Basin Based on Modeling Results and Geochemical Data**  
# Anya Han Zhang, 17, Junior, Ed W. Clark High School, Las Vegas, Nevada, T: Filomena Vine
- TMED027**     **Minimizing Surface-Initiated Thrombogenesis in COVID-19 Patients Using the Fibronectin-Derived Peptide P12**  
Jang Choe, 17, Junior, Ed W. Clark High School, Las Vegas, Nevada, T: Miriam Rafailovich

## NEW HAMPSHIRE

### Concord, USNH50, New Hampshire Science & Engineering Expo

- BCHM023**     **A Highly Selective and Sensitive Novel Biosensor Capable of Quantifying and Monitoring a Clotting Factor Elevated in Severe COVID-19 Cases**  
Jaden Yun, 16, Sophomore, Phillips Exeter Academy, Exeter, New Hampshire, T: Ji Lee
- ENEV069**     **Testing and Comparing the Emissions of a Small Engine Running on Ethanol versus Gasoline**  
John Walter Horangic, 17, Junior, Bishop Brady High School, Concord, New Hampshire, T: Susan Seagroves
- MATS042**     **Optimization of Pressure Sensitive Adhesive Properties through Incorporation of Moisture-Absorbing Particles**  
Lina Huang, 16, Junior, Phillips Exeter Academy, Exeter, New Hampshire, T: Erol Sancaktar

## NEW JERSEY

### Murray Hill, USNJ01, Nokia Bell Labs North Jersey Regional Science Fair

- BMED050**     **Differential Expression Analysis and Transcriptomic Characterization of Glioma Progression**  
Matthew Lee, 15, Sophomore, East Brunswick High School, East Brunswick, New Jersey, T: Marilyn Ryan

# Finalist Directory

- BMED051 Identification of Synovial Tissue Biomarkers in Late-Onset Rheumatoid Arthritis Patients**  
Shruti Tyagi, 16, Junior, Middlesex County Academy for Allied Health and Biomedical Sciences, Woodbridge, New Jersey, T: Ravinder Tyagi
- CBIO063 V-BIND: Deep Geometric Transformers for SARS-CoV-2 Treatment Design**  
Ryan Samuel Park, 16, Junior, Millburn High School, Millburn, New Jersey, T: Susan Arrigoni
- CELLO23 Immunohistochemical Analysis Suggests a Role for Tmem131 in Thymic Epithelial Cell Differentiation**  
Hannah Park, 16, Junior, Tenafly High School, Tenafly, New Jersey, T: Anna Rubenchik
- MATH034 Lebesgue Measure Preserving Thompson's Monoid**  
William Li, 18, Senior, Delbarton School, Morristown, New Jersey, T: Brian Theroux
- SOFT036T Improving Upon Quantum Cryptography Protocols Using Entanglement and Quantum Signatures**  
Rohan Rajendra Kulkarni, 17, Senior, Ansh Girish Sharma, 17, Senior, Montgomery High School, Skillman, New Jersey, West Windsor-Plainsboro High School South, West Windsor Township, New Jersey, T: Jason Sullivan
- Jersey City, USNJ02, Jersey City Medical Center/Barnabas Health STEM Showcase**
- BMED063 Comparing the Efficacy of Dietary Fibers vs a Sap from Acacia Tree: Gum Arabic**  
Rebeca Kristina Fernando, 17, Junior, Jose Marti STEM Academy, Union City, New Jersey, T: Grishma Patel
- ENBM073 Transforming Telemedicine: Engineering Thermoelectric Health Check System**  
Ashita Birla, 16, Sophomore, Dr. Ronald E. McNair Academic High School, Jersey City, New Jersey, T: Maria Osoria
- Lawrenceville, USNJ03, Mercer Science and Engineering Fair**
- ENEV054 Innovative Climate Change Emissions Reduction: The Cargo Ship Flettner Rotor Centrifugal Vortex Exhaust Scrubber**  
Charlotte Lenore Michaluk, 15, Freshman, Hopewell Valley Central High School, Pennington, New Jersey, T: Stefanie Ribecca
- PLNT037 A Novel Assay to Quantitatively Detect Bacterial Endotoxin by Harnessing PAMP-Triggered Immunity of FRK1-LUC *Arabidopsis thaliana***  
Aravind Murali Krishnan, 18, Senior, Hillsborough High School, Hillsborough, New Jersey, T: Minh Dang
- Hackensack, USNJ04, BCA Research Expo**
- BMED022 Schwann Cell Support as a Novel Approach to Peripheral Nervous System Demyelinating Disease: A Phase Two Study**  
Kannammai O. Pichappan, 16, Junior, Bergen County Academies, Hackensack, New Jersey, T: Donna Leonardi
- CBIO027 OrphaDRGL: A Novel Graph Deep Learning-based Drug Repositioning Approach for Orphan Diseases**  
Remington Kim, 16, Sophomore, Bergen County Academies, Hackensack, New Jersey, T: Donna Leonardi
- CELLO15 Unmasking Tumor Heterogeneity: SOX9 Regulates EMT in a Novel High-Plasticity Cell State**  
# Seton Thomas Liu, 16, Junior, Bergen County Academies, Hackensack, New Jersey, T: Donna Leonardi
- NEW MEXICO**
- Albuquerque, USNM01, Central New Mexico Regional Science and Engineering Challenge**
- BEHA047 Statistical Analysis of Stress Level Differentiation Based on an Individual's Brain Dominant Hemisphere**  
Rakin Raunaq Faruk, 17, Senior, Albuquerque Institute for Math and Science, Albuquerque, New Mexico, T: Reginald Tyler

# Finalist Directory

**EBED014      A Novel AI-Based GPS Anti-spoofing System with Subspace Differential Direction-of-Arrival Estimation and Deep Learning Against Dynamic Spoofers**

##  
Milidu Jayaweera, 16, Junior, La Cueva High School, Albuquerque, New Mexico,  
T: Lena Eddings

**ENMC057      Just Passing Through: Use of Hemispheric Sensing with Trajectory Prediction for Satellites to Mechanically Dodge Small Space Debris**

McKenna Collins, 18, Senior, Albuquerque Institute for Math and Science, Albuquerque, New Mexico, T: Reginald Tyler

**MATS020      A Liquid-Liquid Extraction to Purify Magnetite Nanoparticles**

Isaac Zier Huber, 15, Sophomore, Eldorado High School, Albuquerque, New Mexico,  
T: Lesha Harenberg

**Farmington, USNM02, San Juan New Mexico Regional Science and Engineering Fair**

**BCHM020      Identification of the Artificial Synthesis of Aromatic Amino Acid Tyrosine, Based on Pi-to-Pi\* Absorbance Peaks**

Jordyn Begay, 15, Freshman, Navajo Preparatory School, Farmington, New Mexico,  
T: Yolanda Flores

**MCRO030      Isolation of *Enterobacter aerogenes* and *Micrococcus luteus* Bacteriophages from Environmental Sample**

Nathaniel Elliot Jobe, 18, Senior, San Juan College High School, Farmington, New Mexico, T: Geizi Dejka

**Grants, USNM03, Four Corners Regional Science and Engineering Fair**

**BMED034      The Toxic Truth, Part 2**

Nicole Janae Puderbaugh, 18, Senior, Grants High School, Grants, New Mexico,  
T: Shelby Alexander

**MCRO050      Dissecting the Black Walnut**

Alexia Lynn Munson, 15, Freshman, Grants High School, Grants, New Mexico,  
T: Shelby Alexander

**Las Vegas, USNM05, Northeastern New Mexico Regional Science and Engineering Fair**

**ENEV088      Nature Breathe: Natural Plant Material HVAC Filter for Nanoparticle Filtration**

Benjamin Varos, 14, Freshman, Taos Academy Charter School, Taos, New Mexico,  
T: Laura Tenorio

**ENMC067T      Developing the Technology for a Combat Drone**

Daniel Kim, 15, Freshman, Andres Iturregui, 14, Freshman, Los Alamos High School, Los Alamos, New Mexico, T: Stephanie Meyer

**Mescalero, USNM07, Southwest/Southeast New Mexico Regional Science Challenge**

**ENBM104T      Size Adjustable Prosthetic Forearm**

Vincent Joel Carpio-Torres, 18, Senior, Yoo Younggun, 19, Senior, Ryan Hyungjoo Lee, 17, Junior, New Mexico Military Institute, Roswell, New Mexico, T: Frank Kimbler

**ENEV089      Produced Water Treatment and Reuse to Mitigate the Environmental Impact of Oil and Gas Production**

Haoyu Bradley Wang, 15, Sophomore, Centennial High School, Las Cruces, New Mexico, T: Lisa Weinbaum

**MCRO066      Antimicrobial Use of Pecan Shells, Prickly Pear, Oakwood Aqueous Extracts as a Hand Sanitizer**

Ivan Stanislavovich Belyaev, 16, Sophomore, Jaejoon Lee, 18, Junior, Kyunghoon Yeom, 19, Senior, New Mexico Military Institute, Roswell, New Mexico, T: Demvia Maslian

**Socorro, USNM50, New Mexico Science and Engineering Fair**

**ANIM063      Climate Change on Crocodilians: Modeling the Effects of Phenological Shifts**

##  
Karin Ruth Ebey, 17, Senior, Los Alamos High School, Los Alamos, New Mexico,  
T: Stephanie Meyer

# Finalist Directory

- EAEV125**     **Using Machine Learning to Combat Air Pollution by Forecasting Tropospheric Ozone Levels**  
 Eliana Kai Juarez, 16, Sophomore, V. Sue Cleveland High School, Rio Rancho, New Mexico, T: Angelica Olivas
- PHYS079T**     **Nondestructive Analysis of Geological Sites through Muon Transmission Imaging**  
 # Phillip Ionkov, 17, Junior, Anthony Lestone#, 17, Senior, Los Alamos High School, Los Alamos, New Mexico, T: Alison Renner
- ROBO047**     **Neuromorphic Computing: Simulating the Brain's Visual Cortex for a Faster, More Efficient Computer**  
 # Robert Strauss, 16, Junior, Los Alamos High School, Los Alamos, New Mexico, T: Stephanie Meyer
- SOFT054T**     **Entropy in Evolutionary Algorithms—Statistical Mechanics Bearing Insight into Evolution**  
 Lucas Quinn Blakeslee, 16, Sophomore, Aengus Owen McGuinness, 14, Sophomore, Santa Fe High School, Santa Fe, New Mexico, T: Anita Nugent

## NEW YORK

### Poughkeepsie, USNY01, Dutchess County Regional Science Fair

- BEHA044**     **Investigating Correlations Between Internalized Homophobia and Transphobia In Adolescents and Environmental and Demographic Factors**  
 Ditte Isak, 17, Senior, Pawling High School, Pawling, New York, T: Gillian Rinaldo
- BEHA045**     **Effect of an Interactive Mobile Game on the Movement in a Queue Line at an Amusement Park**  
 Lauren Tocci, 17, Senior, Pawling High School, Pawling, New York, T: Gillian Rinaldo

### Long Island, USNY02, Long Island Science and Engineering Fair

- ANIM048**     **The Effect of EGCG on Oxidative Stress in *C. elegans***  
 Maiya Ali Raghu, 18, Senior, Syosset High School, Syosset, New York, T: Veronica Ade
- BEHA051**     **Education During a Pandemic: Exploring the Effectiveness of Synchronous versus Asynchronous E-learning from a Teacher's Perspective**  
 Carly Sara Friedman, 18, Senior, Plainview-Old Bethpage John F. Kennedy High School, Plainview, New York, T: Raymond Tesar
- BEHA056**     **The Analysis of the Use of Color in Pandemic Artwork Using Digital Quantifications**  
 Nethmi Withanage, 17, Senior, Smithtown High School East, St. James, New York, T: Maria Zeitlin
- BEHA057**     **Seeing through the Scan: The Impact of fMRI Evidence on Juror Satisfaction and Verdicts**  
 Isabella Souza, 17, Senior, Syosset High School, Syosset, New York, T: Veronica Ade
- BMED061**     **Curcumin and Capsaicin Synergistically Suppress Neuroblastoma Development**  
 Yifang Zha, 17, Senior, The Wheatley School, Old Westbury, New York, T: Donald Paulson
- BMED067**     **The Role of Bone Lineage Cells During Digit Tip Regeneration in Adult Mice**  
 Samantha Rose Radinsky, 17, Senior, Paul D. Schreiber High School, Port Washington, New York, T: Nicole LoPinto
- CBIO077**     **A Game-Theoretic Model of the Resting-State Brain**  
 Danielle Lauren Gruber, 18, Senior, John L. Miller Great Neck North High School, Great Neck, New York, T: Alan Schorn
- CBIO080**     **Novel Prediction of Adverse Drug Reactions and Underlying Pathological Mechanisms via Hierarchical Classification**  
 Catherine Kim, 18, Senior, Jericho High School, Jericho, New York, T: Serena McCalla
- CELLO30**     **The Effect of IL-22 Stimulation on Paneth Cell Granule Morphology and Epithelial Cell Proliferation**  
 Neil Mehta, 18, Senior, Ward Melville High School, East Setauket, New York, T: Marnie Kula

# Finalist Directory

- CHEM053** **Evaluating the Efficacy of Repurposed and Modified Traditional Eastern Medicinal Compounds on Coronavirus Family Specific Target Structures**  
Brian Insuhp Lee, 18, Senior, Plainview-Old Bethpage John F. Kennedy High School, Plainview, New York, T: Raymond Tesar
- EAEV101** **Aquatic Habitat Nitrate Levels on Long Island: The Effect of High Nitrate Levels on Anuran Species Abundance**  
Ashley Katherine Roth, 18, Senior, Lynbrook Senior High School, Lynbrook, New York, T: Charles Vessalico
- EAEV102** **Harnessing Deep Learning to Assess Coral Reef Health through Crowd-sourced Efforts**  
# Rithika Narayan, 18, Senior, Elwood John Glenn High School, Elwood, New York, T: Arnold Kamhi
- EBED026** **An Autonomous Wildfire Detection and Containment System**  
Margaret Anne Gates, 17, Senior, Wantagh High School, Wantagh, New York, T: Carol-Ann Winans
- ENEV065** **The Optimization of Desalination and Ion-Removal Rate through the Engineering of Novel Turbulent Modular Designs in an Electrodialysis System**  
Julius Yoh, 17, Senior, Manhasset High School, Manhasset, New York, T: Alison Huenger
- MCRO046** **FD028: A Bifunctional HIV-1 Inactivator Acts Before Host Cell Entry**  
# Giselle Rasquinha, 17, Senior, Syosset High School, Syosset, New York, T: Veronica Ade
- PHYS062** **Analyzing the Photometry of Star Cluster Messier 39: Creation of Color Magnitude Diagram, Age Calculation, and Distance Measurement**  
Kathryn Postiglione, 17, Senior, Lynbrook Senior High School, Lynbrook, New York, T: Charles Vessalico
- PLNT035T** **Lipopolysaccharide (LPS) and Galactose Induce Cell Death in Prothallial Cells of Gametophytes of *Ceratopteris richardii***  
# Blake Charles Lippman, 17, Senior, Tyler Logan Bissoondial#, 15, Sophomore, George W. Hewlett High School, Hewlett, New York, John F. Kennedy High School, Bellmore, New York, T: Terrence Bissoondial T: Barbi Frank
- ROBO067** **CET-CNN: Modular Hierarchical Image Classification Using Conditional-Execution Tree CNNs**  
Ethan Joseph Horowitz, 18, Senior, Manhasset High School, Manhasset, New York, T: Alison Huenger
- SOFT044** **Attributing State-backed Information Operations on Twitter through Machine Learning**  
James Connor, 18, Senior, Northport High School, Northport, New York, T: Bryan Horan
- TMED051** **Direct Inhibition of NF- $\kappa$ B Subunits by 9-chloro-8-(hexyloxy)-2H-chromeno[2,3-d]pyrimidine-2,4(3H)-dione (IT-848)**  
Janice Kirti Rateshwar, 17, Junior, Jericho High School, Jericho, New York, T: Serena McCalla
- New York City, USNY03, Terra New York City STEM Fair**
- ANIM058** **Utilizing Hydrostatics to Describe the Paleocology of Orthoceras, an Extinct Fossil Nautiloid**  
Ellie Anna Vaserman, 17, Senior, Staten Island Technical High School, Staten Island, New York, T: John Davis
- BEHA046** **Attention Span Experiment: Do Racing Games Have Effects on Attentional Control?**  
Mazyar Azmi, 17, Junior, Horace Mann School, Bronx, New York, T: Christine Leo
- BEHA049** **Demistifying 'Fake News': Evaluating Media-Borne Misinformation through the Novel Application of AI Powered Sentiment Analysis**  
Arjun Pal Mazumdar, 18, Senior, Bronx High School of Science, Bronx, New York, T: Vladimir Shapovalov

# Finalist Directory

- BMED052**     **Investigating Racial Disparities in Cancer by Assessing Transcriptomic and Proteomic Biomarkers in Various Carcinomas using TCGA Database and Web-based Analysis Tools**  
Brian Lei, 16, Junior, Hunter College High School, New York, New York, T: Philip Frankel
- CELLO24**     **Correlation Between Odor Composition and Neuron Response in the Olfactory Cortex of Mice**  
Gary Shteyman, 16, Junior, Staten Island Technical High School, Staten Island, New York, T: John Davis
- CELLO25**     **Save Our Sons: Exploring RNAi-mediated Intragenomic Conflict in *D. sim* through Genetic Assays and Testis Cytology**  
Jaeah Kim, 17, Senior, Hunter College High School, New York, New York, T: Philip Frankel
- CHEM043T**     **Development of a Novel Machine Learning Algorithm in Biomolecules and Drugs for Measuring Molecular Surface Area: Applications in Long QT Syndrome and Neurodegenerative Diseases**  
Shawn B. Lokshin, 17, Junior, Nouraldeen Ibrahim, 16, Junior, Staten Island Technical High School, Staten Island, New York, T: John Davis
- ENBM062**     **Revolutionizing Computer Vision Algorithms in Cancer Pathology: The Use of Comprehensive Toolkits to Overcome Machine Learning Obstacles in the Digital Pathology Field**  
Benjamin Ling-Wen Chan, 17, Senior, Bronx High School of Science, Bronx, New York, T: Vladimir Shapovalov
- MATH035**     **Quadratization of ODEs: Monomial vs. Non-Monomial**  
Foyez Alauddin, 18, Senior, Trinity School, New York, New York, T: Gleb Pogudin
- MCRO043**     **Distinguishing Bacterial Motion Quantitatively: A Diagnostic Method for Intestinal Disease**  
Neha Mani, 17, Senior, Hunter College High School, New York, New York, T: Gilana Reiss
- PHYS049T**     **Crater Correlations: A Morphological Analysis on Lunar and Mercurian Simple Impact Craters**  
Jasmine Palma, 16, Junior, Michelle Wu, 16, Junior, Townsend Harris High School, Flushing, New York, T: Katherine Cooper
- PLNT032T**     **The Effects of Increased CO<sub>2</sub>, Soil Acidification, and Drought on Aperture, Density, and Potential Conductance Index of Stomata Demonstrated by Buckwheat Plants (*Fagopyrum esculentum*) and Pea-plants (*Pisum sativum*)**  
Behruz Mahmudov, 17, Junior, Kayla Wang, 16, Junior, Forest Hills High School, Queens, New York, T: Matthew Woo
- SOFT052**     **Intra-procedural Prostate MRI Registration: A Data-efficient Siamese Neural Network (SNN) Design**  
Alexander Lyons, 18, Senior, Columbia Grammar and Preparatory School, New York City, New York, T: Ilya Yashin
- Westchester, Putnam, Sullivan Counties, USNY05, Regeneron-Westchester Science and Engineering Fair**
- ANIM027**     **Examining the Predatory Relationship Between the Invasive Green Crab (*Carcinus maenas*) and the Indigenous Blue Mussel (*Mytilus edulis*) in the Gulf of Maine**  
Bryce Lewis Jacobs, 17, Senior, Hastings High School, Hastings-on-Hudson, New York, T: Melissa Shandroff
- ANIM034**     **The Impact of Anthropogenic Effects on North American River Otter (*Lontra canadensis*) Behavior at Latrine Sites**  
Caroline P. Bayer, 18, Senior, Dobbs Ferry High School, Dobbs Ferry, New York, T: Erica Curran
- BEHA031**     **The Impact of Covid-19 on PTSD**  
Natalia Sofia McMorris, 16, Junior, New Rochelle High School, New Rochelle, New York, T: Jeff Wuebber



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# Finalist Directory

- BEHA032 Gender Bias in Online Patient Healthcare Reviews**  
Amanda Cao, 17, Junior, New Rochelle High School, New Rochelle, New York,  
T: Jeff Wuebber
- BMED024 Deep Neural Network Analysis of Clinical Variables Predicts Escalated ICU Care in COVID-19 Patients**  
Joyce Lu, 16, Junior, Ardsley High School, Ardsley, New York, T: Jieun Yoo
- BMED032 Epigenetic Editing of Cdk5 Leads to Sexually Dimorphic Stress Responses**  
Mia Nicole Dittrich, 18, Senior, Byram Hills High School, Armonk, New York,  
T: Caroline Matthew
- BMED033 Elucidating Mechanisms & Impacts of Age-related Alterations in Blood-CNS Barriers: A Transcriptome Study of the Aging Blood-brain Barrier & the Dry Age-related Macular Degeneration Retina**  
Luke Briody, 18, Senior, Byram Hills High School, Armonk, New York,  
T: Caroline Matthew
- BMED038 An Ensemble Method for Ranking Cancers to Target KIF19**  
Isabelle Balachandran, 17, Junior, New Rochelle High School, New Rochelle, New York,  
T: Jeff Wuebber
- BMED039 Abnormalities of PTPN2 Increases BETA-cell Apoptosis in PP2-Beta Cells Derived from hESCs**  
Xia Saavedra, 18, Senior, Ossining High School, Ossining, New York, T: Valerie Holmes
- CBIO051 FlyRNAi Enrichment Tool: Tissue Preferred Expression Analysis for *Drosophila***  
Tiffany Chao, 16, Junior, Blind Brook High School, Rye Brook, New York,  
T: Michele Sugantino
- CBIO052 Do Bainbridge-Ropers Syndrome Causing ASXL3 Mutations Influence Transcript Stability and Exon Exclusion/Inclusion by Disrupting Exonic Splicing Enhancer Sequences?**  
Kaylee Oppenheimer, 18, Senior, Hastings High School, Hastings-on-Hudson, New York,  
T: Melissa Shandroff
- CELLO16 Discovering Long-Lasting Novel Epigenetic Mechanisms Associated with Cocaine Addiction: The Role of the SWI/SNF Remodeling Complex in the Nucleus Accumbens**  
Meagan Ryan, 17, Senior, Ossining High School, Ossining, New York, T: Valerie Holmes
- CELLO18 Immunopeptidomics of Non-small Cell Lung Carcinomas (NSCLC) for the Discovery and Validation of Novel Peptides for Targeted Immunotherapy**  
Maya Sarina Weitzen, 18, Senior, Sleepy Hollow High School, Sleepy Hollow, New York,  
T: Michele Zielinski
- EAEV038 Year-Long Salinization of Groundwater and Surface Waters of Hudson River Watersheds due to Chronic Road Salt Application**  
Nicole Ann Camilliere, 17, Senior, Ossining High School, Ossining, New York,  
T: Valerie Holmes
- EAEV046T A Profile of Heavy Metal Contamination in Lower Hudson Valley Tributaries**  
Jack Richard Dougherty, 18, Senior, Daniel Dusevic, 18, Senior, Pelham Memorial High School, Pelham, New York, T: Steven Beltecas
- EAEV047 Street Trees: An Analysis of Undergrounding Power Lines in the Northeastern Suburbs**  
Lucia Anne Lavallee, 18, Senior, Pelham Memorial High School, Pelham, New York,  
T: Steven Beltecas
- EAEV048 Determining Effective Locations of Seagrass to Prevent Coastal Erosion**  
Brett Carolyn Bober, 17, Senior, Pelham Memorial High School, Pelham, New York,  
T: Steven Beltecas
- ENBM049 The Effects of Scaling on Muscle Force Production in Biological Machines**  
Tessa Schwartz, 18, Senior, Byram Hills High School, Armonk, New York, T: James Gulick

# Finalist Directory

- ENBM074**     **Predicting Mutation Status and Recurrence Free Survival in Non-Small Cell Lung Cancer: A Hierarchical CT Radiomics – Deep Learning Approach**  
Divek Patel, 16, Junior, Hackley School, Tarrytown, New York, T: Andrew Ying
- TMED058**     **Combating Alzheimer's Disease: An Exploration of Resveratrol Treatment and Early Disease Detection Using *Drosophila melanogaster* and Machine Learning**  
# Elizabeth Seowon Chun, 17, Senior, Ardsley High School, Ardsley, New York, T: Jieun Yoo
- Syracuse, USNY06, Central New York Science and Engineering Fair**
- BMED037T**     **A Novel Efflux Pump Inhibitor Improves Chemotherapeutic Efficacy Against P-glycoprotein-expressing Glioblastoma Stem Cells**  
Samuel David Lustig, 16, Sophomore, Sravan Krishna Kodali, 15, Sophomore, Christian Brothers Academy, Syracuse, New York, T: Mariano Viapiano
- ENEV057T**     **Robotic Development for Cleaning Coastlines: Coastline Cleanliness**  
Yakina Sika-Amoah, 15, Freshman, Theodore Samuel Simon, 14, Freshman, Syracuse Academy of Science, Syracuse, New York, T: Amy Ay
- Troy, USNY07, Greater Capital Region Science and Engineering Fair, Inc.**
- CBIO028**     **A Differential Gene Expression and Alternative Splicing Analysis of ALS-Causing Mutations**  
Cristina Corynne DeMeo, 18, Senior, Saratoga Springs High School, Saratoga Springs, New York, T: Peter Robinson
- EAEV045T**     **A New Approach To Ecology: Using Machine Learning to Predict the Spread of Invasive Species**  
Avi Vikram Bagchi, 16, Junior, Ayaan Bargeer, 17, Junior, Shaker High School, Latham, New York, T: Nathaniel Covert
- ENMC041**     **Retrofitting of a Creality Ender 3 to Allow for 5 Axis Motions**  
Owen Scott Emerich, 16, Junior, Burnt Hills-Ballston Lake High School, Burnt Hills, New York, T: Regina Reals
- Utica, USNY08, Utica College Regional Science Fair**
- PHYS071**     **Aw, Snap: Testing Wood Laminates**  
Dennis Albert Francis van Hoesel, 16, Sophomore, Rome Free Academy, Rome, New York, T: Robert Wood
- Rochester, USNY09, Terra Rochester Finger Lakes Science & Engineering Fair**
- MCRO060**     **Structural Changes of the SARS CoV-2 Spike Protein in Varying Salt Concentrations**  
Amy Feng, 17, Junior, Pittsford Sutherland High School, Pittsford, New York, T: Peng Zhang
- St. Bonaventure, USNY12, Twin Tiers Regional Science Fair**
- BEHA080T**     **The Effects of Sleep on Optimism and Memory**  
Estella Guerin, 17, Junior, Bethany Poirier, 17, Senior, Franklin Academy High School, Malone, New York, T: Denise Rogers
- Queens, USNY50, New York State Science and Engineering Fair**
- BEHA035**     **Evaluating the Effects of Perinatal Fluoxetine in Mice in Response to Fear Stimuli**  
Alexander Kesin, 17, Senior, George W. Hewlett High School, Hewlett, New York, T: Terrence Bissoondial
- BMED043**     **The Identification and Validation of Novel Targets and Pathways of Alzheimer's Disease through Integrated System Approaches**  
Michael Zichao Zhong, 16, Junior, Ardsley High School, Ardsley, New York, T: Jieun Yoo
- BMED053**     **AcuRe: Third-Generation Machine Learning Cancer Detection Model Using Nanopore Read Alignments**  
Natalia Pahlavan, 15, Sophomore, Jericho High School, Jericho, New York, T: Serena McCalla

# Finalist Directory

- BMED068** **Phenotypic Behavioral Expression of Different Genetic Lines of *Drosophila melanogaster* as Measured by the Negative Geotaxis Assay & Their Response to Lithium Chloride: A Pharmacogenomics Study**  
Arwen Fernandez O'Brien, 17, Senior, Harrison High School, Harrison, New York, T: Allison Blunt
- CBIO081** **Creation of a Machine Learning App to Facilitate Pancreatic Cancer Prediction**  
Reid Fleishman, 18, Senior, William A. Shine Great Neck South High School, Great Neck, New York, T: Carol Hersh
- CBIO082** **CoronaXNet: Using Convolutional Neural Networks to Automate the Detection COVID-19 from Chest X-Ray Images**  
Michael Chu, 18, Senior, Syosset High School, Syosset, New York, T: Veronica Ade
- CELL026** **Synergy of Treatment: Therapeutic Vulnerabilities in Small Cell Lung Cancer**  
Miah Christina Margiano, 16, Sophomore, Saint Anthony's High School, Melville, New York, T: Paul Paino
- CHEM054** **Simulation of Solar-Powered Capacitive Deionization (CDI) for the Removal of Bacteria, Viruses, and Heavy Metals from Water**  
Sanjna Kedia, 18, Senior, Manhasset High School, Manhasset, New York, T: Alison Huenger
- EAEV103** **Analyzing Water Contaminants through Image Processing of Chlorophyll-a**  
Angela Mao, 17, Senior, Syosset High School, Syosset, New York, T: Veronica Ade
- EGSD046** **Size Optimization of Gold Nanoparticles Functionalized on PEMFC Interfaces to Increase Power Efficiency**  
Benjamin Alex Sherman, 17, Junior, George W. Hewlett High School, Hewlett, New York, T: Terrence Bissoondial
- ENBM078** **MRgRT and Delta Radiomics: Early Prediction of Survival in Pancreatic Cancer**  
Alice Zhaoyi Chen, 17, Senior, Jericho High School, Jericho, New York, T: Serena McCalla
- MCRO041** **Avian Paramyxovirus Serotype 4 (APMV-4) Promotes Greater Rates of Apoptotic Cell Death & Stimulated Immune Responses in Malignant Melanoma and Relapse Cancers with Regards to Newcastle Disease Virus (NDV): The Characterization of a Novel Oncolytic Virus**  
Christopher Edward Alexander, 18, Senior, Elmont Memorial Junior-Senior High School, Elmont, New York, T: Michelle Flannory
- PHYS063** **Analyzing Historical Polarization and Orbit Data from Relativistic Heavy Ion Collider (RHIC) Runs**  
Taylor Fox, 18, Senior, Manhasset High School, Manhasset, New York, T: Alison Huenger
- ROBO068** **Assessing the Impact of Robust Stochastic Operators on Q-learning Efficiency in an OpenAI Gym Environment with a Large Observation Space**  
Henry Demarest, 17, Senior, Irvington High School, Irvington, New York, T: Nadia Parikka
- SOFT048** **Identification of Correlated Qubit Errors for Quantum Computing Error Correction**  
Peyton Schales, 17, Junior, Ardsley High School, Ardsley, New York, T: Jieun Yoo

## NORTH CAROLINA

Charlotte, USNC01, Charlotte-Mecklenburg Regional Science Fair

- EAEV002** **Rethinking Our Roads: The Ability of Porous Concrete to Reduce Surface Runoff of Tire Wear Particles (TWP)**  
Mason Brandt Sufnarski, 17, Junior, Marvin Ridge High School, Waxhaw, North Carolina, T: Steven Wilson
- MATH002** **Novel Methods for Shape Classification, Analysis, and Synthesis Using the Isoperimetric Profile and Mathematical Morphology**  
Dev Mayur Chheda, 17, Senior, Ardrey Kell High School, Charlotte, North Carolina, T: Mayur Chheda

# Finalist Directory

## Durham, USNC02, North Carolina Central Region III Science Fair

- SOFT012**     **Development of an AI-Powered Powered Facial-cue Control Module**  
Daniel Shen, 17, Junior, William G. Enloe High School, Raleigh, North Carolina,  
T: Lori Kubik

## Durham, USNC03, North Carolina Science Fair Region 3B

- ENBM001T**   **ARTHETA-O: An Innovative, Affordable Approach to the Onsite, Rapid 3D Printing of Artery Stents, Parameterized to Fit Individual Patients' Needs**  
Connor Brannon Mitchell, 17, Junior, Prabuddha Ghosh Dastidar#, 17, Junior,  
North Carolina School of Science and Mathematics, Durham, North Carolina,  
T: Jonathan Bennett
- ROBO044**   **BrCaVision: Predicting Breast Cancer Prognosis by Detecting Mitosis, Identifying Histological Tumor Subtypes, and Scoring HER2 in Whole Slide Tissue Images Using Deep Learning**  
Dheepthi Mohanraj, 16, Junior, North Carolina School of Science and Mathematics,  
Durham, North Carolina, T: Robert Gotwals

## Raleigh, USNC50, North Carolina State Science Fair

- ANIM033**     **Seeing in a New Light: Adaptive Changes in Opsin Proteins in Antarctic Icefish**  
Ella Yoder, 16, Sophomore, Research Triangle High School, Research Triangle Park,  
North Carolina, T: Alex Dornburg
- CBIO068**     **A Versatile Population Dynamics Model of Bacterial Resistance, Tolerance, and Persistence**  
Melissa Xin Du, 17, Senior, North Carolina School of Science and Mathematics, Durham,  
North Carolina, T: Amy Sheck
- CHEM036**     **Rare-Earth-Free Silicon-Based Organic Molecules for Solid-State Lighting Applications**  
Lisa Peng Zhang, 17, Junior, Providence High School, Charlotte, North Carolina,  
T: Margaret Kocherga
- EAEV064**     **Assessing and Predicting Wildfire Severity in California Based on Relationships Between Wildfires and Drought Using Machine Learning**  
Angela Chen, 15, Sophomore, William G. Enloe High School, Raleigh, North Carolina,  
T: Chad Ogren
- EGSD027**     **The Computational and Experimental Study of Cellulose in Ionic Liquids and Water for Finding an Optimal Solvent for Biofuel Production**  
Nicholas Boyer, 17, Senior, North Carolina School of Science and Mathematics, Durham,  
North Carolina, T: Tim Anglin
- ENBM053**     **Immunoinformatic Design and Evaluation of a Multi-Epitope Peptide Vaccine Targeting SARS-CoV-2 Structural and Nonstructural Antigens**  
Berk Timothy Yalcinkaya, 18, Junior, Forsyth Country Day School, Lewisville, North Carolina, T: Heather Yalcinkaya
- ENEV048**     **Identifying Natural Flocculating Proteins for Affordable Anti-Microbial Sand Filters**  
Sahil Azad, 17, Senior, North Carolina School of Science and Mathematics, Durham,  
North Carolina, T: Michael Bruno
- ENEV052T**   **Designing a Bioplastic Material to Replace Polystyrene and Polypropylene in Single-Use Hard Plastics that Rapidly Degrades in Landfill, Freshwater, and Saltwater Environments**
- #**               Kaitlyn Lee Zuravel, 17, Junior, Lauren Gail Zuravel, 15, Freshman, Terry Sanford High School, Fayetteville, North Carolina, T: Deborah Vajner
- PLNT036**     **Tropicalization of Temperate Ecosystems: How Climate Change Can Influence**  
Regan Williams, 16, Sophomore, John T Hoggard High School, Wilmington, North Carolina, T: Webster Guthrie

# Finalist Directory

- ROBO075**     **CoMET: A Novel Graph-based Machine Learning System for Predicting Topological Features of Dynamic Covert Networks with Applications in Counterterrorism**  
Paarth Tara, 17, Junior, North Carolina School of Science and Mathematics, Durham, North Carolina, T: Robert Gotwals
- TMED030**     **Assessing the Effectiveness of the *Hericium erinaceus* Extract as Acetylcholinesterase Inhibitors**  
Chayse Skyler Chandler, 17, Senior, North Carolina School of Science and Mathematics, Durham, North Carolina, T: Kim Monahan
- TMED031**     **Using Automated Infant Posture Recognition to Reduce SIDS Risk**  
# Isha Narang, 16, Sophomore, Ardrey Kell High School, Charlotte, North Carolina, T: Meryl Thomas

## NORTH DAKOTA

**Mandan, USND01, Southwest Central North Dakota Regional Science and Engineering Fair**

- BEHA033**     **The Credibility of Eyewitness Memories**  
Blake John Bernhardt, 17, Junior, Wing Public School, Wing, North Dakota, T: Joy Marimon
- ROBO086**     **Language Recognition with Machine Learning**  
Isaac Muth, 17, Sophomore, Mandan High School, Mandan, North Dakota, T: Ciera Kroh

**Fargo, USND03, Southeast North Dakota Regional Science and Engineering Fair**

- EAEV053**     **An Analysis of Agricultural Tile Drainage and the Impact of Crop Residue Retention**  
Gavin Donald Kratcha, 15, Freshman, Hankinson Public School, Hankinson, North Dakota, T: Patty Kratcha
- EAEV114**     **Soil Farms: A New Approach to Cropland Restoration**  
## Emma Pearl Kratcha, 17, Junior, Hankinson Public School, Hankinson, North Dakota, T: Patty Kratcha

**Grand Forks, USND05, Northeast North Dakota Regional Science and Engineering Fair**

- ENBM066**     **The Brace Cap: An Orthodontic Bracket Covering Ligature Tie**  
Sudiksha Singhal, 16, Sophomore, Red River High School, Grand Forks, North Dakota, T: Sonalika Singhal

**Williston, USND06, Northwest North Dakota Regional Science Fair**

- BEHA055**     **Does Gender Affect One's Response to Frustration?**  
Adeline Norgaard, 18, Senior, Tioga High School, Tioga, North Dakota, T: Debra Moe
- EAEV084**     **Manure to Energy**  
Brooke Evelyn Vachal, 15, Freshman, Tioga High School, Tioga, North Dakota, T: Debra Moe
- TMED042**     **How Effective Are Face Masks?**  
Lindsey Vachal, 17, Junior, Tioga High School, Tioga, North Dakota, T: Debra Moe

**Grand Forks, USND50, North Dakota State Science and Engineering Fair**

- ENEV084**     **Design of Novel Scaffolds for Water Filtration by Using Benign and Agriculture Based Precursors**  
# Shrimayi Nikhil Patel, 17, Senior, Red River High School, Grand Forks, North Dakota, T: Lorraine O'Shea
- PHYS058**     **The Science of Rocketry**  
William Kuizon Hejtmanek, 15, Freshman, Milnor High School, Milnor, North Dakota, T: Christina McCleary
- TMED060T**     **Use as Directed**  
Alora Kroh, 15, Freshman, Caiden M. Belile, 15, Freshman, Mandan High School, Mandan, North Dakota, T: Ciera Kroh



*mens et manus*



*mind and hand*



Admissions

[mitadmissions.org/ISEF](https://mitadmissions.org/ISEF)

# Finalist Directory

## OHIO

### Athens, USOH01, Southeastern Ohio Regional Science and Engineering Fair

- PLNT050**     **The Effects of Exogenously Applied L-Tryptophan on the Nodulation and Overall Development of Soybeans Grown in Acidic Soil**  
Joonwoo Park, 15, Freshman, Athens High School, The Plains, Ohio, T: Andrea Anderson

### Cleveland, USOH02, Northeastern Ohio Science and Engineering Fair

- CBIO040**     **Analyzing Patterns of Gene Expression in Inflamed Microglia Stimulated with a Pro-inflammatory Molecule (TNF Alpha)**  
Aditya Kalahasti, 17, Junior, Solon High School, Solon, Ohio, T: Saba Valadkhan
- CHEM027**     **Gelatinization and Hysteresis of Organic Compounds to Create Edible Shelf Stable Adhesives**  
Ryan McGinnis, 17, Junior, West Geauga High School, Chesterland, Ohio, T: Kristin Gregory
- ENMC036**     **Supporting a Wing with Hexagons to Make It Lighter**  
Alexander Michael Kmetko, 16, Junior, University School, Chagrin Falls, Ohio, T: Sara Laux
- PHYS032**     **A Novel Method for Identifying Kepler Exoplanet Habitability Using Python-Based Analysis of Standardized Transit Light Curves and Calculated Parameter Values**  
Michelle Seoyeon Park, 17, Junior, Solon High School, Solon, Ohio, T: Dustin Schroeder
- TMED025**     **The Effects of the COVID-19 Pandemic and Vaccine Knowledge on Vaccine Hesitancy in Adolescents**  
Claire English, 17, Junior, Mentor High School, Mentor, Ohio, T: Lori Cohen

### Shaker Heights, USOH05, Hathaway Brown Upper School Fair

- CBIO055T**     **Descriptive Epidemiology on Vestibular Schwannomas from 2004-2016**  
Kaitlyn Mary Elizabeth Greppin, 17, Junior, Kailey Ines Takaoka, 16, Junior, Hathaway Brown School, Shaker Heights, Ohio, T: Crystal Miller
- CELL007##**     **Removing Brakes of Tumor-Resident Myeloid Cells as a Novel Cancer Immunotherapy**  
Shruthi Ravichandran, 17, Senior, Hathaway Brown School, Shaker Heights, Ohio, T: Crystal Miller
- ENBM019**     **Regenerative Treatment of Stress Urinary Incontinence by Allogenic Macrophage Therapy**  
Snigdha Cingireddi, 16, Junior, Hathaway Brown School, Shaker Heights, Ohio, T: Crystal Miller
- TMED007**     **The cGAS-STING Pathway in Rhabdomyosarcoma and Osteosarcoma**  
Anjali Dhanekula, 16, Junior, Hathaway Brown School, Shaker Heights, Ohio, T: Crystal Miller

### Archbold, USOH06, Northwest Ohio Science and Engineering Fair

- PLNT015#**     **Engineering a Modified Brewbaker and Kwack Medium for *Cucurbita pepo***  
Joseph Ryan Reamsnyder, 18, Senior, Hilltop High School, West Unity, Ohio, T: Cristin Hagans
- PLNT019**     **Rhizofiltration Potential of Cyanocobalamin in *Lactuca sativa* var. *Capitata* to Increase B12 Concentration**  
Jacob William Zajkowski, 18, Senior, Anthony Wayne High School, Whitehouse, Ohio, T: Whitney Short

### Marion, USOH07, Marion Area Science and Engineering Fair

- PLNT041T**     ***Lemna minor* Fertilizer as an Alternative to Commercial Fertilizer for the Growth and Runoff Quality of *Glycine max***  
Caylee Bree Combs, 17, Senior, Brynn Eleanora McGrail, 18, Rutherford B. Hayes High School, Delaware, Ohio, T: Jane Kovatch

# Finalist Directory

**ROBO071      HealthDrone: An Autonomous, Offline Medical UAV For Advanced Biometric Collection and Analysis Using Deep Learning**

Nithin Naikar, 15, Freshman, Olentangy Liberty High School, Powell, Ohio,  
T: Rachel Waltman

**Columbus, USOH50, Buckeye Science and Engineering Fair**

**BMED056      The Effect of Deferoxamine and Ferrostatin-1 Treatments on Total ROS in HK-2 Cells**

Haroon Lughmani, 17, Junior, Sylvania Northview High School, Sylvania, Ohio,  
T: Kathryn Nelson

**BMED057      Examination of Human Colon Organoids for Phenotypic Anomalies in Patients with Ulcerative Colitis**

Ameya Saraf, 17, Junior, William Mason High School, Mason, Ohio, T: Karen Young

**CBIO067      *In silico* Mapping of the 14-3-3zeta and TRAF Protein Interactions**

Anish Umesh Gupta, 16, Junior, Sylvania Northview High School, Sylvania, Ohio,  
T: Kathryn Nelson

**EAEV087      Removing Chromium (VI) from Contaminated Water Using a Low-Cost Chitosan Coated Diatomaceous Earth**

Johan DeMessie, 16, Sophomore, William Mason High School, Mason, Ohio,  
T: Karen Young

**EBED017      Developing a New, Lightweight, Hands-Free Personal Safety System for Female Runners**

Lisa Jean Sebastian, 18, Senior, Bethel High School, Tipp City, Ohio, T: Alisha Gross

**EBED022      Computing at the Speed of Light: Development of a 2-bit Multi-modal Photonic Integrated Circuit (PIC) for Highly Computational Tasks**

Mihai Crisan, 17, Junior, Upper Arlington High School, Upper Arlington, Ohio,  
T: Curt Bixel

## OKLAHOMA

**Alva, USOK01, Northwestern Oklahoma State University Regional Science Fair**

**BMED083      Change in Lung Volume with Recovery Positions**

Kenzie Doane, 18, Senior, Northwest Technology Center, Fairview, Oklahoma,  
T: Shawn Cusack

**ENMC080T      You're Hot Then You're Cold**

Crawford Xan Fuzzell, 18, Senior, Kenzie Mackenzie Madrid, 18, Senior, Northwest Technology Center, Fairview, Oklahoma, T: Shawn Cusack

**Bartlesville, USOK02, Bartlesville District Science Fair**

**BEHA017      Downtime: The Consequences of Excessive Screen Use**

#

Liam Hiroyasu Wisner, 17, Junior, Bartlesville High School, Bartlesville, Oklahoma,  
T: Betty Henderson

**ENEV038T      Conserving Water through the Recycling and Filtering of Greywater through a Domestic System**

Bryce Adley Goodin#, 17, Senior, Colton Micheal McCullough##, 18, Senior, Caleb Joel Cochran, 18, Senior, Bartlesville High School, Bartlesville, Oklahoma,  
T: Betty Henderson

**PHYS018      Finding the Optimal Water Fraction for Maximum Launch Height of Compressed-Air Bottle Rockets**

Emma King, 15, Sophomore, Bartlesville High School, Bartlesville, Oklahoma,  
T: Gary Layman

**Muskogee, USOK05, Muskogee Regional Science and Engineering Fair**

**CHEM037      Environmentally Friendly Edible Water Pods**

#

Thi Alexis Grizzle, 16, Junior, Muldrow High School, Muldrow, Oklahoma, T: Danni Powell

# Finalist Directory

## Tulsa, USOK10, Tulsa Regional Science Fair

- ENEV003**     **A Novel Carbon Dioxide Filtration Device Utilizing Calcium Hydroxide and Chlorophyta to Remediate the Impact of Global Climate Change on Aquatic Ecosystems**  
Ashlyn Milford, 17, Junior, Cascia Hall Preparatory School, Tulsa, Oklahoma,  
T: Sally Fenska
- MATS001T**     **Testing the Safety and Viability of a Cross-linked Starch-Based Bioplastic in Food Packaging and Food Industry Applications**  
# Peyton Elise Carter, 18, Senior, Erin Rose Coulon, 18, Senior, Cascia Hall Preparatory School, Tulsa, Oklahoma, T: Chaunna Steen T: Chaunna Steen

## Stillwater, USOK50, Oklahoma State Science and Engineering Fair

- ENBM064**     **Development of Biomimetic Biopolymers for Healing Early Osteoarthritis**  
# Angelina Mao, 17, Senior, Norman North High School, Norman, Oklahoma, T: Yan Li
- MCRO051**     **Characterizing the Role of PA2803 Protein in Antibiotic Resistance in Bacteria**  
Anna Alexandra Khanov, 17, Junior, Stillwater High School, Stillwater, Oklahoma,  
T: Marianna Patrauchan
- SOFT040**     **Analysis of Public's Concerns on Covid-19 Using Twitter Posts**  
Maxim Khanov, 17, Junior, Stillwater High School, Stillwater, Oklahoma, T: Esra Akbas

## OREGON

### Gresham, USOR01, Gresham-Barlow Science Expo

- CHEM018**     **A Novel Approach for Nuclear Waste Curation: A Manganese and Uranium Coupled Biogeochemical Cycle**  
Dev Rishi Udata, 17, Junior, Jesuit High School, Portland, Oregon, T: Lara Shamieh
- PLNT011**     **The Effect of Mycorrhizae Inoculant on Plant Growth**  
Jordynn Michael, 17, Senior, Gresham High School, Gresham, Oregon, T: Julie Trisel
- TMED015**     **A Novel Machine Learning Based Identification Tool (ELECT) for Early Colorectal Cancer Detection through Advanced Microbiome Composition Analysis**  
Alan Peijun Ma, 16, Sophomore, Jesuit High School, Portland, Oregon, T: Lara Shamieh

### Hillsboro, USOR04, Beaverton-Hillsboro Science Expo

- EBED010T**     **Project Mashiro: Synthetic Aperture Radar Imaging with Inertial Sensor Fusion Using Custom FMCW Hardware and Extensible DSP**  
Pranav Sehgal, 16, Junior, Tim C Solberg, 17, Junior, Beaverton Academy of Science and Engineering, Hillsboro, Oregon, T: Melissa Shell
- ENBM043**     **CODONIFY: A Recurrent-Neural-Network-based Codon Optimization Tool to Improve Protein Expression Towards Efficient Vaccine Manufacturing**  
# Rishab Jain, 16, Sophomore, Westview High School, Portland, Oregon,  
T: Georgianne Harris
- ENEV031**     **Recycling Household Plastics for Use in 3D Printing Applications**  
Nathan Muszynski, 17, Senior, Liberty High School, Hillsboro, Oregon,  
T: Steffan Ledgerwood
- MATS016**     **First-Principles Characterization of a Novel Chromium Doped Vanadyl-Oxide Based Cathode for Higher Energy and Efficiency Lithium-ion Batteries**  
Vedanth Iyer, 17, Senior, Sunset High School, Portland, Oregon, T: Korin Riske
- PHYS028**     **Quantum Machine Learning Simulation of Higgs Boson Charge Parity Symmetry Violation**  
## Lane Braun, 18, Senior, Beaverton Academy of Science and Engineering, Hillsboro, Oregon, T: Melissa Shell

### Portland, USOR05, Aardvark Science Exposition

- EAEV008**     **Developing a User-Friendly System for Predicting Harmful Levels of Marine Biotoxins**  
# Lila Schweinfurth, 18, Senior, Oregon Episcopal School, Portland, Oregon,  
T: Bettina Gregg

# Finalist Directory

- EBED011      Polaris: A Radiation Source Location Visualization System Using Gamma-Geometry Calculation**  
Pun Siripun, 16, Sophomore, Oregon Episcopal School, Portland, Oregon,  
T: Bettina Gregg
- EGSD006      Development of Optimum Design Parameters for an Algae Based Martian Oxygen Production System**  
Kara Gaiser, 17, Junior, Oregon Episcopal School, Portland, Oregon, T: Bettina Gregg
- PHYS035      Musical Harmony and Dissonance: The Mathematical Quantification and Analysis of Two-Note Intervals on the Piano**  
Maxwell Tsai, 15, Sophomore, Oregon Episcopal School, Portland, Oregon,  
T: Bettina Gregg
- ROBO016      The Role of Income in Hospital Pricing: Using Regression Models to Predict Hospital Markup**  
Frances Claire McConnell, 16, Junior, Oregon Episcopal School, Portland, Oregon,  
T: Bettina Gregg
- Wilsonville, USOR06, CREST-Jane Goodall Science Symposium**
- BEHA023      Video Game Reward Systems and Their Impact on Players' Behavior in the Iterated Prisoner's Dilemma**  
Madeline Audrey Santoso, 14, Freshman, West Linn High School, West Linn, Oregon,  
T: Jennifer Howe
- CBIO039      Novel Evolutionary Artificial Intelligence Methods for *de novo* Drug Design**  
Anish Goswami, 16, Sophomore, West Linn High School, West Linn, Oregon,  
T: Brian Delfatti
- CHEM034      Detection of Nitrogen Levels in Sample Using Novel, Accessible, Cost Effective, Accurate, Safe, Simple, Reusable Method**  
Aditi Bhaskar, 16, Sophomore, Wilsonville High School, Wilsonville, Oregon,  
T: Sophie Kirscht
- MATS017T      Testing the Tensile Strength of Student Engineered Starch-Based Bioplastic**  
Jadyn Rain Sherry, 18, Senior, Linnea J Collett, 18, Senior, Wilsonville High School,  
Wilsonville, Oregon, T: Jay Schauer T: Danielle Grenier
- Salem, USOR07, Central Western Oregon Science Expo**
- EBED019      Preventing Hot Car Deaths by Monitoring CO<sub>2</sub> and Temperature Levels to Alert Parents and Affect a Series of Life Saving Interventions in the Car**  
John William Madland, 16, Sophomore, South Salem High School, Salem, Oregon,  
T: Mark Madland
- PHYS012      Radio Emissions of Anomalous X-ray Pulsars**  
Leon Garcia, 16, Sophomore, Corvallis High School, Corvallis, Oregon,  
T: Sue Ann Heatherly
- Bend, USOR08, Central Oregon Community College Regional Science Expo**
- ENEV028      Removing Carbon Dioxide from Coal Exhaust via an Olivine and Sodium Hydroxide Filter**  
# Teaghan Rose Knox, 17, Junior, Bend Science Station, Bend, Oregon, T: David Bermudez
- ROBO030      Mean Green Recycling Machine: Robotic-Assisted Recycling Using Neural Networks**  
## Jacob Jiaxu Zhao, 18, Senior, Bend Science Station, Bend, Oregon, T: David Bermudez
- Portland, USOR50, Northwest Science Expo**
- ANIM060      Predicting Knee Luxation Force for Various Gallinaceous Bird Species Using Musculoskeletal Measurements of the Leg**  
Madison Susanne Nicole Carson, 17, Junior, Oregon Episcopal School, Portland, Oregon, T: Bettina Gregg
- EAEV124T      Progression of Sea Star Wasting Syndrome on the Oregon Coast**  
Anna L Nielsen, 17, Senior, Sophia L. Nielsen, 17, Senior, West Linn High School, West Linn, Oregon, T: Nancy Monson

# Finalist Directory

- ENBM090**     **Optimizing the Holter Diagnostic Process Using a Real-time, Machine Learning-Powered, Ambulatory Event Monitor**  
 Ronald Lin, 15, Sophomore, International School of Beaverton, Beaverton, Oregon,  
 T: Jaimie Yee
- ENBM100**     **An Innovative Microcontroller-Driven Illumination System to Correct Moderate to Severe Color Vision Deficiency**  
 Vladimir Mamchik, 15, Sophomore, Jesuit High School, Portland, Oregon,  
 T: Lara Shamieh
- ENMC076**     **A Predictive Model for Prevention of Hydroplaning Related Car Crashes Using Piezoelectric Sensors and Autoencoder Neural Networks**  
 Ishan Ahluwalia, 15, Freshman, Jesuit High School, Portland, Oregon, T: Lara Shamieh
- MATH037**     **Generalizing Kirchhoff Laws for Signed Graphs**  
 Peter Ye, 17, Junior, Catlin Gabel School, Portland, Oregon, T: Joey Grissom

## PENNSYLVANIA

### Harrisburg, USPA01, Capital Area Science and Engineering Fair

- EAEV030**     **Which Is the Best Spotted Lanternfly Trap?**  
 Samuel Koda, 15, Sophomore, Hershey High School, Hershey, Pennsylvania,  
 T: Jason Sibbach
- ENBM034**     **A Step Towards Solving Foot Pain: A Novel Shoe with Customizable Magnetic Levitation to Reduce Ground Reaction Forces through Pronation-Targeted Computer Vision Pose Estimation, Year 3**  
 ##  
 Dev Lochan, 18, Senior, Cumberland Valley High School, Mechanicsburg, Pennsylvania,  
 T: Mike Floreck
- ENBM035**     **Employing Adversarial Machine Learning and Computer Audition for Smartphone-Based Real-Time Arrhythmia Classification in Heart Sounds**  
 Aditya Kendre, 17, Senior, Cumberland Valley High School, Mechanicsburg, Pennsylvania, T: Mike Floreck

### Lancaster, USPA02, North Museum Science and Engineering Fair

- EAEV092**     **Using Bivalve Mollusks to Detect Water Contaminates**  
 Joshua Matthew Rennekamp, 18, Senior, Conestoga Valley Senior High School, Lancaster, Pennsylvania, T: James Hovan
- EGSD045**     **The Effect of Ground Composition on the Efficiency of Solar Pavers**  
 #  
 Lilly Ann Heilshorn, 18, Senior, Hempfield High School, Landisville, Pennsylvania,  
 T: Neal Kuhn

### Philadelphia, USPA03, Delaware Valley Science Fairs

- ANIM051**     **Breakthroughs in Honey Bee Health: Continuous-Release Mist Diffusion of Thymol-Based Essential Oils**  
 Kaitlyn Nicole Culbert, 15, Freshman, Toms River High School North, Toms River, New Jersey, T: Christine Girtain
- BCHM028**     **Stem Cell Behavior and Osteogenic Differentiation on Plant-Derived Scaffolds**  
 Maya Sonal Butani, 16, Junior, Moorestown High School, Moorestown, New Jersey,  
 T: Sean Watson
- BCHM029**     **Effects of Bioactive Compounds in Berry Seed Extracts on Cariogenic and Periopathogenic Bacteria**  
 Giovanna Marie Onofrietti, 17, Senior, Toms River High School North, Toms River, New Jersey, T: Christine Girtain
- BEHA074**     **Demonstrating a Potential Causative Link Between Dendritic Degeneration and Hydrocephalus Using Par3 Conditional Knockout Mouse Models**  
 Bill Zhang, 17, Senior, Holmdel High School, Holmdel, New Jersey, T: Josephine Blaha



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Engineering

# **ISEF 2021 FINALISTS**

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# Finalist Directory

- BMED077**      **Chronic Sleep Deprivation Induces Brain Inflammation via CCR2-mediated Peripheral Monocyte Infiltration**  
Jason Wang, 17, Junior, Germantown Academy, Fort Washington, Pennsylvania,  
T: Philip Rittenhouse
- BMED078**      **Single-cell Atlas of Mouse Colitis Tissue**  
# Lucy Yi Wang, 16, Sophomore, Methacton High School, Eagleville, Pennsylvania,  
T: Robert Helm
- BMED082T**      **Effects of Grape Seed Extract (GSE) Consumption on Egg Production in *Drosophila melanogaster* Adults**  
Maria Hromcenco, 16, Junior, Cassandra Hung, 17, Junior, Pennsylvania Leadership Charter School – University Scholars Program, West Chester, Pennsylvania,  
T: Katherine Przeworski
- CBIO091**      **The SLED (Shelf Life Expiration Date) Tracking System: Combating Food Waste and Food Borne Illnesses from Expiration Using Machine Learning**  
Srilekha Mamidala, 14, Freshman, Garnet Valley High School, Glen Mills, Pennsylvania,  
T: Brenda Frost
- ENBM093**      **Novel Fully MRI Compatible Nonmagnetic and Dielectric Pneumatic Servo Motor for MRI Guided Surgical Robotics**  
Leo Wylonis, 16, Junior, Conestoga High School, Berwyn, Pennsylvania, T: Scott Best
- ENMC072**      **Implementation of Novel Semi-Supervised Machine Learning Model into Autonomous Irrigation Network Optimized for Power Self-Sufficiency**  
Arya Tschand, 17, Senior, High Technology High School, Lincroft, New Jersey,  
T: Dina Ellsworth
- PHYS073**      **The Study of the Effect of Topspin on the Trajectory of a New Tennis Ball**  
Jue Gong, 15, Sophomore, High Technology High School, Lincroft, New Jersey,  
T: Craig Queenan
- ROBO078**      **SPOTNET: A Novel End-to-End Algorithm that Utilizes Convolutional Neural Networks to Recognize Potholes in Two-Dimensional Monocular Images**  
Riya Sikand, 15, Freshman, Ranney School, Tinton Falls, New Jersey, T: Roxanne Spencer
- ROBO082**      **Autonomous COVID-19 Screening Using Deep Learning and Low-cost Thermal Imaging**  
Yash V Prabhu, 16, Sophomore, North Penn Senior High School, Lansdale, Pennsylvania,  
T: Melody Leithold
- Pittsburgh, USPA04, Pittsburgh Regional Science & Engineering Fair**
- BMED040**      **Activation of Pregnane X Receptor for Xenobiotic Detoxification: A Novel Approach to Targeting Pollution-Related Diseases**  
Rajan T. Reddy, 17, Senior, Winchester Thurston School, Pittsburgh, Pennsylvania,  
T: Graig Marx
- BMED042**      **Interleukin-33 Promotes Th17 Cell Clonal Expansion in the B16 Tumor Microenvironment**  
# Andrew Warren Ni, 17, Junior, Pine-Richland High School, Gibsonia, Pennsylvania,  
T: Ann Gollapudi
- BMED059**      **Activation of Novel Autophagy Pathways to Protect Hepatocyte Injury by Chloroquine**  
Michael Ziqi Gao, 16, Sophomore, North Hills High School, Pittsburgh, Pennsylvania,  
T: Nicholas Hand
- CBIO059**      **Data Mining to Identify Therapeutic Targets for Transplant Rejection**  
Zoe Shira Lakkis, 15, Junior, Fox Chapel Area High School, Pittsburgh, Pennsylvania,  
T: Justin Patterson
- EAEV065**      **Examining the Effects of Marine Microplastics on Porifera Microbial Filtration**  
# Natalie McGee, 16, Junior, Mt. Lebanon High School, Pittsburgh, Pennsylvania,  
T: Kyle Tilger

# Finalist Directory

- EGSD028**     **Optimizing Nannochloropsis Growing Conditions for Biodiesel Production through Analysis of Lipid Content**  
Steven Diwen Liu, 17, Junior, Shady Side Academy, Pittsburgh, Pennsylvania,  
T: Devon Renock
- SOFT030**     **Enabling High-Accuracy Human Activity Recognition with Fine-Grained Indoor Localization**  
Arvind Seshan, 16, Sophomore, Fox Chapel Area High School, Pittsburgh, Pennsylvania,  
T: Justin Patterson
- Reading, USPA05, Reading and Berks Science and Engineering Fair**
- ENMC066**     **The Engineering and Construction of a Large-Capacity CNC Router for Inexpensive Computerized Manufacturing**  
Holden E. Rice, 16, Sophomore, Conrad Weiser High School, Robesonia, Pennsylvania,  
T: John Siefert
- MCRO053**     **Presence of Wolbachia in Wild Adult *Lycorma delicatula***  
Erin Marie Horack, 17, Senior, Conrad Weiser High School, Robesonia, Pennsylvania,  
T: John Siefert

## RHODE ISLAND

**Warwick, USRI50, Rhode Island Science and Engineering Fair**

- BMED069**     **Butyrate: Bridging Bench to Bedside—Bringing Hope for Better Diagnostic and Therapeutic Options for Peanut Allergies**  
###  
Isabella Mary Lillian Heffernan, 17, Senior, Saint Mary Academy Bayview, Riverside,  
Rhode Island, T: Janell Johnson
- CELL027**     **Utilizing Alloferon Peptide to Improve Growth Performance and Survival Rate of Mealworms (*Tenebrio molitor*) in Mass-Scale Insect Farming**  
David Shon, 18, Junior, Portsmouth Abbey School, Portsmouth, Rhode Island,  
T: Stephen Zins

## SOUTH CAROLINA

**Aiken, USSC01, Central Savannah River Area Science and Engineering Fair**

- ANIM023**     **Effects of Embryological Exposure to Cortisol on Gene Expression during Tailfin Regeneration in Adult Zebrafish**  
Krish Mathur, 17, Junior, Lakeside High School, Evans, Georgia, T: Charlotte Smith

**Bluffton, USSC02, Sea Island Regional Science Fair**

- BEHA036**     **I've Got Bias on the Brain: An Investigation Regarding the Relationship between an Individual's Pre-existing Bias and Their Perception**  
Kathleen Kaye Hammett, 15, Freshman, John Paul II Catholic School, Ridgeland,  
South Carolina, T: Alice Wood
- BMED044T**     **How Do Various Controlled Substances Affect *Daphnia magna*?**  
#  
Jacquelyn Grace Sullivan, 16, Sophomore, Jared Parker Reuben#, 17, Junior, Hilton Head Preparatory School, Hilton Head Island, South Carolina, T: Janet Sullivan
- ENMC073**     **Engineering a Program to Locate Intruders Inside a Building by Comparing Recorded Audio to Predicted Decibel Levels from Computer Simulations**  
Nathaniel Lee Abrams, 16, Sophomore, Hilton Head Preparatory School, Hilton Head Island, South Carolina, T: Janet Sullivan
- MCRO045**     **Probiotics in the Fight Against Stony Coral Tissue Loss Disease**  
Anabella Platt, 15, Freshman, Hilton Head Preparatory School, Hilton Head Island,  
South Carolina, T: Janet Sullivan

**Charleston, USSC03, Low Country Science Fair**

- EAEV128**     **A Novel Low-Cost Filtration System for Removing Arsenic and Improving Health in Rural Populations**  
##  
Ishraq Haque, 18, Senior, Academic Magnet High School, North Charleston, South Carolina, T: Katharine Metzner-Roop

# Finalist Directory

## Columbia, USSC04, USC Central South Carolina Region II Science and Engineering Fair

**BMED070**     **The Effect of Ayurvedic Plant Extracts—*Mucuna pruriens* and *Brassica oleracea*—on the Alleviation of Motor Symptoms in PINK1 *Drosophila melanogaster*: A Model of Parkinson's Disease**  
Sanjana Parise, 16, Junior, Spring Valley High School, Columbia, South Carolina,  
T: Michelle Spigner

**ROBO069**     **Partially Speaker-Dependent Automatic Speech Recognition Using Deep Neural Networks**  
Christopher Li, 17, Junior, Spring Valley High School, Columbia, South Carolina,  
T: Michelle Spigner

## Spartanburg, USSC07, Piedmont South Carolina Region III Science Fair

**BCHM015T**     **Should Drinking Water Be Disinfected with Monochloramine?**  
# Cam Srivastava, 16, Sophomore, Logan Sean Kusher#, 16, Junior, Spartanburg Day School, Spartanburg, South Carolina, T: Jason Lonon

## SOUTH DAKOTA

### Aberdeen, USSD01, Northern South Dakota Science and Math Fair

**ANIM032**     **The Effects of Pulsed Electro-Magnetic Fields on Bovine Semen Phase II**  
Avery Miles, 15, Sophomore, Doland High School, Doland, South Dakota,  
T: Melissa Knox

**MCRO042**     **Recombinant Bacteria Capable of Expressing Type I Collagen Proteins**  
Simon Maxwell Bickford, 18, Senior, Roncalli High School, Aberdeen, South Dakota,  
T: Donna Herrick

**PHYS044T**     **Go with the Flow**  
Madeline Knox, 17, Junior, Brody Leisinger, 17, Junior, Highmore Harrold, Highmore, South Dakota, T: Jackie Knox

### Brookings, USSD02, Eastern South Dakota Science and Engineering Fair

**ANIM062T**     **Are Your AI Cattle Having a Better Growth Rate than Your Bull Bred Calves?**  
Carissa Scheel, 15, Freshman, Avery A. Orth, 15, Freshman, Wessington Springs, South Dakota, T: James Kruse

**BEHA070**     **A Multifaceted Insight into Addiction Treatment Programs in the Midwest: Identifying Factors Influencing Treatment Participation and Retention**  
## Aditya Tummala, 16, Junior, Brookings High School, Brookings, South Dakota,  
T: Laura Hummel

**CBIO066**     **Determining Factors that Improve the Efficiency of Capture-Recapture**  
Alexa Grace Sees, 18, Senior, Avon High School, Avon, South Dakota, T: Paul Kuhlman

**MCRO057**     **Romaine Calm: Using a Phage-Enzyme Combination to Treat *E. coli* Contamination in Produce**  
# William Vincent Hummel, 17, Junior, Brookings High School, Brookings, South Dakota,  
T: Laura Hummel

### Rapid City, USSD03, High Plains Regional Science and Engineering Fair

**BEHA058T**     **The Effects of Social Conformity**  
Tuffy Lee Simon, 18, Senior, Dustin Jacob Kraft, 18, Senior, Timber Lake High School, Timber Lake, South Dakota, T: Louise Lindskov

**EGSD047**     **Wind Turbine Blades: Cleaner Materials for Cleaner Energy**  
Ethan Jaye Johnston, 18, Senior, Timber Lake High School, Timber Lake, South Dakota,  
T: Luann Lindskov

# Finalist Directory

## TENNESSEE

### Chattanooga, USTN01, Chattanooga Regional Science and Engineering Fair

**CHEM072**     **Developing a High Protein Vegan Meal Replacement**  
Vaidehi Rathod, 17, Junior, Chattanooga School for the Arts and Sciences, Chattanooga, Tennessee, T: Kelly Davis

**ROBO090**     **Developing a Fish Image Classification System for Mouse Creek, Cleveland, TN Using Machine Learning**  
Rishi Soni, 17, Junior, Cleveland High School, Cleveland, Tennessee, T: Jeannie Long

### Knoxville, USTN04, Southern Appalachian Science and Engineering Fair

**EAEV100**     **Spatial Pattern and Correlation Analysis to Understand the Relationship of City Structure on the Urban Heat Island (UHI) Intensity Across the US**  
Ridhima Singh, 15, Sophomore, Farragut High School, Knoxville, Tennessee, T: Matthew Milligan

**ROBO061**     **Jarvis: A Robotic Companion**  
Jackson Everett Moody, 16, Junior, L&N STEM Academy, Knoxville, Tennessee, T: Bryan Schultz

### Memphis, USTN05, Memphis-Shelby County Science and Engineering Fair

**MATS051**     **Controlled Release of Statin Drugs via Hydrogel Implants**  
# Naisha Anaum Chowdhury, 17, Junior, Pleasant View School, Memphis, Tennessee, T: Farhana Chowdhury

### Nashville, USTN06, Middle Tennessee Science and Engineering Fair

**EBED030**     **Off Target: Improving the Electrical Sabre**  
Charlotte Landman, 15, Freshman, Brentwood High School, Brentwood, Tennessee, T: Franklin King

**ENMC077T**     **Automatic Basketball Return Chute that Uses Color Tracking to Rebound the Ball to the Player as They Move around the Court**  
Elijah Plattner, 17, Junior, Wills Stoddard Kookogey, 17, Junior, The Academy Tutorial, Hermitage, Tennessee, T: Anne Elise Napier

## TEXAS

### Dallas, USTX01, Beal Bank Dallas Regional Science and Engineering Fair

**BEHA002**     **ParkinSensor: Computer Vision and Ensemble Machine Learning-Based Incipient Diagnosis for Parkinson's Disease Using Neuromuscular Biomarkers**  
Sidhya Venkata Peddinti, 16, Junior, Plano East Senior High School, Plano, Texas, T: Julie Baker

**CBIO004**     **Tackling Tau: Identifying a Novel Inhibitor for the MSUT-2 Protein based on Quantum Machine Learning for the Identification of Treatments of Neurodegenerative Diseases**  
Rithvik Ganesh, 17, Junior, Plano West Senior High School, Plano, Texas, T: Emily Sharma

**CHEM001**     **Biodegradable Plastics Made from Waste Biomethane**  
Kevin Sun, 15, Sophomore, Jasper High School, Plano, Texas, T: Vashka Desai

**EBED012**     **A New Paradigm for the Visually Impaired Spectrum Based on a LiDAR System**  
Nethra Srikanth Krishnan, 16, Junior, Plano West Senior High School, Plano, Texas, T: Emily Sharma

**EBED013**     **A Crash and an Airbag: Creating a Algorithm for an External Airbag System**  
Abhinav Malkoochi, 16, Sophomore, Jasper High School, Plano, Texas, T: Vashka Desai

**ENBM004**     **Happy Feet: A Low-Cost Smart Shoe Utilizing Temperature, Pressure, Humidity, and Alcohol Levels to Detect and Monitor Common Foot Problems**  
Vishnu Vasudev, 15, Sophomore, Liberty High School, Frisco, Texas, T: Holley Mosley

# Finalist Directory

- ENEV010T**     **Project TetreNet: Augmenting Wildfire Mitigation With Rapid-Scale Deployment of Low-Cost Nanosatellite Networks Driven by Computer Vision Analysis**  
Abhinav Bichal, 18, Senior, Rohan Chimalapati, 17, Senior, Sarvesh Sathish, 16, Junior, Lebanon Trail High School, Frisco, Texas, Texas Academy of Mathematics and Science, Denton, Texas, T: Derek McDowell
- MCRO002**     **Generating a Non-toxic, Multi-pathway Targeted Cocktail Treatment Composed of N- Acetylcysteine, Carvacrol, and DNase to Inhibit *Pseudomonas* Biofilm Proliferation *in vitro***  
Shriya Prakash Bhat, 16, Sophomore, Plano East Senior High School, Plano, Texas, T: Julie Baker
- ROBO003 #**     **DocAide: A Collaborative AI Medical Assistant Using Novel Autonomous Learning**  
Harshal V. Bharatia, 16, Junior, Plano Senior High School, Plano, Texas, T: Elizabeth Carson
- El Paso, USTX02, Sun Country Science Fair**
- BCHM032**     **Feel It in Your Heart: The Effects of Caffeinated Drinks on the *Daphnia* Heart**  
Isabella Chavez Miranda, 17, Senior, Maxine L. Silva Magnet High School for Health Care Professions, El Paso, Texas, T: Sandra Rivera
- ENEV053T**     **Water Filtration Systems: Re-engineered**  
Jessica Marie Perez, 17, Junior, Thomas Ramirez, 17, Junior, Americas High School, El Paso, Texas, T: Elizabeth Mullins
- PLNT022**     **The Effects of Various Disinfection Agents on the Germination of *Phaseolus vulgaris***  
Andrew Mayne Grine, 15, Sophomore, Coronado High School, El Paso, Texas, T: Brian Gillis
- Fort Worth, USTX03, Fort Worth Regional Science and Engineering Fair**
- ANIM015**     **The Effect of Red 40 on the Aggression of Subsequent Generations of *Drosophila melanogaster***  
Isabella Rene Sanchez, 17, Junior, Granbury High School, Granbury, Texas, T: Priscilla Lumbrellas
- BCHM007**     **Molecular Dynamics Investigation of Poly [ADP-Ribose] Polymerase 1 Inhibitors as Treatment for V762A Single-Nucleotide Polymorphism Correlated with Ovarian Cancer, Lung Cancer, and Follicular Lymphoma**  
Neel Shanmugam, 17, Junior, Texas Academy of Mathematics and Science, Denton, Texas, T: Samuel Earls
- BEHA024**     **Don't Trip; TRIPP! The Effect of a Virtual Reality Meditation Environment on Stress and Mindfulness**  
Stefan Alek Salasles, 17, Junior, Colleyville Heritage High School, Colleyville, Texas, T: Sonya Loughran
- CHEM019**     **Pressure-Driven C-H Activation through Non-Bonding Anagostic Interactions for Petroleum Hydrocarbon Transformation**  
Carly Yang, 16, Junior, Texas Academy of Mathematics and Science, Denton, Texas, T: Samuel Earls
- EAEV029T**     **Developing a Free Energy Parameter Model for the Prediction and Mapping of the Uptake of Hazardous Organic Pollutants by Plant Cuticle Membranes**  
Jennifer Mengzhu Huang, 17, Senior, Shrika Eddula, 17, Senior, Texas Academy of Mathematics and Science, Denton, Texas, T: Samuel Earls
- MATS011**     **The Analysis of Chitosan in Reducing the Initial Burst Effect in Electrospun Nanofiber-Based Drug Delivery Systems (DDS)**  
Sunehra Rahman Chowdhury, 17, Junior, Colleyville Heritage High School, Colleyville, Texas, T: Sonya Loughran
- TMED013T**     **Using Post-Illumination Pupil Response as a Novel Biomarker for Parkinson's Disease**  
Allen Chau, 16, Junior, Brianna Chan, 16, Junior, Texas Academy of Mathematics and Science, Denton, Texas, T: Mark Albert T: Samuel Earls

# Finalist Directory

## Brownsville, USTX04, Rio Grande Valley Regional Science and Engineering Fair

- EAEV019      The Hurricane Engine: Identifying the Correlation Between Ocean Eddies and the Development and Intensification of Hurricanes**  
Michelle Arguello, 17, Junior, James Pace High School, Brownsville, Texas, T: Dora Lopez
- ROBO021      Submersible Robotic System Used to Clean Calm Bodies of Water**  
Benjamin Ian Gracia, 17, Senior, James Pace High School, Brownsville, Texas, T: Dora Lopez
- TMED009      Human iPSC-Derived Cardiomyocyte Model Reveals the Transcriptomic Bases of SARS-CoV-2 Infection Induced Myocardial Injury**  
Kashish Kumar, 17, Junior, Science Academy of South Texas, Mercedes, Texas, T: Tim Sears
- TMED010T      Developmental Neurotoxicity of Artificial Sweeteners and Ethanol in *Danio rerio* Embryos**  
# Rianna Rachel Trevino, 17, Junior, Gaddiel Alejandro Garcia#, 17, Junior, Homer Hanna High School, Brownsville, Texas, T: Phebe Martinez-Fuentes

## Houston, USTX05, Science Engineering Fair of Houston

- BEHA016      Anxiliary: A Novel Wearable Body Sensor Based Machine Learning System for the Detection, Tracking, and Intervention of Anxiety Disorders**  
Pranav Somani, 16, Sophomore, College Park High School, The Woodlands, Texas, T: Joseph Ewbank
- CBIO019      Effect of Smoking on TGF-beta Signaling in Breast Cancer Patients**  
Maegha Tipirneni, 15, Sophomore, Friendswood High School, Friendswood, Texas, T: Dawne Welch
- CHEM011      Keep Our Water Away from FOG**  
# Zhi-Wei Steven Zeng, 18, Senior, Zeng Homeschool, Katy, Texas, T: Ying Feng
- EGSD011      Bio-Power**  
Sohan Kureti, 15, Freshman, Harmony School of Advancement, Houston, Texas, T: Yen Nguyen
- ENBM022      Developing a Cost-Effective Visual Aid Device to Mitigate the Effects of Retinitis Pigmentosa**  
Ganesh Venu, 16, Sophomore, Friendswood High School, Friendswood, Texas, T: Dawne Welch
- ENEV019      An Automated Differentiation Method of Recyclable Textiles via Hyperspectral Imaging**  
Zoe Yu, 16, Sophomore, College Park High School, The Woodlands, Texas, T: Sara Fox
- ENMC020T      Designing an Aerospike Nozzle**  
Max Oberg, 18, Senior, Logan Murray, 17, Senior, College Park High School, The Woodlands, Texas, T: Katrina Cantrell
- ENMC034      Stable Shores: An Experimental Set-Up to Test Economical Alternatives to Conventional Coastal Erosion Control**  
Ved Xi Ganesh, 16, Sophomore, Dulles High School, Sugar Land, Texas, T: Kristin Mathew
- MATH017      Negative Binomial Regression to Model Dengue Cases Using Weather Factors**  
Sanuja Dilanka Manage, 16, Sophomore, College Park High School, The Woodlands, Texas, T: Katrina Cantrell
- MATS004      Scalable and Sustainable Synthesis of a Novel, Bio-Based Polyurethane Foam System Incorporating Industrial Byproducts and Waste**  
# Sohi Sanjay Patel, 15, Sophomore, College Park High School, The Woodlands, Texas, T: Sara Fox

# Finalist Directory

- PLNT004      The Effectiveness of *Pontederia cordata* in the Phytoremediation of Copper Sulfate**  
Cindy Shen, 14, Freshman, College Park High School, The Woodlands, Texas, T: Sara Fox
- SOFT027      StockSy: A Stock Prediction and Analysis Toolkit Using Nonparametric Regression**  
Daniel Konstantin Yamakov, 17, Senior, College Park High School, The Woodlands, Texas, T: Joseph Ewbank
- Kilgore, USTX06, East Texas Regional Science Fair**
- BCHM003      Testing the Efficiency of Alternative Source of Cellulase to Break Down Cellulose from Biomass Compared to Commercial Cellulase**  
Christopher Alan Acker, 18, Senior, Lufkin High School, Lufkin, Texas, T: Charlotte Stover
- Laredo, USTX07, United Independent School District Regional Science Fair**
- BCHM014      Investigating Absorption of iron(II) by Apo Lactoferrin Using pH**  
Daniel Alejandro Musquiz, 16, Junior, John B. Alexander High School, Laredo, Texas, T: Veronica Villarreal
- Lubbock, USTX08, South Plains Regional Science and Engineering Fair**
- PHYS016      Modeling Type Ia Supernovae Hydrodynamics Using Walking Droplets**  
Rafael Amato Regis de Farias, 18, Senior, Lubbock High School, Lubbock, Texas, T: Milene de Farias
- PLNT005      Evaluation of In-Ground Irrigation Systems on Homeowner's Lawns**  
## Michael (Mac) Andrew Chaloupka, 16, Junior, Christ the King Cathedral School, Lubbock, Texas, T: Alicea Chaloupka
- Odessa, USTX09, Permian Basin Regional Science Fair**
- ENEVO42      Exhausted: Reducing Pollution from Vehicle Emissions (Year 3)**  
Michael Crawford Trees, 16, Sophomore, Trees Family Home School, San Angelo, Texas, T: Janice Trees
- San Antonio, USTX11, Alamo Regional Science and Engineering Fair**
- ANIM008      The Investigation of Photobiomodulation as a Factor to Impact Physical Damage, Psychological Behavior, and Metabolic Activity Following a Traumatic Brain Injury in *Drosophila melanogaster***  
Joanna Sohn, 14, Freshman, Keystone School, San Antonio, Texas, T: Jason Nydegger
- BEHA007      Evaluating Perceptions of High School Students and Faculty on Covid-19 Forced Remote Learning via Mixed Methods Study Design for Developing Novel Pedagogies**  
Sharanya Sharma, 15, Sophomore, Health Careers High School, San Antonio, Texas, T: Ramaswamy Sharma
- BEHA018T      Fear in the Age of COVID-19: The Implications of Death Counts, Tests, and Reported Metrics**  
Alinne Romero-Torres, 16, Sophomore, Brenda Romero-Torres, 16, Sophomore, Young Women's Leadership Academy, San Antonio, Texas, T: Karen Harris
- CBIO008      The Genetics of Human Aging: Predicting Age and Age-Related Diseases by Deep Mining High Dimensional Biomarker Data**  
Hannah Guan, 15, Sophomore, BASIS San Antonio Shavano Campus, San Antonio, Texas, T: Maia Bland
- CBIO011      Using Artificial Intelligence to Predict Survival in Patients with Prostate Cancer**  
Shreya Chaudhary, 17, Junior, Keystone School, San Antonio, Texas, T: Jason Nydegger
- CBIO016      mRNA Vaccine Sequence Design Using Discrete Optimization Techniques Applied to the SARS-CoV-2 Virus**  
Sarah Cross, 16, Sophomore, Keystone School, San Antonio, Texas, T: Jason Nydegger
- ENBM015      Wearable Electrochemical Sweat Sensor for Patients with Chronic Kidney Disease, Year II**  
Suran Upul Somawardana, 17, Junior, BASIS San Antonio Shavano Campus, San Antonio, Texas, T: Maia Bland

# Finalist Directory

## Waco, USTX12, Central Texas Science and Engineering Fair

### **EAEV073     Determining the Natural Microbial Flora Found on the Stem Surfaces of Aquatic Plants and Their Connection to Water Filtration**

Madelyn Machelie Kirklin, 15, Freshman, Live Oak Classical School, Waco, Texas,  
T: Katherine Pitts

### **ENMC049T     Engineering an Environmentally Friendly 3D-Printed Rocket Engine**

##

Caleb Wilson Chakmakjian, 18, Senior, John Blanton Lewis, 17, Senior, Live Oak Classical School, Waco, Texas, T: Katherine Pitts

## Austin, USTX13, Austin Energy Regional Science Festival

### **BCHM010     Using Hodgkin-Huxley Differential Equations to Determine the Inhibitory Effects of Potent Neurotoxins that Lead to the Damaging of Voltage-gated Channels in Mammalian Neuron Cells Leading to Multiple Sclerosis**

Rajvi Rakesh Babaria, 15, Sophomore, Vista Ridge High School, Cedar Park, Texas,  
T: Rhonda Christman

### **CBIO037     Refinement of SNP Mutations of Atopic Dermatitis Related Filaggrin through Existing R Packages**

Aniket C. Naravane, 17, Junior, Lake Travis High School, Austin, Texas, T: Lauren Taylor

### **EAEV039     Larvicidal "Trojan-horse": Experimentally Developing a Novel Low-Cost and Eco-Friendly Mosquito Vector Control Treatment**

Aseel Rawashdeh, 16, Junior, L C Anderson High School, Austin, Texas,  
T: Vincent Wrencher

### **EGSD020     Developing a Wearable Triboelectric Nanogenerator to Sustainably Power Biosensors**

Armaan Verma Sireddy, 16, Sophomore, Westwood High School, Austin, Texas,  
T: Christin Key

### **PHYS029     Predicting the Impact of Stellar Kinematics and Dynamics on Habitability in the Milky Way**

##

Camille Chiu, 18, Senior, College Station High School, College Station, Texas,  
T: Casey Akin

### **PHYS031T     A Mathematically Driven Physical Analysis into Exoplanet Detection Confirmation Surveys Using Bayesian Inferential Statistics, Machine Learning/Linear Algebra Sklearn and TensorFlow Techniques, the BATMAN Python Programming Library, 3D Printing Techniques, and a Custom-made Python Processing Pipeline for Image Analysis and Lightcurve Detection**

Pratham Babaria, 17, Junior, Ethan Chandra, 16, Junior, Harmony School of Endeavor, Austin, Texas, T: Joseph Kat

## Laredo, USTX14, Laredo Independent School District Science Fair

### **ENMC009     Hydroloop II: Magnetohydrodynamic Loop**

#

Ken Yaguchi, 17, Junior, Hector J. Garcia Early College High School, Laredo, Texas,  
T: Lorena Madriaga

## Corpus Christi, USTX15, Coastal Bend Regional Science Fair

### **CBIO006     Experimental Detection System for Senile Dementia- A Novel, Systematic Approach Using Metabolomics, Bioinformatics, and Circuitry to Develop a Biosensor through Metabolomic Electrical Resistance Analysis for Detection of Early Onset Alzheimer's**

Priyam Ryan Kumar, 15, Sophomore, Santa Gertrudis Academy High School, Kingsville, Texas, T: Veronica Alfaro

### **ENBM013     Max Health: A Smart Textile Biosensor System for Remote Health Monitoring and Anomaly Detection**

###

Ibrahim Samhar Al-Akash, 18, Senior, Veterans Memorial High School, Corpus Christi, Texas, T: Porifirio Zamora

# Finalist Directory

## College Station, USTX50, Texas Science and Engineering Fair

- ANIM061T**    **The Effect of Protease-Activated Receptors (PAR- 4) on the Fertility and Progeny of *C. elegans* as a Potential Therapeutic Agent for Hereditary Chronic Inflammatory Diseases**  
# Swetha Velayutham, 16, Junior, Vyshnavi Poruri#, 16, Junior, Plano East Senior High School, Plano, Texas, T: Julie Baker
- CBIO096T**    **A Non-Invasive Ear-EEG Hearing Aid to Address the Cocktail Party Problem via Cloud-Based Deep Learning**  
# John Rho, 18, Senior, Govardhan Thirumurthy Poondi#, 18, Senior, Plano West Senior High School, Plano, Texas, T: Jerry Pruett
- CELLO37**    **The Neuro-Protective Role of Select Transcription Factors in a PINK1 Loss-of-Function Based Model of Neurodegeneration in *Drosophila melanogaster***  
Parisa Aryana Vaziri, 18, Senior, Plano East Senior High School, Plano, Texas, T: Julie Baker
- EAEV106T**    **GLAS: A Global Landslide Analytics System**  
Shrey Joshi, 16, Junior, Ishaan Javali, 17, Junior, Plano East Senior High School, Plano, Texas, T: Julie Baker
- EAEV121T**    **A Third Year Study on the Bioremediation of Tetracycline Polluted Soils: How Antibiotic Resistance Can Reduce Antibiotic Pollution in the Environment and a Solution to Antibiotic Pollution-Related Crop Failure**  
# Sanjana Hiremath, 17, Junior, Sriya Teerdhala#, 16, Junior, Plano East Senior High School, Plano, Texas, T: Julie Baker
- EBED028**    **Smart Parkinson's Strap: To Dynamically Detect and Mitigate the Tremors of Parkinson's Patients**  
Anushka Dhaya Sridhar, 15, Freshman, Plano East Senior High School, Plano, Texas, T: Julie Baker
- ENBM077**    **FallWatch: A Novel Approach for Through-Wall Fall Detection in Real-Time for the Elderly Using Artificial Intelligence**  
Aditya Chebrolu, 16, Junior, Independence High School, Frisco, Texas, T: Derek McDowell
- MATS049**    **Carbon Dioxide Conversion to Hydrocarbon Fuel Utilizing Metal Catalyst**  
# Christopher Changhoon Huh, 16, Junior, Westwood High School, Austin, Texas, T: Christin Key
- PHYS072**    **A Population of Planetary Systems on Aligned Orbits with Wide Binary Companions**  
Sam Christian, 17, Senior, Liberal Arts and Science Academy, Austin, Texas, T: Neno December
- PLNT051**    **The Longevity of Plant-Based Bioremediation in Water: An Investigation on the Longevity of the Flocculating Capabilities of *Moringa oleifera* Lam. Seed Extracts in Water Purification**  
Zach Vazhekatt, 17, Senior, Coppell High School, Coppell, Texas, T: Holly Anderson
- ROBO060**    **Using Convolutional Neural Networks (CNN) Image Recognition to Program the Artificially Learned C3BO: Cancer Blood Oncologist**  
Leonardo Amato Regis de Farias, 16, Sophomore, Lubbock High School, Lubbock, Texas, T: Milene de Farias
- TMED053T**    **ProteCount: An AI-Based Reader for Rapid Protein Quantification**  
Sridatta Vinay Teerdhala, 18, Senior, Sameer Parameshwar, 17, Senior, Venu Madhav Poruri, 18, Senior, Plano East Senior High School, Plano, Texas, T: Julie Baker

## UTAH

### Farmington, USUT01, North Davis Area Science and Engineering Fair

- BMED074T**    **Mask Up**  
Kaiimilani Crockett, 16, Sophomore, Tymakoa Crockett, 16, Sophomore, Woods Cross High School, Woods Cross, Utah, T: Janette Duffin

# Finalist Directory

- ENMC046**     **Beneficiation of Clayey Soils Using Aggregate Blending and Cement Stabilization**  
Adam Zachary Guthrie, 18, Senior, Timpview High School, Provo, Utah, T: Joy Petrucka
- TMED035**     **Testing the Use of Phage Andhra at Five pH Levels to Treat Skin Infections Caused by Three Strains of the Bacteria *Staphylococcus epidermidis* and Identifying Strains with the CRISPR-Cas9 System**  
Summer Aspen Moulder, 16, Junior, Pleasant Grove High School, Pleasant Grove, Utah, T: David Van Dijk
- Salt Lake City, USUT05, University of Utah Science and Engineering Fair**
- BEHA026**     **Grasping Gestures: An Analysis of the Aesthetics of Dance through the Lens of Physics and Computer Science**  
Malavika Singh, 17, Junior, West High School, Salt Lake City, Utah, T: Enrique Larreta
- BEHA027**     **Mental Health during COVID-19: The Role of Knowledge and Information Sources**  
Yvonne Jaeyou Kim, 17, Junior, West High School, Salt Lake City, Utah, T: Seung-Hee Son
- CBIO031**     **Predicting Molecular Phenotypes with Single Cell RNA Sequencing: An Assessment of Unsupervised Machine Learning Models**  
Anastasia Dunca, 17, Junior, West High School, Salt Lake City, Utah, T: Enrique Arce-Larreta
- CELL014**     **How Do Specific Mutated Genes Affect Metabolic Functioning in *Prochlorococcus*?**  
Aiden John Pasinsky, 17, Junior, Beehive Science and Technology Academy, Sandy, Utah, T: Kerrie Upenieks
- EAEV033**     **Locking Down: The COVID-19 Pandemic and Air Pollution in Salt Lake City**  
Caleb Matthew Grow, 18, Senior, Jordan High School, Sandy, Utah, T: Heather Gooch
- ROBO034**     **Use of Collaborative Robotics in Mass Production of Freehand Components**  
Nathaniel Loveless, 16, Sophomore, West High School, Salt Lake City, Utah, T: Enrique Arce-Larreta
- Ogden, USUT07, Harold W. & Helen M. Ritchey Science and Engineering Fair of Utah**
- EAEV096**     **Abrupt Change in Ice Loss Rate of Alaska's Glaciers Observed from GRACE and GRACE-FO Data**  
Junsung Park Lee, 16, Sophomore, Logan High School, Logan, Utah, T: Christina Howell
- EAEV097**     **Minimum Slope Required for Liquefaction Induced Lateral Ground Displacement to Occur in a Confined Soil Mass Subject to a Simulated Seismic Shock**  
# Rosemary A. Yahne, 17, Junior, Northern Utah Academy for Math, Engineering and Science, Layton, Utah, T: Nickole Brooks
- MATH042**     **Dynamic Paired Comparison Prediction Using Modified Elo Ratings**  
# Julien Grijalva, 16, Junior, Northern Utah Academy for Math, Engineering and Science, Layton, Utah, T: Nickole Brooks
- MCRO049**     **Creating Highly Efficient Auxin-Producing Soil Bacteria to Promote Crop Growth**  
## Gary Zhan, 16, Junior, Logan High School, Logan, Utah, T: Christina Howell
- VERMONT**
- Northfield, USVT50, Vermont Science, Technology, Engineering and Mathematics Fair**
- EAEV105**     **Functional Roles of Mysis and Amphipods Between Lake Basins Faced by Two Different Stressors: Zebra Mussels and Cyanobacteria Blooms**  
Hiba Ali, 17, Junior, South Burlington High School, South Burlington, Vermont, T: Nathaniel Moore
- MCRO058**     **Evaluation of Phosphatase Genes in *Aspergillus fumigatus* for Viability as Novel Therapeutic Targets, Year Two**  
## Emily Ann Dean, 17, Senior, Woodstock Union High School Middle School, Woodstock, Vermont, T: Vanessa Cramer

# Finalist Directory

- EAEV088**     **Detection of Coliforms in Adam's Canyon Watershed**  
Thanaphone Glenn Shields, 15, Freshman, West Point Junior High School, West Point, Utah, T: Haylie Tracy
- ENMC058**     **A Robotics Assistive Device Application in Minimizing Manibus Tremors in Persons Afflicted with Bradykinesia: Phase V**  
##  
Shaylee Stanger, 17, Junior, Clearfield High School, Clearfield, Utah, T: Jana Barrow
- MCRO031**     **PCR Pandemonium: A Study of Thermophilic Bacteria DNA Polymerases and Their Application in PCR**  
#  
Sierra Lutz, 18, Senior, Farmington High School, Farmington, Utah, T: Jana Barrow
- PHYS059T**     **Transportation of the Future: How the Variance of Diamagnetic Properties Apply to Transportation**  
Jaci Moss, 16, Sophomore, Joshua Hilbig, 15, Sophomore, Woods Cross High School, Woods Cross, Utah, T: Janette Duffin
- PLNT029**     **Conducting Research for the Benefit of Agriculture: Separating *Phaseolus vulgaris* Seeds into Groups**  
Abbigail Dawn Matthews, 14, Freshman, West Point Junior High School, West Point, Utah, T: Haylie Tracy
- Cedar City, USUT02, Southern Utah Science and Engineering Fair**
- BMED065**     **Effects of Brewing Conditions on the Antioxidant Capacity of *Artemisia tridentata***  
Tyneeshia Amber Shortman, 17, Junior, South Sevier High School, Monroe, Utah, T: Deborah Morgan
- EAEV093**     **The Burning Effects of Sunscreen on Coral Algae (*Zooxanthellae*)**  
Adrie Earl, 17, Junior, Success Academy DSU, St. George, Utah, T: Megan Liljenquist
- MATS039**     **Manganese Nanoparticle Synthesis Using Various Capping Agents and the Effects of Nanoparticles on *Raphanus sativus*: A Second Year Study**  
#  
Taytum Oakden Stratton, 16, Sophomore, Canyon View High School, Cedar City, Utah, T: Cassy Sandoval
- PLNT039**     **Effects of Hydroponic Growth on Antioxidant Levels of *Lactuca sativa***  
Beth Mace Robinson, 15, Freshman, South Sevier High School, Monroe, Utah, T: Deborah Morgan
- Ogden, USUT03, Weber Area Science and Engineering Fair**
- BEHA014**     **How Diverse Learning Environments Impact Students' Overall Well-Being**  
Lucianna Katherine Davis, 16, Sophomore, Fremont High School, Plain City, Utah, T: Robert Riley
- EAEV013**     **Environmental Impact of Batteries on Animal and Human Health through Soil and Groundwater Contamination**  
McKayla J. Tingey, 18, Senior, Weber High School, Pleasant View, Utah, T: Colten Smith
- EAEV014**     **Comparative Analysis of the Effectiveness of Cetyl Alcohol (Hexadecan-1-ol) and Shade Balls in Preventing Evaporation of Water**  
Alyse Amelia Radle, 15, Freshman, North Ogden Junior High, North Ogden, Utah, T: Lareen Radle
- PHYS015**     **The Effects of Mass and Grade on Cycling Effort**  
Lucas Joseph Staten, 15, Freshman, Bonneville High School, Washington Terrace, Utah, T: Benjamin Sherman
- Provo, USUT04, Central Utah STEM Fair**
- ANIM039**     **Connections Between Wing Color and Color Vision Among the Monarch Butterfly and the Rare White Morph, *Danaus plexippus nivosus***  
Kyri Forman, 18, Senior, Timpanogos High School, Orem, Utah, T: Josh Heward
- ANIM040**     **Comparison of Same-Hen Yolk and Serum Antibody Levels Using the Elisa Test Following Vaccination with Typical Vaccines Used in Commercial Laying Hens**  
##  
Jesse Shepherd, 17, Junior, Spanish Fork High School, Spanish Fork, Utah, T: Brad Warren

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# Finalist Directory

## VIRGINIA

### Arlington, USVA01, Northern Virginia Science and Engineering Fair

**CELLO31**      **Single-cell RNA Sequencing Analysis of Human Neural Grafts Revealed Unexpected Cell Type Underlying the Genetic Risk of Parkinson's Disease**  
Susan (Yingshan) Wang, 17, Junior, Episcopal High School, Alexandria, Virginia,  
T: Gang Wu

**EAEV094**      **Development of a Zeolite Composite Material for the Simultaneous Removal of Pharmaceuticals, Personal Care Products (PPCPs), and Perfluorinated Alkyl Substances (PFAS) in Water Treatment**

**##**      James Licato, 18, Senior, Washington-Lee High School, Arlington, Virginia,  
T: Lourdes Sotomayor

### Charlottesville, USVA02, Virginia Piedmont Regional Science Fair

**BEHA052**      **Analyzing Political Polarization through Agent-Based Modeling**  
Samuel Perry Rosner, 17, Junior, Albemarle High School, Charlottesville, Virginia,  
T: Kevin Huff

**ROBO088**      **A Fall Detection and Prevention Shoe for the Elderly and Balance Impaired**  
Anna Rosner, 15, Sophomore, Albemarle High School, Charlottesville, Virginia,  
T: Kevin Huff

### Fairfax, USVA03, Fairfax County Regional Science and Engineering Fair

**ANIM026**      **What's All the Buzz? *Drosophila melanogaster* as a Unique Model for Addiction Disorders and Physiology After Traumatic Brain Injury (TBI)**  
**#**      Shan Lateef, 17, Senior, Thomas Jefferson High School for Science and Technology, Alexandria, Virginia, T: Jennifer James

**BCHM011T**      **Protein Secondary Structure Assignment (SSA) by Clustering Amino Acid Residues in the Space of Topological Descriptors**  
Sumanth Ratna, 16, Junior, Sagar Gupta, 17, Junior, Thomas Jefferson High School for Science and Technology, Alexandria, Virginia, T: Dan Tra

**BCHM013T**      **Managing Hyperlipidemia: Algae as Lipase Inhibitors**  
Gitali Bhanot, 16, Junior, Sana Ashlyn Friedman, 16, Junior, Oakton High School, Vienna, Virginia, T: Grace Wang

**CHEM024**      **The Effect of the Mass of Sodium Bicarbonate on Endothermic Reactions**  
Kiara Adrianna-Stephenson Fenn, 16, Sophomore, Fairfax High School, Fairfax, Virginia,  
T: Sara Hubbard

**CHEM025**      **New Methods for Computing the Configurational Entropy of Deeply Supercooled Liquids with the Potential Energy Landscape**  
**#**      Kaïen Yang, 18, Senior, Thomas Jefferson High School for Science and Technology, Alexandria, Virginia, T: Brian Kennedy

**ENBM044**      **An Ultra-Low Cost, Brain-Controlled Transluminal Prosthesis Operated via a Novel EEG/Gesture-Based Approach**  
Benjamin Choi, 16, Junior, The Potomac School, McLean, Virginia, T: Isabelle Cohen

**PHYS030T**      **Modeling Coronal Faraday Rotation of Radiation from Extragalactic Radio Sources**  
Aditi Jayaram Chandrashekar, 18, Senior, Vance Kreider, 18, Senior, Thomas Jefferson High School for Science and Technology, Alexandria, Virginia, T: Kelsey Stuart

**SOFT024**      **DORC: Dynamic Operating Room Companion for Gallbladder Removal Surgery Workflow Verification**  
Pravalika Gayatri Putalapattu, 16, Junior, Thomas Jefferson High School for Science and Technology, Alexandria, Virginia, T: Shane Torbert

**TMED022**      **PANDwriting: An Accessible Parkinson's and Alzheimer's Novel Diagnostic Framework Using Vision-Based Handwriting Kinematic Analysis and Machine Learning**  
Ron Nachum, 16, Junior, Thomas Jefferson High School for Science and Technology, Alexandria, Virginia, T: John Zacharias

# Finalist Directory

- TMED024     A-EYE: Utilizing Multistage Neural Networks and Landmark Localization for Fundus Image Disease Detection**  
Thomas Ka-Chun Chia, 17, Junior, Chantilly High School, Chantilly, Virginia,  
T: Corey Porter
- Harrisonburg, USVA04, Shenandoah Valley Regional Science and Engineering Fair**
- ANIM035     Jumping Spiders Perform Head Saccades During Prey Tracking**  
Nathalie Schelin, 17, Junior, Mountain Vista Governors School, Middletown, Virginia,  
T: Corey Cleland
- EAEV040     Eastern Skunk Cabbages: A Natural and Sustainable Solution for Combating Bank Erosion**  
Chelsea Hu, 15, Freshman, BASIS Independent McLean, McLean, Virginia,  
T: Raymond Wright
- Lynchburg, USVA05, Central Virginia Regional Science Fair**
- EGSD029     Using Piezoelectricity to Create a Self-Powered Calculator**  
Jade Axele Personna, 16, Junior, Central Virginia Governor's School for Science and Technology, Lynchburg, Virginia, T: Jeff Steele
- PLNT018     The Effect of Added Polyamines on *Glycine max* Responses to Drought**  
Beverly Eborn, 16, Junior, Central Virginia Governor's School for Science and Technology, Lynchburg, Virginia, T: Michele Chamot
- Manassas, USVA06, Prince William-Manassas Regional Science and Engineering Fair**
- ANIM057     Evaluating the Benefits of Selected Medicinal Herbs on the Regeneration Rate of *D. dorotocephala***  
Agnes Eunbin Cho, 16, Sophomore, Osbourn Park High School, Manassas, Virginia,  
T: Julia Renberg
- CBIO071T     Augmenting 3D, T1-Weighted, Magnetization-Prepared Rapid Acquisition with Gradient-Echo (MP-RAGE) Sequenced MRIs through Gaussian Filters and Skull Stripping for Alzheimer's Disease Diagnosis via 3D CNNs**  
Khoi Anh Nguyen, 18, Senior, Anish Chandra Pothireddy, 18, Senior, Ashish Pothireddy, 17, Senior, Governor's School at Innovation Park, Manassas, Virginia, T: Ales Psaker
- Ashburn, USVA07, Loudoun County Science and Engineering Fair**
- CBIO058     Molecular Docking Analysis of Novel SARS-CoV-2 Inhibitors Based on Structural Homology**  
Jonah Han, 17, Senior, Independence High School, Ashburn, Virginia, T: Benjamin Kagan
- PHYS045     Identification of Albedo Variations on Asteroid Surfaces through Comparisons Between Optical and Infrared Datasets**  
Jack Nowinski, 17, Junior, Academies of Loudoun, Leesburg, Virginia, T: Ethan Kantz
- ROBO045     Uncovering of Aged Sanskrit/Devanagari Documents Utilizing Generative Adversarial Networks and Tomography to Multidimensionally Reconstruct Missing Elements**  
Srivatsa Krishnamurthy, 16, Junior, Rock Ridge High School, Ashburn, Virginia,  
T: Dermot McGee
- SOFT032T     Automatic Music Generation with Deep Learning**  
Adelynn Crim Jones, 17, Senior, Jaehee Kim, 18, Senior, Academies of Loudoun, Leesburg, Virginia, T: Tobie Juleau
- Roanoke, USVA08, Western Virginia Regional Science Fair**
- EAEV044     Analysis of Microbial Diversity in PCB-Contaminated Environments**  
Eleanor Thompson Little, 16, Sophomore, Roanoke Valley Governor's School for Science and Technology, Roanoke, Virginia, T: Joanne Villers
- ENMC056T     Rotating Weekly Pill Dispenser**  
Sydney Elizabeth Vokus, 17, Junior, Kierstyn Alise Stanley, 17, Senior, Roanoke Valley Governor's School for Science and Technology, Roanoke, Virginia, T: Andrew Hurst

# Finalist Directory

- MCRO023T**    **The Effect of *Trametes versicolor* Infused Bandages on *Staphylococcus epidermidis***  
Emma Kathleen Greer, 18, Senior, Cynthia Kaitlyn Lin, 17, Junior, Jennie Pham, 18, Senior,  
Roanoke Valley Governor's School for Science and Technology, Roanoke, Virginia,  
T: Joanne Villers
- Norfolk, USVA09, Tidewater Science and Engineering Fair**
- CBIO078T**    **Application of Deep Learning in Target Identification through Determining the Mechanism of Action Given Cellular Signature Data**  
Omar Abul-Hassan, 16, Junior, Ayush Jain, 17, Junior, Ocean Lakes High School,  
Virginia Beach, Virginia, T: Babette Shoemaker
- EAEV069**    **Rapid Intensification of Hurricanes in the Atlantic Basin**  
Cameron Blake Carter, 18, Senior, Ocean Lakes High School, Virginia Beach, Virginia,  
T: Allison Graves
- Radford, USVA10, Blue Ridge Highlands Regional Science Fair**
- MATH023**    **Modeling COVID-19: Simulating the Effects of Waning Immunity Using a New Multi-Compartment Epidemiological Model**  
Shoshana Sarah Elgart, 15, Freshman, Blacksburg High School, Blacksburg, Virginia,  
T: Lauren Childs
- MCRO018**    **Diversity of Arctic Ice Bacteria in Relation to Position and Distance from the Shore**  
Katelyn Idella Elizabeth Collett, 18, Senior, Southwest Virginia Governor's School,  
Pulaski, Virginia, T: Rebecca Philips
- Richmond, USVA11, Metro Richmond STEM Fair**
- EAEV063**    **Aero2Aqua: A Novel Bioinspired Atmospheric Water Harvester**  
##  
Cameron Sharma, 17, Junior, Mills E. Godwin High School, Henrico, Virginia,  
T: Heather Martin
- ENBM091**    **The Effect of Rat Brain Phantom Construction on Mimicry of the True Brain Model**  
Chirayu Sachin Nimonkar, 17, Junior, Mills E. Godwin High School, Henrico, Virginia,  
T: Samantha Cope
- MCRO028**    **The Effect of Coronavirus Species on the Binding Strength to a Neutralizing Antibody**  
Monona J. Zhou, 14, Freshman, Mills E. Godwin High School, Henrico, Virginia,  
T: Samantha Cope
- ROBO077**    **A Novel Integrative WSI-Based Deep Learning Framework for Breast Cancer IMS Classification**  
Laasya Konidala, 16, Sophomore, Mills E. Godwin High School, Henrico, Virginia,  
T: Dana Delano
- Roanoke, USVA50, Virginia State Science and Engineering Fair**
- CBIO088**    **Automated Bias Reduction in Deep Learning Based Melanoma Diagnosis Using a Semi-Supervised Algorithm**  
Sauman Das, 16, Sophomore, Thomas Jefferson High School for Science and Technology, Alexandria, Virginia, T: Malcolm Eckel
- ENMC045**    **A Self-Replicating 3D Printer**  
#  
Brian Minnick, 17, Senior, Academies of Loudoun, Leesburg, Virginia, T: John Chapin
- MATS038**    **Surface Modifications of Cellulose Acetate Film for the Applications of Face Shields**  
Sunwoo E. Lee, 16, Junior, Thomas Jefferson High School for Science and Technology, Alexandria, Virginia, T: Robin Taylor
- ROBO089T**    **SoundScape: Real-Time 3D Sound Localization and Classification with Sensory Substitution for the Deaf and Hard of Hearing**  
#  
Eugene Choi, 16, Junior, Irfan Kabir Nafi#, 16, Junior, Raffu Al Khondaker#, 17, Senior,  
Thomas Jefferson High School for Science and Technology, Alexandria, Virginia,  
T: John Zacharias

# Finalist Directory

**TMED050 Identification of Fluoxetine as a Direct NLRP3 Inhibitor to Treat Atrophic Macular Degeneration: Molecular Modeling, Mechanism, Morphometry, and Meta-analysis (Year 2)**

# Meenakshi Ambati, 16, Junior, Albemarle High School, Charlottesville, Virginia,  
T: Bradley Gelfand

## WASHINGTON

**Kennewick, USWA01, Mid-Columbia Regional Science and Engineering Fair**

**BEHA037 Analysis of COVID-19 Misinformation Origin and Cure Narratives**  
Anika Halappanavar, 16, Sophomore, Richland High School, Richland, Washington,  
T: Dale Ingram

**CBIO038 Predicting the Risk of Other Species Susceptibility to SARS-COV-2 by Analyzing ACE2 Protein Sequences**  
Daniel Piao Li, 17, Junior, Hanford High School, Richland, Washington, T: Brian Palmer

**EGSD021 Modeling of Ion Uptake to Understand Molecular Level Interactions of Pyrrole/Nafion and Aniline/Nafion Bipolar Membranes for Fuel Cell Use**  
## Nikhita Amrutha Bontha, 16, Junior, Hanford High School, Richland, Washington,  
T: Brian Palmer

**Tacoma, USWA02, South Sound Regional Science and Engineering Fair**

**CHEM033T A Perovskite Crystal Structure Prediction and Screening System Using Complex Machine Learning Methods**  
# Smriti Manickam Somasundaram, 16, Junior, Sathvik Nallamalli##, 17, Senior, Olympia High School, Olympia, Washington, T: Paul Rae

**EAEV058 New Estimates of Nitrogen Fixation on Early Earth**  
Madeline Eve Christensen, 18, Senior, Bellarmine Preparatory School, Tacoma, Washington, T: Dave Degroot

**ENMC054T Study Comparison: Avalanche Snow Probes versus Conventional Snow Pit in Determining Avalanche Danger**  
Luke Joufflas, 18, Senior, Henry Connor Jacobson, 18, Senior, Bellarmine Preparatory School, Tacoma, Washington, T: Dave DeGroot

**ROBO057 Phytoplankton Detection Using Machine Learning and a Mobile Application**  
Jordan Alexander Janakievski, 18, Senior, Bellarmine Preparatory School, Tacoma, Washington, T: Dave DeGroot

**Bellevue, USWA03, Central Sound Regional Science & Engineering Fair**

**BEHA065 High Accuracy Neural Network Based Deep Learning Solution For Non-Intrusive Early Diagnosis of Dementia**  
Kosha Upadhyay, 14, Freshman, Bellevue Senior High School, Bellevue, Washington,  
T: Snehal Upadhyay

**CBIO060 Predicting Cancer Stem Cell Biomarkers with Machine Learning**  
Julia Liu, 16, Junior, Nikola Tesla STEM High School, Redmond, Washington,  
T: Kate Allender

**EAEV057 Path Dependence of Atlantic Meridional Overturning Circulation Weakening: A Geostrophic Shear Approach**  
Yuchen Li, 16, Junior, Nikola Tesla STEM High School, Redmond, Washington,  
T: Kate Allender

**PHYS037 Data-Driven Approaches to Pulsar Glitch Triggers, Evolution, and Universality**  
## Christine Ye, 16, Junior, Eastlake High School, Sammamish, Washington, T: Casey Green

**TMED032 Apply Machine Learning to Identify Unique Patient Clusters and Associated Key Biomarkers in Rheumatoid Arthritis Developing a Point of Care Test with a Multi Biomarker Panel for RA Patient Classification and Disease Progression**  
Gabriella Lui, 16, Junior, Newport Senior High School, Bellevue, Washington,  
T: Michelle Neises

# Finalist Directory

## Vancouver, USWA04, Southwest Washington Science and Engineering Fair

- BCHM005     Apoptotic Proteins**  
Fahmid Rahman, 18, Senior, Mountain View High School, Vancouver, Washington,  
T: Alison Nightingale
- CBIO024     MRI-based Diagnosis of Alzheimer's Disease Using Deep Learning with CycleGAN for Data Augmentation**  
Sunny Wang, 17, Junior, Camas High School, Camas, Washington, T: Brianna Abraham
- MATS013T     The Neptune by Hydrosolve: A Water-Soluble Facial Mask Combating Oceanic Plastic Pollution**  
Liyu Huang, 18, Senior, Jace Twyman Creech, 17, Senior, Bianca Luana Bucerzan, 18, Senior, Skyview High School, Vancouver, Washington, T: Mahenrika Malixi
- SOFT031     Lucia: Creating Performance-Focused Web Applications**  
Aiden Yutong Bai, 16, Sophomore, Camas High School, Camas, Washington,  
T: Brianna Abraham

## Spokane, USWA05, Eastern Washington Regional Science and Engineering Fair

- ANIM019     The Effect of Sugar Concentration Found in Popular Soft Drinks on *Armadillidium vulgare's* Innate Behavior Patterns**  
Rohini P. Kilaru, 17, Senior, Lewis & Clark High School, Spokane, Washington,  
T: Eric Strate
- EGSD009     The Use of Fluorescent Proteins GFP and EBFP2-BFP for Enhanced Solar Energy Production through the Usage of Magnifiers**  
Ainsley Honora McCollum, 18, Senior, Joel E. Ferris High School, Spokane, Washington,  
T: Darci Hastings
- ENBM031     Customized 3D Printing of Live Cells for Novel Bio-circuitry**  
Emily Elizabeth Scrupps, 16, Junior, Odessa High School, Odessa, Washington,  
T: Jeff Wehr
- ENEV027     Degradation of Bioplastics from Biomass Sources Used as an Alternative for Plastic Products**  
Anna Jean Armstrong, 17, Junior, Joel E. Ferris High School, Spokane, Washington,  
T: Darci Hastings

## Bremerton, USWA50, Washington State Science and Engineering Fair

- BEHA030     Identification of Co-Expressed Genes to BDNF and trk-B as Major Depressive Disorder Related Biomarkers Using Microarray Data**  
Jennifer Hu, 17, Junior, Nikola Tesla STEM High School, Redmond, Washington,  
T: Kate Allender
- CBIO065     Extreme Gradient Boosted Classification and Regression Trees to Predict Outcomes in Patients with Monoclonal Gammopathies of Undetermined Significance**  
Aheli Dutta, 17, Junior, Nikola Tesla STEM High School, Redmond, Washington,  
T: Kate Allender
- EAEV080     Predicting the Extent of Late Seasonal Wildfires in Washington Using the Correlation Between the Standardized Precipitation Index and Burned Area Data**  
Saketh Dhulipalla, 16, Junior, Nikola Tesla STEM High School, Redmond, Washington,  
T: Kate Allender
- ENBM085     Engineering a Clinical Force Measuring Walker for Patients with Restricted Upper Extremity Weight Bearing**  
# Ansel Kinney LaPier, 17, Junior, Central Valley High School, Spokane Valley, Washington,  
T: Kimberly Cleary
- ROBO051     ComposeGAN: A Conditional GAN Approach to Symbolic Music Style Transfer**  
Conan Lu, 16, Junior, Redmond High School, Redmond, Washington, T: Shlomo Dubnov
- TMED040     Determining the Prognostic Value of the DNA Methylation of the GYPC, NME1, and SLIT2 Genes in Human Lung Adenocarcinoma**  
Uma Paul, 17, Junior, Nikola Tesla STEM High School, Redmond, Washington,  
T: Kate Allender

# Finalist Directory

## WEST VIRGINIA

### Keyser, USWV01, Eastern Panhandle Science and Engineering Fair

- ENMC038     Creating a One-Thousand Dollar Supercomputer**  
Bronte Lea Stump, 16, Sophomore, Spring Mills High School, Martinsburg, West Virginia, T: Alexis Emch
- PHYS036     The Effect of a Paper Airplane's Wing Shape on the Distance the Paper Airplane Can Fly**  
Makaylee Haynes, 15, Freshman, Hedgesville High School, Hedgesville, West Virginia, T: Andrew Ferber

### Fairmont, USWV50, West Virginia State Science and Engineering Fair

- ANIM045     Chasing Fireflies: Creating a Firefly Sanctuary to Increase the Firefly Population**  
Alexandria Amaria Harper, 15, Freshman, Riverside High School, Belle, West Virginia, T: Robert McCloud
- ROBO070     Automated Recognition of Autism Based on Visual Analysis with Artificial Intelligence Techniques**  
# Alice Guo, 17, Junior, Morgantown High School, Morgantown, West Virginia, T: William Gibson

## WISCONSIN

### Glendale, USWI02, Nicolet Science and Engineering Fair

- SOFT055     Enterprise Scale Inventory Optimization: Building a Modern Web Application to Improve Inventory and Supply Chain Optimization by Incorporating Advanced Analysis and Business Intelligence into Existing Techniques with a Cohesive, User-friendly Solution.**  
Thomas Marshall Vielmetti, 17, Junior, Nicolet High School, Glendale, Wisconsin, T: Stephanie Rasmussen

### Milwaukee, USWI03, University School of Milwaukee – Science Fair

- BCHM004     Computer-Aided Investigation of Methoctramine-ExoU Interactions**  
Mya Lynneese Johnson, 18, Senior, University School of Milwaukee, Milwaukee, Wisconsin, T: Greg Marks
- BMED007     A Review of Shiga Toxin-producing *E. coli*-induced Convulsions/Seizures Effects on the Expressions of *Drosophila melanogaster***  
Jordan Lee Thomas, 15, Sophomore, University School of Milwaukee, Milwaukee, Wisconsin, T: Robert Juranitch
- ROBO009     Novel Implementation of Deep Learning for Breast Cancer Detection Using Convolutional Neural Networks and Transfer Learning**  
# Buwei Chen, 17, Junior, University School of Milwaukee, Milwaukee, Wisconsin, T: Robert Juranitch

### Madison, USWI04, Capital Science and Engineering Fair

- ENEV009     An Investigation into the Removal of Dyes and Plastic Microfibers from Wastewater**  
Anna Wang, 16, Junior, West High School, Madison, Wisconsin, T: Eric Gettrust
- ENMC008T     Method for Reducing Carbon Emissions from Small Two-Stroke Engines**  
Aidan Blenker, 17, Senior, Luke Foye, 18, Senior, Muskego High School, Muskego, Wisconsin, T: Karen Lindholm-Rynkiewicz

### Milwaukee, USWI50, Badger State Science and Engineering Fair

- CELLO38     Discovery of Novel Dual Phosphatase Kinase Regulating Pyocyanin Secretion in *Pseudomonas aeruginosa***  
Riju Dey, 16, Junior, Shorewood High School, Shorewood, Wisconsin, T: Sam Nadolsky

# Finalist Directory

- ENEV082      The Dispersion of Micron-Sized Aerosolized Particles Under Variable Air Environments: Implications in Respiratory Disease Transmission**  
Max Cole Watchmaker, 16, Sophomore, University School of Milwaukee, Milwaukee, Wisconsin, T: Robert Juranitch
- MATS018      The Effects of Lattice Structure on SLA 3D Printed Piezoelectric PVDF**  
Ethan Mark Zentner, 16, Sophomore, Nicolet High School, Glendale, Wisconsin, T: Stephanie Rasmussen

## WYOMING

Laramie, USWY50, Wyoming State Science Fair

- EBED008      Smart Caretaker: A Health Band to Assist in the Care of Alzheimer's Patients**  
Zoya Khan, 14, Freshman, Cheyenne Central High School, Cheyenne, Wyoming, T: Julie Calkins
- MATS012      Utilization of a Polystyrene-Dense Metal Matrix to Reduce Radiation Exposure and Weight Characteristics**  
Seamus Bercher, 18, Senior, Greybull High School, Greybull, Wyoming, T: Joel Kuper

## UNITED STATES VIRGIN ISLANDS

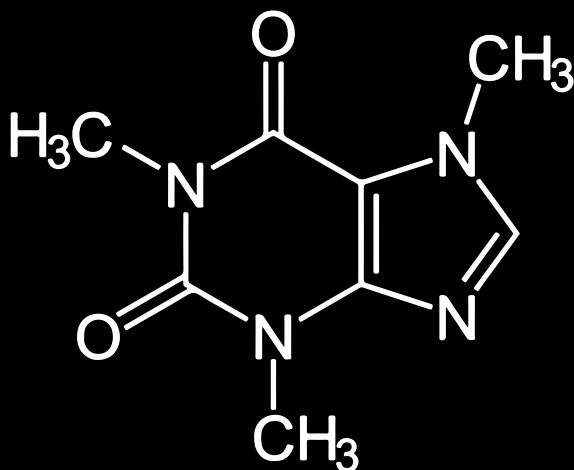
St. Croix, United States Virgin Islands, TEVI02, Good Hope Country Day School Science Fair

- BMED081      Beat the Heat**  
Aidan Joseph Fitzgerald, 15, Freshman, Good Hope Country Day School, Kingshill, United States Virgin Islands, T: Jane Coles
- ENMC075      Using Programming to Create Images into Tactile 3D Objects**  
Nick Turk, 15, Freshman, Good Hope Country Day School, Kingshill, United States Virgin Islands, T: Sara Dykstra

## VIETNAM

Ha Noi City, Vietnam, VNM001, Ha Noi Science Fair

- BEHA066T      High School Students' Psychological Difficulties in Online Learning**  
Phuc Viet Hoang, 16, Sophomore, Mai Phuong Vu, 17, Junior, Lao Cai High School for Gifted Students, Lao Cai, Lao Cai, Vietnam, T: Pham Hue
- BMED062T      Marine Microalgae: Natural Nutritious Food Source for Clam Larvae (*Meretrix meretrix*)**  
Thu Ngoc Minh Le, 17, Senior, Minh Anh Ngo, 15, Sophomore, Viet Duc Upper Secondary School, Hanoi, Hanoi, Vietnam, Chu Van An Upper Secondary, Ha Noi, Ha Noi, Vietnam, T: Huyen Bui
- CHEM052T      Optimize Peptide Polybia-MP1 as Potential Anticancer Agents**  
Anh Thuy Mai, 15, Sophomore, Tam Duc Do, 15, Sophomore, Lam Son High School for the Gifted, Thanh Hoa, Vietnam, T: Phuong Mai
- ENBM072T      Manual Function Rehabilitation Device for Post-Stroke Patients**  
Man Minh Huynh, 16, Junior, Khoi Dinh Mai, 17, Junior, Le Hong Phong High School for the Gifted, Ho Chi Minh, Vietnam, T: Triet Do
- ENMC060T      Robotic Arms for Paralyzed Arms**  
Linh Duc Pham, 16, Junior, An Duc Nguyen, 16, Junior, Han Thuyen High School, Bac Ninh, Vietnam, T: Tien Ngo
- MATH039T      Stimulating Mathematical Thinking through the System of Geometric Exercises and Games Designed by Scratch Programming**  
Khoa Dang Huynh, 14, Freshman, Chau Anh Le, 14, Freshman, Nguyen Tri Phuong Lower Secondary School, Hue, Thua Thien Hue, Vietnam, T: Trang Tran



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THE UNIVERSITY OF  
**CHICAGO**

# Finalist Directory

**MATS029T    On-Demand Release of Drug from Magnetic Nanoparticle-Loaded Alginate Beads**  
Minh Nguyet Nguyen, 15, Sophomore, Minh Duc Vu, 15, Sophomore, Nguyen Tat Thanh  
Lower and Upper Secondary School, Hanoi, Vietnam, T: Duc Tran

## **ZIMBABWE**

**Harare, Zimbabwe, ZWE001, Zimbabwe National Science Fair**

**CELL005    Yeast to Milk Technology**  
Taidaishe Nenyasha Mbizvo, 16, Sophomore, Queen Elizabeth Girls' High School, Harare,  
Zimbabwe, T: James Takaendesa

**CHEM010    Algae-Based Sol-Gel Technology: A Novel Approach to the Bioremediation  
of Wastewater**

**##**  
Vivian Clarissah Chinoda, 19, Senior, Queen Elizabeth Girls' High School, Harare,  
Zimbabwe, T: Knowledge Chikundi

**EAEV012    Climate Clock: A Window of Hope—Our Most Critical Time Window to Take Bold,  
Transformative Action to Protect Our Climate for All Generations**  
Marlvern Chimbwanda, 19, Senior, Mufakose 1 High School, Mufakose, Harare, Zimbabwe,  
T: Solomon Kembo

**EGSD007    The Profitable Catalytic Converter: Making a Converter that Stops the Emission of a  
Greenhouse Gas to Make a Fuel**  
Shammah Ruvimbo Tayengwa, 16, Junior, Queen Elizabeth Girls' High School, Harare,  
Zimbabwe, T: Knowledge Chikundi

**EGSD008    Waste Heat Recovery Cooking Pot**  
Tanaka Chirara, 16, Sophomore, ZRP High School, Harare, Zimbabwe,  
T: Richard Ngomanyuni

**EGSD030    Portable Self Powered Generator that Uses Magnetic Induction  
to Generate Electricity**  
Adrian Friend Machingura, 18, Senior, Mother Touch High School, Harare, Harare Province,  
Zimbabwe, T: Blessing Chipembere

**ENEV013T    Home Based Portable Water Purifier: A Water Quality Enhancement System**  
Panashe Muzite, 18, Senior, Macfaden Ngoni Tanaka Munyoro, 18, Senior, Nyatsime  
College, Harare, Harare, Zimbabwe, T: Cladius Choto

**ROBO024    The Keeper**  
Blessings Lethubuhle Mary Ncube, 18, Senior, Plumtree High School, Plumtree,  
Matabeleland South, Zimbabwe, T: Mercy Nyandoro

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Ricardo Gortaire

Carolyn Gramling

Lisa Grossman

Sujata Gupta

Hunter Hart

Lauren Helms

Lillian Hwang

Ashley Johnson

William Johnson

June Kee

Nora Kelly

Naveed Khan

Natalie Kinnear

Jonathan Lambert

Tracy Lee

Susan Li

Cassandra Martin

Edward Maxwell

Susan Milius

Macon Morehouse

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# In Recognition

## **SOCIETY FOR SCIENCE THANKS THE REGENERON TEAM WHO SO GREATLY CONTRIBUTED TO THE SUCCESS OF REGENERON ISEF 2021**

**Leonard S. Schleifer**

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**And the dozens of Regeneron employees who judge,  
interpret and volunteer at Regeneron ISEF.**

# In Recognition

Society for Science and Regeneron recognize with gratitude the judges, volunteers, parents, teachers and fair directors who support their local, regional, state and national science fairs.

We especially want to express our thanks to those individuals from around the globe who stepped forward to volunteer at this year's virtual Regeneron ISEF 2021. We recruited:

- **more than 1,600 judges**
- **454 volunteer judging proctors**
- **97 interpreters in 19 languages**

And unique to this year's virtual event, our volunteers came from 45 countries, regions and territories, including 48 states within the United States. We could not have done it without the support of the Society for Science Affiliated Fair Network and members of our various Local Arrangements Committees.

# ISEF College Fair Exhibitors

**Thanks to the following colleges, universities and other organizations for their support.**

- A. James Clark School of Engineering, University of Maryland
- AcceptU
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- Arizona State University
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- The George Washington University
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Society for Science is a champion for science, dedicated to expanding scientific literacy, effective STEM education and scientific research. Founded in 1921, we are a nonprofit 501(c)(3) membership organization focused on promoting the understanding and appreciation of science and the vital role it plays in human advancement. Through its acclaimed science research competitions, including the Regeneron Science Talent Search, the Regeneron International Science and Engineering Fair and the Broadcom MASTERS, and impactful outreach and equity programming, its award-winning magazine, *Science News* and digital media properties, *Science News for Students*, the Society is committed to inform, educate and inspire.

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### ABOUT REGENERON

Regeneron is a leading biotechnology company that invents life-transforming medicines for people with serious diseases. Founded and led for over 30 years by physician-scientists, our unique ability to repeatedly and consistently translate science into medicine has led to nine FDA-approved treatments and numerous product candidates in development, almost all of which were homegrown in our laboratories. Our medicines and pipeline are designed to help patients with eye diseases, allergic and inflammatory diseases, cancer, cardiovascular and metabolic diseases, pain, hematologic conditions, infectious diseases and rare diseases.

Regeneron believes that operating as a good corporate citizen is crucial to delivering on our mission. We approach corporate responsibility with three goals in mind: to improve the lives of people with serious diseases, to foster a culture of integrity and excellence and to build sustainable communities. Regeneron is proud to be included on the Dow Jones Sustainability World Index and the Civic 50 list of the most "community-minded" companies in the United States. Throughout the year, Regeneron empowers and supports employees to give back through our volunteering, pro-bono and matching gift programs. Our most significant philanthropic commitments are in the area of science education, including the Regeneron Science Talent Search and Regeneron International Science and Engineering Fair.

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