

REGENERON

ISEF

A PROGRAM OF
SOCIETY FOR SCIENCE

ATLANTA | 2022

FUTURE FORWARD

REGENERON INTERNATIONAL SCIENCE AND ENGINEERING FAIR
May 8–13, 2022

REGENERON®



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REGENERON INTERNATIONAL SCIENCE AND ENGINEERING FAIR 2022

Welcome from Regeneron	2
Welcome from Society for Science	3
About Regeneron ISEF	4
Social Media	5
Grand Awards	6
Special Award Organizations	10
Opening Ceremony Conversation	12
Excellence in Science and Technology Panel	13
Innovation and Entrepreneurship Panel	14
Women in STEM Panel	15
Finalist Directory	21
Society for Science Staff	186
In Recognition	187
ISEF College Fair Exhibitors	191

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 a 2022 Regeneron International Science and Engineering Fair (ISEF) finalist. We hope your experience lived up to your expectations of this distinguished competition. 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 these challenging few years.

Regeneron is honored to sponsor ISEF, shining a light on the world's top young science talent and the critical role you and your science can play in addressing our world's most important challenges. Supporting ISEF is a natural extension of Regeneron's mission to use science to improve human health.

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 almost 35 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.

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 in all your future endeavors.

Sincerely,

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

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

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*
Science Talent Search 1985

Congratulations on being a finalist at the Regeneron International Science and Engineering Fair 2022! Whether you competed in Atlanta or virtually, you have so much to be proud of. During a time when our world is being challenged by a pandemic and war, we were so impressed to see our finalists persevere.

Your research was tremendous, and I cannot wait to see what comes next for each and every one of you! ISEF alumni have gone on to win some of the most prestigious awards, including the Nobel Prize and MacArthur Fellowship, launched companies and joined academia to teach the next generation of scientists and engineers. You are all following in their footsteps.

Tens of millions of students compete in science fairs every year around the globe, with nearly 2,000 finalists this year competing for nearly \$8 million in awards and scholarships! We had finalists competing from 63 different countries, regions and territories.

This year, the Society did not know what to expect when we decided to try something completely new to us—a hybrid science competition. How many students would come together in person? Would we be able to keep our finalists competing in-person safe?

I am so pleased to report that Regeneron ISEF 2022 was a resounding success! Our virtual programming enabled anyone from around the world to view our finalists' research, and our streamed programming allowed a wide audience to hear from top scientists, engineers and entrepreneurs, including George Yancopoulos, Regeneron Scientific Founder, President & Chief Scientific Officer; Ángel Cabrera, President of Georgia Tech; Elizabeth Blackburn, winner of the 2009 Nobel Prize in Physiology or Medicine; Roderic Pettigrew, ISEF 1967 and Vannevar Bush Award winner; and Francis Collins, Science Advisor to President Biden.

Meanwhile, finalists who participated in Atlanta had an opportunity to connect with their fellow young scientists and engineers in person, tour the Georgia Aquarium and watch as cameras from National Geographic's new TV series, SCIENCE FAIR: THE SERIES, recorded it all.

I hope you enjoyed Regeneron ISEF 2022 finals week and continue to celebrate your accomplishments. I also encourage you to thank the people who helped you get here—including 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 of our sponsors, volunteers, judges and interpreters who made this event possible. I hope to see some of you next year in Dallas for Regeneron ISEF 2023!

Sincerely,

Maya Ajmera

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

REGENERON INTERNATIONAL SCIENCE AND ENGINEERING FAIR



ABOUT REGENERON 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 an international 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 \$8 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, Gordon and Betty Moore Foundation, Akamai Foundation, Dow, Howmet Aerospace Foundation, Jacobs, King Abdulaziz & his Companions Foundation for Giftedness & Creativity, Microsoft, Microsoft Azure Sphere, National Geographic Society, Richard F. Caris Charitable Trust II, Rise, Siegel Family Endowment, Arconic Foundation, Cesco Linguistic Services, Georgia Institute of Technology and Insaco. 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>

Social Media

USE #REGENERONISEF

Share your photos and videos to join the conversation.

Enjoy all the best Regeneron ISEF highlights:



twitter.com/**regeneron**
twitter.com/**society4science**



instagram.com/**regeneron**
instagram.com/**society4science**



facebook.com/**regeneron**
facebook.com/**society4science**



@**society4science**



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GRAND AWARDS AT REGENERON ISEF 2022

George D. Yancopoulos Innovator Award

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 was 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.

ETSD014: Investigating a Novel Electric Motor Design

- Robert Sansone, Fort Pierce Central High School, Fort Pierce, Florida, US

Regeneron Young Scientist Award

These finalists were selected for their commitment to innovation in tackling challenging scientific questions, using authentic research practices and creating solutions to the problems of tomorrow.

EGSD018: Bifunctional MOF for Hydrogen Production & Storage

- Abdullah Al-Ghamdi, Al-Hussan High School, Damman, Saudi Arabia

ENBM074: Synthetic DNA Engineering With ICOR

- Rishab Jain, Westview High School, Portland, Oregon, US

Gordon E. Moore Award for Positive Outcomes for Future Generations

This award was presented 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.

TMED010T: BiDEx – Liver Fluke Infection AI Screening System

- Napassorn Litchiowong, The Prince Royal's College, Chiang Mai, Thailand
- Chris Tiditjumnreonpon, The Prince Royal's College, Chiang Mai, Thailand
- Wattanapong Uttayota, The Prince Royal's College, Chiang Mai, Thailand

Craig R. Barrett Award for Innovation

This award was presented 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.

ETSD005: Small Radiosondes on a Great Mission

- Amon Schumann, Robert-Havemann-Gymnasium, Berlin, Germany

Peggy Scripps Award for Science Communication

This award was presented to the finalist who was best able to communicate their project to the lay public, explaining both the science and its potential impact on society.

EAEV066: EISa: Wildlife Poacher Detection Solution

- Anika Puri, Horace Greeley High School, Chappaqua, New York, US

Robert Horvitz Prize for Fundamental Research

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.

EAEV034: Reconstruction Modeling of Western North America

- Rebecca Cho, Jericho High School, Jericho, New York, US

Dudley R. Herschbach SIYSS Award

This award is a multi-disciplinary seminar inspiring youth to science, highlighting some of the most remarkable achievements by young scientists around the world. This award is named for Dudley R. Herschbach, Harvard Professor and 1986 Nobel Laureate in Chemistry. He is Board Chairman Emeritus of the Society for Science. The winning finalists will receive an all-expense paid trip to attend the Stockholm International Youth Science Seminar, which includes attendance at the Nobel Prize Ceremonies in Stockholm, Sweden.

BEHA001: FollowMe: Cortical Visual Impairment Therapy

- Asmi Kumar, Milton High School, Milton, Georgia, US

ENBM013: Deep Learning Based Cranial Surgery Planning

- Emirhan Kurtulus, Cagaloglu Anadolu Lisesi, Fatih, Turkey

ROBO076: Neuron-Specific Dropout Regularization

- Joshua Shunk, Perry High School, Gilbert, Arizona, US

EU Contest for Young Scientists Award

This award was presented to two projects that will represent Regeneron ISEF at the EU Contest for Young Scientists to be held in Leiden, Netherlands September 12–18, 2022.

ANIM007: Optimizing Bee Gut Immunity With a Novel MLR Model

- Varun Madan, Lake Highland Preparatory School, Orlando, Florida, US

ROBO002T: Soft Origami-Inspired 3D Print-In-Place AI Robots

- Sheng Ze Yeoh, Sekolah Menengah Kebangsaan Katholik, Selangor, Malaysia
- Saan Cern Yong, Sekolah Menengah Kebangsaan Katholik, Selangor, Malaysia

Grand Awards 2022 Winners

Grand Awards 2022 Winners



ETSD014

George D. Yancopoulos Innovator Award
Robert Sansone



EGSD018

Regeneron Young Scientist Award
Abdullah Al-Ghamdi



EAEV066

**Peggy Scripps Award
for Science Communication**
Anika Puri



ROBO076

Dudley R. Herschbach SIYSS Award
Joshua Shunk



ENBM074

Regeneron Young Scientist Award
Rishab Jain



TMED010T

**Gordon E. Moore Award for Positive
Outcomes for Future Generations**
Chris Tidtjumreonpon, Napassorn Litchiwong
and Wattanapong Uttayota



ENBM013

Dudley R. Herschbach SIYSS Award
Emirhan Kurtulus



BEHA001

Dudley R. Herschbach SIYSS Award
Asmi Kumar



ETSD005

Craig R. Barrett Award for Innovation
Amon Schumann



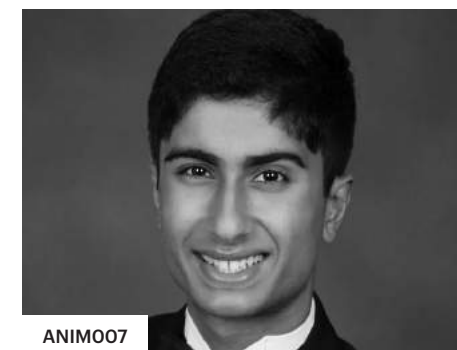
EAEV034

**Robert Horvitz Prize
for Fundamental Research**
Rebecca Cho



ROBO002T

EU Contest for Young Scientists Award
Sheng Ze Yeoh and Saan Cern Yong



ANIM007

EU Contest for Young Scientists Award
Varun Madan

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 2022 SAOs!

Acoustical Society of America
Air Force Research Laboratory on behalf of the United States Air Force
American Chemical Society
American Institute of Aeronautics & Astronautics
American Mathematical Society
American Meteorological Society
American Psychological Association
American Statistical Association
Arconic Foundation
Arizona State University
Association for Computing Machinery
Association for the Advancement of Artificial Intelligence
Central Intelligence Agency
China Association for Science and Technology
Drexel University
Drug, Chemical & Associated Technologies Association
Florida Institute of Technology
Fondazione Bruno Kessler
IEEE Foundation
International Council on Systems Engineering
K. Soumyanath Memorial Award
King Abdulaziz & his Companions Foundation for Giftedness & Creativity

Lawrence Technological University
Missouri University of Science and Technology
Mu Alpha Theta, National High School and Two-Year College Mathematics Honor Society
National Anti-Vivisection Society
National Oceanic and Atmospheric Administration
National Security Agency Research Directorate
National Taiwan Science Education Center
NC State University 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
Ricoh USA, Inc.
SAE International
Shanghai Youth Science Education Society
Sigma Xi, The Scientific Research Honor Society
U.S. Agency for International Development
United States Environmental Protection Agency
University of Arizona
Wolfram Research, Inc.
YM American Academy

Opening Ceremony Conversation



Ángel Cabrera
President, Georgia Institute of Technology

During the Opening Ceremony, the Regeneron ISEF finalists joined the Society's President & CEO, Maya Ajmera, in her conversation with President Ángel Cabrera, the 12th president of the Georgia Institute of Technology. Dr. Cabrera is a first-generation college graduate and earned his M.S. and Ph.D. in psychology and cognitive science from Georgia Tech, which he attended as a Fulbright Scholar.

Throughout the conversation, Dr. Cabrera shared his educational influences while growing up in Spain and why he is glad he switched to psychology. He also shared current STEM projects at George Tech, why higher education is important and the need for diversity.

Cabrera came to Georgia Tech after serving as president of George Mason University (GMU) in Virginia. During his presidency, GMU joined the top tier of research universities in the Carnegie Classification and was the fastest growing institution in the state. Before leading GMU, Cabrera was president of the Thunderbird School of Global Management, now part of Arizona State University, and dean of IE Business School in Madrid.

As a business educator, Cabrera has played a key role in advancing professional ethics, internationalization and corporate social responsibility. While serving as a senior advisor to the United Nations Global Compact, he was the lead author of the "Principles for Responsible Management Education" (PRME). A United Nations-supported initiative that advances sustainable development through management education, PRME has been adopted by more than 800 schools around the world. Cabrera is also a co-founder of the University Global Coalition, a network of global universities working in partnership with the United Nations in support of its Sustainable Development Goals.

Cabrera has been named a "Young Global Leader" by the World Economic Forum, a "Star of Europe" by Bloomberg Businessweek, a "Henry Crown Fellow" by the Aspen Institute and a "Great Immigrant" by the Carnegie Corporation of New York. He has received honorary degrees from Miami Dade College and Universidad Politécnica de Madrid.

Cabrera serves on the boards of the National Geographic Society, Harvard College Visiting Committee, Atlanta Committee for Progress, Metro Atlanta Chamber and Bankinter Innovation Foundation in Spain. He has served on the board of the Federal Reserve Bank of Richmond, the advisory boards of Georgia Tech and Instituto Tecnológico de Monterrey, and three publicly traded companies.



EXCELLENCE IN SCIENCE AND TECHNOLOGY PANEL

May 11, 2022, 11:00 a.m.–12:00 p.m.

Sponsored by Society for Science



ELIZABETH BLACKBURN

- Morris Herzstein Professor of Biology and Physiology, Biochemistry and Physics, University of California, San Francisco
- 2009 Nobel Prize in Physiology or Medicine



MARTIN CHALFIE

- Professor, Biological Sciences, Columbia University
- 2008 Nobel Prize in Chemistry

Moderated by



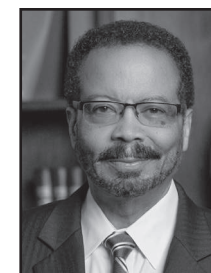
JOE PALCA

- Science Correspondent, National Public Radio



FRANCIS COLLINS

- Science Advisor to President Biden
- Former Director, National Institutes of Health



RODERIC PETTIGREW

- Chief Executive Officer, Engineering Health
- Robert A. Welch Professor and Inaugural Dean, Intercollegiate School of Engineering Medicine, Texas A&M University and Houston Methodist Hospital
- 2020 Vannevar Bush Award recipient
- ISEF 1967



INNOVATION, ENTREPRENEURSHIP AND IMPACT PANEL

May 11, 2022, 2:00 p.m.–3:00 p.m.

Sponsored by Rise



ULYANA HORODYSKYJ

- Scientist, Geologist, Mountaineer
- Founder, Science in the Wild
- Climate Communication Specialist, University of Colorado, Boulder
- National Geographic Grant awardee
- Semifinalist, NASA Astronaut Program
- STS 2003, ISEF 2000–2003



ASHLEY SARRACINO

- President, Native Ascension Community Development, LLC
- ISEF 1999–2000

Moderated by



MAYA AJMERA

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



MATTHEW TAMAYO-RIOS

- Founder & CEO, OpenLattice
- ISEF 2002



MO ZERBAN

- Founder, Tern Water
- ISEF 2010



WOMEN IN STEM PANEL

May 11, 2022, 3:30 p.m.–4:30 p.m.

Sponsored by Johnson & Johnson



DAPO AJAYI

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



REBECCA BUNNELL

- Director of the Office of Science, Centers for Disease Control and Prevention

Moderated by



SEEMA KUMAR

- Vice President of Innovation, Global Health and Policy Communication, Johnson & Johnson



CASSANDRA QUAVE

- Associate Professor, Department of Dermatology
- Associate Professor, Center for the Study of Human Health, Emory College of Arts and Sciences
- Curator, Emory University Herbarium
- ISEF 1994–1996



JASZIANNE TOLBERT

- Senior Director, U.S. Clinical Development, Oncology, Janssen

CONGRATULATIONS

TO THE GEORGE D. YANCOPOULOS
INNOVATOR AWARD WINNER



In the Category of
**Engineering Technology:
Statics and Dynamics**

ROBERT SANSONE

Fort Pierce Central High School
Fort Pierce, Florida

Investigating a Novel
Electric Motor Design
Booth ETSD014

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

REGENERON®

CONGRATULATIONS

TO THE REGENERON YOUNG SCIENTIST
AWARD WINNERS



ABDULLAH AL-GHAMDI

Damman, Saudi Arabia

**Energy: Sustainable Materials
and Design**

Bifunctional MOF for Hydrogen
Production & Storage
Booth EGSD018



RISHAB JAIN

Portland, Oregon

Biomedical Engineering

Synthetic DNA Engineering
With ICOR
Booth ENBM074

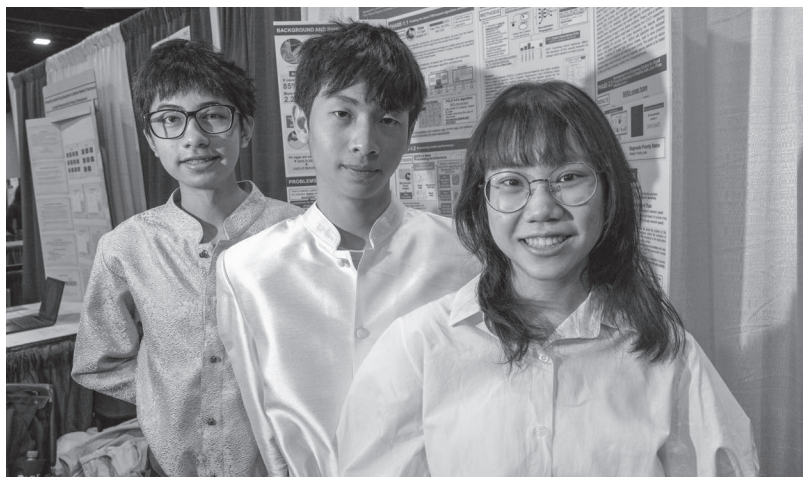
Regeneron applauds the winners of the
Regeneron Young Scientist Award.

REGENERON®

CONGRATULATIONS

TO OUR GORDON E. MOORE AWARD WINNERS

Translational Medical Science



CHRIS TIDIJUMREONPON

WATTANAPONG UTTAYOTA

NAPASSORN LITCHIOWONG

The Prince Royal's College, Chiang Mai, Thailand
BiDEx–Liver Fluke Infection AI Screening System
Booth TMED010T

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

GORDON AND BETTY
MOORE
FOUNDATION

CONGRATULATIONS

CRAIG R. BARRETT
AWARD
FOR
INNOVATION



AMON SCHUMANN
Berlin, Germany
**Engineering
Technology:
Statics and Dynamics**
Small Radiosondes
on a Great Mission
Booth ETSD005

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



REBECCA CHO
Jericho, New York
**Earth and
Environmental
Sciences**
Reconstruction Modeling of
Western North America
Booth EAEV034

PEGGY SCRIPPS
AWARD FOR
SCIENCE
COMMUNICATION



ANIKA PURI
Chappaqua, New York
**Earth and
Environmental
Sciences**
EISa: Wildlife Poacher
Detection Solution
Booth EAEV066

Society for Science applauds these finalists for their achievements.



**SOCIETY
FOR SCIENCE**

Finalist Directory

COUNTRIES, REGIONS AND TERRITORIES PARTICIPATING IN REGENERON ISEF 2022

LEGEND

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

AMERICAN SAMOA

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

ANIM059 Testing the Sinistral Bias of *Pheidole megacephala*, *Tapinoma melanocephalum*, and *Paratrechina longicornis*

Kelly Liang, 15, Freshman, Pacific Horizons School, Pago Pago, American Samoa, T: Karen Dizon

BCHM017 Determining at What Stage Bananas (*Musa acuminata*) and Pineapples (*Ananas comosus*) Contain the Highest Amyolytic and Proteolytic Activity

Princess Jazzelle Franco Viesca, 16, Sophomore, Fa'asao Marist High School, Pago Pago, American Samoa, T: Cassandra Garcia

BMED063 Bus Music Volume and Human Hearing

Matavai Marjorie Auapaa, 17, Senior, Tafuna High School, Pago Pago, American Samoa, T: Claire Bacus

EAEV073 Skyglow in American Samoa

Georgia Renee Cox, 17, Senior, Pacific Horizons School, Pago Pago, American Samoa, T: Karen Dizon

ARMENIA

Yerevan, Armenia, ARM002, Armenian School Science Festival

EGSD038T Walk-Move-Charge: Piezoelectric Shoes to Generate Electricity

Edvard Tovmasyan, 18, Senior, Anush Arakelyan, 17, Senior, High School 139 after Karen Demirchian, Yerevan, Nor Nork, Armenia, T: Ruzanna Tamazyan

ENEV084T EcoProtein: 3 Problems, 1 Solution

Mger Harutyun Sarafyan, 17, Senior, Mane Gagik Kurghinyan, 18, Senior, Yerevan State Medical University Heratsi High School, Yerevan, Armenia, T: Rubina Harutyunyan

AUSTRALIA

Oatlands, Australia, AUS002, Young Scientist

CHEM003 An Investigation Into the Concentration of Bisphenol A in Receipts from Major Australian Supermarkets and Its Potential Dermal Transfer

Phoebe Marion Adam, 16, Junior, Presbyterian Ladies' College, Sydney, NSW, Australia, T: Maria-Luisa Gutierrez

CHEM004 The Perfect Crystal Is the Imperfect One: A Novel Approach for Utilizing Surface Oxygen Vacancies on Crystalline Cerium (IV) Oxide to Promote Catalytic Ozonation for the Removal of BPA in Wastewater

Kush Dewan, 17, Senior, Redeemer Baptist School, North Parramatta, NSW, Australia, T: Stuart Garth

CONGRATULATIONS TO THE 2022 REGENERON ISEF FINALISTS AND WINNERS!

At Regeneron, we are committed to fostering the next generation of scientific innovators who can solve society's greatest challenges.

More than 90 percent of our community investments are focused on STEM education and STEM outreach and equity initiatives. We aim to:



EXPOSE
young minds
to the power of science



EQUIP
students with
scientific skills



ELEVATE
the best and
brightest young scientists

LEARN MORE:
REGENERON.COM
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REGENERON
SCIENCE TO MEDICINE®

- ENBM001** **Walking Tall**
Liberty Christine Jacob, 18, Senior, Barker College, Sydney, NSW, Australia,
T: Phillip Barden
- ENEV002** **Oil Absorption Abilities of Superhydrophobic *Salvinia molesta*: Potential for Crude Oil Spill Clean-up**
Dominique Faith Woodford, 18, Senior, Gosford High School, Gosford, NSW, Australia,
T: Michelle Peach
- ENEV003** **Remote-Control Raft Cleaner**
Max Jueyuan Zhao, 18, Senior, Barker College, Sydney, NSW, Australia,
T: Phillip Barden
- MATH001** **Validating a Predictive Mathematical Modelling Paradigm for Travelling from Point A to Point B**
Edward Stuart Garth, 18, Senior, Redeemer Baptist School, North Parramatta, NSW, Australia, T: Stuart Garth
- MCRO001** **The Clash of the Modern Crises: A Study Investigating the Development of Antibiotic Resistance in *Escherichia coli* Under Increasing Carbon Dioxide**
Tahlia Martignago, 18, Senior, Menai High School, Illawong, NSW, Australia,
T: Ann Hanna
- MCRO002** **Laboratory Investigations of a Possible Biosignature at Columbia Hills, Mars**
Lily Annabelle Miranda, 18, Senior, Brigidine College Randwick, Randwick, NSW, Australia, T: Amber Dommel
- PHYS001** **Quantifying the Emissions Per Kg Mass Returned from an Asteroid Mining Mission**
Benjamin Jack Ritchie, 18, Senior, Barrenjoey High School, Avalon, NSW, Australia,
T: Milena Driscoll

Clayton, Australia, AUS003, BHP Foundation Science and Engineering Awards

- EAEV002** **Darwin Mangrove Ecosystem Field Study**
Reka Dorina Nemeth, 17, Senior, Darwin High School, Darwin City, NT, Australia,
T: Katie Gregory
- EGSD002T** **What Genre of Music Creates the Most Energy?**
Tashan Kirubakaran, 16, Junior, Alan Joseph Joju, 16, Junior, Willetton Senior High School, Willetton, Washington, Australia, T: Thomas Coe
- ENEV005** **Artificially Intelligent Electronic Waste Sorting Selective Compliance Robot Arm**
Sam Rogers, 15, Junior, Proserpine State High School, Proserpine, QLD, Australia,
T: Lucas Sabo
- ETSD026** **Weight Plate Loader**
Skye Sriratana, 15, Sophomore, Tintern Grammar, Melbourne, Victoria, Australia,
T: Lanna Derry
- PHYS002** **Particle Physics: Does Altitude Affect the Quantity of Background Radiation?**
Amelie Malena Nanclares, 16, Junior, Kirrawee High School, Sydney, NSW, Australia,
T: Cherie Donohoe
- PLNT002** **How Do Flavonoids and Isoflavonoids Improve Nodulation in Legumes**
Abbey Curran, 18, Senior, Daramalan College, Canberra, ACT, Australia, T: Colin Price

AZERBAIJAN

Baku, Azerbaijan, AZR001, Azerbaijan Science and Engineering Fair

- BCHM008T** **New Cultivation Technology of Plants at Hydroponic System with Applying Inductors (Phytohormones)**
Ozlem Ahmedli, 16, Sophomore, Erhan Ibrahimli, 15, Sophomore, Ganja FRITL, Ganja, Kapaz, Azerbaijan, Young Talents Lyceum, Baku, Azerbaijan, T: Nurlan Amrahov

- BMED008** **The Effect of Saffron on Reproductive Health**
Nilgun Mammadli, 16, Junior, School Lyceum Complex, Baku, Azerbaijan,
T: Parvana Shukurova
- EAEV011T** **Accelerated Reconstruction of the Ecosystem of Karabakh Region Through Innovative Technologies**
Samed Alizade, 15, Freshman, Ayaz Omarli, 15, Sophomore, Baku European Lyceum, Baku, Absheron, Azerbaijan, Young Talents High School, Baku, Azerbaijan,
T: Firuza Sultan-zadeh
- ENEV010T** **Smart Water-Efficient System**
Nigar Namazova, 17, Junior, Lale Huseynova, 17, Junior, Young Talents Lyceum, Baku, Azerbaijan, T: Murad Qurbanov
- MATH007T** **Solving Some Algebraic Problems with the Help of Vectors**
Nigar Mirzali, 16, Sophomore, Leyla Abbasova, 16, Sophomore, The Modern Educational Complex in Honour of Heydar Aliyev, Baku, Nasimi region, Azerbaijan,
T: Eldeniz Huseynov
- PHYS012T** **New Nano Dimensional Water Concept (Nano Water)**
Solmaz Garibova, 16, Sophomore, Haver Nur Aslanova, 16, Sophomore, Baku European Lyceum, Baku, Absheron, Azerbaijan, T: Yulia Semyonova
- SOFT010** **Allover the Place: AI-Powered E-Commerce and Social Media Platform Makes Daily Business Fun and Easy**
Javad Aslanov, 15, Freshman, Dunya School, Baku, Azerbaijan, T: Ziya Gozalov

BRAZIL

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

- ANIM002** **Application of Agroindustrial Residues in the Combat of the Arbovirus-Vector Mosquito (*Aedes aegypti*), Phase II**
Joao Pedro Silvestre Armani, 19, Junior, Colegio Alfa, Toledo, Parana, Brazil,
T: Carlise Debastiani
- BCHM003** **Biotechnological Potential Analysis of Four Oleaginous Species from the Brazilian Cerrado Biome to Be Applied in the Regional Economic Context**
Marcela Tobias de Araujo Romao, 17, Senior, Escola Santa Teresinha, Imperatriz, Maranhao, Brazil, T: Carlos Sampaio
- BCHM004** **Tucum Mirim Oil (*Astrocaryum acaule*): Evaluation of Its Potential as Repellent Conveyed to an Experimental Model *in vitro***
Gustavo Botega Serra, 16, Senior, Escola Santa Teresinha, Imperatriz, Maranhao, Brazil,
T: Carlos Sampaio
- BEHA004** **Eco-Socius: A Novel Approach Using Multivariate Analysis to Understand Youth Behavior ion Circular Economy**

Victorya Leal Altmayer Silva, 18, Senior, Instituto Federal de Educação, Ciência e Tecnologia do Rio Grande do Sul (IFRS) – Campus Osório, Osorio, Rio Grande do Sul, Brazil, T: Flavia Twardowski
- EGSD004** **Seebeck-Watch: Development of a Nano and Microtechnological Method for Constructing Wristwatch Systems Through Temperature Difference**
Vinicius Ribeiro de Moraes, 19, Senior, Matriz Educacao, Rio de Janeiro, RJ, Brazil,
T: Michael Douglas da Silva Santos
- ENBM003T** **BIONIC STEP II: Biped Mechanical Device for the Locomotion of People with Spinal Cord Injury**
Julia Isabel Ninow da Rosa, 19, Senior, Julia Otoni Bicca Vilela, 19, Senior, Fundacao Escola Tecnica Liberato Salzano Vieira da Cunha, Novo Hamburgo, Rio Grande do Sul, Brazil, T: Alexandre Giacomini
- ROBO004T** **PHYSIOARM: Device to Assist in Upper Limbs Physiotherapy of Post-Stroke Patients**
Rafaela Cardoso Machado, 20, Senior, Samuel Simao, 19, Senior, Fundacao Escola Tecnica Liberato Salzano Vieira da Cunha, Novo Hamburgo, Rio Grande do Sul, Brazil,
T: Alexandre Giacomini

SOFT002 **Development of Immersive Metaverses Applied to Astrobiology Teaching**
 # Henrique Rodrigues Hissa Amorim, 17, Senior, Colegio Dante Alighieri, São Paulo, Brazil, T: Tiago Bode

SOFT003T **NuAR: Technology and Creative Language Together to Tell the Great Stories of Women Who Did Science Around the World**
 Ariadne Nicolay Mori de Paula, 18, Senior, Bianca Fernandes Ribas, 18, Senior, Instituto Federal de Mato Grosso do Sul - Campus Campo Grande, Campo Grande, Mato Grosso do Sul, Brazil, T: Marta Luzzi

Sao Paulo, Brazil, BRA002, FEBRACE – Feira Brasileira de Ciências e Engenharia
BEHA037T **Anti-Skeptical: Clusterization of the Hofstede Cultural Matrix via Machine Learning Methods Applied to the Analysis of Anti-Vax Behavior in Brazil**
 Pietro Andrade Quinzani, 16, Sophomore, Joao Pedro Sassi Sandre, 15, Sophomore, Colégio Visconde de Porto Seguro, São Paulo, Brazil, T: Francisco Correa

BEHA039T **Animated Legends: Recovering the Imaginary From the Amazonian Region City of Igarapé-Miri Through Audiovisual Productions Based on Oral Narratives**
 Eloize Cristiny Quintal Ferreira, 14, Freshman, Oscar Cabral Paraguassu, 14, Freshman, Escola Municipal de Ensino Fundamental Aristóteles Emiliano de Castro, Igarapé-Miri, Pará, Brazil, T: Railson Santos

CHEM053 **Study on Ultraviolet Protection in Cotton Fabric Dyed with Vegetable-Based Colorants**
 Ana Clara Machado Silva, 18, Senior, Centro Federal Tecnológico CEFET-MG Divinópolis, Divinópolis, Minas Gerais, Brazil, T: Fabio Silva

ENBMO47T **Digital Incentive Spirometer for the Treatment of Post-COVID Patients with Motivational Graphical Interface and Telemonitoring Support**
 Enso Matheus Carvalho, 14, Freshman, Ana Elisa Brechane da Silva, 14, Freshman, E.E Professora Maria Das Dores Ferreira Da Rocha, Santa Rita Do Oeste, São Paulo, Brazil, T: Tiago Rebecchi T: Eder Antoniasse

ENEV057T **River Water Purification Process with *Moringa oleifera* Lam. Tablet**
 Sarah Fernandes de Oliveira, 17, Senior, Maria Eduarda Prates Brandao, 17, Senior, Ana Luiza Nogueira Oshiro, 17, Senior, Escola Sesi Ignez Pitta de Almeida, Barreiras, Bahia, Brazil, T: Felina Bulhoes

MATS034 **Biogrape: Bacterial Cellulose Biosynthesis Using Grape Byproduct, Phase II**
 Amanda Ribeiro Machado, 17, Senior, Instituto Federal de Educação, Ciência e Tecnologia do Rio Grande do Sul (IFRS) - Campus Osório, Osório, Rio Grande do Sul, Brazil, T: Flavia Pinto

MATS037 **Optimization of Magnetic Nanoparticle Load in Fluorescent Magnetic Nanocarriers for Application in Magnetic Hyperthermia**
 Anny Gabriela Marcal de Carvalho Araujo, 18, Senior, Centro de Ensino e Pesquisa Aplicada à Educação, Goiânia, Goiás, Brazil, T: Fabiana Fernandes

MCRO037 **Antibacterial Potential of Brazilian Green Propolis in Periodontitis Treatment**
 Maria Eduarda Silva Ferreira, 17, Senior, Escola Estadual Prof. José Ignácio de Sousa, Uberlândia, MG, Brazil, T: Carlos Henrique Martins

SOFT041 **Eduacess – Software for Transcribing Video Lessons Into Compact PDFs Using Keyframe Extraction, Summarization and Transcription Algorithms**
 Ligia Keiko Carvalho, 17, Senior, Colegio Tecnico de Campinas, Campinas, São Paulo, Brazil, T: Patricia Gagliardo de Campos

BULGARIA

Sofia, Bulgaria, BGR001, Bulgarian Science and Innovation Fair

CBIO012 **Exploring Machine Learning Interpretability by Analyzing Tumor Suppressor Genetic Sequence Data**
 # Hristo Todorov Todorov, 19, Senior, High School of Mathematics and Natural Sciences “Professor Emanuil Ivanov”, Kyustendil, Bulgaria, T: Kamen Kotev

ENBMO17 **Image Analysis of Single DNA Molecules**
 Teodor Kirilov Kirilov, 18, Senior, Sofia High School of Mathematics, Sofia, Bulgaria, T: Detelina Doneva

MATH006 **Minimal Number of Monochromatic Edges in Bicolored Graphs**
 Iliyas Bashir Noman, 17, Junior, Sofia High School of Mathematics, Sofia, Bulgaria, T: Iliya Kostov

ROBO017 **The GatedTabTransformer: An Attention-Based Deep Learning Architecture for Tabular Modeling**
 Radostin Lozanov Cholakov, 16, Sophomore, Model High School of Mathematics “Akademik Kiril Popov”, Plovdiv, Bulgaria, T: Gergana Petrova

CANADA

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

CBIO066 **Chaos in Cancer: Analyzing Network Morphology to Predict Tumor Angiogenesis Using Chaos Theory**
 # Caroline Huang, 17, Junior, Abbey Park High School, Oakville, Ontario, Canada, T: Tim O’Byrne

EAEV075 **Multiple Factor Regression Analysis of Vegetation Changes and Land Degradation in Drylands**
 Maria Chzhen, 16, Junior, Westdale Secondary School, Hamilton, Ontario, Canada, T: Bradley Harrison

ENBMO55 **Sweet! – Integrating Glucose and Ketone Testing To Improve Efficiency in the Treatment of Diabetes**
 Isra Galer Bashir, 16, Junior, Westdale Secondary School, Hamilton, Ontario, Canada, T: Erin Lepischak

MCRO045 **Investigating the Antibacterial Properties of Microwave-Assisted Biosynthesized Silver Oxide and Copper Oxide Nanoparticles on *Staphylococcus aureus***
 Arianna Carmela Grace Mastrodonardo, 18, Senior, King’s Christian Collegiate, Oakville, Ontario, Canada, T: Jason Taekema

ROBO065 **Detecting Cracks in Concrete Structures Using a Deep Learning Wall-Climbing Robot**
 Anthony Matteo Saturnino, 16, Junior, Bishop Ryan Catholic Secondary School, Hannon, Ontario, Canada, T: Mara Gazzola

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

BEHA035 **Decoding the Underlying Neural Activity of Neurodegeneration in Traumatic Brain Injury**
 # Haolin Li, 17, Junior, Crescent School, Toronto, Ontario, Canada, T: Rachel Carr

CELL027 **Effect of Mimosa Plant Phytochemicals on the Stress Response Pathways of *Caenorhabditis elegans***
 Anna Monica Voia, 19, Senior, College Jean-de-Brebeuf, Montreal, Quebec, Canada, T: Jean-Claude Labbe

EAEV045 **The Silence of Global Oceans: Acoustic Impact of the COVID-19 Lockdown**
 Artash Nath, 15, Sophomore, Bloor Collegiate Institute, Toronto, Ontario, Canada, T: Kathleen Craigie

EAEV046 **The Effects of Increased Sea Temperature on Phytoplankton Community Composition by Cell Size**
 Julie Inutsuka Sieg, 17, Senior, Earl Haig Secondary School, North York, Ontario, Canada, T: Ryan Williams

EGSD034 **A Mighty Mushroom and the Power of Poop: Testing Biogas Production Using Spent Mushroom Substrate V2**
 Calvin George Karthik, 15, Sophomore, Kenner Collegiate Vocational Institute, Peterborough, Ontario, Canada, T: Amanda McInnes

Finalist Directory

- ENBM037** **A Novel Bioinspired Skin Substitute for Accelerated Wound Healing**
Cindy Cheng, 15, Freshman, Sir John A. Macdonald Secondary School, Waterloo, Ontario, Canada, T: Shirley Tang
- ENBM038** **Specular: A Comprehensive Teleophthalmology Platform for People Centered Eyecare**
Hardit Singh, 16, Sophomore, Cameron Heights Collegiate Institute, Kitchener, Ontario, Canada, T: Kevin Bell
- ETSD043** **An Investigation Into Active Control for Accessible Orbital Flight**
Timothy Cai, 17, Senior, Fraser Heights Secondary, Surrey, British Columbia, Canada, T: John Struik
- ROBO051** **Low-Cost Quadruped Robot with Rough Terrain Traversal, Obstacle Avoidance, and Autonomous Navigation**
Henry Zhao, 17, Junior, Collingwood School, West Vancouver, British Columbia, Canada, T: Edel Vo
- TMED035** **Nano-Antioxidants' Effects on Oxidizing Agent Exposure**
Catherine Diyakonov, 17, Senior, Lord Byng Secondary School, Vancouver, British Columbia, Canada, T: Laurel Anderson
- Lachine, Canada, CAN004, Montreal Regional Science and Technology Fair**
- EBED032** **OR in Focus: An Automatic Focusing Overhead Operating Room Light**
Kayla Joy Salasidis, 15, Sophomore, Herzliah High School, Montreal, Quebec, Canada, T: Patrick Elbaz
- ENBM049** **Immunano: The Future of the Immune Response**
Adam Elkaim, 18, Senior, Marianopolis College, Westmount, Quebec, Canada, T: Angela Keane
- ETSD060T** **Solar-Powered Drone: Creating an Airplane That Is Solar Powered and Autonomous**
Aziz Saoud Kitana, 16, Junior, Mohammadamin Tabari Nia, 16, Junior, Kells Academy, Montreal, Quebec, Canada, T: Raffaat Ghanem
- CHINA**
- Beijing, China, CHN001, China Adolescents Science and Technology Innovation Contest**
- ANIM024** **Seventeen Minutes: The Time of Host Blood Protein Remaining in Anopheles Mosquitoes**
Liyuan Zhu, 17, Junior, Shanghai Foreign Language School Affiliated to SISU, Shanghai, China, T: Shuqi Cai
- BEHA013** **The Competition Behavior of Bike-Sharing Companies and Industry Price Evolution: A Game Theory Approach**
Tianshu Xu, 17, Junior, Shanghai Foreign Language School Affiliated to SISU, Shanghai, China, T: Wenjun Ying
- BMED023** **Ganoderma Spore Oil Induces the Apoptosis of Mammary Adenocarcinoma Cell by Regulating Apoptotic Genes**
Chenge Gao, 16, Junior, The High School Affiliated to Beijing Normal University, Beijing, China, T: Ya Zhang
- CELL012** **Study on the Mechanism Underlying CENP-E Mediated Mitochondrial Movement in Mitosis**
Tianqi Lu, 16, Junior, Hefei No. 8 Senior High School, Hefei, Anhui, China, T: Xuebiao Yao
- CELL013** **Effect of Mammary Adenocarcinoma Supernatant on Hepatic Fibroblast Differentiation**
Enze Wang, 17, Junior, Beijing No. 4 High School, Beijing, China, T: Liyan Kong
- CELL015** **Optimized Expression Condition of SARS-CoV-2 Polymerase Nsp12**
YiFei Liu, 15, Sophomore, The Experimental High School Attached to Beijing Normal University, Beijing, China, T: Wei Fang

CONGRATULATIONS TO OUR CATEGORY FINALISTS

Animal Sciences

Kellen Apuna	Collin Tajiro Horiuchi	Dixie Lynne Miller	Minjun Shin
Kirari Arimura	Yi-Shan Hung	Jack Olivier Mongan	Zaina Fatima Siddiqi
Marisa Arjananont	Hyunmoon Hwang	Soyoun Moon	Joao Pedro Silvestre Armani
Raina A. Bandekar	Yukiha Ishibashi	Irving Solomon Morris	Caleb Brennan Smith
Emma Christine Bogue	Kaleb James Johnson	Natalia Trefoglii Morrow	Sarah Stutsman
William Cameron Boyd	Luke Jow	Hannah Jordan Mullis	McKenna Sun
Matthew Edward Brownrigg	Abhinav Reddy Karri	Tyler Daniel Nagosky	Colin Luke Surabian
Gabriella Eleanor Caskey	Chikako Katayama	Abby Rose Nelson	Lila Carlene Sverdrup
Jenna Nicole Ceele	Hisaaki Kawahara	Dmytriy Omelyanov	Gabriela Szczepanik
Panatas Chaiprakan	Junwoo Kim	Brooklyn Portell	Sarita Rae Thosteson
Reagan Elizabeth Chambers	Serhii Kolomiichuk	Chinmayi Ramasubramanian	Maria Tomita
Sabine Lynn Close	Ana Nalini Kothandram	Rotem Ris	Harmony Grace Tracy
Kaitlyn Nicole Culbert	Sirawich Laolapha	Isabella Zoe Rodriguez Ramos	Sasha Turner
Natalya de la Plaza	Rania Sophia Lateef	Jaspreet Sahota	Lindsey Susan Vachal
Jonmejoy Agniva Dhar	Nicholas Eunsuk Lee	Rika Sakemoto	Lauren Alexa Van
Sabrina Ludovica Di Bello	Ian Lentz	Tanakon Sakhun	Jrasnatt Vongkampun
Porawat Dontanam	Kelly Liang	Alexis Schallock	Sophia White
Noe Furugen	Emma Katherine Lilly	Taylor Jean Schmitt	Regan Catherine Williams
Grant Gallagher	Varun Raj Madan	Sarah Kathryn Schubel	Natchapon Wongsaraj
Jacob Paul Gannon	Marissa Lilianna Martinez	Pilar Hope Seielstad	Shelby Anne-Marie Wray
Claire Elizabeth Green	Emmaline McKinnon	Youngeun Seo	Justine Jin Xu
Witsanuchai Hathakong	Avery Miles	Kaho Shigenobu	Liyuan Zhu

Society for Science applauds the finalists in Animal Sciences.



- CHEM021** **High Concentration Silver-Carrying Materials with Controlled Silver Dissolution and Efficiently Long-Acting Sterilization**
Lingyue Wang, 17, Junior, No. 2 High School of East China Normal University, Shanghai, China, T: Feng Qian
- CHEM022** **An Innovative Method for Determination of Nitrite Content in Salted or Overnight Food by Paper-Based Microfluidic Device**
Yancheng Tao, 17, Junior, Hangzhou Foreign Languages School, Hangzhou, Zhejiang, China, T: Qiaohong He
- CHEM023** **Immobilization of C@TiO₂ in Calcium Alginate Hydrogel for Photodegradation of Organic Pollutants**
Xiyan You, 16, Junior, The Experimental High School Attached to Beijing Normal University, Beijing, China, T: Bo Li
- CHEM024** **Applicability of Textile Industry's Classification of Silk in the Engineering of Silk Protein Material**
Jintong Ding, 17, Junior, Shanghai East Foreign Language School, Shanghai, China, T: Zhengzhong Shao
- CHEM025** **Research on the Microscopic Mechanism of CO₂ Capture Using TBAB Semi-Clathrate Hydrate Formation**
Guoxiang Lu, 16, Junior, Chongqing No 1 International Studies School, Chongqing, Sichuan, China, T: Xuefang Min
- EBED018** **Automatic Monitoring System Based on Arduino**
Ziqian Liu, 16, Junior, Yongzhou No.4 Senior High School, Yongzhou, Hunan, China, T: Yan Lei
- EGSD016** **Uniform Cu-Doped Carbon Inherited from Plant Growth for Electrocatalytic CO₂ Reduction to CH₄**
Qingyuan Zhu, 17, Junior, Shanghai Foreign Language School Affiliated to SISU, Shanghai, China, T: Gengfeng Zheng
- ENBM024** **Posture Detection and Multi-Dimensional Feedback System for AIS Rehabilitation Training**
Zihan Wang, 16, Sophomore, Shanghai Pinghe Bilingual School, Shanghai, China, T: Lucheng Wang
- ENBM025** **Ergonomic Finger Exoskeleton for Hand Muscle Rehabilitation and Protection: Four-Bar Linkage, Finger-Length Personalized, Low Cost**
Chenglin Guo, 16, Junior, Beijing 101 Middle School, Beijing, China, T: Lei Cai
- ENEV026** **Saccharification and Degradation of Inedible Waste in Bioregenerative Life Support System**
Jingyuan Zhang, 17, Junior, Beijing No. 4 High School, Beijing, China, T: Hong Liu
- ENEV027** **Design and Performance of a Plant-Microbial Fuel Cell To Treat Kitchen Wastewater**
Xinning Zhang, 17, Junior, No. 2 High School of East China Normal University, Shanghai, China, T: Yixi Li
- ENEV028** **Improving the Degrading Rate of PETase and Developing Highly Efficient Enzyme Activity Screening Strategies**
Yanbing Jin, 17, Junior, Shanghai Pinghe Bilingual School, Shanghai, China, T: Jiang Zhong
- ETSD017** **A Multi-Joint Geometer-Like Spatial Wall-Climbing Robot with Vacuum Suction Used in Assisting High Altitude Tasks and Terrain Prospection**
Jiarong Sheng, 16, Junior, Shanghai Pinghe Bilingual School, Shanghai, China, T: Yinghe Lv
- ETSD018** **Active Noise Control in Ventilation Ducts Using the LMS Algorithm**
Xinle Song, 17, Junior, YK Pao School, Shanghai, China, T: Xiaoyang Wang
- ETSD019** **Soft Bionic Starfish Robot Based on Suckers**
Chengyue Jiang, 15, Sophomore, Shanghai Pinghe Bilingual School, Shanghai, China, T: Yinghe Lv
- ETSD020** **Development and Experiments on a Kind of Small Dolphin Robot**
Zihao Wang, 16, Junior, Shanghai Xuhui High School, Shanghai, China, T: Yu Su
- MATH018** **The Application of Grover Quantum Algorithm in Lifting Stage Restoration Problem**
Ziru Song, 17, Junior, Beijing Academy, Beijing, China, T: Lei Yue
- MATH019** **Preliminary Exploration of Fractal Geometry and the Application of Fractal Measurement to Explore the Fractal of Rock Sugar and Hydroxide**
Bozhi Bai, 16, Junior, Hefei No.1 High School, Hefei, Anhui, China, T: Ju Yong Zhang
- MATS014** **Solving the Worldwide Mask Pollution Crisis: A Biodegradable High-Performance Low-Cost Mask Made from Natural Polymers**
Enshuo Zhang, 16, Sophomore, The High School Affiliated to Renmin University of China, Beijing, China, T: Dan Wan
- MCRO014** **Decomposition of Microplastics by *Tenebrio molitor* (Mealworm) Intestinal Facultative Anaerobes Facilitate Wheat Growth**
Yujia Ji, 17, Junior, No. 2 High School of East China Normal University, Shanghai, China, T: Yao Qu
- PHYS023** **Investigate the Effects of Active Galactic Nucleus on Star Formation Rate Through Cavity Energetics and SED Fitting**
Yang Shen, 17, Junior, Shanghai United International School, Gubei, Shanghai, China, T: Haiguang Xu
- PHYS024** **Optimization and Application of Kelvin Water Dropper**
Haotian Sun, 17, Senior, Nanjing Foreign Language School, Nanjing, Jiangsu, China, T: Xiaoshan Wu
- PHYS025** **Discovery of Superconductivity and Structural Phase Transition in Heusler Compound HfPd₂Sn**
Yuxuan Chen, 17, Junior, Hangzhou Xuejun High School, Hangzhou, Zhejiang, China, T: Huiqiu Yuan
- PHYS026** **How Does Ring "Dance" in a Bowl?: Study on Chaos-Like Dynamic Behavior of Rigid Rings Using Lagrange Mechanical Analysis**
Ruiqi Zhang, 17, Junior, Shanghai Kongjiang Senior High School, Shanghai, China, T: Jian Shen
- PHYS027T** **The Deformation Analysis and Experimental Study of Chinese Brush Based on the Central Spine Model with Seven Segments**
Huirui Dai, 18, Senior, Xuan Zhang, 17, Senior, Chongqing Nankai Secondary School, Chongqing, China, T: Yicong Wei
- PLNT015** **Study on Leaf Epidermal Hair Characteristics of Eggplant and Its Effects on Cold and Drought Resistance**
Hanyue Cao, 17, Junior, Shanghai Qibao High School, Shanghai, China, T: Jun Gao
- ROBO030** **Research on Landscape Painting Colorization Based on Generative Adversarial Networks**
Yinghan Chen, 16, Junior, Beijing No. 4 High School, Beijing, China, T: Liyan Kong
- ROBO031** **Intelligent Object Finding for the Elderly with Alzheimer's Disease Based on Neural-Symbolic Reasoning**
Yutang Lin, 17, Junior, Beijing 101 Middle School, Beijing, China, T: Wei Wang
- ROBO032** **Single-Actuator Wave-Like Pipeline Robot**
Sicheng Dong, 17, Junior, Shanghai Foreign Language School Affiliated to SISU, Shanghai, China, T: Haobin Zhu
- SOFT019** **Indoor Ranging System for Athletic Discus Throwing**
Shijia Li, 18, Senior, Jinling High School, Nanjing, Jiangsu, China, T: Qijun Zhang
- SOFT020** **The Hash Algorithm Based on Three-Body Chaotic Motion**
Huayi Zhang, 16, Junior, Shanghai Kongjiang Senior High School, Shanghai, China, T: Yunlei Zhao

Finalist Directory

- SOFT021** **Predicting Structural Similarity Between Molecules Using Graph Neural Networks**
Sichen Deng, 17, Junior, High School Affiliated to Shanghai Jiao Tong University, Shanghai, China, T: Qian Shao
- SOFT022** **Face-Recognition Food Consumption Tracker**
Mingyue Deng, 17, Senior, Guiyang No. 1 High School, Guiyang, Guizhou, China, T: Qin He
- TMED019** **A Pneumatic Hand Muscle Rehabilitation Training Glove Based on the EMG Signal: AI-Powered, Improved Robustness, and High Durability**
Zeyuan Wei, 17, Junior, Shanghai World Foreign Language Academy, Shanghai, China, T: Qiuqing Zhang
- Chengdu, China, CHN008, Sichuan Science Fair**
- ETSD003** **A Novel Design of W-Shaped Pipe-Climbing Robot**
Xin Yu Ai, 16, Junior, Shanghai American School–Pudong Campus, Shanghai, China, T: Amanda Young
- MATSO03T** **Silver Nanowire On-Skin Flexible Electrodes for Electrophysiological Monitoring**
Jonathan Lu, 16, Junior, Woonin Hong, 17, Junior, Concordia International School Shanghai, Pudong, China, T: Anne Love
- PLNT005T** **A Sound Solution: An Innovative Application of Insects' Bioacoustics Effect on Herbaceous Plants**
Jessica Li, 17, Junior, Lena Wang, 16, Junior, Shanghai American School–Puxi Campus, Shanghai, China, T: Gregory Rose
- ROBO009** **Research on CRNN-Based Piano Music Transcription Systems**
Victor Yin, 16, Junior, Tsinghua University High School, Beijing, China, T: Fatima Hachem
- ROBO010** **The Smartest Know Their Limits: A Novel Semi-Supervised Causal Inference Deep Learning Model for Open Set Recognition**
Richard Xue, 17, Junior, Shanghai American School–Puxi Campus, Shanghai, China, T: Rui Feng

CHINA, HONG KONG SPECIAL ADMINISTRATIVE REGION

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

- EBED005T** **Driver Drowsiness Detection System**
Lo Yi Tiffany Wong, 19, Senior, Ho Shun Louisa Louie, 17, Senior, Heung to Secondary School (Tseung Kwan O), Hong Kong, China, Hong Kong Special Administrative Region, T: Tung Shek Wong
- ENBM004T** **Asthemeter: A System for Recording and Predicting Asthma Attacks**
Evelyn Fung, 15, Sophomore, Hei Tung Christy Lee, 16, Sophomore, Diocesan Girls' School, Hong Kong, China, Hong Kong Special Administrative Region, T: Michael Nip
- ENBM005T** **Combating Antibiotic-Resistant Bacteria with Leptospermum Honey-Incorporated Calcium Alginate Dressing**
Tsz Ki Liu, 18, Senior, Ting Yan Chung, 17, Senior, St. Paul's Convent School, Hong Kong, China, Hong Kong Special Administrative Region, T: Claudia Ng
- ENBM012T** **EMG Rehab System: A Package for Stroke Self Rehabilitation**
Wang Yui Chow, 16, Junior, Sau Nam Cheung, 16, Junior, Christian Alliance SW Chan Memorial College, Hong Kong, China, Hong Kong Special Administrative Region, T: Kin Long Lee
- MATH003** **An Investigation on Non-Repetitive Coloring of Trees**
Yuxiang Wu, 16, Junior, Chinese International School, Hong Kong, China, Hong Kong Special Administrative Region, T: Adedeji Odunlami
- ROBO005T** **Universal Solution to Extension and Translation of Fonts Across Languages**
Lap Yan Lennon Chan, 16, Junior, Justin Kit Hang Tang, 17, Senior, Justin Shing Chi Cheng, 16, Junior, St. Paul's Co-Educational College, Hong Kong, China, Hong Kong Special Administrative Region, T: Wai Tak Tse

CONGRATULATIONS TO OUR CATEGORY FINALISTS

Behavioral and Social Sciences

Rahaf Naser Ahmad Abuzaid	Alivia Jacqueline Hennessey	Tadiswa-Chloe Chipu Mafara	Rushil Shah
Mawaddah Omar Ali	Saree Lydia Hillstead	Paul Bryan Massey	Elizabeth Sarah Sherbrooke
Salma Omar Saleh Al-Shaghnoobi	William Vincent Hummel	Tanatswa Alexandra Matonda	Victoria Leal Altmayer Silva
Edith Elizabeth Bachmann	Adinda Zahra Islami	Shayleen Dorian Moeini	Abigail Mae Snider
Bethany Ball	Ellishah Beaubrun Jean-Francois	Orlando Ray Osgood	Mira A. R. Soradi
Meagan Elizabeth Berger	Raeed Ayman Kabir	Malcolm Ernest Owusu	Victoria Soranno
Colin Berry	Kyle Arjun Kavully	Siddhanth Pachipala	Tarmo Sorsa
Jack Blackmar	Amelia Louise Kazlo	Oscar Cabral Paraguassu	Michelle Angelica Aventha Suharly
Jorlyann Marielys Campos Ortiz	Jack Aidan Kelly	Sarah Chaeyoon Park	Sierra Anne Sun
Claire Hyunji Chang	Dia Kher	Meghan Pasala	Brayden Marie Sutherland
Olivia Chang	Danica Sue Knapp	Bao Nguyen Gia Pham	Junwei Tan
Susanna Angel Chiruguru	Vivek Reddy Kogilathota	Huy Nguyen Quang Pham	Suchita Tipirneni
Carolyn Elizabeth Clebsch	Neha Ann Kommareddy	Emily Rose Pinheiro	Kosha Upadhyay
Tala A. I. Damery	Natasha Kulviwat	Eloize Cristiny Quintal Ferreira	Sneha Vashistha
Mira M. M. Dhelieh	Asmi Kumar	Pietro Andrade Quinzani	Olivia Jean Wagner
Madi Ann Dickinson	Skye Lam	Yorch Efrain Quispe Condori	Henry Westfall
Katie Fish	Jacob Aaron Leshnower	Lindley Jane Richards	Ashi Sachinda Wickramasundara
Sarah Rose Garfield	Haolin Li	Hyunji Ryu	Fauziyyah Wisnuwardhani
Michelle Sagita Gurning	Arthur Liang	Joao Pedro Sassi Sandre	Tianshu Xu
Seungmin Han	Spencer Kanis Lile	Ellie Schlichtmann	Han Byur Yoon
Jakub Filip Hel	Alexander Yisiang Lim	Claire Andrea Seger	
	Irene Lim		

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



CHINA, MACAO SPECIAL ADMINISTRATIVE REGION

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

- EGSD006T Novel Organic Electrode Material for LIBs**
Ka Hei Chan, 17, Senior, San Chong Ng, 17, Senior, Janelle Camille Shi Chen, 19, Senior, Escola Choi Nong Chi Tai, Macao, China, Macao Special Administrative Region, T: Choi Ngo Sou
- EGSD013T High Capacity, High Stability and Low Corrosive Al-Treated Ionic Liquid Electrolyte with Al-Deposited Carbon Cloth Anode Used in Aluminum-Ion Battery**
Chong Hin Tam, 17, Senior, Oi Wa Cheang, 16, Junior, Pui Ching Middle School, Pui Ching Middle School, Macau, China, Macao Special Administrative Region, T: Ka Kong Chan
- ENBMO18T Portable Homemade Ventilators: Alleviating Global Medical Shortages**
Evelyn Teng, 17, Junior, Hio Cheng Lam, 18, Senior, Weng Si Si Tou, 17, Junior, The Affiliated School of the University of Macao, China, Macao Special Administrative Region, T: Ka Man Wong
- ETSD011T A Rotor Fault Detection System Based on Nonlinear and Dynamic Response**
Un Man Wong, 17, Senior, Ka Wai Huang, 18, Senior, Jia Ning Weng, 17, Senior, The Workers' Children High School, Macao, China, Macao Special Administrative Region, T: Yi Xing Liang
- MATSO13T WO-: Preparation and Application of SERS Substrate Materials**
Hio Cheng Ho, 16, Junior, Hoi Lei Song, 18, Junior, Ka I Lou, 17, Junior, Macau Pooito Middle School, Macao, China, Macao Special Administrative Region, T: Tak Seng Wong
- ROBO019T Developing a Low-Cost Portable Electronic Nose for the Detection of Colorectal Cancer by Using Convolutional Neural Networks**
Yuelong Wang, 16, Sophomore, Mei Fong Lei, 17, Sophomore, Jiahao Liang, 15, Sophomore, Escola Kao Yip, Macao, China, T: Chi Chon Ng

CZECH REPUBLIC

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

- CHEMO09 Rearrangements of N-Aryl Hydroxamic Acid Methanesulfonates: Towards Novel and Valuable Organic Substances**
Veronika Martinkova, 18, Junior, Gymnazium Frantiska Palackeho Valasske Mezirici, Valasske Mezirici, Zlinsky Kraj, Czech Republic, T: Zuzana Halastova
- CHEMO10 Modification of Silica Surface with Supercritical Water as a Tool Indicating New Possibilities of Existing Separation Methods**
Pavel Karasek, 18, Senior, Gymnazium Brno, Trida Kapitana Jarose, Prispevkova Organizace, Brno, South Moravian Region, Czech Republic, T: Michal Roth
- PHYS011 Preparation and Characterization of Spin Polarized Tips for Tunneling Microscopy**
Petr Kahan, 19, Junior, Gymnazium Dr. Antona Randy, Jablonec nad Nisou, prispevkova organizace, Jablonec nad Nisou, Liberecky kraj, Czech Republic, T: Ales Cahlik
- Prague 4, Czech Republic, CZE002, AMAVET Czech Republic Science Fair**
- CELL036 Cytoskeletal Remodelation in Brain Tissue Exposed to Lead Nanoparticles**
Adriena Jedlickova, 18, Junior, Gymnazium Brno, Trida Kapitana Jarose, Prispevkova Organizace, Brno, South Moravian Region, Czech Republic, T: Iva Kubistova
- PHYS062 Detecting Cosmic Rays by Self-Build Scintillation Detector and a Muon Telescope**
Barbora Cabalkova, 19, Senior, Gymnazium Zamberk, Zamberk, Pardubicky kraj, Czech Republic, T: Jiri Hovorka

DENMARK

københavn, Denmark, DNK001, Unge Forskere

- MCRO020 The Influence of Sound Frequencies on Bacterial Growth: A New Perspective on a New Research Field**
Nanna Elizabeth Rosa Kalmar, 18, Senior, Egaa Gymnasium, Aarhus, Midtjylland, Denmark, T: Pia Jensen

EGYPT

North Coast & West of Egypt, Egypt, EGY002, Bibliotheca Alexandrina Science and Engineering Fair – Alexandria

- EBED033 Blind Companion**
Joud Hisham Eldeeb, 15, Sophomore, Haitham Samy Hamad, Itay Elbaroud, Egypt, T: Hala Abdelfataah
- EBED034 Clamor Electric Reckon**
Dina Mohamed Ali, 18, Senior, STEM School of Alexandria, Alexandria, Egypt, T: Eman Ali
- EGSD045T Energetic Countryside from Maize Corn**
Malak Ahmed Selim, 18, Senior, Basmallah Ahmed Mohamed, 18, Senior, STEM School of Alexandria, Alexandria, Egypt, T: Eman Ali
- ENEV072T ZEOLation in Agriculture**
Rawan Mokhtar Abdelaziz, 17, Senior, Salma Ahmed Wafa, 17, Senior, Dakahlia STEM Cchool in Egypt, Gamasa, Dakahlia, Egypt, T: Abdelmaaboud Abdelaleem
- ROBO073 # Hard Missions Robot**
Abd Elrahman Ahmed Draz, 18, Senior, Future International Schools Sadat City Branch, Sadat City, El Sadat, Egypt, T: Ahmed Mohamed

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

- BCHMO23T Microbial Desalination Cells (MDCs) for Sea Water Desalination, Simultaneous Wastewater Treatment, and Electricity Production**
Sama Sayed Farrag, 16, Junior, Mayar Mostafa Ibrahim, 16, Junior, The Red Sea STEM High School, Hurghada, Red Sea, Egypt, T: Sara EL-Shamy
- BCHMO24T Green Flour**
Shahd Ahmed Mohamed, 17, Senior, Menatallah Mohamed Ahmed, 14, Freshman, I Adadia El Thanawia for Girls, New Menia, Egypt, T: Amany Sayed
- BMED053 The Effect of Using Spidroin Protein and Spider Silk Web on Wound Healing Period Reduction**
Zain El Abdeen Ali Kalaf, 15, Freshman, Assiut Governmental Distinguished Language School, Assiut, Assiut, Egypt, T: Mohammed Zaky
- ENBMO39T Conscious Brain Mind-Controlled Cybenthic Cyborg Bionic-Leg - V2**
Mohamed Sabry Abdelsamee, 16, Junior, Ahmed Ayman Mohammed Abd El-Monsef, 16, Junior, El-Sadat STEM School, El-Sadat, Menofia, Egypt, T: Doaa Tahoun
- ENEV051T Creating the New ANKH**
Adham Haitham Eid, 16, Junior, Ahmed Swelam Gouda, 16, Junior, Obour STEM School, Obour, Kalubya, Egypt, T: Shaimaa Elsayed
- ENEV061T Integration of Mechanical and Chemical Treatment in the Hydrological Cycle of the Paper and Pulp Industry**
Abdullah Gamal M. Elaffi El-Ehwany, 19, Senior, Adam Yasser Sayed Ahmed, 18, Senior, Ismailia STEM High School, Ismailia, Ismailia, Egypt, T: Mohamed Aly
- ENEV062 Integrated Ecogreen System for Sustainable Waste Management**
Hager Atef Ibrahim Hasan, 17, Junior, Al Orman Governmental Language School, Giza, Dokki, Egypt, T: Hany Hassan
- ENEV063 Hydrotherapy and Soil Treatment Using Agricultural Wastes**
Alaa Ezzeldeen Elgarhy, 16, Junior, Dr. Mahmoud Omar School Secondary School for Girls, Giza Governorate, Egypt, T: Ezzeldeen Elgarhy
- TMED043T A Novel Modification on Medical Face Mask to Filter Carbon Monoxide for Secondhand Smokers**
Shahd Mohamed Nooh, 16, Sophomore, Sama Mohamed Nooh, 16, Sophomore, Sharkya STEM School, Zagazig, Sharkia, Egypt, T: Hany Boules

Finalist Directory

ESTONIA

Tartu, Estonia, EST001, Estonian Young Scientist Contest

EAEV010 **The Spread of the Woolly Mammoth Over Time and Determining Its Habitat**
Rhea Koivutalu, 19, Senior, Tallinn Secondary School of Science, Tallinn, Harjumaa, Estonia, T: Piret Karu

SOFT009T **Mobile Wallet Platform to Fit the Need of Regional Markets**
Anita Algus, 19, Senior, Paul Jurgens, 19, Senior, Grete Paat, 19, Senior, Hugo Treffner Gymnasium, Tartu, County, Estonia, T: Ulle Seevri

FINLAND

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

BEHA065 **In the Fields of Mansas: The Unofficial Urban Names and Chronological Layers of the Toponyms in the Region of Maunula**
Tarmo Sorsa, 17, Junior, Maunulan Yhteiskoulu ja Helsingin Matematiikkalukio, Helsinki, Uusimaa, Finland, T: Kata Melajarvi

ROBO072 **Emulating Human Vision Processes to Quantify an Environment**
Manu Kiiskila, 16, Freshman, Finnish International School of Tampere, Tampere, Pirkanmaa, Finland, T: Padmasheela Kiiskila

SOFT057T **Sufficiency of Electric Vehicle Charging Infrastructure**
Joonatan Aatos Korpela, 17, Junior, Justus Hansen, 17, Junior, Paivola School of Mathematics, Valkeakoski, Finland, T: Merikki Lappi

GERMANY

Hamburg, Germany, DEU001, Jugend Forscht

BCHM006 **Scientific Web Tool for the Analysis and Visualization of the Packing of Biological Macromolecules**
Nikola Ristic, 19, Senior, Wilhelm-Ostwald-Schule, Leipzig, Sachsen, Germany, T: Michael Haase

BCHM007 **BoxProtect: Identification of 2-Methoxy-1,4-Naphthoquinone from *I. glandulifera* and Exploration of Its Potential in Insect Pest Control**
Helen Hauck, 19, Senior, Nellenburg Gymnasium, Stockach, Baden-Wuerttemberg, Germany, T: Holger Seitz

ENBM009 **Enzymatic Inactivation of the Veterinary Antibiotic Florfenicol**
Marik Muller, 18, Senior, Hermann-von-Helmholtz Gymnasium Potsdam, Potsdam, Brandenburg, Germany, T: Katrin Kopischke

ENBM010T **Enhanced Auricular Reconstruction: Translating Bioprinted Auricles Into Clinical Practice Using Smartphone-Driven Scanning Applications**
Theresa Weber, 18, Senior, Celina Stitz, 19, Senior, Donata Henkel, 19, Senior, Albert-Schweitzer-Gymnasium, Erfurt, Thuringen, Germany, T: Yvonne Bottger

ETSD004 **X-Hedgehog: Enhanced Safety for Firefighters Through Avoiding the Entrance of Dangerous Areas**
Jan Sebastian Heinemann, 19, Senior, Bertha von Suttner Gymnasium Andernach, Andernach, Rheinland Pfalz, Germany, T: Agnieszka Heinemann

ETSD005 **Around the World in Eighty Days: Small Radiosondes on a Great Mission**
Amon Christopher Schumann, 17, Senior, Robert-Havemann-Gymnasium, Berlin, Germany, T: Alexander Stendal

PHYS009T **Lightwhiskers: Branched Flow of Light**
Jan Dajnac, 16, Junior, Maximilian Dorzweiler, 16, Junior, Max-Planck-Gymnasium Saarlouis, Saarlouis, Germany, T: Fabian Schon

PHYS022T **Physical Description and Modeling of Paper Strip Flights**
Leo Neff, 18, Senior, Leonard Muenchenbach, 17, Senior, Gewerbliche und Hauswirtschaftlich-Sozialpflegerische Schulen Emmendingen (GHSE), Emmendingen, Baden-Württemberg, Germany, T: Carsten Muenchenbach

CONGRATULATIONS TO OUR CATEGORY WINNERS

Biochemistry

FIRST PLACE

Maya Sonal Butani

SECOND PLACE

Rohan Sandeep Adwankar
Rohan Prakash Bhosale
Aarya Morgaonkar
Andy Zhang

THIRD PLACE

Rajvi Rakesh Babaria
Halley Madyson Compuesto
Mehak Gaba
Matthew Noto
Sarvesh Prabhu

FOURTH PLACE

Chloe Chang
Helen Hauck
Archita Khaire
Nikola Ristic

Regeneron applauds the finalists
in Biochemistry.

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PLNT006T ***Silphium perfoliatum*: A Newcomer for an Ecologically Sustainable Energy Agriculture**

Isabell Seibel, 17, Senior, Melina Lisa Reckermann, 17, Senior, Immanuel-Kant-Gymnasium Tuttlingen, Baden-Wurttemberg, Germany, T: Katharina Kaltenbach

GHANA

Accra, Ghana, **GHA001, MISE Research Program**

CBIO004 **Predicting Future Mutations of COVID-19 Using Machine Learning**

Keith Torpey, 18, Senior, East Airport International School, Accra, Greater Accra, Ghana, T: Matthew Scicluna

GREECE

Chalandri, Greece, **GRC001, Athens Science Festival**

ENEV085 **Eyes in the Water Can Save the World for Life: A Device Which Remotely Measures Seawater Quality Below the Surface of the Water**

Dimitrios Panagiotis Deliakidis, 15, Sophomore, 4th Lyceum of Alexandroupolis, Alexandroupolis, Evros, Greece, T: Panagiotis Deliakidis

PHYS063T **A Design for an Affordable 2-Qubit Optical Quantum Computer**

Konstantinos Pavlakis, 17, Junior, Dimitrios Tzounakis, 17, Senior, 1st General Lyceum of Thermi, Thermi, Thessaloniki, Greece, T: Evangelos Chatzistavrou

GUAM

Piti, Guam, **TEGU01, Guam Island-Wide Science Fair**

ANIM060 **Estimating the LC50 of 1-Naphthyl-N-methylcarbamate in an Insecticide Using Different Percentages of Concentration on *Apis mellifera***

Justine Jin Xu, 16, Junior, St. John's School, Upper Tumon, Guam, T: Christine McCormic

ENEV094 **Filed Instrumentation and Their Importance in Landslide Assessment**

Cameorn Jae P Bernardo, 17, Junior, Notre Dame High School, Talofoto, Guam, T: Patil Ujwalkumar

HAITI

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

ENBM056T **BlueTech: Innovative Glasses to Decrease the Number of Eye Disorders and Disease Worldwide and the Amount of Plastic Waste**

Schnell Ghaly Jean, 18, Senior, Shevchenko Michel, 18, Senior, Neïka Dallemand, 18, Senior, Ouest, Haiti, T: James Louis

ENEV071T **Eco-House: Sustainable House Design from Environmentally Friendly Concrete**

Ludwicka Sadly Joseph, 17, Junior, Paulingda Barbara Francois, 16, Sophomore, Ronelle Shlande Thelemaque, 16, Sophomore, Institution Saint-Francois Xavier, Cap-Haitien, Nord, Haiti, T: Andrall Cherfils

MATS044T **Mighty Wood: We Transform the Cardboard's Waste Into a Better Substitute of Wood-Based Planks**

Daraelle Ismael, 19, Senior, Christopher Laguerre, 18, Senior, Giovanni Klyd Exilus, 19, Senior, Collège Dominique Savio, Pétion-ville, Ouest, Haiti, T: James Louis

HUNGARY

Budapest, Hungary, **HUN001, Innovation Contest for Young Scientists**

EBED008 **PenAlone: Development of a Writing and Drawing Tool Compatible with Arbitrary Surface**

Janos Rado, 16, Junior, Berzsenyi Daniel High School, Budapest, Hungary, T: Virag Groma

SOFT006 **Horizon Scan Vision**

Balazs Szonyi, 18, Senior, TSZC Benki Donat - Pech Antal High Schools, Tatabanya, Komarom-Esztergom, Hungary, T: Istvan Varga

INDIA

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

ANIM003 **Averting Human-Elephant Conflict Using Machine Learning on Elephant Vocalizations**

Chinmayi Ramasubramanian, 16, Sophomore, Sri Kumaran Children's Home - CBSE, Bangalore, Karnataka, India, T: Seema Lokhandwala

BCHM005 **A Novel Study of the Bio-insecticidal Properties of *Annona reticulata* L.**

Sarvesh Prabhu, 16, Junior, FIITJEE Junior College, Hyderabad, Telangana, India, T: Meera Nambiar

BEHA006 **UDAN: Unobtrusive Sentiment Alert Using Natural Language Processing**

Anagha Sampathkumar, 15, Freshman, National Public School, Indiranagar, Bangalore, Karnataka, India, T: Prizilla Fernandez

CHEM007 **Graphene Oxide-Based Nanoformulations: A Novel Solution to Manage *Aedes aegypti***

Devaj Gupta, 17, Senior, DPS International, New Delhi, Delhi, India, T: Sarita Kumar

EAEV006 **Designing of Nitrogen Doped Melamine Foam-Graphene-CNT-Metal Oxide Heterostructure Photocatalyst for Industrial Waste Management**

Rishita Ghosh, 16, Junior, Learning Paths School, Mohali, Punjab, India, T: Gourav Sharma

ENBM006 **XPGAN: A Novel Patch-Based Generative Adversarial Network Framework for Super-Resolution of X-Ray Images**

Aria Narayan Vikram, 17, Senior, National Public School, Indiranagar, Bangalore, Karnataka, India, T: Prizilla Fernandez

ENBM007T **Mouthscope: Autonomous Detection of Oral Precancerous Lesions Using Fluorescent-Imaging and Computer-Vision**

Aditya Amit Mehta, 16, Junior, Maanav Jignesh Kothari, 17, Junior, Dhirubhai Ambani International School, Mumbai, Maharashtra, India, T: Reetu Jain

MATH004 **On Ramanujan's Identity for Odd Zeta Values and Its Generalization**

Sarth Prashant Chavan, 16, Junior, Aditya English Medium School, Pune, Maharashtra, India, T: Christophe Vignat

MATH005 **On Worker-Optimal Matchings in Many-to-Many Markets with Indifferences**

Niranjan Baskaran, 17, Senior, Gateway International School, Chennai, Tamil Nadu, India, T: Rathna J

MATS002T **Preparation of a Superhydrophobic and Oleophilic Membrane Inspired by Taro Leaves for Oil-Water Separation**

Sara Varghese, 18, Senior, Devika Girish, 17, Senior, St.Peter's Senior Secondary School, Kolenchery, Kerala, India, T: Sandhya N

MCRO018 ***Pseudomonas stutzeri* VR2004 for Green Synthesis of ZnO Loaded Onto a Starch-Gelatine Biopolymer Matrix for Remediation of Xenobiotics in Aquatic Systems**

Vishwadeep Balakrishnan, 17, Senior, Shiva Niketan School, Mangalam, Tamil Nadu, India, T: Ganga Vm

PHYS033 **Hydrodynamic Analogs of Quantum Tunneling**

Ahitagni Das, 17, Junior, Delhi Public School Siliguri, Siliguri, West Bengal, India, T: Rajib Ghosh Roy

PLNT004 **Spatio-Temporal Generation of Morphological Features for Plant Growth Prediction Using Progressively Growing GANs**

Dhruv Sheth, 16, Junior, Pace Junior Science College, Mumbai, Maharashtra, India, T: Rahul Yadav

Finalist Directory

- ROBO006** **Neural Layer Bypassing Network: A Novel Neural Network Architecture to Increase the Speed of Forward Propagation Without Sacrificing Accuracy, Network Structure, or CPU Resources**
Amogh Palasamudram, 18, Senior, The International School of Bangalore (TISB), Bangalore, Karnataka, India, T: Ronjon Nag
- ROBO007** **Penden: Making the Internet More Accessible to the Blind**
Abhijith Chandran, 19, Senior, Mahindra United World College, Pune, Maharashtra, India, T: Andrew Teron
- SOFT004** **Novel AI-Powered Sign Language Translator**
Nand Vinchhi, 17, Junior, National Public School–Koramangala, Bangalore, Karnataka, India, T: Chandita Mukhopadhyay
- SOFT005** **Enhancing the Security of Websites with Virtual Identification Code Steganography**
Krish Yadav, 17, Junior, MKH Sancheti Public School, Nagpur, Maharashtra, India, T: Vishakha Meshram
- TMED004T** **FlikcerAI: Resolution of Photosensitive Epileptic Visual Content with Spatio-Temporal Luminance Frequency Analysis**
Jaisal Kothari, 17, Senior, Ashay Srivastava, 18, Senior, Amity International School–Saket, Delhi Public School, R. K. Puram, Delhi, New Delhi, India, T: Alka Saxena, T: Mukesh Kumar
- TMED005** **A Quantum Machine Learning-Based Framework for Early Cancer Detection and Biomarker Identification Through Transcriptome Profiles**
Rushank Goyal, 16, Junior, 7i World School, Gwalior, Madhya Pradesh, India, T: Rashmi Chowdhary
- TMED006** **GliomAssist: Computational Glioma Grading and Prognosis With PET**
Vishnu Ram Sampathkumar, 18, Senior, National Public School, Indiranagar, Bangalore, Karnataka, India, T: Prizilla Fernandez
- INDONESIA**
Jakarta, Indonesia, IDN002, Olimpiade Penelitian Siswa Indonesia
- BEHA026T** **The Effectiveness of Autonomous Sensory Meridian Response (ASMR) Video to Alleviate Stress (Case Study: SMAN 81 Jakarta-Indonesia High School Students)**
Michelle Angelica Aventha Suharly, 17, Senior, Michelle Sagita Gurning, 18, Senior, SMA Negeri 81 Jakarta, Jakarta Timur, DKI Jakarta, Indonesia, T: Etty Johan
- EBED026T** **RECOVER-V (Remotely Controlled Observer Vehicle) as Aquatic Ecosystems Monitoring Device**
Atya Danastri Masantika, 17, Senior, Zaki Zaidan Akbar, 18, Senior, SMAN 3 Malang, Malang, East Java, Indonesia, T: Dwi Sulistiarini
- MATH029T** **Preserving Uru'ngauwit Batik by Applying a Geometry Transformation Approach**
Nadia Aulia, 18, Senior, Putri Adinda Irmayanti, 18, Senior, SMAN 1 Nunukan, Kalimantan Utara, Indonesia, T: Hidayati S.Pd
- Jakarta, Indonesia, IDN001, Youth Science Competition**
- BEHA027T** **Ecofeminism Movement as a Mangrove Forest Saving Strategy in the Coastal Area of Demak Regency – Central Java Indonesia**
Fauziyyah Wisnuwardhani, 18, Senior, Adinda Zahra Islami, 18, Senior, SMA Negeri 2 Semarang, Semarang City, Central Java, Indonesia, T: Liliek Handoko
- EAEV038T** **How Does the RUSLE Equation Determine the Soil Erosion in Watershed? A Case Study at Serayu Watershed, Banjarnegara, Indonesia**
Juzaili Shahnata Alam, 18, Senior, Erma Wahyu Istiqomah, 18, Senior, SMA Negeri 1 Bawang, Banjarnegara, Jawa Tengah, Bawang Public High School 1, Banjarnegara, Central Java, Indonesia, T: Catur Atun
- ENBM079** **Producing the Polyketide Antibiotic Actinorhodin From Azo Dye Waste: *In silico* Design and Optimization of a Synthetic Pathway in Pseudomonas putida KT2440**
Parsa Nayyara, 18, Senior, SMA Negeri 5 Surabaya, Surabaya, East Java, Indonesia, T: Ratih Fahayana

CONGRATULATIONS TO OUR CATEGORY WINNERS

Biomedical and Health Sciences

FIRST PLACE

Jonathan Crawford
Ambika Grover

SECOND PLACE

Kristi Biswas
Griffin Hon
Christine Song
Katelyn Kelly Wasilenko
Nicholas Wei

THIRD PLACE

Aditi Avinash
Tony Bright
Emily Dodd
Aaron Joel George
Alexander Lan
Ella Selina Lan
Hamza Arman Lateef
Gabriel Brian Ralston
Adhvaith Sridhar

FOURTH PLACE

Samira B.F. Abdullah
Kulpatch Chananam
Helen Lucille Cople
Kunat Khongtong
Justin Keonhyoung Kim
Pakitta Kriangasame
Saachi Anika Mody
Maria Isabel Morales-Quezada
Mayu Nakano
Labrini Panagopoulos
Shaswat Singh
Andres Muedano Sosa
Julia Zhu

Regeneron applauds the finalists
in Biomedical and Health Sciences.

REGENERON®

MATH023 **Exact Analytical Solutions and Bifurcation Analysis of the Modified SIR Model with Time Dependent Population and Vaccination**
Zulfa Siti Zakia, 16, Junior, Madrasah Aliyah Putri PUI Talaga, Majalengka, West Java, Indonesia, T: Mirda Wijayanto

IRAQ

Erbil, Iraq, IRQ001, INPO (Iraq National Project Olympiad)

BMEDO28T **Anti-Heart Attack Glove (AHG)**
Mohammed Omer Hama Ali, 16, Junior, Dlin Nawsherwan Salih, 16, Junior, Private Salahaddin Ayyubi College, Sulaimania, Iraq, T: Mikail Ozturk

ENBMO30T **Automatic Body Temperature Measurement and Warner Device**
Balla Peshtivan Sedeeq, 14, Freshman, Ghandi Abdulrahman Mahmood, 15, Freshman, Kirkuk Cag Boys College, Kirkuk, Iraq, T: Ibrahim Mohammed

ETSD082T **Aural Script Assembler**
Basma Alhamdi, 17, Junior, Jannah Sabah Al-gburi, 15, Sophomore, Baghdad Ishik Girls College, Baghdad, Iraq, T: Riqab Abo-zaid

IRELAND

Dublin 16, Ireland, IRL002, SciFest

PHYS006 **Cosmic Radiation Protection Simulation**
Clare Marie Reidy, 18, Senior, Our Lady's Bower, Athlone, Co. Westmeath, Ireland, T: Julie Greaney

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

SOFT011 **An Investigation Into Worldwide Electoral Systems and the Development of a Novel Internet Voting System**
Andrei Florian, 18, Junior, Saint Aidans C.B.S, Dublin, Ireland, T: Niamh O'Brien

ISRAEL

Jerusalem, Israel, ISR001, The Israeli Young Scientists Contest

BMEDO65 **The Effect of Sleeve Gastrectomy on Progression of Alzheimer's Disease**
Tamar Attali, 18, Senior, Israel Arts and Science Academy, Jerusalem, Israel, T: Yisrael Rappaport

CELL025 **CD160 in Cytotoxic T Cell Exhaustion and Its Effect on PD-1 Blockade Cancer Immunotherapy**
Maya Ben Shalom, 17, Senior, Gymnasia HaRealit, Rishon Lezion, Israel, T: Rakefet Via

MATS033 **Clay Polymer Nanocomposite for Efficient and Rapid Removal of Organic Matter from Water**
Idan Zilcha, 16, Junior, Harel High School, Mevaseret Zion, Israel, T: Yael Abraham

PHYS046 **Phase Noise Characterization in Optical Fiber-Based Sensors**
Omer Arian, 17, Junior, Ort Ironi D, Modi'in, Israel, T: Idit Ron

ROBO060 **Comparative Research of Image Processing Algorithms for Segmentation of Natural Water Bodies in Satellite Images**
Noam Zamski, 17, Senior, Brenner Regional High School, Givat Brenner, Israel, T: Noa Libman

ITALY

Milano, Italy, ITA001, I Giovani e le Scienze

BCHMO36T **EnoMed: The Power of Antioxidants from Grapes: A Green Perspective for Anti-Tumor Treatments**
Letizia Mutti, 19, Senior, Luca Figazzolo, 17, Junior, Istituto Superiore Ascanio Sobrero, Casale Monferrato, Italy, T: Anna Chiara Arcchi, T: Patrizia Cascio

CHEMO49 **From Leavened Products to Proteins Through Flours**
Caterina Amichetti, 19, Senior, Istituto Istruzione Superiore Galileo Galilei, Jesi, Italy, T: Luigi Frati

ETSD081 **Measure Time with an Apple (Innovative Indicator to Determine the Duration of Consumable Goods, and Plant to Extract Raw Materials to Allow Its Industrial Production)**
Viorel Ionut Bohotici, 19, Senior, Istituto Istruzione Superiore Galileo Galilei, Jesi, Italy, T: Luigi Frati

ROBO040T **Wrong-Way Detector: Optoelectronic System to Detect Vehicles in the Wrong-Way Direction on Highways**
Tommaso Caligari, 16, Sophomore, Marco Zecchin, 15, Sophomore, Istituto Tecnico Industriale G. Omar, Novara, Italy, T: Celestino Fontaneto

JAPAN

Tokyo, Japan, JPNO02, Japan Science & Engineering Challenge

ANIM005T **Fantastic Role of Tiny "Second Wings," or Calypteres, in Facilitating Highly Complex Flying Patterns**
Yukiha Ishibashi, 18, Junior, Noe Furugen, 17, Junior, Nagasaki Prefectural Nagasaki Nishi High School, Nagasaki-City, Nagasaki-Pref., Japan, T: Tetsuya Nagashima

ANIM020T **An Attempt to "See" the Behavior of the Japanese Lampreys in the Sandy Mud by Acoustic Analysis**
Akira Mori, 18, Junior, Rika Sakemoto, 17, Junior, Chikako Katayama, 18, Junior, Tottori Nishi High School, Tottori City, Tottori, Japan, T: Kousuke Hayashi

CHEMO15 **The Mechanisms of Amber Color Formation in Aged Umeshu (Japanese Plum Liqueur)**
Ryoko Matsui, 17, Junior, Tamagawa Academy, Machida, Tokyo, Japan, T: Mikiko Kinouchi

CHEMO26 **Energy Creation by Low-Voltage Electrolysis of Water Using Aqueous Solutions with Different pH Levels**
Akane Iwasa, 18, Senior, National Institute of Technology - Gunma College, Maebashi, Gunma, Japan, T: Masakazu Saito

EGSD005T **Ammonia Production from Seawater and Air by a New Method that Utilizes Renewable and Waste Energy**
Nene Kizu, 17, Junior, Yuka Ando, 16, Sophomore, Hinata Yamamoto, 17, Junior, Shizuoka Kita High School, Shizuoka-City, Shizuoka-Pref., Japan, T: Yuji Takagi T: Yuuzi Takagi

MATH016 **Some Notes About Power Residues Modulo Prime: The Challenge to Find a Pattern of Mersenne Primes and to Discover New Primes**
Yuki Kiri, 18, Senior, Shizuoka Salesio High School, Shizuoka City, Shizuoka Prefecture, Japan, T: Takahiro Kudo

PHYS029 **Mutual Influence of Two Drops Falling Through Water; Complex Behavior of Vortex Rings of Drops Fragmenting Due to Hydrodynamic Instabilities**
Rina Nakajima, 17, Junior, Osaka Prefectural Tennoji High School, Osaka, Japan, T: Shuhei Yamamoto

PLNT008 **Effects of Treading Stress on Changes in Morphology and DRO1 Gene Expression of Barley Roots**
Ayumi Ishihara, 18, Senior, Notre Dame Seishin Gakuen Seishin Girl's High School, Kurashiki City, Okayama-Pref., Japan, T: Fukuto Tanaka

Tokyo, Japan, JPNO01, Japan Students Science Awards

ANIM019 **The Mechanism of Female Parasitoid Wasps, That Do Not Oviposit in the Hosts, Interrupt the Oviposition of the Other Female Wasps**
Hisaaki Kawahara, 18, Junior, Mie Prefectural Ise High School, Ise City, Mie, Japan, T: Yoshiyuki Fujiwara

ANIM026T **Protect the Rhinoceros Beetle of Okinawa Island**
Maria Tomita, 17, Junior, Kirari Arimura, 19, Senior, Kaho Shigenobu, 17, Junior, Kagoshima Prefectural Kokubu High School, Kirishima City, Kagoshima, Japan, T: Katsuki Komizo

- CHEM018** **Innovation of “Copper to Silver to Gold - The Alchemist’s Dream” Using Aluminum Foil and Anionic Surfactant**
Yuka Kishi, 16, Sophomore, Otsumaranzan High School, Hiki-gun, Saitama, Japan,
T: Takahiro Suzuki
- CHEM019** **An Environmentally Friendly Method for Preparation of Transparent Wood**
Tomohiro Kato, 17, Junior, Miyazaki Nishi High School, Miyazaki, Miyazaki, Japan,
T: Shigehiro Nakahara
- EAEV023** **Development of a Portable Sensor Using Soil Fluorescence as an Indicator of Fertility in Rice Paddies**
Jun Kondo, 18, Sophomore, Kyoto Tachibana High School, Kyoto, Japan,
T: Naoshi Kondo
- EBED016** **Instrumental Sound Separation Using Compressed Machine Learning Models**
Ryo Muramatsu, 19, Senior, Tokyo Tech High School of Science and Technology,
Minato-ku, Tokyo, Japan, T: Yoshiro Nishizawa
- JORDAN**
Amman, Jordan, **JOR001, Science Fair of The Jordanian Ministry of Education**
- BEHA025** **Screening for Autism Spectrum Disorder by Detecting a Pattern in the Eye Movement of Autistic Children by Using an Eye Tracking System**

Salma Omar Saleh Al-Shaghnobi, 14, Freshman, Jubilee School, Amman, Jordan,
T: Sawsan Abu Jammaah
- BMEDO45T** **The Anticancer Activity of Greenly Synthesized Silver Nanoparticles Using *Ephedra aphylla* Ethanolic Extract**

Naghm Alaa a AlHourani, 18, Senior, Farah Fawwaz AlZaatreh, 18, Senior,
King Abdullah II School for Excellence–Maddaba, Jordan, T: Wajdy Al Awaida
- CHEM054T** **Effectiveness Test of a Low-Cost and High-Efficiency Jordanian Micro Bentonite Filter to Remove Oily Pollutants from Water**
May Ahmad Suleiman Al-Manasra, 16, Junior, Mays Nidal Mohammad Al-Kasassbeh, 16,
Junior, Al-Hasaad Al-Tarbawi School, Amman, Jordan, T: Roweida Abushusheh
- EBED025T** **Hypocapnia and Pediatric Vehicular Heatstroke: Prevention and Rescue**
Ayah Mustafa Abdalkader Alkatib, 17, Junior, Areen Rami Fathi Alashmawi, 15,
Sophomore, Sara Iyad Issa Altarawneh, 15, Sophomore, Jubilee School, King Abdullah II
School For Excellent, Aqaba, Jordan, T: Sawsan Abu Jammaah, T: Rania Alfuqara
- ENEV039T** **Applications of Cellulose Acetate Extracted from Paper Waste for Wastewater Treatment**
Mira Zakaria Faleh Khalil, 16, Junior, Sara Dirar Alqasem, 17, Junior, Jubilee School,
Amman, Jordan, T: Sawsan Abu Jammaah
- ENEV065** **Ocean X: A Device That Cleans Ocean Oil Spills Without Harming the Environment**
Leen Hamadeh Omar Allouh, 15, Sophomore, Maysoon Al-Demashqia, Irbid, Jordan,
T: Jehan Alnouti
- MATS028** **Increase the Conductivity and the Crystallinity of PP by CNPs**
Rashed Saad Waleed Abu Saleh, 16, Junior, Jubilee School, Amman, Jordan,
T: Sawsan Abu Jammaah
- MATS029** **Magnetic Brakes**
Tameem Ahmad Mohahmmad Masadeh, 14, Freshman, Levant International School,
Amman, Jordan, T: Sinaa Husenat
- MCRO023T** **The Antimicrobial Effect of Heavy Metals Nanoparticles on Bacteria**
Sidra Mohammad Zaki Naser, 17, Junior, Yara Raed Abdel Latif Daqa, 16, Junior, Jubilee
School, Amman, Jordan, T: Sawsan Abu Jammaah
- PHYS037T** **Providing a Simulator for the N Body Problem Using Programming and Euler’s Method, After Basing It on Our Solar System**
Rakan Rafic Hamarneh, 16, Junior, Maeen Mustafa Tell, 16, Junior, National Orthodox
School, Amman, Jordan, Amman Baccalaureate School, Amman, Jordan,
T: Odeh Hindeleh T: Odeh Hindeleh

CONGRATULATIONS TO OUR FIRST PLACE CATEGORY WINNERS

Biomedical Engineering



EMIRHAN KURTULUS

Deep Learning Based
Cranial Surgery Planning

Istanbul, Turkey
Booth ENBM013



RISHAB KUMAR JAIN

Synthetic DNA
Engineering With ICOR

Portland, Oregon
Booth ENBM074

Johnson & Johnson applauds the finalists
in Biomedical Engineering.

The Johnson & Johnson logo, featuring the brand name in a classic, elegant script font.

PLNT022 Smart Management System for Indoor Plant
Nebras Tawfiq Ahmad Alrawashdeh, 14, Freshman, Mua'ath Bin Jbal Primary School, Ma'an, Jordan, T: Tawfiq Alrawashdeh

SOFT030 Chemistry 101: A Chemistry Guide and Simulation Mobile App
Jenan Ayed Mohd Nayef Ghaith, 17, Junior, Mayar International Schools, Amman, Jordan, T: Amal Oudat

KAZAKHSTAN

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

CHEM036 Phytochemical Research of *Peganum harmala*
Ayaulym Amangeldieva, 17, Junior, School-Gymnasium No. 4 Named after Zhambyl Zhabayev, Nur-Sultan, Kazakhstan, T: Akmaral Kozhantayeva

ENEV045 Designing the Installation for Cleaning the Tasotkel Reservoir from Fishing Nets
Akadiil Aitu, 15, Freshman, Nazarbayev Intellectual School of Physics and Math, Taraz City, Kazakhstan, T: Inna Axyonova

ROBO061T Intelligent Driver Status Monitoring System
Diana Aleksandrovna Melnikova, 16, Junior, Kamila Manarbekovna Utegenova, 17, Junior, Ozat Boarding School of Information Technology, Kostanay, Kostanay, Kazakhstan, T: Irina Khramey

LATVIA

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

BCHM040 Biotin Consumption in Baker's Yeast *Saccharomyces cerevisiae* Strains Auxotrophic for Biotin
Markuss Gustavs Kenins, 18, Senior, Riga State Gymnasium No. 1, Riga, Latvia, T: Laura Valaine-Driksna

CHEM062T Evaluation of Chlorinated Paraffin Presence in Disposable Face Masks
Liga Lapsina, 17, Junior, Sarlote Luize Odzina, 17, Junior, Cesis State Gymnasium, Cesis, Cesis, Latvia, T: Sarmite Dreijalte

LUXEMBOURG

Luxembourg, Luxembourg, LUX001, National contest "Jonk Fuerscher"

BMEDO85 An Exploration of the Effects of Diet on Liver Cancer and Angiogenesis
Skye Beck, 17, Senior, International School of Luxembourg, Luxembourg, T: Tessa Charnaud

EAEV092 To What Extent Is There a Relationship Between Phosphorus and Nitrogen Concentrations and Excessive Cyanobacteria Growth in Simulated Upper Sure Lake Conditions?
Glenn Partsch, 17, Senior, International School of Luxembourg, Luxembourg, T: Tessa Charnaud

MALAYSIA

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

CHEM017T Cassava Peel Powder: A Novel, Cost-Effective and Eco-Friendly Pharmaceutical Biosorbent
Alden Kai Ray Goh, 16, Junior, Ze Wei Liew, 16, Junior, Chun Rui Tan, 16, Junior, Chung Ling High School Penang, Georgetown, Penang, Malaysia, T: Whey Cheng Heah

EAEV003T ChaCO-Ban: The Revolutionary Eco-Charcoal
Muhammad Fitri Hatim Zainuddin, 16, Junior, Nur Ain Dafina Muhamad Shukor, 17, Junior, Awatif Qistina Suhaimi, 16, Junior, Sekolah Menengah Sains Sultan Mohamad Jiwa, Sungai Petani, Kedah, Malaysia, T: Noraini Mohd Ismail

ENEV006 GrasCPAC (Sustainable Packaging from Cocopeat and Grass Fibres)
Najwa Ariena Mohamad, 16, Junior, Sekolah Menengah Kebangsaan Kubang Bemban, Pasir Mas, Kelantan, Malaysia, T: Nor Zaihan Shamsudin

PLNT003T Innovative Farming of Edible Microgreens Indoors
Yee Hern Cha, 16, Senior, Dong Tze Chan, 15, Sophomore, Heng Ee High School, George Town, Penang, Malaysia, T: Sze Hui Chung

PLNT013T Zein Extract Tea Solution: Eco-Friendly and Cost-Effective Delayed Ripening Solution for Bananas
Yan Yi Cheong, 17, Junior, Yi Fan Lee, 16, Junior, Zhan Hoong Alfred Chin, 17, Junior, Chung Ling High School Penang, Georgetown, Penang, Malaysia, T: Whey Cheng Heah

ROBO002T # Soft Origami-Inspired 3D Print-In-Place Artificial Intelligence Robots
Saan Cern Yong, 16, Junior, Sheng Ze Yeoh, 15, Sophomore, Sekolah Menengah Kebangsaan Katholik, Petaling Jaya, Selangor, Malaysia, T: Voon Siew Yong

MEXICO

Puebla, Mexico, MEX003, Mexico National Science Cup

BMEDO44 *In silico* Transcriptomic Analysis of Microglial Cells: Towards a Global Understanding of Immune Activation in Alzheimer's Disease
Andres Muedano Sosa, 18, Junior, Colegio Suizo de México, Mexico City, Benito Juárez, Mexico, T: Harpreet Kaur

EAEV070T # Preparation of a Waterproofing Based on Nopal Mucilage (*Opuntia ficus-indica*), Alum and Liquid Soap
Jose Jesus Carretero Mendez, 17, Sophomore, Roxana Reyes Ramos#, 16, Freshman, Colegio de Estudios Cientificos y Tecnologicos del Estado de Puebla Plantel Cholula, Cholula, Estado, Mexico, T: Marco Ramirez Cruz

EAEV071T Biodegradable Container Made from Coconut Shells and Cane Husks
Diana Mejia Arellano, 17, Senior, Wendy Maldonado Franco, 16, Sophomore, Hany Nissi Esteban Perez, 16, Freshman, Colegio de Estudios Cientificos y Tecnologicos del Estado de Puebla Plantel Cholula, Cholula, Estado, Mexico, T: Marco Ramirez Cruz

NORTHERN MARIANA ISLANDS

Saipan, Northern Mariana Islands, NMI001, Northern Mariana Islands Science & Engineering Fair

MATH028T COVID-19: The Effect on the CNMI's Visitors
Brent Matthew Estacio Ortizo, 17, Junior, Vidal Hernandez Camacho, 16, Junior, Mount Carmel School, Saipan, Northern Mariana Islands, T: Evangeline Villar

NORWAY

Oslo, Norway, NOR001, Norwegian Contest for Young Scientists

CHEM042 To What Extent Do Different Sodium Silicate (Na₂SiO₃) to Sodium Hydroxide (NaOH) Ratios in Alkaline Solutions Influence the Durability of Fly Ash Based Geopolymer Concrete Measured Through a Sorptivity Test?
Matthieu Raphael Bou, 19, Senior, International School of Stavanger, Stavanger, Rogaland, Norway, T: Marion Streutker

ETSD044 Finding the Optimal Combination of Touch, Color, and Infrared Sensors to Navigate a Robot Explorer Through Simulated Space-Like Conditions
Nikolai Isidro Zemliansky, 17, Junior, Blindern VGS, Oslo, Norway, T: Henning Harholt

OMAN

Muscat, Oman, OMN001, The Omani National Science Faire

EBED036T Smart Heights
Saja Abdulaziz Al Balushi, 16, Junior, Aalaa Yousuf Al Aafi, 15, Sophomore, Al Amal School, Muscat, Oman, T: Fakhria Alshibani

Finalist Directory

- ENEV073** **Treatment of Polluted Water from Wells and Aflaj Using Waste Materials From Date Palm Trees Enhanced With Carbon Nanoparticles Decorated With Activated Carbon**
Abdullah Masoud Al-Azri, 15, Junior, Abo Obaida for Basic Education for Boys, Nizwa, Al Dakhiliyah Governorate, Oman, T: Badriya ALkharusi
- ENEV074T** **Environmental Engineering in the Manufacture of Technology-Enhanced Bioplastics and Its Impact Study**
Neeam Zahran AL Harrasi, 15, Sophomore, Doa'a AL Hashmi, 15, Sophomore, Al Rustaq School, Rustaq, Batinah South, Oman, T: Dhikra Al Harrasi

PAKISTAN

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

- CHEM032** **Reducing the Toxicity of Heavy Metals**
Muhammad Shafique Shah, 15, Sophomore, Punjab Daanish School for Boys, Mianwali, Punjab, Pakistan, T: Muhammad Yasin
- EAEV051** **Influence of Organic Liquid Fertilizer on Crops**
Hiba Noor, 16, Junior, Aga Khan Higher Secondary School, Karachi, Sindh, Pakistan, T: Azra Asad
- EBED023T** **Virtual Human Health and Safety Integration System**
Muhammad Ibrahim, 15, Sophomore, Muhammad Talha Waqar, 15, Freshman, Beaconhouse School System Valencia Town Campus, Lahore, Punjab, Pakistan, T: Faisal Fayyaz
- EGSD021** **Network-Based Piezoelectric System for Self Defense Shoe Mechanism**
Muhammad Ayan Asim, 16, Sophomore, Scarsdale International School, Lahore, Punjab, Pakistan, T: Salma Afroz
- ETSD027** **Applications of Fluid Mechanics on Cars and Wings**
Mohammad Abdullah Salman, 16, Sophomore, The City School-Gulshan Campus A-Boys, Karachi, Sindh, Pakistan, T: Asif Faiz Alam
- MATS022T** **Vegan Leather Obtained from *Cedrus deodara***
Syeda Umm E Kulsoom Bukhari, 19, Senior, Talia Kulsoom, 18, Senior, PakTurk Maarif International School and Colleges, Gulshan-e-Iqbal, Girls Campus, PakTurk International Schools and Colleges, Gulshan-e-Iqbal Girls Campus, Karachi, Sindh, Pakistan, T: Hira Bashir

PALESTINE

Ramallah, Palestine, PSE001, Palestine Science and Technology Fair

- BEHA051T** **Type Independently**
Tala A. I. Damery, 16, Junior, Mira M. M. Dhelieh, 17, Junior, Tulkarem Industrial School, Tulkarem, Palestine, T: Zaina Shtaiwi
- BEHA052T** **I See You**
Mira A. R. Soradi, 16, Junior, Rahaf Naser Ahmad Abuzaid, 16, Junior, Nablus Secondary Vocational School, Nablus, Palestine, T: Walaa Shahrori
- ENEV077** **Rationalize Water Consumption While Waiting for Hot Water To Reach the Tap by Returning It to the Cold Water Tank**
Dana I. A. Eshtaya, 16, Sophomore, Talae' Al-Amal Secondary Schools, Nablus, West Bank, Palestine, T: Ruba Dweakat
- ENEV081T** **The Smart Programmer for Rationalizing Water During Showering and Ablution**
Marah A. M. Zeer, 15, Sophomore, Najah K. I. Halabiya, 16, Sophomore, Abu Dis Secondary Girls School, Abu Dis, Jerusalem, Palestine, T: Roudaina Hamdan
- SOFT050T** **Smart Shopping Cart App**
Dania M. A. Smeeq, 17, Junior, Azad Hamdan, 15, Sophomore, Shaimaa Girls Secondary School, Qalqilya, Palestine, T: Laiali Hamdan

CONGRATULATIONS TO OUR CATEGORY WINNERS

Cellular and Molecular Biology

FIRST PLACE

Shivani Ruk Babu

SECOND PLACE

Zehra Jaffery
Bhavana Sridharan

THIRD PLACE

Michael Ziqi Gao
Miah Christina Margiano
Benjamin Scott Persily

FOURTH PLACE

Thomas Coxe Commander
Angela Huang
Anna Monica Voia
Jean Yu

Regeneron applauds the finalists
in Cellular and Molecular Biology.

REGENERON®

PANAMA

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

- BMEDO25** **Assessment of Knowledge About Chronic Kidney Disease in the Panamanian Population**
Missel De Los Angeles Camano, 14, Freshman, Centro Educativo Jose Santos Puga, Santiago, Veraguas, Panama, T: Karen Castrejo

PERU

Lima, Peru, PER001, Peru Science and Engineering Fair

- BEHA011** **In the Footsteps of Manuela Ttito Condori — Memory and Forgetting: Participation of the Canchina Woman During the First Independence Movement in Peru**
Yorch Efrain Quispe Condori, 16, Senior, Julio Alberto Ponce Antunez De Mayolo, Canchis, Cusco, Peru, T: Adrian Pocco Caceres
- EGSD015** **Peru 2.0: Electrical Energy Generator from Plant Photosynthesis and Water Generator From Air**
Jheriko Sebastian Gomez Quilca, 17, Senior, Politecnico Regional Del Centro, Huancayo, Junin, Peru, T: Edith Chiri Huayta
- ENEVO22** **Pollution and Reduction or Fragmentation of the Natural Habitat in the Wetlands of the Purrumpampa Grasslands, Huamachuco, Peru**
Jhoana Melissa Ruiz Mendoza, 14, Sophomore, I.E. 80779 La Inmaculada, Huamachuco, La Libertad, Peru, T: Eduardo Ponce Zelada
- ENEVO23** **Use of Bivalve Mollusc Residues as Aggregate for the Manufacture of Concrete**
Joanna Ivette Galan Alvarez, 16, Senior, Maria Adele Garnier, Sechura, Piura, Peru, T: Franz Navarro Saavedra
- ENEVO24** **Removal of Hexavalent Chromium with Pectin Extracted From Lignocellulosic Residues of *Citrus sinensis* 'Valencia'**
Day Adelia Cahuapaza Choquehuanca, 16, Senior, Adventista Tupac Amaru, Juliaca, San Roman, Peru, T: Joel Colquehuanca Solis
- SOFT018** **Implementation of the Covhelp Mobile Application as a Guidance Tool in the Face of the COVID-19 Pandemic**
Megan Consuelo Espinoza Luna, 16, Senior, San Juan Macias, Callao, Callao, Peru, T: Nidia Salazar Trucios

POLAND

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

- ANIM013** **The Characteristic of the Penetration Preference of the Field Related to Its Species Diversity by Selected Representatives of Hymenoptera, Flies, Beetles, and Butterflies for the Purpose of Revitalization Activities for Green Spaces in Cities and Farmlands**
Gabriela Szczepanik, 18, Senior, XIV Liceum Ogólnokształcące im. Stanisława Staszica, Warsaw, Voivodeship Mazowieckie, Poland, T: Agnieszka Szczepanik
- ENEVO14** **Specialized Drone for Tropospheric Ozone Research with Precise Positioning and Wireless Data Transmission**
Marek Rauchfleisz, 17, Junior, University High School, Torun, Kuyavian-Pomeranian, Poland, T: Mariusz Kaminski
- PHYS007** **Hurricane in the Cup: Vortices' Trochoidal Motion and the Effects of Instability During Diffusion in Liquids**
Nina Cielica, 18, Senior, III LO im. Adama Mickiewicza, Katowice, Slaskie, Poland, T: Barbara Szymanska-Markowska
- ROBO028T** **Filament Extruder: A Free Manufacturer of Material for a 3D Printer**
Adrian Przybylski, 19, Senior, Rajmund Dejnaka, 19, Sophomore, Zespół Szkół Technicznych i Ogólnokształcących im. Stefana Banacha w Jarosławiu, Jaroslaw, Podkarpacie, Poland, T: Mariusz Skupien

- TMEDO13** **The Role of Melanotropins in the Improvement of Cognitive Functions in Dementia-Related Disorders**

Patryk Wekwejt, 18, Senior, Joseph Bem High School No.1 in Ostroleka, Ostroleka, Mazowieckie, Poland, T: Anna Radecka-Giers

PORTUGAL

Porto, Portugal, PRT001, Portuguese Contest for Young Scientists

- ENEVO50T** **The Phytoproject: *Ex situ* Bioremediation of Water from Lagoa da Ervedeira: Use of the Microalgae *Chlorella vulgaris* Immobilized in Calcium Alginate**
Matilde Lagoa Tarenta, 17, Senior, Mariana Da Silva Simoes, 18, Senior, Escola Secundaria Engenheiro Acacio Calazans Duarte, Marinha Grande, Leiria, Portugal, T: Rui Fernandes

PUERTO RICO

Mayaguez, Puerto Rico, TEPRO1, Puerto Rico Math Fair

- MATH026** **Finding Number Sequences Using the Pascal Triangle and the Newton Binomial**
Karina Alanis Miranda, 15, Sophomore, CROEM HS, Mayaguez, Puerto Rico, T: Edwin Benvenuti
- MATH027** **The Perimeter of an Ellipse and New Suggested Formula K**
Helen Kailin Li, 17, Junior, Dr. Pedro Albizu Campus, Ponce, Puerto Rico, T: Esperanza Soto Rivera
- MATH036** **Using Arithmetic to Determine a Future Time**
Mohammad Ahmad, 17, Senior, Dr. Pedro Albizu Campus, Ponce, Puerto Rico, T: Víctor McDougall Rivera

Ponce, Puerto Rico, TEPRO2, Arecibo Regional Science Fair

- PHYS059** **Modification of a Surfboard in Shape and Fin, for People with Balance Problems Due to Neuromuscular Disabilities**
Noeliz Sophia Cordero, 16, Junior, Abelardo Martinez Otero, Arecibo, Puerto Rico, T: Lilliam Reyes

Ponce, Puerto Rico, TEPRO4, Caguas Regional Science Fair

- BEHA030** **The Studying Habits of Twelfth Grade Student of a School in the Southeast of Puerto Rico**
Jorlyann Marielys Campos Ortiz, 18, Senior, Specialized School of Science and Mathematics Genaro Cautiño Vázquez, Guayama, Puerto Rico, T: Haydee Laporte Berrios

EAEVO39 **Microplastics in the Beaches of Western Puerto Rico**

Edmarie Ramos Burgos, 18, Senior, Escuela Superior Juana Colón, Comerio, Puerto Rico, T: Jackeline Colon Melendez

EGSD029 **Electric Energy Generation to Charge a Smartphone with the Bicycle Wheel Movement**

Alondra Nicole Ortiz Melendez, 18, Senior, Specialized School of Science and Mathematics Genaro Cautiño Vázquez, Guayama, Puerto Rico, T: Maria Medina Barbosa

Sabana Grande, Puerto Rico, TEPRO5, Humacao Regional Science Fair

PLNTO27 **Comparative Analysis on the Effect of the Dosage of Hydrogen Peroxide in the Germination Process in Legumes *Phaseolus vulgaris* L. (Pink and Red Bean Variety) and *Cicer arietinum* (Chickpea)**

Joel Sanchez-Medina, 18, Junior, Florencia Garcia High School, Las Piedras, Las Piedras, Puerto Rico, T: Mayra Cancel

Ponce, Puerto Rico, TEPRO6, Ponce Regional Science Fair

- CHEMO63** **Synthesis of Cinnamic Acid for Use as a Natural Pesticide**
Samuel Jose Cedeno, 17, Junior, Centro Residencial de Oportunidades Educativas de Villalba, Villalba, Puerto Rico, T: Rocio Hernandez

Finalist Directory

- EGSD030** **Sargassum fluitans as an Energy Source for Bioethanol Production**
Fabiola Wah, 17, Senior, Centro Residencial de Oportunidades Educativas de Villalba, Villalba, Puerto Rico, T: Rocio Hernandez
- ETSD036** **Adaptation of "Roof Flaps" to Sedan Body Cars to Increase the Probability of Regaining Control at High Speeds**
Abdiel Urayoan Saez Barcelo, 16, Junior, Dr. Pedro Albizu Campus, Ponce, Puerto Rico, T: Jonatan Plaza
- Sabana Grande, Puerto Rico, TEPR08, Mayaguez Regional Science Fair**
- ROBO070** **Applying OpenCV and Machine Learning to the Enforcement of COVID-19 Prevention Guidelines**

Hector Manuel Lugaro, 18, Senior, Centro Residencial de Oportunidades Educativas de Mayagüez, Mayagüez, Puerto Rico, T: Brenda Cabrera
- Ponce, Puerto Rico, TEPR09, San Juan Regional Science Fair**
- EBED029** **Novel Prototype to Identify Sound Direction Using Vibrations**
Isis Alanis Reveron, 16, Junior, University Gardens High School, San Juan, Puerto Rico, T: Xavier Pagan
- ROBO048** **Determining the Probability of Intensive Care Unit Admission Based on Patient Characteristics Using Machine Learning**
Karen Sofia Medina, 16, Junior, University Gardens High School, San Juan, Puerto Rico, T: Xavier Pagan
- Carolina, Puerto Rico, TEPR12, Puerto Rico Metropolitan Science Fair**
- ANIM043** **Creation of a 3D Design for Hermit Crab Shells**
Isabella Zoe Rodríguez Ramos, 14, Freshman, The Palmas Academy, Humacao, Puerto Rico, T: Sonia Villaverde
- BMED070T** **Microplastics in the Air as a Public Health Hazard: Development of a Digital Design of a Biodegradable Nose Filter**
Maria Isabel Morales-Quezada, 18, Senior, Samira B.F. Abdullah, 17, Senior, The School of San Juan, San Juan, Puerto Rico, T: Christina Jimenez-Gonzalez
- EBED022** **Creation of a Portable Device for Environmental Measurements Using a 3D Printing Design**
Alondra Marie Hernandez Martinez, 15, Freshman, Escuela Especializada en Ciencias, Matemáticas y Tecnología, Caguas, Puerto Rico, T: Shirley Martínez Laureano
- ENBMO32T** **Prototyping and Testing an IoT-Based Solar Rechargeable Wound Care Monitoring System Using a LilyPad Arduino**

Enderick Y. Garcia - Torres#, 18, Senior, Savdiel Ducret - Santana#, 17, Senior, Colegio Rosa-Bell, Guaynabo, Guaynabo, Puerto Rico, T: Yajaira Torres - De Jesus
- ENBMO61** **Personal Wearable Arduino-Based UV Index Detector Integrated with a Mobile IoT App Data Analyzer for UV Radiation Exposure Monitoring and Medical Research**
Daniel Villafuerte-Gonzalez, 17, Junior, Colegio San Ignacio de Loyola, San Juan, Puerto Rico, T: Laura Rosado
- ETSD067T** **Glove-Shaped Hand Manipulative and Application Integration for Hearing People to Learn Basic American Sign Language (ASL)**
Shanttale Aquino Lopez, 18, Senior, Sharlotte Aquino Lopez, 16, Junior, The San Juan Math, Science and Technology Center, San Juan, Puerto Rico, T: Jonathan Perez-Rivera
- MCRO048T** **Growth of a Possible Bacteria That Degrades Polyethylene Terephthalate (PET) Particles in a Controlled Environment**
Diego Jose Corales Casillas, 18, Senior, Joy Naomi Velazquez Colon, 18, Senior, The San Juan Math, Science and Technology Center, San Juan, Puerto Rico, T: Jonathan Perez-Rivera
- TMED036** **The Development of a Videogame That Serves as a Diagnostic Tool for Depression in Teenagers**
Daniela Gonzalez -Romano, 17, Senior, The San Juan Math, Science and Technology Center, San Juan, Puerto Rico, T: Jonathan Perez-Rivera

CONGRATULATIONS TO OUR FIRST PLACE CATEGORY WINNERS

Chemistry



NISHANT LAHIRI

Adsorbents for
Community-Based
Carbon Capture

Corning, New York
Booth CHEM067



DANA MOHAMMED AL AITHAN

Formic Acid
Dehydrogenation by
Ruthenium Catalyst

Eastern, Saudi Arabia
Booth CHEM043

Dow applauds the finalists
in Chemistry.



QATAR

Doha, Qatar, QAT001, The National Student Research Fair

- BMEDO66** **Role of TMEM-143 in Glucose Homeostasis-Implications in the Pathogenesis of Type-2 Diabetes**
Alyaa Eisa Al-Tamimi, 18, Senior, Al Bayan Secondary High School for Girls, Doha, Qatar, T: Hissa Al-Shamari
- CBIO067T** **Bioinformatics Analysis to Identify Potential Transcription Factors That Enhance Reprogramming of Somatic Cells Into Induced Pluripotent Stem Cells**
Saud Abdulaziz Al-Jaidi, 18, Senior, Khalifa Mohammed Aljanahi, 16, Junior, Hassan Ibn Thabit Secondary School for Boys, Doha, Qatar, T: Faisal Hassan
- EGSD049T** **Polymer Nanocomposites for Energy Harvesting Application**
Salwa Al-Kuwari, 17, Senior, Fajer Meshal Al-Shamari, 17, Senior, Qatar Academy for Science and Technology, Education City, Doha, Qatar, T: Ruba Ali
- ENBM067T** **Novel Technique to Fabricate Ultraviolet Sensor Using Photopolymer Resin With 3D Printing Technology To Avoid Skin Cancer**
Ali Yousuf Shams, 17, Senior, Mohammed Nassir Redhwani, 16, Junior, Al-Jazeera Academy, Doha, Qatar, T: Azza Abouhashem
- ENEVO98T** **Development of Efficient Catalysts from Waste Shells for the Production of High Purity Biodiesel From the Household Cooking Waste Oil**
Norahhuda Almubarak, 17, Senior, Umm Ayman Secondary School for Girls, Doha, Qatar, T: Salma Al Tamimi
- MCRO063T** **Use of Zizphus Leaves Extract as a Safe Alternative Against Some Isolated Fungi from Soil**
Raghad Hassen Alkhuzaei, 16, Junior, Raghad Ali Abu Halawa, 18, Senior, Zubaida Secondary School for Girls, Al-Doha, Qatar, T: Yousra Abdelmawgood, T: Yousra Kamal

REPUBLIC OF MOLDOVA

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

- PLNT026T** **Broccoli: The Source of Obtaining Biologically Active Components**
Marina Rusnac, 17, Junior, Maria Ciocoi, 17, Junior, LTPR Mihai Mariniciuc, Chisinau, Republic of Moldova, T: Alla Dvornina
- ROBO042T** **Autonomous Base Station for Drone Storage and Battery Swapping**
Cosmin Ciorba, 17, Junior, Andrei Copaci, 18, Senior, Theoretical Lyceum "Ion Creanga", Chisinau, Republic of Moldova, Liceul de Creativitate si Inventica Prometeu-Prim, Chisinau, Republic of Moldova, T: Marius Dumitrascu

ROMANIA

Lisaura - Ipotesti, Romania, ROM001, Romania Science and Engineering Fair

- EAEV015** **Performance of Machine Learning Algorithms for Predicting Air Pollution Parameters**
Brianna Alexandra Stan, 17, Junior, Lauder-Reut Educational Complex, Bucharest, Romania, T: Ion Stan
- ENBM019** **Demyelination: A Research Into the Use of Electrical Models in the Study of Demyelinating Diseases**
Despina Iuliana Iuliana Gica, 18, Senior, Mihai Viteazul National College, Bucharest, Bucharest, Romania, T: Mircea Ignat
- ENBM020** **Applications of Electromagnetic Forces in Medicine**
Cristiana Andreea Murgoci, 19, Senior, International Computer High School of Bucharest, Bucharest, Romania, T: Mircea Ignat
- ENBM057T** **Guidance System for Visually Impaired People**
Mihai Dumitrescu, 16, Sophomore, Matei Andrei Iosip, 16, Sophomore, Mihai Razvan Varlan, 16, Sophomore, Liceul Teoretic International de Informatica Bucuresti, Bucharest, Hermann Oberth German School, Colegiul National Mihai Viteazul, Bucharest, Romania, T: Mircea Ignat

MATSO08 **Green Interpenetrated Silicone-Based Elastomeric Webs Engineered as Wave Energy Harvesters**

Luiza Natalia Ionescu, 18, Senior, Mihai Viteazul National College, Bucharest, Bucharest, Romania, T: Mircea Ignat

SAUDI ARABIA

Riyadh, Saudi Arabia, SAU001, Mawhiba Science & Engineering Fair

- BEHA017** **A Novel Application of Three-Dimensional Printing in Personalizing Drug Dosage**
Mawaddah Omar Ali, 17, Senior, Umm Salamah, Makkah, Makkah, Saudi Arabia, T: Sharaf Sharaf
- BMEDO24** **The Roles of Activin-A and Its Antagonists in Early and Late Stages of Colon Cancer: In vitro Study**
Layan Zahid Sharalahi, 17, Senior, Umm Salamah, Makkah, Makkah, Saudi Arabia, T: Bassem Refaat
- CBIO025** **Drug-Target Interactions Prediction Using Network Based Method and Machine Learning**
Lara Raed Monagel, 18, Senior, Dar Jana International School, Jeddah, Saudi Arabia, T: Maha Thafar
- CELL018** **Reducing the Screening Time Required for Therapeutic Exon Skips in Duchenne Muscular Dystrophy Using *ab initio* Modeling**
Dana Ali Khafagi, 17, Senior, Al Ibdah Private Girls' Schools, Jeddah, Makkah, Saudi Arabia, T: Ahmed Mirza
- CHEM027** **Development of a Novel, Hybrid Compound as a Single-Source Precursor for Nanocrystalline Manganese Oxide and Sulfide**
Areej Iyas Bajawi, 17, Senior, Smart Learning Schools, Riyadh, Saudi Arabia, T: Norah Tareh
- CHEM028** **Enhancing the Photoelectrocatalytic Performance of WO₃ Decorated with CoO Using Electrodeposition for Water Splitting**
Maria Ghalib Al Ghamdi, 16, Junior, Al Shams National Schools, Riyadh, Saudi Arabia, T: Nawal Abass
- CHEM029** **Novel Biodegradable Fluorescent Polymers for Anti-Counterfeiting Applications**
Leen Ahmed Al Mulhim, 15, Sophomore, KFUPM Schools, Dhahran, Eastern Province, Saudi Arabia, T: Zozo Ahmed
- CHEM043** **Selective Dehydrogenation of Formic Acid Using an Efficient Cost-Effective Ruthenium-Based Catalyst for Generating Power in Automobiles**
Dana Mohammed Al Aithan, 17, Senior, Al-Anjal Private School, Al Hofuf, Eastern, Saudi Arabia, T: Kuo-Wei Huang
- EAEV027** **Estimating the Capillary Pressure of Reservoir Rocks Using Nuclear Magnetic Resonance (NMR) Logging**
Lamar Alkaka, 17, Senior, Dhahran Ahliyya School, Dammam, Eastern Province, Saudi Arabia, T: Hussein Hoteit
- EBED019** **Digital Upgrade of Analog Communication Systems Using Software-Defined Radio Techniques**
Yousef Khojah, 17, Senior, Al-Faisal Secondary School, Jeddah, Makkah, Saudi Arabia, T: Talal Al-Attar
- EBED020** **A Novel, Fluorescent Nano-Based Sensor for Mercury in Seawater with High Sensitivity and Selectivity**
Ahmad Alrabiah, 18, Senior, Dhahran Ahliyya School, Dammam, Eastern Province, Saudi Arabia, T: Muhammad Mansha
- EGSD018** **Engineering a Bifunctional Metal: Organic Framework for Efficient and Cost-Effective Hydrogen Production and Storage**
Abdullah Abdulaziz Al-Ghamdi, 17, Senior, Al-Hussan High School, Dammam, Eastern, Saudi Arabia, T: Mahmoud Abdelnaby

- EGSD019** **Co-Ferrite Modified Hematite Films for All-Day Active Photo-Electrocatalyst Electrode in Water Splitting**
Abdullah Anwar Al Hamadat, 17, Senior, AL Bassam-IGCSE, Dammam, Eastern, Saudi Arabia, T: Mohammad Gondal
- EGSD020** **Enabling High Performance Supercapattery Through Uniquely Designed Multilayer Oxides Electrode Material**
Tala Saad Al-Qahtani, 17, Senior, KFUPM Schools, Dhahran, Eastern Province, Saudi Arabia, T: Zozo Ahmed
- EGSD027** **Development of an All-Solid-State Self-Charging Supercapacitor Energized by a Safe, Biodegradable Gel Electrolyte**
Latifa Hesham Alghannam, 15, Sophomore, KFUPM Schools, Dhahran, Eastern Province, Saudi Arabia, T: Zozo Ahmed
- EGSD036** **Optimizing Zinc Anode Porosity for Suppressing Dendrite Growth in Aqueous Zinc-Ion Batteries to Improve Performance and Prolong Cycle Life**
Hatoon Abdullah Alanqary, 17, Senior, AlTarbyah Allslamiya Schools, Riyadh, Saudi Arabia, T: Husam Alshareef
- ENEV029** **Novel and Environmentally Friendly Method of Heavy Metals and Radionuclides Removal Using Radiation Resistance Bacteria**
Anas Arafat, 17, Senior, Riyadh School for Boys and Girls, Riyadh, Saudi Arabia, T: Mohammed Alsuhybani
- ENEV030** **Synthesis of a Photo-induced Multifunctional Zr Based Metal-Organic Framework for CO₂ Capture and Conversion**
Mansour Majed Al Marzooqi, 18, Senior, Riyadh School for Boys and Girls, Riyadh, Saudi Arabia, T: Mahmoud Abdalnaby
- ENEV031** **Degradation of Organic Pollutants Using (ZnO/Mo) Photocatalyst**
Maymounah Al Shahrani, 17, Senior, University Schools, Dhahran, Eastern Province, Saudi Arabia, T: Zozo Albyomi
- ETSD021** **A Chemical Kinetic Modeling Study for Enhancing the Combustion Properties of Ammonia: A Zero-Carbon Fuel**
Fahad Al Hazmi, 17, Senior, Dar Althikr Private School, Jeddah, Mecca, Saudi Arabia, T: Binod Giri
- ETSD022** **Studying the Auto-Ignition Characteristics of Hydrogen in Homogenous Charge Compression Ignition Engines**
Rafaa Qanash, 17, Senior, Talented Secondary School, Jeddah, Makkah, Saudi Arabia, T: Abdulrahman Mohammed
- ETSD023** **Controlling Combustion Conditions of Ammonia for Eco-Friendly Energy**
Ali Mohammed Alali, 18, Senior, Alkifah Academy, Al Hufuf, Eastern Province, Ahsaa, Saudi Arabia, T: Thibault Guiberti
- ETSD061** **Analyzing the Dynamics of Swirl Flames Using a Novel Lean Premixed Dual-Swirl Burner**
Raghad Abdulellah Alaseeri, 17, Senior, Talented Secondary School, Jeddah, Makkah, Saudi Arabia, T: Deanna Lacoste
- MATS015** **Development of Highly Efficient and Environmentally Friendly CsSnI₃ Perovskite Materials for Solar and Thermoelectric Energy Harvesting**
Tahani Adel Ahmed, 16, Sophomore, KFUPM Schools, Dhahran, Eastern Province, Saudi Arabia, T: Zozo Albyomi
- MATS016** **Boosting the Photoelectrochemical Water Splitting Performance of CuO-Cu₂O Heterojunction Thin Films**
Elaf Abdullah Muayqil, 17, Senior, Riyadh School for Boys and Girls, Riyadh, Saudi Arabia, T: Abdullah Alotaibi
- MATS017** **Development of High Performance Nanocrystalline Bi_{0.8}Cu_xSb_(1.2-x)Te₃ Thermoelectric Films Using Advanced Pulsed Laser Deposition**
Lama Abdullah Al Sayid, 16, Junior, KFUPM Schools, Dhahran, Eastern Province, Saudi Arabia, T: Zozo Ahmed

CONGRATULATIONS TO OUR CATEGORY WINNERS

Computational Biology and Bioinformatics

FIRST PLACE

Wutthipong Chongchareansanti
Pawit Kaewnuratchadasorn
Nattawin Yamprasert
Kevin Zhu

SECOND PLACE

Rithvik Ganesh
Minnie Liang
Khushi Parikh
Ryan Samuel Park

THIRD PLACE

Amogh Chaturvedi
Satvik Dasariraju
Caroline Huang
Edward Wonyong Jung
Alice Liu
Amber Luo

FOURTH PLACE

Ebru Ayyorgun
Vikram Srinivas Goddla
Hannah Guan
Srinath Hariharan
Theodore Tianqi Jiang
Leo Shen
Anjali Sreenivas
Anirudh Venkatraman

Regeneron applauds the finalists
in Computational Biology and Bioinformatics.

REGENERON®

- MATS018** **Date Seeds Derived Phosphorus and Nitrogen Doped Graphene Oxide for Supercapacitor Applications**
Naif Ali Al Qahtani, 18, Senior, Abha Private School, Abha, Aseer, Saudi Arabia, T: Abdullah AlGhamdi
- MATS019** **Enhancing the Photostability and Efficiency of Tin-Lead Perovskite Solar Cells Using Nickel Oxide and Self Assembled Monolayers**
Muhanad Bakr Alammari, 17, Senior, Riyadh School for Boys and Girls, Riyadh, Saudi Arabia, T: Derya Baran
- PHYS032** **Physical Properties Analysis of Double-Perovskite Oxide (La₂CoMnO₆) for Spintronics Devices: A First-Principles Density Functional Theory Study**
Rala Abu Sualmi, 17, Senior, Manarat Al-Madinah National School, Madinah, Saudi Arabia, T: Udo Schwingenschlogl
- PLNT016** **Suicidal Germination of Striga hermonthica in Response to Various Cytokinins in Combination With Fluridone/1-Aminocyclopropane-1-Carboxylic Acid**
Ahmed Marwan Behisi, 17, Senior, Dhahran Ahliyya School, Dammam, Eastern Province, Saudi Arabia, T: Salim Al-Babili
- PLNT017** **Isolation and Characterization of Plant Growth Promoting Bacteria From Olive Tree Cultivated Under Desert Farming in Saudi Arabia**
Faisal Abdullah Al Khwaiter, 18, Senior, Riyadh School for Boys and Girls, Riyadh, Saudi Arabia, T: Anas Rawas
- PLNT018** **A Heterologous System Examination of JACKDAW Mutant Variants' Effects on Complex Formation With SHORT-ROOT and SCARECROW**
Faisal Saad AlGhamdi, 18, Senior, Riyadh School for Boys and Girls, Riyadh, Saudi Arabia, T: Fatimah Abdulhakim
- ROBO035** **A Novel Object Detection-Based Method To Detect Craters and Rilles on the Lunar Surface**
Fadil Mohammed Younes, 18, Senior, Al Khobar Secondary School, Al Khobar, Eastern, Saudi Arabia, T: Ahmed Barnawi
- TMEDO21** **Wastewater-Based Epidemiology (WBE) To Monitor COVID-19 in a Private Community Campus**
Elaf Esam Alahdal, 17, Senior, Secondary Gifted School, Jeddah, Saudi Arabia, T: Abeer Khabti
- TMEDO22** **1,4-Benzodioxin Derivatives as Dual Inhibitors for Alpha-Amylase and Alpha-Glucosidase for Managing Type 2 Diabetes**
Maryam Ali Al Abdulbaqi, 17, Senior, Safwa First Secondary School, Safwa, Eastern, Saudi Arabia, T: Muhammad Taha
- SINGAPORE**
Singapore, Singapore, SGPO01, Singapore Science and Engineering Fair
- BMEDO76** **Differentiating LATE from Alzheimer's Disease in the Era of Anti-Amyloid Monoclonal Antibody Treatment: A Novel Machine-Learning Approach**
Jun Kai Yeong, 17, Senior, NUS High School of Mathematics & Science, Singapore, Singapore, T: Chee Loong Ng
- CELL040T** **Turning the TCA Cycle Backwards To Repair Damaged DNA**
Branden Kang Jun Zhao, 15, Sophomore, Anselmo Klement Chua, 16, Sophomore, Clementi Town Secondary School, Singapore, Singapore, T: Rachel Lehming-Teo
- CHEM070** **Go Mini or Go Home! Fabrication and Evaluation of Miniature Solid-State Ion-Selective Electrodes for pH Measurement**
Annika Xinan Liu, 17, Senior, Raffles Institution, Singapore, Singapore, T: Guoxian Tan
- MATS047** **"Sotong"-Nidin: The Detection of Squid Freshness Using Red Cabbage Extract (RCE)**
Rui Xuan Lee, 18, Senior, Nanyang Junior College, Singapore, Singapore, T: Qian Bing Toh

- MATS049** **One Fish, Two Fish, Bright Fish, Clean Fish: Thermal Induced Biofluorescence of Fish Scale for Enhanced Chemical Adsorptivity**
Malcolm Sow, 18, Senior, National University of Singapore High School of Mathematics and Science, Singapore, Singapore, T: Sher-Yi Chiam
- ROBO082T** **Anti-Virus Autobots: Predicting More Infectious Virus Variants for Pandemic Prevention Through Deep Learning**
Glenda Hui En Tan, 17, Senior, Tze Erhn Koay, 17, Senior, Raffles Institution, Singapore, Singapore, T: Grace Lim
- SLOVAKIA**
Bratislava, Slovakia, SVK002, AMAVET-Slovak Association for Youth, Science & Technology
- ETSD069** **Open-Source DIY Unmanned Aerial System for Remote Sensing: Open Plane Project**
Matej Gurnak, 18, Senior, High School of Jura Hronca, Bratislava, Slovakia, T: Lubica Letanovska
- MCRO047T** **Comparison of Commercial and Natural Disinfectants and Their Effect on Microorganisms**
Katarina Fabulova, 17, Junior, Laura Ivancova, 17, Junior, Saint Nicholas Grammar School, Presov, Slovakia, T: Miriam Feretova
- SLOVENIA**
Ljubljana, Slovenia, SVN001, Slovenia Science and Engineering Fair
- BMEDO12** **Production of Antibodies in Patients Infected With SARS-CoV-2**
Eva Biteznik, 19, Junior, Gimnazija Kranj, Kranj, Slovenia, T: Vanda Kukec
- CHEM013** **Face Mask Protection Against Particulate Matter**
Crt Saksida, 18, Senior, Gimnazija Nova Gorica, Nova Gorica, Slovenia, T: Silvana Stucin
- SOUTH AFRICA**
Johannesburg, South Africa, ZAF001, Expo for Young Scientists-South Africa
- EAEV009T** **A Comparison Between Two Rocky Shore Ecosystems on Two Different Coastlines**
Audrey Kingswell Hunn, 16, Sophomore, Protea Heights Academy, Cape Town, Western Province, South Africa, T: Danielle van Eck
- EBED009** **Automated Energy-Saving Cleaning Systems for Central Heating and Ventilation: Healthy Air for Hospitals and Offices**
Michael Grey Shepstone, 16, Junior, Somerset College, Cape Town, Western Cape, South Africa, T: Louise van Zyl
- ENBM011** **Diagnosis of Respiratory Diseases Through Physiological Sound Analysis**
Sachin Mohan, 17, Senior, Horizon International High School, Johannesburg, Gauteng, South Africa, T: Huseyin Ackinci
- PHYS010** **Formula One Aerodynamics**
Dashayin Gilbert, 17, Senior, Curro Durbanville High School, Cape Town, Western Cape, South Africa, T: Charmaine Matthee
- ROBO013** **Using Machine Learning To Diagnose Pneumonia and Skin Cancer: DoctorNet**
Kutlwano Brian Tshatiwa, 16, Senior, Gabonewe High School, Madikwe Township, North West, South Africa, T: Gale Mekgwe
- TMEDO08** **Mitigating Impaired Drug Absorption To Shorten Medical Treatment and Enable Pharmaceutical Product Development: Critical Evaluation of Human Oral Bioavailability for Pharmaceutical Drug Paracetamol**
Ra'ees De Witt, 18, Senior, Curro Hermanus Independent School, Hermanus, Western Cape, South Africa, T: Marthelle Theart

Finalist Directory

SOUTH KOREA

Daegu, South Korea, KOR001, Korea Code Fair

- EBED028T** **CURE (Smart Check-In Service Using Palm Vein Authentication)**
Seongbin Byun, 15, Sophomore, Youngtae Cho, 15, Sophomore, Seokho Lee, 16, Sophomore, Kyeongbuk High School, Daegu Joong-Ang High School, Daegu Software High School, Dalseong-gun, Daegu, South Korea, T: Jaegwon Kim
- ROBO056** **Glasses for the Blind Using Finger Tracking and OCR**
Du-go Park, 16, Junior, Korea Digital Media High School, Ansan-si, South Korea, T: Mi-Young Ha
- SOFT023** **Program Development To Check Students' Concentration During Online Class**
Ju-Young Shim, 17, Junior, SeHyun High School, Seoul, Gangseo-gu, South Korea, T: Jungwoon Choi
- SOFT028T** **A New Approach to Image-Based 3D Virtual Try-On Using Deep Learning**
ChaeWon Huh, 16, Junior, Eun Woo Chang, 17, Senior, Chae Young Huh, 18, Senior, Kyeongbuk High School, Gyeongil Girl's High School, Nam-gu, Daegu NamSan High School, Daegu, South Korea, T: Sunhee Lee
- SOFT045** **Internet Broadcast Management System: Post-Broadcast File Management and Editing Point Extraction**
Shin Doyun, 17, Senior, Incheon Daegun High School, Incheon, Yeonsu-gu, South Korea, T: Kim Mingu
- Cheonan-si, South Korea, KOR003, Korea Science Fair**
- ANIM008T** **Mosquito Surge: Global Warming and Geographical Factors**
Junwoo Kim, 18, Senior, Hyunmoon Hwang, 18, Senior, Youngeun Seo, 17, Senior, Incheon Academy of Science and Arts, Incheon, Incheon, South Korea, T: Hangseol Cho
- ANIM015** **What You Eat, What You Are: Diet-induced Epigenetic Alteration of *Tenebrio molitor's* Pigmentation**
Minjun Shin, 17, Senior, Hankuk Academy of Foreign Studies, Yongin, Gyeonggido, South Korea, T: Yoo Soyeun
- BCHM016T** **Exploring Ecofriendly Way To Recycle Wasted Part of *Flammulina velutipes*: Through Proving Bioactivity of Its Subcritical Water Extract**
MyeongJin Kang, 16, Junior, Seungmin Lee, 17, Senior, Donghyeon Gwak, 17, Junior, Changwon Science High School, Changwon-si, Gyeongsangnam-do, South Korea, T: EunKyeong Yoon
- CBIO011** **Pharmacodynamic Prediction Model Using Physicochemical Properties of Antidepressant**
Guhyun Chung, 17, Junior, Saint Paul Preparatory Seoul, Seocho, Seoul, South Korea, T: Michael Kim
- EAEV014T** **Please Embedding Roundabout on the City!: Roundabout Planning Program for Reducing Air Pollution in the Urban Planning Stage**
Gaon Han, 15, Sophomore, Jiho Hwang, 15, Sophomore, Hui Gwan Yang, 15, Sophomore, Haemil High School, Sejong-si, Heamil, South Korea, T: Kim So yeon
- ENBM016T** **A New Paradigm of Ankle CPM Machine: A Portable Two Axes Ankle CPM Machine Using Linear Actuators**
Gyujin Kim, 18, Senior, Seogyun Yim, 17, Senior, Gyeongmin Kwon, 18, Senior, Incheon Academy of Science and Arts, Incheon, Incheon, South Korea, T: Daeki Cho
- MATH010T** **Study on the Solution Set of Knot Colorings**
Dongin Kim, 18, Senior, Sihyeong Yang, 18, Senior, Seokyoung Yoon, 18, Senior, Korea Science Academy of KAIST, Busan, Busan, South Korea, T: Hun Kim
- MATSO06T** **A Novel Type of Piezoelectric Device: Development and Utilization of Bio Piezoelectric Device Using Jellyfish Collagen**
Minseo Jo, 16, Junior, Seonwoo Kang, 16, Junior, Chungnam Science High School, Gongju Si, Chungcheongnamdo, South Korea, T: Guntaek Lee

CONGRATULATIONS TO OUR CATEGORY WINNERS

Earth & Environmental Sciences

FIRST PLACE

Rebecca Cho
Anika Puri

SECOND PLACE

Rishita Ghosh
Eyrin Kim
Thitipong Larndate
Artash Nath
Tarunika Sasikumar
Jirapon Sengnongban

THIRD PLACE

Maria Chzhen
Cameron Dunn
Arjun Gupta
Eliana Kai Juarez
Ashton Timothy Ryan
Suraj Vaddi
Sunny You

FOURTH PLACE

Lamar Alkaka
Druhin Bhowal
Desmen Andrew Boykin
Angela Chen
Jun Kondo
Ellery Alice Barngrove McQuilkin
Julie Inutsuka Sieg
Arihant Singh
Kayla J. Sohn
Brianna Alexandra Stan
Lu-Heng Wang
Po-Kai Yang

National Geographic applauds the finalists
in Earth & Environmental Sciences.



- MATS007** **Analysis and Classification of Directional Motions of Cholesterol Crystals Surfing on a Lipid Membrane**
Melissa Kim, 16, Sophomore, Seoul International School, Seoul, Gyunggi-Do, South Korea, T: Allyson Lee
- MCRO006T** **Gene Expression Mechanism of Alternative Sigma Factors SigE and SigB Inducing Rifampicin Resistance in *Mycobacterium Smegmatis***
Jungho Kim, 18, Junior, Sanghyun Park, 17, Senior, Minjae Kim, 18, Junior, Korea Science Academy of KAIST, Busan, Busan, South Korea, T: In Jeong Ko
- PHYS014T** **Is Quantum Mechanics Wrong?: Verification of Bell-Type Inequality Violation and Suggestion of the Improved Form Inequality**
Jiwan Seo, 18, Senior, Hyeondong Yoo, 17, Senior, Sanghwa Lee, 18, Senior, Korea Science Academy of KAIST, Busan, Busan, South Korea, T: Zaeyoung Ghim
- PHYS038** **System of the Particle-Permeation Controllable Soap Membrane Filter With High Self-Recovering Property as Multiscale Particle “Switches”**
Taekyung Lee, 17, Senior, Korean Minjok Leadership Academy, Hoengseong, Gangwon, South Korea, T: Helen Jeong
- ROBO016** **3D AttnGAN for Text to Voxel Generation**
Seungwoo Yoon, 17, Senior, Chung Nam Samsung Academy, Asan-si, Chungcheongnam-do, South Korea, T: Jeongseok Lee
- SOFT013T** **U-TAB: User-Centered Transparent Aid Platform Using Blockchain**
Goo Ha Park, 18, Junior, Yates Johneth Park, 14, Freshman, Yechan Lee, 16, Sophomore, Chadwick International School, Incheon, South Korea, Seoul International School, Seoul, Gyunggi-Do, South Korea, Dublin High School, Dublin, California, T: Gary Wines
- Seoul, South Korea, KOR002, YSC (National Science Research Competition)**
- BEHA036** **Do You Want To Know the Best Way To Study? We Can Help You!**
Hyunji Ryu, 17, Junior, Yatap High School, Seong-Nam, Gyeonggi-do, South Korea, T: Giyong Choi
- CHEM035T** **Novel Protein Quantification With Metal-Organic Framework (MOF)-Coated Quartz Crystal Microbalance (QCM)**
Tae hoon Kim, 18, Senior, Woojin Park, 18, Senior, Joonsung Lee, 17, Senior, Korea Science Academy of KAIST, Busan, Busan, South Korea, T: Eun-Young Choi
- ENEV040T** **Making and Utilizing Wave Generator Using Eco-Friendly Buoy**
Jin woo Seong, 17, Senior, Hyewon Shin, 17, Senior, Yeo Jin Cho, 17, Junior, Changwon Science High School, Changwon-si, Gyeongsangnam-do, South Korea, T: Hyeong Ki Yu
- ENEV055T** **A Study on Purification Method of Expired Medication Through Biofilm Sponge Manufacturing**
Seo Yeon Choi, 17, Senior, Min Kyeong Shin, 17, Senior, Chan Woo Oh, 18, Senior, Taejang High School, Suwon-si, Gyeonggi-do, South Korea, T: Jae Sung Sim
- ETSD034T** **Raspberry Pi Is Enough for an Anti-Drone Laser: Achieving an Efficient and Simple Anti-Drone Laser Tracking System**
Donghwa Choi, 18, Senior, Sihyeon Park, 17, Senior, Sejong Academy of Science and Arts, Sejong, Chungcheong, South Korea, T: Jaehyung Park
- PLNT024T** **Effect of Plant Growth Promoting Rhizobacteria (PGPR) on Native Korean Wheat**
Chea-Yeon Shin, 17, Senior, Alexander Jungik Hong, 16, Junior, Cheongshim International Academy, Seoul, South Korea, T: Hyunchang Hong
- SOFT033T** **Abstract Image Search Algorithm Based on Color Histogram**
Juntae Jeong, 16, Junior, Jiwoo Kim, 16, Junior, Sihwan Lee, 17, Senior, Gyeongnam Science High School, Jinju-si, Gyeongsangnam-do, South Korea, T: Joo Yeon Kim
- SOFT038T** **A Secret Sharing Scheme Without Third-Party Dealers**
Taehyun Lee, 18, Senior, Minwoo Kim, 17, Senior, Gunwook Jeon, 17, Senior, Korea Science Academy of KAIST, Busan, Busan, South Korea, T: Sanghyun Yoon

- SOFT044T** **Auto Accident Report System**

Ju-Hyeong Choi, 17, Senior, Hyoung Ju Seon#, 16, Junior, Da Won Yang, 16, Junior, Yedang High School, Deungnyang-myeon, Boseong-gun, Jeollanam-do, South Korea, T: Dong-Min Lee

SPAIN

Barcelona, Spain, SPN001, Exporecerca Jove

- ETSD068** **Automated Greenhouse: Is Its Use a Good Way To Boost the Plants' Growth?**
Bernat Carnota Torres, 18, Senior, IES Damia Campeny, Mataró, Barcelona, Spain, T: Carme Prunera Sas
- TMEDO49** **Evaluation and Comparison of the Effectiveness and Safety of Fecal Microbiota Transplantation, Anti-Inflammatory Drugs, and Biologics for the Treatment of Inflammatory Bowel Disease**
Laia Uya Caba, 17, Senior, Escola Mare de Deu de la Salut, Sabadell, Barcelona, Spain, T: Sergi Bonet Martinez

SWEDEN

Stockholm, Sweden, SWE001, Utställningen Unga Forskare

- EAEV074** **Effects of Changes in Precipitation on Marine Ecosystems Due to Overstraining of Wastewater Treatment Plants**
Lovis Margareta Bergstrand, 18, Senior, Uddevalla Gymnasieskola, Uddevalla, Vastra Gotalandsregionen, Sweden, T: Birthe Pedersen
- PHYS061T** **The Three-Body Problem: A Stability Analysis of Multiple Star Systems**
Simon Jonatan Hugo Holmqvist, 18, Senior, Albin Sjogren, 19, Senior, Polhemskolan, Lund, Skane, Sweden, T: Carina Lagerholm
- SOFT052T** **How Far Can You See?: Simulations of Sightlines in Swedish Landscapes**
Moltas Lindell, 18, Senior, Andreas Tornkvist, 18, Senior, Curt Nicolin Gymnasiet, Finspang, Ostergotland, Sweden, T: Anna Hermelin

SWITZERLAND

Bern, Switzerland, CHE001, Swiss Youth in Science

- BCHM018** **Application and Comparison of Deep Learning Methods in the Prediction of RNA Sequence Degradation and Stability**
Ankit Singhal, 18, Senior, International School of Basel, Reinach, Baselland, Switzerland, T: Nicola Mason
- ROBO038** **Development and Construction of a Low-Cost Six-Axis Robot Arm**
Noa Sendlhofer, 19, Senior, Academia Engiadina, Samedan, Graubünden, Switzerland, T: Georg Steinwender

TAIWAN

Taipei, Taiwan, TWN001, Taiwan International Science Fair

- ANIM006** **Mechanisms of High-Salt Diet-Induced Learning Deficit in *Drosophila***
Yi-Shan Hung, 18, Senior, Taipei Municipal Zhongshan Girls High School, Taipei City, Chinese Taipei, T: Sue-Wei Lin
- BEHA018** **How Neighbors Affect Self-Identification: Evidence From Chinese Character Reading**
Jia-Ying Lian, 15, Freshman, Zheng De Junior High School, New Taipei City, New Taiwan City, Taiwan, T: Chia-Ying Lee
- CHEM030T** **Degradation of rPLA With the Non-Metal Catalyst (PLADEG) and Its Application in Vitrimers Synthesis**
Lu-An Lin, 17, Junior, Ti-An Hsu, 17, Junior, Taipei First Girls High School, Taipei City, Chinese Taipei, T: Man Kit Leung

Finalist Directory

- EAEV054T** **Polar Vortex Influence on Broadscale Cold Extremes Associated With Arctic Oscillation**
Lu-Heng Wang, 18, Senior, Po-Kai Yang, 17, Senior, Kaohsiung Municipal Kaohsiung Senior High School, Kaohsiung, Taiwan, T: Pay-Liam Lin
- ENEV056T** **Improvement of *Pantoea* sp. Denitrification Activity at Low Temperature Using Carbon Sources**
Ling-Yi Chang, 18, Senior, Yi-Wei Chung, 17, Junior, Kaohsiung Municipal Kaohsiung Girls' Senior High School, Kaohsiung, Kaohsiung, Taiwan, T: Ying-Tang Huang
- ETSD035T** **Performance Enhancement of PMMA/GOx Hybrid Rocket Engine Using Swirling Injection**
Yu-Sheng Wang, 17, Senior, Guan-Yu Chen, 18, Senior, Taipei Municipal Jianguo High School, Taipei City, Chinese Taipei, T: Yi-Fan Lal
- MATH020T** **Farey Sequences and Ford Spheres in Higher Dimensions**
Ming-Te Hong, 18, Senior, Chia-Wei Lu, 18, Senior, The Affiliated Senior High School of National Taiwan Normal University, Taipei City, Chinese Taipei, T: Hsiang-Chun Hsu
- MATS020T** **Synergistic Effects of Polysaccharides on Protein Adsorption and Tribological Behaviors of Orthokeratology Lens**
Kai Ting Lin, 17, Junior, Hsin Chang, 16, Junior, Taipei Municipal LiShan High School, Taipei City, Chinese Taipei, T: Hsu-Wei Fang
- PHYS028T** **Critical Solar Parameters for Prediction of Geomagnetic Storm**
Hsin-Yu Lin, 18, Senior, Yu-Chen Liu, 17, Senior, Taipei First Girls High School, Taipei City, Chinese Taipei, T: Shan-Chien Yang
- PLNT009T** **Electric Shock Can Protect Plants Against Viruses**
Shao-Jyun Lai, 17, Senior, Fu-Ru Li, 18, Senior, Taipei First Girls High School, Taipei City, Chinese Taipei, T: Hsin-Hung Yeh
- SOFT029T** **An Enhanced Adversarial Attack Method for Defending Against CAPTCHA Solvers**
Luther Wei, 16, Junior, Bo-Feng Lai, 16, Junior, Taipei Municipal Jianguo High School, Taipei City, Taiwan, T: Po-Wen Chi
- TMED023** **Targeting Glut3 and GABA Receptors Alleviates the Intestinal Side Effects of HER2 TKIs**
Yu-Wei Huang, 16, Sophomore, Taipei Fuhsing Private School, Taipei, Chinese Taipei, T: Ma-Hsuan Ma
- THAILAND**
Phatumwan, Thailand, THA001, SST-NSM National Science Projects Competition
- ANIM009T** **The Effect of Herbal Extract Supplementation on Biological and Productive Character of Silkworm: A Novel Approach for Efficient Silk Sheath Production**
Panatas Chaiprakan, 16, Sophomore, Porawat Dontanam, 16, Sophomore, Sirawich Laolapha, 16, Sophomore, Damrongratsongkroh School, Muangchiangrai, Chiangrai, Thailand, T: Kiettisak Inrajsadon
- ANIM010T** **Increasing Propolis Production of Stingless Bee (*Tetragonilla collina*) for Promoting Species Conservation and Sustainable Utilization**
Witsanuchai Hathakong, 16, Freshman, Natchapon Wongsaraj, 15, Freshman, Tanakon Sakhun, 15, Freshman, Damrongratsongkroh School, Muangchiangrai, Chiangrai, Thailand, T: Sutipong Jaikaew
- ANIM011T** **Rearing Crickets *Teleogryllus mitratus* in Green LED Light Can Significantly Reduce Limb Autotomy and Mortality**
Marisa Arjananont, 18, Senior, Jrasnatt Vongkampun, 18, Senior, Princess Chulabhorn Science High School Pathumthani, Ladlumkaew, Pathumthani, Thailand, T: Khunthong Klaythong
- ENEV020T** **ESStab: Eco-Friendly Soil Stabilizing Powder**
Ek-amon Srijomkwan, 17, Senior, Pojarpa Puanglumpyai, 18, Senior, Narawit Pratueangsukpong, 17, Senior, Kamnoetvidya Science Academy, Rayong, Thailand, T: Arjaree Thirach

CONGRATULATIONS TO OUR CATEGORY WINNERS

Embedded Systems

FIRST PLACE

James Nagler

SECOND PLACE

Nishu Yogesh Anekere

Yike Chen

Dawen Winston Cheng

Harrison Taylor Gover

Sahil Naresh Krishnani

Yiming Xiong

THIRD PLACE

Aditi Bhaskar

Sarang Goel

Eric Zou

FOURTH PLACE

Mihai Crisan

Kayla Joy Salasidis

Vivek Sandrapaty

Emily Kathleen Troutman

Microsoft Azure Sphere applauds the finalists
in Embedded Systems.

Azure Sphere

- ETSD010T** **Effect of Magnetic Field on Frequency Generated From an Active Magnetic Buzzer**
Settasit Settagaroon, 18, Senior, Pojchara Ounjaroen, 18, Senior, Wachirawit Nisapruksachart, 18, Senior, Kamnoetvidya Science Academy, Rayong, Thailand, T: Kriangkamon Sawangsri
- MATH015T** **The Relationship Between *Colletotrichum gloeosporioides* Distribution Area on the Skin and the Flesh of Nam Dok Mai Mangos**
Kolunya Lopradit, 18, Senior, Puntira Bunkokuea, 18, Senior, Thanchanok Nuenin, 18, Senior, Princess Chulabhorn Science High School Phetchaburi, Cha-Am, Phetchaburi, Thailand, T: Pitsinee Kongsukon
- PHYS015** **Age Determination and Comparison of Open and Globular Star Clusters by HR-Diagram**
Chalisa Srikum, 17, Junior, Varee Ciang Mai School, Muang, Chiang Mai, Thailand, T: Sarawut Pudmale
- PLNT021T** **Prevention of Guava Fruit Flies Using New Trap From Combination of Baits With Methyl Eugenol Extract From Local Plants**
Seksan Aphai, 18, Senior, Suthini Thoebthip, 18, Senior, Mekhim Panchasin, 18, Senior, Huaynamhomwittayakan School, Nakhon Sawan, Thailand, T: Niramol Rodpai
- TMED010T** **BiDEx – A Screening System for Rapid Proactive Detection of Patients With Liver Fluke Infection Using a CNN Model To Detect *Orphistorchis viverrini* Eggs From Microscopic Fecal Images and a NN Model for Infection Risk Assessment**
Napassorn Litchiowong, 17, Junior, Chris Tiditjumnreonpon, 16, Junior, Wattanapong Uttayota, 17, Junior, The Prince Royal’s College, Mueang Chiang Mai, Chiang Mai, Thailand, T: Khampol Kantakaew

THAILAND

Pathum Thani, Thailand, THA002, Young Scientists Competition

- BMED071T** **Sawasdee-AMP: Highly Efficient, Portable and Low-Cost Point of Care Test Kit for Future Emerging RNA/DNA Diseases Diagnosis**
Pakitta Kriangasame, 17, Junior, Kulpatch Chananam, 18, Junior, Kunat Khongtong, 17, Junior, Mahidol Wittayanusorn School, Nakhon Pathom, Nakhon Pathom, Thailand, T: Kiattipoom Rodpun
- CBIO068T** **PLCAI: Systematic Pipeline for Protein-Ligand Binding Prediction via Multi-Scale Convolution Neural Network With Applications in Interpretable Drug Design Process**
Koravit Poyungnoen#, 18, Senior, Pongpak Manoret, 18, Senior, Triam Udom Suksa, Pathumwan, Bangkok, Thailand, T: Pisanu Jantaraset
- CBIO069T** **CANDraGAT: A Hybrid Fragment-Based Graph Attention Network To Improve Cancer Drug Response Prediction**
Pawit Kaewnuratchadasorn, 17, Senior, Nattawin Yamprasert, 17, Senior, Wutthipong Chongchareansanti, 18, Senior, Mahidol Wittayanusorn School, Nakhon Pathom, Nakhon Pathom, Thailand, T: Bundit Boonyarit
- EAEV076T** **A Novel Floatable Planting Material for Inner Mangrove Forest Inspired by *Barringtonia asiatica***
Thitipong Larndate, 17, Junior, Jirapon Sengnongban, 17, Junior, Princess Chulabhorn Science High School Pathumthani, Ladlumkaew, Pathumthani, Thailand, T: Khunthong Klaythong
- ENBMO68T** **BioWaveNet: A Novel Multi-Scale Convolutional Neural Network for Generalized Bio-Signal Applications**
Thee Mateepithaktham, 17, Junior, Punnawish Thuwajit, 18, Senior, Suankularb Wittayalai School, Phra Nakorn, Bangkok, Thailand, T: Theerawit Wilaiprasitporn
- ENBMO69T** **Microneedles for Creatinine Detection: Novel Prototype of Non-Invasive Portable Tool Towards Chronic Kidney Disease Risk Assessment**
Peerathat Lapnarongchai, 17, Junior, Thanapat Reechewa, 17, Junior, Mahidol Wittayanusorn School, Nakhon Pathom, Nakhon Pathom, Thailand, T: Kiattipoom Rodpun

- PHYS064** **Bob Pendulum Oscillation Under Air Flow: An Experimental and Numerical Investigation**
Witchayoot Nakasoon, 18, Senior, Benjamarachutit School, Mueng Nakon Si Thammarat, Nakhon Si Thammarat, Thailand, T: Salwanee Jemamad

TURKEY

Ankara, Turkey, TURO02, Tubitak Fair

- CBIO005** **Diagnosing COVID-19 and Prioritizing Treatment via Fuzzy Parameterized Fuzzy Soft Matrices**
Zeynep Parla Parmaksiz, 17, Junior, Besiktas Bilim Ve Sanat Merkezi, Besiktas, Istanbul, Turkey, T: Serdar Enginoglu
- CHEM008 ##** **Novel Antibody-like Targeting Ligand Assays for the Detecting Volatile Pollutants**
Mehmet Sertac Cekuc, 20, Senior, Istanbul Fuat Sezgin Bilim ve Sanat Merkezi, Istanbul, Atasehir, Turkey, T: Ismail Ates
- ENBMO08** **Boric Acid Added Composite Hydrogel Synthesis, Characterization and Investigation of Usage as Soft Contact Lens Material**
Aybuke Sener, 18, Senior, Kayseri Cetin Sen Bilim ve Sanat Merkezi, Kayseri, Kayseri, Turkey, T: Burhan Ates
- ENBMO13** **A Novel End-to-End Deep Learning Pipeline for Stereotactic Cranial Surgery Planning**
Emirhan Kurtulus, 18, Senior, Cagaloglu Anadolu Lisesi, Istanbul, Fatih, Turkey, T: Yonca Bozkurt
- ENEVO08** **3 in 1: A Novel Method for Microplastic, Industrial Dye and Biological Pollutant Removal From Wastewater**
Yusuf Efe Kivilcim, 18, Senior, Ankara Fen Lisesi, Ankara, Turkey, T: Baran Dadakoglu
- ENEVO09** **A Novel Magnetic System With Carbon Nanotubes To Remove Microplastics From Water**
Ayse Pelin Dedeler, 17, Junior, Cakabey Schools, IZMIR, Turkey, T: Hilal Senay Tekesin
- ETSD006** **Ultrasonic Soundbar**
Ali Orsel, 18, Senior, Melikgazi Mustafa Eminoglu Anatolian High School, Kayseri, Turkey, T: Ferhat Cekim
- ETSD007T** **Airless Terrain Wheel With Adjustable Articulating Arms Enclosing Multi-Suspension System**
Eyup Alper Saygili, 18, Senior, Eyup Tarik Engin, 18, Senior, Samsun Bahcesehir College Atakum Science And Technology High School, Samsun, Atakum, Turkey, Ozel Final Anadolu Lisesi, Denizli, Merkezefendi, Turkey, T: Deniz Azen, T: Serap Seçkin
- MATH008** **Investigation of the Cryptographic Applications of a Recurrence Relation Through Elliptic Curves and Collatz Conjecture**
Huseyin Sahin, 18, Senior, Uskudar American Academy, Istanbul, Turkey, T: Turker Teker
- MATH009** **A Circular Approach to the Broken Pick-Up Sticks Problem**
Yavuz Bulent Yurduseven, 19, Senior, Amasya Sehit Ferhat Unelli Bilim ve Sanat Merkezi, Amasya, Turkey, T: Nursen Yailmaz
- MATS004 #** **A New Polysiloxane/Ceramic Composite for Space and Nuclear Fusion Applications**
Feridun Balaban, 19, Senior, Malatya Bilim ve Sanat Merkezi, Malatya, Malatya, Turkey, T: Savas Zafer Guler
- MATS012T** **A Novel Hemp Reinforced Auxetic Structure To Develop Sustainable Wind Turbine**
Safa Merve Zehiroglu, 18, Senior, Iclal Seker, 19, Senior, Atakum Anadolu Imam Hatip Lisesi, Samsun, Atakum, Turkey, T: Deniz Ustuncelik
- SOFT012T** **Mind Plateau: A Collaborative Mobile Application and Procedural Puzzle Generation for Mind Games Education**
Muhammed Yusuf Kartal, 18, Junior, Yusuf Efdal Yilmaz, 17, Junior, Kartal Anadolu Imam Hatip High School, Istanbul, Turkey, T: Ersin Erturk
- TMED007** **Determination of Therapeutic Potential of Apigenin on Philadelphia Negative Acute Lymphoblastic Leukemia**
Ayse Serra Kosger, 17, Senior, Izmir Fen Lisesi, Izmir, Bornova, Turkey, T: Meryem Yazici

Finalist Directory

UKRAINE

Kyiv, Ukraine, UKR001, Eco-TechnoUkraine

- ANIM051T** **Potential Use of Synthetic and Natural Aromatic Mixtures in Prevention from Cockroaches of *Shelfordella lateralis* Genus**
Dmytriy Omelyanov, 17, Junior, Serhii Kolomiichuk, 17, Junior, Dnipro Financial and Economic Lyceum, Dnipro, Ukraine, T: Victor Brigadyrenko
- CHEM046** **Synthesis of Layered Double Hydroxides, Intercalated by Anionic Forms of Active Chlorine as a New Type of Antibiotic-Free Solid Disinfectant With Prolonged Activity for Wound Dressings and Other Application**
Sofia Timofeieva, 16, Sophomore, Chemical Ecological Lyceum, Dnipro, Dnipropetrovsk Region, Ukraine, T: Oxana Kobzar
- CHEM055** **Synthesis of Optically Active Dimethylphosphinoyl Analogues of Fotemustine**
Sofia Smovzh, 17, Junior, Kyiv-Pechersk Lyceum No. 171 Leader, Kyiv, Ukraine, T: Oleksii Holovan
- ENBMO41** **Method of Spatial Information Transmission Through Acoustic Channel**
Yurii Sahaidak, 17, Junior, Lviv Physics and Mathematics Lyceum, Lviv, Lviv Oblast, Ukraine, T: Koldun Viktor
- SOFT040** **Waycat-Scratch-Like Code Editor That Can Translate Blocks To Code and Vice Versa**
Mykhailo Shynder, 17, Junior, Richelieu Scientific Lyceum, Odesa, Odes'ka, Ukraine, T: Oleh Pustovoit

UNITED STATES OF AMERICA

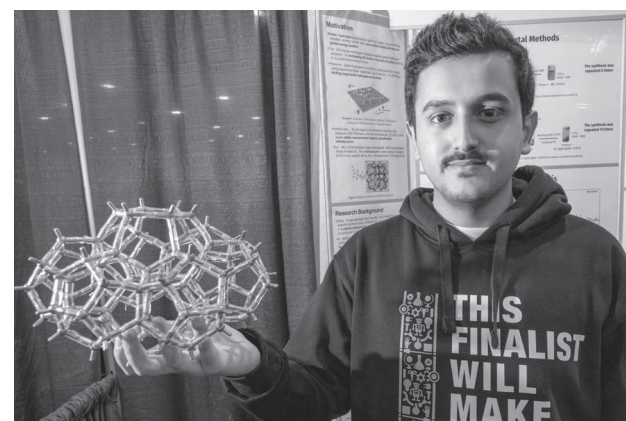
ALABAMA

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

- CBIO019** **Evaluation of Patient-Derived Xenograft Model Accuracy Using Differential Gene Expression Analysis for Cancer Modeling Optimization**
Leo Shen, 16, Junior, Auburn High School, Auburn, Alabama, T: Sarah Sharman
- CELL010** **Attenuation of Adipocyte Hypertrophy in a Palmitic Acid-Induced 3T3 Cell Model Through Lupeol Treatment**
Shivani Ruk Babu, 16, Junior, Auburn High School, Auburn, Alabama, T: Jacque Middleton
- EGSD010** **Generating Energy From Wheel Motion by Designing a Hybrid 3D-Printed Triboelectric Nanogenerator**
Naeim Mahjouri, 17, Junior, Auburn High School, Auburn, Alabama, T: Sarah Sharman
- Birmingham, USAL02, Central Alabama Regional Science and Engineering Fair
- BEHA014** **The Local and Global Factors of the Generalized Poggendorff Illusions**
Trisha Bheemanathini, 17, Senior, Alabama School of Fine Arts, Birmingham, Alabama, T: Anton Spraul
- BMED018** **Evolution of Oncogenic Signatures Within Glioblastoma Along a Spatiotemporal Axis**
Mayu Nakano, 17, Junior, Indian Springs School, Indian Springs, Alabama, T: Tessa Magnuson
- CBIO023** **Estimating Particulate Matter Exposure Across Populations in Alabama**
Elizabeth Grace Lancaster, 18, Senior, Alabama School of Fine Arts, Birmingham, Alabama, T: Rebecca Thrash
- ROBO034** **Recognition of American Sign Language (ASL) Trigger Words Using RF Sensors in Combination with Deep Neural Networks**
Catherine Kung, 17, Senior, Indian Springs School, Indian Springs, Alabama, T: Christina Tetzlaff
- Huntsville, USAL03, North Alabama Regional Science and Engineering Fair
- EBED039** **Portable and Modular Spectral System for Material Characterization**
Ashwin Prabhakar, 17, Junior, Bob Jones High School, Madison, Alabama, T: Jessye Gaines

CONGRATULATIONS TO OUR FIRST PLACE CATEGORY WINNER

Energy: Sustainable Materials and Design



ABDULLAH ABDULAZIZ AL-GHAMDI

Bifunctional MOF for Hydrogen
Production & Storage
Dammam, Saudi Arabia
Booth EGSD018

**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



ENBM062 **The Future of Organ Replacement: Using Bioinformatics To Determine the Best Protein Environment To Bioengineer the Optimum Renal Vasculature System Using hiPSCs**
Shreya Sunil, 16, Junior, James Clemens High School, Madison, Alabama, T: Leah McRae

Mobile, USAL04, Mobile Regional Science Fair

ENEV037 **A Mechanism Utilizing Renewable Energy for Eliminating Aquatic Trash in Waterways That Does Not Contribute to Global Warming and Air Pollution**
Dakota Katlyn Perry, 15, Sophomore, WP Davidson High School, Mobile, Alabama, T: Ryan Moody

MATS050 **Synthesis of 2D Tin-Sulfide Nanosheets Through Liquid Phase Exfoliation**
Sanjana Mupparaju, 17, Senior, The Alabama School of Math and Science, Mobile, Alabama, T: Durga Paudel

Auburn, USAL50, Alabama Science and Engineering Fair

BEHA056 **Putting Music Theory to the Test: Emotional Effects of Scales and Intervals**
Jakub Filip Hel, 15, Sophomore, Hoover High School, Hoover, Alabama, T: Connor Franklin

CHEM056 **Glowing Gumballs: Can Gumballs Be Used as an Additive to Reduce Paint's Flammability?**
Julian Robert Vilardi, 18, Senior, Wetumpka High School, Wetumpka, Alabama, T: Virginia Vilardi

ENEV092 **Exploring Algal Applications to the Aerobic and Anaerobic Bioremediation of Wastewater and Developing a Low-Cost Biofertilizer To Enhance Plant Growth**
Shemai'ya Zenay Peak, 17, Senior, Stanhope Elmore High School, Millbrook, Alabama, T: Jennifer Daniels

ROBO074 **Lan-DLE: Uncertainty-Aware Autonomous Landing of Fixed-Wing Aircraft With Deep Learning Ensembles**
Daniel Zhao, 17, Junior, Alabama School of Fine Arts, Birmingham, Alabama, T: Vincent Spraul

ALASKA

Anchorage, USAK50, Alaska Science and Engineering Fair

ENEV079 **Development of Seaweed Bioplastics to Alleviate Environmental Plastic Pollution**
Elizabeth Shao Djajalie, 16, Sophomore, Thunder Mountain High School, Juneau, Alaska, T: Rebecca Farrell

ARIZONA

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

MATS009T **Rebuilding the Zeppelin: The Power and Purity of Hydrogen**
Robert Houge Gavin, 18, Senior, Cameron Miles Tinney, 17, Senior, Veritas Christian Community School, Sierra Vista, Arizona, T: Melissa Bravenec

MCRO008 **The Bacteria Between Us: The Exploration of Different HVAC Air Filters in Relation to the Spread of Airborne Bacteria in Classrooms**
Zoe Elizabeth Lynn, 18, Senior, Veritas Christian Community School, Sierra Vista, Arizona, T: Melissa Bravenec

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

CELL016 **Rare Immune Cells Significantly Associated With Severe COVID-19 Cases**
Karah Michelle Mayer, 18, Senior, Tanque Verde High School, Tucson, Arizona, T: Grazyna Zreda

EAEV024 **Nouveau-AI-Plastic-Degen: A Novel Approach Using AI-Based Enzyme Engineering To Design New and Highly Efficient Marine Plastic Degrading Enzymes**
Arjun Gupta, 17, Junior, Quest for Education and Arts, Tucson, Arizona, T: Rebecca Thai

CALIFORNIA

Santa Ana, USCA01, Orange County Science and Engineering Fair

ANIM048 **Robotic Microinjection of Embryos for Producing Transgenic Mosquitoes**
Grant Gallagher, 17, Junior, Sage Hill School, Newport Beach, California, T: Derek Shapiro

ANIM050 **Uncovering the Origin and Evolution of the Firefly Bioluminescence Storage Protein**
Lauren Alexa Van, 17, Junior, Portola High School, Irvine, California, T: Brittney Kang

CBIO043 **Exploring the Effects of Supervised Contrastive Learning on Alzheimer's Disease Classification With the F-18 AV45 PET Modality**
Edward Wonyong Jung, 17, Junior, University High School, Irvine, California, T: David Knight

CBIO052 **COVID-19 Mortality Drivers in Brazil: Prioritizing Patients With COVID Symptoms To Reduce Mortality**
Zara Hommez, 15, Sophomore, Portola High School, Irvine, California, T: Jeralyn Newton

ETSD054 **The Design and Creation of a Solar Powered Trail Water System That Uses a Turbidity Sensor**
Tarini Neeladaran, 14, Freshman, El Toro High School, Lake Forest, California, T: Nicole Muilenburg

MCRO027 **Characterizing HBV Viral Particles Propagated by 5 Different Host Methods**
Annabel Tiong, 16, Junior, Northwood High School, Irvine, California, T: David Monge

MCRO031 **Evaluating the Carbon Degradation Potential of Marine Plasmids**
Pranav Sudarshan Moudgalya, 18, Senior, University High School, Irvine, California, T: Tim Smay

TMED039 **AURA: A Novel ResNet50 Approach to Predicting Karnofsky Performance Score and Survival Time of Glioblastoma Patients**
Diya Sreedhar, 15, Freshman, Troy High School, Fullerton, California, T: David Kim

South Pasadena, USCA02, Los Angeles County Science and Engineering Fair

ANIM045 **Can Jellyfish Smell? *Aurelia aurita* Exhibit a Pulse Response to Food Stimuli**
William Cameron Boyd, 16, Sophomore, Flintridge Preparatory School, La Cañada Flintridge, California, T: Shane Frewen

CBIO044 **Mutformer-Deciphering the Language of Genetic Variants: Using a Transformer-Based Language Model To Identify Pathogenic Missense Mutations Associated With Human Inherited Diseases and Cancer**
Theodore Tianqi Jiang, 18, Senior, Palisades Charter High School, Pacific Palisades, California, T: Jane Curren

CHEM047 **Improving the Ductility and Overall Usability of Casein Plastic Through the Addition of a Plasticizer**
Sana Rajesh, 16, Sophomore, Gretchen Whitney High School, Cerritos, California, T: Nitta Song

EAEV055 **Dissolved-Solid Filtering Efficacy of Varied Landfill Liners**
Marta Pambukhchyan, 16, Junior, Crescenta Valley High School, La Crescenta, California, T: Orenda Tuason

ENBM042 **Designing and Constructing an Automatic, Electrical Independent, Pneumatic-Based, Cardiopulmonary Resuscitation Machine to Eliminate Human Error in the Medical Field**
Andreas John Tempereau, 16, Junior, Palos Verdes High School, Palos Verdes Estates, California, T: Julie Munoz

MCRO032 **A Solid State: Growing *Chlorella vulgaris* in Different Media**
Mark Y. Lin, 16, Sophomore, Palos Verdes High School, Palos Verdes Estates, California, T: Julie Munoz

Finalist Directory

- EAEV025T** **Contemporary and Projected Climate Change Across the Southwestern United States Relative to the Last 24,000 Years**
Lily E. Wood, 16, Junior, Nathaniel Adam van der Leeuw, 17, Junior, University High School, Tucson, Arizona, T: Elyse Wexler
- EGSD017** **Exogenous Niacin and Zeaxanthin Treatment To Increase the Stress Tolerance and Light Absorbance Capacity of Microalgae *Chlorella vulgaris* Under an Engineered Martian Environment**
Christopher Alexander Miranda, 15, Sophomore, Harvest Preparatory Academy, Yuma, Arizona, T: Alfred Santos
- MATS024** **Engineering of Antimicrobial Bioplastics From Invasive Algae *Caulerpa prolifera*, *Undaria pinnatifida*, and Waste Corn Cobs**
Julianna Serna-Ortiz, 15, Sophomore, Harvest Preparatory Academy, Yuma, Arizona, T: Alfred Santos
- MCRO016** **Improving the Dental Health in Developing Countries With a Toothpaste Infused With *Psidium guajava* and *Acmella oleracea* Extracts Against Tooth Decay Causing Bacteria *Streptococcus mutans***
Ashley Valencia, 15, Sophomore, Harvest Preparatory Academy, Yuma, Arizona, T: Alfred Santos
- PHYS030** **Exploration of Chaotic Orbits Using the Lyapunov Exponent in the Restricted Three-Body Problem**
Yaritza Durazo, 18, Senior, Sunnyside High School, Tucson, Arizona, T: Cindy Bujanda
- PLNT014** **Analysis of Pollen-Pistil Interactions To Model Reproductive Thermotolerance in Tomato**
Alexander Clinton Nelson, 18, Senior, Nelson Home School, Tucson, Arizona, T: Sandra Nelson
- Phoenix, USAZ50, Arizona Science and Engineering Fair**
- BCHM037T** **Natural Termite Control: A Novel Biomolecular Approach**
Alex Kroumov, 17, Junior, Andre Glukhovskiy, 16, Junior, Nikita Sobolev, 17, Junior, Arizona College Prep High School, Chandler, Arizona, Arizona College Preparatory–Erie, Chandler, Arizona, T: Rachna Nath
- BMED072T** **Alternative for Formaldehyde-Based Embalming**
McKinley Jae Pasiakos, 15, Freshman, Surbhi Chandak, 15, Freshman, Paradise Valley High School, Phoenix, Arizona, T: Amanda Cherry
- CBIO076** **Machine Learning To Detect Fusarium Wilt of Banana**
Khushi Parikh, 17, Senior, Gilbert Classical Academy, Gilbert, Arizona, T: Marcia Kalkman
- CELL033** **Hedgehog Signaling Mediates the Dysregulation of Adrenocorticotropin Hormone Secretion and Somatostatin Receptor Expression in Cushing's Disease**
Saptarshi Mallick, 18, Senior, University High School, Tucson, Arizona, T: Elyse Wexler
- CHEM065** **Comparison of Struvite and *Chlorella vulgaris* Solution to Phosphorus Water Pollution**
Savannah Botello, 17, Junior, Cibola High School, Yuma, Arizona, T: Patricia Garcia
- EGSD052** **The Use of Alternative Non-Solid Chemicals To Create an Advanced Energy Storage System With a Machine Learning Charging System**
Mars Kapadia, 18, Senior, Gilbert Classical Academy, Gilbert, Arizona, T: Erik Gillman
- ENEV086** **A Novel Model-Based Constrained-Optimization Approach To Maximize Water Productivity Under Deficit Irrigation**
Chloe Feiyang Zhan, 15, Sophomore, Hamilton High School, Chandler, Arizona, T: Debbie Nipar
- ETSD072** **AWSOM: Designing an Active Wrist Mechanism Utilizing Spherical-Gears and a One-Drive Mechanism**
Alexander Yicheng Huang, 15, Sophomore, Hamilton High School, Chandler, Arizona, T: Debbie Nipar

CONGRATULATIONS TO OUR CATEGORY WINNERS

Environmental Engineering

FIRST PLACE

Yanbing Jin
Vedant Srinivas

SECOND PLACE

Mansour Al Marzooqi
Varun Hariprasad
Jaden Luna
Naomi Park
Sam Rogers

THIRD PLACE

Johan DeMessie
Chloe Hindes
Emily Kim
Sasha Masson
Marek Rauchfleisz
Aseel Rawashdeh
Haoyu Wang
Xinning Zhang

FOURTH PLACE

Adam Ahmed
Neeam AL Harrasi
Do'a AL Hashmi
Anna Armstrong
Josephine Barber
Tanaka Chirara
Abdullah Elafifi El-Ehwany
Najah Halabiya
Vedant Janapaty
Najwa Ariena Mohamad
Shrihari Nagarajan
Anushka Rawat
Mason Sufnarski
Marah Zeer
Chloe Zhan

Jacobs applauds the finalists
in Environmental Engineering.

Jacobs

- PHYS065** **Towards the Exploration of the Exoplanets: Studying Key Physical Parameters for the Habitability of Primitive Earth Using Climate Models**
Yana Markova Surtchev, 16, Junior, BASIS Ahwatukee, Phoenix, Arizona, T: Nick Tessari
- ROBO067** **Early Predator Identification System (EPIS): A Powerful Machine Learning Model To Stop the Epidemic of Child Predators on the Modern Internet**
Jai Krishna Agrawal, 15, Sophomore, BASIS Chandler, Chandler, Arizona, T: Daniel Hodge
- ROBO076** **Neuron-Specific Dropout: A Deterministic Regularization Technique To Prevent Neural Networks From Overfitting and Reduce Dependence on Large Training Samples**
Joshua Logan Shunk, 17, Junior, Perry High School, Gilbert, Arizona, T: Karen Hutchinson
- SOFT053** **qSimulator: A Novel Method for Rapid Quantum Simulation of Molecules Using Cliques**
Arun J. Moorthy, 17, Junior, BASIS Scottsdale, Scottsdale, Arizona, T: Ryan Carey
- SOFT054** **Subscript: A Functional Programming Language for Scripting in Data-Driven JVM Applications**
Elliott James Krzeminski, 18, Senior, Red Mountain High School, Mesa, Arizona, T: Kathy Wooton
- TMED054** **AZCARE: A Novel Data-Centric AI Approach for Early Detection of Alzheimer's Disease With Multi-Modal Data and Multi-Model Ensemble**
Alexis Li, 15, Sophomore, Hamilton High School, Chandler, Arizona, T: Debbie Nipar
- TMED057** **DermaTech: A Novel, Non-Invasive Technology To Detect Skin Cancer**
Janvi Srivastava, 15, Sophomore, BASIS Scottsdale, Scottsdale, Arizona, T: Ryan Carey

ARKANSAS

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

- ENBMO81** **Mask Collecting Aerosol Droplets**
Gracie Marie Young, 17, Junior, Mountain Pine High School, Mountain Pine, Arkansas, T: Bobby Young
- ETSD056** **Boats vs. Waves**
Dominick Michael Chase Spradling, 17, Sophomore, Mountain Pine High School, Mountain Pine, Arkansas, T: Bobby Young
- FAYETTEVILLE, USAR03, Northwest Arkansas Regional Science and Engineering Fair**
- BCHMO25** **To What Extent Do Silver Nanoparticles Affect the Growth of Hornwort Plants?**
Lucas Hayes, 17, Senior, Alma High School, Alma, Arkansas, T: Tiffany Scriver
- MATSO43** **Growth and Characterization of 2D Magnetic Materials**
Taksh Yogeshbhai Patel, 16, Junior, Fayetteville High School, Fayetteville, Arkansas, T: Matthew Holden
- ROBO075** **Early Detection of Acromegaly Using a Novel Convolutional Neural Network**
Anish Reddy Leekkala, 16, Junior, Bentonville High School, Bentonville, Arkansas, T: John Mark Russell

Jonesboro, USAR04, Northeast Arkansas Regional Science Fair

- BEHA031** **Psychological Effects of Absent Fathers**
Katie Fish, 16, Sophomore, Salem High School, Salem, Arkansas, T: Katie Southard
- ETSD039** **Motion in Motion**
Jon Thomas Cottingham, 17, Junior, Riverside High School, Lake City, Arkansas, T: Jeremy Lamb
- PLNT029** **Overcrowding: Is It a Problem?**
Sydney Rae Wolf, 15, Sophomore, The Academies at Jonesboro High School, Jonesboro, Arkansas, T: Allyson Goodin

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

- BCHMO15** **The Effect of Amino Acid Mutagenesis on the Binding Affinity of SARS-CoV-2 Monoclonal Antibodies**
Kartik Joshi, 15, Freshman, Little Rock Central High School, Little Rock, Arkansas, T: Patrick Foley
- CELL021** **In vitro Evaluation of the Antioxidant Potential and Differential Effects of Punicalagin in Normal and Breast Cancer Cells**
Bhavana Sridharan, 16, Sophomore, Little Rock Central High School, Little Rock, Arkansas, T: Beth Maris
- EAEV029** **The Surveillance of SARS-CoV-2 in Wastewaters**
Olya Sophia Tryndyak, 14, Freshman, Little Rock Central High School, Little Rock, Arkansas, T: Alan Buchanan
- MATH022** **Analyzing the Value of a Lego Investment Based on the Set's Factors**
Kevin Daniel Durden, 16, Sophomore, Little Rock Central High School, Little Rock, Arkansas, T: April Owen
- ROBO037** **Systematic Parkinson Audio Recognition Construct (SPARC): A Novel Approach Implementing a Machine Learning Method To Diagnose Parkinson's Disease Using Voice Features**
Anu Iyer, 17, Junior, Little Rock Central High School, Little Rock, Arkansas, T: Lee Conrad

Hot Springs, USAR07, West Central Regional Science fair

- ANIM016** **Mushroom Medicine for Bees: A Look Into the Benefits of the *Trametes versicolor* Extract on *Apis mellifera* Colony Health for Backyard Beekeepers**
Claire Elizabeth Green, 18, Senior, Arkansas School for Mathematics, Sciences and the Arts, Hot Springs, Arkansas, T: Lindsey Waddell
- EBED007** **Smart Sole: A Technological Approach to Accessible Gait Analysis**
Danielle Josephine Luyet, 18, Senior, Arkansas School for Mathematics, Sciences and the Arts, Hot Springs, Arkansas, T: Shane Thompson
- PLNT012** **The Potential of Forage Soybeans as a Grazing Source for Cattle**
Abby Claire Berger, 17, Senior, Arkansas School for Mathematics, Sciences and the Arts, Hot Springs, Arkansas, T: Brian Monson

Conway, USAR50, Arkansas State Science Fair

- BEHA057T** **COVID-19's Effect on States' Economies**
Paul Bryan Massey, 18, Senior, Spencer Kanis Lile, 17, Senior, Arkansas School for Mathematics, Sciences and the Arts, Hot Springs, Arkansas, T: Brian Monson, T: Josh Ulrey
- CHEM064** **FRET-Based Combination Drug With Enhanced Photothermal Therapy**
Amna Khan, 18, Senior, Little Rock Central High School, Little Rock, Arkansas, T: Katie Anderson
- EAEV068** **A Direct Comparison of the Acute Toxicity of Zinc Oxide Nanoparticles and Avobenzone to *Daphnia magna***
Emma Elizabeth Cavaneau, 17, Senior, Arkansas School for Mathematics, Sciences and the Arts, Hot Springs, Arkansas, T: Brian Monson
- EGSD050** **Synthesis and Characterization of Doped Carbon Materials for Supercapacitor Applications**
Ahmad Gohar Alam, 15, Sophomore, Little Rock Central High School, Little Rock, Arkansas, T: Katie Anderson
- MCRO049** **Antimicrobial Activity of Garlic and Ginger Extracts Against Oral Bacteria**
Disha Ram, 15, Freshman, Little Rock Central High School, Little Rock, Arkansas, T: Patrick Foley
- PLNT042T** **The Effects of Cauterization on *Nandina domestica* and *Ligustrum sinense***
Sheridan Isabella Dethrow, 18, Senior, Gweneth Jamison Keith-Powell, 17, Senior, Arkansas School for Mathematics, Sciences and the Arts, Hot Springs, Arkansas, T: Lindsey Waddell

- TMEDO40** *In silico* High-Throughput Identification of Novel Dual Amyloid Beta and Tau Aggregation Inhibitors for Alzheimer's Disease Treatments
Amrutha Srivatsav, 17, Senior, Palos Verdes Peninsula High School, Rolling Hills Estates, California, T: Melissa Klose
Fresno, USCA03, Fresno County Science Fair
- ANIM035** Parkinson's Disease: Assessing the Effect of a Polyphenolic Compound on Alpha-Synuclein Aggregation in Lab Afflicted *Drosophila melanogaster*
Jaspreet Sahota, 14, Freshman, Sanger High School, Sanger, California, T: Joel Orellana
- ENEV044** Engineering and Testing of Metakaolin Al₂Si₂O₇ and Calcium Bentonite Al₂H₂O₁₂Si₄ Concretion-Spheres: A Novel Composite for the Remediation of Hydrocarbons and Heavy Metals
Jaden Luna, 18, Senior, Sanger High School, Sanger, California, T: Davin Aalto
- MCRO024** Evaluation of Three Naturally Occurring Phytochemicals as Alternatives to Aminoglycosides on the Inhibition of *Escherichia coli in vitro*
Niveditha Sukesh, 18, Senior, Floyd B. Buchanan High School, Clovis, California, T: Kendia Herrington
- PLNT025T** Early Detection of Drought Stress Through a Novel AI Drought Assessment (AIDA) Model in Field Grown Tomato (*Solanum lycopersicum*) Plants Using a Custom-Built "Spectra-Rover"
John Benedict Allasas Estrada#, 17, Junior, Pauline Victoria Estrada, 15, Freshman, Clovis North High School, Fresno, California, T: Kay Barrie
Sacramento, USCA04, Sacramento Regional Science and Engineering Fair
- EGSD039** Pura Aer: A Low-Cost, Energy-Efficient Portable Air Purifier System Using Disposable Face Mask for Emergency and Daily Uses
Jordan Prawira, 15, Sophomore, Mountain House High School, Mountain House, California, T: Steve Geuss
- ENBM054** Enabling Oral Communication and Accelerating Recovery: The Creation of a Novel Low-Cost Electroencephalography-Based Brain-Computer Interface for the Differently Abled
Rishabh Vijay Ambavanekar, 15, Sophomore, Vista del Lago High School, Folsom, California, T: Lisa Moore
- MATS040** Cyclo.Cloud: Development of Fish Scale Waste-Derived Materials for Adsorbance of Aquatic Pollutants
Jacqueline Prawira, 17, Senior, Mountain House High School, Mountain House, California, T: Emily Jeng
Bonita, USCA05, Greater San Diego Science and Engineering Fair
- BCHM019** Novel Inhibitors for Conserved Regions of RecA To Slow Bacterial Antibiotic Resistance
Matthew Noto, 17, Junior, Canyon Crest Academy, San Diego, California, T: Alex Siegel
- CBIO035** DIANE: A Novel Multi-Omics Data Integration Framework Using Attributed Network Embedding Paired With Machine Learning for More Accurate Biomedical Classification
Amogh Chaturvedi, 17, Junior, Canyon Crest Academy, San Diego, California, T: Evan Fisher
- CBIO036** Deep Learning-Aided Diagnosis of Autoimmune Blistering Diseases
Daniel Cai, 18, Senior, Torrey Pines High School, San Diego, California, T: Brinn Belyea
- MATH031** A Heuristic Solution to the Closest String Problem Using Wave Function Collapse Techniques
Shirley Xu, 16, Junior, The Bishop's School, La Jolla, California, T: Marcus Jaiclin
- PHYS041** Utilizing InSb/Si Quantum Dots for the Development of Next-Generation Multivalued High-Mobility Transistor Technology
Ayush Nayak, 17, Junior, Westview High School, San Diego, California, T: Scott Halander

CONGRATULATIONS TO OUR CATEGORY WINNERS

Materials Science

FIRST PLACE

Sohi Sanjay Patel

SECOND PLACE

Devika Girish

Jacqueline Prawira

Neel Redkar

Sara Varghese

THIRD PLACE

Tahani Adel Ahmed

Evan Eunjae Kim

Marianne Feng Liu

Elaf Abdullah Muayqil

Malcolm Sow

FOURTH PLACE

Hsin Chang

Giovanny Klyd Exilus

Daraelle Ismael

Libby Knipper

Christopher Laguerre

Rui Xuan Lee

Kai Ting Lin

Varun Nathan

Alan Wang

Howmet Aerospace Foundation applauds
the finalists in Materials Science.



**HOWMET
AEROSPACE
FOUNDATION**

ROBO047 PathFinder: Novel Inverse Kinematical Path Tracking for Autonomous Vehicles Using Pure Pursuit and Bezier Curves

Rohan Bosworth, 16, Junior, Poway High School, Poway, California, T: Kelly Woldseth

Novato, USCA06, Golden Gate STEM Fair

ANIM041T Analysis of Coupled Nonlinear Dynamic Phenomena Using Sensors To Detect Abnormal Motion in Quadrupeds

Sabine Lynn Close, 16, Sophomore, Natalia Trefogli Morrow, 15, Sophomore, Sequoia High School, Redwood City, California, Notre Dame High School Belmont, Belmont, California, T: Nicolas Lee

BCHM020 So Liá @! Designing a Novel Approach for Rapid Lithium Detection: Investigating Enzymatic Coupling to Produce Hydrogen Peroxide for the Development of Colorimetric and Fluorescent Sensors and Testing the Efficacy of Horseradish Peroxidase, 3,3',5,5' Tetramethylbenzidine, and Amplex Red

Katie Sun, 16, Sophomore, Crystal Springs Uplands School, Hillsborough, California, T: Justin Thompson

Palo Alto, USCA07, Synopsys Silicon Valley Science and Technology Championship presented by the Santa Clara Valley Science and Engineering Fair Association

BMED051 Investigating Epigenetic Modifications in Chromosome Structure in Cardiomyocyte Differentiation Mechanisms for Heart Disease Treatment

Nicholas Wei, 17, Junior, The Harker School, San Jose, California, T: Matthew Harley

BMED052 Variant Effect Prediction Using Deep Neural Networks for Alzheimer's Disease

Alexander Lan, 17, Junior, The Harker School, San Jose, California, T: Eric Nelson

BMED054 Performer: A Novel PPG to ECG Reconstruction Transformer for a Digital Biomarker of Cardiovascular Disease Detection

Ella Selina Lan, 15, Sophomore, The Harker School, San Jose, California, T: Eric Nelson

CBIO037 Single-Cell Transcriptomic Analysis Reveals Genetic Drivers of Slow/Fast Motor Neuron Identity

Luke Yuchen Zhao, 17, Senior, Lynbrook High School, San Jose, California, T: Isaac Pallone

CBIO053 De Novo Nanobody Design With Neural Networks, AlphaFold, and Docking Algorithms

Anirudh Venkatraman, 16, Junior, Homestead High School, Cupertino, California, T: Samuel Fung

ENEV064 A West Coast Estuarine Case Study: A Novel, Predictive Approach to Monitor Estuarine Eutrophication

Vedant Venkatasai Janapaty, 16, Sophomore, Silver Creek High School, San Jose, California, T: Bich Nguyen

PHYS042 The Study of Globular Cluster Systems in Virgo Cluster Dwarf Galaxies

Nicole Tian, 17, Senior, The Harker School, San Jose, California, T: Mark Brada

PHYS051 27th Compact Hierarchical Trinary System Discovered Using Machine Learning

Alina Yuan, 18, Senior, The Harker School, San Jose, California, T: Chris Spenner

ROBO059 Neural Networks Learn Lazily: Improving Generalization and Adversarial Robustness via Learning Capacity-Complexity Constraints

Andy Phung, 17, Junior, Independence High School, San Jose, California, T: Joanna Shea

SOFT043 Explore-and-Fuse: A Physarum-Inspired Approach to the Steiner Tree Problem

Sheryl Hsu, 18, Senior, Valley Christian High School, San Jose, California, T: Scott Vander Veen

TMED031 Enabling Ankle-Brachial Index Prediction From Dopplers Using Deep Learning for Peripheral Arterial Disease Diagnosis

Adrit Rao, 14, Freshman, Palo Alto Senior High School, Palo Alto, California, T: Oliver Aalami

TMED042 Novel Prediction of Five-Year Survival and Recurrence Rates and Discovery of Cancer Genetic Biomarkers Using MIBI Scans in the Tumor-Immune Microenvironment

Snikitha Banda, 16, Junior, Notre Dame High School San Jose, San Jose, California, T: Natasha Fazeli

Walnut Creek, USCA08, Contra Costa County Science and Engineering Fair

CBIO028 Prediction of Genetic Predisposition to Isoniazid-Induced Hepatic Steatosis via Computational Analysis of Genetic Biomarkers

Shikha Kismat Kathrani, 16, Junior, Dougherty Valley High School, San Ramon, California, T: Andrew Bramante

ETSD028 Food Deserts: Developing a Self-Sustaining Greenhouse

Jill Allison Seater, 16, Sophomore, Campolindo High School, Moraga, California, T: Jennifer Frugaletti

ROBO041 A Deep Learning Approach to Detection of Metastasis in H&E-Stained Lymph Node Sections

Neel Krish Kondapalli, 16, Sophomore, Dougherty Valley High School, San Ramon, California, T: Sheida Otmishi

Pleasanton, USCA09, The Synopsys Outreach Foundation Alameda County Science and Engineering Fair

BCHM029T Computational Design, Docking, and Analysis of Novel Aryl Sulfone Compounds as Potential NNRTIs

Aarya Morgaonkar, 16, Junior, Andy Zhang, 16, Junior, Rohan Sandeep Adwankar, 17, Junior, Irvington High School, Fremont, California, T: Justin Choi

CBIO059 Creation of a Novel Machine Learning Model To Predict MGMT Promoter Methylation Status Using Multimodal MRI Images

Ananya Anand, 16, Sophomore, Mission San Jose High School, Fremont, California, T: Ling Kuei

CBIO060 Synthesis and Motif Discovery of Novel Antibacterial Molecules and Orally Active Drugs via Sequence-Based Machine Learning

Tony Wang, 16, Junior, Amador Valley High School, Pleasanton, California, T: Drew Melby

CHEM060 The Effect of Carbon Quantum Dots Derived From *Yucca filamentosa* on the Photosensitivity of a Dye-Sensitized Solar Cell

Adivi Bharadhwaj Kiran, 14, Freshman, BASIS Independent Fremont, Fremont, California, T: Zeynep Araci

ENEV076 WAL-SEA: Development of a Homebuilt, Multifunctional Remotely Operated Vehicle for the Study of the Near-Shore Ocean Ecosystems

Faye Lin, 16, Sophomore, Mission San Jose High School, Fremont, California, T: Sarah Mueller

ENEV078 Testing the Effectiveness of a Polyvinyl Alcohol Polymer Layer Bonded to Lead-Chelating Agents versus a Phosphate Salt Layer on the Minimization of Lead Iodide Leaching in Perovskite Solar Cells

Sasha Masson, 16, Sophomore, The Harker School, San Jose, California, T: Casey Brown

Palos Verdes Peninsula, USCA10, Palos Verdes Peninsula Unified School District Science and Engineering Fair

EAEV004 Qube Network: A Low-Cost, High-Sensitivity Consumer Seismic Network for Earthquake Early Warning

Vivien He, 18, Senior, Palos Verdes Peninsula High School, Rolling Hills Estates, California, T: Melissa Klose

PHYS003 Optimization of Distributed Phased Arrays

Akash Anand, 18, Senior, Palos Verdes Peninsula High School, Rolling Hills Estates, California, T: Melissa Klose

Finalist Directory

SOFT014 **Argus III: A Novel Image Optimization and Augmentation Framework To Enable an Improved Patient Experience for the Next Generation Epiretinal Prosthesis**
William Huang, 17, Junior, Palos Verdes Peninsula High School, Rolling Hills Estates, California, T: Melissa Klose

Salinas, USCA12, Monterey County Science and Engineering Fair

BCHM033 **Enzyme Inhibition: Combating Cardiovascular Diseases, Diabetes, and Obesity Using Phytochemicals Found in Indian Spices**
Sneha Gokaraju, 16, Sophomore, Monterey High School, Monterey, California, T: Jason Nicholson

PHYS054 **Analyzing the Acoustics of Violins With FAST: Utilizing Graphical Analysis To Determine the Correlation Between Price and Quality**
Hannah T. Shu, 16, Junior, Carmel High School, Carmel-By-The-Sea, California, T: Jason Maas-Baldwin

San Bernardino, USCA13, San Bernardino, Inyo, Mono, (SIM) Science and Engineering Fair

BMED061 **Why Can't Grandma See? It's Probably AMD: The Effects of A2E and Zeaxanthin on Age-Related Macular Degeneration**
Elizabeth (Snow) Cameron, 15, Sophomore, Upland High School, Upland, California, T: Elizabeth Salazar

EAEV062T **The Effects of Varying Nitrogen: Phosphorus: Potassium (NPK) Ratios on Algal Growth in Wetland Water**
Kyra Tasanont Phaychanpheng, 16, Sophomore, Makena Bailey, 15, Sophomore, Chino Hills High School, Chino Hills, California, T: Chirichan Tasanont

EAEV063 **Projecting Disappearance of the Dana Glacier Using Observed Melt Rate and 3D Modeling**
Ellery Alice Barngrove McQuilkin, 17, Senior, Lee Vining High School, Lee Vining, California, T: Andrew Sindel

TMED052 **Predicting Onset of Depressive Disorder Using Machine Learning**
Varun Srivastava, 16, Junior, Redlands High School, Redlands, California, T: Paea LePendu

Riverside, USCA15, Riverside County Science and Engineering Fair

ANIM034 **Auto-Dissemination: Analyzing the Function of a Novel Tool in Mosquito Control**
Sarah Stutsman, 16, Junior, Corona High School, Corona, California, T: Alleen Porter

PLNT023 **Simulate To Innovate: Cell Signaling Simulations of Stem Cell Mutants With Enhanced Transcription Factor Binding To Optimize Crop Productivity**
Ishan Reddy Gonehal, 15, Freshman, Martin Luther King High School, Riverside, California, T: Michelle Hampton

SOFT034T **Evaluating Machine Learning-Based Static Malware Classifiers**
Andrew Yin, 17, Junior, Daniel Tong Link, 16, Junior, Martin Luther King High School, Riverside, California, T: Michele Hampton

Bakersfield, USCA16, Kern County Regional Science Fair

CHEM051 **Green Mechanochemical One-Pot Isoxazoline Synthesis With TPGS-750-M Micelle**
Alor Sahoo, 18, Senior, Stockdale High School, Bakersfield, California, T: Jill Reynolds

ENBM045 **Designing, Prototyping, and Testing a Novel, Portable, Energy Efficient, 3D Printed Ventilator With a Diaphragm Mimicking Membrane and an Intuitive User Interface**
Harjaisal Singh Brar, 16, Sophomore, Stockdale High School, Bakersfield, California, T: Jill Reynolds

Los Angeles, USCA50, California Science & Engineering Fair

EBED042 **Geolocation of Wireless and Radio Emitters in Real Time**
Peter Radic, 16, Junior, Canyon Crest Academy, San Diego, California, T: Alex Siegel

CONGRATULATIONS TO OUR CATEGORY WINNERS

Mathematics

FIRST PLACE

Akilan Sankaran

SECOND PLACE

Jiahui Li

Shirley Xu

THIRD PLACE

Ram Krishna Goel

Donald James Liveoak

Daniel Salkinder

FOURTH PLACE

Sarth Prashant Chavan

Edward Stuart Garth

Yavuz Bulent Yurduseven

Sophie Zhu

Akamai Foundation applauds the finalists
in Mathematics.



- MATS055** **CarbNN: A Novel Active Transfer Learning Neural Network to Build De Novo Metal Organic Frameworks (MOFs) for Carbon Capture**
Neel Redkar, 17, Junior, Dougherty Valley High School, San Ramon, California,
T: Sanjeev Redkar
- MCRO064T** **Eukaryotic Algicide: Environmental Remediation of Harmful Algal Blooms via Microencapsulation for Bioactivation of Programmed Cell Death**
Christopher Sammy Kwok#, 17, Junior, Nicholas Sammy Kwok#, 17, Junior, Sequoia High School, Redwood City, California, T: Sarah Chu

COLORADO

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

- BEHA010** **Is a Pandemic Academic?**
Claire Andrea Seger, 15, Freshman, Monte Vista High School, Monte Vista, Colorado,
T: Loree Harvey
- ENEV093** **Reduce, Reuse, Digest? Optimizing pETase Function Within k-12 *E. coli***
Chloe Rebecca Hindes, 18, Senior, Monte Vista High School, Monte Vista, Colorado,
T: Loree Harvey

Durango, USCO02, San Juan Basin Regional Science Fair

- MATS032** **Moon-opoly: Utilizing in situ Resources (ISRU) for the Construction of Lunar Concrete**
Nathaniel Ellis, 15, Sophomore, Durango High School, Durango, Colorado,
T: Erik Skaggs

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

- EAEV021** **LD50 Investigation With Brine Shrimp: Comparing the Effects of COVID Disinfectants With Water Dilution and Brine Shrimp**
Benjamin Wells, 15, Freshman, Weldon Valley High School, Weldona, Colorado,
T: Danny Thistle
- PHYS035T** **Comparing the Leidenfrost Effect on Distilled Water and Ethanol**
Bailey Terese Link, 17, Junior, Giulia Roccasalva, 17, Junior, Brush High School, Brush, Colorado, T: David Miner

Colorado Springs, USCO04, Pikes Peak Regional Science Fair

- CHEM020** **Isolation, Extraction, and Identification of Fluorescent Unknown in Friedel-Crafts Acylation of Biphenyl**
Nicholai Hagemann, 18, Senior, Sand Creek High School, Colorado Springs, Colorado,
T: Kristin Rowan
- EGSD025** **Electrify Your Step: Converting Foot Traffic Into Renewable Energy Using Piezoelectric Transducers**
Shrey Rohilla, 15, Freshman, The Classical Academy, Colorado Springs, Colorado,
T: Candus Muir
- ROBO026** **Binary Synthesis: Applying Philosophical Principles to Artificial Neural Networks**
Gryphon Rhys Patlin, 18, Senior, The Classical Academy, Colorado Springs, Colorado,
T: Darren Wilson

Joes, USCO08, Northeast Colorado Regional Science Fair

- MATS010** **Shining Lights: How Curing Lights Polymerize Different Thicknesses of Pigmented Dental Fillings**
Fatima Duran, 18, Senior, Yuma High School, Yuma, Colorado, T: Amy Melby

Boulder, USCO09, Corden Pharma Colorado Regional Science Fair

- CBIO072** **Discovering Biomarkers for Breast Cancer Subtypes With Gene Expression Data Using Machine Learning**
Daniel Lin, 16, Junior, Fairview High School, Boulder, Colorado, T: Paul Strode
- MATH017** **Attempting To Define Tetrations of Non-Integer Heights**
Morgan Arthur Holien, 17, Senior, Monarch High School, Louisville, Colorado,
T: Katharine Ellis

- PHYS031T** **Characterizing the Altitude and Variability of the Martian Mesopause Over the MAVEN Mission**
Allison Inge, 17, Senior, Langley Nakari, 18, Senior, Monarch High School, Louisville, Colorado, T: Katharine Ellis

Denver, USCO10, Denver Regional Science and Engineering Fair

- BMEDO33** **Quantitative Methods To Analyze the Synergism of Digestive Enzymes for Gluten Breakdown: A Step Closer to Making Glu-Relief Pills**
Aditi Avinash, 15, Sophomore, Rock Canyon High School, Littleton, Colorado,
T: Susanne Petri
- EGSD028** **Analyzing Non-Chemical Storage Solutions for the Grid-Scale Energy Problem**
Wilson Bolton Moyer, 17, Junior, Lakewood High School, Lakewood, Colorado,
T: James Megrdichian
- ROBO043** **Analyzing the Effects of Non-Generative Augmentation on MRI-Based Classification of Brain Tumors Using Convolutional Neural Networks**
Adam Rolander, 15, Sophomore, Prospect Ridge Academy, Broomfield, Colorado,
T: Vernon Caswell

Fort Collins, USCO50, Colorado Science and Engineering Fair

- ANIM017** **A Habitat Assessment Protocol To Determine Suitability for Southwestern Willow Flycatcher Occupancy in the Northern Rio Grande Watershed**
Marissa Lilianna Martinez, 17, Junior, Monte Vista High School, Monte Vista, Colorado,
T: Loree' Harvey
- BEHA015** **Polarization in Social Networks: Investigating Opinion Dynamics Through Human Experiments and Agent-Based Simulation**
Henry Westfall, 17, Junior, Fairview High School, Boulder, Colorado, T: Paul Strode
- ENBM070** **A Novel Approach to Early Directional Diagnosis of Prescription Opioid Addiction**
Gitanjali Adhikarla Rao, 16, Junior, STEM School Highlands Ranch, Highlands Ranch, Colorado, T: Benjamin Johnston
- ETSD073** **To Apogee and Beyond: A Home-Grown Space Program**
Rhys Christian Hanson, 17, Junior, Conifer High School, Conifer, Colorado,
T: Eric Halingstad
- PHYS066** **Modeling Triton's Seasonal Atmospheric Change: Applications of the VT3D Model to Triton**
Natalie Claire Pujet, 16, Junior, Fairview High School, Boulder, Colorado, T: Paul Strode

CONNECTICUT

Cromwell, USCT50, Connecticut Science & Engineering Fair

- ANIM044** **Real-Time Motion Tracking and Data Analytics for Live Insects Using Three-Wheeled Servosphere Robot**
Nicholas Eunsuk Lee, 16, Junior, Hopkins School, New Haven, Connecticut,
T: Phillip Stewart
- BMEDO46** **Design of a Novel, Dual-Functioning, Tissue Plasminogen Activator and Anticoagulant Therapeutic for Rapid Ischemic Stroke Treatment**
Ambika Grover, 16, Junior, Greenwich High School, Greenwich, Connecticut,
T: Andrew Bramante
- CELL026** **The Use of Prime Editing To Induce and Correct the CFTR-F508del Mutation in Induced Pluripotent Stem Cells**
Benjamin Scott Persily, 16, Junior, King School, Stamford, Connecticut,
T: Victoria Schulman
- ENEV054** **Implementing Nontoxic Modified Biochar Enhanced Filtration for the Efficient Removal of Emerging Contaminants in an Aqueous Solution**
Snigtha Mohanraj, 14, Freshman, Engineering and Science University Magnet School, West Haven, Connecticut, T: Alyssa Anderson

Finalist Directory

- ENEV060** **Biomimetic Removal of Microsphere Water Contaminants, via Calcite-Infused, Coral-Like Melamine Sponges**
Naomi Park, 16, Sophomore, Greenwich High School, Greenwich, Connecticut,
T: Andrew Bramante
- TMEDO38** **Development of a Readily Accessible Machine Learning Diagnostic for Early-Stage Mild TBI Using Eye Tracking Methods**
Ashley Taylor Malkin, 15, Freshman, Greenwich High School, Greenwich, Connecticut, T: Andrew Bramante
- TMEDO51** **Development of a Home N-Terminal Pro-Brain Natriuretic Peptide Assay for Early Detection of Congestive Heart Failure**
Maya Rose Chiravuri, 17, Junior, Choate Rosemary Hall, Wallingford, Connecticut, T: Selena Gell

FLORIDA

Okeechobee, USFL01, Heartland Regional Science and Engineering Fair

- CELL017** ***Fusobacterium nucleatum* as a Marker for Epithelial to Mesenchymal Transition in Colorectal Cancer**
Angela Huang, 16, Junior, Sebring High School, Sebring, Florida, T: Amy Bubb
- CHEMO12** **The Effects of Dissolving Polystyrene With D-Limonene on the pH of Seawater: A Fifth Year Study**
Anna Rose Velten, 17, Senior, Okeechobee High School, Okeechobee, Florida, T: Wendy Reister

Bradenton, USFL02, Manatee STEM Competition

- MCROO21** **Beat That Blemish**
Skylar Alivun Rattana, 16, Junior, Southeast High School, Bradenton, Florida, T: Steven Craig

Deland, USFL04, Tomoka Region Science and Engineering Fair

- PLNTO07** **Examining the Effect of a Simulation of Varied Microplastic Types on *Rhizophora mangle***
Jacob Harry Friedman, 16, Sophomore, Spruce Creek High School, Port Orange, Florida, T: Anne Cooney

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

- CBIO032** **Developing an Algorithm To Analyze Structural Characteristics of Alzheimer's Disease in Different Stages of Mild Cognitive Impairment and Validate White Matter Atrophy as an Early Predictor of Mild Cognitive Impairment (A Novel Second Year Study)**
Maya Sruti Chandar, 18, Senior, Canterbury School, Fort Myers, Florida, T: Katherine Morris
- EAEV077** **Engineering a Biomimetic System That Maximizes Surface Area Exposure to Water Flow Thus Increasing the Rate of Bioremediation in an *in vitro* Hypereutrophic System (A Novel Fourth Year Study)**
Morgan Taylor Barnes, 17, Junior, Canterbury School, Fort Myers, Florida, T: Jeffery Carstens
- EGSD037** **An Investigation on the Use of "*Tradescantia pallida*" as a Sensitizer for the Dye-Sensitized Solar Cell**
Isabel Tia Liu, 15, Freshman, Dunbar High School, Fort Myers, Florida, T: Catherine Griffin
- MATS023** **Generating Bioplastics From Banana Peels: An Innovative Approach To Reduce Artificial Plastic Pollution**
Caroline Guerra, 17, Junior, Community School of Naples, Naples, Florida, T: Kelly Percivall

CONGRATULATIONS TO OUR CATEGORY WINNERS

Microbiology

FIRST PLACE

Shriya Prakash Bhat

SECOND PLACE

Yujia Ji
Nanna Elizabeth Rosa Kalmar
Pinyu Liao
Shloke Nirav Patel

THIRD PLACE

Rayan Rai Jawa
Jungho Kim
Minjae Kim
Christopher Sammy Kwok

THIRD PLACE (continued)

Nicholas Sammy Kwok
Tahlia Martignago
Sanghyun Park
Lakshanna Raveendran

FOURTH PLACE

Maryam Abdel-Azim
Julia Rose Brodsky
Calvin Kirtley Harold Carpenter
Fiona Anne Dreesbach
Mark Y. Lin
Emerson Reese Morris
Raven Jade Pascua

Regeneron applauds the finalists
in Microbiology.

REGENERON®

- PLNT054** **The Creation and Sustainability of a Symbiotic Atmosphere in Relation to Surface Area**
 # Bryce M. Krohnfeldt, 17, Junior, Estero High School, Estero, Florida, T: Cody Rimes
- SOFT025T** **Comparing the Efficiency of Novel Point-Of-Care, Low-Cost Neural Networks in Identifying Specific Stages of Diabetic Retinopathy Across a Limited Retinal Dataset**
 Nicholas Shea Harty, 16, Junior, Aum Jaykumar Dhruv, 17, Junior, Fort Myers High School, Fort Myers, Florida, T: Anthony Sangermano
- Port St Lucie, USFL06, St. Lucie County Regional Science and Engineering Fair**
- MCRO028** **How Do Endophytic Bacteria From Mango Affect the Growth of Fungus *Botrytis cinerea* and the Use of 16S rDNA Sequence To Identify Bacteria?**
 # Madison Nicha Adkins, 17, Junior, Lincoln Park Academy, Fort Pierce, Florida, T: Deborah Lookabill
- Shalimar, USFL07, Panhandle Regional Science and Engineering Fair**
- CHEM005** **The Effect of Pectin Levels on Fruit-Based Superabsorbent Polymers**
 Annalise Thompson, 17, Senior, Niceville High School, Niceville, Florida, T: Jennifer Cook
- ENEV004** **Not Your Average Soil: A Modern Solution to the Predicted 2050 Soil Crisis That Is Applicable to All Types of Plant and Crop Types**
 Zoe Orange, 16, Sophomore, Paxton High School, Paxton, Florida, T: Brande Stephenson
- Gainesville, USFL08, Alachua Region Science and Engineering Fair**
- CBIO003** **COVID-19 Detection on Chest X-Ray Using an Enhanced Neural Network Model: Impact of Network Architecture Complexity, Data Augmentation, and Transfer Learning on Model**
 Himel Bamzai-Wokhlu, 16, Junior, F. W. Buchholz High School, Gainesville, Florida, T: Marc Moody
- Ft Lauderdale, USFL09, Broward Regional Science & Engineering Fair**
- BEHA064** **The Transgenerational Effects of the Synergy of Nicotine, Atomoxetine, and Bupirone on Egg Laying Habits, Gene Expression, and Oxidative Stress Levels in *C. elegans***
 Malcolm Ernest Owusu, 16, Sophomore, American Heritage School, Plantation, Florida, T: Leya Joykutty
- CELL039** **Assessing the Influence of TOMM40-523' Enhancer Length on APOE ϵ 4 Expression in Alzheimer's Disease**
 Leah Ellison, 17, Senior, Pine Crest School, Fort Lauderdale, Florida, T: Jennifer Gordinier
- CHEM061** **A Novel Approach for Wastewater Treatment Utilizing Adsorbent Enhanced Biosand Filtration**
 Sanjana Umesh Bhatt, 16, Junior, Cypress Bay High School, Weston, Florida, T: Clara Russo
- MATS054** **Developing Novel Plant Waste-Based Hydrogels for Skin Regeneration and Infection Detection in Diabetic Wounds**
 Calvin Thomas Mathew, 15, Freshman, American Heritage School, Plantation, Florida, T: Leya Joykutty
- Jacksonville, USFL10, Northeast Florida Regional Science and Engineering Fair**
- BEHA002** **Spark Care+: Personalized Music Therapy Device Utilizing Artificial Intelligence Model**
 Sarah Chaeyoon Park, 14, Freshman, The Bolles School, Jacksonville, Florida, T: Kathryn Halloran

- BMED002** **Associations of Genetic SNPs With AD, Neuropathology, and Gene Expression Offers Novel Insight Into AD**
 # Kristi Biswas, 17, Junior, Paxon School for Advanced Studies, Jacksonville, Florida, T: Emma Gallagher
- CELL001** **Analyzing the CD44-Targeting Capabilities of Chitosan-Coated Iron Oxide Nanoparticles in Glioblastoma Multiforme**
 Thomas Coxe Commander, 17, Junior, Episcopal School of Jacksonville, Jacksonville, Florida, T: Marion Zeiner
- EBED003T** **Simulating Astronautic Information Transfer Through the Implementation of Optical Laser Technology**
 Emma Christine Lee, 15, Freshman, Eric Lee, 17, Senior, Stanton College Preparatory School, Jacksonville, Florida, T: Marion Zeiner
- EGSD001** **The Energy Generation Efficiency and Storage Capability of a Novel Dye-Sensitized Solar Cell**
 Claire Marie Huang, 17, Junior, Episcopal School of Jacksonville, Jacksonville, Florida, T: Marion Zeiner
- Winter Haven, USFL12, Polk Region Science and Engineering Fair**
- EAEV005** **The Effects of Increasing Iron Concentration on the Biomass and Fluorescence of *Chlorella sp.***
 Carmela Victoria Fetherlin, 17, Senior, Haines City IB East, Lake Wales, Florida, T: April Blaze
- MATS001** **An Evaluation of the Performance of Post-Use Firefighter Turnout Gear Using NFPA Standards**
 Zane Jacob Carter, 17, Junior, Haines City IB East, Lake Wales, Florida, T: April Blaze
- Satellite Beach, USFL13, Brevard South Science and Engineering Fair**
- BEHA009** **Understanding and Creating an Equation on the Impact of Celebrity Endorsements and Their Numerous Factors on the Growth of Alt-Coins**
 Rushil Shah, 16, Sophomore, West Shore Junior/Senior High School, Melbourne, Florida, T: Mary Schropp
- CHEM016** **The Effectiveness of Porous Photothermal Sepiida Ink Nanoparticles for Osteosarcoma Treatment**
 Laya Damaraju, 17, Junior, West Shore Junior/Senior High School, Melbourne, Florida, T: Mary Schropp
- ROBO069** **Detection of Benign and Malignant Lung Nodules in 3D Volumes Generated From Thoracic Computed Tomography Scans Leveraging Artificial Intelligence, Year 2**
 Bianka Anita Albert, 17, Junior, West Shore Junior/Senior High School, Melbourne, Florida, T: Mary Schropp
- Satellite Beach, USFL14, Brevard Intra-coastal Regional Science and Engineering Fair**
- CELL005** **Customized Cancer Cell Weapons: Using CRISPR Cas9 Genetic Engineering and Human Adipose-Derived Mesenchymal Stem Cells To Overcome Platinum-Based Chemotherapy Resistance in OVCAR-3 Human Ovarian Cancer Cells, Year 4**
 # Neil Reddy, 18, Senior, Satellite High School, Satellite Beach, Florida, T: Magdalena Molledo
- ROBO018** **Constructing a Neural Network To Classify Lung Cancer**
 Bisrat Kassahun, 16, Junior, Edgewood Junior Senior High School, Merritt Island, Florida, T: Meredith Reninger
- Miami, USFL15, South Florida Science and Engineering Fair**
- BMED011** **The Effect of Varying Concentrations of Artemisinin, Berberine, and Sulforaphane Upon Ocular Tumor Formation in *Drosophila melanogaster***
 Annalise Garrido, 16, Junior, Westminster Christian School, Palmetto Bay, Florida, T: Lisa Garrido

Finalist Directory

- CBIO013** **ERVK3-1 as a Prognostic Marker for Invasive Ductal Carcinoma**
Vasundara Govindarajan, 18, Senior, TERRA Environmental Research Institute, Miami, Florida, T: Julie Sierramontes
- CELL006** **Immunomodulatory Properties of Mesenchymal Stem Cells for Knee Osteoarthritis Prevention and Treatment**
Lara Gastelumendi, 17, Senior, Medical Academy for Science and Technology, Homestead, Florida, T: Jennifer Barreto
- EAEV016 #** **Predicting Future Tropical Cyclone Intensity Using a Convolutional Neural Network**
Sunny You, 15, Sophomore, Miami Palmetto Senior High School, Pinecrest, Florida, T: Pamela Shlachtman
- MATH011** **Utilizing Convergence Tests and Complex Analysis To Redefine the Provability of the Partition Formula**
Emilie Morgan Steinberg, 18, Senior, Dr. Michael M. Krop Senior High School, Miami, Florida, T: Todd Thompkins
- MATH012** **LD-Based Mapping by Cluster Analysis of the GWAS To Determine a Single Variant Most Associated With Alzheimer's Disease**
Lucas Gutman, 16, Sophomore, iPrep Academy North, Miami, Florida, T: David Buncher
- MATH013** **Can High School Baseball Players Optimize Their College Recruiting by Analyzing Their Athletic Metrics?**
Peter Nicholas Frometa, 18, Senior, Westminster Christian School, Palmetto Bay, Florida, T: Lisa Garrido
- Ocala, USFL16, Big Springs Regional Science Fair**
- BEHA005** **Enhancing the Educational Experience: How Does Digital Anatomy Compare to Physical Anatomy**
Elishah Beaubrun Jean-Francois, 15, Sophomore, West Port High School, Ocala, Florida, T: Judith Dominguez
- EBED006 ##** **Remote Detection System for Penetrative Bodily Injury Using an Innovative Electrical Engineering Enhancement of Wearable Fabric**
Vivek Sandrapaty, 17, Junior, West Port High School, Ocala, Florida, T: George Choon
- ENEV011T** **Synthesizing Biofuels From Waste Oil for a Sustainable Alternative in Diesel Engines**
Diana Gegaj, 16, Junior, Raaghuv Nandur, 17, Junior, Abigail Dela Cruz Andal, 17, Junior, Vanguard High School, Ocala, Florida, T: Eddy Rey-Castellanos
- PHYS004T** **The Affect of Airfoil Characteristics on the Laminarity of Fluid Flow**
Vaughn Sirkis, 17, Junior, James Leonard Kearin, 16, Junior, Vanguard High School, Ocala, Florida, T: Christina Davis
- Davenport, USFL17, Dr. Nelson Ying-Orange County Science Exposition**
- ANIM007 ###** **Year 5: Developing a Novel Multiple Linear Regression Model To Optimize Honey Bee Gut Immunity Using a Lactic Acid Bacteria Probiotic Mixture**
Varun Raj Madan, 17, Senior, Lake Highland Preparatory School, Orlando, Florida, T: Lisa Davenport
- CBIO006 #** **Using Artificial Intelligence Graph Neural Networks To Repurpose Pre-existing Drugs and Analyze Drug Relationships: Year 2**
Krithik Seela, 16, Junior, Lake Highland Preparatory School, Orlando, Florida, T: Lisa Davenport
- CHEM073** **Study of Magnesium Based Migraine Therapeutics**
Meghana Reddy Konda, 16, Sophomore, Lake Highland Preparatory School, Orlando, Florida, T: Lisa Davenport
- ETSD008** **Creating Naturally Enhanced Concrete for Seismic Resistance**
Genesis Angelyne Cely, 16, Junior, Trinity Preparatory School, Winter Park, Florida, T: Elmarie Mortimer

CONGRATULATIONS TO OUR CATEGORY FINALISTS

Physics and Astronomy

Rala Abu Sualmi	Dashayin Gilbert	Witchayoot Nakasoon	Vaughn Sirkis
Akash Anand	Ourania-Maria Glezakou-Elbert	Amelie Malena Nanclares	Albin Sjogren
Anica Jihae Ancheta	Isabelle Ann Gruner	Ayush Nayak	Chalisa Srikum
Omer Arian	Rakan Rafic Hamarneh	Mathena Nhu Nguyen	Cam Srivastava
Haver Nur Aslanova	Simon Jonatan Hugo Holmqvist	Jasmine Palma	William Austin St. John
Max Bee-Lindgren	Erez Moshe Israeli Miller	Katherine Mary Panebianco	Haotian Sun
Jonah Luther Ross Bieger	Petr Kahan	Michelle Seoyeon Park	Yana Markova Surtchev
Samantha Jo Brodeen	Michael Kasprzak	Konstantinos Pavlakis	Maeen Mustafa Tell
Barbora Cabalkova	James Leonard Kearin	Rohit Prasanna	Nicole Tian
Yuxuan Chen	Harish Krishnakumar	Natalie Claire Pujet	Lena Tran
Nina Cielica	Sanghwa Lee	Clare Marie Reidy	Dimitrios Tzounakis
Noeliz Sophia Cordero	Taekyung Lee	Stephanie Ressel	Annika Maria Larsson
Huirui Dai	Bailey Terese Link	Cade Evan Rigg	Vaidyanathan
Jan Dajnac	Audrey MacLachlan	Benjamin Jack Ritchie	Jack Troy Wadsworth
Luke Abraham Dalebout	Ashini Modi	Giulia Roccasalva	Anderson Washburn
Ahitagni Das	Leonard Muenchenbach	Galilea Stephania Rodriguez	Theresa Audry White
Maximilian Dorzweiler	Fletcher James Murray	Kenta Milton Sakamoto	Michelle Wu
Yaritza Durazo	Joseph Bronislaw Nadol IV	Jiwan Seo	Ashley Xu
Ryan Robert Fletcher	Rina Nakajima	Hailee Rene Sexton	Hyeondong Yoo
Orion Chuanyi Foo	Langley Nakari	Yang Shen	Alina Yuan
Leon Garcia		Hannah T. Shu	Ruiqi Zhang
Solmaz Garibova			Xuan Zhang

Richard F. Caris Charitable Trust II and Interface applaud the finalists in Physics and Astronomy.

Richard F. Caris
Charitable Trust II

interface
FORCE MEASUREMENT SOLUTIONS.

Wildwood, USFL18, Sumter County Regional Science Fair

- ANIM001** **Testing Effectiveness of Surfactants on Stable Foam Involved in Primary Ruminant Tympany**
Emma Christine Bogue, 16, Sophomore, South Sumter High School, Bushnell, Florida, T: Shelbie Wiley
- BCHM002T** **Lactate! Lactate! Lactate!**
Ty Carson Kadur, 16, Sophomore, Johanna Rebekah Heijkoop, 16, Sophomore, South Sumter High School, Bushnell, Florida, T: Shelbie Wiley
- CHEM006** **Effectiveness of Using Worms To Biodegrade Plastic**
Jordan Kanye Riche, 18, Senior, Wildwood High School, Wildwood, Florida, T: Emily Keeler
- PLNT001** **Hydroponics: What Method of Hydroponics Would Increase the Growth Rate of a Lettuce Plant?**
Ariana Zarazua-Benitez, 17, Senior, Wildwood High School, Wildwood, Florida, T: Emily Keeler
- TMEDO02** **To What Extent Does the L Form of Beta-Hydroxybutyrate (BHB) Have Unique Anti-Cancer Effects Compared to the D Form, on U87 Brain Cancer Cells *in vitro*?**

Cheyenne Rashelle Shirley, 17, Senior, South Sumter High School, Bushnell, Florida, T: Shelbie Wiley
- TMEDO03T** **The Production of Tumor Suppressor Protein TP53 and the Relative Homologous Properties Identified Using Gorilla Genome To Account the Absence of Cancer**
Colby Kenneth Rinberger, 16, Sophomore, Ivory Gail Andrei, 18, Senior, South Sumter High School, Bushnell, Florida, T: Shelbie Wiley

Pensacola, USFL20, West Panhandle Regional Science and Engineering Fair

- ROBO001T** **AI Surgery Robot**
Charles Benson Pratt, 17, Junior, Danish - Edupuganti, 16, Junior, Pensacola High School, Pensacola, Florida, T: Karen Bruening
- St. Augustine, USFL21, St. Johns County STEM Fair**
- BMEDO09** **Developing CLL-1 and MSLN Immunogens for Dual CAR-T Cell Therapy for AML**
Andrew Y. Liu, 17, Junior, Ponte Vedra High School, Ponte Vedra, Florida, T: Marna Fox
- BMEDO17** **Altering Metabolic Pathways To Override Drug Resistance in Cancer**
Emma Alexandra Chirila, 18, Senior, Ponte Vedra High School, Ponte Vedra, Florida, T: Kathryn Kehoe

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

- CELL009** **A Novel Approach to Bone Implant Infection Therapeutics Leveraging Proteins Derived From Lactobacillus acidophilus and Modulating Anti-Inflammatory Gene Expression**
Anouska Seal, 16, Sophomore, Paul J. Hagerty High School, Oviedo, Florida, T: Angela Campbell
- CHEM075** **Analysis of Microplastic Removal Efficiency of Synthesized Ferrofluids and the Development of an Automated Prototype for Aquatic Environments**
Kyra Marissa Henriques, 17, Junior, Oviedo High School, Oviedo, Florida, T: William Furiosi
- PHYS005** **Dynamic Contact Angle Measurements of Superhydrophobicity in Face Masks To Minimize Exposure to COVID-19 (Year 3: Lab-to-Market)**

Annika Maria Larsson Vaidyanathan, 17, Senior, Winter Springs High School, Winter Springs, Florida, T: Chris Adamson

Stuart, USFL25, Martin County Regional Science and Engineering Fair

- PLNT048** **Plastic Mulch and Organic Amendments: Can They Help Us Control Nutsedge?**
Nira Goyal, 15, Sophomore, Martin County High School, Stuart, Florida, T: Jennifer Borges

Tallahassee, USFL26, Capital Regional Science and Engineering Fair

- CELL003** **Characterization of Lung Cancer Mechanosensation**
Shiv Pareskumar Patel, 15, Sophomore, Maclay School, Tallahassee, Florida, T: Ariel Evans
- ROBO008** **An Eco-Friendly Deep Learning Tool for Disrupting Insect Mating Behavior of *Diaphorina citri* Supporting the Mitigation of Unwarranted Pesticide Usage in Citrus Greening Control**

Sruthi Sentil, 17, Junior, James Rickards High School, Tallahassee, Florida, T: Paula Hall

Tampa, USFL27, Hillsborough Regional Science Fair

- CBIO031** **A Novel Approach to Analyzing Alzheimer's Disease in MRI Scans Using a Convolutional Neural Network**
Krudra Patel, 15, Freshman, Middleton High School, Tampa, Florida, T: Bhagyashree Kulkarni

Satellite Beach, USFL28, Brevard Mainland Regional Science and Engineering Fair

- ANIM012** **A Genetic Analysis of Solar-Powered Sea Slugs**
Sarita Rae Thosteson, 18, Senior, Satellite High School, Satellite Beach, Florida, T: Maggie Molledo
- EBED013** **Landfill SCADA System: A Next-Gen Prescriptive IoT Solution Engineered To Detect, Transmit, and Mitigate Fugitive Methane Emissions via a Long-Range Supervisory Control and Data Acquisition System (Year 4)**
Lavanya S. Natarajan, 16, Junior, Viera High School, Viera, Florida, T: Elizabeth Youngs
- MCRO007** **Utilizing Glycolysis in *Streptococcus pyogenes* To Model Gastrointestinal Stromal Tumors (GISTs) in Response to Endogenous Stimulus-Powered Nanoreactors (Year 6)**

Om Dipakkumar Patel, 18, Senior, Eau Gallie High School, Melbourne, Florida, T: Chelsea George

West Palm Beach, USFL29, Palm Beach Regional Science and Engineering Fair

- BEHA042** **The Effect of Virtual Learning on Student Long Term Self-Esteem**
Sarah Rose Garfield, 18, Senior, Palm Beach Central High School, Wellington, Florida, T: William Bartenslager
- BMEDO57** **Testing the Effects of Anti-DLL4 Monoclonal Antibody in Conjunction With Tamoxifen Hormone Therapy Treated Ovarian Cancer**
Tara Muthuswamy, 17, Junior, American Heritage School of Boca Delray, Delray Beach, Florida, T: Iris Thompson
- BMEDO75** **The Effect of Heat Shock Proteins on *Drosophila* With Malignant Tumors**
Saachi Anika Mody, 17, Junior, Florida Atlantic University High School, Boca Raton, Florida, T: Jennifer Krill
- CHEM074** **Investigating the Binding Interactions of Small-Molecule Inhibitors to PLKs Using Molecular Dynamics Simulations**
Seymour Mahdi Haque, 17, Senior, Florida Atlantic University High School, Boca Raton, Florida, T: Kendra Palumbo
- ENEV066** **The Effect of Magnetic Carbon Nanotubes on the Oil Degrading Ability, Vitality, and Gene Mutations of *A. borkumensis***
Tejasvi Kari, 17, Senior, Palm Beach Central High School, Wellington, Florida, T: William Bartenslager
- ETSD055** **Creation of an Artificial Atmosphere at Orbital Altitudes To Combat Space Debris**
Cooper Weisman, 16, Junior, Alexander W. Dreyfoos School of the Arts, West Palm Beach, Florida, T: Stephen Anand
- MATS039** **Biodegradable Chitosan-Silver Hydrogel as a Delivery Mechanism for Cyclic Lipopeptide-4**
Satviki Singh, 18, Senior, Florida Atlantic University High School, Boca Raton, Florida, T: Kendra Palumbo

Finalist Directory

Land O' Lakes, USFL30, Pasco Regional Science and Engineering Showcase

- CELL004** **BMP4 Prevents Thrombin Induced Inflammation and Vascular Damage in Endothelial Cells**
Cemre Su Kayisli, 18, Senior, Wiregrass Ranch High School, Wesley Chapel, Florida, T: Branden Anglin
- EAEV008** **Study on the Effects of Polyvinyl Chloride (PVC) Water Contamination on the Oxygen Production Levels of *Elodea densa* (Aquatic Elodea Plant)**
Katelynn Helena Paciorek, 18, Senior, Wiregrass Ranch High School, Wesley Chapel, Florida, T: Branden Anglin
- MCRO004** **The Development of an Effective Antibiotic Treatment To Limit the Bacterial Growth of *Staphylococcus epidermidis* on Total Joint Arthroplasties**
Raven Jade Pascua, 18, Senior, Wiregrass Ranch High School, Wesley Chapel, Florida, T: Branden Anglin

Sarasota, USFL32, Sarasota County STEM Fair

- EAEV081** **The Effect of Consuming Polyethylene on the Function and Consumption Rate of the *Zophobas atratus* Superworm**
Anja Kristin Schwarzbauer, 16, Junior, Sarasota High School, Sarasota, Florida, T: Andrew Harshman
- EAEV082T** **How Do Different Concentrations of Glyphosate Affect Phytoplankton Populations and How Effective Will a Granular Activated Carbon (GAC) Adsorption Filtration Test Be at Removing Glyphosate From an Herbicide to Protect Phytoplankton Populations?**
Nicholas Wright Cox, 16, Junior, Rylee Lynn Mulhollen, 17, Junior, Sarasota High School, Sarasota, Florida, T: Andrew Harshman

Howey In The Hills, USFL34, Lake County Regional Science & Engineering Fair

- TMED011** **Assessment of the Neurological Effects of *Withania somnifera* and Resveratrol Using a *Drosophila* Model**
Roshna Mannuthoduvel, 17, Senior, Tavares High School, Tavares, Florida, T: Courtney Stokes

Orange Park, USFL35, Clay Rotary Regional Science and Engineering Fair

- EGSD047** **Enzymatically Treated Cellulosic Packaging Waste Utilized to Release Fermentable Sugars for the Production of Bioethanol: A Third Year Study**
Serenity Renee Derousie, 18, Senior, Ridgeview High School, Orange Park, Florida, T: Bethany Derousie
- PLNT051** **How Does Nitrate Absorption Differ Between the *Rhizophora mangle*, *Laguncularia racemosa*, and *Avicennia germinans* Over a 48 Hour Period?**
Mary Christine Reed, 18, Senior, Ridgeview High School, Orange Park, Florida, T: Jacey Skrzypczak

Orlando, USFL50, State Science and Engineering Fair of Florida - Ying Scholars

- BEHA070** **Addressing Barriers to Classroom Communication by Automating Student to Educator Feedback Loops Through a Novel Software-Based Approach**
Junwei Tan, 18, Senior, Lee Virtual Instruction Program, Fort Myers, Florida, T: Eric Arseneau
- ENEV007** **Development of an Engineered Face Mask With Optimized Nanoparticle Layering for Filtration of Air Pollutants and Viral Pathogens**
Ishika Nag, 16, Junior, Oviedo High School, Oviedo, Florida, T: William Furiosi
- ETSD014** **First Insights Into a Novel Synchronous Reluctance Electric Motor Design**
Robert Nicholas Sansone, 17, Junior, Fort Pierce Central High School, Fort Pierce, Florida, T: Steven Shotola

CONGRATULATIONS TO OUR CATEGORY FINALISTS

Plant Sciences

Naman Agarwal	Magnolia Andra Garbarino	Saumitra Suyog Prabhu
Faisal Abdullah Al Khwaiter	Erin Katherine Gaydar	Melina Lisa Reckermann
Faisal Saad AlGhamdi	Ishan Reddy Gonehal	Mary Christine Reed
Nebras Tawfiq Ahmad Alrawashdeh	Nira Goyal	Marina Rusnac
Seksan Achai	Ashika Bhavani Gullapalli	Joel Sanchez-Medina
Jack William Bailey	Grace Frances Helle	Isabell Seibel
Ahmed Marwan Behisi	Rachel Hoffman	Siddhartha Shah
Abby Claire Berger	Alexander Jungik Hong	Tanmay Shekhar
Prisha Bhat	Ayumi Ishihara	Dhruv Sheth
Ariella Maia Blackman	Grace Johnson	Chea-Yeon Shin
Hanyue Cao	Gweneth Jamison Keith-Powell	Aaron Min Song
Yee Hern Cha	Emma Pearl Kratcha	Julie Madison Sundheim
Dong Tze Chan	Bryce M. Krohnfeldt	Suthini Thoebthip
Julia Chen	Ishani Kulkarni	Aiden Vilo
Yan Yi Cheong	Yi Fan Lee	Eric Wang
Zhan Hoong Alfred Chin	Jessica Li	Lena Wang
Maria Ciocoi	Shreya Nair	Rachel Catherine Warner
Sheridan Isabella Dethrow	Rishi Nautiyal	Sydney Rae Wolf
John Benedict Allasas Estrada	Alexander Clinton Nelson	Ariana Zarazua-Benitez
Pauline Victoria Estrada	Katherine Ann Opria	Sadie Grace Zehner
Grace Margaret Finnerty	Mekhim Panchasin	Ava Zhang
Daniel Charles Fletcher	Aarushi Pandey	
Jacob Harry Friedman	Ngoc H. Pham	

Society for Science applauds the finalists in Plant Sciences.



- MATSO45** **Development and Characterization of a Novel Laponite-Enhanced Tannic Acid-Based Hydrogel**
Nolan Wen, 17, Junior, American Heritage School of Boca Delray, Delray Beach, Florida, T: Iris Thompson
- MCRO017** **Developing a Monomolecular Model To Describe the Disease Progress Curve for Early Blight in Tomato (*Solanum lycopersicum*), Potato (*Solanum tuberosum*), and Bell Pepper (*Capsicum annuum*), Treated With Novel Microbial Formulations**
Shloke Nirav Patel, 16, Junior, Hillsborough High School, Tampa, Florida, T: Mishell Thomas-King
- PLNT035** **Abolition of Unfurling Nutrients Is the Solution for Elimination of Microalgae in the Indian River Lagoon (Year III)**
Erin Katherine Gaydar, 18, Senior, Edgewood Junior Senior High School, Merritt Island, Florida, T: Robert Cillick
- ROBO066** **Designing a LiDAR Topographic Navigation System: A Novel Approach To Aid the Visually Impaired**
Tiffani Rai Gay, 15, Freshman, Orlando Science Schools, Orlando, Florida, T: Judith Bright
- TMEDO25** **Analyzing the Viability of Pure Mushroom-Derived Chitosan as an Alternative to Pure Crustacean-Derived Chitosan in Hemostatic Agents**
Lara Jean Kendall, 17, Junior, Canterbury School, Fort Myers, Florida, T: Kati Morris

GEORGIA

Atlanta, USGA03, Atlanta City Science & Engineering Fair

- ANIM039T** **Do Relatives in Families Have Similar Fingerprints?**
Sophia White, 15, Freshman, Emma Katherine Lilly, 15, Freshman, North Atlanta High School, Atlanta, Georgia, T: Usha Patke
- EAEV001** **Project Titan-Phyto: The Effects of Titanium Dioxide Nanoparticles on Marine Phytoplankton**
Ai Phan, 15, Sophomore, Atlanta Girls' School, Atlanta, Georgia, T: Melissa Hankinson
- MCRO026T** **Determining Which Acne Medications Prevent the Growth of *Staphylococcus epidermis* Most Successfully**
Solunne Fedovskiy, 15, Sophomore, Avi Crosby, 16, Sophomore, Lily Harper Reilly, 16, Sophomore, Henry W. Grady High School, Atlanta, Georgia, T: Jormell Cofield

Stone Mtn, USGA04, Dekalb Science & Engineering Fair

- MATSO36** **Designing 3D Printed Diatom-Biomimicking Materials Using Unsupervised Machine Learning**
Aaditya Saha, 18, Senior, Chamblee Charter High School, Chamblee, Georgia, T: Jacqueline Stephens

McDonough, USGA06, Henry County Science and Engineering Fair

- EBED002** **Novel Application of Lock-In Amplifiers With 2-bit FSK**
Jonathan Luke Dorminy, 15, Freshman, Sola Fide Home School, McDonough, Georgia, T: Ann Dorminy
- ETSD001** **Arduino Controlled Robotic Arm Utilizing Flux Pinning**
Cason Alexavier Allen, 18, Senior, Luella High School, Locust Grove, Georgia, T: Renuka Rajasekaran

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

- CBIO016** **NeuroXNet: A Novel Hierarchical Based, Blood Biomarker Driven, Deep Learning Model With miRNA Drug Discovery Pipeline for Neurological Disease Diagnosis and Treatment Using *in silico* Modeling, MRI Imaging and Genomic Data**
Vaibhav Mishra, 17, Senior, West Laurens High School, Dexter, Georgia, T: Meredith Lawhorn

Griffin, USGA09, Griffin RESA Regional Science Fair

- EBED001T** **COVID Prevention: More Precise Contact Tracing**
Nathaly Rangel-Gonzalez, 15, Freshman, Jesna Santhosh Thomas, 15, Freshman, Fayette County High School, Fayetteville, Georgia, T: Laura Rogers T: Laura Rogers
- ENBM002** **Redesigning Carbon Monoxide Detectors for Industrial Environments**
Alyssa JoNaykathleen Reed, 15, Freshman, Fayette County High School, Fayetteville, Georgia, T: Laura Rogers
- ENEV001** **Sustainable Habitats for *Crassostrea virginica***
Emily Elizabeth White, 16, Junior, McIntosh High School, Peachtree City, Georgia, T: Seth Bishop

Perry, USGA10, Houston Regional Science and Engineering Fair

- ANIM014** **Hay, Hay, Which Is Better?**
Dixie Lynne Miller, 16, Junior, Warner Robins High School, Warner Robins, Georgia, T: Veronica Sanders
- EAEV017** **Superabsorbent Hydrogels for Water Conservation and Plant Growth**
Jaabili Sai Gosukonda, 15, Sophomore, Houston County High School, Warner Robins, Georgia, T: Jenny Gutshall

Suwanee, USGA11, Gwinnett Regional Fair

- CELL007** **The Role of Ribosomal RNA Modifications in Ribosome Biogenesis**
Jean Yu, 17, Junior, Gwinnett School of Mathematics, Science, and Technology, Lawrenceville, Georgia, T: Jennifer Berry
- CHEM014** **The Effect of Powdered Orange Peels on the Removal of Textile Dye**
Dua Bashir, 16, Sophomore, Gwinnett School of Mathematics, Science, and Technology, Lawrenceville, Georgia, T: Jennifer Berry
- ENBM021** **Brain-Computer Interface: Ambient Environment Control for the Paralyzed**
Eesh Trivedi, 17, Junior, Gwinnett School of Mathematics, Science, and Technology, Lawrenceville, Georgia, T: Jennifer Berry
- ETSD012T** **Small Satellite and Launch Vehicle for Climate Change Research**
Jonathan M. Gutknecht, 18, Senior, Joey Gorman, 18, Senior, Gwinnett School of Mathematics, Science, and Technology, Lawrenceville, Georgia, T: Joanne Shaw
- ROBO023** **Search and Rescue System Using Omni-Orientation Mapping Robot**
Matthew Hansol Jabez Kim, 17, Junior, Gwinnett School of Mathematics, Science, and Technology, Lawrenceville, Georgia, T: Hyunjin Son
- ROBO039** **Optimizing Machine Learning Algorithms for Multiclass Neuroimaging Segmentation**
Arjan Kohli, 18, Senior, Peachtree Ridge High School, Suwanee, Georgia, T: Corey Wellmaker

Conyers, USGA12, Rockdale Regional Science & Engineering Fair

- CELL008** **Evaluating the Effects of Resveratrol on the Lysis of Skin Melanoma Cells**
Kayla Andrea Holland, 15, Sophomore, Rockdale Magnet School for Science and Technology, Conyers, Georgia, T: Shelley Seagraves
- EGSD009** **Solar-Wind Charger**
Camila Moreno, 16, Sophomore, Rockdale Magnet School for Science and Technology, Conyers, Georgia, T: Tyrone Huebsch
- ETSD013T** **Biomimicry: The Effect of Mother Nature on the Automotive Industry**
William Bradford Brumback, 18, Junior, Jorge Luis Escalera, 17, Junior, Rockdale Magnet School for Science and Technology, Conyers, Georgia, T: Scott Bolen, T: Tyrone Huebsch

Atlanta, USGA13, Fulton County Regional Science & Engineering Fair

- BEHA001** **FollowMe: AI To Revolutionize Cortical Visual Impairment**
Asmi Kumar, 18, Senior, Milton High School, Milton, Georgia, T: Catherine Riley

Finalist Directory

MATS048 # **Rapid Detection and Inactivation of SARS-CoV-2 with Bio-Conjugated Nanomaterial**
Vinod Rупpa-Kasani, 17, Junior, Chattahoochee High School, Johns Creek, Georgia,
T: Matthew Mihordea

TMED001T **Using Fluorescent Imaging To Make Cancer Detection More Accurate**
Sahil Paras Hemrajani, 16, Sophomore, Ibrahim Mohammad, 15, Sophomore,
Chattahoochee High School, Johns Creek, Georgia, T: Matthew Mihordea

Marietta Ga 30060, USGA14, Cobb/Paulding Regional Science Fair

BCHM001 ## **Phase VII: Inhibiting Cancer Metastasis by Using EGCG To Target the 67 kDa Laminin Receptor**
Stephen Robert Litt, 17, Senior, Kennesaw Mountain High School Academy of
Mathematics, Science and Technology, Kennesaw, Georgia, T: Angela Wood

BMED001 **Nanoparticle-Mediated Drug Delivery as a Therapeutic for Aortic Aneurysms**
Misha Nilesh Patel, 16, Sophomore, Wheeler High School, Marietta, Georgia,
T: Joel Howell

SOFT024 **Detecting Glaucoma From Retinal Fundus Images Using Machine Learning**
Rohan Kalia, 15, Freshman, Wheeler High School, Marietta, Georgia, T: Joel Howell

Jonesboro, USGA15, Clayton County Regional Science & Engineering Fair

CHEM002 **A Green Method of Removing Immiscible Pollutants From Waterways Using Vitamin E and a Magnetic Suspension**
Amy Pham, 16, Junior, Elite Scholars Academy, Jonesboro, Georgia, T: Andrew Hoang

Athens, USGA50, Georgia State Science and Engineering Fair

ENBM073T **Low-Cost 3D Printed Modular and Adjustable Pediatric Prosthesis Leg**
Hakimuddin Huzefa Kitabwalla, 16, Sophomore, Luc Douglas Nguyen, 15, Sophomore,
Gwinnett School of Mathematics, Science, and Technology, Lawrenceville, Georgia,
T: Jennifer Berry

ETSD076 # **Designing and Fabricating a Vortex Aerospike Rocket Engine**
Cayden Shaffer, 17, Senior, Whitewater High School, Fayetteville, Georgia,
T: Shelley Kozlowski

ETSD077 **The Update of the Outdated Mosquito Collection Device**
Heewon Eum, 17, Junior, North Oconee High School, Bogart, Georgia,
T: Matthew Shuman

PHYS074 **Calculating Transition Amplitudes of an Observable Using the Rodeo Algorithm for Quantum Computing**
Max Bee-Lindgren, 18, Senior, Decatur High School, Decatur, Georgia,
T: Jennifer Gonzalez

HAWAII

Waipahu, USHI01, Hawaii Association of Independent Schools Science and Engineering Fair

BCHM012 **LuxI/LuxR-Type Quorum Sensing System in K61, Dickeya Species Novel: Growth and AHL Production in MgSO4-Rich Brine**
Jingjing Wang, 18, Senior, Iolani School, Honolulu, Hawaii, T: Yvonne Chan

TMED058 **Protective Effect of Bromelain and Pineapple Extracts on UV-Induced Damage in Human Skin Cell**
Atena Mori, 17, Junior, Iolani School, Honolulu, Hawaii, T: Yvonne Chan

Waipahu, USHI02, Leeward District Science and Engineering Fair

CBIO014 # **Identification of Target IVF Preimplantation Screening Regions via Developmental Pathway and RNA-Seq Expression Analysis**
Emily Phanphongsa, 18, Senior, Waipahu High School, Waipahu, Hawaii,
T: Tanya Cobbin

ETSD031 **Engineering a New Foundation for Buildings To Withstand Seismic Disruptions and Soil Liquefaction**
Harold Cacal, 16, Junior, Waipahu High School, Waipahu, Hawaii, T: Dawn Shin

CONGRATULATIONS TO OUR CATEGORY FINALISTS

Robotics and Intelligent Machines

Omar Abul-Hassan	Leonardo Amato	Neel Krish	Kush Parikh	Samuel Simao
Laasya Acharya	Regis de Farias	Kondapalli	Du-go Park	Avery Rose Simon
Rudransh Agnihotri	Elisa Marie	Nidhi Krishna Kumar	Gryphon Rhys Patlin	Kylan Takakusagi
Jai Krishna Agrawal	Diop-Weyer	Catherine Kung	Andy Phung	Glenda Hui En Tan
Bianka Anita Albert	Sicheng Dong	Anish Reddy	Jaxon Kawika	Justin Kit Hang Tang
Anish Aradhey	Danish - Edupuganti	Leekkala	Poentis	Paarth Tara
Tashareny Baez	Tiffani Rai Gay	Yutang Lin	Charles Benson	Enzo Tiptur
Harshal V. Bharatia	Adrian	Jiachen Lu	Pratt	Kutlwano Brian
Ayush Biswal	Gonzalez-Vega	Rafaela Cardoso	Adrian Przybylski	Tshatiwa
Sydney Renee Bostic	Claire Gu	Machado	Krish Inba	Kamila
Rohan Bosworth	Michelle Hu	Timothy Josh	Rajashankar	Manarbekovna
Lap Yan Lennon Chan	Michelle Hua	Mathew	Padmalakshmi	Utegenova
Abhijith Chandran	Chigozirim	Karen Sofia Medina	Ramesh	Richard Xue
Sophie Chen	Nodebechukwu	Ruth Eliza Mellin	Adam Rolander	Sheng Ze Yeoh
Yinghan Chen	Ifebi	Diana	Mikul Saravanan	Saan Cern Yong
Justin Shing Chi Cheng	Claire	Aleksandrovna	Anthony Matteo	Seungwoo Yoon
Jilly Abraham Choi	Jaroonjetjumnong	Melnikova	Saturnino	Fadil Mohammed
Radostin Lozanov	Seoyoung Jun	Utkarsh Mittal	William Savage	Younes
Cholakov	Bisrat Kassahun	Alex Orion Moore	William Savage	Dajun Yuan
Cosmin Ciorba	Matthew Hansol	Karthik Varma	Noa Sendlhofer	Noam Zamski
Andrei Copaci	Jabez Kim	Nadimpally	Sruthi Sentil	Daniel Zhao
	Tze Erhn Koay	Satvik Nelakuditi	Alexander Nicholas	Henry Zhao
	Arjan Kohli	Gracie Nutt	Shipleay	
	Sree Kolla	Amogh	Joshua Logan	
		Palasamudram	Shunk	

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



- SOFT015 Watershed Computer Game**
Benjamin Whithurst, 17, Senior, Pearl City High School, Pearl City, Hawaii,
T: Jessica Stoerger
- Puunene, USHI03, Maui County Regional Science and Engineering Fair**
- PHYS016 Habitable Zones of Galaxies: Finding Metal-Rich Zones in Various Galaxies and Their Relation to Color**
Anica Jihae Ancheta, 15, Sophomore, Henry Perrine Baldwin High School, Wailuku, Hawaii, T: Amy Ancheta
- Lihue, USHI04, Kauai Regional Science & Engineering Fair**
- ROBO077 Electronic Breaking System**
Kylan Takakusagi, 18, Senior, Waimea High School, Waimea, Hawaii,
T: Kawika Wellington
- Hilo, USHI05, Hawaii District Science and Engineering Fair**
- ETSD030 Modification of Squirrel Cage and Slip Ring Induction Motors for a Higher Efficiency and Starting Torque**
Paul Watson Varricatt, 17, Junior, Waiakea High School, Hilo, Hawaii, T: Whitney Aragaki
- TMED012 Understanding the Molecular Mechanisms Underlying the Anticancer Pathway of a Traditional Hawaiian Herb**
Rachel Z. Tao, 16, Junior, Waiakea High School, Hilo, Hawaii, T: Whitney Aragaki
- Kaneohe, USHI06, Windward District Science and Engineering Fair**
- SOFT001 Gamifying Learning by Repetition**
Alicia Christine Daraban, 18, Senior, James B. Castle High School, Kaneohe, Hawaii,
T: Malia Vaughn
- SOFT008 Building Silent Activation and Improved Location Accuracy Into the Current 911 System**
Roan Wainscoat, 18, Senior, Kalaheo High School, Kailua, Hawaii, T: Crystal Stafford
- Aiea, USHI07, Central Oahu District Science and Engineering Fair**
- ANIM004 Analyzing the Ease of Digestion in Dogs Through the Absorbency of Different Types of Dog Foods**
Collin Tajiro Horiuchi, 17, Senior, Mililani High School, Mililani, Hawaii, T: Nel Venzon
- BMED005 Comparing Neural Network Strategies to Label Tricuspid Valve on MRI Images**
Belise Swartwood, 16, Sophomore, Mililani High School, Mililani, Hawaii, T: Nel Venzon
- Honolulu, USHI08, Honolulu District Science & Engineering Fair**
- BMED006 Serological Characterization of *Drosophila* S2 Cells-Expressed SARS-CoV-2 Spike Proteins**
Hinano Tsuchiya, 18, Senior, Kalani High School, Honolulu, Hawaii, T: Kenneth Okawa
- PHYS008 Analyzing Earth's Bow Shock Compression Ratio With Magnetohydrodynamic Limits**
Kenta Milton Sakamoto, 18, Senior, President Theodore Roosevelt High School, Honolulu, Hawaii, T: Jennifer Williams
- ROBO012 Using Hand Tracking and Server Architecture to Allow Online Control of a Robotic Hand**
Jaxon Kawika Poentis, 17, Junior, President Theodore Roosevelt High School, Honolulu, Hawaii, T: Jennifer Williams
- Kailua-Kona, USHI09, West Hawaii District Fair**
- BEHA038 BREATH Analysis: Improving Community Readiness Outcomes for Native Hawaiian Students in K-12 Education**
Carolyn Elizabeth Clebsch, 17, Senior, Kealahou High School, Kailua-Kona, Hawaii,
T: Justin Brown

- Honolulu, USHI50, Hawaii State Science and Engineering Fair**
- ANIM056 Population Status and Monitoring of the Red-Crowned Parrot (*Amazona viridgenalis*) on O'ahu, Hawai'i**
Kellen Apuna, 17, Senior, Kamehameha Schools Kapalama Campus, Honolulu, Hawaii,
T: Grant Yamashita
- CHEM058 A Sustainable Alternative to Textile Dyes: Synthesizing and Applying PMMA Nanoparticles To Create Structural Coloration**
Yumi Hannah Mizobuchi, 17, Junior, Iolani School, Honolulu, Hawaii, T: Jessica Saylor
- CHEM059 Evaluation of Natural Products in Mamaki Tea Using Untargeted Metabolomics**
Alanna Sun, 16, Junior, Waiakea High School, Hilo, Hawaii, T: Whitney Aragaki
- EAEV078 Effectiveness of a Fire-Fighting Foam as an Eco-Friendly Replacement**
Ethan Abraham, 16, Sophomore, Kamehameha Schools Kapalama Campus, Honolulu, Hawaii, T: Grant Yamashita
- EGSD044 Harnessing the Energy in Waves To Generate Electricity**
Landon Choy, 17, Junior, Kamehameha Schools Kapalama Campus, Honolulu, Hawaii,
T: Grant Yamashita
- MCRO057 Identifying the Role of Alternative Ribosomes in Inducing Biofilm Formation**
Ayana Dorothy Sakamoto, 18, Senior, President Theodore Roosevelt High School, Honolulu, Hawaii, T: Jennifer Williams
- ROBO085 The Creation of a Convolutional Neural Network To Classify Chronic Ulcer Infectivity**
Avi Anand Gupta, 16, Junior, Iolani School, Honolulu, Hawaii, T: Yvoone Chan
- IDAHO**
- CRAIGMONT, USID01, Northern Idaho Science & Engineering Fair**
- ETSD040 Increasing Drone Flight Times Without Sacrificing FPV Flight Capability**
Caden Joel Perry, 17, Junior, Moscow High School, Moscow, Idaho, T: Pat Blount
- ETSD041 Electromagnetic Braking System: A Rotary Design Which Applies Electromagnetism To Achieve Reduced-Friction/Frictionless Braking**
Jesse James St. Onge, 18, Senior, Lewiston Senior High School, Lewiston, Idaho,
T: Terri Varnado
- Craigmont, USID02, Western Idaho Science & Engineering Fair**
- CBIO039 Identification of Potential Inhibitors of Severe Acute Respiratory Syndrome Coronavirus 2 Envelope Protein Ion Channel Activity Using Machine Learning Techniques**
Wency Suo, 17, Junior, Boise High School, Boise, Idaho, T: Reid Spain-Strombom
- SOFT026T Novel Search Algorithms To Efficiently Solve the Shortest Vector Problem in Post-Quantum Cryptography**
James Liu, 18, Senior, Luke Bousfield, 17, Junior, Timberline High School, Boise, Idaho,
T: Heidi Pluska
- Craigmont, USID03, Eastern Idaho Science & Engineering Fair**
- BEHA032T Is There a Correlation Between Higher Scores on an Autism Spectrum Test and the Ability To Taste PTC Paper?**
Saree Lydia Hillstead, 15, Freshman, Danica Sue Knapp, 15, Freshman, Hagerman Junior-Senior High School, Hagerman, Idaho, T: Daniel Knapp T: Daniel Knapp
- EAEV041T Is True Glacier Water Really More Pure?**
Nathan Elison, 17, Junior, Brecken Allegood, 15, Sophomore, Hillcrest High School, Ammon, Idaho, T: Barbara Nelson

Finalist Directory

ILLINOIS

Chicago, USILO1, Chicago Public Schools Student Science Fair

CBIO046 **Novel 3D Convolutional Neural Network for Age-At-Death Estimation From Cranial CT Scans**
Maya Joshi, 17, Junior, Walter Payton College Preparatory High School, Chicago, Illinois, T: Walter Kinderman

CELL024 **A Novel RNAi-Based Drug for the Treatment of Hepatocellular Carcinoma**
Ritvik Viniak, 17, Junior, Walter Payton College Preparatory High School, Chicago, Illinois, T: Walter Kinderman

PLNT031 **Using Computers To Optimize Crop Yield**
Rachel Hoffman, 18, Senior, Lane Technical College Prep High School, Chicago, Illinois, T: Lucy Young

SOFT055 **Quantum Bogosort**
George Huebner, 18, Senior, Walter Payton College Preparatory High School, Chicago, Illinois, T: Michael Caines

Edwardsville, USILO2, STEM Science and Engineering Research Challenge

EAEV083 **Evaluating Ultraviolet Rays as a Method To Increase the Efficiency of Methods Used To Clean Up Oil Spills**
Brenton Gbadebo-Goyea, 16, Junior, The Governor French Academy, Belleville, Illinois, T: Christine Stewart

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

EAEV090 **Zooplankton Studies in Lentic Ecosystems—Phase VI: Vertical Migration**
Ashton Timothy Ryan, 17, Senior, Rochester High School, Rochester, Illinois, T: Lyndell Robinson

PHYS044 **Identifying the Source of a Hydroxyl Outflow in a Region of High-Mass Star Formation**
Cade Evan Rigg, 17, Junior, Southeastern Junior/Senior High School, Augusta, Illinois, T: Kassie Henry

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

CBIO047 **A Novel Multi-Task Learning Model To Predict Pan-Cancer Drug Response With Integrated Multi-Omics Data**
Shaurya Agrawal, 16, Sophomore, Adlai E. Stevenson High School, Lincolnshire, Illinois, T: Christina Palffy

CBIO048T **A Novel Machine Learning Method for Tuberculosis Drug Discovery**
Gaurish Lakhnopal, 16, Junior, Aditya Tiwari, 16, Junior, Adlai E. Stevenson High School, Lincolnshire, Illinois, T: Christina Palffy

CHEM048 **Creation of a Predictive MOF Performance Indication System Utilizing Synthesis Criteria and Machine Learning**
Zahra Zulfiqar Nathani, 17, Junior, Niles Township West High School, Skokie, Illinois, T: Parin Patel

INDIANA

Terre Haute, USIN20, Hoosier Science and Engineering Fair Region 1

ANIM070 **Strengthening Eggshells Using a Natural Calcium Supplement**
Kaleb James Johnson, 15, Freshman, Marian High School, Mishawaka, Indiana, T: Ken Andrzejewski

BCHM030 **Spin Doctor: Determining the Capacity for a Circulatory Supplement To Mitigate the Negative Effects of Placing an Unexpected Rotational G-Force Upon *Vanessa cardui* Larvae During Metamorphosis**
Lexy Foust, 16, Junior, Frankfort High School, Frankfort, Indiana, T: Bret Rhea

CONGRATULATIONS TO OUR CATEGORY WINNERS

Systems Software

FIRST PLACE

Andrei Florian

SECOND PLACE

William Huang
Elliott James Krzeminski
Navya Ramakrishnan

THIRD PLACE

Aiden Yutong Bai
Ritika Candadi Brahmadesam
Raahi Reddy Chada
Landon Penn Colaresi
Henrique Rodrigues
Hissa Amorim

FOURTH PLACE

Rohan Kalia
Muhammed Yusuf Kartal
Moltas Lindell
Jay Omkar Nimbalkar
Mykhailo Shynder
Andreas Tornkvist
Thomas Marshall Vielmetti
Yusuf Efdal Yilmaz

Microsoft applauds the finalists
in Systems Software.



Terre Haute, USIN21, Hoosier Science and Engineering Fair Region 2

- BMEDO78** **The Effect of Antepartum Maternal Position Changes on Labor and Delivery Outcomes**
Grace Elizabeth Harrison Weaver, 18, Senior, Marian High School, Mishawaka, Indiana, T: Kenneth Andrzejewski
- EGSD051** **Effects of Nutrient Deprivation on the Production of Algal Biodiesel**
Sneha Yelamanchili, 17, Senior, Signature School, Evansville, Indiana, T: Cynthia Ahmed

Terre Haute, USIN22, Hoosier Science and Engineering Fair Region 3

- CBIO058T** **Identification of X-Linked Candidate Disease Genes Through Trio Family Analysis of Family Pedigree**
James Yang#, 16, Junior, Bolong Xia Huang, 16, Sophomore, Carmel High School, Carmel, Indiana, T: Yongsheng Bai

Terre Haute, USIN23, Hoosier Science and Engineering Fair Region 4

- BCHM034** **Accelerated Bio-Chemical Depolymerization of Plastics From Surgical Face Masks: A Proactive Solution to the Impending Environmental Pandemic**
Rohan Prakash Bhosale, 15, Freshman, Carmel High School, Carmel, Indiana, T: Jennifer Drudge
- ROBO086** **Explore the Protein Folding Problem Using Reinforcement Learning**
Jiachen Lu, 17, Sophomore, Culver Academies, Culver, Indiana, T: David Lawrence

Terre Haute, USIN24, Hoosier Science and Engineering Fair Region 5

- ANIM057** **Vitamin D Impacts on Chicken Eggs**
Taylor Jean Schmitt, 15, Freshman, Northwestern High School, Kokomo, Indiana, T: Linda Wilson
- CBIO061** **Machine Learning-Based Identification of Cognitive Engagement States in EEG Data Driven by Visual Stimulation**
Sean Borneman, 13, Freshman, Bloomington High School South, Bloomington, Indiana, T: Joshua Borneman

Terre Haute, USIN25, Hoosier Science and Engineering Fair Region 6

- ETSD063** **Reduction of Internal Parasites Through Improved Feeder Design**
Matthias David Hefty, 16, Sophomore, DeKalb High School, Waterloo, Indiana, T: Chris Refner
- MATSO46** **Development of a Magneto-Optical Kerr Effect System To Study Magnetic Molecules**
Jonathan Yang, 15, Sophomore, Carmel High School, Carmel, Indiana, T: Jennifer Drudge

Terre Haute, USIN26, Hoosier Science and Engineering Fair Region 7

- BCHM041** **Developing Potential Phosphoprotein Biomarkers for Kidney Cancer From Urinary Extracellular Vesicles**
Zheng-Chi Lee, 16, Sophomore, West Lafayette Junior/Senior High School, West Lafayette, Indiana, T: Brittany Croy
- CBIO062** **Identification of Pancreatic Cancer Driver Genes With a Novel Machine Learning Approach**
Minnie Liang, 17, Junior, West Lafayette Junior/Senior High School, West Lafayette, Indiana, T: Brittany Croy
- TMEDO59** **The Evasion of Cell Death by Cancer Cells Detached From the Extracellular Matrix**
Luke Electious Reynolds, 17, Junior, Marian High School, Mishawaka, Indiana, T: Kenneth Andrzejewski

Terre Haute, USIN27, Hoosier Science and Engineering Fair Region 8

- BEHA048** **The Trends in Music and Technology: Prospectives and Approaches for Early Childhood Development**
Sneha Vashistha, 17, Junior, Carmel High School, Carmel, Indiana, T: Mangilal Agarwal

- CBIO073T** **NucleoDepot: A Novel Approach to Genetic Depositories for the Novice Researcher**
Aaron Slamovich, 19, Senior, Raunak Dani, 15, Sophomore, West Lafayette Junior/Senior High School, West Lafayette, Indiana, T: Brittany Croy

Terre Haute, USIN50, Hoosier Science and Engineering Fair

- BMEDO73** **Establishing Macrophage-Neuron Co-Culture Systems To Assess Neuronal Dynamics**
Maxx Martinez, 17, Senior, Delta High School, Muncie, Indiana, T: Lance Brand
- BMEDO79** **What Is the Role of PRPF39 in Cisplatin Treated Cancer Cells?**
May Elizabeth Weston, 16, Junior, Marian High School, Mishawaka, Indiana, T: Kenneth Andrzejewski
- MCRO050** **Real-Time Imaging Reveals the Antimicrobial Effectiveness of Natural Bromelain on Bacteria**
Madelyn Grace Cerney, 18, Senior, Marian High School, Mishawaka, Indiana, T: Kenneth Andrzejewski

IOWA

Cedar Rapids, USIA01, Eastern Iowa Science and Engineering Fair

- CHEM038** **Biofuel: Testing Oils for Energy Efficacy**
Kelly Ako Takorbisong, 15, Freshman, Keokuk High School, Keokuk, Iowa, T: Arie Schiller
- ENBMO48** **A Thermoreversible Gel for Delivery of Immunostimulant**
Jayden Shin, 17, Junior, West High School, Iowa City, Iowa, T: Carolyn Walling
- PLNT034** **Analysis of Chelated Minerals on *Brassica rapa* and *Raphanus sativus* as a Post-Germination Fertilizer**
Grace Frances Helle, 17, Junior, Beckman Catholic High School, Dyersville, Iowa, T: Cheryl Kluesner

Sheldon, USIA02, Western Iowa Science and Engineering Fair

- ANIM040** **Secret Sounds of Bees: Analysis of Honey Bee Vibroacoustics Using Hidden Markov Models**
Amara Jean Orth, 18, Senior, Lewis Central High School, Council Bluffs, Iowa, T: Carol Fassbinder-Orth
- ENEV047** **Turbid or Not Turbid? That Is the Question: Creating a Water Filtration and Sanitation Method for Developing Countries**
Kiersten Jean Knobbe, 17, Junior, Guthrie Center High School, Guthrie Center, Iowa, T: Jennifer Reed

Ames, USIA50, State Science and Technology Fair of Iowa

- MATSO35** **Mechanical Properties of Antimicrobial Starch-Based Plastic Food Storage Films Phase II**
Libby Knipper, 17, Junior, Beckman Catholic High School, Dyersville, Iowa, T: Cheryl Kluesner
- MCRO038** **Turmeric Bandage: A Natural and Sustainable Way for Faster Wound Healing**
Ishita Mukadam, 16, Sophomore, Maharishi School of the Age of Enlightenment, Fairfield, Iowa, T: Asha Sharma
- ROBO049** **Forecasting Beach Safety in Iowa's Recreational Lakes Using Machine Learning Models**
Claire Gu, 17, Junior, Valley High School, West Des Moines, Iowa, T: Karen Downing
- SOFT042** **A Novel Deep Learning-Based Symptom Recognition System for Effective Physician Decision-Making**
Jonathan Samuel Xu Fan, 16, Junior, West High School, Iowa City, Iowa, T: Carolyn Walling
- TMEDO37** **A Looming Epidemic: Personal Music Player Use in a Young Adult Sample and Its Implications for Future Noise-Induced Hearing Loss**
Lilly Graham, 16, Sophomore, West High School, Iowa City, Iowa, T: Carolyn Walling

Finalist Directory

KANSAS

Eureka, USKS50, Kansas State Science and Engineering Fair

BEHA058 **The Effects of Trauma Manipulation in Rats Through a Social Exploration Task**
Ashi Sachinda Wickramasundara, 18, Senior, Manhattan High School, Manhattan, Kansas, T: Janet Hanson

MATS051 **Creating a Unique Floating Concrete**
Jesse Felix Kemper, 15, Freshman, Pratt High School, Pratt, Kansas, T: Luana Bitter

KENTUCKY

Louisville, USKY02, Louisville Regional Science and Engineering Fair

BEHA016 **Now You See, Now You Don't...**
Suchita Tipirneni, 16, Sophomore, Ballard High School, Louisville, Kentucky, T: Glenda Jones

CBIO024T **Predicting Mycobacteriophage Gene Start Sites Using Artificial Intelligence**
Bella Norman, 17, Senior, Sarisha Lohano, 18, Senior, The Carol Martin Gatton Academy of Mathematics and Science in Kentucky, Bowling Green, Kentucky, T: Cheryl Kirby-Stokes

CELL019 **The Sensory Potential of Synaptopodin: An Analysis of Synaptopodin within the Dorsal Root Ganglion**
Veenasravani Pendyala, 18, Senior, North Oldham High School, Goshen, Kentucky, T: Cristine McMahan

EBED024T **Water Pollution Detection Using Autonomous Drone Hardware and Software**
Sahil Naresh Krishnani, 17, Senior, Nishu Yogesh Anekere, 17, Junior, Harrison Taylor Gover, 17, Senior, The Carol Martin Gatton Academy of Mathematics and Science in Kentucky, Bowling Green, Kentucky, T: Cheryl Kirby-Stokes

ROBO036 **Using Multivariate Time Series Forecasting Neural Networks With Sentimental Analysis To Determine Future Stock Prices**
Karthik Varma Nadimpally, 16, Junior, Ballard High School, Louisville, Kentucky, T: Glenda Jones

Jeffersonville, USKY03, Dupont Manual High School Regional Fair

BMED060 **Role of Quaternary Ammonium Compounds on Inducing Cancer Progression Using a Melanoma Cell-line**
Gokul Achaththekoot, 17, Junior, duPont Manual High School, Louisville, Kentucky, T: Keri Polevchak

CBIO040 **An Application of Machine Learning on Predicting the Presence of Retinopathy Among Diabetic Patients**
Spandana Pavuluri, 16, Junior, duPont Manual High School, Louisville, Kentucky, T: Keri Polevchak

EBED031 **A Wearable Device To Measure and Correct Unhealthy Back Posture**
Amy Chen, 16, Sophomore, duPont Manual High School, Louisville, Kentucky, T: Keri Polevchak

ENBM036T **The Development of a Low-Cost Holistic System for the Stratified Screening of Pancreatic Ductal Adenocarcinoma Utilizing Urinary miRNA Biomarkers**
Rishabh Ranjan, 16, Sophomore, Gopalaniruddh Saisantosh Tadinada, 16, Sophomore, duPont Manual High School, Louisville, Kentucky, T: Keri Polevchak

ROBO050 **Designing a Robotic Arm Prosthesis With the Integration of FDM 3D Printing, Haptic Feedback, FSRs, and Machine Vision**
Jilly Abraham Choi, 15, Freshman, duPont Manual High School, Louisville, Kentucky, T: Keri Polevchak

CONGRATULATIONS TO OUR CATEGORY WINNERS

Translational Medical Science

FIRST PLACE

Napassorn Litchiwong
Chris Tiditjumreongpon
Wattanapong Uttayota

SECOND PLACE

Jaisal Kothari
Darsh S. Mandera
Mercedes Randhahn
Amrutha Srivatsav
Ashay Srivastava

THIRD PLACE

Adrit Rao
Dheepthi Mohanraj
Ron Nachum
Janice Kirti Rateshwar
Vishnu Ram Sampathkumar

FOURTH PLACE

Maryam Ali Al Abdulbaqi
Snikitha Banda
Maya Rose Chiravuri
William Jinliang Gao
Rushank Goyal
Ashley Taylor Malkin
Patrik Wekwejt

Regeneron applauds the finalists
in Translational Medical Science.

REGENERON®

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

ANIM025 **Analysis of Magnetoreception and the Foraging Behavior of Pogonomyrmex Using an Altered Magnetic Field**
Ana Nalini Kothandram, 17, Senior, Notre Dame Academy, Park Hills, Kentucky,
T: William Stamm

Lexington, USKY05, Central Kentucky Regional Science and Engineering Fair

ANIM033 **Investigating Differences in Regeneration Across Species of Planarian Flatworms**
Irving Solomon Morris, 17, Senior, Paul Laurence Dunbar High School, Lexington,
Kentucky, T: Karen Young

BCHM014 **Single Amino Acid Polymorphism at Position 1709 Alters Integrin Beta 4 Function in BT-549 Breast Cancer Cell Growth**
Saadhavi Maskey, 17, Senior, Paul Laurence Dunbar High School, Lexington, Kentucky,
T: Karen Young

CELL011 **Sex Chromosomal Differences and Increased Leukemia Rates in Males**
Sireesha Priya Gutti, 17, Junior, Paul Laurence Dunbar High School, Lexington, Kentucky,
T: Karen Young

Prestonsburg, USKY06, East Kentucky Regional Science and Engineering Fair

CBIO063 **Computational Method of Analyzing Genetic and Epigenetic Information for Predicting Mutations in Colorectal and Pancreatic Ductal Adenocarcinoma Cancers**
Hannah Ashton Long, 17, Junior, Magoffin County High School, Salyersville, Kentucky,
T: Kelsey Salyer

Richmond, USKY50, Kentucky Science and Engineering Fair

ANIM058 **The Role of Dietary Inulin in Mitigating Brain Injury**
McKenna Sun, 17, Senior, Paul Laurence Dunbar High School, Lexington, Kentucky,
T: Karen Young

ENEV068 **Developing a Novel Autonomous Swarm-Based Beach Cleaning Robot**
Varun Hariprasad, 16, Junior, Paul Laurence Dunbar High School, Lexington, Kentucky,
T: Karen Young

ETSD064 **Structural Dynamic Simulation: Mathematical Modeling of Bridge Deformations Using Analytical Methods**
Emily Yang Hu, 17, Junior, Paul Laurence Dunbar High School, Lexington, Kentucky,
T: Karen Young

MATH034 **Gauss Circle Primes**
Thomas Richard Ehrenborg, 16, Junior, Henry Clay High School, Lexington, Kentucky,
T: Renee Goin

MCRO051 **Genome Engineering of Bacteriophage MooMoo**
Sahil Chhabra, 17, Senior, The Carol Martin Gatto Academy of Mathematics and
Science in Kentucky, Bowling Green, Kentucky, T: Cheryl Kirby-Stokes

PLNT053T **The Effect of *Lonicera maackii* on Kentucky's Understory**
Ishani Kulkarni, 15, Sophomore, Aiden Vilo, 16, Sophomore, duPont Manual High School,
Louisville, Kentucky, T: Keri Polevchak

LOUISIANA

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

CBIO015 **Statistical Analysis of Infant Mortality and Social Contributions**
Camille Julie Kleinpeter, 17, Junior, St. Joseph's Academy, Baton Rouge, Louisiana,
T: Jaqueline Savoia

ENBM022 **Engineered 3D Cellular Co-Culture to Study How Fibroblasts Alter Extracellular Matrix Composition Estrogen Receptor Positive Breast Cancer**
Margaret Catherine Moe, 16, Junior, St. Joseph's Academy, Baton Rouge, Louisiana,
T: Jacqueline Savoia

MAINE

Bar Harbor, USME50, Maine State Science Fair

ANIM062 **A Non-Invasive Approach to the Treatment of Equine White Line Disease Using Poly-Wrap and Manuka Honey Topical**
Emma Markowitz, 17, Junior, Maine Homeschool, Trevett, Maine, T: Lisa Markowitz

ENBM050 **Creating a Low-Cost Non-Invasive Blood Glucose Monitoring and Automatic Insulin Injection System With an Artificial Neural Network and Raspberry Pi**
Cuthbert Cammett Henninger Steadman, 15, Junior, Bangor High School, Bangor,
Maine, T: Barbara Stewart

TMEDO47 **A Novel Approach for Early Detection of Alzheimer's Disease: Developing an AlexNet Convolutional Neural Network Enhanced by Class Activation Mapping**
William Xu, 16, Junior, Bangor High School, Bangor, Maine, T: Barbara Stewart

MARYLAND

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

CBIO026 **Comparing the Genomic and Functional Properties of Phage BangNhom and Other Phages To Test Medical Capabilities for Tuberculosis**
Laiba Farooq, 17, Senior, Annapolis High School, Annapolis, Maryland,
T: Kathleen Cochran

EAEV030 **Tides, Pollution, and Human Health: Exploring the Relationship Between Tidal Phases and Water Contamination in a Coastal Inlet**
Emily Ruth Ernst, 17, Junior, Broadneck High School, Annapolis, Maryland,
T: Vikki Romanoski

EGSD022 **Improving the Performance of Solar Cells Using Thermal Cooling**
Megan Reyna Yeager, 15, Freshman, Chesapeake Science Point Public Charter School,
Hanover, Maryland, T: Robert Woerner

ENBM029 **Gastro-tastic; Using Stomach Acid To Power Smart Pills**
Josie Freedom Billett, 18, Senior, Arundel High School, Gambrills, Maryland,
T: Victoria Romanoski

Frederick, USMD02, Frederick County Science and Engineering Fair

EBED037 **The Brain and an Impact: Real-Time Detection of Concussions Among Athletes in Contact Sports Using Sensor Fusion and Convolutional Neural Networks**
Amogh Kashyap, 17, Junior, Urbana High School, Ijamsville, Maryland, T: Christopher Shullenberger

ENEV087 **Automatic Dual-Purpose Trash Collector Based on Soft Tooth Collection Structure**
Xiayi Jin, 17, Junior, The Hill School, Pottstown, Pennsylvania, T: Hoda Ehsan

Rockville, USMD03, ScienceMontgomery

ENEV080 **Making Removal of Chemical Contaminants in Drinking Water Affordable and Available Anywhere and Everywhere**
Muhil A. Thendral, 16, Sophomore, Thomas S Wootton High School, Rockville,
Maryland, T: Angeliq Bosse

PHYS055 **Powerful Quasar-Driven Outflows in the Local Universe From the Cosmic Origins Spectrograph Hubble Space Telescope Far-Ultraviolet Spectroscopic Archive**
Orion Chuanyi Foo, 17, Senior, Poolesville High School, Poolesville, Maryland,
T: Zachary Kingman

TMEDO53 **Representation and Deep Learning on Brain Surface Data for Transcranial Magnetic Stimulation**
Dhruv B. Pai, 18, Senior, Montgomery Blair High School, Silver Spring, Maryland,
T: Angeliq Bosse

Finalist Directory

PHYS017 The Effects of Cymatics on Artificially Auditory-Impaired Hearing Individuals' Ability To Learn Music

Isabelle Ann Gruner, 17, Junior, St. Joseph's Academy, Baton Rouge, Louisiana,
T: Jacqueline Savoia

Bossier City, USLA02, Bossier Parish Community College Louisiana Region I Science and Engineering Fair

MATH024 Functional Analysis of Parameterized Torus Knots

Nhi Dao, 17, Junior, Caddo Parish Magnet High School, Shreveport, Louisiana,
T: Kris Clements

PHYS021 Modeling the Atmospheric Evolution of Exoplanets in the Habitable Zone of M-Dwarfs

Ashini Modi, 18, Senior, Caddo Parish Magnet High School, Shreveport, Louisiana,
T: Kris Clements

ROBO021 Applying Deep Learning in Recognizing Endometrial Carcinoma

Sophie Chen, 15, Sophomore, Caddo Parish Magnet High School, Shreveport, Louisiana, T: Kris Clements

Lake Charles, USLA05, Louisiana Region V Science and Engineering Fair

BEHA007 Perspective vs. Emotional Intelligence

Susanna Angel Chiruguru, 14, Freshman, LaGrange Senior High School, Lake Charles, Louisiana, T: Suresh Chiruguru

SOFT007 Overcoming the Air Gap: Experimentation on Data Transfer

Joy Dong, 17, Junior, Louisiana School for Math, Science, and the Arts, Natchitoches, Louisiana, T: Robert Dalling

New Orleans, USLA08, Greater New Orleans Science and Engineering Fair

ENBM031 Incorporating an Articulating Facemask Into a Multi-Directional Self-Centering Linear Damping Football Helmet System

Rachel Michelle Pizzolato, 18, Senior, Elearning Academy, Metairie, Louisiana,
T: Cathy Boucvalt

ENEV019 Hydrokinetic Power in the Mississippi Riverbed

Caitlin Parker Estrada, 16, Junior, Isidore Newman School, New Orleans, Louisiana,
T: Victoria Mercouris

ETSD015 The Buoy: A Novel Pool Alarm To Save Lives

Grayson Barron, 18, Senior, John Curtis Christian School, River Ridge, Louisiana,
T: Cathy Boucvalt

SOFT017T WatchfuLock

Dylan Daves Bracey#, 18, Senior, Joshua Robert Burk, 19, Senior, Jesuit High School, New Orleans, Louisiana, T: Helen Swan

Baton Rouge, USLA50, Louisiana Science and Engineering Fair

EGSD031 Increasing Efficiency of Electrolysis

Gabriela Maria Journee, 17, Junior, St. Joseph's Academy, Baton Rouge, Louisiana,
T: Jacqueline Savoia

ENEV048 Capacitive Deionization With Bipolar Membranes

Sophia Manuel, 17, Junior, Saint Joseph's Academy, Baton Rouge, Louisiana,
T: Jacqueline Savoia

MATS030T The Degradation of H₂S Through the Utilization of UV-C Light and a TiO₂ Quartz Felt Photocatalyst

Alexander Wu, 17, Junior, Keanna Minkai Luo, 17, Junior, Baton Rouge Magnet High School, Baton Rouge, Louisiana, T: Lai Cao



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Capitol Heights, USMD05, Prince George's Area Science Fair

BMEDO38 Investigation of CD47 Dependent miRNAs as Early Cancer Detection Biomarker Using Liquid Biopsy Database

Morelle Meegane Konchou, 17, Senior, Eleanor Roosevelt High School, Greenbelt, Maryland, T: Sean Brady

EGSD032 Design of a Low-Cost Weather Station for Photovoltaic Modeling

Chad Fe Bo, 18, Senior, Eleanor Roosevelt High School, Greenbelt, Maryland, T: David Eisenberg

ETSD032 Fire, Smoke and Evacuation Modeling: The Ideal Theater

George Jamil Jamaldinian, 18, Senior, Eleanor Roosevelt High School, Greenbelt, Maryland, T: Sean Brady

MCRO025 The Resistance of Bacteria

Carter Annmarie Brotherton, 16, Sophomore, Great Mills High School, Great Mills, Maryland, T: Charles Skinner

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

CBIO054 Identifying Small Molecule Inhibitors of Programmed Cell Death 1 for Cancer Immunotherapy Using Pharmacophore-Based Virtual Screening

Nicole Liang, 17, Junior, River Hill High School, Clarksville, Maryland, T: Moustafa Gabr

TMEDO44 Designing a Deep Learning-Based Resource-Efficient Diagnostic System for Metastatic Breast Cancer: Reducing Long Delays of Clinical Diagnosis and Improving Patient Survival in Developing Countries

William Jinliang Gao, 16, Sophomore, Centennial High School, Ellicott City, Maryland, T: Julia Bakhr

MASSACHUSETTS

Bridgewater, USMA01, Massachusetts Region V Science Fair

ENEV082 Effect of Isopropyl Alcohol on the Prolongation of Surgical Mask's Lifespan During COVID-19

Hsiang-En Liu, 18, Junior, Tabor Academy, Marion, Massachusetts, T: David Wellstead

ETSD049 Design and Fabrication of a Flapping-Wing Robot Based on Slider-Crank Mechanism

Jue Wang, 17, Junior, Milton Academy, Milton, Massachusetts, T: Gabrielle Holman

PLNT046 The Effect of Fertilizers on the Germination of *Vigna radiata* Seeds

Julia Chen, 16, Sophomore, North Quincy High School, Quincy, Massachusetts, T: Patrick Kessler

Medford, USMA02, Massachusetts Region IV Science Fair

ENBMO43 A Robotic Hand Orthosis and Novel Automatic Brunnstrom Evaluation for Stroke Patients

Eric Jiakai Ge, 16, Sophomore, Groton School, Groton, Massachusetts, T: Stephen Belsky

ENEV096 Printing Our Future

Kiley Catherine Conlon, 17, Junior, Lowell High School, Lowell, Massachusetts, T: Emily Steinberg

Fall River, USMA03, Massachusetts Region III Science Fair

ETSD065 Design and Optimization of Toroidal Aerospoke Nozzle

Aprameya Pandit, 16, Junior, North Attleboro High School, North Attleboro, Massachusetts, T: Alexander Hatzberger

ETSD070T The Wheelchair Project

Arav Tyagi, 16, Junior, Antonio Edgardo Marzoratti, 17, Junior, Franklin High School, Franklin, Massachusetts, T: William Bobrowsky

CHEM072 An "Artificial Leaf" That Can Generate Oxygen and Electricity

Sheng-Chun Chang, 16, Junior, Northfield Mount Hermon School, Gill, Massachusetts, T: Jolene Schuster

CHEM076 Mobile Carbon Capture-Phase 3

Maya Sushkin, 14, Freshman, South High Community School, Worcester, Massachusetts, T: Emillie Richmond

EAEV089 Effects of Copper Sulfate Exposure on the Nervous System of the *Hirudo verbana* Leech

Cameron Dunn, 16, Sophomore, Boston College High School, Boston, Massachusetts, T: John Sullivan

PHYS068 Discovering Extremely Rare Neutral Carbon Absorbers in Intergalactic Medium Using Machine Learning

Ashley Xu, 17, Junior, The Winsor School, Boston, Massachusetts, T: Mark Brooks Hedstrom

TMEDO65 A Novel Approach to Burn Wound Assessment: Analysis of Cell Packing Behavior in Wound Healing and Regeneration

Erin Kim, 17, Junior, Phillips Academy, Andover, Massachusetts, T: Jeremiah Hagler

MICHIGAN

Farmington, USMIO2, Science and Engineering Fair of Metropolitan Detroit

BMEDO42 Dietary Impact on Memory T Cells

Annabelle Ye, 16, Junior, Huron High School, Ann Arbor, Michigan, T: Andrew Collins

CBIO041 Artificial Intelligence Solution for Effective Treatment Planning for Brain Tumor Patients

Vikram Srinivas Goddla, 16, Sophomore, Detroit Country Day School, Beverly Hills, Michigan, T: Patricia Hanlan

EAEV048 Arsenic Metabolism in the Mushroom *Agaricus bisporus*

Owen Dong, 16, Junior, Rochester Adams High School, Rochester Hills, Michigan, T: Eric Lohr

EAEV050 *Daphnia magna* in Surface Runoffs

Kiera Washington, 16, Junior, Davis Aerospace, Detroit, Michigan, T: Sharon Holloway

EGSD035 Engineering Compositionally Uniform Whole-Cell Biocatalyst for Biofuel

Margaret Yang, 17, Senior, Cranbrook Kingswood School, Bloomfield Hills, Michigan, T: Stephanie Kokoszka

MATH032 Schrodinger Bridges on Discrete Domains

Donald James Liveoak, 18, Senior, Allen Park High School, Allen Park, Michigan, T: Lawrence Dunlap

ROBO064 Novel Multipurpose Air-Handling Robot With AI-Based Anomaly Detection

Mikul Saravanan, 17, Junior, Cranbrook Kingswood School, Bloomfield Hills, Michigan, T: Stephanie Kokoszka

SOFT036 Versatile and Customizable Gesture Recognition-Based Computer Control Using Open Source, Inexpensive Computer Vision Technology

Glen Russell Warren, 17, Senior, Dearborn Center for Math, Science, and Technology, Dearborn Heights, Michigan, T: Jennifer Gorsline

Bloomfield Hills, USMIO3, Flint Regional Science & Engineering Fair

BEHA033 A Quantitative Graphic Study and Wilcoxon Signed Rank Analysis To Determine if There Is a Significant Gender Difference in Summer Olympic Uniforms

Olivia Jean Wagner, 14, Freshman, H.H. Dow High School, Midland, Michigan, T: Claire Fries

Finalist Directory

Westfield, USMA04, Massachusetts Region I Science Fair

BMEDO68 Exploring the Use of Face Masks for Social Pathogen Detection and Personal Medical Diagnosis

Harene Kim, 16, Junior, Northfield Mount Hermon School, Gill, Massachusetts,
T: Ellena Bethea

ETSD066 The Application of Hybrid Prediction Models in Investigating Sources of Railway Interior Noise and Achieving Noise Reduction

Kaiqing Dai, 17, Junior, Northfield Mount Hermon School, Gill, Massachusetts,
T: Dominic Zhang

Worcester, USMA05, Massachusetts Region II State Science Fair

CELL030 JNK Signaling as a Mediator for Gene Differentiation in Human Umbilical Vein Endothelial Cells Exposed to High Glucose

Jaclyn Michele Zatsiorsky, 19, Senior, Saint Mark's School, Southborough,
Massachusetts, T: Lindsey Lohwater

ETSD059 Reducing the Impact of Wingtip Vortices on Aircraft Through the Use of a Novel Winglet Design

Nevin Antony Thinagar, 16, Sophomore, Shrewsbury High School, Shrewsbury,
Massachusetts, T: Catherine Phillips

MCRO040 Bacteriophage Resistance in *E. coli* Impacts Sensitivity to Antibiotics

Maya Zheng, 17, Junior, Massachusetts Academy of Math and Science at WPI,
Worcester, Massachusetts, T: Kevin Crowthers

TMED050T Intergenerational Substance Abuse Transmission - A Novel Testing Model: Impact of Parental Exposure to Nicotine or Alcohol on Conditioned Place Preference of Regenerated Offspring in Brown Planaria

Eva Bennet#, 16, Sophomore, Esha Bennet, 14, Freshman, Hopkinton High School,
Hopkinton, Massachusetts, T: Kristen Murphy

Boston, USMA06, Massachusetts Region VI Science Fair

ENBM071T IR Thermometers: Optimizing the Degree of Accuracy Through the Inspection of Energy Transfer

Alexander Ajouri, 16, Junior, Zachary Chen, 16, Sophomore, Boston Latin School,
Boston, Massachusetts, T: Scott Balicki

PHYS067T Are You Experiencing a Muffled Voice, or Having Trouble Hearing? What Mask Is the Most Effective for Sound Projection?

Lena Tran, 17, Junior, Mathena Nhu Nguyen, 16, Junior, Boston Latin School, Boston,
Massachusetts, T: Scott Balicki

Dudley, USMA50, Massachusetts State Science & Engineering Fair

BEHA067T Adolescent Perspectives on Stereotypes of Girls in Math

Alivia Jacqueline Hennessey, 15, Freshman, Ellie Schlichtmann, 15, Freshman, Newton
Country Day School of the Sacred Heart, Newton, Massachusetts, T: Sarah Webster,
T: Sarah Webster

BMEDO81 Autism From Mars?: Decoding the Genetic Underpinning of Sex Bias in Autism Through Big Data Analysis

Junu Lee, 16, Sophomore, Lexington High School, Lexington, Massachusetts,
T: Elliot Gimble

CBIO074 Novel Reinforcement Learning Framework for Synthesizable Drug Optimization

Aaron Tian, 17, Junior, Massachusetts Academy of Math and Science at WPI, Worcester,
Massachusetts, T: Kevin Crowthers

CBIO075 Quantum Support Vector Machines (QSVMs) for Breast Cancer Detection on IBM's Hardware

Alice Liu, 18, Senior, Boston Latin School, Boston, Massachusetts, T: Scott Balicki

CONGRATULATIONS ISEF 2022 FINALISTS

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Finalist Directory

- EAEV042** **Assessing Genotoxicity and Coliform Contamination of Rivers and Lakes in the Saginaw Watershed Area**
Anthony Daoud, 15, Sophomore, Saginaw Arts and Sciences Academy, Saginaw, Michigan, T: Matthew Miller
- EAEV043** **The Effect of Fracking on Thermal Conductivity and Seismic Wave Transmission**
Jett Miller, 16, Sophomore, Saginaw Arts and Sciences Academy, Saginaw, Michigan, T: Matthew Miller
- EGSD033** **Hydrogen and Oxygen Gas Production From Water for a Marine Engine as a Function of Voltage and Electrolyte Concentration**
Andrew Joseph Wagner, 17, Junior, Nouvel Catholic Central High School, Saginaw, Michigan, T: Clara Wagner
- Kalamazoo, USMIO7, Southwest Michigan Science & Engineering Fair**
- MATSO42T** **MXene Synthesis Using Lewis Acidic Etching for Li-Ion Battery Applications**
Salena Zhu, 16, Junior, Samadhi Lavanya Attanayaka, 17, Junior, Kalamazoo Area Mathematics and Science Center, Kalamazoo, Michigan, T: Jennifer Richardson
- PLNT043T** **Effects of Perfluorooctane Sulfonic Acids (PFOS) on the Growth and Development of Plants**
Katherine Ann Opria#, 17, Senior, Ashika Bhavani Gullapalli, 17, Junior, Tanmay Shekhar, 18, Senior, Kalamazoo Area Mathematics and Science Center, Kalamazoo, Michigan, T: Jennifer Richardson
- Farmington, USMI50, Michigan Science and Engineering Fair**
- ROBO052T** **COVision: A Novel Convolutional Neural Network for the Differentiation of COVID-19 From Common Pulmonary Conditions**
Kush Parikh, 16, Sophomore, Timothy Josh Mathew, 16, Sophomore, Troy High School, Troy, Michigan, T: Rebecca Brewer
- ROBO053** **Geometric Consistency-Based Self-Supervised Neural Network: A Novel Deep Learning Framework for 3D Human Shape and Motion Reconstruction**
Michelle Hua, 17, Junior, Cranbrook Kingswood School, Bloomfield Hills, Michigan, T: Stephanie Kokoszka
- MINNESOTA**
- Duluth, USMNO2, Northeast Minnesota Regional Science Fair**
- ANIM018** **Tough Turkeys, Year 2: What Habitat Type Do Turkeys Now Associate With in Northeast Minnesota?**
Harmony Grace Tracy, 18, Senior, Cloquet Senior High School, Cloquet, Minnesota, T: Cynthia Welsh
- BMED014** **Disinfectant Properties of Nuphar advena: An Ethnopharmaceutical Approach**
Johanna Bernu, 15, Freshman, Cloquet Senior High School, Cloquet, Minnesota, T: Cynthia Welsh
- EAEV018** **Effects of the Line 3 Oil Pipeline on Gray Wolves (*Canis lupus*) on the Fond du Lac Reservation**
Grace Kathryn Lavan, 15, Sophomore, Cloquet Senior High School, Cloquet, Minnesota, T: Cynthia Welsh
- ENEV016** **Wastewater Treatment: The Use of Mealworm Gut Bacteria (*Tenebrio molitor*) To Isolate and Identify Bacteria That Can Biodegrade Polystyrene**
Rowan Rock, 17, Junior, Cloquet Senior High School, Cloquet, Minnesota, T: Cynthia Welsh
- Mankato, USMNO3, Southern Minnesota Regional Science and Engineering Fair**
- BEHA012** **Investigating Psychological Determinants of Efficient Behavioral Changes by Community Members To Pursue a Common Interest Using the *Drosophila* Model**
Seungmin Han, 19, Senior, Shattuck-St. Mary's School, Faribault, Minnesota, T: Craig Peck

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the fields of science,
technology, engineering
and math is inspiring.





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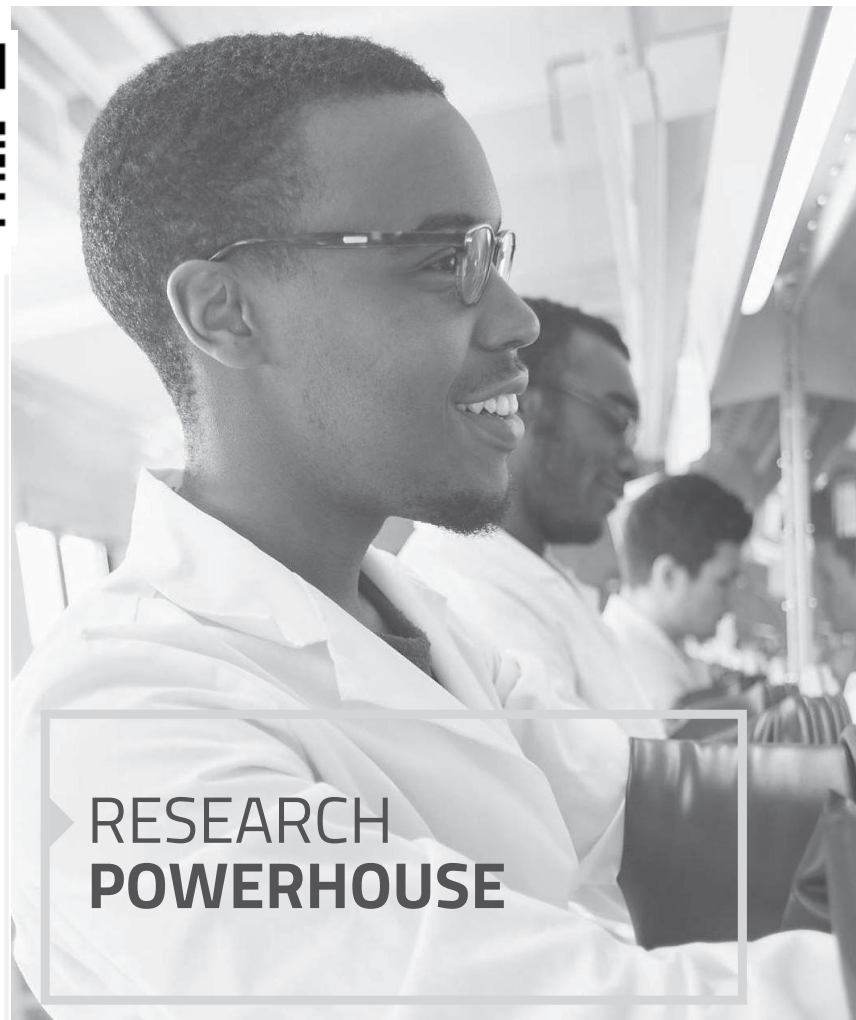
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Finalist Directory

- EAEV047** **The Effects of Natural and Artificial Dyes on Water Quality**
Grace Eileen Moeller, 18, Senior, Lake Crystal Wellcome Memorial, Lake Crystal, Minnesota, T: Kelly Moeller
- Plymouth, USMN04, Twin Cities Regional Science Fair**
- BMEDO15** **The Electromyographic Evaluation of the Bilateral Muscle Asymmetry of the Latissimus Dorsi in Martial Arts and the Effect of Real-Time Biofeedback on Technique Improvement**
Karen Claire Nakamura, 17, Junior, Math and Science Academy, Woodbury, Minnesota, T: Jeana Albers
- CBIO018** **Tumor Targeting: Utilizing Spatial Data Science Techniques To Decode the Enigmatic Immune Response With the Goal of Informing Further Efforts to Develop Immunotherapies for Tumor Treatment**
Srinath Hariharan, 17, Junior, Woodbury High School, Woodbury, Minnesota, T: Princesa Hansen
- EBED010** **Automated Sorting Device Using Sensors and Motor Control**
Nickolas Zander, 18, Senior, New Life Academy, Woodbury, Minnesota, T: Shay Motalebi
- MCRO009** **New Research, Old Medicine: Exploring Antibacterial Properties of Plants and Fungi Used in Indigenous Medicine**
Caroline Schlehner, 18, Senior, Visitation School, Mendota Heights, Minnesota, T: Kristen Piehl
- Crookston, USMN05, Western Minnesota Regional Science Fair**
- PHYS034** **Testing the Effects of Mixture Ratio on Rocket Impulse**
Jonah Luther Ross Bieger, 18, Senior, Perham High School, Perham, Minnesota, T: Shawn Stafki
- Winona, USMN06, Southeast Minnesota Regional Science Fair**
- PLNT032** **A Chemical-Free Apple Tree Thinning Technique: Using Hail Netting To Achieve Ideal Crop Load**
Grace Margaret Finnerty, 18, Senior, Cotter High School, Winona, Minnesota, T: Tammy Drazkowski
- Rochester, USMN07, Rochester Regional Science & Engineering Fair**
- BMEDO40** **Cure of Breast Cancer – Year 5: A Novel Approach to Treating Hormonal Breast Cancer Using Diabetic Medication Through Clinical Database and 3D ex vivo Model**
Christine Song, 17, Junior, Mayo High School, Rochester, Minnesota, T: Christin Stegenga
- CBIO007** **Identifying Breast Cancer Cell Surfaceome Mutations as Potential B-Cell Targets**
Margaret Hu, 17, Senior, Century High School, Rochester, Minnesota, T: Janelle Milliken
- Plymouth, USMN09, St. Paul Science Fair**
- EGSD011** **A Plant With Promise: Using Engineering Principles To Create an Eco-Friendly Manufacturing Process for a Biodegradable Piezoelectric Transducer**
Maggie Banks, 16, Sophomore, Mounds Park Academy, St. Paul, Minnesota, T: Jane Anderson
- ROBO015T** **Project SERSI: Smartphone-Enabled Robotic Sign Language Interpreter**
Ruth Eliza Mellin, 18, Senior, Alex Orion Moore, 18, Senior, Saint Paul Academy and Summit School, Saint Paul, Minnesota, T: Kate Lockwood
- Plymouth, USMN10, Western Suburbs Science Fair**
- EBED015** **Wi-C.A.R.E.: Wifi Computer-Assisted Remote Eldercare (Year 3)**
Shreshth Shrivastava, 15, Sophomore, Eden Prairie High School, Eden Prairie, Minnesota, T: Princesa Hansen
- MATS005** **Studying the Effects of Print Angle on the Impact Resistance of 3D Printed Pieces**
Jared Alan Geppert, 15, Freshman, Blaine High School, Blaine, Minnesota, T: Robert Nick



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- MCRO010** **A Look into the Tiny Earth: Finding Antibiotic Producing Bacteria in Yellowstone Soil**
Elizabeth Pamela Levinshteyn, 15, Freshman, Spring Lake Park High School, Blaine, Minnesota, T: Irina Makarevitch
- ROBO024** **Medical Device Recall Prediction Using MAUDE Reports**
Krish Inba Rajashankar, 16, Junior, Minnetonka High School, Minnetonka, Minnesota, T: Kimberly Hoehne
- TMEDO09T** **Essential Protection: Using UV-Sensitive Yeast To Evaluate Essential Oils as an Alternative to Sunscreen**
Amrit Menon, 18, Senior, Ava Noelle Jaffe, 17, Junior, Breck School, Golden Valley, Minnesota, T: Kati Kragtorp
- Saint Paul, USMN50, Minnesota Academy of Science State Science & Engineering Fair**
- ANIM066** **Harms and Benefits of Oral Sucrose To Reduce Adverse Events, Pain and Distress During Veterinary Needle Prick Procedures in Domestic Rabbits: Random Control Trial**
Caleb Brennan Smith, 17, Junior, Southwest Metro High School, Chaska, Minnesota, T: Sarah Schurmann
- BCHM027** **Synthesizing Ethanol From Recycled Cardboard Sludge Using a Cellulase Enzyme Blend and Yeast**
Josiah Liam Butler, 15, Sophomore, Chaska High School, Chaska, Minnesota, T: Ulrike Tschirner
- BMEDO62** **Automatic Classification of Peripheral Neutrophils on Digital Images Analyzed by Artificial Intelligence**
Jeffrey Wang, 16, Junior, Mayo High School, Rochester, Minnesota, T: Aaron Larson
- BMEDO69** **Immune System Innovation: Ushering in a New Era of Immunology Research by Characterizing Cell Populations Most Impacted by Normal Microbial Exposure for Preclinical Research and Healthcare Treatment Development Success**
Adhvaith Sridhar, 17, Senior, Wayzata High School, Plymouth, Minnesota, T: Princesa Hansen
- TMEDO62** **Overcoming Melphalan Resistance in the Treatment of Multiple Myeloma**
Isha Kapoor, 16, Sophomore, Mayo High School, Rochester, Minnesota, T: Aaron Larson
- MISSISSIPPI**
- Hattiesburg, USMS01, Mississippi Region VI Science and Engineering Fair**
- BEHA029T** **The Effectiveness of Audible Subliminal Messaging**
Shayleen Dorian Moeini, 15, Freshman, Madi Ann Dickinson, 14, Freshman, St. Patrick Catholic High School, Biloxi, Mississippi, T: Deborah Worrel
- MCRO060** **The Effects of Mississippi River Pollutants on the Growth of *Microcystis aeruginosa***
Emerson Reese Morris, 17, Junior, St. Patrick Catholic High School, Biloxi, Mississippi, T: Deborah Worrel
- Cleveland, USMS03, Mississippi Region III Science and Engineering Fair**
- ETSD016** **Under the RADAR: Modeling the RADAR Cross-Section of Aircraft To Enhance Stealth Capabilities**
Rushyendranath Reddy Nalamalapu, 16, Sophomore, Cleveland Central High School, Cleveland, Mississippi, T: Jody McIntosh
- PHYS048T** **The Impacts of Cosmic Rays on Planetary Climate Change**
Stephanie Ressel, 17, Senior, Hailee Rene Sexton, 18, Senior, Mississippi School for Mathematics and Science, Columbus, Mississippi, T: Tina Gibson
- Hattiesburg, USMS04, University of Southern Mississippi Region I Science and Engineering Fair**
- BEHA059** **Assessing Racial Determinants of Wellbeing**

Raeed Ayman Kabir, 18, Senior, The Mississippi School for Mathematics and Science, Columbus, Mississippi, T: Tina Gibson

- BMEDO74** **An Analysis of the Effects of Nicotine on Characteristics of *Drosophila melanogaster***
Madison Grace Echols, 17, Junior, Mississippi School for Mathematics and Science, Columbus, Mississippi, T: Tina Gibson
- Jackson, USMS05, Mississippi Region II Science and Engineering Fair**
- ANIM042** **Examining the Effects of Sodium Propionate on Heart Rate Using *Daphnia magna* as a Model Organism**
Jonmejoy Agniva Dhar, 17, Junior, St. Andrew's Episcopal School, Ridgeland, Mississippi, T: Marks McWhorter
- BMEDO58** **The Effects of Different pH levels of Chlorine on the Tooth Enamel**
Madelyn Abraham, 18, Senior, St. Andrew's Episcopal School, Ridgeland, Mississippi, T: Price Chadwick
- CBIO042** **Identifying Genetic Biomarkers for Essential Tremor Using Bioinformatics and Machine Learning**
Nicholas Le Djedjos, 18, Senior, Mississippi School for Mathematics and Science, Columbus, Mississippi, T: Tina Gibson
- Mississippi State, USMS06, Mississippi Region V Science and Engineering Fair**
- CBIO020** **Assessing the Effect of Traveling on COVID at the County Level Using Machine Learning**

Andrew Yu, 18, Senior, The Mississippi School for Mathematics and Science, Columbus, Mississippi, T: Tina Gibson
- CHEM033** **Improving Rice Nutrition**
Vivian Peng, 15, Sophomore, Starkville High School, Starkville, Mississippi, T: Tina Gibson
- Oxford, USMS07, Mississippi Region VII Science and Engineering Fair**
- BMEDO49** **Complex Combination of Diabetes and Covid-19: Role of Glycolytic Inhibitors in the Treatment**

Keerthin Karthikeyan, 17, Junior, Oxford High School, Oxford, Mississippi, T: Sarah Robinson
- PLNT033** **Bitter Melon, a Miracle Fruit To Control Diabetes: Its Cultivation and Selection of the High Yielding Varieties**
Rishi Nautiyal, 15, Sophomore, Oxford High School, Oxford, Mississippi, T: Sarah Robinson
- Hattiesburg, USMS50, Mississippi Science and Engineering State Fair**
- BEHA060** **An Analysis of the Impact of Food Insecurity and Education on the Economy**
Dia Kher, 16, Junior, The Mississippi School for Mathematics and Science, Columbus, Mississippi, T: Tina Gibson
- MISSOURI**
- Cape Girardeau, USMO01, Southeast Missouri Regional Science Fair**
- BCHM021** **Using *Micrococcus luteus*, *Lactococcus lactis* and *Bacillus cereus* Bacteria and the Breaking Down of Microplastics**
Kaden Dane Luker, 16, Junior, Jackson Senior High School, Jackson, Missouri, T: Leanne Thele
- CHEM041** **Towards the Total Synthesis of the TRAIL-Resistance-Overcoming Pannokin D for the Development of a Pharmaceutically Significant Diprenylated Chromone-Derived Flavonoid Synthesis**

Hiren Parekh, 18, Senior, Saxony Lutheran High School, Jackson, Missouri, T: Brenda Etzold
- EAEV044** **The Effect of Replacing Surfactants With Fossil Fuel Free Alternatives on the Toxicity of *Ceriodaphnia dubia***
Emma Christine Shields, 18, Senior, Jackson Senior High School, Jackson, Missouri, T: Leanne Thele

Finalist Directory

Joplin, USMO03, Missouri Southern Regional Science Fair

- ENEV083** **The Utilization of Biochar and *Bacillus subtilis* To Remove Regionally Prevalent Heavy Metals From Wastewater**
Shrihari Nagarajan, 18, Senior, Thomas Jefferson Independent Day School, Joplin, Missouri, T: Christopher Rupar

Kansas City, USMO04, Greater Kansas City Science & Engineering Fair

- ENEV067** **The Efficiency of Wetland Plants on Absorbing Contaminated Runoff**
Lily Marie Anderson, 18, Senior, Olathe North High School, Olathe, Kansas, T: Marsha Skoczek
- ETSD048** **Designing an Efficient Propeller by Prototyping With 3D Printing**
Logan Honors, 17, Senior, Olathe North High School, Olathe, Kansas, T: Amy Clement
- PLNT039** **The Impact of Compost Composition on Plant Growth**
Jack William Bailey, 18, Senior, Olathe North High School, Olathe, Kansas, T: Marsha Skoczek
- TMED066** **The Effect of Polymer Coating on Taste-Masking Ability of AZT (HIV Drug) for Pediatric Oral Delivery**
Maggie Zhang, 18, Senior, Blue Valley Center for Advanced Professional Studies, Overland Park, Kansas, T: Eric Kessler

Saint Charles, USMO05, Missouri Tri-County Regional Science and Engineering Fair

- ANIM061** **The Effect of Anthropogenic Noise on Bumblebee Foraging Patterns**
Lila Carlene Sverdrup, 17, Junior, Wentzville Holt High School, Wentzville, Missouri, T: Jennifer Hess
- ETSD042** **The Relative Seismic Resistance of Different Structural Aspects of the Pantheon**
Clare Michelle Tyson, 18, Senior, Wentzville Holt High School, Wentzville, Missouri, T: Jennifer Hess

St. Louis, USMO07, Academy of Science - Greater St. Louis Science Fair

- BMED019** **The Effect of Metabolite Glucose 6-Phosphate on Apoptosis of Breast Cancer Cells**
Emily Shaw, 17, Junior, Ladue Horton Watkins High School, St. Louis, Missouri, T: Allen Weltig
- ENEV041** **A Novel Biodegradable Device To Combat and Prevent Water Eutrophication**
Anushka Rawat, 17, Junior, Parkway South High School, Manchester, Missouri, T: Kathy Erhardt

Greenfield, USMO08, Ozarks Science and Engineering Fair

- ENBMO63** **Utilization of Biomimetic and Mechanical Designs To Engineer a More Efficient Surgical Laparoscopic Grasper**
Carter Isaiah Smith, 16, Sophomore, Camdenton High School, Camdenton, Missouri, T: Chris Reeves
- PLNT040** **The Biofortification of *Raphanus sativus* With Calcium Through Irrigation With Ca²⁺ Solutions**
Grace Johnson, 18, Senior, Lebanon High School, Lebanon, Missouri, T: Ryne Emerick

Hillsboro, USMO09, Mastodon Art/Science Regional Fair

- ANIM074T** **Bruce vs. Climate Change**
Abby Rose Nelson, 18, Senior, Brooklyn Portell, 18, Senior, Crystal City High School, Crystal City, Missouri, T: Amy Kimbrell
- MCRO062** **Bacterial Growth in Runner's Shoes**
Hanna Nicole Spoon, 17, Junior, St. Clair High School, St. Clair, Missouri, T: Benjamin Martin

Fayette, USMO10, Central Methodist Eagles Science and Engineering Fair

- ENEV033** **Now You See It, Now You Don't: Investigating the Effectiveness of Various Agri-Waste Biochars as Adsorbents for Methylene Blue in Aqueous Solutions**
Jonah Charles Visser, 15, Sophomore, Tuscumbia High School, Tuscumbia, Missouri, T: Constance Wyrick

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MONTANA

Butte, USMT02, Montana Tech Regional Science and Engineering Fair

ANIM028 Genetic Analysis of Brown Trout To Understand Population Declines in Southwestern Montana

Pilar Hope Seielstad, 18, Senior, Big Sky High School, Missoula, Montana, T: Brandon Honzel

ENBM027 Silk Fibroin-Coated Drug-Eluting Sutures

Mila McKay, 17, Junior, Hellgate High School, Missoula, Montana, T: Willow Affleck

Great Falls, USMT04, Great Falls College MSU Regional Science & Engineering Fair

EAEV031 Assessing Microplastic Pervasiveness in Bark

Claire Yvonne Bucklin, 16, Sophomore, North Toole County High School, Sunburst, Montana, T: Amanda Nix

MATS025 "Weather" Leather Will Withstand

Audrey Ann Rumney, 15, Freshman, Cascade Public Schools, Cascade, Montana, T: Kendra Lane

Missoula, USMT50, Montana Science Fair

ANIM071 The Role of Developmental Plasticity in Adaptation to High Altitude in Highland and Lowland Deer Mice

Natalya de la Plaza, 17, Junior, Hellgate High School, Missoula, Montana, T: Willow Affleck

EAEV079 The Effect of Ocean Acidification on Carbon Sequestration by Nannochloropsis

Kenna Renee Anderson, 16, Junior, Flathead High School, Kalispell, Montana, T: Renee Cordes

NEBRASKA

Kearney, USNE01, Central Nebraska Science and Engineering Fair

ANIM022 Impact of Prednisone on the Body Length, InR, and ILP2 Expression in *Drosophila melanogaster*

Jenna Nicole Cecrle, 17, Junior, Adams Central Jr.-Sr. High School, Hastings, Nebraska, T: Jay Cecrle

ANIM023 Investigation of the Movements of Western Painted Turtles Into Brumation

Gabriella Eleanor Caskey, 18, Senior, Ogallala High School, Ogallala, Nebraska, T: Jennifer Jones

BMED021T The Effects of E-Cigarettes on *Drosophila melanogaster*

Hannah Lynn Gengenbach, 16, Sophomore, Irelyn Samuelson, 16, Sophomore, Adams Central Jr.-Sr. High School, Hastings, Nebraska, T: Jay Cecrle T: Jay Cecrle

Nebraska City, USNE02, Greater Nebraska Science and Engineering Fair

ANIM047 The Effects of Clothianidin, Propiconazole, and Amitraz on *Apis mellifera* Behavior

Lauren Marie Sitzman, 18, Senior, Omaha North High Magnet School, Omaha, Nebraska, T: Amy Leising

MCRO043 Cross-Species Transmission of *Drosophila melanogaster* Nora Virus in Other Species of Insect and the Prevalence of Nora Virus in Insect Populations in Central Nebraska

Ella Grace Buhlke, 18, Senior, Central City High School, Central City, Nebraska, T: Chelle Gillan

NEVADA

Spring Creek, USNV01, Elko County STEM Fair

BMED029 Medicinal Properties of *Lomatium dissectum* and *Sambucus caerulea*

Tziavi Brynn Melendez, 17, Junior, Owyhee High School, Owyhee, Nevada, T: Dietlinde Beneder-Dann

SOFT027 Coding for STEM Education

Marlea Martens, 17, Senior, Elko High School, Elko, Nevada, T: Thomas Wallek

Las Vegas, USNV02, Beal Bank USA Southern Nevada Regional Science & Engineering Fair

TMED061 Investigating *Daphnia magna* Response to Sleep Aids as an Indirect Correlation With Humans

Jacqueline Alexa Springer, 16, Junior, Coral Academy of Science Las Vegas, Henderson, Nevada, T: Khurmet Ayapanov

NEW HAMPSHIRE

Nashua, USNH50, New Hampshire Science & Engineering Expo

CBIO033 Computational Analysis of SARS-CoV-2 Variants' Binding With Vertebrate ACE2

Adithya Puninchittaya, 16, Sophomore, Bedford High School, Bedford, New Hampshire, T: Alyson Michael

EBED027 An Economical Approach To Detect Vaping, Preventing a Vaping Epidemic Among Adolescents

Abhinav Avvaru, 15, Sophomore, Nashua High School South, Nashua, New Hampshire, T: Alyson Hobbs

TMED030 NeuraHealth: An Automated Screening Pipeline To Detect Undiagnosed Cognitive Impairment in Electronic Health Records Using Deep Learning and Natural Language Processing

Tanish Tyagi, 17, Junior, Phillips Exeter Academy, Exeter, New Hampshire, T: Sudeshna Das

NEW JERSEY

Lebanon, USNJ01, Nokia Bell Labs North Jersey Regional Science Fair

ANIM049 Exploring E-Cigarette Condensate Toxicity of Menthol and Nicotine in PCLS

Jeffrey Ho, 18, Senior, Millburn High School, Millburn, New Jersey, T: Susan Arrigoni

CBIO049 ARIEL: Adversarial Neural Evolution for Unified Variant Forecasting and Proactive Therapeutic Design

Ryan Samuel Park, 17, Senior, Millburn High School, Millburn, New Jersey, T: Susan Arrigoni

CELL041 Homologous Histone Acetyltransferases KAT2A (GCN5) and KAT2B (PCAF) Roles in the Intestinal Epithelium

Sean Woo, 16, Junior, Millburn High School, Millburn, New Jersey, T: Susan Arrigoni

ENBM044 Design of Oxygen-Carrying Autonomous Following and Health Monitoring Robot for Pulmonary Rehabilitation

Yuxuan Tian, 18, Junior, Rutgers Preparatory School, Somerset, New Jersey, T: Pablito Lake

ETSD050 Novel Magnetic Levitation Train Using a Triple-Dipole-Line Track System

Nathanael Timothy Gunawan, 16, Junior, Westwood Regional High School, Township of Washington, New Jersey, T: Henry Chen

PLNT036 Effects of Various Soil Microbiomes on Native and Invasive Plants

Eric Wang, 17, Junior, Millburn High School, Millburn, New Jersey, T: Susan Arrigoni

Spring Lake, USNJ02, Jersey City Medical Center/Barnabas Health STEM Showcase

ENEV058 Year 4: Small-Scale Multilevel Bioremedial Water Filtration System (Prototyping)

Sania Naik, 17, Senior, Dr. Ronald E. McNair Academic High School, Jersey City, New Jersey, T: Maria Osoria

PHYS049 The Effect of Dimples on a Mid-Sized Automobile's Aerodynamics

Sivaditya Teju Padmanabhan, 16, Sophomore, Dr. Ronald E. McNair Academic High School, Jersey City, New Jersey, T: Maria Osoria

PLNT037 Application of Indigenous Technical Knowledge (ITK) in the Geographic Context of Mid-Atlantic/North-Eastern American Agriculture

Saumitra Suyog Prabhu, 16, Junior, Dr. Ronald E. McNair Academic High School, Jersey City, New Jersey, T: Maria Osoria

Finalist Directory

Hackensack, USNJ04, BCA Research Expo

- BMEDO34** **Glutamine Transporter ASCT2's Novel Antioxidant Role in Parkinson's Disease**
Rohit Varma Mantena, 18, Senior, Bergen County Academies, Hackensack, New Jersey,
T: Donna Leonardi
- BMEDO39** **Fisetin in an in vitro Model of the Diabetic Eye**
Neha Vazarkar, 17, Senior, Bergen County Academies, Hackensack, New Jersey,
T: German Sabio
- PHYS045T** **Efficient Computation of Interference Between Pathways in Quantum Control Systems**
Erez Moshe Israeli Miller, 18, Senior, Michael Kasprzak, 17, Senior, Bergen County Academies, Hackensack, New Jersey, T: Ozgur Dogru

NEW MEXICO

Albuquerque, USAI50, National American Indian Science and Engineering Fair

- EAEV033** **The Effect of Casein Polymers on the Filtration of Heavy Metals and Contaminants in Well Water**
Desmen Andrew Boykin, 17, Junior, Governor's School at Innovation Park, Manassas, Virginia, T: Alexis Patanarut

Albuquerque, USNM01, Central New Mexico Regional Science and Engineering Challenge

- CBIO055** **CIRCA - CircularRNA for Cancer Active Immunotherapy: A Machine Learning Model To Predict Liver Cancer and Top Genes for Cancer Vaccine**
Aditya Koushik, 15, Sophomore, La Cueva High School, Albuquerque, New Mexico,
T: Lena Eddings
- ENBM052** **A Low-Cost Artificial Pancreas System With Integrated Machine Inference**
Landon Flemming, 17, Junior, Explore Academy, Albuquerque, New Mexico,
T: Matthew Steinkraus
- MATH033** **Modifying the ABCs of Number Theory**
Akilan Sankaran, 14, Freshman, Albuquerque Academy, Albuquerque, New Mexico,
T: David Metzler
- SOFT046** **Using Logistic Regression Markov Chain-Based Machine Learning Models To Predict Basketball Using NBA Data**
Sherwin Thiyagarajan, 18, Senior, Albuquerque School of Excellence, Albuquerque, New Mexico, T: Suzanne Zamora

Farmington, USNM02, San Juan New Mexico Regional Science and Engineering Fair

- CBIO022** **Bioinformatics Applied to the Y-DNA Haplogroup Q-M242: Male Navajo Genetic Marker**
Jordyn Begay, 16, Sophomore, Navajo Preparatory School, Farmington, New Mexico,
T: Yolanda Flores
- EGSD023** **Synthesizing Biomorphic Batteries Using Porous Plant Stems Using Zinc (Zn) and Copper (Cu) Electroplating Technique**
Lia K. Wilford, 18, Senior, Navajo Preparatory School, Farmington, New Mexico,
T: Yolanda Flores

Grants, USNM03, Four Corners Regional Science and Engineering Fair

- ENEV042** **Biodigestion: Turning Nothing Into Something**
Alexia Lynn Munson, 16, Sophomore, Grants High School, Grants, New Mexico,
T: Cody Hayes
- MCRO022** **What's Lurking in Your Mask?**
Chloe Starr Rychener, 17, Junior, Grants High School, Grants, New Mexico,
T: Cody Hayes

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Las Vegas, USNM05, Northeastern New Mexico Regional Science and Engineering Fair

- BMEDO64 Construction of Oxygen Permeable Veins From Biogel**
Katherine Shoulla, 16, Sophomore, Academy for Technology and the Classics, Santa Fe, New Mexico, T: David Kriegshauser
- ROBO044 Soft Bio-Mimetic Caterpillar Robot**
Dajun Yuan, 17, Junior, Armand Hammer United World College, Montezuma, New Mexico, T: Jason Booker

Peralta, USNM07, Southwest/Southeast New Mexico Regional Science Challenge

- ENEV034 Clean Hydrogen Production From Photocatalytic Degradation of Plastic Wastes**
Haoyu Bradley Wang, 16, Junior, Centennial High School, Las Cruces, New Mexico, T: Lisa Weinbaum
- ENEV043T Utilizing Cow Dung Ash and Volcanic Ash To Manufacture Eco-Friendly Building Materials To Solve Environmental Pollution and Provide Accessibility to Cheap Housing**
William Wade Rosser, 16, Sophomore, Danylo Starepravo, 18, Senior, Ngoc Minh Pham, 17, Junior, New Mexico Military Institute, Roswell, New Mexico, T: Frank Kimbler

Socorro, USNM50, New Mexico Science and Engineering Fair

- CHEM066 Effects of Different Combinations of Halogen Additions to Anti-B18H22 Molecule on Absorption and Emission Wavelength**
Melody Yeh, 18, Senior, La Cueva High School, Albuquerque, New Mexico, T: Creighton Edington
- EAEV085 Urban Ozone Forecasting and Policy Recommendations Through Photochemical Modeling and Machine Learning**
Eliana Kai Juarez, 17, Junior, V. Sue Cleveland High School, Rio Rancho, New Mexico, T: Leah Fely
- EBED035T Using Machine Learning To Dynamically Filter Nanopore DNA Sequencing Data**
Aaron Matthew Philip, 18, Senior, Leonid Svyatsky, 17, Junior, Los Alamos High School, Los Alamos, New Mexico, T: Michela Ombelli
- PLNT052T Using the Kirby Bauer Method To Test the Effectiveness of Phenols Extract From Pecan Shells and Saponin Extract From Prickly Pear Cactus in Inhibiting the Growth of *E. coli***
Ivan Stanislavovich Belyaev, 17, Junior, Ngoc H. Pham, 17, Junior, New Mexico Military Institute, Roswell, New Mexico, T: Demvia Maslain

NEW YORK

Poughkeepsie, USNY01, Dutchess County Regional Science Fair

- ENEV089 The Development of Recyclable Wind Turbine Blades Using Autodesk 3D Simulations**
Paige Elizabeth DeMino, 15, Sophomore, Our Lady of Lourdes High School, Poughkeepsie, New York, T: John Herles
- PLNT049 Molecular, Physiological, and Ecological Evaluation of Latvian Genetic Resources of Valuable Wild Legume Species *Trifolium fragiferum* in the Context of Sustainable Agriculture**
Magnolia Andra Garbarino, 16, Junior, Pawling High School, Pawling, New York, T: Gillian Rinaldo

Halesite, USNY02, Long Island Science and Engineering Fair

- ANIM029 Loss of NMDA Receptor Signaling Results in Excess Proliferation of CNS and Neural Crest-Derived Cells**
Sarah Kathryn Schubel, 18, Senior, Smithtown High School East, St. James, New York, T: Maria Zeitlin

- ANIM030 Exploring Sexual Dimorphism and Sex Hormone Receptor Expression in the Bed Nucleus of the Stria Terminalis (BNST) in the Monogamous Prairie Vole**
Soyoun Moon, 18, Senior, Commack High School, Commack, New York, T: Jeanette Collette
- BEHA019 Why We Vote: How Positive Descriptive Norms and Holding a Minority Political Viewpoint Increase Citizens' Intention and Responsibility to Vote**
Han Byur Youn, 17, Senior, Roslyn High School, Roslyn Heights, New York, T: Allyson Weseley
- BEHA020 Music and Emotion: The Intervallic Fallacy of the Major-Minor Dichotomy**
Jacob Aaron Leshnow, 16, Junior, Half Hollow Hills High School East, Dix Hills, New York, T: Michael Lake
- BEHA024 American Dream or American Myth? A Linear Regression Analysis of American Attitudes as a Factor of Race and Ideology**
Kyle Arjun Kavully, 18, Senior, Plainedge High School, N Massapequa, New York, T: William Bertolotti
- BMEDO31 Repurposed Cephalexin Causes Multifaceted Pro-Cancer Effects by Way of Wnt Signaling Pathway**
Griffin Hon, 16, Sophomore, Syosset High School, Syosset, New York, T: Mary Hendrickson
- CBIO027 Recurrent Repeat Contractions: Investigating a Novel Genomic Factor of Polymorphism in 10 Human Cancers**
Kevin Zhu, 17, Junior, Jericho High School, Jericho, New York, T: Serena McCalla
- CBIO029 RiboBayes: Assessing the Transcriptome-Wide Expression of Ribosome Pause Sites in Ribosome Profiling Data With Bayesian Wavelet Thresholding**
Amber Luo, 18, Senior, Ward Melville High School, East Setauket, New York, T: Marnie Kula
- CELL022 LncRNAs Influence on NK Cells: Potential Therapeutic Target for Neuroblastoma**
Miah Christina Margiano, 17, Junior, Saint Anthony's High School, Melville, New York, T: Paul Paino
- CHEM031 Computational Assessment of Macrocyclic Host-Guest Ion-Dipole Interactions With Negative Pores**
Alex Lin Wang, 17, Junior, Syosset High School, Syosset, New York, T: Mary Louise Hendrickson
- EAEV034 Reconstruction Modeling Using Tectonics and Climate of Western North America**
Rebecca Cho, 17, Senior, Jericho High School, Jericho, New York, T: Serena McCalla
- EAEV035 Assessing the Efficacy of the U.S. Endangered Species Act Through the Novel Quantification of Species Charisma and Respective Population Trends**
Tarunika Sasikumar, 17, Senior, Plainview-Old Bethpage John F. Kennedy High School, Plainview, New York, T: Raymond Tesar
- EBED021 Project Vision: Virtual Environment Through Artificial Intelligence Recognition**
James Nagler, 15, Sophomore, Garden City High School, Garden City, New York, T: Steven Gordon
- ENBMO28 Automatic Diagnosis of Cardiovascular Disease: 12-Lead Electrocardiogram and Elucidating Sex Differences via Deep Learning**
Natalia Pahlavan, 16, Junior, Jericho High School, Jericho, New York, T: Serena McCalla
- ENEV032T Electrocoagulation With Aluminum, Copper, and Zinc for Aqueous Methylene Blue Remediation and Sustainable Energy Production**
Ava Malysa, 17, Junior, Samantha Palmadessa, 16, Junior, Manhasset High School, Manhasset, New York, T: Alison Huenger
- ENEV035 RB5 Dye Removal Using Activated Carbon Under UV Irradiation**
Emily Kim, 16, Junior, Jericho High School, Jericho, New York, T: Serena McCalla

Finalist Directory

TMEDO60T Breast Cancer Detection in Mammographic Images Using an Ensemble Deep Learning Model
Harshitha Jasti, 16, Sophomore, Eesha Amit Patel, 15, Sophomore, Ardrey Kell High School, Charlotte, North Carolina, T: Manjusha Pavuluri

NORTH DAKOTA

Mandan, USND01, Southwest Central North Dakota Regional Science and Engineering Fair

MCRO044 Antibiotic Resistance
Jada Rose Bonogofsky, 17, Junior, Flasher High School, Flasher, North Dakota, T: Tana Schafer

MCRO061 Antibiotics vs. Essential Oils
Alivia Geffre, 16, Sophomore, Flasher High School, Flasher, North Dakota, T: Tana Schafer

Hankinson, USND03, Southeast North Dakota Regional Science and Engineering Fair

ANIM072 Monitoring Honeybee Hive Health With Computer Vision
Reagan Elizabeth Chambers, 17, Senior, Woodhaven Academy, Fargo, North Dakota, T: Victoria Chambers

BEHA043 Analysis of Smiling Back
Elizabeth Sarah Sherbrooke, 18, Senior, Hankinson Public School, Hankinson, North Dakota, T: Patty Kratcha

BEHA071 Social Confidence
Brayden Marie Sutherland, 14, Freshman, Lisbon High School, Lisbon, North Dakota, T: Tina Pierce

MCRO041 Antibacterial Effectiveness of Hand Soaps
Elise Michelle Elliot, 16, Sophomore, Hankinson Public School, Hankinson, North Dakota, T: Patty Kratcha

Grand Forks, USND05, Northeast North Dakota Regional Science and Engineering Fair

BMEDO80 The Physical Effects of Sound; the Unconscious Impact of Sound Waves on Adolescent Heart Rates
Sudiksha Singhal, 17, Junior, Red River High School, Grand Forks, North Dakota, T: Lucas Moldenhauer

Grenora, USND06, Northwest North Dakota Regional Science Fair

ANIM064 Effectiveness of Cattle Dewormers
Lindsey Susan Vachal, 18, Senior, Tioga High School, Tioga, North Dakota, T: Debra Moe

MCRO052 Animals vs. Human Bacteria
Abrianna Lou Volz, 15, Freshman, Tioga High School, Tioga, North Dakota, T: Debra Moe

ROBO078 A.I. T.A.
Gracie Nutt, 17, Junior, Tioga High School, Tioga, North Dakota, T: Sarah Skarphol

Langdon, USND50, North Dakota State Science and Engineering Fair

EAEV088 An Innovative Approach To Manage the Environmental Impact of Agricultural Drainage Water
Gavin Donald Kratcha, 16, Sophomore, Hankinson Public School, Hankinson, North Dakota, T: Patty Kratcha

ENEV095 Bringing Contaminated Soils Back to Life, Remediating Brine Contaminated and Alkaline Soils Using Phytoremediation and Engineered Drainage Techniques
Benjamin Tate Ellingson, 18, Senior, Maddock High School, Maddock, North Dakota, T: Jonathan Ellingson

PLNT044 Soil Farms II: Optimizing Cropland Soil Conditions for Microbiological Supplementation
Emma Pearl Kratcha, 18, Senior, Hankinson Public School, Hankinson, North Dakota, T: Patty Kratcha

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- MATH021** **Nxnxn Rubik's Cubes and God's Number**
Daniel Salkinder, 17, Senior, Half Hollow Hills High School East, Dix Hills, New York, T: Michael Lake
- MCRO019** **Characterizing the Secretion of the Francisella tularensis Protein FTL_1123**
Lakshanna Raveendran, 17, Senior, Commack High School, Commack, New York, T: Jeanette Collette
- TMED024** **SmartClick: A Novel Automated Segmentation Tool for Medical Images With Interactive Optimization Capabilities Designed for Liver Cysts**
Collin Li, 18, Senior, William A. Shine Great Neck South High School, Great Neck, New York, T: Nicole Spinelli
- TMED027** **Development of a Polydiacetylene-Based Paper Biosensor for Naked-Eye Detection of COVID-19 in Saliva**
Christopher Prainito, 17, Senior, John F. Kennedy High School, Bellmore, New York, T: Barbi Frank
- New York City, USNY03, Terra New York City STEM Fair**
- ANIM075** **Caste Plasticity in the H. saltator Ant – Social Context Influences Dominance and Reproduction Related Gene Expression**
Luke Jow, 17, Senior, Bronx High School of Science, Bronx, New York, T: Richard Lee
- BEHA055** **Detecting, Dismantling, and Defeating Environmental Racism Through the Lens of Urban Flooding**
Skye Lam, 17, Senior, Bronx High School of Science, Bronx, New York, T: Vladimir Shapovalov
- BEHA066** **A Pharmacological Approach for Studying Alcohol Use Disorder: Using Calcium Imaging on hiPSC-Derived Glutamatergic Neurons to Dissect the Glutamate Response in the Context of Chronic Ethanol Treatment**
Arthur Liang, 17, Senior, Stuyvesant High School, New York, New York, T: Isabel Gameiro-Ros
- CBIO065** **CROTON: An Automated and Variant-Aware Deep Learning Framework for Predicting CRISPR/Cas9 Genome Editing Outcomes**
Victoria Robin Li, 17, Senior, Hunter College High School, New York, New York, T: Brian Park
- CBIO070** **Two Novel Single-cell Algorithms Elucidate the Therapeutic Potential of Clinically-relevant Small-molecule Inhibitors for Targeting Cancer Metastasis**
Akshay Shivdasani, 17, Senior, Columbia Grammar and Preparatory School, New York City, New York, T: Ilya Yashin
- CBIO071T** **Predicting Nucleolin Interactions in DNA Repair: An *in silico* Approach**
Laura Fan, 17, Senior, Sukaina Sarah Shivji, 17, Senior, Staten Island Technical High School, Staten Island, New York, T: John Davis
- EAEV072** **The Implicative Comparisons of 90th Percentile Lead and Copper Compliance Calculations on Historic NYC Public Water System Data**
Alvin Chen, 17, Junior, Stuyvesant High School, New York, New York, T: Jason Econome
- ENBM065** **Adaptive Multi Sigmoid Contrast Enhancement**
Samuel Iskhakov, 17, Senior, The Bronx High School of Science, Bronx, New York, T: Vladimir Shapovalov
- ETSD071** **Design and Control of a Three-DoF Ball Joint With Applications in Robotic COVID-19 Swabbing and Surgery**
Samuel Rossberg, 17, Senior, The Bronx High School of Science, Bronx, New York, T: Vladimir Shapovalov
- MATH035** **On Lucas Sequences of the First Kind With Finitely Many Primes**
Aaron Kim, 17, Sophomore, Bronx High School of Science, Bronx, New York, T: Vladimir Shapovalov

- PHYS069T** **Learning From the Shadows: Exploring North Polar Impact Craters in Mercury's Permanently Shadowed Regions**
Jasmine Palma#, 17, Senior, Michelle Wu#, 17, Senior, Townsend Harris High School, Flushing, New York, T: Katherine Cooper
- PLNT045** **Soilization of Sand Indicated by Photosynthetic Rate, Water Retention Rate, and Health of Plants**
Ava Zhang, 18, Senior, Brooklyn Technical High School, Brooklyn, New York, T: MacRae Maxfield
- ROBO079** **Coding a Goniometer Robot To Replicate Human Eye Movements as Tool for Improved Disease Research**
Sree Kolla, 17, Junior, Staten Island Technical High School, Staten Island, New York, T: John Davis
- Mahopac, USNY05, Regeneron-Westchester Science and Engineering Fair**
- BEHA034** **Assessing the Distribution of Excessive Noise Exposure and the Risk of Tinnitus Onset in Opera, Orchestra, and High School Musicians**
Orlando Ray Osgood, 18, Senior, Ossining High School, Ossining, New York, T: Angelo Piccirillo
- BEHA040** **Quantifying Linguistic Polarization for Congressional Representatives Facing Primary Challengers: A Random Effects Logit Regression Approach**
Jack Aidan Kelly, 18, Senior, Harrison High School, Harrison, New York, T: Allison Blunt
- BEHA041** **Tell Me a Story: The Effects of Storytelling vs. Story-Reading on the Executive Functions of Fourth Graders**
Edith Elizabeth Bachmann, 18, Senior, Byram Hills High School, Armonk, New York, T: Caroline Matthew
- BEHA054** **"Keep Your Eye on the Ball": A Comparative Study of the Visual Tracking Accuracy of Baseball Batters and Non-Athletes During Knuckleball Tracking**
Jack Blackmar, 18, Senior, Byram Hills High School, Armonk, New York, T: Stephanie Greenwald
- BMED041** **Pediatric BMSC Exosome Treatment Requires Interaction With Bone Tissue Defect Environment To Improve Bone Repair**
Katelyn Kelly Wasilenko, 18, Senior, Ossining High School, Ossining, New York, T: Angelo Piccirillo
- BMED050** **Post-SARS-CoV-2 Symptoms and Conditions in Patients Aged 18 and Older**
Blake Daniel Rappaport, 16, Junior, Ardsley High School, Ardsley, New York, T: James Dowd
- BMED055** **Assessing the Role of Constitutive JAK/STAT Signaling in Jak2V617F-p53 Post-MPN Leukemia Using a Novel Knock-in/Knock-out Mouse Model of Jak2V617F**
Benjamin Zachary Wang, 17, Senior, Horace Greeley High School, Chappaqua, New York, T: Lisa Papernik
- BMED056** **Altered Homer1b/c Volumes and mGluR1/5-Homer1b/c Colocalization in Parkinson's Disease-Linked LRRK2 G2019S Mice**
Emily Dodd, 18, Senior, Somers High School, Lincolnale, New York, T: William Maelia
- CELL028** **A Novel Investigation of the Effects of EphA4 on Axon Regeneration in the Spinal Cord**
Christina Rose Kelly, 17, Junior, Westlake High School, Thornwood, New York, T: Lawrence McIntyre
- CELL029** **Investigating the Unexplored Genome: Evaluating the Role of the Long Non-Coding RNA (lncRNA) Morbid in the Development of Inflammatory Bowel Disease (IBD)**
Gabriella Franchesca Colabello, 17, Senior, Byram Hills High School, Armonk, New York, T: Caroline Matthew
- CELL034** **The Effect of N-methyl D-aspartate Receptor Shutdown on Neural Stem Cell Proliferation in Zebrafish Larvae**
Charlotte Rubin, 17, Senior, Hastings High School, Hastings-on-Hudson, New York, T: Melissa Shandroff

Finalist Directory

- CHEM050** **Identification of Chemical Contaminants in Spiked Beverages With the Use of Infrared Spectroscopy Through Development of Inexpensive and Inconspicuous Device To Identify Date-Rape Drugs**
Mai Blaustein, 18, Senior, Harrison High School, Harrison, New York, T: Allison Blunt
- EAEV059** **The Effect of *Hordeum vulgare* I. Extract and *Phragmites australis* Extract on the Growth of Algae in a Freshwater Environment**
Maxwel Wilcoln Lee, 18, Senior, Hackley School, Tarrytown, New York, T: Andrew Ying
- EAEV064** **Evaluating the Efficacy of Organic Management Methods on Japanese Stiltgrass (*Microstegium vimineum*)**
Michael Eugene Clarke, 17, Junior, Westlake High School, Thornwood, New York, T: Lawrence McIntyre
- ENEV059** **Developing and Assessing Fucose-Based Water-Soluble Bioplastics**
Olivia Reiff Pollock, 17, Senior, Pelham Memorial High School, Pelham, New York, T: Steven Beltecas
- ETSD051** **Autonomous UGV Inspection and Monitoring of Electrical Substations**
Julia Meryl Meyerson, 17, Junior, Pelham Memorial High School, Pelham, New York, T: Steven Beltecas
- PHYS050** **Designing a Quantum Teleportation Circuit on Novel Qubits**
Anisha Musti, 17, Junior, Edgemont High School, Scarsdale, New York, T: Talia Dardis
- PLNT030** **Elucidating Terrestrial Optical Refrigeration Through Transpiration in *Rhizophora mangle* and Chlorophyll A Fluorescence in Low-Polarity Mediums**
Aaron Min Song, 17, Senior, Ossining High School, Ossining, New York, T: Angelo Piccirillo
- TMED045** **SMART-Screen: A Point-of-Care COVID-19 Active Replication Detection System**
Tista Goswami, 17, Senior, Mamaroneck High School, Mamaroneck, New York, T: Guido Garbarino
- TMED046** **Diagnostic Accuracy of Deep Learning's Computational Photography in the Morphology of Acute Myeloid Leukemia**
Leah Sherbansky, 16, Junior, Pelham Memorial High School, Pelham, New York, T: Steven Beltecas
- Syracuse, USNY06, Central New York Science and Engineering Fair**
- EGSD046T** **Sustainable Electricity From Dirt: Microbial Fuel Cell**
Miguel Mathis, 16, Sophomore, Makayla Love McMullen, 15, Sophomore, Syracuse Academy of Science, Syracuse, New York, T: Amy Ay
- ETSD058** **Cubesat Propulsion With Magnets**
Caoimhe Dudgeon, 15, Sophomore, Homer Senior High School, Homer, New York, T: Miles Dudgeon
- PHYS057** **Consumer-Grade Virtual Reality as a Tool and Methodology for Mars and Other Off-World 3D Immersive Experiential and Scientific Exploratory Research**
Theresa Audry White, 14, Freshman, Fayetteville-Manlius High School, Manlius, New York, T: Christian Tate
- Lake Placid, USNY07, Greater Capital Region Science and Engineering Fair, Inc.**
- ANIM073** **Efficacy of Copper Oxide Wire Particles and Albendazole Against Gastrointestinal Nematodes in Goats**
Jack Olivier Mongan, 18, Senior, Burnt Hills-Ballston Lake High School, Burnt Hills, New York, T: Regina Reals
- MATH030** **From the Manhattan Project to Statistics of Zeros of L-Functions**
Jiahui Li, 17, Junior, Emma Willard School, Troy, New York, T: Alexandra Schmidt
- MCRO035** **Investigating the Effectiveness of the Eradication of *Microcystis aeruginosa* Using Sonication and Magnetic Filtration**
Ashlyn Nicole Hutchinson, 18, Senior, Hudson Falls High School, Hudson Falls, New York, T: Thomas Vartuli

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Utica, USNY08, Utica College Regional Science Fair

ENEV075 **Microfibers, a Macroproblem: Optimizing Washing Machine Filters To Reduce Microfiber Emissions**
Dennis Van Hoesel, 17, Junior, Rome Free Academy, Rome, New York, T: Melissa Downs

Syracuse, USNY09, Terra Rochester Finger Lakes Science & Engineering Fair

CHEM067 **Polyethyleneimine Impregnated Adsorbents for a Community-Based Carbon Capture and Sequestration Approach**
Nishant Lahiri, 17, Junior, Corning-Painted Post High School, Corning, New York, T: Susanna Seip

ROBO087T **Screen CXR: A Novel Deep Learning-Based Multi-Model Pipeline for Detection of Any Lung Tissue Disease Through Automatic Chest X-Ray Image Analysis**
Rudransh Agnihotri#, 17, Senior, Utkarsh Mittal#, 17, Senior, Ayush Biswal, 14, Freshman, Birla Vidya Niketan, New Delhi, Delhi, India, Coppell High School, Coppell, Texas, T: Naveen Rajput

Syracuse, USNY11, Western New York Regional Science and Engineering Fair

CELLO37 **ST6GAL 1 May Play a Role in Preventing Death by Irradiation After Chemotherapy**
Amelia Winslow Colder, 16, Junior, City Honors School, Buffalo, New York, T: Kelly Cal

MATH037 **Factorizations in Evaluation Monoids of Laurent Semirings**
Sophie Zhu, 15, Junior, Williamsville East High School, East Amherst, New York, T: Felix Gotti

Potsdam, USNY13, Terra North East Regional Science and Engineering Fair

BEHA061T **What Do You See?**
Emily Rose Pinheiro, 14, Freshman, Amelia Louise Kazlo, 14, Freshman, Moriah Central School, Port Henry, New York, T: Tiffany Pinheiro

Glen Cove, USNY50, New York State Science and Engineering Fair

ANIM054 **Using Cnidarian Nerve Nets To Visualize the Excitotoxic Effects of BMAA**
Tyler Daniel Nagosky, 17, Senior, Smithtown High School West, Smithtown, New York, T: Joanne Figueiredo

BCHM026 **Investigating the Therapeutic Potential of Epigallocatechin Gallate and Theaflavin-3, 3'-digallate on Inhibiting ACE2-Spike Protein Binding and Mitigating Induced-Cellular Death by SARS-CoV-2**
Chloe Chang, 17, Senior, Herricks High School, New Hyde Park, New York, T: Caitlin Etri

BEHA046 **A Novel Evaluation of Current Psychiatric Treatment Paradigms Involving Polypharmacy via Resting-State Functional Magnetic Resonance Imaging (fMRI) in a Sample of Patients With Bipolar I Disorder**
Dara Lisa Neumann, 17, Senior, Plainview-Old Bethpage John F. Kennedy High School, Plainview, New York, T: Raymond Tesar

BEHA047 **Neurocognitive Tasks: Novel Markers To Predict and Prevent Adolescent Suicidal Behavior**
Natasha Kulviwat, 15, Sophomore, Jericho High School, Jericho, New York, T: Serena McCalla

BMEDO59 **Implementation of Land Cover Data in a Neural Network To Forecast West Nile Virus Around the Gulf Coast**
Noah Nager, 17, Junior, Hackley School, Tarrytown, New York, T: Andrew Ying

BMEDO84 **Natural Is Not Neutral: Dangers of Natural Compounds Found in Produce and Dietary Supplements and Therapeutic Mechanisms of Flavone Luteolin on Neuroblastoma and Lymphoma**
Jessie Dong, 17, Junior, Roslyn High School, Roslyn Heights, New York, T: Allyson Weseley

CBIO056 **Improved Visualization of Dimensionality Reduction Plots With Controlled Downsampling**
Ashley Jiashing Hsu, 17, Senior, Commack High School, Commack, New York, T: Andrea Beatty

EAEV066 **EISa: A Novel Real-Time Wildlife Poacher Detection Solution Leveraging Machine Learning-Driven Spatio-Temporal Analysis of Nighttime UAV Thermal Infrared Videos**
Anika Puri, 17, Senior, Horace Greeley High School, Chappaqua, New York, T: Lisa Papernik

EAEV067 **Biologically Inspired Material Design for Selective Removal of Estradiol Water Contaminants**
Kayla J. Sohn, 17, Senior, Herricks High School, New Hyde Park, New York, T: Caitlin Etri

EGSD040T **Simultaneous Azo Dye Removal and Bioelectricity Generation by an Up-Flow Constructed Wetland-Microbial Fuel Cell With Biochar Substrate**
Ericka Lai, 16, Junior, Christian Seongmin Kim, 15, Sophomore, Manhasset High School, Manhasset, New York, T: Alison Huenger, T: Laura Petras

PHYS058 **A Specialized Searching Algorithm Towards the Improvement in Detection of Single-Transit and Long-Period Exoplanets in Brightness Time-Series Data**
Joseph Bronislaw Nadol IV, 18, Senior, Hackley School, Tarrytown, New York, T: Andrew Ying

PLNT041 **Developing a Model in situ Resource Utilization System for Oxygen Sustaining Life Support and Launch Cost Reduction for Mars**
Ariella Maia Blackman, 17, Junior, Harrison High School, Harrison, New York, T: Allison Blunt

ROBO062 **How To Train Your Multi-View Cloth Classifier**
Chigozirim Nodebechukwu Ifebi, 16, Junior, Elmont Memorial Junior-Senior High School, Elmont, New York, T: Kathryn Farley

SOFT048 **An Active Fairness Algorithm for Estimating Socioeconomic Status From Household Surveys and Satellite Images**
Ritika Candadi Brahmadesam, 18, Senior, Ossining High School, Ossining, New York, T: Valerie Holmes

TMEDO48 **Cancer-Specific NF-kB Inhibition via Novel Small Molecule IT-848: Investigating IT-848 Monotherapy and Combination Therapy for Hematological Malignancy Treatment**
Janice Kirti Rateshwar, 18, Senior, Jericho High School, Jericho, New York, T: Serena McCalla

NORTH CAROLINA

Charlotte, USNC01, Charlotte-Mecklenburg Regional Science Fair

ANIM021 **The Effect of Rider Ability and Movement on the Stress/Discomfort Indicating Behaviors of Hippotherapy Equines**
Hannah Jordan Mullis, 18, Senior, East Gaston High School, Mt. Holly, North Carolina, T: Brian Johnson

ENEV021T **Sustainable Subsistence: A Low-Cost Method of Greywater Recycling for Hydroponic Agriculture**
Mason Brandt Sufnarski#, 18, Senior, Josephine Anne Barber, 16, Junior, Marvin Ridge High School, Waxhaw, North Carolina, Mercer Island High School, Mercer Island, Washington, T: Raji Suresh T: Susie Brown

Chapel Hill, USNC02, North Carolina Central Region III Science Fair

TMEDO14 **EyeGen: A Low-Cost Biomarker for the Ophthalmological Assessment of Ophthalmic Diseases Using Deep Learning Models**
Abhinav Gurram, 16, Sophomore, Green Hope High School, Cary, North Carolina, T: Bala Gurram

Finalist Directory

Durham, USNC03, North Carolina Science Fair Region 3B

- EAEV007** **Developing a Machine Model to Predict Wildfire Risk and Identify Key Wildfire Drivers in California**
Angela Chen, 16, Junior, North Carolina School of Science and Mathematics, Durham, North Carolina, T: Robert Gotwals
- ROBO011** **Q-NEST: Quantum Neuroevolutionary Strategies for Parametrically Optimizing and Topologically Augmenting Artificial Neural Networks via Novel Mutation, Translocation, and Crossover Hybrid Quantum-Classical Genetic Operators**
Paarth Tara, 18, Senior, North Carolina School of Science and Mathematics, Durham, North Carolina, T: Robert Gotwals

Raleigh, USNC50, North Carolina State Science Fair

- ANIM052** **Collective Behavior and Coastal Health: How Individual Personality Influences Population Mortality in a Marsh Ecosystem Predator-Prey Interaction**
Regan Catherine Williams, 17, Junior, John T Hoggard High School, Wilmington, North Carolina, T: Hunter Moody
- ANIM063** **The Epigenetic Effects of Climate Change on Aiptasia**
Shelby Anne-Marie Wray, 18, Senior, North Carolina School of Science and Mathematics, Durham, North Carolina, T: Kimberly Monahan
- BCHM035** **Computational and Experimental Design of a Novel Acetylcholinesterase Inhibitor: Silanediols for Alzheimer's Disease Treatment**
Archita Khaire, 16, Junior, North Carolina School of Science and Mathematics, Durham, North Carolina, T: Tom Schmedake
- CELL035** **Neurotoxicity of GenX, a Perfluoroalkyl Substance Found in Drinking Water**
Yunjia Quan, 15, Sophomore, Charlotte Country Day School, Charlotte, North Carolina, T: Lowell Combs
- EAEV065** **Modeling Sea Level Rise Driven Coastal Forest Loss and the Aboveground Carbon Impacts With Remote Sensing and Machine Learning**
Felicia Yan, 17, Junior, William G. Enloe High School, Raleigh, North Carolina, T: Chad Ogren
- ENBM051** **Development of a Bioactive, Biodegradable, and Variable-Density 3D Printer Filament for Patient-Specific Bone Reconstructive Implants**
Jacob Andrew Rose, 18, Senior, North Carolina School of Science and Mathematics, Durham, North Carolina, T: Michael Bruno
- ENBM066** **A Precise, Portable, Non-Invasive Melanoma Detection Device Using Image-Based Deep Learning Approach**
Shubhan Bhattacharya, 15, Freshman, William G. Enloe High School, Raleigh, North Carolina, T: Lori Kubik
- ENEV088T** **Further Studies on the Application of Novel Rapidly Degrading Bioplastics Derived From Upcycled Waste Products To Replace Polystyrene and Polypropylene in Single-Use Hard Plastics Like Cutlery**
Kaitlyn Lee Zuravel##, 18, Senior, Lauren Gail Zuravel#, 16, Sophomore, Terry Sanford High School, Fayetteville, North Carolina, T: Deborah Vajner
- PHYS052** **Simulating Quantum Key Distribution in Three Polarization Bases**
Katherine Mary Panebianco, 17, Senior, North Carolina School of Science and Mathematics, Durham, North Carolina, T: Jonathan Bennett
- SOFT051** **Sustainability Scanner: Empowering Consumers To Make Eco-Friendly Grocery Purchases**
Jay Omkar Nimbalkar, 17, Junior, Green Hope High School, Cary, North Carolina, T: Daniel Nolan
- TMED056** **AutoFlow: A Novel Method for Assessing Minimal Residual Disease in Breast Cancer Patients by Identifying Bone Marrow Disseminated Tumor Cells Using Flow Cytometry Data**
Dheepthi Mohanraj, 17, Senior, North Carolina School of Science and Mathematics, Durham, North Carolina, T: Robert Gotwals

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OHIO

Athens, USOH01, Southeastern Ohio Regional Science and Engineering Fair

MATSO38 **Growing Sustainable Packaging Material With Mycelium and Agricultural Waste**
Luca Gagliano, 16, Junior, Athens High School, The Plains, Ohio, T: Natalie Kruse

Cleveland Heights, USOH02, Northeastern Ohio Science and Engineering Fair

ANIM037 **Sensory Input Underlying Natural Behaviors in *Sepsis punctum* (Diptera: Sepsidae)**
Sasha Turner, 17, Junior, Hawken School, Gates Mills, Ohio, T: Lacy Chick

CHEM037 **Electrolysis of 3D Polylactic Acid (PLA) for Custom Fabrication of Sustainable Electromagnets**

Ryan McGinnis, 18, Senior, West Geauga High School, Chesterland, Ohio, T: Stephanie Meyer

ENEV046 **The Effects of Pyrolysis on Upcycling Polyvinyl Chloride (PVC) Present in Gloves Through Reattaining Hydrochloric Acid (HCl) for Higher-Value Applications**

Grace Chen, 16, Junior, Mentor High School, Mentor, Ohio, T: Lori Cohen

ETSD037 **Designing and Testing a Prototype Automatic Electronic Control System for Active Magnetic Levitation of a Ferromagnet Towards Magnetically Deflected Ballistic Mass Technology**

Carlton Gould Cort, 17, Senior, University School, Chagrin Falls, Ohio, T: Paul Moody

PHYS043 **The Search for Dark Matter Through Soft Unclustered Energy Patterns at CMS**

Michelle Seoyeon Park, 18, Senior, Solon High School, Solon, Ohio, T: Christoph Paus

Shaker Heights, USOH05, Hathaway Brown Upper School Fair

BMEDO22 **C19orf12 Ablation-Caused Iron Accumulation, Mitochondrial Dysfunction, and Susceptibility to Ferroptosis**

Julia Zhu, 15, Sophomore, Hathaway Brown School, Shaker Heights, Ohio, T: Crystal Miller

CBIO010 **Epidemiology of Pineoblastoma in the United States, 2000–2017**

Kaitlyn Mary Elizabeth Greppin, 18, Senior, Hathaway Brown School, Shaker Heights, Ohio, T: Crystal Miller

ENBM026 **Procoagulant Synthetic Platelets To Restore Hemostatic Clot Quality in Platelet Dysfunction Settings**

Neha Sangani, 15, Sophomore, Hathaway Brown School, Shaker Heights, Ohio, T: Crystal Miller

ROBO025 **Creating an Autonomous Path Navigator To Generate Interest in Machine Learning Among Children**

Avery Rose Simon, 18, Senior, Hathaway Brown School, Shaker Heights, Ohio, T: Crystal Miller

Bryan, USOH06, Northwest Ohio Science and Engineering Fair

BMEDO16 **Comparison of Skin Moisturizers and Antibiotic Ointments in the Ability To Inhibit Bacteria**

Kelly Danielle Wyse, 17, Junior, Pettisville High School, Pettisville, Ohio, T: Donna Meller

EAEV019 **The Effect of Artificial Light at Night on *Anabaena* and *Microcystis* Growth**

Carsyn Kaylene Hagans, 18, Senior, Archbold High School, Archbold, Ohio, T: Laura Bickel

Marion, USOH07, Marion Area Science and Engineering Fair

EAEV060 **Interactions of Various Algae Species and Phosphate**

William Allen, 15, Freshman, Buckeye Valley High School, Delaware, Ohio, T: Matt Sforza

Dublin, USOH50, Buckeye Science and Engineering Fair

CELL038 **BG34-200 Engagement With Integrin CD11b for Modulating Tumor-Associated Myeloid Cells in Pancreatic Cancer**

Kaitlyn Ernst, 16, Sophomore, Laurel School, Shaker Heights, Ohio, T: Kimberly Corrigan

EBED041 **A Novel Optical Approach: Developing a Generic Nanophotonic Processor (GNP) for Classical and Quantum Computing Applications**

Mihai Crisan, 18, Senior, Upper Arlington High School, Upper Arlington, Ohio, T: Gwyneth Pinta

ENEV090 **Removal of Arsenic(III) and Chromium(VI) From Contaminated Water Using Novel Chitosan Coated Polyamide Adsorbent With Ethylenediaminetetraacetic Acid, EDTA, Regeneration**

Johan DeMessie, 17, Junior, William Mason High School, Mason, Ohio, T: Karen Young

MATSO53 **Deployment of Thermoplastic and Thermosetting Technologies To Improve the Durability of Solar Sails**

Destynn Ayrom Keuchel, 18, Senior, Hawken School, Gates Mills, Ohio, T: Lacy Chick

MCRO053 **Function of Neurons AVA, BAG, and RIM in Response to an Aversive Stimulus in *Caenorhabditis elegans***

Maya Leela Sarikonda, 18, Senior, Sylvania Northview High School, Sylvania, Ohio, T: Kathryn Nelson

ROBO080 **Ceres: A Novel Device Utilizing Raspberry Pi and Neural Networks To Detect Crop Diseases Using Imaging**

Laasya Acharya, 14, Freshman, William Mason High School, Mason, Ohio, T: Karen Young

OKLAHOMA

Alva, USOK01, Northwestern Oklahoma State University Regional Science Fair

ETSD046 **Faster Than the Wind**

Elizabeth Grace Wallace, 17, Senior, Northwest Technology Center, Fairview, Oklahoma, T: Shawn Cusack

ETSD053 **Bouncing Off the Walls (Testing Safety of Walls Around Welders)**

Lexie Grace Zuniga, 17, Junior, Northwest Technology Center, Fairview, Oklahoma, T: Shawn Cusack

Bartlesville, USOK02, Bartlesville District Science Fair

EAEV020 **Orange Is the New Green; From Waste to Water Absorbent BioPolymer: How Can Orange Peels Help Plants Resist Drought?**

Mehdi Mohsen Achour, 15, Sophomore, Bartlesville High School, Bartlesville, Oklahoma, T: Gary Layman

ENEV017 **Greener Concrete and Cleaner Oceans**

Rachel Cochran, 15, Sophomore, Bartlesville High School, Bartlesville, Oklahoma, T: Gary Layman

MATH014 **Emergency Savings Fund vs. Emergency Relief Fund: An Economic Model**

Joyce Yixin Yang, 17, Junior, Bartlesville High School, Bartlesville, Oklahoma, T: Tonya Knollmeyer

Muskogee, USOK05, Muskogee Regional Science and Engineering Fair

EAEV053 **Fluid Filtration**

Jorge M. Romero, 16, Junior, Muskogee High School, Muskogee, Oklahoma, T: Terri Brossett

Tulsa, USOK10, Tulsa Regional Science Fair

BEHA008 **Personality and Learning in the Classroom: How Personality Traits and Learning Styles Relate to High School GPA**

Victoria Soranno, 17, Senior, Cascia Hall Preparatory School, Tulsa, Oklahoma, T: Chaunna Steen

BMEDO07 **Determining the Effects of Insulin on Serotonin Levels With and Without Vitamin D3 Using *Drosophila melanogaster* as a Model Organism**

Labrini Panagopoulos, 17, Senior, Cascia Hall Preparatory School, Tulsa, Oklahoma, T: Chaunna Steen

Finalist Directory

Stillwater, USOK50, Oklahoma State Science and Engineering Fair

- EAEV061** **Big Data Analysis of Climate Change: Extreme Temperature, Rainfall, Snowfall**
Jason Chung-Yee Wang, 17, Junior, Oklahoma School of Science and Mathematics, Oklahoma City, Oklahoma, T: Mark Wang
- ETSD057** **A Novel Way To Clean Solar Panels Using a Self-Powered Arduino Controlling a Servo**
George Panagopoulos, 15, Sophomore, Cascia Hall Preparatory School, Tulsa, Oklahoma, T: Chaunna Steen
- MCRO036** **Analysis of Antibiotic and Disinfectant Resistance in E. coli Implicated UTIs**
Laci Goldner, 17, Junior, Grove High School, Grove, Oklahoma, T: Donna Deason

OREGON

Gresham, USOR01, Gresham-Barlow Science Expo

- EAEV040** **A Novel Approach for Coral Rehabilitation: Growth Enhancement With Electrochemical Deposition of CaCO₃**
Dev Rishi Udata, 18, Senior, Jesuit High School, Portland, Oregon, T: Lara Shamieh
- PLNT028** **Seed Dispersal of *Achyrachaena mollis***
Rachel Catherine Warner, 17, Junior, Oregon City High School, Oregon City, Oregon, T: Elizabeth Scott
- TMED032** **OncoRx: An Integrative Approach to Identification of Pan-Cancer Molecular Biomarkers and Prediction of Targeted Multi-Drug Cancer Therapeutics**
Darsh S. Mander, 17, Junior, Jesuit High School, Portland, Oregon, T: Lara Shamieh

Beaverton, USOR04, Beaverton-Hillsboro Science Expo

- BEHA072T** **Mental Health Risk Detection With Artificial Intelligence**
Irene Lim, 16, Junior, Alexander Yisiang Lim, 16, Junior, International School of Beaverton, Beaverton, Oregon, T: Jaimie Yee
- CBIO051T** **A Novel Computational Pipeline To Identify Target Genes That Define Cancer Subtypes To Improve Cancer Detection and Therapy**
Vatsal H. Parikh, 17, Junior, Ekansh Mittal, 16, Sophomore, Sunset High School, Portland, Oregon, Westview High School, Portland, Oregon, T: Korin Riske
- PHYS039** **Skew-Axis Cylinder Lens Optical System: Physical Properties, Application for Novel Method of Clinical Optometry of Astigmatism, and Engineering Implementation**
Alexander Plekhanov, 16, Sophomore, Beaverton Academy of Science and Engineering, Hillsboro, Oregon, T: Melissa Shell
- ROBO058** **Using Subpixel Interpolation and Deep Learning Convolution Models To Compress Domain-Specific Audio Waveforms**
Nikhil Nayak, 15, Sophomore, Sunset High School, Portland, Oregon, T: Korin Riske

Portland, USOR05, Aardvark Science Exposition

- BCHM010** **Reversible Inhibition of Retinoic Acid Synthesizing Enzyme ALDH1A2 With WIN18,446 Derivatives in Male Contraception**
Mingya Wang, 19, Senior, Oregon Episcopal School, Portland, Oregon, T: Bettina Gregg
- EAEV012** **The Effect of Climate Change on Carbon Sequestration in *Pinus ponderosa***
Cameron Mae Gabrielson, 16, Sophomore, Oregon Episcopal School, Portland, Oregon, T: Peter Kimball
- EGSD008** **Prototyping an Algae-Based Martian in situ Oxygen Generation System**
Kara Gaiser, 18, Senior, Oregon Episcopal School, Portland, Oregon, T: Robert Orr
- ETSD002** **Polaris II: Gamma Ray Visualization System and Risk Mitigation Through Real-Time Radionuclide Atmospheric Dispersion Modeling**
Naphat Siripun, 17, Junior, Oregon Episcopal School, Portland, Oregon, T: Bettina Gregg
- ROBO022** **Real-Time American Sign Language (ASL) Detection and Translation Using Kinect Sensor**
Claire Jaroonjetjumnong, 16, Junior, Oregon Episcopal School, Portland, Oregon, T: Bettina Gregg



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Wilsonville, USOR06, CREST-Jane Goodall Science Symposium

- EAEV026T** **What Are the Effects of Cyanobacteria Blooms on the Taxa Diatoma?**
Melinda Lin, 16, Junior, Uma Aditi Grover, 16, Junior, West Linn High School, West Linn, Oregon, T: Julie McDevitt
- EBED017** **Invisible Blues (Novel Device for Detection and Measurement of Nitrogen Traces in a Sample)**
Aditi Bhaskar, 17, Junior, Wilsonville High School, Wilsonville, Oregon, T: CJ Koll
- MCRO013** **Inhibiting *Streptococcus mutans* With Antibacterial and Antioxidant Hibiscus Polyphenolic Compounds**
Isabella Scalise, 18, Senior, Wilsonville High School, Wilsonville, Oregon, T: Brian Ramm
- ROBO033** **Autonomous Rapid Disaster Damage Assessment Using Machine Learning Techniques**
Anish Goswami, 17, Junior, West Linn High School, West Linn, Oregon, T: Julie McDevitt

Salem, USOR07, Central Western Oregon Science Expo

- ENEV012T** **Comparison of Ambient Air Pollutants in Varying Income Tracts Using a Constructed, Portable Device That Precisely Measures Ambient Air Concentrations (PAQMS)**
Mary Parmigiani, 15, Sophomore, Joe Parmigiani, 15, Sophomore, Pablo Ellis Garcia, 15, Sophomore, Corvallis High School, Corvallis, Oregon, T: Britt Holmen
- PHYS019** **Simulating Off-Axis Short Gamma-Ray Burst Afterglows To Inform Electromagnetic Follow-Up to Future Gravitational Wave Events**
Leon Garcia, 17, Junior, Corvallis High School, Corvallis, Oregon, T: Jillian Rastinejad

Bend, USOR08, Central Oregon Community College Regional Science Expo

- EGSD026** **Investigating the Impacts of Dye Color on Energy Production of Luminescent Solar Concentrators**
Teaghan Rose Knox, 18, Senior, Summit High School, Bend, Oregon, T: David Bermudez
- TMEDO20** **Using Machine Learning To Detect and Prevent Early Stages of Skin Cancer in Underrepresented Communities**
Emma Nordstrom, 16, Sophomore, Trinity Lutheran High School Bend Oregon, Bend, Oregon, T: Thomas Stueve

Banks, USOR50, Northwest Science Expo

- EAEV084** **Boundary Detection of Debris-Covered Glaciers Using Fractal Analysis and Normalized Differencing of Thermal and Infrared Bands in Remote-Sensed Landsat Datasets**
Mithra Karamchedu, 18, Senior, Jesuit High School, Portland, Oregon, T: Lara Shamieh
- ENBM074** **Synthetic DNA Engineering With ICOR: Improving Codon Optimization With Recurrent Neural Networks Towards Efficient, Low-Cost, High-Efficacy Recombinant Vaccine and Pharmaceutical Manufacturing**
Rishab Kumar Jain, 17, Junior, Westview High School, Portland, Oregon, T: Taylor Lee-Rouille
- ENBM075** **Dynamic Extraocular Filtering: A Novel Method for Active Correction of Color Vision Deficiency, Validated With Steady-State Visual Evoked Potentials**
Vladimir Mamchik, 16, Junior, Jesuit High School, Portland, Oregon, T: Alexander Mamchik
- ENBM076** **MusTENG: A Wearable Triboelectric Nanogenerator for Personalized Muscle Spasticity Data for Improved Rehabilitation and Monitoring of Children With Cerebral Palsy**
Ishan Ahluwalia, 16, Sophomore, Jesuit High School, Portland, Oregon, T: Lara Shamieh
- MATH039** **Products of Reflections in Smooth Bruhat Intervals**
Ram Krishna Goel, 17, Junior, Krishna Homeschool, Portland, Oregon, T: Gunjan Tiwari

- TMEDO63** **EZ Rhythm: ECG Diagnosis Framework Using Novel Patient-Specific Morphology Comparison To Screen Disadvantaged Populations**
Ronald Lin, 16, Junior, International School of Beaverton, Beaverton, Oregon, T: Jamie Yee

PENNSYLVANIA

Yardley, USNJ03, Mercer Science and Engineering Fair

- CBIO050** **RARE: Machine Learning Approach for Binning Rare Variant Features to Detect Association With Disease**
Satvik Dasariraju, 16, Junior, The Lawrenceville School, Lawrenceville, New Jersey, T: Ryan Urbanowicz
- ETSD078** **Innovative Climate Change Emissions Reduction: Flettner Vortex Scrubber With Active Seakeeping**
Charlotte Lenore Michaluk, 15, Sophomore, Hopewell Valley Central High School, Pennington, New Jersey, T: Stefanie Ribecca

Bradford, USNY12, Twin Tiers Regional Science Fair

- MCRO042** **The Inhibitory Effects of Essential Oils on *Staphylococcus epidermidis* Biofilms on Stainless Steel and Glass**
Catherine Przybyla, 18, Senior, Archbishop Walsh Academy, Olean, New York, T: Lois Housler

Duncannon, USPA01, Capital Area Science and Engineering Fair

- ANIM038** **Spot the Predator**
Ian Lentz, 15, Freshman, Camp Hill High School, Camp Hill, Pennsylvania, T: Amy Diehl
- PLNT050** **Effectiveness of Plant Growth in Vertical Aeroponics vs. Horizontal Raft Aquaponics**
Sadie Grace Zehner, 17, Senior, Berwick Area High School, Berwick, Pennsylvania, T: Matthew Shrader

Lancaster, USPA02, North Museum Science and Engineering Fair

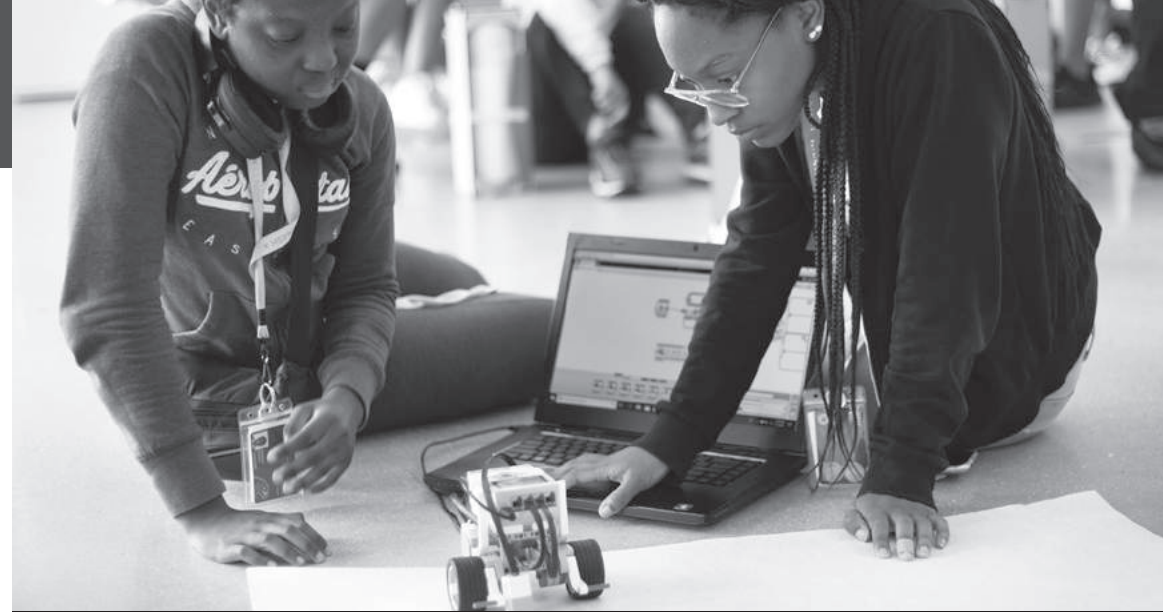
- ENEV069** **Amphibious Vehicle for Collecting Water Samples**
Curtis Cheng, 18, Junior, Lancaster Country Day School, Lancaster, Pennsylvania, T: James Ringlein
- MCRO054** **Thrautochytrids: The Understudied Coral Symbionts**
George Warfel, 18, Senior, Lancaster Country Day School, Lancaster, Pennsylvania, T: Juliette Winterer

Exton, USPA03, Delaware Valley Science Fairs

- ANIM065** **Breakthroughs in Honey Bee Health: Continuous-Release Mist Diffusion of Thymol-Based Essential Oils in Varroa Control, Part II: The Field Study**
Kaitlyn Nicole Culbert, 16, Sophomore, Toms River High School North, Toms River, New Jersey, T: Christine Girtain
- ANIM067** **Early Gonadectomy as a Factor that Predisposes Canines to Cranial Cruciate Ligament Injury: An Evaluation With Reference to the Tibial Plateau and Femoral Anteversion Angles**
Raina A. Bandekar, 17, Junior, Germantown Academy, Fort Washington, Pennsylvania, T: Sarah Kesten
- ANIM068** **Enhancing Human Embryonic Kidney Cell Regeneration Through Transducing Exogenous *Ambystoma Mexicanum Pax-7* DNA**
Matthew Edward Brownrigg, 18, Senior, Central Bucks High School East, Doylestown, Pennsylvania, T: Mark Hayden
- BCHM038** **Biochemical Interactions of siRNA-Based Gene Silencing To Augment Elastogenesis in Abdominal Aortic Aneurysms**
Rayna Malhotra, 15, Sophomore, Moravian Academy, Bethlehem, Pennsylvania, T: Peter Kish

Finalist Directory

- BCHM039** **Novel Plant-Derived Scaffolds Influence Cellular Mechanotransduction and Differentiation**
Maya Sonal Butani, 17, Senior, Moorestown High School, Moorestown, New Jersey, T: Sean Watson
- EBED038** **Designing a Low-Cost Wayfinder for the Visually Impaired Using Bluetooth Angle-of-Arrival Feature**
Brandon Cai, 14, Freshman, Parkland High School, Allentown, Pennsylvania, T: Kaitlin Heintzelman
- ENBM072** **A Novel Robust and Low-Cost Anthropomorphic Myoprosthesis: Utilizing an Articulated Soft Robotic System and Convolution Kernel Compensation-Based Non-Invasive EMG Decoding for Bionic Restoration of Upper Limb Function to Amputees**
Okezue Alexander Bell, 16, Junior, Moravian Academy, Bethlehem, Pennsylvania, T: Peter Kish
- ENBM078** **Non-Invasive Method To Efficiently Detect Bronchial Carcinoma, Chronic Obstructive Pulmonary Disease, and Emphysema Without Deleterious Effects on the Chest's Cavity**
Grace S. Yacobe, 15, Freshman, Academy of Notre Dame de Namur, Villanova, Pennsylvania, T: Jessica Reid
- MATH038** **Determining the Pebbling Number for Endpoint Root Vertices of Generalized Theta Graphs**
Kevin Matthew Liu, 16, Junior, High Technology High School, Lincroft, New Jersey, T: Dina Ellsworth
- MCRO055** **Abundance of Multidrug Resistant Genes (MDRs) in Suburban Residential Community Soil**
Anand Shah, 14, Freshman, Unionville High School, Kennett Square, Pennsylvania, T: Sandra Litvin
- MCRO056** **Monitoring the Cellular Immune Profiles of COVID-Vaccinated Donors Using *in silico*-Designed Immunogenic Epitopes From SARS-CoV-2 Proteins**
Rayan Rai Jawa, 16, Senior, Holmdel High School, Holmdel, New Jersey, T: Kevin Chang
- MCRO058** **Modeling Quorum Sensing Cycles in *Pseudomonas aeruginosa* Using Longitudinal Approaches by Measuring Gene Expression**
Maryam Abdel-Azim, 15, Sophomore, Central Bucks High School East, Doylestown, Pennsylvania, T: Judith Elinow
- Pittsburgh, USPA04, Pittsburgh Regional Science & Engineering Fair**
- CELL031** **A Novel Autophagy-Related Gene Regulates Autophagy Through Endolysosomal Pathway**
Michael Ziqi Gao, 17, Junior, North Hills High School, Pittsburgh, Pennsylvania, T: Nicholas Hand
- CHEM045** **Techno-Economic Assessment of a Cost and Quality-Based Algal Biodiesel Production Process**
Steven D. Liu, 18, Senior, Shady Side Academy, Pittsburgh, Pennsylvania, T: Heather Fani
- SOFT032** **Using Kleisli Morphisms for Malware Detection With Graph Convolution Networks**
Landon Penn Colaresi, 16, Junior, Pittsburgh Allderdice High School, Pittsburgh, Pennsylvania, T: Janet Waldeck
- SOFT039** **Using Machine Learning To Augment Dynamic Time Warping-Based Signal Classification**
Arvind Seshan, 17, Junior, Fox Chapel Area High School, Pittsburgh, Pennsylvania, T: Justin Patterson
- Reading, USPA05, Reading and Berks Science and Engineering Fair**
- CHEM057** **Pulverizing PFOA: Analyzing Molecular Dynamics Simulations Between Perfluorooctanoic Acid and a Fluoroacetate Dehalogenase Enzyme**
Srigouri Oruganty, 18, Senior, Muhlenberg High School, Reading, Pennsylvania, T: Kayla Gordon



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MCRO039 Inhibition of *Staphylococcus epidermidis* Utilizing Borate-Based and Silica-Based Bioactive Glass

Lindsey Preston, 16, Junior, Conrad Weiser High School, Robesonia, Pennsylvania, T: John Siefert

York, USPA06, York County Science and Engineering Fair

CELL020 The Effect of Covalent Cross Links on the Secondary Structure of the Tetracycline Aptamer

Anand Dipak Patel, 18, Senior, Dallastown Area High School, Dallastown, Pennsylvania, T: Michael Tapp

RHODE ISLAND

Warwick, USRI50, Rhode Island Science and Engineering Fair

BMEDO43T Evaluating the Migration of Glioblastoma Stem Cells *in vitro* Towards a Chemoattractant Gradient

Helen Lucille Copple, 17, Junior, Shaswat Singh, 17, Junior, Barrington High School, Barrington, Rhode Island, T: Diana Siliezar-Shields

EBED030T A Dangerous Occasion Monitoring and Management System

Yike Chen, 18, Junior, Yiming Xiong, 15, Sophomore, Dawen Winston Cheng, 17, Junior, Barrington High School, Barrington, Rhode Island, Diana Siliezar-Shields

SOUTH CAROLINA

North Augusta, USSC01, Central Savannah River Area Science and Engineering Fair

BMEDO32 Multiple Sclerosis and the Retina: A Study on Neurodegeneration

Nidhi Shenoy, 17, Junior, Lakeside High School, Evans, Georgia, T: Charlotte Smith

Bluffton, USSC02, Sea Island Regional Science Fair

BEHA044 The Serial Position Effect and Recency Effect

Meagan Elizabeth Berger, 17, Junior, Hilton Head Island High School, Hilton Head Island, South Carolina, T: Alexandria Mazur

ENEV070 Effect of *Nannochloropsis oceanica* in Carbonic Acid Acidification

Gunnar Rossmoor Ternstrom, 17, Junior, Hilton Head Preparatory School, Hilton Head Island, South Carolina, T: George Ramseur

SOFT047 Analyzing the Musical “Genome” With Neural Networks

Nathaniel Lee Abrams, 17, Junior, Hilton Head Preparatory School, Hilton Head Island, South Carolina, T: George Ramseur

Charleston, USSC03, Low Country Science Fair

ENBM053 MoJoint: A Motion Visualization and Kinematic Analysis Software for the Musculoskeletal System

Angela Mei, 16, Junior, Academic Magnet High School, North Charleston, South Carolina, T: Katharine Metzner-Roop

Columbia, USSC04, USC Central South Carolina Region II Science and Engineering Fair

BEHA068 The Modification of Jury Instructions To Improve Juror Verdicts and Confession Recognitions in a Criminal Trial

Meghan Pasala, 17, Junior, Spring Valley High School, Columbia, South Carolina, T: Michelle Spigner

ENBM058 Further Developing a Merged Aspiration Thrombectomy Device and Rotational Athrectomy Device for Efficacious Individual or Joint Removal of Thrombi and Plaque

Shyam Ganesh Babu, 18, Senior, Spring Valley High School, Columbia, South Carolina, T: Michelle Spigner

MCRO046 Designing a Litter Box That Neutralizes *Toxoplasma gondii*: A Parasite That Causes Toxoplasmosis in Humans

Doonya Wali Khan, 16, Junior, Center for Advanced Technical Studies, Chapin, South Carolina, T: Julie Krusen

ROBO068 Automatic Detection of Stroke-Induced Aphasia

Satvik Nelakuditi, 15, Sophomore, Spring Valley High School, Columbia, South Carolina, T: Michelle Wyatt

Spartanburg, USSC07, Piedmont South Carolina Region III Science Fair

PHYS072T Faster Than Light: Voltage and Resistance Phenomena on a 1 km Loop

Logan Sean Kusher##, 17, Senior, Cam Srivastava##, 17, Junior, Spartanburg Day School, Spartanburg, South Carolina, T: Jason Lonon

SOUTH DAKOTA

Aberdeen, USSD01, Northern South Dakota Science and Math Fair

ANIM053 The Effects of Pulsed Electro-Magnetic Fields on Bovine Semen Collection Rates

Avery Miles, 16, Junior, Doland High School, Doland, South Dakota, T: Melissa Knox

SOFT058 Geography Education Computer Application

Dillon Browning, 18, Senior, Warner High School, Warner, South Dakota, T: Bobbie Deuter

Brookings, USSD02, Eastern South Dakota Science and Engineering Fair

BEHA049T The Disproportionate Effect of the Labor Force Exodus on Rural Communities

William Vincent Hummel###, 18, Senior, Aditya Tummala###, 17, Senior, Brookings High School, Brookings, South Dakota, T: Laura Hummel T: Laura Hummel

ETSD052T Car Seat Safety

Grayson Joseph Girard, 15, Freshman, Bentlee Ann Kollbaum, 15, Freshman, Elk Point Jefferson High School, Elk Point, South Dakota, T: Melanie Norris

PHYS060 Goldilocks’ Paradox

Samantha Jo Brodeen, 18, Senior, Avon High School, Avon, South Dakota, T: Paul Kuhlman

PLNT047 Impact of Fish Fertilizer on Plant Growth

Julie Madison Sundheim, 18, Senior, Elk Point Jefferson High School, Elk Point, South Dakota, T: Karlene Stabe

Rapid City, USSD03, High Plains Regional Science and Engineering Fair

BMEDO36 Finding a Correlation Between Physical and Mental Health

Natalie Jean Gross, 17, Junior, Timber Lake High School, Timber Lake, South Dakota, T: LuAnn Lindskov

TENNESSEE

Chattanooga, USTN01, Chattanooga Regional Science and Engineering Fair

CHEM052T Carbon Capturing

Love Karan Patel, 17, Junior, Mason Nash Headrick, 17, Junior, McMinn County High School, Athens, Tennessee, T: Brandi Bridwell

TMED055 A Multi-Output Convolutional Neural Network Model for Melanoma Detection and Prevention

Anyia A. Parambath, 16, Junior, Girls Preparatory School, Chattanooga, Tennessee, T: Keith Sanders

Knoxville, USTN04, Southern Appalachian Science and Engineering Fair

EAEV069 Planning Equitable Accessibility to Dialysis Care: A Case Study of Hurricane Ida

Eyrin Kim, 16, Junior, Farragut High School, Knoxville, Tennessee, T: Matthew Milligan

EAEV086 Quantification of Environmental Drivers Underlying the Changes in Urban Vegetation Across the United States

Ridhima Singh, 16, Junior, Farragut High School, Knoxville, Tennessee,
T: Matthew Milligan

Memphis, USTN05, Memphis-Shelby County Science and Engineering Fair

ENBM077 Sticky Stitchez
Ahmad Elabiad, 16, Sophomore, Pleasant View School, Memphis, Tennessee,
T: Farhana Chowdhury

Nashville, USTN06, Middle Tennessee Science and Engineering Fair

BCHM031 Pyrocystis fusiformis vs. the Circadian Rhythm: How Does Light Exposure Affect the Bioluminescence of Pyrocystis fusiformis?

Ella Jane Brown, 17, Junior, Columbia Central High School, Columbia, Tennessee,
T: Emily Stafford

ENBM059 Development of an Electronic Nose: Detecting VOC Levels

Brittney Williams, 18, Senior, Fred J. Page High School, Franklin, Tennessee,
T: Jennifer Mackie

TEXAS

Dallas, USTX01, Beal Bank Dallas Regional Science and Engineering Fair

BEHA003 iPonder: A Multimodal and Anonymous Approach to Remote Teen Mental Health Diagnosis and Peer-Based Conversational Therapy via Deep Transfer Learning and Computer Vision

Vivek Reddy Kogilathota, 17, Senior, Rick Reedy High School, Frisco, Texas,
T: Derek McDowell

CBIO002 Experimental Characterization of Inhibitors of the MSUT-2 Protein for the Treatment of Neurodegenerative Diseases (Year 2)

Rithvik Ganesh, 18, Senior, Plano West Senior High School, Plano, Texas,
T: Emily Sharma

CELL002 The Mechanism of Methylmercury Permeation Through the Blood-Brain Barrier Using *C. elegans*

Zehra Jaffery, 16, Sophomore, Jasper High School, Plano, Texas, T: Vashka Desai

EAEV036 A Novel Solution to Combat Brewery Waste Utilizing *Hermetia illucens*

Sreya Lakshmi Das, 17, Senior, Liberty High School, Frisco, Texas, T: Derek McDowell

EBED004 IVY - Intelligent Vision System for the Visually Impaired

Sarang Goel, 16, Sophomore, Coppell High School, Coppell, Texas, T: Holly Anderson

MATH002 Fast and Furious: Designing an Ultra-Efficient Hybrid Matrix Multiplication Algorithm

Meryl Zhang, 14, Freshman, R. C. Clark High School, Plano, Texas, T: Jamieson Johns

MCRO003 Computational Analysis of the Cystic Fibrosis Lung Microbiome and Development of a Non-Toxic Quorum Quenching Cocktail Therapy To Inhibit Multispecies Biofilm Proliferation

Shriya Prakash Bhat, 17, Junior, Plano East Senior High School, Plano, Texas,
T: Julie Baker

ROBO003 Adaptive Learning: Evolving Explainable Predictions

Harshal V. Bharatia, 17, Senior, Plano Senior High School, Plano, Texas, T: Rachel Carlson

SOFT016 A Home Automation System for Neuromuscular Disorder Patients Using Brain-Computer Interface

Navya Ramakrishnan, 18, Senior, Plano Senior High School, Plano, Texas,
T: Elizabeth Carson

El Paso, USTX02, Sun Country Science Fair

EBED014 Addressing Medicine Adherence in Older Adults Through User-Friendly Medicine Dispensers

Maya Cosette Ruiz, 15, Freshman, Americas High School, El Paso, Texas,
T: Elizabeth Mullins



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- PHYS020** **The Effects of Qubit Entanglement in Quantum Teleportation**
Galilea Stephania Rodriguez, 16, Junior, Harmony Science Academy, El Paso, Texas, T: Myrna Villanueva
- TMED015** **Attenuating the Consequences of Ethanol Exposure With Probiotics**
Heidi Danielle Houck, 15, Freshman, Transmountain Early College High School, El Paso, Texas, T: David Esparza
- Arlington, USTX03, Fort Worth Regional Science and Engineering Fair**
- CBIO008** **Novel-DTI: A Machine Learning Pipeline To Predict Drug-Target Interactions for Large-Scale Drug Repurposing and Drug Discovery Using Multiplex, Heterogeneous Networks**
Shreya Amalapurapu, 17, Junior, Texas Academy of Mathematics and Science, Denton, Texas, T: Alyssa Rodriguez
- CHEM011** **Breaking Chemical Bonds by Force: A Computational Investigation of Metal-C-H Interaction Under High Pressure**
Carly Yang, 17, Senior, Texas Academy of Mathematics and Science, Denton, Texas, T: Hao Yan
- EBED012** **Optimizing Micro-Computer Architecture in the Arithmetic Logic Unit**
Emily Kathleen Troutman, 17, Junior, Texas Academy of Mathematics and Science, Denton, Texas, T: Dana Troutman
- ENBM015** **Using (PVDF) Sensors and Microphones To Determine Infant Heart Rate and Respirations in Novel Machine Learning Modeling Approach to SIDS Detection**
Eshan Singhal, 16, Junior, The Oakridge School, Arlington, Texas, T: Jeff Farley
- ETSD009T** **Microfluidic Fabrication of Double Emulsion Photonic Microlasers**
Jayanth Narasimha Pandit, 17, Junior, Bhanuprakash Reddy Kunam, 17, Junior, Texas Academy of Mathematics and Science, Denton, Texas, T: Omar Cavazos
- MCRO005T** **Identifying Metabolites in *Aspergillus heteromorphus* and *Magnaporthe grisea* and the Overproduction of Cytochalasins**
Neha Singaravelan, 17, Junior, Arianna Fa, 16, Junior, Texas Academy of Mathematics and Science, Denton, Texas, T: Alyssa Rodriguez
- PLNT010T** **Identification and Characterization of Genes Functioning With HR4, a Newly Identified Gene Conferring Resistance to the Green Peach Aphid**
Siddhartha Shah, 18, Senior, Shreya Nair, 17, Junior, Texas Academy of Mathematics and Science, Denton, Texas, T: Alyssa Rodriguez
- Weslaco, USTX04, Rio Grande Valley Regional Science and Engineering Fair**
- BCHM009T** **An Experimental Study of the Effects of Increased CO₂(g) on the Production and Concentration of Biomacromolecules of Plants**
Kathia Michelle Palacios, 18, Senior, Dyllan Mackenzie Lozano-Lomeli, 17, Junior, Ashley Gabriela Nunez, 17, Junior, James Pace High School, Brownsville, Texas, T: Dora Lopez
- BMED003** **Exploring Ethanol Tolerance in Honey Bees**
Noah Trstenjak, 19, Senior, UTRGV Mathematics and Science Academy, Edinburg, Texas, T: Armando Montes
- CBIO001** **Genes Negatively Regulated by FOXO1 and Their Association With Breast Cancer**
Bipul Raj Soti, 16, Junior, Science Academy of South Texas, Mercedes, Texas, T: Megan Keniry
- EGSD003** **Underwater Turbine Innovations**
Alan Gael Garcia, 16, Sophomore, Veterans Memorial Early College High School, Brownsville, Texas, T: Cynthia Garcia
- ROBO014T** **iGlide: An ROV SeaGlide Design Engineered To Collect Oil in a Marine Environment**
Adrian Gonzalez-Vega, 18, Senior, Tashareny Baez, 17, Senior, James Pace High School, Brownsville, Texas, T: Dora Lopez

- TMED018T** **Determining the Cumulative Effects of Saccharin, Ethanol, and Taurine on the Developing Embryo of *Danio rerio***
Rianna Rachel Trevino##, 18, Senior, Gaddiel Alejandro Garcia##, 18, Senior, Hanna Early College High School, Brownsville, Texas, T: Phebe Fuentes
- Houston, USTX05, Science Engineering Fair of Houston**
- ANIM031T** **Year III: Optimizing the Bioavailability of Curcumin in *Dugesia tigrina* as a Model To Mitigate the Negative Effects of Radiotherapy**
Zaina Fatima Siddiqi, 16, Junior, Rotem Ris, 16, Junior, College Park High School, The Woodlands, Texas, T: Sara Fox
- BEHA021** **SuiSensor: A Novel, Low-Cost Machine Learning System for Real-Time Suicide Risk Identification and Treatment Optimization via Computational Linguistics**
Siddhanth Pachipala, 17, Junior, College Park High School, The Woodlands, Texas, T: Sara Fox
- CHEM034T** **Engineering an Inexpensive and Sustainable Cellulose Battery Cell**
Shivani Mundra, 16, Sophomore, Madelyn Puza, 16, Sophomore, College Park High School, The Woodlands, Texas, T: Sara Fox
- EAEV028** **Enhanced CO₂ Capture via Carbon Mineralization**
Emmy Li, 16, Junior, Clear Lake High School, Houston, Texas, T: Robin Mayeaux
- EGSD014** **Utilizing Soft Robotic Concepts To Achieve Passive Solar Tracking To Increase Efficiency of a Solar Panel**
Ricardo Victorio, 15, Sophomore, College Park High School, The Woodlands, Texas, T: Joseph Ewbank
- ENEV038T** **Sea It To Believe It: Machine Learning-Based Prediction of Harmful Algal Bloom (HAB) Intensity**
Olivia Ye, 16, Junior, Ada Tian Wang, 17, Junior, College Park High School, The Woodlands, Texas, T: Joseph Ewbank
- ETSD024** **Conquering Chaos: Can Engineering Design Be Applied To Prove Coin Flips Are Not Random?**
Abigail Rose Hindman, 15, Sophomore, Saint John's School, Houston, Texas, T: Franco Posa
- ETSD029T** **From Space to Horizon: Improving Efficiency and Modeling the Future of Ion Thrusters**
Mahi Patel, 18, Senior, Felipe Aceves, 18, Senior, College Park High School, The Woodlands, Texas, T: Stephanie Marts
- MATH025** **Random Forest To Predict Dengue Cases and Outbreaks**
Sanuja Dilanka Manage, 17, Junior, College Park High School, The Woodlands, Texas, T: Jon Anderson-White
- MATS021** **Programmable Matter: A Microscale, Self-Reconfigurable, Modular Robotic Metamaterial**
Sohi Sanjay Patel, 16, Junior, College Park High School, The Woodlands, Texas, T: Sara Fox
- PLNT019** **Measuring the Effects of Varying Wavelengths of Light on the Growth of Hydroponically Grown *Allium fistulosum***
Aarushi Pandey, 14, Freshman, College Park High School, The Woodlands, Texas, T: Sara Fox
- TMED017** **Use of Bio-Electrical Impedance Analysis To Detect Changes in Bone Density Indicative of Osteoporosis**
Sanskriti Manoharan, 14, Freshman, Hightower High School, Missouri City, Texas, T: Chelsea Baker
- Kilgore, USTX06, East Texas Regional Science Fair**
- EAEV032T** **Plant Growth With At-Home Soil Treatments Planted in Riverside Soil**
Brisa Lizeth Rocha, 18, Senior, Jade De La Garza, 18, Senior, Nacogdoches High School, Nacogdoches, Texas, T: Jason Ray

- MCRO015 # Aquatic Plant Surface Micro-Flora and the Coliform Response**
Maddie Mabelle Kirklin, 16, Sophomore, Live Oak Classical School, Waco, Texas, T: Katherine Pitts
- Austin, USTX13, Austin Energy Regional Science Festival**
- BCHM013 In silico Analysis of Small Molecules With Possible SARS-CoV-2 RNA-Dependent RNA Polymerase Inhibiting Properties and Their Therapeutic Potential**
Michael Yang, 16, Junior, A&M Consolidated High School, College Station, Texas, T: Michelle Jedlicka
- CBIO021 A Novel Computational Modeling Framework To Analyze Synovial-Tissue Based Drug Targets and Diagnostic Biomarkers in Rheumatoid Arthritis**
Paridhi Latawa, 17, Senior, Liberal Arts and Science Academy, Austin, Texas, T: Neno December
- EAEV022 A Novel Method for Automated Identification and Prediction of Invasive Species Growth Using Deep Learning**
Nathan Elias, 16, Junior, Liberal Arts and Science Academy, Austin, Texas, T: Neno December
- ENBM023 Smart Leukemia Labs: A Low-Cost Microscope and Diagnostic Tool That Use Semantic Segmentation, Image Processing and Object Detection To Detect Acute Lymphoblastic Leukemia**
Adelle Jia Xin Yong, 16, Junior, Westlake High School, Austin, Texas, T: Nancy Misage
- MATSO11 Three-Dimensional Hierarchical Porous Electrode Structure for Improved Performance in Battery Applications**
Alan Wang, 17, Junior, Westlake High School, Austin, Texas, T: Nancy Misage
- TMED016T A Novel Methodology To Improve Hand Hygiene Compliance Using Computer Vision and 3D Depth Sensors**
Laya Yalamanchili#, 18, Senior, Kaavya Yalamanchili, 16, Sophomore, L C Anderson High School, Austin, Texas, T: Anne Goshorn
- Laredo, USTX14, Laredo Independent School District Science Fair**
- BCHM011 Comparing the Polymerization of Casein Protein Using Homogenized Bovine Milk Types**
Jose Antonio Avila, 16, Junior, Joseph W. Nixon High School, Laredo, Texas, T: Melissa Allred
- Corpus Christi, USTX15, Coastal Bend Regional Science Fair**
- ENBM033 ACEREVERS 1: Development of an Artificial Prototype Biosensor System for Identification and Treatment of Diabetic Ketoacidosis (DKA)**
Priyam Kumar, 16, Junior, Santa Gertrudis Academy High School, Kingsville, Texas, T: Rachel Escobedo
- ENBM046 Athlete Temperature Sensor: A Novel Approach to Heat Exhaustion Monitoring in Student Athletes**
Cuauhtemoc Zamora, 15, Freshman, Veterans Memorial High School, Corpus Christi, Texas, T: Porfirio Zamora
- College Station, USTX50, Texas Science and Engineering Fair**
- BCHM022T An Integrative Approach of Utilizing Antipsychotic Supplements Designated for Schizophrenia and Endogenous Firing Rate Differential Equation Models To Induce Neuronal Synaptic Activity in PINK-1 Gene Mutated C. elegans With Parkinson's Disease**
Rajvi Rakesh Babaria#, 16, Junior, Mehak Gaba, 16, Junior, Halley Madyson Compuesto, 17, Junior, Vista Ridge High School, Cedar Park, Texas, T: Rhonda Christman
- BMED082 Reusable Screening Method for Malaria Infections From Thin Blood Smear Images Using Convolutional Neural Network**
Aaron Joel George, 15, Freshman, Saint Dominic Savio Catholic High School, Austin, Texas, T: Pamela Koo

- EAEV087 Finding an Accessible, Environmentally Friendly Solution to Water Purification: Testing the Effectiveness of *Aloidendron barberae* and *Bambusa dolichomerithalla* as Natural Coagulants on Copper Ion Concentration Using UV-vis Spectrophotometry**
Katherine Lee, 16, Sophomore, Jasper High School, Plano, Texas, T: Vashka Desai
- EGSD041 Redesigning Surface Conduction Manifolds To Improve the Efficiency and Reliability of Solar Cells**
Otto Beall, 16, Junior, Plano East Senior High School, Plano, Texas, T: Julie Baker
- ENBM060T Using AI To Detect Morphological Abnormalities of Leukocytes To Diagnose Leukemia**
Anushka Aggarwal, 15, Sophomore, Madison Burke, 16, Sophomore, Dulles High School, Sugar Land, Texas, T: Kristin Mathew
- ENEV097 Low-Cost Electrochemical Arsenic Detection (LEAD): A Novel Quantitative, Portable and Ultra-Sensitive Arsenic Sensor Using Pencil Lead**
Aseel Rawashdeh, 17, Senior, L C Anderson High School, Austin, Texas, T: Vincent Wrencher
- PLNT038 Computational Analysis of the Rhizosphere Metagenome and a Wet Lab Approach To Derive an Optimal Strategy for Heavy Metal Remediation in situ**
Prisha Bhat, 14, Freshman, Plano East Senior High School, Plano, Texas, T: Julie Baker
- ROBO063 Simulation of Abnormal Crouch Gait and Development of a Generalized Torque-Additive Rehabilitative Technique for Complex Mobility Issues**
Allen Shen, 17, Senior, Clear Lake High School, Houston, Texas, T: Brenda Pinchbeck
- SOFT059 Xnet: A Novel Machine Learning Model for Fast MRI Reconstruction**
Shoumik Roychowdhury, 18, Senior, Westwood High School, Austin, Texas, T: Anvi Kantawala
- UTAH**
- Farmington, USUT01, North Davis Area Science and Engineering Fair**
- ANIM046 A Caterpillar That Can Eat Polyethylene: *Galleria mellonella***
Sabrina Ludovica Di Bello, 17, Junior, Woods Cross High School, Woods Cross, Utah, T: Janette Duffin
- BMED048 The Introduction of Excess Calcium in Cancer Cells**
Denali Emilie Isaacs-Perman, 15, Freshman, West Point Junior High School, West Point, Utah, T: Barbara Trask
- EAEV058 How Humans Have an Impact on Our Watersheds Today: A Microbial Study on the Jordan River**
Thanaphone Glenn Shields, 16, Sophomore, Syracuse High School, Syracuse, Utah, T: Nannette Gunty
- ETSD047 The Application of Higher Visibility Road Markings in Inclement Weather**
Joshua Hilbig, 16, Junior, Farmington High School, Farmington, Utah, T: Jana Barrow
- ETSD079T 2-in-1 No Mess Toothbrush**
Mason Spencer Hymas, 14, Freshman, Brady Farr Hill, 15, Freshman, Shoreline Junior High School, Layton, Utah, T: Alicia Clark
- PHYS056 Home-Brew Quantum Key Distribution**
Fletcher James Murray, 18, Senior, Woods Cross High School, Woods Cross, Utah, T: Janette Duffin
- Cedar City, USUT02, Southern Utah Science and Engineering Fair**
- BCHM032 Effects of Brewing Temperatures on the Antioxidant Capacity of Common Native Herbal Plants: *Thelesperma megapotamicum* and *Pectis angustifolia***
Tyneeshia Amber Shortman, 18, Senior, South Sevier High School, Monroe, Utah, T: Deborah Morgan
- CELL032 The Extraction of Apple Juice From Applesauce Using Cellulase Enzyme**
Ethan Anthony Calvasina, 16, Sophomore, SUCCESS Academy-SUU, Cedar City, Utah, T: Kimberly McCollum

Finalist Directory

- CHEM071 Novel Synthesis and Characterization of Manganese Nanoparticles: A Third Year Study**
 Taytum Oakden Stratton, 17, Junior, SUCCESS Academy–SUU, Cedar City, Utah, T: Kimberly McCollum
- ETSD062 Building a Prosthetic Hand With Microcomputers and Sensors**
 Jeron Clarence Osguthorpe, 16, Junior, SUCCESS Academy–SUU, Cedar City, Utah, T: Micah Jackson
- Ogden, USUT03, Weber Area Science and Engineering Fair**
- BEHA045 How Personal Biases Influence Our Voting Habits**
 Lindley Jane Richards, 17, Junior, Fremont High School, Plain City, Utah, T: Robert Riley
- EAEV057 Comparative Analysis of the Effectiveness of Polyethylene, Cetyl Alcohol (Hexadecan-1-ol) and Shade Balls in Preventing Evaporation of Water and Its Effect on Water Quality**
 Alyse Amelia Radle, 16, Sophomore, Weber High School, Pleasant View, Utah, T: Lareen Radle
- EAEV080T Effectiveness of Grass Clippings as a Fuel Alternative**
 Oakley Marriott#, 17, Junior, Keiley Elean Mitchell, 17, Junior, Fremont High School, Plain City, Utah, T: Robert Riley
- PHYS070T An Analysis of the Factors Affecting Make Rate When Putting**
 Luke Abraham Dalebout, 17, Junior, Jack Troy Wadsworth, 16, Junior, Fremont High School, Plain City, Utah, T: Robert Riley
- Provo, USUT04, Central Utah STEM Fair**
- BMED067 Effects of STAT3 on Pathological Retinal Angiogenesis**
 Sarah Lee, 16, Sophomore, Timpview High School, Provo, Utah, T: Joy Petrucka
- EGSD042 Electrifying Lake Mud! Part 3**
 Fianna Jean Smith, 15, Freshman, Early Light Academy, South Jordan, Utah, T: Darci Cordero
- ENEV091 Saving Water Around the House**
 Sky Teeples, 16, Sophomore, Provo High School, Provo, Utah, T: Hyrum Everitt
- PHYS071 Trailer Towing Safety: How Load Weight Distribution and Tow Vehicle Size Affects Trailer Sway**
 Anderson Washburn, 14, Freshman, Canyon View Junior High School, Orem, Utah, T: Jenny Damarjian
- Salt Lake City, USUT05, University of Utah Science and Engineering Fair**
- BEHA023 A Behavioral Study of Public Health Messaging: Community, Self-interest, Vulnerability and Racial Bias**
 Sierra Anne Sun, 15, Freshman, The Waterford School, Sandy, Utah, T: Karla Stucker
- BMED026 Repressed Autophagy in Aging Is Associated With Heightened Blood-Brain-Barrier Permeability and Altered Functional Hyperemia**
 Megan Adrienne Tandar, 15, Junior, West High School, Salt Lake City, Utah, T: Enrique Arce-Larreta
- ETSD025T Engine-ering the Future of Air Travel**
 Evan Skyler Weinstein, 15, Freshman, Aiden Shah Gandhi, 15, Freshman, Eli Daniel Hattton, 15, Freshman, Rowland Hall- Lincoln Street Campus, Salt Lake City, Utah, T: Padmashree Rida
- MATS026 DiSCoVeR: An Attention and Density-Based Machine Learning Algorithm for Discovering Novel Superhard Materials**
 Marianne Feng Liu, 16, Junior, West High School, Salt Lake City, Utah, T: Enrique Arce-Larreta



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INTERCOLLEGIATE INTERDISCIPLINARY PROGRAMS

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 Integrated Degree in Engineering, Arts and Sciences (IDEAS)
 Integrated Business and Engineering (IBE)

DUAL-DEGREE/ACCELERATED PROGRAMS

Arts & Engineering



This is a partial list of Lehigh's majors and programs. For the full list, please scan the QR code.



- TMEDO26** **Investigating the Cytotoxicity of *Centella asiatica* Methanolic Leaf Extracts on MDA-MB-231 Human Breast Cancer Cells**
Mercedes Randhahn, 16, Junior, Saint Joseph Catholic High School, Ogden, Utah, T: Kory Ulle
- TMEDO29T** **Development of Novel, Selective, Orally Available Small Molecule CDK9 Inhibitors for Prostate Cancer Therapy–Mechanistic Studies**
Saisha Vankayalapati, 16, Junior, Sowmya Paritala, 17, Junior, Hillcrest High School, Midvale, Utah, T: Jody Oostema, T: Andie Arnold
- Ogden, USUT07, Harold W. & Helen M. Ritchey Science and Engineering Fair of Utah**
- BEHA050** **Do People Prefer Online or Physical Libraries?**
Bethany Ball, 17, Junior, Northern Utah Academy for Math, Engineering and Science, Layton, Utah, T: Jon Simerick
- CBIO057** **Predicting Virus-Human Interactions To Facilitate the Design of Anti-Coronavirus Vaccines and Therapeutics**
Angela Zhan, 14, Freshman, Logan High School, Logan, Utah, T: Christian Howell
- EAEV056** **A 1-g Earthquake Simulation Model Evaluating the Impact of P-waves and S-waves on the Occurrence of Liquefaction-Induced Lateral Spread**
Rosemary Angelica Yahne, 18, Senior, Northern Utah Academy for Math, Engineering and Science, Layton, Utah, T: Debra Titmus
- ##**
- SOFT049** **Using Cellular Automata To Simulate Liquid, Gas, and Powder Physics**
Erick Reece Graham, 16, Sophomore, InTech Collegiate High School, North Logan, Utah, T: Tracy Davidson

VERMONT

Northfield, USVT50, Vermont Science, Technology, Engineering and Mathematics Fair

- CELL023** **Coordination of Myosin Va Motors Within a Team During Cargo Transport**
Hiba Ali, 18, Senior, South Burlington High School, South Burlington, Vermont, T: Nathaniel Moore
- CHEM068** **Identification of Microplastics in Soil Using Fluorescence**
Cecilia Sweeney, 18, Senior, Saint Johnsbury Academy, St. Johnsbury, Vermont, T: Edwin Eckel

VIRGINIA

Arlington, USVA01, Northern Virginia Science and Engineering Fair

- BMEDO47** **Development of RNA Vaccines Targeting Alzheimer's Disease Using Single-Cell RNA Sequencing and Proteomic Analysis**
Chloe Yan, 16, Sophomore, Episcopal High School, Alexandria, Virginia, T: Kim Olsen
- MCRO034** **Anti-Biofilm Activity of Isolated Bacteriophages for the Treatment of Multidrug-Resistant Pulmonary Infections**
Julia Rose Brodsky, 16, Junior, H-B Woodlawn Secondary Program, Arlington, Virginia, T: Eric Young
- ROBO057T** **Using Computer Vision and Augmented Reality To Utilize Pupil Movement as an Alternative to Traditional Tactile Input Systems**
William Savage, 16, Sophomore, Alexander Nicholas Shipley, 16, Sophomore, H-B Woodlawn Secondary Program, Arlington, Virginia, T: Hang Owen

Charlottesville, USVA02, Virginia Piedmont Regional Science Fair

- EGSD012** **Novel Model of an Adaptive Wave Energy Converter With Spectral Analysis-Based Sea State Classification**
Gwyneth Liu, 17, Junior, Mills E. Godwin High School, Henrico, Virginia, T: Samantha Cope

- ETSD038** **Vehicle Rollover Prevention Through Dynamic Shifting of Center of Mass**
Vivian Wenyin Hui, 16, Junior, Albemarle High School, Charlottesville, Virginia, T: Kevin Huff
- ETSD083T** **An Efficient and Interpretable Vehicle Controller for Safe Navigation in Neighborhood Environment With Riemannian Motion Policies**
Zitong Wang, 17, Junior, Eddy Xu, 18, Junior, Shanghai Pinghe Bilingual School, Shanghai, China, Miller School of Albemarle, Charlottesville, Virginia, T: Luke Robbins
- TMEDO33** **FluVaxAI: A Novel AI-Inspired Regional Flu Vaccine Formulation**
Cameron Sharma, 18, Senior, Mills E. Godwin High School, Henrico, Virginia, T: Bishop Boshier
- Fairfax, USVA03, Fairfax County Regional Science and Engineering Fair**
- ANIM069** **The Effect of Substrate Type on Black Soldier Fly Larvae Mass**
Colin Luke Surabian, 15, Sophomore, South Lakes High School, Reston, Virginia, T: Emily Texdahl
- BCHM028** **Investigation Into the Feasibility of *Maclura pomifera* as a Commercial Source of Pectin**
Aaron Kurtz, 16, Junior, Thomas Edison High School, Alexandria, Virginia, T: Kate Anderson
- EGSD043** **PAMNSys: An Integration of Novel Machine Learning and Reinforcement Learning Algorithms To Accurately Predict and Optimize Electrical Energies Within Heaving Point Absorbers Based on Placement, Implementation and Real-Time Control**
Shaunak Tandon Sinha, 16, Junior, George C. Marshall High School, Falls Church, Virginia, T: Amy Speegle
- EGSD048T** **The Effectiveness of Various Hydroelectric Turbines**
Ben Gregg Mahdessian, 15, Sophomore, Sam Troy, 16, Sophomore, Langley High School, Mclean, Virginia, T: Cynthia Chung
- ETSD074T** **Decentralized Shared Intelligence of Autonomous Vehicles With Real-Time Multi-Agent Reinforcement Learning**
Irfan Kabir Nafi##, 17, Senior, Eugene Choi##, 17, Senior, Raffu Al Khondaker##, 18, Senior, Thomas Jefferson High School for Science and Technology, Alexandria, Virginia, T: Shane Torbert T: Shawn Torbert
- MCRO033** **Changing the Martian Atmosphere: Examining Lichen's Effect on Oxygen Percentage in a Simulated Martian Atmosphere**
Fiona Anne Dreesbach, 17, Senior, Hayfield Secondary School, Alexandria, Virginia, T: Julia Riley
- MCRO059T** **The Effect of Different Types of Masks on the Amount of Bacteria Spread**
Nicole Lee, 14, Freshman, Brianna Hao-Nhi Nguyen, 15, Freshman, Wilbert Tucker Woodson High School, Fairfax, Virginia, T: Laura Barry
- ROBO083** **Mind Beacon: A Portable Spatial Recognition Device for the Visually Impaired Using a 3D Depth Sensor and Custom Tactile Display**
Seoyoung Jun, 16, Sophomore, Thomas Jefferson High School for Science and Technology, Alexandria, Virginia, T: Jane Iyengar
- TMEDO41** **Post-Traumatic Stress Disorder (PTSD) Biomarker Identification Using Integrative Network Fusion and Deep Learning With Bayesian Hyperparameter Optimization**
Sohini Banerjee, 18, Senior, Thomas Jefferson High School for Science and Technology, Alexandria, Virginia, T: Katherine Phillips
- TMEDO64** **PANDwriting: An Accessible, High-Sensitivity Parkinson's and Alzheimer's Screening System Using Vision-Based Handwriting Kinematic Analysis and Machine Learning**
Ron Nachum, 17, Senior, Thomas Jefferson High School for Science and Technology, Alexandria, Virginia, T: Selma Yilmaz

Finalist Directory

Harrisonburg, USVA04, Shenandoah Valley Regional Science and Engineering Fair

PHYS053 **Understanding the Variability of Optical Spectra of H₂O Megamasers**
William Austin St. John, 18, Senior, Massanutten Regional Governor's School,
Mt. Jackson, Virginia, T: Kara Bates

ROBO084 **Demonstration and Accuracy of Machine Learning for Sorting Recyclables**
Anish Aradhey, 17, Junior, Harrisonburg High School, Harrisonburg, Virginia,
T: Andy Jackson

Lynchburg, USVA05, Central Virginia Regional Science Fair

BMED030 **The Effect of Bacillus cereus on the Central Nervous System of *Dugesia tigrina***
Justin Keonhyoung Kim, 17, Junior, Central Virginia Governor's School for Science and
Technology, Lynchburg, Virginia, T: Michele Chamot

EGSD024 **The Effect of Hydrophobic Coatings on the Efficiency of Solar Panels**
Burke Watson Bankston, 17, 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

ANIM027 **Dozing Off With *Drosophila*: The Effect of Disrupted Circadian Rhythms and Disturbed Sleep on Mortality, Mood, and Addiction**
Rania Sophia Lateef, 15, Freshman, Charles J. Colgan Sr. High School, Manassas,
Virginia, T: Stephanie Brown

CBIO030 **A Novel Visualization Tool: Application to RNA-Sequence Classification**
Ebru Ayyorgun, 17, Junior, Battlefield High School, Haymarket, Virginia,
T: Chelsea Bollinger

MCRO065T **Creating Novel Bacteriophage Solutions as a Preventative Measure for *Escherichia coli* Biofilm Formation on Elastomer Biomaterials in Medically Relevant Settings *in vitro***
Gabriella Liana La Cour, 17, Junior, Alahna Moreno, 16, Junior, Anisha Ramakrishnan, 16,
Junior, Governor's School at Innovation Park, Manassas, Virginia, T: Elizabeth Romano

PLNT020 **A Low-Cost Deep Learning Solution for Early Detection of Lettuce Stress in Indoor Farms**
Naman Agarwal, 17, Junior, Governor's School at Innovation Park, Manassas, Virginia,
T: Elizabeth Romano

Ashburn, USVA07, Loudoun County Science and Engineering Fair

ENBM035T **Evaluating the Viability of an Asymmetric Electrospun Nanofiber Composed of Polycaprolactone, Chitosan, and Curcumin To Promote Chronic Wound Healing**
Brett Wilson, 18, Senior, Laasya Doppalapudi, 18, Senior, Academies of Loudoun,
Leesburg, Virginia, T: Michael Tomlinson

ETSD033 **Constructing a Reusable Solid-Fuel Rocket Capable of Propulsive Landing**
Ravin Joshi, 17, Senior, Academies of Loudoun, Leesburg, Virginia, T: Trevor Barry

PHYS040 **Real-Time Prediction of Solar Flares and Coronal Mass Ejections**
Rohit Prasanna, 17, Senior, Academies of Loudoun, Leesburg, Virginia, T: Duke Writer

ROBO046 **Realtime ASL Translation Using ML and Computer Vision**
Enzo Tiptur, 18, Senior, Academies of Loudoun, Leesburg, Virginia, T: Peter Randall

SOFT031 **Combating Disease in Under-Resourced Areas: Synthetic Degradation as a Method to Low-Quality Image Classification**
Raahi Reddy Chada, 17, Senior, Academies of Loudoun, Leesburg, Virginia,
T: Zachary Minchow-Proffitt

Roanoke, USVA08, Western Virginia Regional Science Fair

ANIM055 **Col-IV: An Indicator of Vascular Formation and P**
Michelle Hu, 16, Sophomore, Woodside High School, Newport News, Virginia,
T: Rita Mina

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- BMEDO37** **A Novel Glioblastoma Prognostic Assay Using Droplet Digital Polymerase Chain Reaction**
Caroline Elizabeth Grant, 18, Senior, Roanoke Valley Governor's School for Science and Technology, Roanoke, Virginia, T: Brandon Taylor
- TMEDO34** **A Precision Medicine Approach: In silico Analysis of a Novel Anti-Tumor Peptide as a Future Targeted Therapy**
Rebecca Liu Qiu, 16, Junior, Roanoke Valley Governor's School for Science and Technology, Roanoke, Virginia, T: Mark Levy
- Norfolk, USVA09, Tidewater Science and Engineering Fair**
- BEHA069T** **Flies on the Fly: A Novel Research on Thiamine as a Preventative Measure to Traumatic-Brain-Injury-Induced Locomotive Ability Loss**
Claire Hyunji Chang, 17, Junior, Olivia Chang, 18, Senior, New Horizons Governor's School for Science and Technology, Hampton, Virginia, T: Laura Vobrak
- ENBM064** **Swim Smart, Swim Fast: Development and Application of a Fitbit App for Swim Technique Study**
Rockwell Tianyou Li, 15, Freshman, Ocean Lakes High School, Virginia Beach, Virginia, T: Babette Shoemaker
- Radford, USVA10, Blue Ridge Highlands Regional Science Fair**
- BMEDO20** **The Effects of Inflammatory Neutrophils on Endothelial Cell Integrity**
Jacqueline J. Hou, 18, Senior, Blacksburg High School, Blacksburg, Virginia, T: Katharine Davis
- ENBM080** **An Optimized Whitewater Helmet Designed Using a Newly Developed Helmet STAR Evaluation System and 3D Printing**
Brock Duma, 18, Senior, Blacksburg High School, Blacksburg, Virginia, T: Katharine Davis
- Roanoke, USVA50, Virginia State Science and Engineering Fair**
- BEHA073** **Bringing Truth Into Fake News: The Diffusion of Fact-Checked Fake Stories on Twitter**
Colin Berry, 17, Senior, Yorktown High School, Arlington, Virginia, T: Allyson McKowen
- BMEDO83T** **Staying Ahead of the Hit: Concussion Recovery in Youth Optimized Using a Comprehensive App-Based Program (CRYO CAP)**
Hamza Arman Lateef, 16, Junior, Tony Bright, 16, Junior, Gabriel Brian Ralston, 17, Junior, Governor's School at Innovation Park, Manassas, Virginia, T: Alexis Patanarut
- EAEV091** **Tar Print: Novel Convolutional Remote Sensing Techniques To Quantify Urbanization and Study Water Quality**
Suraj Vaddi, 17, Junior, Thomas Jefferson High School for Science and Technology, Alexandria, Virginia, T: Brian Mandell
- ROBO071** **A Helmholtzian Deep Learning Approach to Glomeruli Segmentation Using Energy-Based Models for Uncertainty Estimation**
Omar Abul-Hassan, 17, Senior, Ocean Lakes High School, Virginia Beach, Virginia, T: Babette Shoemaker
- ROBO088** **Deepfake Detection Using Deep Learning**
Michelle Hu, 16, Sophomore, Woodside High School, Newport News, Virginia, T: Rita Mina

WASHINGTON

- Prosser, USWA01, Mid-Columbia Regional Science and Engineering Fair**
- ANIM032** **Characterizing the Feeding Behavior of Western Screech Owls**
Emmaline McKinnon, 17, Senior, Hanford High School, Richland, Washington, T: Joyce Stark
- EAEV037** **How Do Sound Waves Affect Plant Root Physiology and Photosynthesis?**
Ruth Elizabeth Wise-Maldonado, 16, Sophomore, Sunnyside Senior High School, Sunnyside, Washington, T: Joyce Stark
- PHYS036** **A Comparison of Machine Learning Algorithms for Higgs Boson Identification**
Ourania-Maria Glezakou-Elbert, 16, Junior, Hanford High School, Richland, Washington, T: Brian Palmer

- Puyallup, USWA02, Discovery Regional Science and Engineering Fair**
- ETSD045** **A Novel Approach to Biomimicking the Avian Tail on Fixed Wing Micro Air Vehicles**
Kevin Shen, 15, Freshman, Olympia High School, Olympia, Washington, T: Jenna Halsey
- ROBO055** **Real-Time Sign Recognition for ASL to Text Conversion**
Nidhi Krishna Kumar, 17, Junior, Olympia High School, Olympia, Washington, T: Kimberly Crites
- SOFT037** **Million.js: A Fast, Compiler-Augmented Virtual DOM for Performant JavaScript UI Libraries**
Aiden Yutong Bai, 17, Senior, Camas High School, Camas, Washington, T: Brianna Abraham
- Dallas, USWA03, Central Sound Regional Science & Engineering Fair**
- CBIO038** **A Machine Learning Approach to Identifying Blood-Based Biomarkers for Differential Diagnosis of Alzheimer's Disease**
Anjali Sreenivas, 17, Junior, Nikola Tesla STEM High School, Redmond, Washington, T: Kate Allender
- CHEM044** **Characterization of Enzymes, Chalcone Synthase, Chalcone Isomerase, and Dihydroflavonol 4-Reductase, by X-Ray Crystallography To Improve the Efficacy of Crops *Panicum virgatum* and *Sorghum bicolor* as Potential USDA Biofuel Sources**
Rishi Hazra, 17, Junior, Skyline High School, Sammamish, Washington, T: Jacob Lewis
- EAEV052T** **It's Flaming Out: Using Artificial Intelligence To Emulate Critical Aspects of Wildfire Growth**
Druhin Bhowal, 16, Junior, Arihant Singh, 17, Junior, Nikola Tesla STEM High School, Redmond, Washington, T: Kate Allender
- ENEV053** **Eqwis: Rapid Animal Detection and Driver Warning System To Mitigate Animal Vehicle Collisions Using Artificial Intelligence**
Vedant Malolan Srinivas, 15, Sophomore, Eastlake High School, Sammamish, Washington, T: Emma Morris
- MCRO030** **Exploiting Plasmid-Mediated Resistance: Discovery of Small-Molecule Inhibitors for the Artificial Activation of the Kid-Kis Toxin-Antitoxin System in Plasmid R1**
Pinyu Liao, 16, Junior, Inglemoor High School, Kenmore, Washington, T: Beth Stewart
- Spokane, USWA05, Eastern Washington Regional Science and Engineering Fair**
- ANIM036T** **Effect of a Multi-Strain Probiotic (Visbiome ©) on Intestinal Microbiome Diversity in Two-Breeds of Canines**
Jacob Paul Gannon, 18, Senior, Alexis Schallock, 18, Senior, North Central High School, Spokane, Washington, T: Dan Shay
- BEHA028** **A Detailed Statistical Analysis of Chest Muscle Recruitment Patterns During Activities of Daily Life**
Neha Ann Kommareddy, 15, Junior, Central Valley High School, Spokane Valley, Washington, T: Tanya LaPier
- ENEV052** **Engineering a Bioplastic With *Aspergillus oryzae* To Increase Degradation Rate**
Anna Jean Armstrong, 18, Senior, Joel E. Ferris High School, Spokane, Washington, T: Darci Hastings
- TMED028** **Regression Analysis of Pectoralis Major Muscle Electromyography To Estimate Anterior Thoracic Cage Forces**
Ansel Kinney LaPier, 18, Senior, Central Valley High School, Spokane Valley, Washington, T: Tanya LaPier
- Silverdale, USWA50, Washington State Science and Engineering Fair**
- BEHA062** **Cognitive Profiling and Personalized Therapy Recommendation for Dementia Through a Language-Aware Multi-Model Artificially Intelligent System**
Kosha Upadhyay, 15, Sophomore, Bellevue Senior High School, Bellevue, Washington, T: Sydney Katz

Finalist Directory

- CBIO045** **Elucidating the Mechanisms of Drug-Induced Hearing Loss: Characterization of Interferon Gamma Signaling as a Regulator of Hair Cell Regeneration and Inflammation in Zebrafish**
Rohak Jain, 15, Sophomore, Interlake High School, Bellevue, Washington, T: Pankaj Jain
- ETSD080** **Study and Application of a Biomimetic Fish Propulsion System Mimicking the Body Structure and Stroke of Black Marlin for Energy-Efficient Propulsion With Respect to the Added Mass Effect**
Jake W. Chung, 18, Senior, Interlake High School, Bellevue, Washington, T: Jinkyu Yang
- MATS041** **ScGAN: A Generative Adversarial Network To Predict Hypothetical Superconductors**
Evan Eunjae Kim, 16, Junior, Nikola Tesla STEM High School, Redmond, Washington, T: Kate Allender
- PHYS047** **Analysis of Ring Galaxies Detected Using Deep Learning With Real and Simulated Data**
Harish Krishnakumar, 17, Junior, Nikola Tesla STEM High School, Redmond, Washington, T: Kate Allender
- PHYS073** **Inferring the Neutron Star Maximum Mass and Lower Mass Gap in Neutron Star-Black Hole Systems With Spin**
Christine Ye, 17, Senior, Eastlake High School, Sammamish, Washington, T: Casey Green

WEST VIRGINIA

- Keyser, USWV01, Eastern Panhandle Science and Engineering Fair**
- PHYS018** **A Measurement of Naturally Occurring Ambient Light Levels Near Peak Wavelength = 540 nm Near Twilight Hours**
Audrey MacLachlan, 15, Sophomore, Hedgesville High School, Hedgesville, West Virginia, T: Andrew Ferber
- ROBO027** **Sibling Safe With LIDAR**
Sydney Renee Bostic, 14, Freshman, Spring Mills High School, Martinsburg, West Virginia, T: Jana Woofter

Charleston, USWV50, West Virginia State Science and Engineering Fair

- BEHA022** **Facial Recognition: The Impact on Identifying People When Features Around the Face Are Altered**
Abigail Mae Snider, 15, Freshman, Hedgesville High School, Hedgesville, West Virginia, T: Andrew Ferber
- BMED027** **Analyzing Relationships Among Features of Diabetes-Induced Cerebral Microvascular Disease Using Causal Inference Methods**
Lauren Shen, 16, Sophomore, Morgantown High School, Morgantown, West Virginia, T: Stacey Yuhase

WISCONSIN

- Glendale, USWIO2, Nicolet Science and Engineering Fair**
- SOFT035** **Novel Method for the Identification of High-Risk Space Debris**
Thomas Marshall Vielmetti, 18, Senior, Nicolet High School, Glendale, Wisconsin, T: Stephanie Rasmussen
- Milwaukee, USWIO3, University School of Milwaukee - Science Fair**
- BMED013** **Functional Comparison of LV19.20 Bispecific CAR T-Cells Manufactured Under Distinct Cytokine Priming Conditions**
Jordan Lee Thomas, 16, Junior, University School of Milwaukee, Milwaukee, Wisconsin, T: Robert Juranitch
- CBIO017** **Leveraging Singular Value Decomposition(SVD) to Detect SARS-CoV-2 Variants**
Aidan Wang, 16, Sophomore, University School of Milwaukee, Milwaukee, Wisconsin, T: Robert Juranitch

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ENEV015T **The Use of Laminar Flow To Reduce Aerosolized Particle Dispersion: A Strategy for Respiratory Disease Prevention**
Max Cole Watchmaker#, 17, Junior, David Anthony Watkins, 16, Junior, University School of Milwaukee, Milwaukee, Wisconsin, T: Robert Juranitch

Madison, USW104, Capital Science and Engineering Fair

ENBMO34 **An Efficient and Accurate Super-Resolution Approach to Low-Field MRI via U-Net Architecture With Logarithmic Loss and L2 Regularization**
Aryan Thomas Kalluvila, 17, Junior, Hartford Union High School, Hubertus, Wisconsin, T: Matthew Rosen

MATS027 **3D Printed Foam Structures for Safer High School Football Helmets**
Varun Nathan, 17, Junior, James Madison Memorial High School, Madison, Wisconsin, T: Hridyesh Tewani

Fond du Lac, USW150, Badger State Science and Engineering Fair

BMEDO35 **Defining the Mechanism of Fibroblast Death in Pulmonary Emphysema To Target Novel Therapies for COPD**
Jonathan Crawford, 17, Junior, University School of Milwaukee, Milwaukee, Wisconsin, T: Robert Juranitch

ENBMO40 **Innovative Augmented Reality Based Rehabilitative Tool for Arm Injuries Utilizing HoloLens 2**
Aditya Pillai, 17, Junior, University School of Milwaukee, Milwaukee, Wisconsin, T: Robert Juranitch

MCRO029 **Assessment of Alternative Antimicrobial Substances on *Staphylococcus epidermidis***
Joyce W. Essuman, 18, Senior, Nicolet High School, Glendale, Wisconsin, T: Stephanie Rasmussen

WYOMING

Greybull, USWY01, Northern Wyoming District Science Fair

ENEV036 **A Low-Cost Device To Improve the Quality of Drinking Water: Utilization of Ultrasonic Transduction in Conjunction With Filtration**
Jose Atilano, 19, Senior, Greybull High School, Greybull, Wyoming, T: Joel Kuper

Laramie, USWY50, Wyoming State Science Fair

CBIO034 **Modeling Genetic and Neurological Changes With Alcohol Use Disorder**
Zoya Khan, 15, Sophomore, Cheyenne Central High School, Cheyenne, Wyoming, T: Sobia Khan

ROBO045 **Evaluating Machine Learning Methods for Modeling the Distribution of the Two Form Bumble Bee (*Bombus bifarius*) in Wyoming**
Padmalakshmi Ramesh, 15, Freshman, Laramie High School, Laramie, Wyoming, T: Jason Carlisle

VIETNAM

Hanoi City, Vietnam, VNMO01, Hanoi Science Fair

BEHA063T **Environmentally Responsible Consumption Behavior of Youth**
Huy Nguyen Quang Pham, 17, Senior, Bao Nguyen Gia Pham, 15, Sophomore, Phan Huy Chu High School, Hanoi, Vietnam, T: Huy Tran

BMEDO77T **Evaluation of Gastric Cancer Stem Cell Targeting Ability of Saponin Extract and Preparation of Tea Product from *Ardisia gigantifolia* Stapf. Leaves**
Minh Xuan Dao, 16, Junior, Cuong Le Nguyen, 17, Junior, Thai Nguyen Specialized High School, Thai Nguyen, Vietnam, T: Thanh Truong

CHEM069T **A Creative Approach to Designing and Synthesizing an Effective Plasmonic Photocatalyst Based on g-C3N4**
Quan Minh Do, 15, Sophomore, Luong Thien Nguyen, 15, Sophomore, Hanoi Amsterdam High School for the Gifted, Hanoi, Vietnam, T: Hai Nguyen

EBED040T **HMS-Health Monitoring System for Home-Quarantined COVID-19 Patients**
Hoang Duc Nguyen, 17, Senior, Tu Minh Nguyen, 15, Sophomore, Hung Yen Specialized High School, Hung Yen, Vietnam, T: Anh Tuyet Nguyen

ETSD075T **Design, Manufacture a Semi-Automatic Passion Fruit Juice Suction Machine**
Ha Thi Thu Vi, 17, Junior, An Huynh Duy Dao, 18, Senior, Dong Du Secondary and High School, Buon Ma Thuot, Dak Lak, Vietnam, T: Thuong Luu

MATS052 **Biodegradable Plastic Made Up by *Tacca leontopetaloides* Starch**
Thu Minh Anh Tran, 17, Senior, Thu Khoa Nghia Highschool for the Gifted, Chau Doc, An Giang, Vietnam, T: Chinh Tran

SOFT056T **A Humanitarian Blood Donation Application That Facilitates the Search for Potential Blood Donors and the Smart Management of Blood Storage**
Phong Tran, 17, Junior, Chi My Tran, 16, Junior, Lao Cai High School for Gifted Students, Lao Cai, Lao Cai, Vietnam, T: Kien Mai

ZIMBABWE

Harare, Zimbabwe, ZWE001, Zimbabwe National Science Fair

BEHA053T **Mechatronics in a Zimbabwean Girl's World: Cultivating Interest in STEM Among Female Students in Zimbabwe by Using Mechatronics**
Tanatswa Alexandra Matonda, 17, Senior, Tadiswa-Chloe Chipso Mafara, 18, Senior, Peterhouse Girls School, Marondera, Mashonaland East, Zimbabwe, T: Samantha Satumba

CHEM040 **Extracting Humic Acid From Banana Peels To Reduce the Risks of Salinization**
Ruvarashe Sharon Mutema, 18, Senior, Queen Elizabeth Girls' High School, Harare, Zimbabwe, T: Memory Mutema

EGSD007 ***Typhi capensis* (Reed) Biofuel**
Memory Panashe Bvungo, 18, Senior, Dominican Convent High School Harare, Harare, Zimbabwe, T: Coughlan Ndambakuwa

ENEV013 **An Inexpensive and Easily Produced System To Reduce Indoor Air Pollution**
Tanaka Chirara, 17, Senior, ZRP High School, Harare, Zimbabwe, T: Richard Ngomanyuni

ENEV049T **Development of a Low-Cost Highly Efficient Filter for Heavy Metal and Organic Contaminant Removal**
Nyaradzo Nicole Mutiti#, 18, Senior, Omar Chinyanga, 17, Senior, Stanley Madziyire, 17, Senior, Saint George's College, Harare, Zimbabwe, T: Sanelisiwe Moyo
T: Knowledge Chikundi

ENEV099 **Clay Bricks: An Ultimate Solution to Zimbabwe's Clean Water Crisis**
Ruvarashe Moyo, 16, Sophomore, Queen Elizabeth Girls' High School, Harare, Zimbabwe, T: Memory Mutema

MATS031 **Novel Biodegradable and Eco-Friendly Porous Carbon Dioxide Adsorbent Porous Coordination Polymer**
Samantha Rutendo Kaseke, 18, Senior, Queen Elizabeth Girls' High School, Harare, Zimbabwe, T: Chipso Matambanadzo

ROBO020 **A Novel Amyotrophic Lateral Sclerosis Diagnostic Tool Using Machine Learning and Biomarkers**
Elisa Marie Diop-Weyer, 16, Junior, Harare International School, Harare, Zimbabwe, T: Emmily Chitongo

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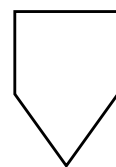
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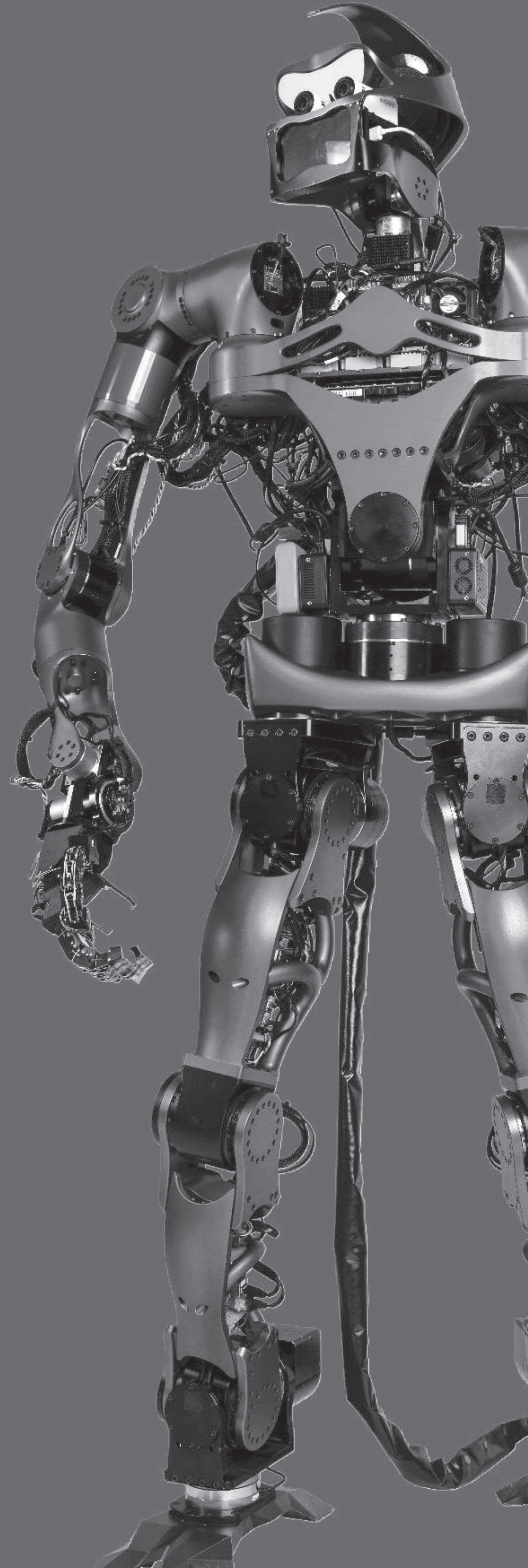
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ISEF 2022 FINALISTS



TURNING ADVERSITY INTO OPPORTUNITY

A rare form of cancer left Colin Beach blind in one eye, but it also gave the Rose-Hulman biochemistry major a lifelong passion for helping people. Now Colin is a 2021 Goldwater Scholar, recognized as one of the nation's top undergraduate STEM students for his work in biochemistry, medical physics and nanomedicine.

Rose-Hulman is one of The Princeton Review's top five colleges for internships and science labs, and Colin has taken full advantage of both – serving five internships and research experiences in just three years. His work includes COVID-19 molecular biology, cancer research, biostatistics and clinical data analysis.

As one of Rose-Hulman's 12 Goldwater Scholars in 16 years, Colin is set to deliver a healthier future for us all.

Check out more of Colin's story. rose-hulman.edu/colin



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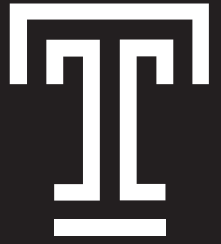


Ptero-
-- PTERODACTYLS!

JAMIE COE



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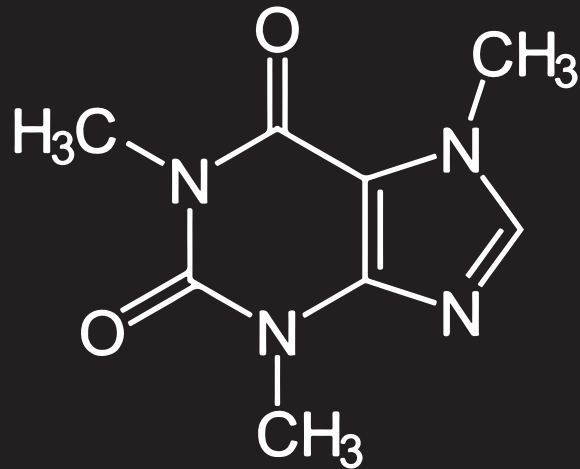


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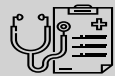


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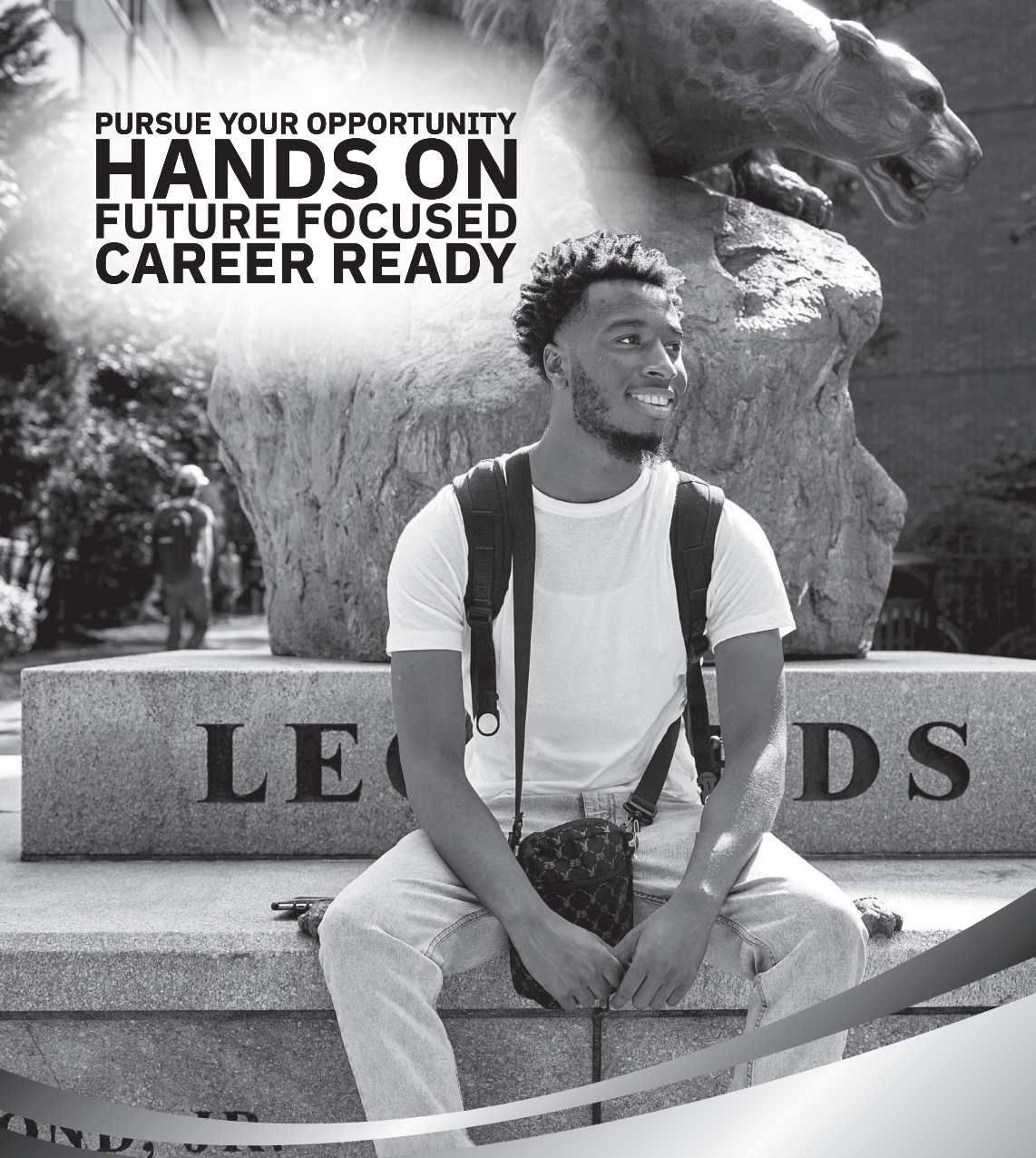
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And the dozens of Regeneron employees who judge, interpret and volunteer at Regeneron ISEF.

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 hybrid Regeneron ISEF 2022. We recruited:

- **more than 1,600 judges**
- **454 volunteer judging proctors**
- **97 interpreters in 19 languages**

And unique to this year's hybrid 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.

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