

Intel International Science and Engineering Fair



Finalist Directory 2018

Table of Contents

| | |
|---|----|
| Acknowledgments and Special Award Organizations..... | 2 |
| Animal Sciences (ANIM) | 3 |
| Behavioral and Social Sciences (BEHA) | 6 |
| Biochemistry (BCHM) | 9 |
| Biomedical and Health Sciences (BMED) | 11 |
| Biomedical Engineering (ENBM) | 14 |
| Cellular and Molecular Biology (CELL) | 17 |
| Chemistry (CHEM) | 19 |
| Computational Biology and Bioinformatics (CBIO) | 22 |
| Earth and Environmental Sciences (EAEV) | 24 |
| Embedded Systems (EBED) | 28 |
| Energy: Chemical (EGCH)..... | 30 |
| Energy: Physical (EGPH) | 32 |
| Engineering Mechanics (ENMC) | 34 |
| Environmental Engineering (ENEV) | 37 |
| Materials Science (MATS) | 41 |
| Mathematics (MATH) | 44 |
| Microbiology (MCRO) | 46 |
| Physics and Astronomy (PHYS)..... | 49 |
| Plant Sciences (PLNT) | 53 |
| Robotics and Intelligent Machines (ROBO) | 56 |
| Systems Software (SOFT) | 59 |
| Translational Medical Sciences (TMED) | 62 |

Intel ISEF 2017 Special Award Organizations provide education scholarships, cash awards, summer internships, scientific field trips, and equipment grants. Intel and Society for Science & the Public thank the following organizations for their support of the Intel ISEF.

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| Acoustical Society of America | International Council on Systems Engineering – INCOSE |
| Air Force Research Laboratory on behalf of the United States Air Force | K. Soumyanath Memorial Award |
| American Chemical Society | King Abdul-Aziz & his Companions Foundation for Giftedness and Creativity |
| American Committee for the Weizmann Institute of Science | Mu Alpha Theta, National High School and Two-Year College Mathematics Honor Society |
| American Geosciences Institute | National Aeronautics and Space Administration |
| American Institute of Aeronautics & Astronautics | National Anti-Vivisection Society |
| American Mathematical Society | National Center “Junior Academy of Sciences of Ukraine” |
| American Meteorological Society | National Institute on Drug Abuse, National Institutes of Health & the Friends of NIDA |
| American Physiological Society | National Security Agency Research Directorate |
| American Psychological Association | National Taiwan Science Education Center |
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| Association for Computing Machinery | Qatar Foundation, Research & Development |
| Association for the Advancement of Artificial Intelligence | Ricoh USA, Inc |
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| IEEE Foundation | University of the Sciences in Philadelphia |
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| | Wolfram Research, Inc. |

Visit student.societyforscience.org/special-awards-organizations to learn more about each Special Award Organization.

Intel ISEF Finalist Directory

Each # next to the finalist's name indicates previous ISEF participation;

An * identifies non-competing projects

A T after the booth ID number indicates a Team Project

Animal Sciences

- ANIM001T FishApp**
Manuel Cassarino, 18, Senior,
Sofia Cabezas, 17, Junior,
Liceo No. 1 Jose Maria Campos, Mercedes, Soriano, Uruguay
- ANIM002 Hopping Down the Bunny Trail: Spatial Distribution of *Lepus americanus* Tracks**
Lily Marie Hall, 18, Senior,
South Ridge School, Culver, Minnesota
- ANIM003 Analyzing the Relationship Between Herbicide Introduction and the Development of *Gallus domesticus* Embryos**
Katelyn Nicholson, 17, Senior,
Episcopal School of Jacksonville, Jacksonville, Florida
- ANIM004T Larvicidal Effect of Coffee (*Coffea arabica cordoba-caracolillo*) Against Mosquito (*Aedes aegypti*)**
Vanessa Salazar Balboa, 19, Senior,
David Hernandez Garza, 19, Senior,
Adrian Villareal Castillo, 19, Senior,
Prepa UDEM Unidad San Pedro Universidad de Monterrey, San Pedro Garza Garcia, Nuevo Leon, Mexico
- ANIM005T Yogyakarta Beaches Mapping Based on Sea Turtle Nesting Beach Characteristics**
Aden Muflih Khaitami, 17, Senior,
Fadlilah Nur Hasanah, 18, Senior,
SMA Negeri 1 Yogyakarta, Yogyakarta, D.I. Yogyakarta, Indonesia
- ANIM006 The Effect of Environmental Factors on Tardigrade Communities**
Stefan Kemmerich, 15, Sophomore,
Erzbischofliches St.-Angela Gymnasium, Wipperfurth, Germany
- ANIM007 Effect of Fragmentation, Isolation, and Bleaching on Coral Reef Fish Assemblages**
Sonja Giardina, 15, Sophomore,
Hilo High School, Hilo, Hawaii
- ANIM008 Worm Amnesia: The Effect of Taurine, Glucose, and Caffeine on *Dugesia dorotocephala***
David Lee Garcia, 17, Junior,
IDEA College Preparatory McAllen, McAllen, Texas
- ANIM009 Determining the Effect of a Top-Level Predator in a Simulated Aquatic Ecosystem with Organisms Used for the Mitigation of HABs**
Nathan Foo, 14, Freshman,
West Shore Junior/Senior High School, Melbourne, Florida
- ANIM010 Mammalian Behavioral Ecology in Southern California Habitat Fragments**
Austin Leonard Nash, 18, Senior,
Palos Verdes High School, Palos Verdes Estates, California
- ANIM011T Who Is the Mice's King? Key Factors for Regulation of Social Hierarchy on C57BL/6, Mice**
Jingru Zhang, 17, Junior,
Xieran Gu, 17, Junior,
Yuhui Zhang, 17, Junior,
High School Affiliated to Fudan University, Shanghai, China
Shanghai Foreign Language School, Shanghai, China
High School Affiliated to Shanghai Jiao Tong University, Shanghai, China
- ANIM013T On the Structure and Mechanics in vivo of the Ostial Cells and the Aortic Valve of the *Drosophila melanogaster* Larva Heart by Analyzing High Resolution Microscopic Images**
Claudia Rodriguez, 18, Senior,
Juan Sanchez Mateos, 17, Junior,
I.E.S. Maestro Gonzalo Korreas, Jaraiz de la Vera, Caceres, Spain
- ANIM014 Evolution of Aphid Species due to Host Plant Preference**
Kyohei Ikawa, 18, Senior,
Kosei Gakuen High School, Suginami-ku, Tokyo, Japan
- ANIM015 Accelerated Planarian Regeneration through the Manipulation of Frequency**
Xena Tame, 18, Senior,
Ysleta High School, El Paso, Texas
- ANIM016 Environmentally-Friendly, Color-Infused, Structurally-Strengthened Silk Fibers from Feed-Induced *Bombyx mori***

Andrew Dong-Hyun Kim, 18, Senior,
Academy of Science and Technology, The Woodlands, Texas
- ANIM017 Can A Small Bird End Malnutrition? A Comparison of *Coturnix japonica* and *Gallus gallus* as Potential Sustainable Protein Sources for Developing Countries and Those Seeking a Quality Sustainable Source of Protein**
Shannon Leigh Anderson, 16, Sophomore,
Anderson Christian Academy, Seguin, Texas
- ANIM018 A Novel Approach to Substance Abuse Rehabilitation Using Transient Receptor Potential Channels and Insulin Signaling in *C. elegans***
Sindhuja Uppuluri, 16, Sophomore,
Westwood High School, Austin, Texas
- ANIM019 Motion Activated Auditory Deterrents to Prevent Wildlife Vehicular Collisions Along High-Density Wildlife Crossing**

Maegan Yeary, 18, Senior,
J.W. Nixon High School, Laredo, Texas
- ANIM020T Metformin as a Novel Neurogenic Method of Methylmercury Neurotoxicity Symptom Mitigation in *Danio rerio* as a Model for Human Fetuses**
Ayman Napsy Isahaku, 18, Senior,
Anna Spektor, 17, Junior,
Nicolet High School, Glendale, Wisconsin
- ANIM021 What's All the Buzz About?**
Breanna Michelle Williams, 18, Senior,
Alma High School, Alma, Arkansas
- ANIM022 Mealworms... A Potential Solution to the Global Plastic Problem**

Alyssa H. Rawinski, 17, Junior,
Monte Vista High School, Monte Vista, Colorado
- ANIM023 Isolation of Novel Epigenetic Insights in Heritable Fertility Trends via NGS-Driven Analysis of DNA Damage Response and piRNA Biogenesis Pathways**

Evan James Mizerak, 18, Senior,
Wachusett Regional High School, Holden, Massachusetts
- ANIM024 Resurvey of Fish Species in Three Agricultural Freshwater Ecosystems in Fulton County, Ohio 2014-2017**
Jordan M. Skates, 17, Senior,
Pettisville High School, Pettisville, Ohio

- ANIM025T Evaluation of the Potential of Planarians *Dugesia tigrina* as Bioindicators of the Toxicity of Waters and Sludges from Mining Tailing**
Fernando Andres Gonzalez, 17, Senior,
Rene Alonso Esper, 17, Senior,
Colegio Ingles Saint John, Rancagua, Cachapoal, Chile
- ANIM026T Galaxy Nest: A Study on the Nesting Behaviors of Asian Weaver Ants**
Ruo Yan Elysia Ye, 15, Sophomore,
Muhua Yang, 16, Sophomore,
Chinese International School,
St. Joseph's College, Hong Kong, China,
Hong Kong Special Administrative Region
- ANIM027 # Sheep Vocalization Analysis from Gestation to Birth**
Clara Megan Benadon, 16, Junior,
Poolesville High School, Poolesville, Maryland
- ANIM028 Effects of Known Endocrine Disruptor Pyriproxyfen Compared to Suspected Endocrine Disruptors Bisphenol-A (BPA) and Bisphenol-S (BPS) on *Blaptica dubia* Roaches**
Casey Wyrwas, 17, Senior,
Baker High School, Baker, Montana
- ANIM029 Accelerating Biomimetic Design Evolution Using Advanced Analytics and Rapid Prototyping: An Api-Centric Hive for Domestic *Apis mellifera***
Jade Anne Greenberg, 17, Junior,
Pascack Hills High School, Montvale, New Jersey
- ANIM030 Developing a Protocol to Extract DNA from Killer Whale Mucus as a Non-Invasive Alternative to the Use of Biopsy Darts**
Luke Joseph Harris, 18, Senior,
West Islip High School, West Islip, New York
- ANIM031 The Role of Purple Hermit Crabs, *Coenobita brevipanus*, as Forest Frugivores**
Alyssa Cepeda, 17, Senior,
Kagman High School, Saipan, MP, Northern Mariana Islands
- ANIM032 Analysis of the Use of an Organic Pesticide Synthesized with Ursolic Acid as a Substitute for Pesticides with Neonicotinoids to Maintain Stable Sperm Production in *Apis mellifera* Drones**
Jerica Andrea Siberon, 18, Senior,
Dr. Pedro Albizu Campus, Ponce, Puerto Rico
- ANIM033 A Reverse Genetic Approach to Identify Novel Regulators of Cell Invasive Behavior**
Sydney Bracht, 18, Senior,
Smithtown High School East, St. James, New York
- ANIM034 Saving the Honey Bee from *Varroa destructor* Using RNA-Interference**
Elizabeth Paige Wamsley, 16, Sophomore,
Timber Ridge Scholars Academy, Pacific, Missouri
- ANIM035T Elucidating the Influence of Habitat Fragmentation, Urbanization, and Environmental Factors on the Inhibitory Ability of Antifungal Cutaneous Bacteria Found on the Eastern Redback Population**
Julia Ann Piccirillo-Stosser, 16, Junior,
Sabrina Grace Piccirillo-Stosser, 16, Junior,
Kiara Taveras, 16, Junior,
Ossining High School, Ossining, New York
- ANIM036 Analyzing the Role of Intralipid and Epinephrine in the Treatment of Bupivacaine-Induced Toxicity in *Daphnia magna***
Nicholas Lin, 17, Junior,
Westfield High School, Chantilly, Virginia
- ANIM037T Effect of Yeast Diversity on Mosquito Populations**
Jadyn Lynne Henry, 15, Freshman,
Kylie Erin Orris, 17, Junior,
Southeastern Junior/Senior High School, Augusta, Illinois
- ANIM038 Bovine Somatic Cell Count and Mastitis Bacterial Strains**
Kathryn Marie Bosley, 17, Senior,
Franklin Academy High School, Malone, New York
- ANIM039 The Role of NRBF2 in the Regulation of the ULK1 Kinase Complex**
Jessica Li Jiang, 17, Senior,
William A. Shine Great Neck South High School, Great Neck, New York
- ANIM040 The Effect of Talking on a Horse's Heart Rate When Grooming the Neck and Withers After Exercise**

Abegail Louise Faz, 17, Senior,
Northridge High School, Layton, Utah
- ANIM041T Conservation of Endangered, Endemic Megapode *Macrocephalon maleo* S. Muller, 1846, in Lore Lindu National Park, Indonesia: Strategy in Selecting Nesting Pit**
Herditha Asya Putri, 18, Senior,
Nabila Triana, 17, Senior,
Al-Azhar Mandiri Palu Senior High School, Palu,
Central Celebes, Indonesia
- ANIM042T A Method Combining Geographic Information Systems and Environmental DNA Reveals Hidden Populations of the Endangered Japanese Clouded Salamander, *Hynobius nebulosus***
Kota Tsuchida, 18, Senior,
Yusuke Sakai, 17, Senior,
Yuka Tsuzuku, 17, Senior,
Gifu Prefectural Gifu Senior High School, Gifu-City,
Gifu-Pref, Japan
- ANIM043T A Study on the Species Diversity in Ponds with and without Bullfrogs in Jeju Island**
Hee Do Shin, 17, Junior,
Su-Sung Park, 16, Junior,
Minbeom Kim, 16, Junior,
Daykey High School, Jeju-si, South Korea
- ANIM044 # A Novel Approach to Increase Honey Bee Immune Response: The Effect of Amino Acid Supplementation on the Longevity of Nosema Infected Honeybees**
Natalia Noel Jacobson, 18, Senior,
Empire High School, Tucson, Arizona
- ANIM045 The Significant Agrohhomeopathic Effect of Natural Extracts on *Acheta domesticus***
Rodnell Busigo Torres, 16, Senior,
CROEM High School, Mayaguez, Puerto Rico
- ANIM046 Behavior of Weaver Ants to Access Food when Encountering Barriers**
Suparas Yendee, 18, Senior,
Princess Chulabhorn Science High School Phetchaburi, Cha-Am,
Phetchaburi, Thailand
- ANIM047T A New Method to Increase Propolis Production by Activating Nest Repair Behavior in Stingless Bees**
Metawee Leeja, 17, Junior,
Chonnaphat Luanghan, 17, Junior,
Nattakarn Prommin, 17, Junior,
Damrongratsongkroh School, Muangchiangrai, Chiangrai,
Thailand
- ANIM048 Acoustic Signatures: A Novel Tool to Detect Muscle Myopathy**
Divya Srinivasan, 17, Junior,
Johns Creek High School, Johns Creek, Georgia
- ANIM049 Determining the Availability of Pollen Sources for Honeybees on Deciduous Fruit Farms in Summer**
Gabriele Maria Gess, 18, Senior,
St. Cyprian's School, Cape Town, Western Cape,
South Africa

- ANIM050 Acetylcholine and Nicotine Potentiate Currents in Cells Isolated from Sea Anemone *Nematostella vectensis***
Sarah Elizabeth Adamo, 18, Senior,
Smithtown High School West, Smithtown, New York
- ANIM051 Bird Migration Patterns**
Liam-Gavin Dell, 15, Freshman,
City Honors School, Buffalo, New York
- ANIM052 Color Preference in Poultry Chicks**
Loulou Neff, 15, Freshman,
Elko High School, Elko, Nevada
- ANIM053T Novel Method for Determining *Culex quinquefasciatus* Behavioral Response to Acoustic Stimuli Utilizing a Split-tube Design**
Hunter Chase Bishop, 17, Junior,
Fritz Alexander Ruppert, 15, Sophomore,
Brevard Senior High School, Brevard, North Carolina
- ANIM054 Increased Conception Rates by Regulating Temperature of Semen**
Bailey Beckman, 17, Senior,
Danville Junior/Senior High School, Danville, Iowa
- ANIM055 The Effects of Monk Parakeet Age on Sociality**
Aushna Saleem, 17, Senior,
Midwood High School at Brooklyn College, Brooklyn, New York
- ANIM056 The Effects of Salinity on *Aedes aegypti* Blood Meal Selection**
Rachel Leigh Brown, 18, Senior,
Bartlesville High School, Bartlesville, Oklahoma
- ANIM057 Effects of Molting on Movement Patterns in *Chromatopelma cyanpubescens* (Green Bottle Blue Tarantulas)**
Francesca Teresa Circosta, 18, Senior,
Massanutten Regional Governor's School, Mt. Jackson, Virginia
- ANIM058 All Cracked Up Again**
Amy Bonner, 17, Sophomore,
Cleveland High School, Cleveland, Mississippi
- ANIM059 The Effect of Storage Conditions and Time on the Quality of Chicken Eggs**
Emma Millie Serisier, 16, Junior,
Bishop Druitt College, North Boambee Valley, New South Wales, Australia
- ANIM060 Comparative Study Between *Bellis sylvestris*, *Artemisia dracunculus* and *Lantana trifolia* in the Ability to Attract *Apis mellifera***
Marco Antonio Calo, 16, Sophomore,
University Gardens High School, San Juan, Puerto Rico
- ANIM061 Modeling American Alligator Population Dynamics**
Karin Ruth Ebey, 14, Freshman,
Los Alamos High School, Los Alamos, New Mexico
- ANIM062T Increasing the Honey Productivity of Stingless Bees (*Tetragonula fuscobalteata*) by Creating Pseudo Honey Pots**
Wirachad Sripori, 17, Junior,
Boonyakorn Sonkhayan, 17, Junior,
Jitrada Chaichaompoo, 17, Junior,
Damrongratsongkroh School, Muangchiangrai, Chiangrai, Thailand
- ANIM063 Development of 3D Pollen Adsorption Models by Analyzing Pollinating Insects' Setae Structures**
Seong Won Ok, 17, Senior, Gyeongnam Science High School,
Jinju-si, Gyeongsangnam-do, South Korea
- ANIM064 Wnt6, in Progenitor Maintenance During Hematopoiesis: A Potential Biomarker for Acute Myeloid Leukemia (AML)**

Titash Biswas, 17, Senior,
Crescenta Valley High School, La Crescenta, California
- ANIM065 The Effect of Turmeric Upon the Mortality and Mobility of *Drosophila melanogasters* with Alzheimer's**
Arielle Jasmine Fedee, 17, Junior,
Westminster Christian School, Palmetto Bay, Florida
- ANIM067 A Better Way to Wean**

Abigail Grace Larson, 17, Senior,
Tioga High School, Tioga, North Dakota
- ANIM068 Unintended Consequences of the Sunscreen Compound Oxybenzone on the Threatened Staghorn Coral *Acropora cervicornis***
Madison Kristin Precht, 18, Senior,
Westminster Christian School, Palmetto Bay, Florida
- ANIM069 See the Bees Speak: Confined Direct Analysis in Real Time and SPME-GC-MS for *B. impatiens* and *A. mellifera* Alarm Pheromone Detection**
Skylar Mariquita Brodowski, 17, Senior,
Washington-Lee High School, Arlington, Virginia
- ANIM070 Satellites and Cows**
Ashley Nicole Riggs, 15, Sophomore,
Willcox High School, Willcox, Arizona
- ANIM071 Which Egg-Laying Substrate Do Crickets Prefer?**
Katherine Traver, 15, Sophomore,
Sockdolager School, Hartsville, South Carolina
- ANIM072 Illuminating the Problem: Bioluminescence**
Chase Andrew Beausoleil, 16, Sophomore,
Bishop Feehan High School, Attleboro, Massachusetts
- ANIM066 The Impact of Ocean Acidification on *Lytechinus variegatus* Fertilization & Development**
Logan M. Track, 18, Senior,
Sarasota High School, Sarasota, Florida

Behavioral and Social Sciences

- BEHA001 Endophenotype Model in Obsessive Compulsive Disorder: Identification of Risk and Protective Factors**
Ricardo Angelin Pereira Giorgion, 17, Junior,
Alef Peretz, Sao Paulo, Brazil
- BEHA002 KeMotions: Keys to Emotional Cues, Year Two**
Sapna Karina Patel, 17, Senior,
Oviedo High School, Oviedo, Florida
- BEHA003T Biopsychosocial Impact in Mayan Adults with Type 2 Diabetes in Yucatan**
Jesus Raymundo Ceballos Torres, 17, Junior,
David Zavala Perez, 17, Junior,
Escuela Preparatoria Dos, Merida, Yucatan, Mexico
- BEHA004T Anthropological and Historical Study of "Tamal Chinchano" (Tamale from Chinch) Throughout Time**
Jose Ignacio Tijero Ayarza, 15, Sophomore,
Fiorella Giovanna Almeyda Luis, 15, Sophomore,
Simon Bolivar, Chinch, Ica, Peru
- BEHA005 Social Skills in Adolescents Who Use Cochlear Implants**
Megan Cantwell, 16, Sophomore,
Veritas Academy, Austin, Texas
- BEHA006 Better Decision Making: Forecasting or Surrogation?**
Alyssa Knowles, 16, Sophomore,
Friendswood High School, Friendswood, Texas
- BEHA007 A Rapid Prediction Method for Epileptic Seizures Using Machine Learning Algorithms**
Suraj Modi, 16, Junior,
Mountain View High School, Lawrenceville, Georgia
- BEHA008 The Expression of Genes Correlated with ADHD and Dyslexia on the Vocal and Auditory Pathways of a Zebra Finch Model**
Alison Thomas, 17, Junior,
Oregon Episcopal School, Portland, Oregon
- BEHA009T Using Python to Develop Twitter Personas**
Daniella Feistritz, 15, Sophomore,
Adam Joseph Rilatt, 15, Sophomore,
Central York High School, York, Pennsylvania
- BEHA010T A Device that Regulates Auditory Hypersensitivity for Autistic Children Using Specialized Sounds**
Hoor Abdel Karim Al Amawi, 16, Junior,
Mohammad Na'el Al Masri, 16, Junior,
Jubilee School, Amman, Jordan
- BEHA011 Peer Group Influences on High School Girls' Interest in STEM**
Percy Gresham, 18, Senior,
Alabama School of Fine Arts, Birmingham, Alabama
- BEHA012 Effects of Stress on Neuroanatomical Functionality**
Meredith Odyl Blaise, 16, Junior,
Bishop Feehan High School, Attleboro, Massachusetts
- BEHA013T The Effect of Altering *Drosophila* Gut Microbiota on Mate Choice, Immunity, Memory, and Aggression**
Natalia Nicole Murillo, 18, Senior,
Rebecca Volkov, 17, Senior,
Pascack Hills High School, Montvale, New Jersey
- BEHA014 Reducing Test Anxiety to Increase Academic Performance Through Novel Breathing Techniques and Digital Visualization**
Rhitishah Yuva Raju, 15, Sophomore,
Mira Loma High School, Sacramento, California
- BEHA015 The Language of Facial Expressions: A Neuroimaging Study on How a Smile Is Generated and Perceived by Another Person**
Amy Rose Shteyman, 18, Senior,
John L. Miller Great Neck North High School, Great Neck,
New York
- BEHA016 Alterations in Oligodendroglia Lineage Cells and Their Impact in Major Depressive Disorder**
Matthew Ryan Mullahy, 17, Junior,
Smithtown High School East, St. James, New York
- BEHA017 What Influences Safe Medication Practices: Investigating the Relationship Between Parent's Intentions, Self-Efficacy and Knowledge**
Emily Stephany Garcia, 17, Junior,
Young Women's Leadership Academy, San Antonio, Texas
- BEHA018T Cartography of Missing Teenagers within the Violence Triangle in the South Area of Sao Paulo City in 2016**
Clara Helena Vicentini Ferreira do Valle, 17, Senior,
Ana Carolina Bueno Goncalves, 16, Senior,
Beatriz de Souza Bim, 17, Senior,
Escola Nova Lourenco Castanho, Sao Paulo, Brazil
- BEHA019 The Effects of Lithium on Insomniac *Drosophila melanogaster***
Alaina Shana Leticia Otto, 18, Senior,
Sleepy Hollow High School, Sleepy Hollow, New York
- BEHA020 Diagnostic Test for Dyslexia, Year Three**
Ainsley McDonald-Boyer, 18, Senior,
Azle High School, Azle, Texas
- BEHA021 Banding Together: Gender's Role in Collaboration on a Logic Puzzle**
Elias Balslev Gilbert, 15, Sophomore,
Santa Cruz High School, Santa Cruz, California
- BEHA022T Correlation Between the Development of the Prefrontal Cortex and Reaction Time**
Jess Huber, 18, Senior,
Elsie Aslesen, 18, Senior,
Elk Point Jefferson High School, Elk Point, South Dakota
- BEHA023T The Upside Down in the Modern Day: The Changing Role of Father and Mother in Parenting World**
Tara Belinda, 17, Senior,
Putri Azizah Malik, 17, Senior,
Senior High School 2 Purbalingga, Purbalingga,
Central Java, Indonesia
- BEHA024T Providing Social Support for Cancer Survivors in Rural Indonesia**
Zahira Amaalia, 17, Senior,
Nur Bella Turcica Anibah, 17, Senior,
SMA Negeri 2 Bengkulu Selatan, South Bengkulu,
Bengkulu, Indonesia
- BEHA025 Drawit**
Dania Rasmi Almubiden, 15, Freshman,
Modern Systems School, Amman, Amman, Jordan
- BEHA026 Recreating Ancient Art Mediums**
Hailey Ann Boekelheide, 16, Sophomore,
Northwestern High School, Mellette, South Dakota
- BEHA027 What's Feeding Your Mind?**
Shantel A. Mack, 16, Freshman,
Waverly-South Shore Public School, Waverly, South Dakota
- BEHA028 Externality Framing Effects on Cognition**
Emma Grace Sun, 15, Sophomore,
The Waterford School, Sandy, Utah
- BEHA029 Assessment of Fall Risk Associated with High-Heeled Footwear Utilizing Computerized Dynamic Posturography: A Two-Phase Study**
Alexis McFeely, 16, Sophomore,
St. John Paul II Catholic High School, Huntsville, Alabama
- BEHA030T Learning in the Digital Era**
Amy Nicole Cyr, 17, Junior,
Sarah Arbuckle, 17, Junior,
Ames High School, Ames, Iowa

- BEHA031T The Petroglyphs Attribute in Pre-Columbian of Caldera**
Luz Jackeline Yanguez Franco, 18, Senior,
Liz Jackeline Yanguez Franco, 18, Senior,
Instituto David, David, Chiriqui, Panama
- BEHA032 Sex Perspective Rigidity and Sex Discrimination**
Troilus White, 16, Sophomore,
Cedar City High School, Cedar City, Utah
- BEHA033 Improving Communication for the Visually Impaired through an Innovative Arabic Writing System**
Taala Fahad Aboalnaja, 14, Freshman,
Third Intermediate School in Dhahran, Dhahran, Saudi Arabia
- BEHA034 Generation Z's Motivations to Use Social Media and Susceptibility to Anxiety**
Alisha Goyal, 18, Senior,
Hamilton High School, Chandler, Arizona
- BEHA035 Automatically Analyzing Open-Ended Survey Responses Using Statistical and Machine Learning Methods**
Devrath Iyer, 15, Sophomore,
Hamilton High School, Chandler, Arizona
- BEHA036T The Effect of Metformin on Post Traumatic Brain Injury Learning and Learning Disabilities**
Emma Elizabeth Bilton, 18, Senior,
Hannah Rose Bilton, 18, Senior,
Yorktown High School, Yorktown Heights, New York
- BEHA037 A Quantifiable Method to Detect and Monitor ADHD: The Use of Facial and Motion-Based Behavioral Cues Analysis Using Deep Neural Network and RGBD Data**
Ishaan Maitra, 16, Sophomore,
Ardrey Kell High School, Charlotte, North Carolina
- BEHA038 The Effect of Exercise on Neuroplasticity: A Skill-Based Approach**
John Austin Schupbach, 18, Senior,
Monett High School, Monett, Missouri
- BEHA039 The Impact of Emotionally Targeted Branding on Social Behavior**
Phoebe Mae Yates, 17, Senior,
Institute for Collaborative Education, New York, New York
- BEHA040 Effects of High Fat Diet on Metabolic Profile, Cognition, and Brain Derived Neurotrophic Factor (BDNF): Establishing a Connection Between Metabolic Dysregulation and BDNF Expression**
Rachel Elman, 16, Junior,
Fayetteville-Manlius High School, Manlius, New York
- BEHA041 Investigating the Relationship Between Polling Building Type and Voting Results: A Study in Priming**
Noah Ball Robinson, 17, Junior,
Bangor High School, Bangor, Maine
- BEHA042 S.O.S (Students Overcoming Stress) Gaining Insight and Addressing Student Stress: An Exploratory Study Analyzing the Different Modalities of Stress and Mindfulness on Adolescents**
Caitlin O'Donnell, 18, Senior,
Yorktown High School, Yorktown Heights, New York
- BEHA043 Treating Parkinsonian Neurodegeneration in Diabetic, Paraquat-exposed Drosophila by Increasing Caffeine Intake**
Ephraim Oyetunji, 17, Junior,
American Heritage School, Plantation, Florida
- BEHA044T Harmony: How Math Influences Our Esthetic Choices**
Gabriele Morello, 17, Senior,
Elisa Seghetti, 18, Senior,
Liceo Scientifico Galileo Ferraris, Torino, Italy
- BEHA045T Watch Out! Move Objects! Secure Your Furniture! Good Practices for Seismic Safety**
Annalisa Persello, 18, Senior,
Martina Piemonte, 18, Senior,
High School 'Magrini Marchetti', Gemona del Friuli, Udine, Italy
- BEHA046 Perceptual Learning Channel Predominance Among Young Students in a Public High School of Canovanas District of Puerto Rico**
Elymar Polanco Dominguez, 17, Senior,
Escuela Superior Luis Herniaz Veronne, Canovanas, Puerto Rico
- BEHA047 Combatting Familial Alzheimer's Disease by Comparing Calcium Retention of Mutated Presenilin Genes and Assessing the Restorative Potential of Parathyroid Hormone in a *Caenorhabditis elegans* Model**
Amber Bhutta, 16, Junior,
American Heritage School, Plantation, Florida
- BEHA048T Improving Facial Expression Recognition in Parkinson's Disease Using Meditation**
Ben Weiss, 17, Junior,
Kaitlynn Weiss, 15, Freshman,
Kalaheo High School, Kailua, Hawaii
- BEHA049 Caffeine and Sugar vs. Focus**
Aisling Irene Finnegan, 17, Junior,
Murphy High School, Mobile, Alabama
- BEHA050 The Effects of Multilingualism on the Working Memory of Human Subjects**
Joaquin Alejo Gomez, 15, Sophomore,
Benjamin Franklin High School, New Orleans, Louisiana
- BEHA051T Unplugged: Quantifying the Effects of Technology on Adolescent Sleep and Mood**
Louise Aehyun Hostrup Kim, 16, Junior,
Spencer Lee Yueh, 17, Junior,
Breck School, Golden Valley, Minnesota
- BEHA052 FacePrint: A Novel, Differential Diagnostic and Monitoring Tool for Parkinson's Disease, Essential Tremor, and Atypical Parkinsonism Using Facial Behavioral Biomarkers and Dynamic Video Footage Tracking with Machine Learning**
Erin Smith, 18, Senior,
Shawnee Mission West High School, Overland Park, Kansas
- BEHA053T CAC-Companions of Autistic Children**
Pham Nhat Minh Tran, 16, Sophomore,
Thi Hau Nhu Nguyen, 16, Junior,
Tran Phu Gifted High School, Hai Phong, Viet Nam
- BEHA054 Whistle While You Work It**
Mikayla Grace Wolfe, 17, Junior,
Tioga High School, Tioga, North Dakota
- BEHA055T Creation of a Diagnostic Tool to Identify Spatial Abilities in Scholastically-Classified Slow-Learners**
Tanya Kaur Talwar, 15, Freshman,
Akshat Gupta, 14, Sophomore,
Amity International School, Pushp Vihar, New Delhi, Delhi, India
- BEHA056T Blind's Eye**
Farah F. I. Ghanim, 16, Junior,
Danya S. A. Ishtaiwi, 17, Junior,
Immatain Secondary Mixed School, Qalqelia, Palestine
- BEHA057 Are Twenty-Four Heads Better than One? Testing the Optimal Group Size for Decision-Making in a Social Insect**
Sylvia Zarnescu, 18, Senior,
Catalina Foothills High School, Tucson, Arizona
- BEHA058 Can a Preventative Social Media UI Break "Fake News?"**
Ryan Miles Beam, 16, Sophomore,
Scotts Valley High School, Scotts Valley, California

- BEHA059 Test Tunes**
Naomi Rae Higgins, 15, Freshman,
The Georgetown School of Arts and Sciences, Georgetown,
South Carolina
- BEHA060 An Interactive Design of an Upper Limb Therapy Method for Stroke and Spinal Cord Injury to Measure Patient's Motor Performance Quantitatively and Objectively with Tangible Robotic Companionship and Emotion Assessment**
Mustafa Muhyi, 16, Junior,
Las Cruces High School, Las Cruces, New Mexico
- BEHA061 The Effect of Noise Reduction and Pink Noise on Memory and Cognition**
Grayson Roger Gretzinger, 18, Senior,
Oak Grove High School, Hattiesburg, Mississippi
- BEHA062T MJF Smart Cane**
Mays K. A. Hussein, 15, Sophomore,
Jwana M. O. Ainasawi, 14, Freshman,
Applied Nour Al-Huda School, Ramallah, Palestine

Biochemistry

- BCHM001 Evaluation of the Biocatalytic Potential of Agroindustrial Residues by Employing the Orange Peel Residue as a Biocatalyst in the Asymmetric Bioreduction Reaction of the Acetophenone Substrate to 1-Phenylethanol**
Gabriel Negrao de Moraes, 18, Senior,
Escola Djalma Pessoa - Sesi Bahia, Salvador, Bahia, Brazil
- BCHM002 Hydrolysis of the Bovine Milk Lactose from Beta-Galactosidase Enzyme Obtained by Extraction and Permeabilization of *Saccharomyces fragilis* IZ 275 Cells**
Amanda Sayuri Senoo Kakuno, 16, Junior,
Colegio Interativa, Londrina, Parana, Brazil
- BCHM003 Novel Replication Fork Protection Factor #**
Karina Zadorozhny, 19, Senior,
Prvni Ceske Gymnazium v Karlovych Varech,
Karlov Vary, Czech Republic
- BCHM004T Cantaloupe Seeds: An Exploitable Waste**
Samantha Serna Fernandez, 18, Senior,
Susana Sosa Ballesteros, 18, Senior,
Alejandra Perez-Merodio Gomez, 18, Senior,
Instituto Cumbres Alpes Torreon, Torreon, Mexico
- BCHM005 The Development of Biligand Inhibitors and Non-Radioactive Inhibition Assay for Protein Kinase Aurora B**
Mirel Mesila, 18, Senior,
Tallinn Secondary School of Science, Tallinn, Harjumaa, Estonia
- BCHM006 Effective Evasion of Chemotherapeutic Resistance by Functionalized Viral Capsid QB #**
Sangita Vasikaran, 16, Junior,
Texas Academy of Mathematics and Science, Denton, Texas
- BCHM007 The Role of Sarcolipin Protein on Energy Expenditure and Obesity Prevention**
Kadambari Vyas, 17, Junior,
Lake Nona High School, Orlando, Florida
- BCHM008 Alteration of the Metabolism of *Chlorella* in a Productive Way**
Fidan Ibrahimova, 15, Sophomore,
Lyceum Named after Academician Zarifa Aliyeva, Baku,
Azerbaijan
- BCHM009 Glycosylation of the Cardiac Ion Channel Protein TRPM4 in Rat and Mouse Tissues**
Nicole Barbara Christine Hasler, 20 Senior,
Neue Kantonsschule Aarau, Aarau, Switzerland
- BCHM011 Developing a Novel Inhibitor for Cdc14, in the Fungus *Aspergillus niger***
Stephanie Xue Zhang, 18, Senior,
Fairview High School, Boulder, Colorado
- BCHM012 The Difference in the Energy Release of Lipids vs. Carbohydrates Based on Their Chemical Structure**
Mairead Baker, 16, Sophomore,
Boston Latin Academy, Boston, Massachusetts
- BCHM013 Identifying Metabolic Inhibitors to Target Aggressive Cancers with Deregulated p27kip1**
Michael Ken-Long Hwang, 16, Sophomore,
Jenks High School, Jenks, Oklahoma
- BCHM014 Post-Translational Modification of LaminB1 as a Regulator of Translesion DNA Synthesis (TLS)**
Dvora Rywka Sehtman, 17, Senior,
Ulpenat Bnei Akiva Orot Modiin, Israel, Modiin Macabim
Reut, Israel
- BCHM015T Medicinal Activity of *Larrea tridentata* and *Juniperus osteosperma* Extracts**
Destiny Jonisha Max, 17, Junior,
Rachel Rae Gallego, 17, Junior,
Owyhee High School, Owyhee, Nevada
- BCHM016 The Role of Autotaxin-LPA-LPP3 Axis in Ischemic Stroke**
Grace Karen Sun, 16, Sophomore,
Caddo Parish Magnet High School, Shreveport, Louisiana
- BCHM017 Targeting a Redox Dependency in Pancreatic Ductal Adenocarcinoma**
Julia Park, 18, Senior,
Plainview-Old Bethpage John F. Kennedy High School,
Plainview, New York
- BCHM018 The Effect of Ocean Acidification on Native Oyster Reproduction and Larval Development**
Anna Christine Mattson, 18, Senior,
Tillamook High School, Tillamook, Oregon
- BCHM019 Biodegradable Polymers for Protein and DNA Drug Delivery**
Ariel Jade Butler, 16, Junior,
Sibley East High School, Arlington, Minnesota
- BCHM020 Rab35: A Potential Therapeutic Target for Alzheimer's Disease**
Madiha Qureshi Zia, 18, Senior,
Ossining High School, Ossining, New York
- BCHM021 Optimal Circadian Rhythms of Pyrocystis Dinoflagellate Algae for Maximizing Bioluminescence**
Carissa Margaret Bruton, 17, Junior,
Winnsboro High School, Winnsboro, Texas
- BCHM022 Exploring the Floating Mechanism of Algal Cells Responsible for Cyanobacterial Blooms**
Lixin Zhang, 15, Sophomore,
Xiamen Shuangshi Middle School, Xiamen, Fujian, China
- BCHM023 Developing an Optimal Fluorescent Protein Tag**
Mia Pellegrini, 16, Junior,
Pittsburgh Allderdice High School, Pittsburgh, Pennsylvania
- BCHM024 Uncovering the Hidden Defense Mechanisms of Flaviviruses**
Jacqueline Liu, 17, Senior,
Urbana High School, Ijamsville, Maryland
- BCHM025 The Effects of Exercise on Cognitive Impairment due to Metabolic and Epigenetic Dysregulation**
Aysha Mariyam Puzhakkaraillath, 15, Sophomore,
duPont Manual High School, Louisville, Kentucky
- BCHM026T New Materials with Micron Network Membrane Morphology: The Research of Their Potential Usage in Proteomic Studies**
Roza Mercan Eskin, 15, Sophomore,
Halil Ozgur, 16, Sophomore,
Gaziemir Ozel Rota Fen Lisesi, Izmir, Turkey
- BCHM027 The Effect of Nonassociative Learning on Oxidative Stress in *Caenorhabditis elegans*: A Potential Application for Alzheimer's Disease Research**
Gillian Elizabeth Patton, 16, Junior,
Spring Valley High School, Columbia, South Carolina
- BCHM028 Determination of Optimal Metal Conditions for Adaptation in a Type 1E CRISPR System**
Lily Kathleen DeBell, 17, Junior,
Baltimore Polytechnic Institute, Baltimore, Maryland
- BCHM029 Neutralizing Free Radical Peroxynitrite Using Antioxidants**
Savannah Margaret Huff, 18, Senior,
Joplin High School, Joplin, Missouri
- BCHM030 Cancer is MAD(2L2); Regulation of Rev7, on Survival and Chemoresistance in Multiple Myeloma**
Jordan Levett, 16, Sophomore,
Herzliah High School, Montreal, Quebec, Canada
- BCHM031 Cell Surface Engineering of Glycosaminoglycan Mimetics for Targeting Parkinson's Disease**
Vicky Qianqian Qu, 18, Senior,
Raffles Institution, Singapore, Singapore, Singapore

- BCHM032 Magnetite Synthesis for Drug Delivery Purposes**
Pablo Luis Garcia, 16, Junior,
Union City High School, Union City, New Jersey
- BCHM033 The Agricultural Application of Phytomethylotrophy**
Frank Kaelin Mittel, 18, Senior,
American Fork High School, American Fork, Utah
- BCHM034T Identification, Cloning and Recombinant Expression of Novel Bioactive Peptides from Coral: Clues to Potential New Therapeutics for Human**
Chun Hei Fong, 14, Freshman,
Chi Kio Chan, 18, Senior,
Pui Ching Middle School, Macau, China,
Macao Special Administrative Region
- BCHM035 The Effects of Alkaline and Acidic Substances on Catalase Functionality and Molecular Structure**
Emily Ann Dean, 14, Freshman,
Woodstock Union High School Middle School,
Woodstock, Vermont
- BCHM036 Buffalo vs. Beef: Analyzing Lipid Content in Search of Potential Health Benefits (Phase II)**
Elise Monique DuBray, 17, Senior
Timber Lake High School, Timber Lake, South Dakota
- BCHM037T Novel Bacteriophage Lysin: A Solution for Antibiotic Resistant *Staphylococcus aureus* Infection in Vietnam**
Tuyet Quynh Anh Le, 17, Senior,
Thi Minh Hue Pham, 17, Junior,
Tran Phu Gifted High School, Hai Phong, Viet Nam
- BCHM038 The Biochemical Interactions of Cardiac Ion-Blocking Agents and Optical Coherence Tomography *in vivo* for Cardiovascular Diseases**
Rhea Malhotra, 15, Sophomore,
Moravian Academy, Bethlehem, Pennsylvania
- BCHM040 Allosteric Inhibition of the Carbonic Anhydrase IX for Anticancer Applications**
Nandini Tondamantham Naidu, 17, Senior,
Valley Catholic High School, Beaverton, Oregon
- BCHM041 Targeting Apoptotic Pathways by Regulating Caspase-3 with Chemo-Preventive Agents for Cancer Therapeutics**
Tanya Mehta, 14, Freshman,
Parkland High School, Allentown, Pennsylvania
- BCHM042 Heterocyclic Arylidene Chemical Compounds vs. Glioblastoma**
Megan Wieger, 15, Freshman,
Berrien County Mathematics and Science Center,
Berrien Springs, Michigan
- BCHM043T The Influence of Citric Acid on Bacterial Growth**
Noemie Ney, 15, Sophomore,
Jean-Marc Raffaello Matteo Furlano, 16, Sophomore,
Atert-Lycee Redange, Redange/Attert, Luxembourg
- BCHM044 Engineering a Bacterial Pathogen with an Enhanced Luminescent Reporter for High-Throughput Resistance Assays**
Isabella Quisqueya Elmore, 16, Sophomore,
San Marcos High School, San Marcos, Texas
- BCHM045T Release of Active Pharmaceuticals Using Hyperbranched Polyesters**
Brandon Zhu, 18, Senior,
Daniel Lin Zhang, 17, Senior,
Herbert Henry Dow High School, Midland, Michigan
- BCHM046T Organic Arch Support**
Soukaina El Atifi, 17, Junior,
Lidiya Assefa Gebbru, 18, Junior,
Excel High School, Boston, Massachusetts

Biomedical and Health Sciences

- BMED001 Treatment of Human Melanoma: Overcoming Cell Resistance by Glutathione Depletion (Phase II)**
Juliana Martes Sternlicht, 17, Senior,
Colegio Dante Alighieri, Sao Paulo, Sao Paulo, Brazil
- BMED002 Using CRISPRi to Analyze the Role of Caveolae-Mediated Endocytosis in Tau Uptake of Central Nervous System Culture**
Helen Zhang, 17, Senior,
Concordia International School Shanghai, Shanghai, Pudong, China
- BMED003 Discovery of Blood-Brain Barrier Disruption Regional Variability and Neuronal and Glial Uptake of Fibrinogen in Multiple System Atrophy Using a Novel Color Deconvolution Algorithm**
Devanik Biswas, 18, Senior,
Stanton College Preparatory School, Jacksonville, Florida
- BMED004 Igniting Tumorigenesis: Gamma-Glutamyl-Glutamine Induced Transformation of NIH 3T3 Cells**
Sabrina Jones, 18, Senior,
Arkansas School for Mathematics, Sciences and the Arts, Hot Springs, Arkansas
- BMED005 Investigating Whether FOXO1 Hinders ZEB1 Gene Expression in (U87MG) Glioblastoma Cells**
Angelica Rodriguez, 17, Junior,
UTRGV Mathematics and Science Academy, Edinburg, Texas
- BMED006 Effectiveness of 3D vs. 2D *in vitro* Well Treatments**
Lillian Nicole Zobel, 18, Senior,
Satellite High School, Satellite Beach, Florida
- BMED007 Differential Inflammatory Genes Expression Between the Inflamed and the Unaffected Gut Tissues of Inflammatory Bowel Disease Patients**
Radhika Uday Desai, 18, Senior,
Lake Highland Preparatory School, Orlando, Florida
- BMED008 Protective Effects of Natural Products Like Curcumin and *Centella asiatica* Against Amyloid Beta Induced Mitochondrial Dysfunction in Ocular Manifestations of Alzheimer's Disease**
Himanshi Verma, 16, Sophomore,
Eastside High School, Gainesville, Florida
- BMED009 Identification of Novel Drivers of Insulin Resistance and Type 2 Diabetes in the Skeletal Muscle Tissue of Non-Obese Individuals Using a Multi-Omics Approach**
Adithya Mummidi, 17, Senior,
Keystone School, San Antonio, Texas
- BMED010 East Indian Sandalwood Oil (EISO) as a Therapeutic Target for Disease: A Study of TRPM7, Ion Channels (Year IV)**
Nia Myfanwy Clements, 17, Senior,
Keystone School, San Antonio, Texas
- BMED011 Role of Telomerase in Vascular Function and Exploration of Mitochondrial Dynamics: A Novel Approach to Treatment of Vascular Dysfunction**
Nabeel Jami Quryshi, 18, Senior,
University School of Milwaukee, Milwaukee, Wisconsin
- BMED012 Exosomes and Macrophage Polarization in Lung Cancer**
Alexandra Pritchard, 16, Junior,
The Altamont School, Birmingham, Alabama
- BMED013 Sleep Deprivation: "Are You Getting Enough Sleep?"**
Corbin Osburn, 15, Sophomore,
Rural Special High School, Fox, Arkansas
- BMED014 Efficiency of a Novel Nano-Cardiac Device for Atherectomy of Coronary Artery Occlusion**
Ethan Zvi Levy, 15, Sophomore,
Dr. Michael M. Krop Senior High School, Miami, Florida
- BMED015 Nanoparticle-Mediated Sorting of Circulating Tumor Cells**
Kaiya Mitchell, 18, Senior,
Benjamin E. Mays High School, Atlanta, Georgia
- BMED016 Can Yeast Help Boost the Immune Response to Cancer?**
Edward Qihao Zhong, 16, Junior,
Kentucky Country Day School, Louisville, Kentucky
- BMED017 Stress Signaling Inhibitory Effects of Estrogen Cardioprotection in Myocardial Ischemia**
Lilly Anne Denis Kamberov, 17, Senior,
Caddo Parish Magnet High School, Shreveport, Louisiana
- BMED018T Melatonin's Effect on Learning and Memory in a Tauopathy Model of Alzheimer's Disease in *D. melanogaster***
Sada Rose Nichols-Worley, 17, Senior,
Sophie Haugen, 18, Senior,
Saint Mark's School, Southborough, Massachusetts
- BMED019 Mast Cell Quantity and Localization in the Hearts, Quadriceps, and Diaphragms of a Duchenne Muscular Dystrophy Model**
Justin Vo Duffy, 17, Senior,
Mounds View High School, Arden Hills, Minnesota
- BMED020 Drawing the Line Between Atypical Ductal Hyperplasia and Ductal Carcinoma *in situ***
Joshua Matthew Proehl, 18, Senior,
New London-Spicer High School, New London, Minnesota
- BMED021 Effect of Protein Kinase Inhibitors on Tau Hyperphosphorylation as a TBI Cell-Based Model**
Milin Jiji Kurup, 18, Senior,
T. R. Robinson High School, Tampa, Florida
- BMED022 The Effect of Senescence on *Drosophila* Rhythmic Behavior and Possible Molecular Mechanism**
Jiaming He, 17, Junior,
Beijing No. 4 High School, Beijing, Beijing, China
- BMED023 Can I Eat That? An Investigation into the Effectiveness of Gluten Digestive Dietary Supplements**
Cassandra Leigh Dods, 18, Senior,
Tintern Grammar, Melbourne, Victoria, Australia
- BMED024 The Role of Carbohydrate Sulfotransferase 11 on Epithelial-to-Mesenchymal Transition in Lung Cancer Cells**
I-An Chiu, 18, Senior,
Taipei First Girls High School, Taipei, Taiwan
- BMED025 Ovarian Cancer Pathogenesis Is Associated with Decreased Expression of the Zinc-Finger Transcription Factor SLUG**
Emma Theresa Kelly, 16, Junior,
Newton Country Day School of the Sacred Heart, Newton, Massachusetts
- BMED026 What Is the Role of Wolfram in the Endoplasmic Reticulum Ca²⁺ Signaling Network?**
Daniel Edwin Schaffer, 16, Junior,
Montgomery Blair High School, Silver Spring, Maryland
- BMED027 More than Skin Deep: Deciphering the Role of *Bartonella henselae* Infection in Melanoma Metastasis, (Phase Two)**
Cole Maxwell, 18, Senior,
Breck School, Golden Valley, Minnesota
- BMED028 Next Generation Intracellular Delivery: Optimization of Exosome Isolation and Novel Exosome-Mediated Delivery for Therapeutic Targeting of Cancer**
Megha Nitin Joshi, 16, Junior,
South Salem High School, Salem, Oregon
- BMED029 Effect of Plasma Exosomes in Polymicrobial Sepsis on Erythrocyte Deformability**
Srikrishnan Pillai Raju, 16, Junior,
Lakeside High School, Evans, Georgia

- BMED030 Evaluating the Potential of CD264 as an Effective Biomarker for Cellular Aging in Mesenchymal Stem Cells**
Amaris Rachael Lewis, 16, Junior,
Lusher Charter High School, New Orleans, Louisiana
- BMED031 Dihydotanshinone: A Pan-Therapeutic Treatment for Chemoresistance in Cancer**
Varun Kumar, 16, Junior,
Bergen County Academies, Hackensack, New Jersey
- BMED032 BIC Augments the Proliferative Effects of miR-155 in Diffuse Large B Cell Lymphoma Via Downregulation of Tumor Suppressor and Anti-Apoptotic Targets**
Rinni Bhansali, 17, Junior,
Half Hollow Hills High School East, Dix Hills, New York
- BMED033 Riluzole Rescues Non-Canonical Akt Signaling and Improves Hereditary Hemorrhagic Telangiectasia Vascular Pathology**
Radhika Patel, 18, Senior,
Syosset High School, Syosset, New York
- BMED034 Establishment and Characterization of Topotecan Resistant NCI-H460/TPT10 Cells**
Kimberly W. Lu, 18, Senior,
William A. Shine Great Neck South High School, Great Neck, New York
- BMED035 Development of Differentiation Therapies for NPM1 Mutated AML**
Allison Sewell, 17, Junior,
Hawken School, Gates Mills, Ohio
- BMED036 Wasp Venom Stings Cancer: Investigation of Dictyostelium as a Model Organism and the Potential of an Improved Treatment Delivery System**
Rini Vyomesh Kaneria, 17, Senior,
Conrad Weiser High School, Robesonia, Pennsylvania
- BMED037 A Microbiome Approach to Treat Galactosemia, a Life-Threatening Disorder**
Philippe Ingemann Hansen-Estruch, 17, Senior,
Canyon Crest Academy, San Diego, California
- BMED038T The Detection of Peanut Protein on Eating Surfaces in Monterey County Public Schools and on Commercial Passenger Airliners**

Camryn Leigh More, 17, Junior,
Annalisa Jane More, 14, Freshman,
Salinas High School, Salinas, California
- BMED039 Strategic Epithelialization: Utilizing RNA Interference to Inhibit Novel Microtubule Depolymerase Fidgetin Like-2 in Human Umbilical Vein Endothelial Cells**
Ifeoluwa Tugbobo, 17, Senior,
Elmont Memorial Junior-Senior High School, Elmont, New York
- BMED040 From EpiPens to EpiGenetics: Understanding the Mechanisms Behind the Microbiome's Impact on Peanut Allergies**
Isabella M. Heffernan, 14, Freshman,
St. Mary Academy - Bay View, Riverside, Rhode Island
- BMED041 Inhibitor A: Targeting Therapeutically Resistant HER2+ Breast Cancer Tissues**
Alexander James Schaffer, 18, Senior,
May River High School, Bluffton, South Carolina
- BMED042T Total Sponge and Coral Proteins Show Promise for Slowing N2a Cancer Cell Division**
Ben Smith, 18, Senior,
Grant Harrison Smith, 18, Senior,
McCallie School, Chattanooga, Tennessee
- BMED043 The Effect of Different Wavelengths of Amplified Light on the Corneas of Cow Eyes**
Makenzie Paula Moore, 16, Sophomore,
Syracuse High School, Syracuse, Utah
- BMED044T Identifying Alzheimer's-Associated Proteins as Substrates of a Novel Protein Quality Control Pathway**
Karthik Sai Budharaju, 18, Senior,
Christopher Bi, 16, Junior,
Thomas Jefferson High School for Science and Technology, Alexandria, Virginia
- BMED045 Analysis of Periodontal Trends within the United States in Comparison to Developing Countries to Further Oral Disease Prevention Understanding**
Michaela Rachel Kyer, 17, Senior,
Yorktown High School, Yorktown Heights, New York
- BMED046 Optimization of Lipid-Coated Mesoporous Silica Nanoparticles for Cancer Immunotherapy**

Lien Tang, 18, Senior,
Manzano High School, Albuquerque, New Mexico
- BMED047 The Protease Inhibiting Effects of Almonds**
Caitlin Lucy Roberts, 18, Senior,
The Friends' School, Hobart, Australia
- BMED048 Tissue-Specific Requirement of Autophagy Gene Atg-18, Is Essential for Lipid Metabolism Regulated by Insulin-like Signaling in *Caenorhabditis elegans***

Ray Jia, 18, Senior,
Alexander W. Dreyfoos School of the Arts,
West Palm Beach, Florida
- BMED049 Using Unique Ultrashort Inhibitor Peptide as BETA-Amyloid Modulator in *C. elegans***
Abdulelah Ghazi Alharbi, 16, Senior,
Alssdeq Secondary School, Hail, Saudi Arabia
- BMED050 Viability of Lung Cancer Cells After Exposure to a Commercial Mixture of a Natural Compound Extracted from Seaweed and Cereals**
Serena Catalina Florez, 16, Junior,
Academia Interamericana de Arecibo, Arecibo, Puerto Rico
- BMED051 The Effect of Nitric Oxide Synthase Inhibition on Spiral Arteries and Venous Remodeling During Rat Pregnancy**
Anna Grace Oblak, 14, Sophomore,
South Burlington High School, South Burlington, Vermont
- BMED052 The Effect of Green Tea on a Dementia Patient's Cognitive Ability**
Aislin Claire Gamon, 17, Senior,
Mead Senior High School, Spokane, Washington
- BMED053T The Association of the KIT Gene with Colorectal Cancer**
Marlee Feltham, 17, Junior,
Rishima Mukherjee, 16, Junior,
West Linn High School, West Linn, Oregon
- BMED054 Role of G Protein Receptor Kinase 3 (GRK3) on Pathogenesis of Osteoarthritis**
Hyun Ho Lee, 18, Senior,
North Carolina School of Science and Mathematics, Durham, North Carolina
- BMED055 Developing Diagnostic Tools for Vascular Disease Using RNA Markers**

Brindha Priya Rathinasabapathi, 16, Sophomore,
Eastside High School, Gainesville, Florida
- BMED056 Blocking Multidrug Resistance in Cancer Cells with MicroRNA Mimics**
Seo-Hyun Yoo, 17, Junior,
Lexington High School, Lexington, Massachusetts
- BMED057 Potentiation of Glutamatergic Neurons of the Medial Amygdala Promotes Aggression**
Jada Christine Collins, 18, Senior,
Oxon Hill High School, Oxon Hill, Maryland

- BMED058 Multiple Sclerosis and Epilepsy: Insights into a Potential Therapy Through the Role of Mutation T1244C of Theiler's Murine Encephalomyelitis Virus (TMEV) in Reducing Virulence**
Xiao Zhou, 16, Junior,
College Station High School, College Station, Texas
- BMED059 Bidara Vape (The Potential as a Mosquito Repellent)**
Muhammad Danial Afham Zailan, 16, Sophomore,
Sekolah Menengah Kebangsaan Palong Timur, Batu Anam,
Segamat, Malaysia
- BMED060 An Affordable, Autonomous, AI-Enhanced Microscope to Enable Efficient Diagnosis of Parasitic Infection in Developing Countries**
Alice Martynova, 16, Junior,
Los Gatos High School, Los Gatos, California
- BMED061 Tumorigenic Effect of a Cannabinoid Receptor Blocker in a Squamous Cell Carcinoma Cell Line: Implications for Treatment**
Daniel Baksh, 16, Sophomore,
Lancaster Catholic High School, Lancaster, Pennsylvania
- BMED062 Quantifying Lung Macrophages to Understand Increased Susceptibility to Bacterial *Pneumonia* with Age**
Anika Gupta, 16, Sophomore,
Westdale Secondary School, Hamilton, Ontario, Canada
- BMED063 A Novel Pediatric Cancer Therapy Targeting Epigenetics and Neuroblastoma Differentiation**
Colette Erin Benko, 17, Senior,
St. Mary's High School, Calgary, Alberta, Canada
- BMED064 The Effect of Folic Acid on Adipose Derived Mesenchymal Stem Cells Migration and Proliferation with Gamma Secretase Inhibitor**
Kathryn L. Richards, 17, Senior,
Sarasota High School, Sarasota, Florida
- BMED065 Transcription Factor Preferences of Bacterial Detection Proteins**
Rollin Leavitt, 18, Senior,
Animas High School, Durango, Colorado
- BMED066 The Effect of Ketoacidosis on the Breath: A Cost-Efficient Way to Monitor Ketones**
Cody Kay Robinson, 16, Junior,
Yuma High School, Yuma, Colorado
- BMED067T Near Infrared Light Photobiomodulation and *C. longa* Mitigates the Neurological Effects of Mutant Amyloid Beta Precursor Protein Pathway in *D. melanogaster***
Hoang Le, 17, Junior,
Laura Sarah Allen, 17, Junior,
Western High School, Davie, Florida
- BMED068 The Role of Notch Signaling in T-Cell Acute Lymphoblastic Leukemia**
Jessica Finkler, 18, Senior,
Mahopac High School, Mahopac, New York
- BMED069 EEG Coherence as a Marker for Alzheimer's Dementia**
Crystal Kelly Radinski, 17, Junior,
Rundle College, Calgary, AB, Canada
- BMED070T Novel Strategies for Detecting and Treating Podocyte Injury in Diabetic Nephropathy**
Nicole Hankovszky, 15, Sophomore,
Evelyn Ariana Bodoni, 16, Sophomore,
Cherry Creek High School, Greenwood Village, Colorado
- BMED071 An In-Depth Patch Clamp Study of HCN2 Channels: Cyclic AMP – A Possible Novel Therapy for the Treatment for the Suppression of the I_h Current by Dexmedetomidine**
Perisa Satish Ashar, 15, Freshman,
Maggie L. Walker Governor's School, Richmond, Virginia
- BMED072T Using C# Programming Language to Create a Ready to Use Therapeutic Food (Rutf) Aimed at Addressing the Nutritional Needs of the Undernourished in Kenya**
Aleena Sara Saji, 16, Sophomore,
Atiya Kadide Kuwehan, 15, Sophomore,
Shree Cutchi Leva Patel Samaj School, Nairobi, Kenya
- BMED073T *Garcinia binucao* Fruit and Leaf: Phytochemicals-Mediated Antioxidant, Alpha-Amylase and Alpha-Glucosidase Enzyme Inhibitors**
Leann Patrice Advincola Ganzon, 17, Sophomore,
Anne Nicole Occena, 16, Sophomore,
Iloilo National High School, Iloilo City, Philippines
- BMED074T Use of Cardiac Stent to Restore Blocked Air Passage in Chronic *Sinusitis***
Ahmed Bassel Abboushi, 16, Junior,
Ali Nasser Murad, 16, Junior,
Ahmad Bin Hanbal Secondary School, Doha, Qatar
- BMED075 Computational and Experimental Methods to Find Targets of HCFC1, a Gene Linked to Neurological Disease**
Anand Manohar Chundi, 15, Sophomore,
Skyview Academy, Highlands Ranch, Colorado
- BMED076T The Study of Concentration of Urine Neurotransmitters of Dopaminergic and Serotonergic System and the Relationship to Behavioral Disorders in Patients with Online Game Addiction**
Ha Khoa Le, 16, Junior,
Phuong Nam Nguyen, 16, Junior,
Nguyen Hue High School for Gifted Students, Hanoi, Viet Nam
- BMED077T Identification of the Gene by Which Physical Exercise Protects Brain Injury Against Stroke**
Fahema Shaik, 17, Junior,
Fathima Shaik, 17, Junior,
Morgantown High School, Morgantown, West Virginia
- BMED078T A Novel Approach to a p53-Stabilizing Agent to Accelerate Cell Apoptosis and Initiate Cell Arrest and Curb Malignancy of Tumor Cells**
Shuvayu Dasgupta, 17, Junior,
Syed Roshan Ali, 16, Junior,
La Martiniere for Boys, Kolkata, Kolkata, West Bengal, India
- BMED079 Diabetes Biomarker Study on the Navajo Nation**
Kaylin Nicole McLiverty, 16, Sophomore,
Navajo Preparatory School, Farmington, New Mexico
- BMED080 The Effect of Various Sodium Hypochlorite Solutions on Porcine Dental Pulp Dissolution**
Shannon Caitlin Kirkpatrick, 18, Senior,
St. Patrick Catholic High School, Biloxi, Mississippi
- BMED081 What Conditions Do Planarians Regenerate Best In?**
Britney Kristen Freund, 18, Senior,
Lakota High School, Lakota, North Dakota
- BMED082 Drug Testing Chemotherapies to Identify Kinase Pathways Affected by Hypertrophic Cardiomyopathy**
Himani Sood, 17, Junior,
Westview High School, Portland, Oregon
- BMED083 A Novel Inflammation Detection Device Through Hydrogen Peroxide Decomposition**
Michael Chen, 15, Sophomore,
Ridgeview High School, Orange Park, Florida
- BMED084T The Use of Calf Intestinal Alkaline Phosphatase and CRISPR to Change the Permeability of the BBB**
Mehmet Ihsan Kiziloglu, 15, Freshman,
Muhammed Ahmed Mudheher, 17, Junior,
Kirkuk Cag Boys College, Kirkuk, Girnata, Iraq

Biomedical Engineering

- ENBM001T** **Sit to Play- Floor-Level Adaptable Mobility Device for Paraplegic Children**
Matheus Bender, 18, Senior,
Emerson da Costa e Silva, 18, Senior,
Fundacao Escola Tecnica Liberato Salzano Vieira da Cunha,
Novo Hamburgo, Rio Grande do Sul, Brazil
- ENBM002** **Fish & Snips: Facilitating Wound Healing through Tilapia Collagen Dressing**
Juyeon Baik, 17, Junior,
Concordia International School Shanghai, Shanghai,
Pudong, China
- ENBM003T** **Lipid Structures in Microelectromechanics (Mems) and Their Use in the Drug Delivery**
Andrei Cristian Ionescu, 17, Junior,
Serghei Ulian, 17, Junior,
Colegiul National Mihai Viteazul Ploiesti, Ploiesti, Prahova,
Romania
Liceul Teoretic International de Informatica Bucuresti, Bucharest,
Bucharest, Romania
- ENBM004** **Rotating Electric Spark: Innovative Medical Device**
Valeriia Lebedeva, 17, Junior,
Gymnasium #5 of Korolyov, Korolyov, Moscow Region,
Russian Federation
- ENBM005** **Single-Step Breast Cancer Detection Method Through Measurement of Gold Nanoparticle Adsorption to Lysine Amino Acid**
Liam A. Ordner, 17, Junior,
Niceville High School, Niceville, Florida
- ENBM006** **A Cardio-Auxiliary Bracelet for the Monitoring of Arrhythmias**
Daniela Vianey Luna Sandoval, 16, Junior,
Colegio de Estudios Cientificos y Tecnologicos del Estado de
Queretaro, Queretaro, Mexico
- ENBM007T** **In vitro Cytotoxicity Testing of PEEK Biomaterials on Mesenchymal Stromal Cells**
Samuel Smoter, 18, Junior,
Miriam Feretova, 18, Junior,
Saint Nicholas Grammar School, Presov, Slovakia
- ENBM008** **"Anaphylactic Shocker!": The Use of a Dynamic QR Code Medical Bracelet and Connected Bluetooth Carrying Case to Locate and Administer a Practice Epinephrine Auto-Injector During a Staged Medical Emergency**
Katelyn Jo France, 18, Senior,
Hinckley-Finlayson High School, Hinckley, Minnesota
- ENBM009T** **So that Load-Bearing Implants Do Not Burden: Load Analyzes for the Selection of Joint Replacements**
Paula Lankowski, 19, Senior,
Bianca Kreitz, 19, Senior,
Lea Kampfert, 19, Senior,
Innerstädtisches Gymnasium, Rostock, Germany
- ENBM010** **Solar Powered Decontaminator Design and Testing**
Alyssa Keirn, 16, Sophomore,
Rocky Mountain High School, Fort Collins, Colorado
- ENBM011** **Is Honeybee Silk Antimicrobial?**
Ella Jade Cuthbert, 15, Sophomore,
Lynham High School, Canberra, Australia
- ENBM012** **Detection of Ear Infection Using a Smartphone Application**
Anushka Sameer Jetly, 15, Sophomore,
Friendswood High School, Friendswood, Texas
- ENBM013** **Superhydrophobicity of Biocompatible Titanium Dioxide Nanotubes**
Helvi Shah, 15, Sophomore
Little Rock Central High School, Little Rock, Arkansas
- ENBM014** **3D Printable Prosthetic Foot**
Everett Adien Jeffrey Kroll, 17, Junior,
Stillwater Area High School, Stillwater, Minnesota
- ENBM015** **Creating a High Fidelity Portable Electrocardiogram Analysis System**
Sanjeev Melchizedek Gunawardena, 16, Junior,
Centerville High School, Centerville, Ohio
- ENBM016** **Sucrose Addition Improves Targeted ECO/siBeta3 Nanoparticle Stability**
Michelle Yin, 18, Senior,
Hathaway Brown School, Shaker Heights, Ohio
- ENBM017** **Design and Mechanical Analysis of a Promising Hip Prosthesis Using Quaternions**
Rei Landsberger, 18, Senior,
Palos Verdes Peninsula High School, Rolling Hills Estates,
California
- ENBM018** **HeartMonitor: An Integrated Home-Based and Mobile Heart Attack Monitor and Alert System**
Kavinya Theumali Welikala, 16, Junior,
Daramalan College, Canberra, ACT, Australia
- ENBM019T** **HDYS (How Did You Sleep): A Home-Based System for Monitoring and Treating Insomnia**
Yuval Bazak, 18, Senior,
Shir Ner Gaon, 17, Senior,
Omer Nulman, 18, Senior,
Experimental High School - Rabin Tel Mond, Tel Mond, Israel
- ENBM020T** **Development of a Mobile Application with a Wearable Device for the Detection and Monitoring of Heartbeat Irregularities**
Gustavo Enrique De Leon-Rivera, 17, Senior,
Hector Manuel Santos-Soto, 18, Senior,
Escuela Especializada en Ciencias, Matematicas y Tecnologia,
Caguas, Puerto Rico
- ENBM021** **Smartphone-Controlled Portable Phoropter Powered by Variable Focal Length Liquid Lens**
Ronak Roy, 16, Junior,
Canyon Crest Academy, San Diego, California
- ENBM022** **Non-Invasive, Low-Cost Detection of Chronic Obstructive Pulmonary Disease (COPD) via Smartphone Breath Analysis**
Hiba Hussain, 15, Sophomore,
Greenwich High School, Greenwich, Connecticut
- ENBM023T** **Holding Your Heart in Your Hand: 3D-Printing a Mechanically Accurate Aortic Valve Model**
Siyuan Ma, 17, Senior,
Alexander Richard Anderson, 17, Junior,
Breck School, Golden Valley, Minnesota
- ENBM024** **Innovative Carbon Nanotube Based Microsensor for Early Diagnosis of Ovarian Cancer**
JooUn Lee, 16, Sophomore,
Tenafly High School, Tenafly, New Jersey
- ENBM025** **Automatic Contouring Methods for Adaptive Radiotherapy in Cancer Patients Using Artificial Intelligence and a Virtual Mobile Robotic Assistant**
David Lyons, 17, Junior,
Hawken School, Gates Mills, Ohio
- ENBM026** **The Peru-Ready Method for Optimizing Bioavailable Iron in Water to Reduce Anemia Caused by Iron Deficiency in the Highlands of Peru**
James Paul Verheyden, 17, Senior,
Bend Science Station, Bend, Oregon
- ENBM027** **Subchondral Bone Engineering: Regeneration of Cartilage-Bone Interface to Replace Knee Prosthetics**
Irene Antony, 17, Senior,
Half Hollow Hills High School West, Dix Hills, New York

- ENBM028 Biodegradable Artificial Blood Vessels: A Breakthrough in Tissue Engineering**
Claudia Michelle Hamilton, 16, Junior,
Hawken School, Gates Mills, Ohio
- ENBM029 Neural Networks and Colon Polyp Detection**
Inthat Boonpongmanee, 17, Junior,
Deerfield Academy, Deerfield, Massachusetts
- ENBM030 VTE GTG: Using Near Infrared Light to Create a Vein Map to Accurately, Quickly and Safely Diagnose Venous Thromboembolism**
Rohan Khera, 16, Junior,
Plano West Senior High School, Plano, Texas
- ENBM031 Metal Nitrate Enhanced Green Fluorescent Protein for Nano-Technology**
Lexie Kay Smith, 18, Senior,
Joel E. Ferris High School, Spokane, Washington
- ENBM032T SmartRate: A Machine Learning Approach to Predicting Cardiac Arrest**
Sameer Sundrani, 17, Senior,
Nikhil Sundrani, 16, Junior,
University High School, Fresno, California
- ENBM033 Efficient Incorporation of Matrix Protein M2 into Influenza Virus-like Particles (VLPs) to Improve Future Vaccine Production and Immunogenicity**
Madeleine Yang, 16, Junior,
Detroit Country Day School, Beverly Hills, Michigan
- ENBM034 Development of Decellularized Peppermint Leaf Functionalized Biomimetic Scaffolds for Cardiac Tissue Engineering: An Investigation of Physico-Chemical and Mechanical Properties**
Sarah Mae Broas, 17, Junior,
Putnam Valley High School, Putnam Valley, New York
- ENBM035 Multiscale Statistical Analysis of Lung Cancer Tissue Using the Backscattering of Polarized Light**
Kiera Megan Mallinson, 17, Senior,
Pelham Memorial High School, Pelham, New York
- ENBM036 Macular**
Priyanka Agochiya, 16, Sophomore,
Olentangy High School, Lewis Center, Ohio
- ENBM037 A Fully Functional Closed- Loop System Using Ultrasound Imaging to Automatically Detect Lipohypertrophy in People with Insulin-Dependent Diabetes**
Rohan Ahluwalia, 16, Sophomore,
Westview High School, Portland, Oregon
- ENBM038 Automatic Detection of Intravitreal Neovascularization in Retinal Flat Mount Images Using Deep Learning Methods**
Alexander Cheng, 17, Junior,
Hillcrest High School, Midvale, Utah
- ENBM039 Designing a Miniature Gait Lab**
Michael James Remley, 18, Senior,
Northern Utah Academy for Math, Engineering and Science,
Layton, Utah
- ENBM040 A Novel Approach to Diagnosing Zika: The Use of Silk Fibroin and 2D Paper Networks to Create a Temperature-Independent, Affordable Paper Test Strip**
Ashlynn Anne Gallagher, 18, Senior,
W.F. West High School, Chehalis, Washington
- ENBM041 Detecting the Elusive Lyme Disease, Year Two: Creating a Novel Diagnostic Aid for the Detection of *Borrelia burgdorferi* in Ticks**
Luke Daniel Little, 18, Senior,
Timber Ridge Scholars Academy, Pacific, Missouri
- ENBM042 A Low-Cost, Point-of-Care Ammonia Sensor for Urea Cycle Disorder Patients Utilizing Colorimetric Techniques**
Mindy Long, 17, Junior,
Hamilton High School, Chandler, Arizona
- ENBM043 3-D Printing with Modified Biocompatible Polymers for Tissue Regeneration and Drug Delivery**
Bhargav Ramesh, 16, Junior,
duPont Manual High School, Louisville, Kentucky
- ENBM044 Developing Novel Peptide Sequences to Produce Antimicrobial Hydrogels for Potential Wound Treatment**
Qusai Abdulbasit Ghabrah, 17, Senior,
Dar Althikr Private School, Jeddah, Mecca, Saudi Arabia
- ENBM045T Detecting World's Dengue Fever with Dengue Test Strip: An Innovation of Dengue Rapid Test System**
Amelinda Mayaparamastri Agus, 18, Senior,
Alifah Hanandyanti Susatya, 18, Senior,
Budi Mulia Dua International School, Sleman, Daerah Istimewa Yogyakarta, Indonesia
- ENBM046T Microfluidic Chips for Detection of Lung, Breast and Prostate Cancer**
Berna Akdeniz, 18, Senior,
Leyla Al Masoud, 17, Senior,
Izmir Ozel Ege Lisesi, Izmir, Bornova, Turkey
- ENBM047 UCICATRIZE: Practical Self-Healing Injection Kit for Allergic Reactions**
Yahya Yagiz Kemikoglu, 17, Senior,
Ozel Kemerburgaz Okyanus Anadolu Lisesi, Istanbul, Turkey
- ENBM048 Smart Heart: A Portable Early Diagnostics System for Myocardial Infarction Events Utilizing Generative Machine Learning Algorithms**
Abhinav Gundrala, 16, Junior,
Olympia High School, Olympia, Washington
- ENBM049 Improving Documentation and Treatment for Patient Care Utilizing a Cell Phone Algorithm to Quantify Wounds in Three Dimensions**
Abigail Jean Browne, 17, Junior,
Conrad Weiser High School, Robesonia, Pennsylvania
- ENBM050 Immunology Interfaces with Nanotechnology: The Development of a Sensitive Carbon Nanotube-Based Biosensor for the Detection of Influenza A (H1N1)**
Benjamin Josiah Cummings, 17, Junior,
Pittsburgh Allderdice High School, Pittsburgh, Pennsylvania
- ENBM051 Development of an *in vitro* Human Liver Model for Nonalcoholic Fatty Liver Disease**
Nicole Marie Munne, 18, Senior,
Peters Township High School, McMurray, Pennsylvania
- ENBM052T Prescribed Code: A Therapeutic Smart Device Used for Rapid Rehabilitation of Ligaments, Muscles, and Tendons**
William Robert Voorhees, 18, Senior,
Kyra Sue Pratley, 18, Senior,
John Caleb Podsednik, 18, Junior,
Dr. James A. Forrest Career and Technology Center,
Leonardtown, Maryland
- ENBM053 Optimizing Long-term Gene Expression Using Chromatin Insulators in Stably Integrated Multi-gene Constructs**
Morgan Kopecky, 16, Junior,
Woodbridge High School, Irvine, California
- ENBM054 Development of a Biosensor Using Sialic Acid-Bound Gold Nanoparticles for the Rapid Screening of Influenza A Virus-Positive Samples**
Hamilton Ji Wan, 16, Junior,
Mississippi School for Mathematics and Science,
Columbus, Mississippi

- ENBM055 Recruiting Endogenous Proteins for Site-Specific Transport: A Novel Workflow for Gene Carrier Design**
Sajeev Kohli, 16, Junior,
Sir John A. Macdonald Secondary School, Waterloo,
Ontario, Canada
- ENBM056 W.I.N.I.T.S. (Wireless Interconnected Non-Invasive Triage System)**
Danish Mahmood, 14, Freshman,
London Central Secondary School, London, Ontario, Canada
- ENBM057 A Novel Computational Solution to Advance Ferromagnetic NanoTherapy to Cure Cancer**
Tasnia Nabil, 17, Senior,
Vincent Massey Secondary School, Windsor, Ontario, Canada
- ENBM058T Heart Knight**
Fadwa Elshenawy Elshenawy, 17, Senior,
Hadeel Hesham Adam, 18, Senior,
Kafr EL-Sheikh STEM School, Kafr EL-Sheikh, Egypt
- ENBM059T Safety Collar**
Suad I. M. Farun, 14, Freshman,
Sadil N.D Ibaidi, 14, Freshman,
The Orthodox School of Bethany, Bethany, Palestine
- ENBM060 Novel Vascularization of Mouse Heart Tissue-Engineered Vascular Scaffolds by Triggering Decidualization of Mouse Endometrial Stromal Cells for Use in Bio-Synthetic Organs**
Emily Pallack, 17, Junior,
American Heritage School, Plantation, Florida
- ENBM061 The Use of AI Algorithms to Automatically Identify Premature Atrial Contractions from Electrocardiogram Recordings**
Ryan Zhu Luo, 17, Junior,
Biotechnology High School, Freehold, New Jersey
- ENBM062T A U"knee"Que Solution**
Thomas Alexander Curtin, 15, Freshman,
Ibrahim Samhar Al-Akash, 15, Freshman,
Veterans Memorial High School, Corpus Christi, Texas
- ENBM063 Automatic Lung Cancer Prediction from Chest X-Ray Image Using Machine Learning Techniques**
Worawate Ausawalaithong, 16, Junior,
Kamnoetvidya Science Academy, Rayong, Thailand
- ENBM064T Fabrication of Fluorescein Isothiocyanate (FITC)-Doped Silica Nanoparticles and Gold-Coated Silica Nanoparticles for Locating and Killing Cancer Tumors**
Bao Vu Dang, 18, Senior,
Ha Phuong Thao Nguyen, 17, Senior,
Bao Loc High School for the Gifted, Bao Loc,
Lam Dong, Viet Nam
- ENBM065 Prostate Cancer Diagnostic Device: The Application of Multiplex Lateral Flow Immunoassay for the Detection of Prostate Specific Antigen (PSA)**
Shehbeel Arif, 18, Senior,
Central High School, Philadelphia, Pennsylvania
- ENBM066 Non-Invasive Detection of Asymptomatic Heart Attacks Using BioElectrics Through Transcutaneous Blood Analysis**
Akash Manoj, 16, Junior,
The Ashok Leyland School, Hosur, Tamil Nadu, India
- ENBM067 Migraine Mind**
Doaa M. H. Sarmoudi, 16, Junior,
Al Yamoun Secondary Girls School, Al Yamoun, Jenin, Palestine
- ENBM068 Re-Life Socks**
Jawa I. M. Nazzal, 16, Junior,
Qabatiya Westren School for Girls, Qabatiya, Jenin, Palestine
- ENBM069T Exerciser for Rehabilitation After a Stroke**
Georgii Barashkov, 16, Sophomore,
Vladislav Sokolskiy, 17, Sophomore,
Lyceum 1580, Moscow, Russian Federation
University High School Moscow State University Named after M. V. Lomonosov, Moscow, Russian Federation
- ENBM070 Engineering and Evaluation of 3D Printed and Bioprinted Novel Photocuring Polymer Composite Scaffolds for Bone Tissue Regeneration**

Nipun Udara Jayatissa, 16, Junior,
Maumee Valley Country Day School, Toledo, Ohio
- ENBM071 Unfolding the Mysteries of vWF: Experimental vs. Computation Studies of vWF's A2 Domain**
Prathysha Oliveira Kothare, 15, Freshman,
Parkland High School, Allentown, Pennsylvania
- ENBM072 An Electronic Device with an Integrated Mobile App for Early Detection of Cardiovascular Diseases: A Low-Cost, Easy-To-Use, Non-Invasive Device and Comprehensive, Multi-Parametric Smartphone App**

Shelly Goel, 17, Junior,
School of Science and Engineering at Yvonne A Ewell Townview Magnet Center, Dallas, Texas
- ENBM073 3D Printing of Bioengineered Human Cardiac Stem Cells**
Katharine Claire Schwister, 17, Junior,
Brookfield Academy, Brookfield, Wisconsin
- ENBM074 Giving a Hand: A 3D Printed Modern Day Miracle**
Gracie Kimbrell, 17, Junior,
Lyceum Named after Academician Zarifa Aliyeva, Baku, Azerbaijan
- ENBM075 3D Printing Away Catheter-Associated Urinary Tract Infections**
Mitchell James Sampson, 15, Freshman,
Northview High School, Brazil, Indiana
- ENBM076 A Low Cost, Closed Loop Insulin Pump for Better Management of Types 1 and 2 Diabetes Mellitus**

Anna Quinlan, 16, Junior,
Menlo-Atherton High School, Atherton, California

Cellular and Molecular Biology

| | | | |
|----------|---|----------|--|
| CELL001 | Should Human Induced Pluripotent Stem Cells Regret Their Choice of DNA Repair Mechanisms? Adela Rotreklova, 18, Senior, Gymnazium Brno, Trida Kapitana Jarose, Prispevkova Organizace, Brno, South Moravian Region, Czech Republic | CELL015 | Oxidative Damage and Aging: Characterization of Novel Helicases DinG and YoaA and Catalases KatE/KatG, and Their Effects in Cellular Defense Against Reactive Oxygen Species Natalie Eajia Wang, 15, Sophomore, Lincoln High School, Portland, Oregon |
| CELL002 | Transient Expression of Flowering Locus T1 in <i>Arabidopsis thaliana</i> via Cell-Penetrating Peptides Antonio Hernandez, 18, Senior, South Sumter High School, Bushnell, Florida | CELL016 | The Functional Requirement of Aquaporin1a1 in Zebrafish Vascular Development Merrina Lan, 19, Senior, Ames High School, Ames, Iowa |
| CELL003 | Electronic Cigarette Aerosols Induce Adverse Health Effects in Mice of Reproductive Age and Their Offspring Anusha Zaman, 17, Junior, Baton Rouge Magnet High School, Baton Rouge, Louisiana | CELL017 | SOX and MALAT1: Understanding the Progression of Breast Cancer Metastasis Shruthi Shekar, 17, Junior, Jericho High School, Jericho, New York |
| CELL004 | Detecting Self-associated ORC4 in Live Murine Oocytes During Polar Body Extrusion Using FLIM of eGFP and FIAsh-EDT2 Labelling Brandon Alex Nguyen, 14, Sophomore, Henry J. Kaiser High School, Honolulu, Hawaii | CELL018 | Examining the Effect of HIF and Notch in Endothelial Cell Migration and Sprouting Vishal Keshav Senthilkumar, 17, Senior, Brunswick High School, Brunswick, Ohio |
| CELL005 | Can Lowering Mutant Huntingtin Limit Susceptibility to Oxidative Stress in HD Neurons? Ritika Jeloka, 16, Sophomore, Melbourne High School, Melbourne, Florida | CELL019 | Melanoma Cell Malignancy Does Not Correlate with Migratory Rates in Three Different Highly Metastatic Cell Lines Tyler Lee Amos, 17, Senior, Chantilly High School, Chantilly, Virginia |
| CELL006 | Prototypical Galectins and the Innate Immunity Against Molecular Mimicry Marissa Rose McDonald, 18, Senior, Union Grove High School, McDonough, Georgia | CELL020 | Dietary Analysis of Sea Lion Consumption of Salmonid Populations Along the Pacific Northwest Coast Using qPCR and Fluorescent Species-Specific Probes Cydni Tatem Lynn Marshall, 18, Senior, North Central High School, Spokane, Washington |
| CELL007 | Characterization of Assembly-Activating Protein in Adeno-Associated Virus Capsid Assembly Lauren Hsing-Tze Li, 17, Junior, Westview High School, Portland, Oregon | CELL021 | Role of GATA4 in Early Gastrointestinal Tract Development Afiya Fatima Quryshi, 16, Sophomore, University School of Milwaukee, Milwaukee, Wisconsin |
| CELL008 | Genome Architecture Indicates Cellular Potential in Embryonic Stem Cell Differentiation Sruthika Baviriseaty, 17, Senior, C. Leon King High School, Tampa, Florida | CELL022 | <i>In vitro</i> Characterization of HER2 Positive Breast Cancer Brain Metastases Allison Sarah Heath, 18, Senior, Bloomfield Hills High School, Bloomfield Hills, Michigan |
| CELL009T | Impact of Chitinase-3-Like-1 on M1 Macrophage Polarization and Functions Guan-Yi Huang, 17, Junior, Yu-Ruei Chen, 17, Junior, Taipei Municipal Jianguo High School, Taipei City, Chinese Taipei | CELL023T | The Cilium and Centrosome Associated Protein CCDC11 Is Required for Cytokinesis via Midbody Recruitment of the ESCRT-III Membrane Scission Complex Jillian Emma Parker, 16, Junior, Jiachen Elizabeth Lee, 17, Junior, Arooba Ahmed, 16, Junior, Half Hollow Hills High School West, Dix Hills, New York Half Hollow Hills High School East, Dix Hills, New York |
| CELL010T | Assessing the Impacts of CRISPR Editing on Protein Expression; Utilizing dCas9, as a Potential Roadblock to DNA Transcription Yesh Satyajit Doctor, 18, Senior, Kshitij Sachan, 18, Senior, Plano East Senior High School, Plano, Texas | CELL024 | Mechanisms of the Interplay of Tau and Alpha-Synuclein on Tubulin Polymerization Promoting Protein (TPPP/p25) Anjali Hetal Patel, 18, Senior, New Horizons Governor's School for Science and Technology, Hampton, Virginia |
| CELL011 | Peptide Nucleic Acids as Potential Designer Antimicrobials Raaga Unmesha Vullikanti, 17, Junior, Blacksburg High School, Blacksburg, Virginia | CELL025 | Engineering Bacterial Guanylate Cyclase for Optogenetic Applications Arundathi Sreejayan Nair, 15, Sophomore, Laramie High School, Laramie, Wyoming |
| CELL012 | X Chromosome Inactivation in Pluripotent Stem Cells Lev Roz Seaton, 17, Senior, Ort Giva'at Ram High School Jerusalem in the name of Joseph Charmatz, Jerusalem, Israel | CELL026 | Inhibiting the Effects of Fetuin-B Upregulation Using TAK-242 Eden Sheinin, 18, Senior, Yorktown High School, Yorktown Heights, New York |
| CELL013 | The DNA Damage Effect of Aloe Vera Extracts Chengyue She, 15, Sophomore, Little Rock Central High School, Little Rock, Arkansas | CELL027 | Preventing Preterm Birth: Maximizing GSH Synthesis to Fight Oxidative Stress Lucy Arin Greenman, 17, Senior, Academy of Science, Sterling, Virginia |
| CELL014 | TrkC Identifies a Putative Mechanoreceptor that Specifically Innervates Taste Papillae Madison Andrea Sneve, 18, Senior, duPont Manual High School, Louisville, Kentucky | CELL028 | Targeted Screen of Genes Involved in <i>Drosophila</i> Neuromuscular Junction Development Bowen Jing, 18, Senior, West Lafayette Junior/Senior High School, West Lafayette, Indiana |

- CELL029 Participation of Annexin A1 and Associated Genes in the Pathogenesis of Gliomas**
Elena Ptitsyna, 17, Junior,
Advanced Educational Scientific Centre, A.N.Kolmogorov
Boarding School, Moscow, Moscow, Russian Federation
- CELL030 Expression of Arginase in Murine Colon Cells During Wound Healing Confirms the Presence of Myeloid Derived Suppressor Cells**
Joseph Zhang, 17, Junior,
Gwinnett School of Mathematics, Science, and Technology,
Lawrenceville, Georgia
- CELL031 Radioprotection of Normal Cells Using CD47, Morpholino Antisense Therapeutics Causes Progression of Prostate Cancer**
Teresa Anne Ozga, 17, Senior,
Eleanor Roosevelt High School, Greenbelt, Maryland
- CELL032 A Two-Year Study to Initiate and Characterize a Cell Culture of the Native Pollinator *Bombus impatiens*: Applications in Entomology, Agriculture, and Nosema Research**
Olivia Ann Kline, 18, Senior,
Camdenton High School, Camdenton, Missouri
- CELL033 Exploring Posterior Growth in *D. rerio* Using a Live Cell Cycle Biosensor**
Ella Rose Feiner, 18, Senior,
Horace Mann School, Bronx, New York
- CELL034 Regulation of Endothelial Cell-Specific Molecule 1 (Esm-1)- Implications in Diabetes and Cancer**
Arvind Muruganantham, 16, Junior,
American High School, Fremont, California
- CELL035 Development of Animal Component-Free Media for the Cryopreservation of *Drosophila* S2 Cells**
Erin Yuki Kajihira, 17, Senior,
Moanalua High School, Honolulu, Hawaii
- CELL036 An Investigation into the Current Use of Caffeine as a Migraine Treatment and Its Effects on Spreading Depolarizations: A Second Year Study and the Introduction of a Novel Therapy**
Russell Warren Ludwigsen, 17, Junior,
Early College Academy, Albuquerque, New Mexico
- CELL037 Use of a Novel Peptide-Based Assay to Determine Potential Risk of Reaction to Lupine for Peanut Allergic Patients**
Simon Jacob Peck, 17, Senior,
Fox Lane High School, Bedford, New York
- CELL038 Investigating Heat Exposure on Transgenerational Inheritance in *C. elegans***
Reed Elizabeth Robinson, 17, Junior,
Alabama School of Mathematics and Science, Mobile, Alabama
- CELL039 Identifying Inhibitors of PDE4B2 Mutant Enzymes and Inhibitor Specificity Using *Schizosaccharomyces pombe***
Avi Jonah Cohen, 17, Senior,
South Burlington High School, South Burlington, Vermont
- CELL040 CRISPR and Its Use in Determining the Function of the VPS-34 Gene in *Caenorhabditis elegans***
Colin Michael Robinson, 18, Senior,
Utah County Academy of Sciences, Orem, Utah
- CELL041 Using Urine and Saliva Solutions in a Capillary Tube Precipitation Test to Detect Dust and Dander Allergens in IgE Sensitized Individuals: A New Non-Intrusive Antigen/Antibody Reaction Test**
Audrey Jules Bakerson, 16, Sophomore,
Berrien County Mathematics and Science Center, Berrien
Springs, Michigan
- CELL042 A Novel Method of Constructing Short Synthetic Promoters Using Random Transcription Factor Binding Site Combinations**
Adit Gupta, 16, Junior,
Westview High School, Portland, Oregon
- CELL043 The Evolution of Antibiotic Resistance Through Protein Mutations**
Adis Kukuljac, 18, Senior,
James W. Mitchell High School, New Port Richey, Florida
- CELL044 The Use of NKG2D Signaling in NK Cell Immunotherapy**
Rachel Brenner Silverstein, 18, Senior,
Shawnee Mission West High School, Overland Park, Kansas

Chemistry

- CHEM001 Isolation and Identification of Quercetin from the Leaves of *Psidium guajava* by Gas Chromatography-Mass Spectrometry and Evaluation of the Extract for Anti-Cancer Activity Using the Brine Shrimp Cytotoxicity Bio-Assay**
Anna Kucera, 17, Senior,
Canterbury School, Fort Myers, Florida
- CHEM002 The Filter for Dynamic Purification of Water from Oil Products**
Alena Sergeevna Nikiforova, 18, Junior,
State School #1080, Moscow, Russian Federation
- CHEM003T Research of Wood and Oil Shale Ash Utilisation**
Martins Kaukulis, 18, Senior,
Rudolfs Baumanis, 19, Senior,
Valka Janis Cimze Gymnasium, Valka, Latvia
- CHEM004 An Investigation into the Removal of Microplastics from Water Using Ferrofluids**
Fionn Miguel Eckardt Ferreira, 17, Junior,
Schull Community College, Schull, Co. Cork, Ireland
- CHEM005 JONOTEC-Sustainable Bioplastic**
Yadira Guadalupe Fernandez Maximo, 17, Senior,
Colegio de Bachilleres del Estado de Hidalgo Plantel Actopan,
Actopan, Hidalgo, Mexico
- CHEM006 Biopolymer from *Musa paradisiaca* Peel Waste and Nanoparticles**
Jorge Enrique Gonzalez Sevilla, 18, Senior,
Colegio de Estudios Científicos y Tecnológicos del Estado de Jalisco, Guadalajara, Jalisco, Mexico
- CHEM007T Penicillium and Pleurotus Fungus-like Biocatalyst of Heavy Metals in Batteries**
Elizabeth Martinez Becerril, 17, Senior,
Sarahi Sosa Mondragon, 17, Senior,
Escuela Preparatoria Oficial No. 109, Acambay, Mexico, Mexico
- CHEM008T Green Synthesis of the Biodegradable Polymers**
Maryam Ijaz, 16, Sophomore,
Momina Akmal, 15, Sophomore,
The City School, Girls Campus, Sialkot, Punjab, Pakistan
- CHEM009 Attacking Alzheimer's: Developing New Drugs Using Computational Modeling of Beta-Amyloid Protein Binding**
Sanidhya Dutt Tripathi, 17, Senior,
Arkansas School for Mathematics, Sciences and the Arts,
Hot Springs, Arkansas
- CHEM010 Lipid Layer's Permeability of Amino Acids in Primordial Earth**
Mark C. Brigman, 18, Senior,
Polk State Collegiate High School, Lakeland, Florida
- CHEM011 Will Fluorescent Dyes Be Able to Detect the Saccharide D-galactose on Parasites, such as *Trypanosoma cruzi*?**
Abigail Haydee Soliven, 15, Sophomore,
Melbourne High School, Melbourne, Florida
- CHEM012 The Fabrication of Flexible Transparent Electrodes Based on Silver Nanowires**
Yuejia Zhu, 16, Junior,
Hefei No. 8, Senior High School, Hefei, Anhui, China
- CHEM013T Leading the Environment with Less Heavy Metals**
Ghada Sameeh Haddad, 17, Junior,
Ayah Amjad Bani Mustafa, 16, Junior,
Jubilee School, Amman, Jordan
- CHEM014T Research and Application of Diethyl Ether Solution of Au(III)**
Shuhei Tsumuraya, 17, Junior,
Hiroki Nagata, 17, Junior,
Tomoya Yamada, 17, Junior,
Miyagiken Sendai Daisan High School,
Sendai-shi Miyagiken, Japan
- CHEM015 Computer Modeling of Protein-Protein Interactions with Hsp70 to Understand the SOD2 Import to Mitochondria for Regulation of Oxidative Stress**
Amogh Bhatnagar, 16, Sophomore,
University School of Milwaukee, Milwaukee, Wisconsin
- CHEM016 Geophone Phase 1: Synthesis and Characterization of a NiO ZnO P-N Type Semiconductor Junction for an Increased Electromechanical Effect**
Jenna Marie Salvat, 17, Junior,
Coronado High School, Colorado Springs, Colorado
- CHEM017 Direct Methanol Fuel Cell, Phase II**
Molly Anne Kleier, 16, Sophomore,
Notre Dame Academy, Park Hills, Kentucky
- CHEM018 *Manihot esculenta*: A Raw Material for Biodegradable Plastic**
Evan Scott Blank, 14, Freshman,
Wilcox-Hildreth Public School, Wilcox, Nebraska
- CHEM019 Computational Predictions in the Design of Affinity-Based Drug Delivery**
Alison Wenqing Xin, 17, Junior,
Hathaway Brown School, Shaker Heights, Ohio
- CHEM020T Tree Plaster - Using Polymers as a Drugs Release Media to Cure Wood Decay Fungi**
Po Ying Yip, 14, Freshman,
Yuet Ting Wong, 15, Freshman,
Pui Lam Queenie Choi, 15, Freshman,
Shun Tak Fraternal Association Yung Yau College, Hong Kong, China, Hong Kong Special Administrative Region
- CHEM021T An Investigation on Starch-Stabilized Silver Nanoparticles on Detection of Proteinuria and Hyperphosphatemia**
Kam Fai Wan, 18, Senior,
Chi Ho Ng, 17, Senior,
King's College, Hong Kong, China, Hong Kong Special Administrative Region
- CHEM022 Molecular Sensor Using Aptamers in Precision Ellipsometry**
Jin Wen Kee, 18, Senior,
National Junior College, Singapore, Singapore, Singapore
- CHEM023T Photodegradation of Ciprofloxacin Using Titanium Oxide Nanowires and Nanoparticles (P25)**
Ana Valeria Vazquez-Navas, 16, Junior,
Juan Diego Rodriguez-Rivera, 17, Junior,
Escuela Especializada en Ciencias, Matemáticas y Tecnología,
Caguas, Puerto Rico
- CHEM024T Design New Exciplex-forming Systems for OLEDs Application**
Jie-Lan Jhang, 17, Junior,
Jie-Jhu Jhang, 17, Junior,
Taipei First Girls High School, Taipei City, Chinese Taipei
- CHEM025 Green Synthesis of Phosphorous, Nitrogen Co-Doped Carbon Materials from Renewable Resources for Supercapacitor Applications via Microwave Assisted Technique**
Meghana Chowdary Bollimpalli, 17, Junior,
Little Rock Central High School, Little Rock, Arkansas
- CHEM026T Water Free of Lead and Mercury**
Marwa Nabil Al Aqtash, 15, Freshman,
Dima Abdallah Alshawabkeh, 14, Freshman,
Al-Hasaad Al-Tarbawi School, Amman, Amman, Jordan
- CHEM027 Synthesis of Acetylene-Perfluorinatedpyridine Monomer for Click Mediated Linear Polymerization**
Katelynn Ryenne Salmon, 17, Junior,
Palmer Ridge High School, Monument, Colorado
- CHEM028 Benzodiazepine Detection in Alcoholic Beverages**
Isabela Dadda dos Reis, 17, Senior,
Instituto Federal de Educação, Ciência e Tecnologia do Rio Grande do Sul (IFRS) - Campus Osório, Osorio, Rio Grande do Sul, Brazil

- CHEM029 Synthesis and Separation of Chiral Compounds in the Preparation of a PET Radiotracer Targeting Synaptic Vesicle Glycoprotein 2A**
Maya N. Geradi, 17, Senior,
Wilbur Cross High School, New Haven, Connecticut
- CHEM030 Fatty Acid Methyl Ester Energy Solutions: Biodiesel as a DIY Energy Alternative**
Elizabeth Grace Melby, 18, Senior,
Carroll High School, Ozark, Alabama
- CHEM031 Extract the Insulating Fiber from the Chicken Feathers**
Amira Gamal Abdelazim, 16, Sophomore,
El Menia Preparatory Secondary School for Girls in New Menia, New Minia, Egypt
- CHEM032T Reception of New Biologically Active Substances on the Basis of Curcumin**
Grigol Mikadze, 18, Senior,
Tsozne Mikadze, 15, Sophomore,
Luka Buskandze, 17, Junior,
Vazha-Pshavela #87, Public School, Tbilisi, Georgia
- CHEM033 Removal of Pharmaceuticals from Water by Thin Film of Nano-Composite**
Ban Ayoup Ghrair, 16, Sophomore,
Pioneer Educational Schools, Amman - Khalda, Jordan
- CHEM034 Pharmaceutical Identification and Purification: Evaluating International Publications in Reference to Pharmaceutical Substance Identification**
Zoe Elizabeth Timothy, 18, Senior,
Susquenita High School, Duncannon, Pennsylvania
- CHEM035T New Approach to the Synthesis of the Functionalized Fluoroalkenes' New Perspective Types of Medicines**
Yulia Maslova, 17, Junior,
Anastasiia Andrianova, 17, Junior,
Moscow South-Eastern School Named After V.I. Chuikov, Moscow, Russian Federation
- CHEM036 Predicting the Hazardous Qualities of Compounds Based on NFPA 704 Labels Using Deep Learning for QSAR/QSPR Modeling**
Hashim Mohammed Almutairi, 17, Senior,
Dar Althikr Private School, Jeddah, Mecca, Saudi Arabia
- CHEM037 A Novel Analytical Method for Quantifying Metallic Impurities in Carbon Nanotubes by Using ICP-OES**
Mohammed Jamal Hamdi, 17, Senior,
AL-Falah High School, Makkah, Saudi Arabia
- CHEM038T The Polar Compound Measuring Tool Referred from the Frying Oils Viscosity**
Nichapat Bunlengjit, 18, Senior,
Yadthip Thaithunyaphanich, 18, Senior,
Satriwithaya School, Phra Nakhon, Bangkok, Thailand
- CHEM039T Electrochemical Preparation of Tin-Silver Alloy to Be Used as Solder**
Anhelina Hunich, 15, Sophomore,
Hanna Rabenok, 16, Junior,
Minsk State Regional Lyceum, Minsk, Minsk Region, Belarus
- CHEM040 BPA vs. BPS: An Analysis of Water Stored in "BPA-Free" Polycarbonate-Based Baby Bottles Using High Performance Liquid Chromatography and X-Calibur Software**
Rachel Alys Stratton, 15, Sophomore,
Hilton Head Preparatory School, Hilton Head Island, South Carolina
- CHEM041 Comparing the Potentially Hazardous Chemical Components of Different Types of Drinking Water and the Dangers We Might Not Perceive**
Nicole Monika Grace Jeselson, 18, Senior,
Rome Free Academy, Rome, New York
- CHEM042 The Synthesis and Characterization of Novel Heteroleptic Alkaline Earth Metal Compounds**
Marina Cousins, 18, Senior,
Manlius-Pebble Hill School, Dewitt, New York
- CHEM043 Designing Sustainable Adsorbents to Remove Arsenic from Drinking Water Using Computer-Aided Molecular Design**
Rajat Kaushik Doshi, 16, Junior,
Henry B. Plant High School, Tampa, Florida
- CHEM044 Can the Efficiency of Hydrogen Gas Production by Electrolysis Be Increased?**
Shirlin Janita Kingston, 15, Freshman,
Ballard High School, Louisville, Kentucky
- CHEM045T Quest to the Mystery Metal**
Camila Muneton, 17, Junior,
Shandira Soto, 17, Junior,
Boston Latin Academy, Boston, Massachusetts
- CHEM046 Development of a Mathematical Algorithm Modeling the Bioaccumulation of Styrene in the New Hanover County Materials Recovery Facility Through the Analysis of Volatiles Emitted from Recyclable Plastics**
Zane S. Dash, 16, Sophomore,
Isaac Bear Early College High School, Wilmington, North Carolina
- CHEM047 Cutting off Cancer: Design, Analysis, and Synthesis of Novel Vascular Disrupting Agents**
Brendon Choy, 17, Senior,
Hunter College High School, New York, New York
- CHEM048T The Power of Nature**
Abdelaziz Emad Mohamed, 17, Senior,
Mohamed Mahmoud Hegazy, 17, Senior,
The Red Sea STEM High School, Hurghada, Red Sea, Egypt
Red Sea STEM, Hurgada, Egypt
- CHEM049T Use of Electrochemical Advanced Oxidation Processes for Novel Treatment of Sludge and Wastewater**
Bryan Wei Leong Lim, 18, Senior,
Shawn Hai Leong Lim, 17, Senior,
Dominic Wei Ting Yap, 18, Senior,
Hwa Chong Institution, Singapore, Singapore
- CHEM050 The Effect of Natural Chitosan on the Removal of Azo Dyes from Water**
Carly Mae Smith, 17, Junior,
Roanoke Valley Governor's School for Science and Technology, Roanoke, Virginia
- CHEM051 Novel Sustainable Process for Synthesis of Acetylsalicylic Acid: Application to Opioid Epidemic and CO₂ Emissions**
Akshaj Mishra, 16, Sophomore,
Signature School, Evansville, Indiana
- CHEM052 Multifunctional, Hybrid Electrocatalytic Systems Active Towards Electroreduction of Oxygen**
Maciej Stanislaw Solnicki, 18, Junior,
II Liceum Ogólnokształcące z Oddziałami Dwujęzycznymi im. Stefana Batorego, Warsaw, Masovian Voivodeship, Poland
- CHEM053 Keeping Water Supercool: Non-Toxic Substances that Inhibit the Crystallization of Supercooled Water**
Xavier Rafael Morales, 17, Junior,
Escuela Secundaria de la Universidad de Puerto Rico (UHS), San Juan, Puerto Rico
- CHEM054T Indenyl Rhodium Complexes; New Efficient Coal Tar Catalyst**
Elizaveta Sovdagarova, 18, Junior,
Vladimir Kharitonov, 18, Junior,
Moscow South-Eastern School Named After V.I. Chuikov, Moscow, Russian Federation

- CHEM055 TiO₂ Hollow Shell Around Gold Nanoparticles- A More Efficient Photocatalyst**
Laura Marie Noronha, 15, Sophomore,
Redlands High School, Redlands, California
- CHEM056 LC-MS-MS Method Development and Analysis of Stimulants, Opiates, Synthetic Opiates, PCP, and Benzodiazepines in Wastewater: Preponderance of These Drugs During Football Games**
Shahbaz Waseem Gul, 18, Senior,
Oxford High School, Oxford, Mississippi
- CHEM057 A New Route to Next-Generation Spin Based Devices for Quantum Information Processing: Optically Active Fully Organic Room Temperature Ferromagnetic Semiconductors**

Arnob Das, 18, Senior,
Jesuit High School, Portland, Oregon
- CHEM058 Synthesis and Antiproliferative Properties of Tryptamine Derivatives**
Irina Konstantinovna Belousova, 17, Junior,
Moscow South-Eastern School Named After V.I. Chuikov,
Moscow, Russian Federation
- CHEM059T Eggshells as a Substituent for Lowering the Rate of Combustion**
Muhammad Shazwan Bin Sobri, 16, Senior,
Nur Helmi Arwizar, 16, Senior,
MRSM Transkrian, Nibong Tebabl, Malaysia
- CHEM060T SoBlue: A Pigment from the Past with a New Future. Nanosized Halloysite Clay-Colorant Composites**
Roberto Mignacco, 16, Junior,
Valentina Bo, 18, Senior,
Samuele Ferrero, 18, Senior,
Istituto Superiore Ascanio Sobrero, Casale Monferrato, Italy
- CHEM061T Flammability of Fabrics**
Estabraq Qussay Al Sanousi, 18, Senior,
Lujain Ammar Sadeqi, 18, Senior,
American Bacculaureate, Khaitan, Kuwait
- CHEM062 The Color of An Azo Dye - A Combined Experimental and DFT Investigation of Spectral Properties of 5-(4-Sulfophenylazo) Salicylic Acid**
Johanna Kristina Huhtasaari, 19, Senior,
Midgardsskolan School, Umea, Sweden
- CHEM063 Synthesis of a Bifunctional Metal (Fe, Ni, Co) Phthalocyanine/ Tin (IV) Oxide/Carbon Nanotube Electrocatalyst for the Aqueous CO₂ Reduction to Carbon Monoxide and Formate at Different Potentials Respectively**
Jessica Cohen, 18, Senior,
Spackenkill High School, Poughkeepsie, New York
- CHEM064 The Impact of Fullerene Additives on the Morphology of P3HT Thin Films Processed from Binary Solvent Mixtures**
Anna Smirnova, 18, Senior,
Academic Magnet High School, North Charleston, South Carolina
- CHEM065 Augmenting Gaseous Adsorption Capabilities via Nanoporous Cyclodextrin Metal-Organic Frameworks (CD-MOF) Synthesized with Alkali Coordinating Ions**
David Jeremy Toomer, 16, Junior,
Hayfield Secondary School, Alexandria, Virginia
- CHEM066 Development of Synthesis Strategies of Quinoline for the Inhibition of HIV-Integrase**
Amy Hoang Pham, 18, Senior,
Oak Grove High School, Hattiesburg, Mississippi
- CHEM067 Lord Kelvin's Thunderstorm: Improving Power Generation with Ionic Solutions**

Benjamin DeVries, 16, Sophomore,
Woods Cross High School, Woods Cross, Utah
- CHEM068T Techno-Filter Glasses**
Fatma Arif Albastaki, 15, Junior,
Fatima Mohammed Alneyadi, 17, Junior,
Hessa Yousuf Alsayegh, 16, Junior,
Dubai National School - Al Barsha, Dubai, United Arab Emirates
- CHEM069T Temperature Insulating Solution**
Noora Salem Aldahmani, 16, Junior,
Shaikha Ali Alsuwaidi Street, 16, Junior,
Dubai National School - Al Barsha, Dubai, United Arab Emirates

Computational Biology and Bioinformatics

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| <p>CBIO001 Dementia, Beyond Memory Loss: A Neuroimaging Study of the Hippocampus and Amygdala Utilizing OASIS and FreeSurfer Ryan Theodore Nguyen, 13 Freshman, Henry J. Kaiser High School, Honolulu, Hawaii</p> | <p>CBIO015 Generation of Novel Fatty Acid Binding Protein (FABP) Inhibitors with Analgesic and Anti-Cancer Properties Kiana Ziadkhanpour, 17, Senior, Plainview-Old Bethpage John F. Kennedy High School, Plainview, New York</p> |
| <p>CBIO002 Botanical Biomimicry: Using Genetic Algorithms and Plant Phyllotaxy to Determine Optimum-Efficiency Solar Arrays John Ostermueller, 18, Senior, Arkansas School for Mathematics, Sciences and the Arts, Hot Springs, Arkansas</p> | <p>CBIO016 GlioVision: A Platform for the Automatic Assessment of Glioblastoma Tumor Features, Molecular Identity, and Gene Methylation from Histopathological Images Using Deep Learning # Kavya Kopparapu, 17, Senior, Thomas Jefferson High School for Science and Technology, Alexandria, Virginia</p> |
| <p>CBIO003 Analysis of the HBG2-4kb DNase I Hypersensitive Site Before and After the Knockout of the HBD-1kb Region in the Beta-Globin Locus Alex Salvador Perez, 17, Junior, Union County High School, Lake Butler, Florida</p> | <p>CBIO017 Comparing Lichen Phenotypic Expression with Genomic Verification # Jessica Deonna Moore, 18, Senior, Jasper County High School, Monticello, Georgia</p> |
| <p>CBIO004 Classification of Burkholderia Species Using Random Forest for Detection of Pathogenicity Michael Lu, 15, Freshman, Starkville High School, Starkville, Mississippi</p> | <p>CBIO018 Optimization of Seizure Detection Using the Machine Learning Algorithm SVM Zachary Xiao Huang, 16, Junior, The Albany Academies, Albany, New York</p> |
| <p>CBIO005 Designing a Modified HAC-PD-1 to Antagonize PD-L2 for the Improvement of Cancer Immunotherapy Amanda Grace Moon, 17, Junior, Plano East Senior High School, Plano, Texas</p> | <p>CBIO019T New Structure and Energy Cycles of Kinesin Dimers Walking on Microtubules Revealed from Molecular Simulations Alicia Pan, 16, Junior, Allen Pan, 15, Freshman, James Madison High School, Vienna, Virginia</p> |
| <p>CBIO006 Alzheimer's Disease Prediction Adarsh Suresh, 16, Junior, Clear Brook High School, Friendswood, Texas</p> | <p>CBIO020 MiRNet: A Novel <i>in silico</i> Network-Based Approach to miRNA Drug Target Identification for Next Generation Drug Discovery ## Marissa Sumathipala, 17, Senior, Broad Run High School, Ashburn, Virginia</p> |
| <p>CBIO007 Mathematical Model of HIV: Immune System Dynamics and Treatments Nicole Victoria Rychagov, 17, Junior, Cape Henry Collegiate, Virginia Beach, Virginia</p> | <p>CBIO021 Gene Methylation Is a Driver of Cellular Differentiation for Intrinsic Subtype of Breast Cancer During Carcinogenesis Thomas Ik-Hyun Kim, 18, Senior, Vincetian Academy, Pittsburgh, Pennsylvania</p> |
| <p>CBIO008 The Relationship Between Brain Volume and Cognitive Function in Parkinson's Disease Christopher Quinn Ferrier, 18, Senior, Caddo Parish Magnet High School, Shreveport, Louisiana</p> | <p>CBIO022 Modeling the Emergence of Epistatic Gene Combinations as a Phenotypic Function of Evolution # Wyatt Graham Brannon, 15, Sophomore, InTech Collegiate High School, North Logan, Utah</p> |
| <p>CBIO009 Data-Analytics Modeling to Detect Peripheral Neuropathy: Augmenting Big Data with Google Trends Neil Ujjal Tomala, 16, Junior, Parkway West High School, Chesterfield, Missouri</p> | <p>CBIO023 New Cell Type Detection via a Universal Single-Cell Gene Expression Algorithm # Zoe Weiss, 17, Junior, Lakeside High School, Atlanta, Georgia</p> |
| <p>CBIO010T The Anti-inflammatory and Regenerative Effects of Interleukin-1 Receptor Antagonist on Ischemic Strokes Isabel Baez-Alicea, 16, Junior, Kamileh Alexandra Rivera-Amaral, 17, Junior, Colegio Puertorriqueno de Ninas, Guaynabo, Puerto Rico</p> | <p>CBIO024T Experimental External Neural Pathway for Motion in Stroke Victims Jacqueline Frances van Zyl, 16, Sophomore, Caitlin Patrica van Zyl, 16, Sophomore, McIntosh High School, Peachtree City, Georgia</p> |
| <p>CBIO011 Designing a Reinforcement Learning Controller for Insulin Delivery in an Artificial Pancreas Mark James Raj, 17, Junior, duPont Manual High School, Louisville, Kentucky</p> | <p>CBIO025T Undetected Suicide: Classification of Undetermined Drug-Related Deaths Using Machine Learning Techniques Daphne Liu, 14, Freshman, Mia Yu, 17, Senior, West High School, Salt Lake City, Utah</p> |
| <p>CBIO012 A Characterization of n-way Fitness Graphs that Imply n-way Epistasis Mengming Luo, 18, Senior, Montgomery Blair High School, Silver Spring, Maryland</p> | <p>CBIO026 A Novel Computational Model for Discovery of DNA Spatial Interactions: New Insights into Genomic Organization ## Joseph Galasso, 17, Senior, Galasso Homeschool, Tucson, Arizona</p> |
| <p>CBIO013 Proteomic Evolution in Hair Cell Regeneration Rahul Ram, 16, Junior, Camas High School, Camas, Washington</p> | <p>CBIO027 Developing a Machine Learning Model to Identify Protein-Protein Interaction Hotspots to Facilitate Drug Discovery Rohit Nandakumar, 17, Senior, Basha High School, Chandler, Arizona</p> |
| <p>CBIO014 Deep Learning Identification of Autism Mutations: Using Molecular and Computational Methods to Characterize a Novel Prioritized Non-Coding Variant in FEZF1 Vanessa J. Zhang, 17, Senior, Manhasset High School, Manhasset, New York</p> | <p>CBIO028 Accuracy Estimation of Protein Multiple Sequence Alignments Using Profile Hidden Markov Models ## Joyce Muhan Liu, 18, Senior, Sentinel High School, Missoula, Montana</p> |

- CBIO029 Early-Onset Schizophrenia Detection via Novel Diffusion Tensor Machine Learning of Cingulate-Orbitofrontal Tractography**
Utkarsh Tandon, 18, Senior,
Cupertino High School, Cupertino, California
- CBIO030 Battling Superbugs: A Machine Learning Framework for Identifying Novel Antibiotic Resistance Factors**
Harkirat Bhullar, 17, Junior,
Evan Hardy Collegiate Institute, Saskatoon, Saskatchewan, Canada
- CBIO031 A Scalable and Freely Accessible Machine Learning Based Application for the Early Detection of Dyslexia**
Isha Puri, 16, Junior,
Horace Greeley High School, Chappaqua, New York
- CBIO032 Computational Analyses to Identify Genes Disproportionately Affected by NFKBIA Deletions and Implicated in Breast Cancer and Glioblastoma Tumorigenesis**
Amrita Lakhanpal, 17, Junior,
The Altamont School, Birmingham, Alabama
- CBIO033 Illuminating Gene Dysregulation in Cancer: Deep Learning Identification of Disrupted Transcription Factor Binding Sites**
Bryan Hau-Ping Chiang, 17, Senior,
Lynbrook High School, San Jose, California
- CBIO034 The Role of Kinetic Parameters in Phenotypic Switches**
Sreya Banik, 15, Sophomore,
Lincoln Park Academy, Fort Pierce, Florida
- CBIO035 Phylogenetic and Evolutionary Patterns of the P53 Gene in Mammals**
Yuqi Zhang, 17, Junior,
BASIS Tucson North, Tucson, Arizona
- CBIO036 A Machine Learning Method for Selection of Genetic Variants and Prediction of Type 2 Diabetes Mellitus Using Next-Generation Sequencing Data**
Luann Chan Jung, 17, Senior,
Manhattan High School, Manhattan, Kansas
- CBIO037 A Novel Approach to Classify and Detect Thoughts Using Electroencephalography**
Viraat Das, 17, Senior,
Morgantown High School, Morgantown, West Virginia
- CBIO038 Developing a Novel Model for Predicting Patient Susceptibility to Contracting a Hospital Acquired Infection Utilizing Machine Learning in the Evaluation of Electronic Patient Health Records**
Erika Eleonora Ravitch, 17, Senior,
Cascia Hall Preparatory School, Tulsa, Oklahoma
- CBIO039 Analysis of Polymer Characteristics through C++ Computational Methods**
Shridhar Athinarayanan, 17, Junior,
White Station High School, Memphis, Tennessee
- CBIO040T Hit or Miss? Using Mathematical Computations Based on Existing Physics Theorems to Evaluate Head Impacts in the National Football League**
Smaran Velidi, 16, Sophomore,
Aditya Sai Vishnubhotla, 16, Sophomore,
Plano East Senior High School, Plano, Texas

Earth and Environmental Sciences

- EAEV001T Environmental Magnetism on the Black Sea Coast**
Cristiana Savuca, 16, Sophomore,
Alin Mihai Rada, 17, Sophomore,
Carmen Sylva High School, Eforie Sud, Constanta, Romania
- EAEV002 Aquaponics and Hydroponics; Experimentation in Real World Environments**
Makayla Bedgood, 15, Junior,
South Sumter High School, Bushnell, Florida
- EAEV003 An Efficient Water Purification Method Using Renewable Energy**
Prerana Kumar, 18, Senior,
Americus Sumter High School, Americus, Georgia
- EAEV004 Crumb Rubber for Artificial Turf: The Effects of Herbs on Environmental Runoff**

Connor N. Cleveland, 18, Senior,
Fort Walton Beach High School, Fort Walton Beach, Florida
- EAEV005T Characterization of Aquatic Plants of the Coba Lagoon and Its Potential as Biofilters in Planters**
Alba Yuselmi Hau May, 17, Junior,
Jose Eduardo Yam Chay, 16, Junior,
EMSaD Coba, Coba, Quintana Roo, Mexico
- EAEV006 *G. mellonella*, *T. molitor*, *Z. morio*, Larvae Waste Products from Polystyrene Biodegradation Used as Fertilizer for Tropaeolum Plant**
Lourdes Marian Marquez, 17, Junior,
John B. Alexander High School, Laredo, Texas
- EAEV007 A Combined Explanation for the Sailing Stones in Death Valley, California and the Laguna del Altillo Chica, Spain**
Ronja Spanke, 18, Senior,
Hans Thoma Gymnasium, Lorrach, Germany
- EAEV008 Testing the Effectiveness of Various Shading Materials to Mitigate Effects of Climate Change on Mock Leatherback Sea Turtle Nests**
Annabelle Christine Colao, 18, Senior,
Ridgefield High School, Ridgefield, Connecticut
- EAEV009 The Lethal Effects of Hexafluoropropylene Oxide Dimer Acid on *Daphnia magna***
Emmily Mobley, 16, Sophomore,
Stuart W. Cramer High School, Belmont, North Carolina
- EAEV010T Campaign Air Pollution with the Help of Nanotechnology**
Artemie Mitioglo, 17, Junior,
Vladislav Mitioglo, 17, Junior,
Theoretical High School "Orizont, Durlesti", Chiinu, Republic of Moldova
- EAEV011 Examining Directivity of the 2016, Meinong Earthquake Using Doppler Effect**
Shen-Chang Huang, 17, Senior,
Taipei Municipal Jianguo High School, Taipei City, Chinese Taipei
- EAEV012 An Environmental Study: Activated Carbon as a Neutralizing Agent of a Pesticide Imidachloprid**
Isabella Lopez, 17, Senior,
J.W. Nixon High School, Laredo, Texas
- EAEV013 Carbon Dioxide Removal in Coniferous and Deciduous Trees**
Analise Elizabeth Chambers, 16, Junior,
Jefferson County International Baccalaureate, Irondale, Alabama
- EAEV014 Banana Peel Sorption of Cations**
Trang Thi Thuy Do, 18, Senior,
Fayetteville Christian School, Fayetteville, Arkansas
- EAEV015T Using 3D Drone-based Digital Models to Investigate the Fluvial Geomorphology of an Eroding Arroyo**

Kathryn Tsi-Pak Kummel, 14, Freshman,
Michelle Tsi-ying Kummel, 17, Senior,
William J. Palmer High School, Colorado Springs, Colorado
- EAEV017 A Tale of Two Fishes: An Analysis of Differentiation in Compositional Characteristics of Two Distinct Fossil Butte Member Localities**

Casey John Shaw, 17, Senior,
Liberty High School, Joes, Colorado
- EAEV018 Biodegradation of Polystyrene by Superworms**
Ariana Nicole Peralta, 18, Senior,
Medical Academy for Science and Technology, Homestead, Florida
- EAEV019T Effects of Different Frequencies of Electromagnetic Radiation on the Growth Rates of the Cyanobacteria *Spirulina platensis***
Alyssa Yumi Watarida, 15, Sophomore,
Michelle Cho Tam, 15, Sophomore,
Kapolei High School, Kapolei, Hawaii
- EAEV020 Small Plastics Causing a Big Problem: The Prevalence of Micro- and Macro- Plastics on Oahu Beaches**
Jasmine Mia Chase, 16, Junior,
Mililani High School, Mililani, Hawaii
- EAEV021 Using Microbial Indicators to Analyze Water Quality at Cypremort Point Beach**
Ruth Adams, 17, Junior,
Ovey Comeaux High School, Lafayette, Louisiana
- EAEV022 Multiple Time-Step Predictive Models for Hurricanes in the North Atlantic Basin Based on Machine Learning Algorithms**
Aneesh Gupta, 16, Junior,
Oregon Episcopal School, Portland, Oregon
- EAEV023 Analyzing Water Quality in Local Watersheds Through Water Chemistry and Macroinvertebrates**
Ethan Jean, 17, Junior,
Cookeville High School, Cookeville, Tennessee
- EAEV024T Study of Mercury (Hg) Concentration Levels in Commercial Fish: A Quantitative Analysis**
Jean Paul Ambroise-Robles, 17, Senior,
Isabel Irene Vega-Calderon, 17, Senior,
Colegio Rosa-Bell, Guaynabo, Guaynabo, Puerto Rico
- EAEV025 The Effect of 4-MCHM on *Daphnia magna* Population Change**
Kate Nadja Karaman, 16, Sophomore,
Niles Township West High School, Skokie, Illinois
- EAEV026 Spray and Stick: A Novel Agent for Pesticide Adhesion**
Jacob Wu, 16, Junior,
The Lawrenceville School, Lawrenceville, New Jersey
- EAEV027 Sinkhole Detection Using Wireless Sensor Networks and Structural Health Monitoring**
Sophia Joy Wang, 15, Sophomore,
Amity Regional High School, Woodbridge, Connecticut
- EAEV028T Water Retaining Characteristics of *Pomelo albedo* to Combat Water Crisis**
Raymond Yin Hong Chow, 16, Junior,
Kai Wern Wong, 16, Senior,
Yew Siang Ku, 17, Senior,
Heng Ee High School, Georgetown, Penang, Malaysia

- EAEV029T Mitigation of TiO₂ Stress and Characterization of a Brassinosteroid Insensitive-1 Gene in Aquatic Bioindicator Species *Limna minor***
Dylan Daniel Makani, 16, Sophomore,
Tong Ye, 16, Sophomore,
Jacqueline Olivia Balestrieri, 16, Sophomore,
North Shore Hebrew Academy High School, Great Neck,
New York
Half Hollow Hills High School East, Dix Hills, New York
Saint Anthony's High School, South Huntington, New York
- EAEV030 Tracking Climate Change, Human Impact, and the Overall Oceanic and Terrestrial Health of Estuaries Along the Hudson River and Long Island Sound to Influence Policy**
Emily Alexandra Cruz, 18, Senior,
Manhasset High School, Manhasset, New York
- EAEV031 Microplastics, Macro Problem: A Novel Technique to Remove Microplastics from Water Using a Modified Electrostatic Filter**
Melanie Elise Quan, 15, Freshman,
Las Lomas High School, Walnut Creek, California
- EAEV032 Radiochemistry and AI: Development of a Targeted Emergency Response and Recovery System Using ML Algorithms for Use After a Nuclear Event**
Anushka M. Nair, 17, Junior,
Lake Oswego High School, Lake Oswego, Oregon
- EAEV033 Next Generation Morphological and Molecular Analysis of the Toxicity of Pharmaceutical-Derived Aquatic Contaminants (PPCPs)**
Ronit Jain, 16, Sophomore,
Interlake High School, Bellevue, Washington
- EAEV034 Stop the Flame in Its Infancy! Multivariable Early-Warning System for Low-Cost Prevention of Wildfire Proliferation**
Vasily Antonovich Tremsin, 18, Senior,
Campolindo High School, Moraga, California
- EAEV035 Enhanced Biogas System for Sustainable Agriculture**
Sara Atef Ibrahim Hasan, 16, Sophomore,
Hadabet El-Ahram Governmental Language School, Giza,
Haram, Egypt
- EAEV036T Eco-Brick**
Ahmed Abdelbaset Elshenawy, 17, Senior,
Ahmed Nabil El Sheikh, 18, Senior,
Kafr EL-Sheikh STEM School, Kafr EL-Sheikh,
Kafr Elsheikh, Egypt
- EAEV037T FLOC AND FLOW: Using Electrocoagulation and Granular Media Filtration to Improve Water Quality**
Matthew Jeffrey Trees, 15, Sophomore,
Garrett Guerrero, 16, Sophomore,
Trees Family Home School, San Angelo, Texas
Guerrero Home School, San Angelo, Texas
- EAEV038 Speed and Survival Rate of *Oncorhynchus nerka* Migrating from the Pacific Ocean**
Ryan Paul Bunn, 16, Junior,
Success Academy DSU, St. George, Utah
- EAEV039 The Effect of Pharmaceuticals on Nitrate Concentration and Removal Rate in a Simulated Bardenpho Reactor**
James Licato, 15, Freshman,
Washington-Lee High School, Arlington, Virginia
- EAEV040 Microplastics in the Terrestrial Food Chain via Earthworms (*Lumbricus terrestris*)**
Siena Catherine Cizdziel, 16, Junior,
Oxford High School, Oxford, Mississippi
- EAEV041 Quantifying Microplastics in the Mississippi River: A Source of Pollution in Gulf Coast Seafood**
Claire Theresa Cizdziel, 15, Freshman,
Oxford High School, Oxford, Mississippi
- EAEV042T Can Cicada's Song Forecast Local Weather? A Scientific Approach**
Arif Kusuma Firdaus, 17, Senior,
Nadia Alfi Syarifah, 17, Senior,
Madrasah Aliyah Negeri 2 Kota Malang, Malang, East Java,
Indonesia
- EAEV043 The Abundance and Population Health of Common Reef Fish in Protected Marine Reserves Compared to Unprotected Reef Environments, Utilizing Baited Remote Underwater Video (BRUV) Surveys**
Michael Noah Odzer, 15, Freshman,
Dr. Michael M. Krop Senior High School, Miami, Florida
- EAEV044 Carbon Capture Using Solid Sorbents. Amine-Tethered Polystyrene and Polyacrylic Polymers for CO₂ Adsorption**
Glenn Manuel Grimmert, 16, Sophomore,
American Heritage School of Boca Delray, Delray Beach, Florida
- EAEV045 Machine Learning Algorithms for Satellite Remote Sensing of Ocean Color in Coastal Waters**
Marvin Fangzhou Li, 15, Freshman,
James M. Bennett High School, Salisbury, Maryland
- EAEV046 Satellite Modeling of Wildfire Susceptibility in California by Using Artificial Neural Networking**
Anthony David Weng, 17, Senior,
Terre Haute South Vigo High School, Terre Haute, Indiana
- EAEV047T Modeling of the Objects Drifting on the Sea Surface**
Oleg Andreevich Kirillov, 15, Freshman,
Elena Alexandrovna Kovalchuk, 17, Junior,
Academic Gymnasium No. 56, St. Petersburg, Russian Federation
Middle School of General Education No.25, Balakovo, Saratov
Region, Russian Federation
- EAEV048T Effect of Mud Conditions in Mangrove Forests on Rowing Motions of Robotic Mudskippers: A Novel Anticipation Method on Reforestation and Ecosystem Rehabilitation**
Naphat Cheenchamrat, 17, Junior,
Pattharaphol Chainiwattana, 16, Sophomore,
Bangkok Christian College, Bangkok, Thailand
- EAEV049T Comparison of the Toxic and Lethal Effects of the Cleaners Containing and Non-Containing Phosphate and Petroleum Derived Agents on Biomes in Aquatic and Terrestrial Ecosystem**
Zeynep Coskun, 17, Senior,
Ali Umur Guler, 19, Senior,
Fethi Gemuhluoglu Fen Lisesi, Yesilyurt, Malatya, Turkey
Fahri Kayahan Kultur Temel Lisesi, Yesilyurt, Malatya, Turkey
- EAEV050T Chitosan as an Eco-Friendly Biopack**
Aliaksandra Hileuskaya, 16, Junior,
Lizaveta Karpovich, 17, Junior,
BSU Lyceum, Minsk, Minsk Region, Belarus
- EAEV051T Development of Green Mussels Granules Coated with Actives from Oil Palm Empty Fruit Bunch Extract as a Natural Coagulant**
Christopher Prasetya Mulya, 18, Senior,
Devina Grisella, 18, Senior,
Santa Laurensia Senior High School, Tangerang Selatan, Banten,
Indonesia
- EAEV052 Influence of Color Dishes on Insects Capture and Composition in the Forests of the Comarca Kuna Yala, Panama**
Edili Aurelis Paredes, 17, Junior,
Instituto Cacique Olodebiliginya, Panama, Comarca Kuna Yala,
Panama
- EAEV053 Evaluating Phosphorus Absorbing Materials for the Mitigation of Harmful Algal Blooms (HABs)**
Savio Le, 17, Junior,
Holy Rosary Academy, Anchorage, Alaska

- EAEV054 # Predicting Food Shortages in Africa from Satellite Imagery**
Lillian Petersen, 15, Sophomore,
Los Alamos High School, Los Alamos, New Mexico
- EAEV055 Insights into the Effects of Tropical Disturbances Hurricane Irma and Invest 92L on the Dynamics of the Phytoplankton Community of the Estero Bay Estuary**
Mark Ethan Leone, 15, Sophomore,
Canterbury School, Fort Myers, Florida
- EAEV056 Combating Hepatocellular Carcinoma in the Developing World: A Novel Discovery of the Fungicidal Potential of Bicarbonate Solutions Against *Aspergillus flavus***
Evan Thomas Collins, 18, Senior,
Ridgeview High School, Orange Park, Florida
- EAEV057T # The Effects of Increasing Temperature on Plant Development and Nutritional Content**
Vivian Heleana Pryor, 17, Junior,
Sabrina Michelle Borg, 15, Freshman,
St. Andrew's Episcopal School, Ridgeland, Mississippi
- EAEV058 A Destructive Invader: How Rising Atmospheric CO₂ Is Aiding *Noctiluca scintillans* in Taking Over Tropical Oceans**
Alexandria Lauren Ang, 17, Senior,
Bronx High School of Science, Bronx, New York
- EAEV059 The Effects of Bacteria on the Biodegradation of Polymers**
Alexis Elizabeth Kellogg, 15, Sophomore,
Warwick High School, Lititz, Pennsylvania
- EAEV060T Rain vs. Bore –Do the Best Results Come Out of the Blue or the Red?**
Felisha Rose Kaiser, 18, Senior,
Elena Suzette Kaiser, 16, Junior,
Danthonia Home School, Elsmore, New South Wales, Australia
- EAEV061 ## Taphonomic Geochemistry of Fossil Bones from Marine and Terrestrial Fossilization Environments**
Emily Grace Cross, 18, Senior,
Hammarskjöld High School, Thunder Bay, Ontario, Canada
- EAEV062 Silver Nanoparticles: Reducing Environmental Toxicity Through Shape Control**
Katie Lu, 17, Junior,
Central High School, Springfield, Missouri
- EAEV063T Effect of the Extract of the Leaves of the *Rizophora mangle* on the Growth of *E. coli* Bacteria**
Naomi L. Santell Lebron, 17, Senior,
Krystal L. Santell Lebron, 17, Senior,
Specialized School of Science and Mathematics Genaro Cautino Vazquez, Guayama, Puerto Rico
- EAEV064 Assessment of Water Quality of the Gulpha Creek Watershed, Hot Springs National Park**
Rachel Elizabeth Stall, 17, Junior,
Arkansas School for Mathematics, Sciences and the Arts, Hot Springs, Arkansas
- EAEV065T Eradication Methods of *Paulownia tomentosa* in the Hot Springs National Park**
Hollie Hagler, 18, Senior,
Lily Ann Easley, 17, Senior,
Arkansas School for Mathematics, Sciences and the Arts, Hot Springs, Arkansas
- EAEV066 Which Solar Reflector Increases Solar Efficiency the Most?**
Charles Bryce Buchanan, 15, Freshman,
South Lake High School, Groveland, Florida
- EAEV067T Comparing the Difference in Plant Species Diversity, Plant Growth Forms, and Soil Characteristics Between Native and Non-Native Forests, Year II**
Marion Rose Powell, 16, Junior,
Cameryn Rae Kahalewai, 16, Junior,
Molokai High School, Ho'olehua, Hawaii
- EAEV068 Earthquakes ROCK: Preliminary Data from a Manipulated Model to Show the Newton Force of Different Bedrock Types and Their Relationship with Induced Earthquakes in Kansas**
Kevin Johnson, 18, Senior,
Pratt High School, Pratt, Kansas
- EAEV069 The Dark Side of Light: The Potential Impact of Artificial Light on Libellulid Feeding Behavior and Activity**
Hannah Rogers, 16, Sophomore,
Camdenton High School, Camdenton, Missouri
- EAEV070 The Aquaponic Life**
Sarah Grace Trimble, 17, Junior,
Kossuth High School, Corinth, Mississippi
- EAEV071 Air Quality: A Quantitative Approach to Small and Large Particles**
Abigail Renae Post, 14, Freshman,
Hankinson Public School, Hankinson, North Dakota
- EAEV072T Innovative Conservation of Wetland Resources with *Rhizophora mucronata* Nursery**
Kasidet Sukkwai, 17, Junior,
Chidchanok Inkaew, 17, Junior,
Pattadon Namwongnao, 17, Junior,
Suratpittaya School, Muang District, Suratthani, Thailand
- EAEV073T "FloBot": A Mobile Portable and Floating Real Time Data Acquisition Device for Lake Water Quality Monitoring and Mapping**
Pranav Nadig Shikarpur, 17, Junior,
Siddharth Viswanath, 17, Junior,
Bangalore International Academy (NSV), Bangalore, Karnataka, India
- EAEV074 The Alamosa River Watershed: A Unique Proving Ground for Natural Selection**
Amber L. Michel, 17, Junior,
Monte Vista High School, Monte Vista, Colorado
- EAEV075 The Optimization of Degradation of Azo Dyes via *Saccharomyces cerevisiae***
Nicole Segaran, 16, Sophomore,
Carmel High School, Carmel, Indiana
- EAEV076 # Nitrogen Fixation: Biological vs. Synthetic Agents**
Addie James Schnabel, 18, Senior,
Ashley Public School, Ashley, North Dakota
- EAEV077T Biosorption of Manganese Mine Effluents Using Crude Chitin from Shell Wastes of Philippine Bivalves**
Randy Estales Molejona Jr., 19, Senior,
Elaine Nicole Sally Saquin, 18, Senior,
Iloilo National High School, Iloilo City, Philippines
- EAEV078T The Effect of Different Types of Fruit Peels on the Absorption of Oil: A Biodegradable Way to Clean Oil Spills**
Elda Bengu, 14, Freshman,
Shreya Tripathi, 15, Freshman,
Hamilton High School, Chandler, Arizona
- EAEV079 Reducing Total *Coliform* Bacteria in American Samoa's GUDI Wells with UV-B Treatment**
Gloria Park, 16, Junior,
Pacific Horizons School, Pago Pago, American Samoa
- EAEV080T Trip to Old Astronomical Map: Development and Application of Equation to Convert from 2D to 3D**
Youngseo Du, 17, Junior,
Hajun Myung, 18, Senior,
Gyeonggibuk Science High School, Uijeongbu-Si, Gyeonggi-do, South Korea
- EAEV081 Searching for Hydrothermal Vents in the Samoan Archipelago**
Seamos Cleary, 16, Junior,
Pacific Horizons School, Pago Pago, American Samoa

EAEV082 The Effect of Atrazine on *Raphanus sativus* 'Champion' Seed Germination

Austin Gene Sundell, 17, Senior,
Delavan High School, Delavan, Illinois

EAEV083T Micro Farms

Lillian Pearl Ingraham, 18, Senior,
Taylor Brianne McKinney, 18, Senior,
Northwest Technology Center, Fairview, Oklahoma
Fairview High School, Fairview, Oklahoma

EAEV084 Adsorption of Nitrophenols (NPhs) Using N-Doped Carbonaceous Material

Anusha Bhattacharyya, 16, Junior,
Little Rock Central High School, Little Rock, Arkansas

EAEV085T Save It, Repeat It and Eat It

Dinya Nazeer Brifkani, 16, Sophomore,
Rashan Jamal Mohammed, 16, Sophomore,
Ronaki Duhok Ishik Girls College, Duhok, Duhok, Iraq

Embedded Systems

- EBED001T Experimental Study of Upper Limb Movement for Creating a Natural and Universal Interface: Innovative Applications**
Paul Andrei Bricman, 17, Junior,
Matei Ciprian Anghel, 17, Junior,
National Bilingual High School "George Cosbuc", Bucharest,
Romania
Lauder-Reut Educational Complex, Bucharest, Romania
- EBED002 # A Novel Gesture Decoding Sensor for the Evolution of Cost Effective Electronic Smart Gloves**
Arqam Ali Khan, 18, Senior,
Islamabad Model College for Boys, G-10/4, Islamabad, Capital
Territory, Pakistan
- EBED003T Intel Genuino-Based Cow Estrous Detector**
Yuan Dwi Kurniawan, 17, Junior,
I Dewa Gede Wicaksana Prabaswara, 18, Junior,
SMA Negeri Bali Mandara, Buleleng, Bali, Indonesia
SMAN Bali Mandara, Singaraja, Bali, Indonesia
- EBED004 Infrared-Laser Computer Control**
Lukas Nullmeier, 19, Senior,
Salier-Gymnasium, Waiblingen, Germany
- EBED005 Read4me: Using the Internet of Things and Machine Learning to Enable Blind People to Read Paper Books**
Tarek Abdessattar Aloui, 17, Junior,
Pioneer School of Gabes Tunisia, Gabes, Gabes, Tunisia
- EBED006 Multicopter Autonomous Refueling System**
Aziz Hanafi, 14, Freshman,
International School of Carthage, Tunis, Carthage, Tunisia
- EBED007T Biofeedback for the States of Anxiety and Stress Through Automated Detection Processes**
Nicolas Esleyder Cayturo Silva, 15, Sophomore,
Alfred Addison Chillitupa Quispihuanca, 16, Sophomore,
High Performance College - Arequipa, Arequipa, Peru
- EBED008 Diurnal Variation and Duration of Meteors Usable for Radio Communications**
Kyra Slovacek, 18, Senior,
Monarch High School, Louisville, Colorado
- EBED009 Monitoring Environmental Status of a Mesocosm Using an ESP32**
Richard Alexander Pope, 16, Junior,
Pensacola High School, Pensacola, Florida
- EBED010 Wearable Tech Glove Enabling Speech Through Hand Gestures**
Ethan Nathaniel Damiani, 16, Junior,
Henry W. Grady High School, Atlanta, Georgia
- EBED011 Design of Blind E-Reader with Conjugate Cam Group Based on Binary Principle**
Zizhuo Wang, 17, Senior,
Shanghai Experimental School, Shanghai, China
- EBED012 Electroencephalogram (EEG) Sensor and Subsequent Analysis System Optimization for Objective and Point-of-Care Concussion Diagnosis**
Paritosh Suri, 17, Junior,
Plano West Senior High School, Plano, Texas
- EBED013 Development of a Multidimensional Atmospheric Sensing Platform**
Ryan Westcott, 16, Sophomore,
Oregon Episcopal School, Portland, Oregon
- EBED014T Universal Sign Language Translation Gloves**
Ho Fai Chung, 17, Senior,
Ka Lung Chan, 17, Senior,
Christian and Missionary Alliance Sun Kei Secondary School,
Hong Kong, China, Hong Kong Special Administrative Region
- EBED015 # EMG Controlled Bionic Hand**
Marc Miguel Mirabal, 17, Sophomore,
Grants High School, Grants, New Mexico
- EBED016 A Low-Cost, Rapid Response Communication Link During a State of Emergency Using WiFi Mesh Networks**
Pooja Jain, 17, Junior,
West Linn High School, West Linn, Oregon
- EBED017 Indoor Blind Navigation System**
Abdul Rahman Hazem Sa'D, 16, Sophomore,
Jubilee School, Amman, Jordan
- EBED018 Typing without Touch: A Touchscreen Accessible Device for the Visually Impaired**
Natasha Dilamani, 17, Senior,
John L. Miller Great Neck North High School, Great Neck,
New York
- EBED019 Write Anywhere: Filtering Low-Cost IMU Data for Small-Scale Motion Reproduction**
David Xu, 16, Junior,
Jericho High School, Jericho, New York
- EBED020 Developing a Facial Shaving Device for People with Limited Hand Dexterity**
Aaron Hannon, 19, Senior,
St. Muredach's College, Co. Mayo, Connacht, Ireland
- EBED021 Autonomous Liquid Dispenser**
Gabriel Gelli Checchinato, 18, Senior,
Colegio Ser, Jundiai, Sao Paulo, Brazil
- EBED022 # Repti-Lighting: The Automated Solution to Prevent Calcium Deficiency in Reptiles**
Abigail Ann Arnashus, 15, Sophomore,
Von Steuben Metropolitan Science Center, Chicago, Illinois
- EBED023 Aware of Air: Measuring Local Air Quality Using Portable Arduino-Based Sensors**
Nikhil Devanathan, 16, Sophomore,
Kennewick High School, Kennewick, Washington
- EBED024T New Vision for the World**
Nourhan Hussien ZainElabedeen, 16, Junior,
Mira Medhat Moussa, 16, Junior,
S.T.E.M. Luxor School, Luxor, Egypt
- EBED025T Salvum Cars**
Sama Mahmoud Hadhoud, 16, Junior,
Hanin Hossam Eldaly, 16, Junior,
Menofya STEM School, Sirs Eel Lian, Menofya, Egypt
- EBED026T Large Format Mosaic Screens to Visualize Schlieren**
Shorena Gudzhabidze, 16, Junior,
Marina Gudzhabidze, 17, Junior,
Dea Ilarionova, 17, Junior,
Cervantes Gymnasium AIA-GESS, Tbilisi, Georgia
- EBED027T Automatic Sustainable Low Cost Climate Control for Small Rural Buildings**
Naresh Pradeep Pillay, 16, Sophomore,
Lucca Poli Fernandes Pinto, 16, Sophomore,
Alexandra Leah Sherman, 16, Sophomore,
International School of Panama, San Miguelito, Panama Este,
Panama
- EBED028 Sound Wave Modulation as a Method of Color Perception for the Visually Impaired**
Jane Carolyne Hantanto, 18, Senior,
Smak Penabur Gading Serpong, Kab. Tangerang, Banten,
Indonesia
- EBED029 Universal GPS Watch**
Mallory Bohr, 15, Sophomore,
Plankinton High School, Plankinton, South Dakota

- EBED030 e-Strip: The First Self-Taught, Personalized and Wearable Smart Medical Device to Control the Temperature of Body Parts**
Melinda Szegedi, 16, Sophomore,
ELTE Apaczai Csere Janos High School, Budapest, Hungary
- EBED031 Walk Enhancing Smart Device**
Liyanaadura Supun Sasipriya Silva, 14, Sophomore,
De Mazenod College, Kandana, Western Province, Sri Lanka
- EBED032 Background Noise Reduction by Using Spectral Selection to Remove Unneeded Frequencies**
Kevin Xiao, 17, Junior,
Alabama School of Mathematics and Science, Mobile, Alabama
- EBED033 Ultrasonic Glasses for the Visually Impaired**
Axel Sariel Toro Vega, 15, Sophomore,
Dr. Carlos González High School, Aguada, Guaniquilla,
Puerto Rico
- EBED034 Wireless Sensor Network for Illegal Logging and Wildfire Detection**
Yanapat Nikomrak, 18, Senior,
Princess Chulabhorn Science High School Mukdahan,
Mukdahan, Thailand
- EBED035 RDS of Things: Using RDS Technology for Smart Cities**
Atalay Kutlay, 19, Senior,
Ankara Ataturk Lisesi, Ankara, Turkey
- EBED036 A Portable Android Based Detection System of Prevalent Chronic Respiratory Illnesses**
Sathvik Nallamalli, 14, Freshman,
Olympia High School, Olympia, Washington
- EBED037 Development of an Efficient Pipe to Separate Reusable and Non-Usable Water**
Kau Winston Mohlamonyane, 17, Senior,
Hoerskool Ben Viljoen, Groblersdal, Mpumalanga, South Africa
- EBED038 SkySend: Providing Communication During Disaster Relief**
Sanjana Subramanian, 16, Sophomore,
Urbana High School, Ijamsville, Maryland
- EBED039 Developing a Tactile Depth Map for the Blind**
Tyler James Delargy, 16, Junior,
Bangor High School, Bangor, Maine
- EBED040 iCordisX: SmartPhone-Based Personalized Cardiac Monitoring Using Computer Vision and Bluetooth Low Energy**
Patrick Liu, 17, Junior,
University High School, Irvine, California
- EBED041 Green Switch**
Athavan Thambimuthu, 16, Junior,
Royal West Academy, Montreal, Quebec, Canada
- EBED042T Smart Walking Stick for Blind: The "Golden i"**
Gajindu Kavinda Bandara, 17, Senior,
Kavindra Gimhan Wijayawardana, 17, Senior,
St. Anthony's College, Kandy, Central Province, Sri Lanka
- EBED043 Drip - A Precision Irrigation System for Developing Nations**
Waleed Wael Sawan, 16, Junior,
Oakridge Secondary School, London, Ontario, Canada
- EBED044T LabTrak: A Micro-Telemetry Device for Modeling Mice Behavior**
Rohan Arora, 17, Senior,
Venkat Vinayak Krishnan, 17, Senior,
Anil Ravi Tolwani, 18, Senior,
American High School, Fremont, California
- EBED045 Doppler Radar Flash Flood Detector**
Ammon Wallace, 14, Freshman,
Salem Hills High School, Salem, Utah
- EBED046T iSAFE (The Integrated Systems Automobile Failsafe Environment): Decreasing Infant Mortality Rates and Driver Distraction Using Microcontrollers and Embedded Circuits**
Melody Wheat, 17, Senior,
Robert James Blaine, 18, Senior,
Fabian Dalton Hill, 17, Junior,
Jim Hill High School, Jackson, Mississippi
- EBED047 Does Mental Practice Make Perfect?**
Pamela Nash, 16, Sophomore,
Strasburg Public School, Strasburg, North Dakota
- EBED048 P.I.P.S. - An Inexpensive Patient Indoor Positioning System**
Joseph Carmelo Saturnino, 15, Freshman,
Bishop Ryan Catholic Secondary School, Hannon, Ontario,
Canada
- EBED049 Arduino Navigation for the Visually Impaired and Elderly**
Luis Fernando Flores Juarez, 16, Sophomore,
Yuma High School, Yuma, Arizona
- EBED050T EyeMove: Using Electrooculography to Provide Mobility for the Disabled**
Malav H. Shah, 18,
Burzin Poras Balsara, 18, Senior,
Plano Senior High School, Plano, Texas
- EBED051T NeoEyes: Smart Glasses for the Blind Based on Vietnamese Character Recognition System**
Hoang Minh Khoi Nguyen, 17, Senior,
Phuong Thao Vu, 17, Senior,
Le Hong Phong High School for the Gifted, Ho Chi Minh,
Viet Nam
- EBED052 DIMOS: A Novel Low-Power, Fast Response Logic Gate Architecture**
Swagat Bhattacharyya, 17, Senior,
Morgantown High School, Morgantown, West Virginia
- EBED053 ENVIRO**
Fahad Osama Al Yaqout, 17, Senior,
Salah Edin School, Kuwait, Kuwait
- EBED054 Using Piezoelectric Sensors to Find the Center of Gravity of an Aircraft**
Everett Reed, 17, Senior,
Washington Math Science Technology PCHS, Washington,
District of Columbia
- EBED055 Ferrotilt - A New High Accuracy Tilt Measurement Sensor**
Aron Molnar, 19, Senior,
Szechenyi Istvan Technical Secondary School of Szekesfehervar,
Szekesfehervar, Hungary
- EBED056 A Smart Device to Protect Children from Heat Stroke in Confined Spaces**
Sara Ameer Abdulla AL-Baker, 17, Junior,
Qatar Banking Studies & Business Administration School for
Girls, Doha, Qatar
- EBED057T A Compact Microstrip Antenna for Ultra-Wide Band Applications**
Rashed Ali Aljasmi, 17, Senior,
Omar Hassan Alhousani, 16, Junior,
Humaid Bin Abdulaziz School for Boys, Ajman,
United Arab Emirates
- EBED058 Design of the Onboard Computer "CERBER"**
Ivan Shoitov, 17, Sophomore,
Murmansk Polytechnic Lyceum, Murmansk, Russian Federation

Energy: Chemical

- EGCH001 Biocombustion Cells with Photosynthesizing Microorganisms**
Elena Robu, 18, Senior,
Tudor Vianu National High School of Computer Science,
Bucharest, Romania
- EGCH002 The Development of New Power Storage Devices Based on Organic Heterocyclic Aromatic Compounds**

Samuel Marin Scott, 18, Senior,
Kahuku High and Intermediate School, Kahuku, Hawaii
- EGCH003T Development of Novel Synthetic Methods for Hybrid Perovskites Using Reactive Polyiodide Melt CH₃NH₃I-2**
Ivan Yakimov, 18, Junior,
Elizaveta Maksimovna Nemygina, 17, Junior,
Universitetskaya Gimnaziya MSU im.Lomonosova, Moscow,
Russian Federation
- EGCH004 Trash to Treasure: Converting Aluminum Cans into a Valuable Additive for Li-S Batteries with an Unprecedented Performance**

Sophia Patricia Zhou, 15, Sophomore,
Lafayette High School, Lafayette, Louisiana
- EGCH005T A Bright Future: The Use of Organic Waste in Dye-Sensitized Cells in the Creation of Efficient Solar Energy Systems**
Grace Lee, 16, Junior,
Nick Lee, 18, Senior,
Colleyville Heritage High School, Colleyville, Texas
- EGCH006 Long Life High Energy Density K⁺/FSI- Dual-Ion Battery with Corncob/Graphite Mixture as Cathode and Soft Carbon as Anode**
Kairui Lin, 17, Junior,
QuanZhou No.5 High School, Quanzhou, Fujian, China
- EGCH007 Development and Performance Evaluation of a New Type of Mg-Air-Battery for Emergency: The Teabag Model**
Shuho Hamano, 17, Junior,
Sakado High School of Saitama Prefecture, Sakado-shi,
Saitama, Japan
- EGCH008 Genetic Engineering Yeast to Produce Lipid Based Biofuel for the Future**
Remi Olivier Labeille, 16, Sophomore,
Midway High School, Waco, Texas
- EGCH009T Roots for the Road**
Emma Stone, 15, Freshman,
Reiley Leake, 15, Freshman,
Brush High School, Brush, Colorado
- EGCH010 America's Next Generation of Green Energy: Biodigesters**
David S. Baden, 17, Junior,
Patrick Henry High School, Hamler, Ohio
- EGCH011 Deconvoluting Impedance Mechanisms in Emerging Fuel Cell Material**
Alexia Popescu, 16, Junior,
Niles Township West High School, Skokie, Illinois
- EGCH012 The Effects of Sodium Bicarbonate Concentration on the Growth Rate of *Chlorella***

Jessica Elise Roth, 18, Senior,
Big Sandy High School, Big Sandy, Montana
- EGCH013 The Relationship Between Oil and Biodiesel Quality**

Tyler Shaud Schwarzbach, 17, Junior,
Big Sandy High School, Big Sandy, Montana
- EGCH014 The Effect of Sulfate Compounds on Perovskite Solar Cell Voltage Output**
Chloe Anne Seng, 17, Junior,
Central Virginia Governor's School for Science and Technology,
Lynchburg, Virginia
- EGCH015 Research on the Conversion of Waste Straws into High-Octane Gasoline**
Ziqi Pan, 17, Junior,
Beijing No. 4 High School, Beijing, Beijing, China
- EGCH016 How to Feed Your Fuel: Analyzing the Effects of Nitrogen Deprivation vs. Increased Carbon on Lipid Production in an Algal Photobioreactor**
Christopher Daniel Dwyer, 17, Junior,
Wachusett Regional High School, Holden, Massachusetts
- EGCH017 Paper-Based Microbial Fuel Cells for Self-Powered Sustainable Disease Diagnostics**

Kendra Zhang, 17, Senior,
Jericho High School, Jericho, New York
- EGCH018T Storage of Electrical Energy by Converting It into Chemical Energy**
Matthias Franz Breitegger, 19, Senior,
Kerstin Koller, 19, Senior,
Hoherer Technische Lehranstalt Weiz, Weiz, Styria, Austria
- EGCH019 Sulfur-Deplete Cultivation of *C. reinhardtii*: A Novel Approach to Increasing the Cost-Efficiency of Green Hydrogen Fuel Production**
Alexander Bryce Walker, 17, Junior,
Patrick F. Taylor Science & Technology Academy,
Westwego, Louisiana
- EGCH020 The Production of Oxygen and Hydrogen Gases Through the Development of an On Board Electrolyzer to Improve the Mile per Gallon Efficiency of a Spark-Ignition Engine**

Daniel A. Orr, 17, Junior,
Northwestern High School, Mellette, South Dakota
- EGCH021 Fuel Ethanol Potential of Barley, Phase Four**

Morgan Marcella Kohl, 18, Senior,
Waverly-South Shore Public School, Waverly, South Dakota
- EGCH022 A Novel Sol-Gel Derived SPEEK/Silicon Dioxide Composite Membrane for the Vanadium Redox Flow Battery**
Dhruvik Parikh, 18, Senior,
Henry M. Jackson High School, Bothell, Washington
- EGCH023 Electricity from Living Water Hyacinth Plants Enhanced Biogas Production**
Macdonald Tawanda Chirara, 18, Senior,
ZRP High School, Harare, Harare Metropolitan, Zimbabwe
- EGCH024T The Effect of Fluorination of Graphene on the Effectiveness of Primary Batteries (Li/CF_x) and Supercapacitors**
Sukitha Rukshan Gunasena, 15, Sophomore,
Ruchira Udara Sumanasekera, 16, Junior,
duPont Manual High School, Louisville, Kentucky
- EGCH025 Proposed Inclusive Model for the Prediction of the Derived Cetane Number (DCN) of Fuels Using Molecular Parameters**
Mohannad Ahmed Jabrah, 17, Senior,
Dar AlFikr Schools, Jeddah, Makkah, Saudi Arabia
- EGCH026 Acquisition of Low Cost Energy by Natural Dyes with Dye Sensitized Solar Cells (DSSC)**
Muhammed Melih Dogan, 18, Senior,
Fethi Gemuhluoglu Fen Lisesi, Yesilyurt, Malatya, Turkey
- EGCH027 Improving the Water Splitting Efficiency Using Nickel-Based Catalysts: A Hydrogen Production Device Driven by Photovoltaic Cell**
Nawar Tayseer Alhaddad, 17, Senior,
Dahran Ahliyya School, Dammam, Eastren Province,
Saudi Arabia
- EGCH028 Efficiency and Stability Improvement of Perovskite Solar Cells**
Meshail Mansour Aljalawi, 17, Senior,
AlBassam Schools, Dammam, Saudi Arabia

- EGCH029 A Novel Approach to Optimizing Algae Biofuel Production by Using Naturally Occurring Extracellular Polymeric Substances (EPS) Through Bioflocculation**
Nikita Bharati, 14, Freshman,
Basha High School, Chandler, Arizona
- EGCH030 Multi-Fuel Analysis**
Jackson Carmichael Boyle, 18, Senior,
Delta High School, Delta, Utah
- EGCH031 Creating a Cost-Efficient Water Soluble Carbon Capture System for CO₂ Emitting Vehicles to Increase Biofuel Production Efficiency**
Satya Phoenix Alagarsamy, 17, Junior,
American Heritage School, Plantation, Florida
- EGCH032T Performance of Conventional & Unconventional Hybrid Rocket Fuels**
Ryan Spencer Pearson, 15, Sophomore,
Chad Harrison Brown, 16, Sophomore,
Woods Cross High School, Woods Cross, Utah
- EGCH033T The Efficiency Increase of Eco-Friendly DSSC Containing Visible Light Activity**
Dabin Lee, 17, Senior,
Subin Lee, 16, Junior,
Seo Yeon Jeong, 16, Senior,
Changwon Sungmin Girls' High School, Changwon,
Gyeongsangnam-do, South Korea
- EGCH034 Novel Use of Bio-Based Materials in Metal-Air Batteries**
Aniruddh Chennapragada, 17, Senior,
James Ruse Agricultural High School, Sydney, NSW, Australia
- EGCH035 Optimizing the Designs of Multi-Layer Microbial Fuel Cells**
Zachary Kochert, 17, Senior,
Center for Advanced Technical Studies, Chapin, South Carolina
- EGCH036T Highly Mesoporous Electrodes Derived from Polymer Blends of Polyacrylonitrile-Polystyrene and Polyacrylonitrile-Poly(Methyl-Methacrylate) Paired with a Cost-Effective Deep Eutectic Solvent for High Energy Density Supercapacitors**
Ashna Shah, 17, Junior,
Ashay Shah, 17, Junior,
Plano East Senior High School, Plano, Texas
- EGCH037T Biomass Energy as a Means of Electrical Production**
Angela Carolina Morales Diaz, 16, Junior,
Daniel Esteban Cruz Perez, 16, Junior,
Veinte de Julio, Acacias, Meta, Colombia
- EGCH038T Research of LI-S Battery with Porous Carbon from Garlic Peel**
Jihyeok Jang, 16, Sophomore,
Seungjin Lee, 16, Sophomore,
Changwon Science High School, Changwon-si,
Gyeongsangnam-do, South Korea
- EGCH039T Vermicompost as a Source of Electricity**
Muhammad Fareeq Bin Mohamed Nasser, 16, Senior,
Muhammad Amirul Naim Bin Shaiful Kamarul, 17, Senior,
MRSM Tun Abdul Razak, Pekan, Pahang, Malaysia
- EGCH040 Leidenfrost Effect as a Reactor for Direct Methanol Fuel Cell Catalyst**
Fatima Zayed ALMaadeed, 16, Senior,
AlArqam Academy for Girls, Doha, Qatar
- EGCH041T Determining the Role of n-Hexane in Multiple Phases in *Nannochloropsis sp.* and *Nitzschia sp.***
Jenna Lily Takata, 16, Junior,
Charlene Tan, 16, Junior,
Kauai High School, Lihue, Hawaii
- EGCH042 A Billion Powerplants: Could Microscopic Organisms Lead to a Future of Environmentally Friendly Electricity?**
Kylee Pameticky, 18, Senior,
Fairview High School, Fairview, Oklahoma

Energy: Physical

- EGPH001 In-Line Turbine Network Based Hydro-Electric Power Generation System for Residential Application**
Hasnat Ahmad, 13 Freshman,
Scarsdale International School, Lahore, Punjab, Pakistan
- EGPH002 Solar Efficiency Cover-Up: Solar Panel Protective Cover Effects on Efficiency**
Davis Cinitis, 18, Senior,
Riga's French Lyceum, Riga, Riga, Latvia
- EGPH003 Untapped Static: A New Paradigm for Energy Harvesting Integrating a Cost-Effective Electrostatic-Based Generator with Supercapacitors to Optimize Energy Storage and Energy Harvesting Efficiency**
Eshan Chhabra, 17, Junior,
Plano Senior High School, Plano, Texas
- EGPH004T Energy of Life: Colored Bioluminescent Concentrator for Enhanced Photovoltaic Performance**
Smiti Gandhi, 17, Senior,
Andrew Liu, 17, Senior,
Clear Brook High School, Friendswood, Texas
- EGPH005 Offsetting High Rise Booster Pump Systems' Energy Consumption with the Implementation of Hydropower Turbines**
Sean Arthur Roades, 17, Junior,
Valley View High School, Jonesboro, Arkansas
- EGPH006T Road Wind Power Generation Using Momentary Air Pressure Difference**
Leehan Kim, 17, Senior,
Jaewon Jang, 18, Senior,
Jinhyeok Choi, 17, Senior,
Bundang Jungang High School, Seongnam-si, South Korea
- EGPH007 Improving the Energy Produced by a Flexible Solar Cell**
Michele Schremp, 14, Freshman,
Bishop Feehan High School, Attleboro, Massachusetts
- EGPH008 The Laser's Potential: Photonic Propulsion in the Future of Transportation**
Benjamin Erik Hickenlooper, 18, Senior,
Fremont High School, Plain City, Utah
- EGPH009T Increase of the Wave-Tidal Power Generator Efficiency by Copying *Litopenaeus vannameis*' Swimming**
Yuna Jung, 18, Senior,
Chan Hui Kim, 17, Senior,
Minseo Bang, 19, Senior,
Gyeongnam Science High School, Jinju-si, Gyeongsangnam-do, South Korea
- EGPH010 Fusion Reactions in Low Wattage Inertial Electrostatic Confinement Devices**
Daniel Alexander Klasing, 19, Senior,
Stuart W. Cramer High School, Belmont, North Carolina
- EGPH011 Catalyst Integration and Surface Protection of Water-Splitting Photoelectrochemical Cells for Hydrogen Production Applications**
Dana Turki Altoaimi, 17, Senior,
Kingdom Schools, Riyadh, Saudi Arabia
- EGPH012 An Innovative Design of Enhanced-Performance Solar Panels Using Heat Pipe and Thermoelectric Generator**
Norah Fahad Alamri, 16, Sophomore,
Alfaisaliah Islamic Schools, AlKhobar, Saudi Arabia
- EGPH013 Aneutronic IEC Fusion Concept**
Ben James Kolar, 17, Junior,
Fergus High School, Lewistown, Montana
- EGPH014 Maximizing Energy Efficiency: Improvements in Litz Wire Designs in the Megahertz Range**
Rachel Joseph, 17, Junior,
Somers High School, Lincolndale, New York
- EGPH015T Solar Musical Engine**
Fatma Adel Mahmoud, 17, Junior,
Khadeja Omar Dapour, 17, Junior,
STEM School of Alexandria, Alexandria, Egypt
- EGPH016 Use of Stray Currents as a Source of Renewable Energy**
Vladyslav Kazakov, 14, Freshman,
Educational Complex "Alexandria Kollegium - Specialized School", Olexandriya, Ukraine
- EGPH017 The Design and Testing of an Ankle Induction Coil to Charge Devices During Movement**
Chase Joel Newel, 17, Senior,
Pinelands High School, Cape Town, Western Cape, South Africa
- EGPH018 Increasing Hydropower Flow Rate Using a Non-Linear Penstock**

Malini Mukherji, 18, Senior,
Notre Dame Preparatory, Pontiac, Michigan
- EGPH019 Medium Affecting Thermal Efficiency in the Heating Pipe System with the Simultaneous Prevention of Eutrophication Process**
Szymon Pawel Kanikowski, 19, Senior,
I Liceum Ogolnoksztalce im. Karola Marcinkowskiego, Poznan, Wielkopolska, Poland
- EGPH020T Electricity from the Air**
Tonyaradzwa Louisa Chivandire, 17, Senior,
Tapiwanashe Kamba, 16, Junior,
Queen Elizabeth Girls' High School, Harare, Zimbabwe
- EGPH021 RPAL: A Novel Low-Cost High-Efficiency Photovoltaic System Using Tunable Plasmonic Nanostructures**

Sathya Edamadaka, 16, Junior,
High Technology High School, Lincroft, New Jersey
- EGPH022T A Dual Axis Solar Tracker as a Hybrid Solar Harvesting Tool as an Alternative Energy Provider for Rural Areas in Kenya**
Rohit Dhanji Rabadiya, 17, Sophomore,
Kauel Rajeshkumar Brahmhbhatt, 15, Sophomore,
Shree Cutchi Leva Patel Samaj School, Nairobi, Nairobi, Kenya
- EGPH023T Design and Development of Solar-Tracking Arduino-Rooted PV Panels**
Joscel Kent Padayao Manzanero, 19, Senior,
Keith Russel Pelagio Cadores, 18, Senior,
Eugene Rualizo Rivera, 18, Senior,
Camarines Sur National High School, Naga City, Camarines Sur, Philippines
- EGPH024 Investigation of Novel and Unconventional Microwave Antenna Designs Using *in silico* Modeling**

Samuel Brian Lossef, 17, Junior,
School Without Walls High School, Washington, District of Columbia
- EGPH025 Electrae- An Innovative Solution for Generating Energy from Multiple Sources Including Piezoelectrics, Photovoltaic Materials and Low Flow/Head Hydropower for Application in a Multitude of Environments**
Laalitya Acharya, 14, Freshman,
William Mason High School, Mason, Ohio
- EGPH026 Harvesting Energy from Raindrops Using Piezoelectric Generator**
Huong Ho, 17, Junior,
Rockdale Magnet School for Science and Technology, Conyers, Georgia

- EGPH027 Thickness Variation of Optical Spacer By Using Poly (Methyl Methacrylate) (PMMA) on the Performance of a Four Terminal Mechanically-Stacked Tandem Solar Cell**
Hasan Abdulredha Ashkanani, 17, Junior,
Yosef Bin Eissa, Kuwait, Kuwait
- EGPH028 Eggtricity: The 3-D Printed Buoy that Generates Sustainable Energy Using Wave Movement**
Catalina Teresa Lemus, 17, Junior,
Georgetown Visitation Preparatory School, Washington,
District of Columbia
- EGPH029T Designing a Novel Self-Sustained Solar Powered Desalination Apparatus to Produce Thermoelectricity, Using a Fresnel Lens and Thermoelectric Generators**
Ibrahim Mateen Moghul, 15, Sophomore,
Maryam Mateen Moghul, 16, Junior,
Triangle Math and Science Academy, Cary, North Carolina
- EGPH030T Anti-Shake for Sky Scrapers**
Zhir Raouf Mohammedali, 18, Junior,
Shkar Abdalla Ahmed, 18, Junior,
Private Salahaddin Ayyubi College, Sulaimania, Iraq
- EGPH031T Portable Thermoelectric System**
Oula Fares Qasim, 17, Junior,
Manar Montasar Kadhim, 17, Junior,
Baghdad Ishik Girls College, Baghdad, Iraq
- EGPH032T Smart Extension Cord**
Omar Maghdid Abdullah, 17, Sophomore,
Mustafa Fadhil Kamal, 16, Sophomore,
Erbil Ishik Boys College, Erbil, Iraq

Engineering Mechanics

ENMC001T Using Fluid Dynamics to Create a Submersible Aircraft

Donald Edward Martin 17, Junior,
Jason Dong, 17, Senior,
Academics Etc., Lake Charles, Louisiana
Alfred M. Barbe High School, Lake Charles, Louisiana

ENMC002T Captain Smartphone

Ivan Andres Otero, 16, Sophomore,
Santiago Gabriel Perez, 17, Sophomore,
Escuela Technica Carmelo Anexo (ERCNA), Carmelo, Colonia,
Uruguay

ENMC003 Dynamo Powered Vaccine Carrier for Off-Grid Locations, Year Two

Susanna Ruth Dorminy, 16, Junior,
Sola Fide Home School, McDonough, Georgia

ENMC004 Measuring the Sound Intensity and Reflection Coefficients of Materials Inside an Acoustically Designed Classroom (Choir Room), Assisted by a Custom Impedance Apparatus and Modeled by Two and Three Dimensional Models

Abigail Rose Smith, 15, Sophomore,
Cloquet Senior High School, Cloquet, Minnesota

ENMC006T Automatic Brake System for Motorcycles

Ignatius Vito Wirawan Putra Hapsara, 16, Junior,
Attar Husna Fathiya, 16, Junior,
SMA Negeri 8, Yogyakarta, Yogyakarta, Daerah Istimewa
Yogyakarta, Indonesia

ENMC007 Is Your Smart Phone Leaking?: Year Three

Camila Rimoldi Ibanez, 15, Freshman,
Sebring High School, Sebring, Florida

ENMC008 Electromagnetic Wall Climber

Matthew Garrett Graham, 15, Freshman,
Polk Pre-Collegiate Academy, Auburndale, Florida

ENMC009 Detecting Earthquakes Using a Two-Dimensional Pendulum

Ephram Jonah Edelkind, 14, Freshman,
Manatee High School, Bradenton, Florida

ENMC010 Controlled Landing: Manipulating a Parachute to Determine the Landing Site of a Rocket

Lorenzo Shaikewitz, 16, Junior,
Charles E. Jordan Senior High School, Durham, North Carolina

ENMC011 Designing and Building a Continuously Spinning but Controllable Flying Object

Frederik Dunschen, 19, Senior,
Friedensschule Munster, Munster, Germany

ENMC012T Orientation Gadget for Visually Impaired

Nele Tornow, 18, Senior,
Fabian Charles Miro Rimmele, 19, Senior,
Alfred Nobel Schule, Geesthacht, Germany

ENMC013 Suppression of Aeroelastic Instabilities in High Ratio Wing Structures Using Principal Component Analysis

Krithik Ramesh, 15, Sophomore,
Cherry Creek High School, Greenwood Village, Colorado

ENMC014 KN-Sucrose Rocket Fuels

Caleb Wilson Chakmakjian, 15, Freshman,
Live Oak Classical School, Waco, Texas

ENMC015T Access to the Study of Rapid Chemical Kinetics by Generating and Monitoring a Drop of a Reaction Mixture

Clarisse Baudouin, 17, Senior,
Clement Traup, 18, Senior,
Chloe Emma Simonnet, 17, Senior,
Lycee Douanier Rousseau, Laval, France

ENMC017T An Amphibious Teleoperated Vehicle Designed to Collect Water Samples in Remote and Hazardous Environments

Ryker Bullis, 18, Senior,
Nathaniel A. Fritsch, 18, Senior,
Nicholas Conrad Ogden, 18, Senior,
Glencoe High School, Hillsboro, Oregon

ENMC018 B.M.G. Brushless Motor Generator

Ashley Hugh Cain, 17, Junior,
Mazenod College, Mulgrave, Victoria, Australia

ENMC019 Inspection 360: A Novel Spin-Climbing Robot Design Targeting at Performing Maintenance Tasks for Cable-Stayed Bridges

Yifan Zhang, 18, Senior,
Shanghai High School, Shanghai, Shanghai, China

ENMC020T Wildlife Observation System Based on Autonomous Target Recognition and Tracking

YanYi Wang, 16, Sophomore,
YuFei Li, 16, Sophomore,
Beijing No. 4 High School, Beijing, Beijing, China
The High School Affiliated to Renmin University of China, Beijing,
Beijing, China

ENMC021 Traditional Five-Story Pagoda: Experimental Analysis Using Home-Brew Seismic Generator

Miyabi Nagano, 17, Junior,
National Institute of Technology, Gifu College, Motosu-shi,
Gifu, Japan

ENMC022 Development of a Smart Cervical Vertebrae Brace for Neck Pain Prevention and Rehabilitation

Muning Fan, 17, Junior,
Academy of Science and Technology, The Woodlands, Texas

ENMC023 Economizing Materials on a Pratt Truss Bridge

Chloe Aviana Boerner-Martinez, 15, Freshman,
John Jay Science and Engineering Academy, San Antonio, Texas

ENMC024 The Hexagonal Weave: Using Hexagonal Engineering to Create a Better Body Armor

Lucas Carey Lynn, 18, Senior,
Wetumpka High School, Wetumpka, Alabama

ENMC025T A Helping Hand for Arthritis Pain Relief & Rehabilitation

Natalie Noel Luong, 17, Junior,
Jenna White, 17, Junior,
Ana Bogdanova, 16, Junior,
Peachtree Ridge High School, Suwanee, Georgia

ENMC026 Saving Our Environment: Ash to Concrete

Dylan Tornquist Tucker, 17, Junior,
Waipahu High School, Waipahu, Hawaii

ENMC027 Development of a Hybrid Direct Write 3D Printer: A Novel One-Step Approach to Fabricating Multi-Layer Functional Devices and Flexible Electronics Through Reactive Inkjet Printing

Joshua Murphy Jacob, 18, Senior,
Saint Xavier High School, Louisville, Kentucky

ENMC028 Solar Updraft Tower-Wind Turbine Hybrid: Optimizing Power Generation in Multifarious Climatic Conditions Using Computational Fluid Dynamics Analysis

Rachel Spaulding, 17, Junior,
Eastern High School, Louisville, Kentucky

ENMC029 Essential Features of Hyperloop Systems

Collin Christopher Kemper, 18, Senior,
Saint Xavier High School, Louisville, Kentucky

ENMC030 The Virtual Winglet: A Novel Approach to Boundary Layer Manipulation and Wingtip Vortex Suppression

Rachel Seevers, 16, Junior,
Paul Laurence Dunbar High School, Lexington, Kentucky

- ENMC031T A Spherical Induction Motor with Hexahedron Stator for Attitude Control**
Shang-Jung Lee, 18, Senior,
Po-Hsun Yen, 18, Junior,
Concordia Middle School, Chiayi County, Taiwan
Department of Education, Chiayi City, Taiwan
- ENMC032 Project POWER: A Swift Water Warning System**
Tyler E. Robertson, 16, Junior,
Clovis West, Fresno, California
- ENMC033 Undulated Leading-Edge Airfoils in Low to Medium Reynolds Number Regime**
Keshav Vedula, 18, Senior,
CREC Academy of Aerospace and Engineering, Windsor,
Connecticut
- ENMC034 Engineering an Atomic Force Microscopy Based Nano-Stethoscope**
Fred Chu, 18, Senior,
Manhasset High School, Manhasset, New York
- ENMC035 BEAM Me Up, Scotty! Mitigating the Decibel Levels on the BEAM Space Module Using a 1:10 Scale Model with Acoustic Engineering Techniques for Long Term Space Missions**
Daniel Liddell Anand, 17, Junior,
Anand Homeschool Academy, Akron, Ohio
- ENMC036 MARS-Q: A Vertical Thrust Vehicle Capable of Planetary Reconnaissance in a Martian Atmosphere**
Aylor Jake Huneycutt, 15, Freshman,
AP4, Madison, Tennessee
- ENMC037 FEA Based Analysis of Spidron Fractal Structures in Force Absorption Applications**

Skyler Steven Hughes, 18, Senior,
Albuquerque Institute for Math and Science, Albuquerque, New Mexico
- ENMC038 Optimizing Combustion Efficiency and Emissions in a Burner Design Using Spiral Mixing Technology; Year Two of an Ongoing Study**

Brendan Joseph Crotty, 16, Sophomore,
Home School, Muskogee, Oklahoma
- ENMC039 Simulation, Optimization, and Validation of a Closed Wing Airplane**

Andrew Bennett, 18, Senior,
Bountiful High School, Bountiful, Utah
- ENMC040 Proof of Concept Modeling of Venus Atmospheric Maneuverable Platform Utilizing Earth-Bound Modeling**
Spencer Andrew Krock, 17, Junior,
Norco High School, Norco, California
- ENMC041T Fuel Geysering in Small Motor Systems**
Mason Robert Palmer, 17, Senior,
Lylee Rane Nebeker, 18, Senior,
Fremont High School, Plain City, Utah
- ENMC042 How to Make a More Efficient DC Motor**
Delaney Ann Hammond, 15, Freshman,
Piedra Vista High School, Farmington, New Mexico
- ENMC043 Implementation of Gyroscopically Leveled Spherical Drones Optimized Through Neuro-Evolution of Augmented Topologies for Reconnaissance and Imaging of Martian Environments**
William Wang, 16, Junior,
Nikola Tesla STEM High School, Redmond, Washington
- ENMC044 Evaluation of Scrubber Designs for Cleaning Ship's Hulls**
Lily Gabrielle Adcock, 16, Junior,
Pearl City High School, Pearl City, Hawaii
- ENMC045 Towards Engine Downsizing: Examining the Effect of Injection Strategies and Novel AC Ion Sensor on Preignition Tendency of Spark-Ignited Engines**
Yousif Bader Alhammadi, 17, Senior,
Dhahran Ahliyya School, Dammam, Eastern Province,
Saudi Arabia
- ENMC046 Determining the Ignition Characteristics of GCI Blend for Gasoline Compression Ignition Engines Using Chemical Kinetics**
Hassan Ahmed Alkhunaizi, 17, Senior,
Almajeediah Secondary School, Qatif, Saudi Arabia
- ENMC047 New Generator Producing Energy in a Closed Circuit**
Angelysmar Feliciano-Cordero, 18, Senior,
Dr. Carlos González High School, Aguada, Guaniquilla,
Puerto Rico
- ENMC048 Utilizing Low-Cost Hybrid Technology to Decrease Emissions in Motorcycles**
Nikhil Wagher, 17, Senior,
Rivermont Collegiate, Bettendorf, Iowa
- ENMC049 Mathematically Accurate, Double-Axis Microgravity Simulator**
Gwyneth Marie Schloer, 17, Senior,
Rock Ridge High School, Ashburn, Virginia
- ENMC050T Langmuir Plasma Research**
Daniel Joel Christensen, 18, Senior,
Michaela Germani Fennell, 17, Junior,
Northwest Nuclear Consortium, Federal Way, Washington
- ENMC051 The Optimal Truss**
Edwin Ding, 15, Sophomore,
Bartlesville High School, Bartlesville, Oklahoma
- ENMC052T Investigating the Effects of Propellant Mass Flow Rate and a Swirl Ring on the Efficiency of a Magnetoplasmadynamic Thruster**
Avery Parker Clowes, 16, Sophomore,
William Augustus Menken, 16, Sophomore,
Phillips Exeter Academy, Exeter, New Hampshire
- ENMC053 The Impact of Physical Properties on a Subsonic Projectile's Velocity**
Andre Farinazo Jr., 17, Junior,
Olentangy High School, Lewis Center, Ohio
- ENMC054 EVERSE: Electric Vehicle Energy Recovery and Safety Enhancement**
Michael Wolfe, 15, Sophomore,
King's Christian Collegiate, Oakville, Ontario, Canada
- ENMC055 Automated Radiation Shield for Potential Space Colonies**
Deniz Gulbaharli, 18, Senior,
Ozel Cevizlibag Doga Anadolu Lisesi, Istanbul, Turkey
- ENMC056 Microwave Resonant Cavity Thruster**
Jakub Jedrzejewski, 19, Senior,
Technikum nr 1 w Zespole Szkoa, Technicznych w Ostrowie Wielkopolskim, Ostrow Wielkopolski, Poland
- ENMC057 The Designing of Remote Control System "Robot Snowplow"**
Evgenii Mikhailov, 16, Sophomore,
Municipal Budgetary Educational Institution "The Hibinsky Gymnasium", Kirovsk, Murmansk Region, Russian Federation
- ENMC058 3... 2... 1... Blast Off!**
Durga Sai Venu Omkaar Chimma, 15, Sophomore,
Greenwood High School, Greenwood, Mississippi
- ENMC059T The Automatic Freshwater Distillation System from Seawater Operated by Water Pressure**
Anh Nhat Mai, 17, Senior,
Long Van Phung, 17, Senior,
Phan Boi Chau Gifted High School, Vinh, Nghe An, Viet Nam

- ENMC060T The Wheel for Moving on the Floor and Stair, the New Solution for Wheelchairs**
Nguyen Cong Khanh, 17, Senior,
Nguyen Huu Thanh Dat, 16, Junior,
Bac Ninh Specilaized High School, Bac Ninh, Viet Nam
- ENMC061 Engineering a Composite Ballet Pointe Shoe Shank**
Abigail Roslyn Freed, 17, Junior,
Hilton Head Preparatory School, Hilton Head Island,
South Carolina
- ENMC062 Device for Measuring the Efficiency of Electromagnetic Launchers**
Petteri Haverinen, 16, Sophomore,
Lahden Lyseo, Lahti, Pajjat-Hame, Finland
- ENMC063 Flying Birdie**
Hailey M. Smith, 17, Junior,
Billings Senior High School, Billings, Montana
- ENMC064T Hexagon Housing: A More Realistic Solution to Refugee Housing Using the Isoperimetric Honeycomb Conjecture**
Samantha B. Davis, 17, Junior,
Alicia Kuhlmann, 17, Junior,
Bingham High School, South Jordan, Utah
- ENMC065 The Effectiveness of Man-Made Structures in Reducing the Amount of Flooding Caused by a Tsunami**
Liam Paul Kellogg, 15, Freshman,
Seton School, Manassas, Virginia
- ENMC066 Improving Robustness of X-Ray Synchrotron Image Analysis Using Deep Learning and Data Augmentation**
Nicole Meister, 17, Senior,
Centennial High School, Ellicott City, Maryland
- ENMC067 Graphene Insulated Nanosatellite**
Ghaya Mohammed Ibrahim, 16, Senior,
Al Khaleej National School, Dubai, United Arab Emirates

Environmental Engineering

- ENEV001 Biosorventum: A Novel Approach for Textile Effluent Treatment**
Juliana Davoglio Estradioto, 17, Senior,
Instituto Federal de Educação, Ciência e Tecnologia do Rio Grande do Sul (IFRS) - Campus Osório, Osorio,
Rio Grande do Sul, Brazil
- ENEV002 Sustainable Construction of a Desalination Model with Supplementary Heating and Photovoltaic Conversion**
Caio Vinícius Lima de Souza, 16, Sophomore,
Escola Estadual Gabriel de Almeida Cafe, Macapa, Amapa, Brazil
- ENEV003 Potential Bioremediation of Waste Hydrocarbons: Utilization of Mycorrhizal Fungi as an Environmental Enhancement Agent**
Eduardo Burgos, 17, Senior,
Greybull High School, Greybull, Wyoming
- ENEV004 Developing a Deployable pH Sensor to Monitor Ocean Acidification, Year Three**
Evelyn Amal Haase, 17, Junior,
Molokai High School, Ho'olehua, Hawaii
- ENEV005 Biodiesel Fuel Production via Mild Chemical Recycling of Thermosetting Polymers**
Emily Guo, 17, Junior,
Chattahoochee High School, Johns Creek, Georgia
- ENEV006 Harmful Algal Growth Suppressed by Allelopathy Regardless of Excess Phosphorus**
Elizabeth Margaret Farmer, 17, Senior,
North Carolina School of Science and Mathematics, Durham,
North Carolina
- ENEV007T Innovative Indoor Biowaste Composting Solution: Biobox with Added Microorganisms and Heating Source**
Kevin Reisenbuk, 19, Senior,
Kris-Robin Sirge, 19, Senior,
Joonatan Oras, 19, Senior,
Hugo Treffner Gymnasium, Tartu, Tartu County, Estonia
- ENEV008T Arsenic and Lead Decontamination Level Identification Through the Toxic Metal Biosorption Technique Using Vegetable Residues**
Ariana Fernanda Ponce Bohorquez, 15, Sophomore,
Maria Jose Jaico Roman, 15, Sophomore, Santa Ana, Tacna, Peru
- ENEV009T Development of Self-Managed Seawater Desalination Device with Biofouling Reduction Powered by the Tidal Range**
Hyesung Jeon, 18, Senior,
Yoojeong Kwon, 18, Senior,
Gyeonggi Science High School for the Gifted, Suwonsi,
Gyeonggido, South Korea
- ENEV010 Using Solar Power in a Combined Electrocoagulation-Electroflotation Approach to Water Treatment**
Stephanie Brown, 17, Junior,
College Station High School, College Station, Texas
- ENEV011 One Key Recycling Intelligent Disinfection Cabinet for Waste Textbooks**
Jingke Hu, 17, Sophomore,
Hangzhou Xuejun High School, Hangzhou, Zhejiang, China
- ENEV012 ECO 3D Printing**
Mohammad Basil Omari, 17, Junior,
Modern Systems School, Amman, Amman, Jordan
- ENEV013T Assessment of the Levels of Mercury in Students Aged 12 to 18**
Afonso Morgado Mota, 18, Senior,
Bernardo Jose Soares Alves, 17, Senior,
Joao Neto Afonso Dickson Leal, 18, Senior,
Colegio Valsassina, Lisboa, Lisboa, Portugal
- ENEV014 Sustainable Structural Health Monitoring after Earthquake Based on Multiscale Entropy Analysis**
Kai-En Yang, 17, Junior,
National Experimental High School at Hsinchu Science Park,
Hsinchu, Taiwan
- ENEV015 A New Air Pollution Filter for Effective Gas Separation and Purification: High-Performance Polymer-Blended Mixed-Matrix Membranes with Triad Compatibilizers - Small Organic Molecules, Metal Organic Frameworks, and Carbon Nanotubes**
David Yue, 17, Junior,
Texas Academy of Mathematics and Science, Denton, Texas
- ENEV016T Reducing Commercial Food Waste: Developing an Application for the Economically Viable Transportation of Food Waste from Source to Compost Facility via Private Contractors**
Michael Jonathan Gerhard, 15, Sophomore,
Kabir Jolly, 16, Sophomore,
Academy of Science and Technology, The Woodlands, Texas
- ENEV017T Understanding the Degradation of an Algae-Derived Bioplastic and Its Immediate Effects on Aquatic Environments**
Odessa Emmanuelle Thompson, 16, Sophomore,
Rose Marlee Leveen, 15, Sophomore,
Bailey Rhyan Segall, 16, Sophomore,
Camas High School, Camas, Washington
- ENEV018 Cleaner Bottoms, Part III, Hull Materials: An Environmentally Friendly Method of Reducing Barnacle Growth and Improving the Quality of Our Waterways Using Ultrasonic Waves**
Isabela Victoria Perdomo, 15, Freshman,
MAST at FIU Biscayne Bay Campus, North Miami, Florida
- ENEV019 Time of the Month: Bad for the Environment?**
Tykera Carmen Moore, 16, Junior,
Rockdale Magnet School for Science and Technology,
Conyers, Georgia
- ENEV020 Designing a Novel Heavy Metal Bioremediation System Utilizing Immobilized Algae Partnered with Heavy Metal Resistant Microbial Isolates Collected from Contaminated Superfund Mine Sites and Identified with a 16S Ribosomal Subunit Analysis**
Braden Nicholas Milford, 16, Junior,
Cascia Hall Preparatory School, Tulsa, Oklahoma
- ENEV021T Implementation of *Salvinia sp.* and *Eichhornia sp.* for the Phytoremediation, Rhizofiltration, and Recycling of Heavy Metals from Contaminated Aquatic Environments**
Nastassia Goodson, 18, Senior,
Bryan To, 17, Senior,
Oregon Episcopal School, Portland, Oregon
- ENEV022 From Shrimps to a Barbie: Shrimp Shell Bioplastics – A New Solution to the World's Growing Plastic Problem**
Angelina Arora, 15, Junior,
Sydney Girls High School, Sydney, NSW, Australia
- ENEV023T Grapes Cotton**
Obada Nayef Al-leimon, 16, Sophomore,
Ahmad Nayef Al-leimon, 16, Sophomore,
Abdullah II for Excellence Alkarak, Alkarak, Jordan
- ENEV024T Introduction of Styrofoam-Degrading Bacteria Derived from Mealworm into Intestine of Goldfish**
Jinhyuk Park, 18, Senior,
Younghoon Lee, 18, Senior,
Sebin Choi, 17, Senior,
Hanmin High School, Goyang-si, South Korea
- ENEV025T Application of Stirling Engine to Appropriate Technology**
Junsu Kim, 17, Senior,
Jaeho Seong, 18, Senior,
Horyeong Chung, 17, Senior,
Moksang High School, Mokpo City, Jeollanam-do, South Korea

- ENEV026 Magnetically Induced, Visual Detection of Trace Arsenic Contaminants in Water Using Fe₃O₄ Photonic Crystal Structures**
Raina Jain, 15, Sophomore,
Greenwich High School, Greenwich, Connecticut
- ENEV027 Investigating the Water Filtration Capabilities of Carbon-Coated Oyster Shells**
Alexander Jason Howard, 17, Senior,
Timberline High School, Boise, Idaho
- ENEV028 Development of a Fully Automated 3D-Printed IoT Sensor for Arsenic Detection in Groundwater**

Anjali R. Chadha, 15, Junior,
duPont Manual High School, Louisville, Kentucky
- ENEV029 Pulp Fiction?! Lead Remediation with Biochar Made from the *Apiaceae* (Carrot) Plant Family**

Manashree Seth Padiyath, 16, Sophomore,
Woodbury High School, Woodbury, Minnesota
- ENEV030 PEBBLE: Preservation and Evaluation for Benthic Barcode Life Elements**
Sonja Morgan Michaluk, 15, Sophomore,
Hopewell Valley Central High School, Pennington, New Jersey
- ENEV031 Development of a Highly Efficient Low-Cost Filter for Effective Dissolved Heavy-Metal and Organic Contaminant Removal**

Yatin J. Chandar, 17, Junior,
The Davidson Academy of Nevada, Reno, Nevada
- ENEV032 Single Chamber MFC: Role of Extracellular Phosphate in Heavy Metal Precipitation**

Nathan Michael Tidball, 16, Junior,
Wilsonville High School, Wilsonville, Oregon
- ENEV033 Examining Manufactured Esterification, Homemade Esterification, and Non-Corroding Coating as Viable Solutions to Fatberg Formation**
Jee-Ho Kim, 16, Junior,
Albemarle High School, Charlottesville, Virginia
- ENEV034 Innovative Wind Turbines**
Mahammad Hajiyev, 16, Junior,
Namiq Hemzeyev Adina 238, Sayli Tam Orta Mekteb,
Baku, Azerbaijan
- ENEV035T A Multi-Functional, Deep Water Monitoring Robot for Pollution Control in Reservoirs**
Man Chon Ho, 15, Sophomore,
Seong Hok Lao, 16, Sophomore,
Pui Ching Middle School, Macao, Macao, Macao,
China, Macao Special Administrative Region
- ENEV036 *Chlorella vulgaris* Culturing as a Method of Bioremediation for Waste Water Treatment to Control Entropic Eutrophication**
Ernesto Vazquez, 17, Junior,
Dr. Pedro Albizu Campus, Ponce, Puerto Rico
- ENEV037 Textile Dye Pollution: Can Green Chemistry Fix the Problem with a Biomimetic Iron-Complex?**
Sanjana Padala, 16, Junior,
Little Rock Central High School, Little Rock, Arkansas
- ENEV038 An Economical Approach for Detecting Water Contamination at Homes - Preventing a Public Drinking Water Crisis**
Meghana Avvaru, 17, Junior,
Nashua High School South, Nashua, New Hampshire
- ENEV039 Solar Powered Nanotech Water Filtration Device with Personal Robotic Transport System**
Smiti Shah, 17, Senior,
Bethpage High School, Bethpage, New York
- ENEV040 Direct Functionalization of Algal Nanocellulose to Enhance Biosorption for Lead(II) Remediation**
Michelle Xing, 17, Senior,
William A. Shine Great Neck South High School, Great Neck,
New York
- ENEV041 Transforming Agriculture to Feed the World Sustainably: A State-of-the-Art, Drone-Enabled Precision Agriculture End-to-End Solution**

Veenadhari Kollipara, 17, Senior,
Interlake High School, Bellevue, Washington
- ENEV042 Polymeric Environmental Cycle: Synthesis of Crystals from Expanded Polystyrene to Solve Problems in the Petroleum Industry**

Myllela Cristyna Braz da Silva, 19, Junior,
Instituto Federal De Educacao, Ciencia E Tecnologia Do Ceara,
Limoeiro do Norte, CE, Brazil
- ENEV043T Using *Dunaliella salina* Microalgae to Reduce Anthropogenic CO₂ Levels in the Atmosphere and Applying Its Biomass to Produce Surfactants**
Marcos Felipe Soares Alves Pereira, 18, Sophomore,
Joao Vitor dos Santos Oliveira, 18, Sophomore,
Escola SESI Djalma Pessoa - Unidade Piata, Salvador, BA, Brazil
- ENEV044T Copper Recovery from Galvanic Industries Through Spontaneous Oxidation**
Kaique Goncalves Ferreira, 17, Senior,
Elizandra Larissa da Silva, 16, Senior,
Vitoria Ventura, 16, Senior,
ETEC Trajano Camargo, Limeira, Sao Paulo, Brazil
- ENEV045 Engineered Environmental Containment: Converting *Lemna minor L.* into a Natural Fertilizer**

Aaron Alexander Wills, 18, Senior,
Central Lee High School, Donnellson, Iowa
- ENEV046 A Novel Approach to Marine Hydrocarbon Bioremediation**
Christian Andrew Bloch, 18, Senior,
North Toole County High School, Sunburst, Montana
- ENEV047T Silver Nanoparticle Water Filtration Incorporating Ultra-Violet Sterilization**

Mackenzie Camille Wiegand 16, Junior,
Madison Clio Wiegand, 16, Junior,
Simms High School, Simms, Montana
- ENEV048 Constructing a Solar Graphene-Based Supercapacitor, Phase II**

Madison Rose Hetland, 18, Senior,
Mitchell High School, Mitchell, South Dakota
- ENEV049 Organic and Synthetic: Evaluation of Environmentally Conscious Chemical Dispersant for Biological Crude Oil Remediation**
Adham Mohab Kassem, 17, Junior,
Academy of Science and Technology, The Woodlands, Texas
- ENEV050T Impurivision: A High Performance Mobile Application for Identifying Water Contamination Using Deep Learning**

Palash Shah, 17, Junior,
Kartik Chugh, 17, Junior,
Westfield High School, Chantilly, Virginia
- ENEV051 Hydrogen Generation and the OER Electrode**
Madison M. Autrey, 16, Junior,
Trinity Preparatory School, Winter Park, Florida
- ENEV052T No More Nitrates! A Comparison of Materials Used to Reduce Nitrate Levels in Sand Creek**
Anna Jo Prchal, 17, Junior,
Julianne Pankow, 17, Junior,
New Prague High School, New Prague, Minnesota

- ENEV053 Using Stropharia Mushroom Mycelium (*S. rugosoannulata*) and Waste Treatment Residual for Filtration of Nitrate/Total Dissolved Nitrogen and Phosphate from Agricultural Runoff to Prevent Harmful Algae Blooms, Year Four**
Harshal Rajesh Agrawal, 16, Junior,
Dr. Ronald E. McNair Academic High School, Jersey City,
New Jersey
- ENEV054 Affordable Web-Enabled Continuous Radon Detector**
Anna Erica Prilutsky, 15, Sophomore,
Dr. Ronald E. McNair Academic High School, Jersey City,
New Jersey
- ENEV055 Re-Use and/or Disposal of Disposable Diapers**
Memory Panashe Bvungo, 14, Freshman,
Irene Christian College, Harare, Zimbabwe
- ENEV056 Enhancing Algal Bioremediation in Wastewater Using the Surface Plasmon Resonance of Silver Metal Nanoparticles as an Optical Nanofilter**
Min Hua Tsou, 17, Junior,
Mililani High School, Mililani, Hawaii
- ENEV057T 'Leave' It Back to Us: A Comprehensive & Sustainable MCD Concept Integrating the Whole Life Cycle of Consumer Goods**
Weng Io Chan, 17, Senior,
Weng Ian Wong, 18, Senior,
Keang Peng School - Secondary Section, Macao, Macao, China,
Macao Special Administrative Region
- ENEV058T Novel Approach to Improve Local Wisdom Using Termite Mounds in Treating Agricultural Waste**
Atid Techanitisawad, 16, Sophomore,
Siwakorn Chanchalotorn, 16, Sophomore,
Wasin Tiarawut, 15, Freshman,
Bangkok Christian College, Bangkok, Bangkok, Thailand
- ENEV059 Developing a Biologically Based Artificial Leaf to Filter and Transform Carbon Dioxide Emissions into Oxygen via Photosynthesis**
Vithulan Suthakaran, 17, Junior,
Florida Atlantic University High School, Boca Raton, Florida
- ENEV060 Comparing the Effects of Mycoremediation and Phytoremediation on Soil Pollution Levels Using *Pleurotus ostreatus* and *Brassica juncea***
Ali Talib Mustufa Saifee, 16, Junior,
Success Academy at DSU, St. George, Utah
- ENEV061 Reducing the Environmental Impact of Organic Dyes in Industrial Wastewater Using Modified Graphene-BiOBr Photocatalysts**
Razan Ahmed Almusaed, 15, Sophomore,
Al-Bassam Schools, Dammam, Saudi Arabia
- ENEV062 Storing CO₂ in Unconventional Gas Reservoirs Through the Development of an Optimum Hydraulic Fracturing Design**
Deemah Ali Alashban, 17, Senior,
Dhahran Ahliyya School, Dammam, Eastern Province,
Saudi Arabia
- ENEV063 Recycling Waste into Biochar: A Sustainable and Economic Wastewater Filter and Fertiliser for the Agricultural Industry**
Minh Nga Nguyen, 17, Senior,
Sydney Girls High School, Sydney, NSW, Australia
- ENEV064 Using *Dimorphotheca sinuata* in the Phytoremediation of Tailing Storage Facilities Contaminated by Gold Mining**
Martha Ama Nyarko Djan, 17, Senior,
The Potchefstroom High School for Girls, Potchefstroom,
North West, South Africa
- ENEV065 An Improved Method for Trace Level Arsenic Quantification in Water**
Ankush Kundan Dhawan, 16, Sophomore,
Signature School, Evansville, Indiana
- ENEV066 Calculating Nephelometric Turbidity Units of Increased Suspended Solids in Water by Creating a Cost-Effective Turbidity Buoy System Using an Attenuation Light Collection System**
Samuel Anthony Maher, 17, Senior,
Arthur Hill High School, Saginaw, Michigan
- ENEV067 The Air We Breathe – Reducing Health Risks by Improving IAQ: An Innovative, Smart, and Responsive Ductless System Optimized by Stochastic Simulation and Machine Learning**
Eeshan Tripathii, 16, Junior,
Dalton School, New York, New York
- ENEV068 Desalinating Water Using Electric Fields**
Ari Joseph Firester, 15, Sophomore,
Hunter College High School, New York, New York
- ENEV069T The SAS Water Purification System: Utilizing Novel Chemical, Ionizing, Solar and Off Grid Thermal Induction Techniques for Chemical and Microbial Purification and Medical Sterilization of Water in Developing Communities**
Macinley Neve Butson, 17, Senior,
Jade Taylor Moxey, 18, Senior,
The Illawarra Grammar School, Mangerton, NSW, Australia
Sapphire Coast Anglican College, Bega, NSW, Australia
- ENEV070T Utilizing the Limestone Cycle to Reduce Net Atmospheric CO₂ While Simultaneously Producing Electricity**
Rishi Sai Popuri, 16, Sophomore,
Kishore Jaiswal, 15, Freshman,
Hillfield Strathallan College, Hamilton, Ontario, Canada
- ENEV071 Altitude: A Aquadcopter UAV for Air Pollutants Identification and Measurement**
John Fredy Sepulveda, 17, Junior,
Institucion Educativa Instituto Tecnico Industrial Pascual Bravo,
Medellin, Antioquia, Colombia
- ENEV072 Homemade Water Purifying System**
Jeancarlos Melendez, 17, Junior,
Jose Rojas Cortes, Orocovis, Puerto Rico
- ENEV073T Plaspalt: An Engineered Application for Plastic Waste in Asphalt**
Dakota Lynn Finley, 16, Sophomore,
Eduardo Lauro, 16, Sophomore,
Willcox High School, Willcox, Arizona
- ENEV074 A Novel Approach to the Bioremediation of Concurrent 1,4-Dioxane and Chlorinated Solvent cis-DCE Contamination**
Lauren Waldman, 17, Senior,
American Heritage School, Plantation, Florida
- ENEV075 Buffering the Bloom - The Effect of Nutrient Management Practices on Pond Eutrophication**
Alyssa Mae Kemp, 16, Junior,
Cavalier Public High School, Cavalier, North Dakota
- ENEV076 Development of Innovative Strategies to Protect the Aquatic Environment from Household Plastic Microfibers**
Noel Katherine Lange, 17, Junior,
Auburn High School, Auburn, Alabama
- ENEV077 Lead Ion Biosorption with *Candida albicans*, *Escherichia coli*, and *Saccharomyces cerevisiae* via Engineered Bio-Sand Filters as a Method for Pollution Remediation**
Abril Noel Hunter, 17, Junior,
The Governor French Academy, Belleville, Illinois
- ENEV078 The Effect of Spent Coffee Grounds on the Multicyclic Adsorption of Lead**
Janine Tomas Icalla, 15, Sophomore,
Mills E. Godwin High School, Henrico, Virginia

- ENEV079 Remediation of Cr(VI) Contaminated Soil and Water Using an Optimized Strain (*Anabaena cylindrica*) Immobilized in a Polymer Matrix**
Naisargik Lenka, 15, Freshman,
Dav Public School, Bhubaneswar, India
- ENEV093T H₂O Desalination and Purification Using CNT and Silver Nanoparticles**
Hind Tariq Alqassem Street, 17, Senior,
Hamda Arif Almheiri, 17, Senior,
Al Khaleej National School, Dubai, United Arab Emirates
- ENEV080T Non-Thermal, Atmospheric Plasma: A Means of Water Purification**
Mary Eileen Sgroi, 17, Junior,
Victor Karwacinski, 17, Junior,
Trinity School at Greenlawn, South Bend, Indiana
- ENEV081 Is Your Water Safe to Drink? Development of a Novel Home Test Method to Quantitatively Determine the Concentration of Lead in Water, Phase Two**
Mukund Anand Seshadri, 15, Sophomore,
Dublin Coffman High School, Dublin, Ohio
- ENEV082T Study on Prevention of Soil Acidification Using Hydrogen Bacteria**
Tae Gyun Lee, 18, Senior,
Hyun Ho Bae, 18, Senior,
Gyeongnam Science High School, Jinju-si, Gyeongsangnam-do, South Korea
- ENEV083 Ordered Mesoporous Alkali Metal Catalyst for Recycling Waste Glycerol from Biodiesel Manufacturing Process**
Yoonseok Yang, 18, Junior,
Korean Minjok Leadership Academy, Hoengseong, Gangwon, South Korea
- ENEV084 Low Cost Coastal Irrigation System. Spots I the Desert**
Anastasiia Venchkovska, 16, Freshman,
Lviv Lyceum of Technology, Lviv, Ukraine
- ENEV085 Reliability and Efficiency of 3D Printed Microfluidic Devices when Used in Ocean Acidification Testing**
Ibrahim Ghassan Saleh, 16, Junior,
Greely High School, Cumberland, Maine
- ENEV086 Enhanced Biofilter Control of CAFO Green House Gas Emissions**

Juliann Kathleen Spilman, 17, Senior,
Mandan High School, Mandan, North Dakota
- ENEV087 Bat Consumption of *Ostinia nubilalis*, European Corn Borer**
Mya Nicole Vetter, 17, Senior,
Linton High School, Linton, North Dakota
- ENEV088 The Gel of the Future: The Extraction and Creation of Polyethylene Degrading Bacterial Gel**
Taeseung Um, 18, Junior,
Oviedo High School, Oviedo, Florida
- ENEV089 Filtration of Microplastics in Aqueous Environments Using Ultrasonic Acoustics**
Gary Thanh Nguyen, 18, Senior,
The Mississippi School for Mathematics and Science, Columbus, Mississippi
- ENEV090T Lint! A New Way to Conserve Water**
Monique Dianna Reyes, 16, Junior,
Andrea Yocelin Campos, 17, Junior,
Alta Vista Early College High School, Anthony, New Mexico
- ENEV091 Comparative Assessment of Physical and Chemical Properties of Carrier Bags and Comparison of Its Appropriateness with Environmental Studies**
Vita Krump, 19, Senior,
Il.Gimnazija Maribor, Maribor, Slovenia
- ENEV092T The Recycling of Fiberglass in Wind Turbine Blades**
Bram Bats, 16, Junior,
Myrthe van de Velde, 17, Junior,
Sarah Dahoe, 16, Junior,
Bonhoeffer College, Enschede, Netherlands

Materials Science

- MATS001 Tensile Testing of Additively Manufactured Joineries Complementary to Digital Engineering**
Zhaoxian Zhang, 17, Senior,
Episcopal School of Jacksonville, Jacksonville, Florida
- MATS002T CEBA-TIC: Bioplastic Generated with Biopolymers of *Hordeum vulgare***
Uriel Gutierrez Aguilar, 17, Senior,
Alejandro Dominguez Ayala, 17, Senior,
Colegio de Estudios Científicos y Tecnológicos del Estado de Hidalgo, San Salvador, Hidalgo, Mexico
- MATS003 Developing a 3D Printer Capable of Producing Hybrid Hydrogel Based Artificial Cartilage**
Anna C. Feldbush, 19, Senior,
West Shore Junior/Senior High School, Melbourne, Florida
- MATS004 Green Synthesis of Antibacterial Silver Nanoparticles from Georgia Peach**
Harshvardhan Singh, 16, Junior,
Houston County High School, Warner Robins, Georgia
- MATS005 Novel Agarose Processing Techniques: Design and Characterization of a Sturdy, Porous Foam for Controlled Topical Drug Delivery**
Hamzah Faiyaaz Jhaveri, 18, Senior,
Lake Highland Preparatory School, Orlando, Florida
- MATS006 Reclaimed Consumer Waste and Additive Manufacturing: The Perfect Blend**
Daniel Craig Bobbitt, 18, Senior,
Niceville High School, Niceville, Florida
- MATS007 Sulfur-Doped Carbon Materials Derived from Waste-Car-Tire for High Performance Lithium-Sulfur Battery**
Yutong Wang, 16, Sophomore,
The High School Affiliated to Renmin University of China, Beijing, China
- MATS008T Jaundice: The Battle Between Blue vs. Yellow**
Samantha M. Perez, 15, Freshman,
Dinorah A. Perez, 16, Sophomore,
Loretto Academy High School, El Paso, Texas
- MATS009T Eco-friendly Alternatives to Polystyrene**
Varisha Masroor, 16, Sophomore,
Rushmia Zaina Hoq, 16, Sophomore,
Austin Peace Academy, Austin, Texas
- MATS010 Optical Studies of Nanostructures for Biosensing Applications**
Aniket Pant, 15, Sophomore,
Jefferson County International Baccalaureate, Irondale, Alabama
- MATS011 Heteromultivalent Approaches to Clot-Targeted Nanomedicine: Combination Targeting of Drug Delivery Systems to Active Platelets and Fibrin**
Amaya Najma Razmi, 17, Senior,
Hathaway Brown School, Shaker Heights, Ohio
- MATS012 Formation of Copper Nanoparticles Ink Upon Copper Complex Decomposition**
Hallel Shohat, 16, Junior,
The Hebrew University Secondary School, Jerusalem, Israel
- MATS013 Rotating Magnetic Nanoparticles to Measure Microviscosity in Gels**
Wei De Koo, 17, Senior,
National Junior College, Singapore, Singapore
- MATS014T Effect of Experimental Parameters on Forming Prince Rupert's Drops for Maximum Strength and Toughness**
Srikar Reddy Godilla, 16, Junior,
Cristian Alexen Rodriguez, 17, Junior,
CREC Academy of Aerospace and Engineering, Windsor, Connecticut
- MATS015 A Kinetic Monte Carlo Study of Effects of Adatom-Adatom Repulsive Interactions on Nucleation and Growth of Nanoclusters**
Lilly Gonzalez, 15, Sophomore,
duPont Manual High School, Louisville, Kentucky
- MATS016 3D Printing of Biodegradable Material**
Alex Sun, 17, Junior,
Red Lion Area Senior High School, Red Lion, Pennsylvania
- MATS017 A Novel Type of Nonvolatile Memory Device - RS Study on ZnO Materials**
Tsz Hei Lo, 17, Senior,
St. Paul's Co-Educational College, Hong Kong, China, Hong Kong Special Administrative Region
- MATS018 Quantification of the Effects of Fluid Shear Stress on Circulating Tumor Cells**
Rachael Noel Coates, 17, Junior,
St. Joseph's Academy, Baton Rouge, Louisiana
- MATS019 An Investigation of a Simple, Inexpensive Apparatus for Lipid Nanoparticle Fabrication with Controllable Size and Dispersity with *in vitro* Applications**
Susan Wu, 18, Senior,
Manhasset High School, Manhasset, New York
- MATS020 The Effect of Drumstick Material on Sound Produced**
Davis Michael Funk, 16, Sophomore,
Spring Mills High School, Martinsburg, West Virginia
- MATS021 Making Scalable Inexpensive High Power and Energy Density Graphene Supercapacitors with the LightScribe Method**
Minxing "Tony" Pan, 17, Senior,
University Liggett School, Grosse Pointe Woods, Michigan
- MATS022 Repurposing Recycled Materials for Greener, Stronger Cement**
Jill Elizabeth Bohnet, 17, Junior,
Academy of Science and Technology, The Woodlands, Texas
- MATS023 Alternative Construction 3D Printing Materials**
Christine Pagett, 17, Junior,
Portville Central School, Portville, New York
- MATS024 Thermal Transport Properties of 2-Dimensional Transition Metal Dichalcogenide Heterostructures**
Terrance Li, 17, Junior,
Newport Senior High School, Bellevue, Washington
- MATS025 A Comparison of the Strength of Experimental Chestnut Hybrids to Functionally Extinct *Castanea dentata***
Heather Dawn Wotton, 18, Senior,
Mountain Vista Governor's School, Warrenton, Virginia
- MATS026 Radiation Prevention: One Fiber at a Time**
Kaylee Cunningham, 18, Senior,
Olympic Heights Community High School, Boca Raton, Florida
- MATS027 Casualty Care Improvised Direct Pressure Adjunct**
Marissa Claire McAfee, 17, Senior,
South Forsyth High School, Cumming, Georgia
- MATS028T "Med1cast"- Oil Palm Empty Fruit Bunch (EFB) and Plaster of Paris as a Novel Composite to Produce an Eco-Friendly and Cost Effective Orthopedic Cast**
Wei Wen Chiew, 17, Junior,
Jing Jun Chew, 17, Junior,
Chung Ling High School Penang, Georgetown, Penang, Malaysia

- MATS029 Preventing the Drought from Turning into World Hunger**
Bianca Cristina Rodriguez-Castro, 18, Senior,
Centro Residencial de Oportunidades Educativas de Ceiba,
Ceiba, Ceiba, Puerto Rico
- MATS030 Development of Bio-Based PLA/NR Blends and DIY Mini-Extruder for Fabrication of 3D Printing Filaments**
Pattiya Pibulchinda, 16, Junior,
Kamnoetvidya Science Academy, Rayong, Thailand
- MATS031 Evaluating Zinc Oxide-Doped Aluminum Oxide (AZO) as a New Dielectric Material to Develop Highly Efficient Transparent Thin Film Transistors**
Doha Ahmed Amer, 17, Senior,
Dar Alfikr Schools, Jeddah, Makkah, Saudi Arabia
- MATS032 Exploring Protective Barriers for the Outer Layer of Spacesuits and Visors**
Steven Sacht-Luwes, 17, Senior,
Bethlehem Voortrekker High School, Bethlehem, Free State,
South Africa
- MATS033T Degradation of Polyethylene and Poly (Ethyl Cyanoacrylate) via Photothermal Heating**
Tamar Ruth McMahon, 18, Senior,
Matthew Ray Mims, 17, Senior,
North Carolina School of Science and Mathematics, Durham,
North Carolina
- MATS034 Designing a Water Repellent and Breathable Material for Wound Dressings Using Nanotechnology**
Sasha Leila Ronaghi, 15, Sophomore,
Sage Hill School, Newport Coast, California
- MATS035T Pervoskite Nanostructures as LEDs: Towards Flexible Displays #**
Nathaniel Goenawan 17, Senior,
Siddhant Nandkishor Pagariya, 17, Senior,
Kalamazoo Area Mathematics and Science Center, Kalamazoo,
Michigan
- MATS036 Novel Fabrication of Organic Multifunctional Materials via Magnetic Alignment #**
Vera Alexandra Zarubin, 17, Senior,
The Bronx High School of Science, Bronx, New York
- MATS037 Polarized Vehicle Headlights: A Novel Solution to Nighttime Snowblindness Affecting Human Drivers & Autonomous Vehicles**
Nicholas Albert-Jozef Primanis-Erickson, 16, Sophomore,
Pinedale High School, Pinedale, Wyoming
- MATS038T From Banana Peels to Bioplastic - Using Banana Peels as a Starch-Rich Material to Produce Biodegradable Plastic**
Jassin Fahd Zaki, 17, Senior,
Mohammad Yahia Arafa, 18, Senior,
6 of October STEM Egypt School, Giza, Egypt
- MATS039 Developing Cellulosic Biocomposites for Water Purification and Smartphone-Based Analysis**
Krtin Kanna Nithiyandam, 17, Senior,
Sutton Grammar School, Sutton, Surrey, United Kingdom
- MATS040 Fabricating a Novel Ultrasensitive Flexible Biosensor with Patterned 10 nm Single Antibody Size Periodic Line Channel Created by Directed Molecular Self-Assembly to Achieve Extremely High Accuracy in the Earlier Detection of Cancer #**
Erika Yang, 18, Senior,
Granada High School, Livermore, California
- MATS041T The Impact of Using Nanotechnology to Improve the Silica to Make Self-Cleaning Glass**
Faisal Adel Alyafei, 17, Senior,
Mahmoud A Hamid Sawalha, 15, Sophomore,
Ahmad Bin Hanbal Secondary School, Doha, Qatar
- MATS042 Preparation of Carboxymethyl Cellulose from Water Hyacinth for Film Formation and Encapsulations**
Yuttapong Srirakan, 18, Senior,
Anukoolnaree School, Muang Kalasin, Kalasin, Thailand
- MATS043T Improving the Elasticity of Concrete Paving-Blocks Using Natural Rubber Latex and Rice-Husk-Ash Silica**
Apinya Chotsorn, 18, Junior,
Inthira Somsriyo, 17, Junior,
Kanthicha Pholsana, 17, Junior,
Princess Chulabhorn Science High School Loei, Loei, Thailand
- MATS044T The Investigation of Pectin Extracted from Melon Shells Used in Capsule Production**
Praewa Makmee, 17, Junior,
Tunpitchar Singnontad, 17, Junior,
Princess Chulabhorn Science High School Phitsanulok,
Phitsanulok, Thailand
- MATS045 Establishing the Method for Investigating the Impact of Healing Agent to Concrete Ratio on Water Permeability of Concrete**
Katie Lynn Sommerfield, 17, Junior,
Mountain Vista Governor's School, Middletown, Virginia
- MATS046T Synthesizing and Characterizing Novel Gelatin and Pluronic F127, Hybrid Hydrogels as a Barrier Membrane for Guided Bone Regeneration Following Periodontitis**
Jainil Sutaria, 18, Senior,
Chelsea Wang, 17, Senior,
Rachel Li, 17, Junior,
Ardsley High School, Ardsley, New York
Fossil Ridge High School, Fort Collins, Colorado
Spackenkill High School, Poughkeepsie, New York
- MATS047 Highly Induced Electrical, Morphological, and Optical Characteristics of PEDOT: PSS Film Fabricated by Hot-Casting Technique**
MinJae Kim, 16, Senior,
Gwangju Science Academy for the Gifted, Gwangju, South Korea
- MATS048 Laser Micro Structurization of Titanium Surface in Liquid and Subsequent Galvanic Metal Deposition**
Aziza Khusainova, 17, Junior,
Samara Regional Centre for Intellectually Gifted Children,
Samara, Samara, Russian Federation
- MATS049T Nanosurfer Flash Mobs: E-Field-Choreographed Silver Migration on Graphene Oxide**
Patria Yun Xuan Lim, 18, Senior,
Yong Han Jerome Leow, 17, Senior,
Dunman High School, Singapore, Singapore
- MATS050 Building a Multilayered Hydrogel Microsphere Crosslinked by Genipin for Controlled Dissolution in Drug Release**
Hyokyung An, 16, Junior,
Palos Verdes Peninsula High School, Rolling Hills Estates,
California
- MATS051 Phyto-reductive-Hydrothermal Synthesis of Polyethylene Glycol-Coated Magnetic Iron Oxide Nanoparticles for Drug Delivery Applications**
Pete Gabriel Labayno Ledesma, 18, Senior,
Iloilo National High School, Iloilo City, Philippines
- MATS052 Novel Graphene Nanoplatelet Embedded Pigmentless Emulsions for Low-Cost Paintable Capacitive Sensors and Supercapacitors**
Daniel Zion Kang, 16, Sophomore,
John F. Kennedy High School, Tamuning, Guam
- MATS053 A Novel Approach for Sensing Seismic Events: Applications of Graphene Nanoflake Powder Composites, Part Two #**
Isaac Nicholas Jordan, 17, Senior,
Southwest Colorado eSchool, Durango, Colorado

- MATS054 Superconductivity: Planar Weight Disparity in Relation to Critical Temperature**
Grayson Nelson, 17, Senior,
Sturgis Brown High School, Sturgis, South Dakota
- MATS055 A Novel Analytical Technique for Dendritic Microstructures Formed During Directional Solidification of Metallic Alloys and Synthesis of an Alloy Fabrication Protocol for Optimization of Physical Properties**
Arman Sharma, 15, Sophomore,
Academy of Science and Technology, The Woodlands, Texas
- MATS056 Effect of Shot-Peening on Oxidation Behavior of Nuclear Light Water Reactor Fuel Cladding Material to Improve Accident Stability**
Charles Xialong Hua, 17, Senior,
West High School, Madison, Wisconsin
- MATS057 Various Crystals Responding to Environmental Sound Audio**
Adrienne Lillian Jones, 18, Senior,
Trinidad High School, Trinidad, Colorado
- MATS058 Cupronickel Nanowire Networks for Future Flexible Touch Sensor Display Applications**
Musa Asim Tahir, 16, Junior,
Oregon Episcopal School, Portland, Oregon
- MATS059 Investigation of the Effect of Basalt Fiber on the Mechanical Properties of Asphalt Concrete Which Is Operated in the Extreme North**
Ashot Shagenian, 16, Sophomore,
Secondary School #2 of Nijniy Bestyakh, Nijniy Bestyakh,
Republic of Sakha, Russian Federation

Mathematics

- MATH001** **Generating Functions of the Free Generators of Some Submagmas of the Free Omega Magma and Planar Trees**
Chavdar Tsvetanov Lalov, 17, Junior,
Geo Milev High School of Mathematics, Pleven, Pleven, Bulgaria
- MATH002** **A Probabilistic Formulation of the Computational Analysis of Stratified Spaces**
Gianfranco Cortes-Arroyo, 16, Senior,
West Port High School, Ocala, Florida
- MATH003** **Combinatorics of Circular Codes**
Aleksandr Nikolaevich Serdiukov, 17, Junior,
School 564, St. Petersburg, Russian Federation
- MATH004** **New Explicit Solution to the N-Queens Problem and the Millennium Problem**

Dmitrii Mikhailovskii, 17, Junior,
School 564, St. Petersburg, Russian Federation
- MATH005** **Levi-Civita Symbol in Hilbert Space L_2**
Dusan Daniel, 18, Senior,
Grammar School of St. Francis, Malacky, Slovakia
- MATH006** **A Fine Classification of Second Minimal Odd Orbits**

Muhammad Ugur Oglu Abdulla, 18, Senior,
West Shore Junior/Senior High School, Melbourne, Florida
- MATH007** **The Generalization of Finsler-Hadwiger's Inequality on General Hyperbolic Triangles and Its Applications**
Yingxin Liu, 17, Junior,
Beijing No.161 High School, Beijing, China
- MATH008** **A Design of Early Warning Models for Spectator Violence at Soccer Games - A Research Based on Home Games of Shanghai Greenland Shenhua FC in China Super League 2016**
Nuo Chen, 17, Junior,
No. 2 High School of East China Normal University, Shanghai, Shanghai, China
- MATH009** **What Do We Have in Mathematics 2000 Years Ago?: A Study of Arithmetic Based on the Nine Chapters on the Mathematical Art**
Yundi Hou, 17, Junior,
Nanjing Foreign Language School, Nanjing, Jiangsu, China
- MATH010T** **The Possibility to Build a Triangle, Given Its Three Medians, Three Bisectors or Three Heights**
Sandro Janelidze, 16, Sophomore,
Nodar Trapaidze, 15, Freshman,
Georgian-American School, Tbilisi, Georgia
- MATH011T** **"Equal Powers Turn Out" - Conics, Quadratics, and Beyond**
Kai Wang, 18, Senior,
Chi-Lung Chiang, 17, Senior,
The Affiliated Senior High School of National Taiwan Normal University, Taipei City, Chinese Taipei
- MATH012** **The Napkin Ring Paradox**
Evan Joseph Crispino, 16, Freshman,
Terrebonne High School, Houma, Louisiana
- MATH013** **Fractals**
Barrett Seth Daves, 16, Junior,
Cross County High School, Cherry Valley, Arkansas
- MATH014** **From Lucas Sequences to Lucas Groups**

Kayson Taka Hansen, 16, Junior,
Twin Falls High School, Twin Falls, Idaho
- MATH015** **Pythagorean Quintuples and Quaternions**
Theodore Arthur Ehrenborg, 16, Junior,
Henry Clay High School, Lexington, Kentucky
- MATH016** **Using Lyapunov Exponents to Differentiate Between Randomness and Pseudorandomness**
Adam Michael Saunders, 17, Junior,
Carroll High School, Dayton, Ohio
- MATH017** **Discrete Derivatives of Random Matrix Models and the Gaussian Free Field**
Gopal Krishna Goel, 14, Freshman,
Krishna Homeschool, Portland, Oregon
- MATH018T** **On Two Letter Identities in Lie Rings**

Boris Borisovich Baranov, 16, Sophomore,
Savelii Novikov, 18, Junior,
School 564, St. Petersburg, Russian Federation
- MATH019** **Elementary Solution to Primes of the Form x^2+ny^2**
Ohad Avnery, 18, Senior,
Shimon Ben Zvi High School, Givatayim, Israel
- MATH020T** **A Study on the Estimation of the Number of People Through Photographs**
Kyung Jae Lee, 16, Junior,
Seunghun Jee, 16, Junior,
Dongwook Cho, 17, Junior,
Incheon Science High School, Incheon, Incheon, South Korea
- MATH021T** **Mathematics of Gene Regulation: Control Theory for Ternary Monomial Dynamical Systems**

Omar Alejandro Santiago-Reyes, 18, Senior,
Gustavo Xavier Santiago-Reyes, 18, Senior,
Escuela Especializada en Ciencias, Matemáticas y Tecnología, Caguas, Puerto Rico
- MATH022** **The Effect of the Number of Crossing on Prime Knots on the Complexity of Their Stereographic and Inverse Stereographic Projections**
Varun Malladi, 17, Junior,
Adlai E. Stevenson High School, Lincolnshire, Illinois
- MATH023** **On a Lower Bound for the Energy Functional on a Family of Hamiltonian Minimal Lagrangian Tori in CP^2**
Aknazar Kazhymurat, 16, Junior,
Nazarbayev Intellectual School of Physics and Math, Almaty, Almaty, Kazakhstan
- MATH024** **The Frequency and Distribution of Consecutive Quadratic Residues Modulo p**
Merrick H. Cai, 16, Junior,
Kings Park High School, Kings Park, New York
- MATH025** **Musical Homotopy: A Topological Study of Voice Leading Groups and Its Application to Contrapuntal Music Genres**

Aditya Sivakumar, 18, Senior,
Franklin High School, Portland, Oregon
- MATH026** **Combinatorics on Path Connections of a Rectangular Graph**

Emil Geisler, 16, Junior,
Bountiful High School, Bountiful, Utah
- MATH027** **An Improvement of the Asymptotical Upper Bound for the Cardinality of Sidon Sets of Vectors with Binary Components**
Joakim Asger Faergeman, 19, Senior,
Allsundgymnasiet Sonderborg, Sonderborg, Denmark
- MATH028** **Analyzing Patterns within an Original Egyptian Fraction Decomposition Algorithm**

AnaMaria Perez, 16, Sophomore,
Albuquerque Academy, Albuquerque, New Mexico
- MATH029** **Restoring Wild Oyster Reefs: Optimization of Population Sustainability Through Mathematical Modeling of Fertilization Dynamics**
Vincenzo Pagano, 18, Senior,
Long Beach Senior High School, Lido Beach, New York

- MATH030 A Practical Cryptosystem with Provable Security: Three New Innovations in Cryptography**
Wyatt John Howe, 17, Senior,
Hershey High School, Hershey, Pennsylvania
- MATH031 On the Maximum Number of Non-Intersecting Diagonals in Unit Squares Filling an $n \times n$ Grid**
Anna Savelyeva, 16, Sophomore,
Moscow State School #57, Moscow, Russian Federation
- MATH032T Extension of Soddy's Hexlet: Number of Spheres Generated by Nested Hexlets**
Yuta Yokohama, 18, Senior,
Ryusei Sakai, 17, Senior,
Sota Kojima, 17, Senior,
Shiga Prefectural Hikone Higashi High School, Hikone City,
Shiga-Pref., Japan
- MATH033 Asymptotics of Character Sums**
Rachana Madhukara, 16, Sophomore,
Canyon Crest Academy, San Diego, California
- MATH034 A Solution of Generalized Legendre's Equation $Cz^n = Ax^2 + By^2$ and Its Application to Cryptography**

Yuliia Suprun, 16, Junior,
Municipal Institution Sumy Specialized School of I-III Levels
Named After the Hero of the Soviet Union O. Butko, Sumy,
Ukraine
- MATH035 On the Validity of Composite Logical Functions**

Daniel Alejandro Santiago, 16, Sophomore,
Centro Residencial de Oportunidades Educativas de Mayagüez,
Mayagüez, Puerto Rico
- MATH036 On the Convergence of the Reciprocals of Mersenne Primes**
Juan Diego Cancel, 17, Senior,
Centro Residencial de Oportunidades Educativas de Mayagüez,
Mayaguez, Puerto Rico
- MATH037 The Use of Algorithms to Analyze 3D Vectors and Component Transformations in a ROV Simulator**
Zahydee Marie Machado, 17, Senior,
Centro Residencial de Oportunidades Educativas de Mayagüez,
Mayaguez, Puerto Rico
- MATH038T The Polar Equations of Water Distribution from Butterfly Sprinkler Heads**
Adisorn Khantong, 18, Senior,
Witchaya Natemonprapa, 18, Senior,
Kullanut Booranarom, 17, Senior,
Princess Chulabhorn Science High School Phetchaburi, Cha-Am,
Phetchaburi, Thailand
- MATH039 Number Patterns and Power-Difference Triangles**
Melih Sahin, 17, Junior,
Ankara Fen Lisesi, Ankara, Turkey
- MATH040 Properties of Bicentric Quadrilaterals**
Mehmet Emin Ozturk, 17, Senior,
Gazi University Foundation Private Science High School,
Ankara, Turkey
- MATH041 Game Theory-Based Investment Strategy vs. Buy-And-Hold: Which Optimizes Profits?**
Lisa Qin, 16, Junior,
Maggie L. Walker Governor's School, Richmond, Virginia
- MATH042 A Novel Accelerator for Machine Learning Algorithms**
Bryan Dev Gopal, 17, Junior,
Brophy College Preparatory, Phoenix, Arizona
- MATH043T What Properties Define the Eulerian Sequence? A Computer-Inspired Analysis**
Raj Sekhar Reddy Palleti, 16, Sophomore,
Suhas Prasad, 15, Sophomore,
Monta Vista High School, Cupertino, California
- MATH044 On the Modular Properties of Hypothetical Collatz Loops**
Jian Park, 15, Freshman,
Sage Hill School, Newport Beach, California
- MATH045 Differentiate the Difference**
Tessla Jade Muir, 17, Junior,
Musselman High School, Inwood, West Virginia
- MATH046 Braid Groups on Triangulated Surfaces and Singular Homology**

Karthik Yegnesh, 18, Senior,
Methacon High School, Eagleville, Pennsylvania
- MATH047 Looking at the Dynamics of $Q(Z) = Z^2 + C$ in the Space of 2×2 Real Matrices**
Pranav Garimidi, 16, Sophomore,
Conestoga High School, Berwyn, Pennsylvania
- MATH048 Finnish Baseball's Draw of Choice (Hutunkeitto) as a Two Player Finite Game**
Olli Aapo Matias Jarviniemi, 16, Sophomore,
Valkeakosken Tietotien Lukio, Valkeakoski, Pirkanmaa, Finland
- MATH049 Solving a Mathematical Mystery: Schinzel's Conjecture**

Sacheth Sathyanarayanan, 17, Senior,
National Public School, Chennai, India
- MATH050 The Analogue of Szemerédi's Theorem for Rectangles, $n \times n$ Lattice, Cuboid and n -Orthotope**
Nishant Dhankhar, 15, Sophomore,
Delhi Public School, R. K. Puram, Delhi, New Delhi, India
- MATH051 Extreme Point in the Triangle Plane**
Egor Vladislavovich Batarin, 16, Sophomore,
Lyceum 1523, Moscow, Russian Federation
- MATH052 Monodromy Groups of Indecomposable Rational Functions**
Franklyn Hai Wang, 17, Senior,
Thomas Jefferson High School for Science and Technology,
Alexandria, Virginia
- MATH053 Deconstructing Complexity of Large Topological Models**
Roshan Warman, 17, Junior,
Academy at the Lakes, Land O' Lakes, Florida
- MATH054T Sharis Sochahto**
Sharon Jerop, 16, Senior,
Damaris Chepotip, 19, Senior,
Stephen Kositany Girls' High School, Kaviyet, Rift Valley, Kenya

Microbiology

- MCRO001T** ***In vitro* Evaluation of Cytotoxicity and Genotoxicity of an Ionic Liquid with Antifungal Activity**
Laura Cavalheiro Brizola, 18, Senior,
Andrea Auler, 18, Senior,
Fundacao Escola Tecnica Liberato Salzano Vieira da Cunha,
Novo Hamburgo, Rio Grande do Sul, Brazil
- MCRO002** **Do Microorganisms or Mealworms Poly-Degrade Polystyrene Faster?**
Sarah Whittle, 15, Freshman,
The Villages Charter High School, The Villages, Florida
- MCRO003** **Efficacy of Bacteriophage P1 Therapy vs. 1,3-Dibromo-5,5-Dimethylhydantoin on Pathogenic Bacteria in Cow Skeletal Muscle**
Jay Iyer, 15, Freshman,
Baton Rouge Magnet High School, Baton Rouge, Louisiana
- MCRO004T** **The Nutmeg-ical Solution: Investigating Bactericidal Effects of *Myristica fragrans* for Treatment of *Helicobacter pylori* Infection**
Dakota Chen Ma, 17, Senior,
Yoonhyun Jung, 16, Junior,
Qihong (Anna) Wei, 16, Junior,
Concordia International School Shanghai, Shanghai,
Pudong, China
- MCRO005** **Are Bacteria Transport Properties Correlated to Hydraulic Conductivity and Geochemical Heterogeneity of the Porous Medium "Synthetic Porous"?**
Rachael Yacuzzo, 14, Freshman,
South Sumter High School, Bushnell, Florida
- MCRO006** **Green Watts: Investigating Power Generation of *Spartina patens* Compared to *Chlorophytum comosum* by Utilizing a Mixed *Shewanella oneidensis* MR-1 Community in a Plant Microbial Fuel Cell (A Novel Fourth Year Study)**
Luke M. Long, 17, Junior,
Canterbury School, Fort Myers, Florida
- MCRO007** **Isolation and Characterization of *Staphylococcus aureus* with Zoonotic Potential from Domestic Pets**
David Moises Quinones, 17, Senior,
Colegio Bilingue Maria Auxiliadora, Arraijan, Panama
- MCRO008** **Metformin Inhibits Bacterial Glycerol Metabolism: Implications for Medicinal Effect**
Isha Shah, 16, Sophomore,
Veterans High School, Kathleen, Georgia
- MCRO009** **Orchestrated Organisms**
Bailey Marie Dupre, 17, Junior,
South Terrebonne High School, Bourg, Louisiana
- MCRO010** **Optimizing the Ratios of Manuka Honey to Adhesive in an Antibacterial Surgical Adhesive**
Peyton Maria Leyendecker, 15, Sophomore,
Skyview Academy, Highlands Ranch, Colorado
- MCRO011T** **Halobacteria - An Anti-Salt Bomb**
Maria Joao Oliveira Lopes, 17, Junior,
Ana Catarina Cairrao Barata, 17, Junior,
Raquel Costa Silva, 16, Junior,
Escola Secundaria Julio Dinis, Ovar, Portugal
- MCRO012** **Cancer Targeting and Drug Delivery by Chimeric Proteins**
Jennifer Lin, 17, Junior,
Michael E. DeBakey High School for Health Professions,
Houston, Texas
- MCRO013** **Biodegrading Acid: A Novel Approach Using Bacteria**
Raneen Aljamal, 17, Junior,
Austin Peace Academy, Austin, Texas
- MCRO014** **The Temperature-Dependent Inhibition of *Pseudogymnoascus pannorum* by *Pseudomonas protegens***
Benjamin George McCarthy, 17, Junior,
Central Virginia Governor's School for Science and Technology,
Lynchburg, Virginia
- MCRO015T** **An Inside Job: The Transformation of *Escherichia coli* K-12 with *aiiA* Encoded Plasmids and Their Translative Effects as Quorum Sensing Inhibitors**
Jason Tanner Smith, 18, Senior,
Austin Wolfgang Katzer, 18, Senior,
Plano West Senior High School, Plano, Texas
- MCRO016** **Antimicrobial Properties of Honey from Different Regions in North America**
Zachary R. Kurowski, 17, Junior,
Ovey Comeaux High School, Lafayette, Louisiana
- MCRO017** **The Potential Antimicrobial Abilities of Herb Mold**
Morgan Frances Arnold, 15, Freshman,
Cotter High School, Winona, Minnesota
- MCRO018** ***Wolbachia* Effects on the Fecundity of *Drosophila mauritiana***
Sophia Vaughn Richter, 17, Junior,
Hellgate High School, Missoula, Montana
- MCRO019T** **ShealS - Sea Heals Soil**
Gabriel Silva, 18, Senior,
Eduardo Teixeira Rocha Nogueira, 18, Senior,
Francisca Santos Martins, 19, Senior,
Colegio Luso-Frances, Porto, Portugal
- MCRO020** **Tiny Titans: A Comparative Study of the Antimicrobial Effects of Silver Nanoparticles and Silver Nitrate Against MRSA and MSSA**
Jeremy Turner Cotton Ward, 18, Senior,
Ridgway Christian School, Pine Bluff, Arkansas
- MCRO021** **The Effects of Sugar Substitutes and Prebiotics on the Gut Microbiome**
Elaina Rose Render, 15, Freshman,
duPont Manual High School, Louisville, Kentucky
- MCRO022** **Bioprospecting for Benthic Fungi and Their Bactericidal Antibiotics**
Emma Louise Keeler, 17, Junior,
Falmouth Academy, Falmouth, Massachusetts
- MCRO023** **Is Alternate Sigma Factor H (SigH) Essential for the *Mycobacterium marinum* Response to Low-Shear Modeled Microgravity (LSMMG)?**
Matthew Blaise Willis, 17, Senior,
Caddo Parish Magnet High School, Shreveport, Louisiana
- MCRO024** **Effects of Antimicrobial Culinary Spices on *E. coli* and *C. butyricum***
Jade Ray Samanta, 17, Senior,
Saxony Lutheran High School, Jackson, Missouri
- MCRO025** **Addressing Arsenic Contamination: Creating a "Super" Bioremediator with Sub-Lethal Pretreatment**
Nikhil Lohe, 18, Senior,
Bergen County Academies, Hackensack, New Jersey
- MCRO026T** **Genetically Engineering Nonpathogenic *E. coli* to Bind to a Cellulose Matrix Using Curli Fibers and Cellulose Binding Domains**
Jonah Douglas Carter, 18, Junior,
Max Anthony Herrmann, 17, Junior,
Carroll High School, Dayton, Ohio
- MCRO027** **Study on Molds Prevention Effect of *Broussonetia papyrifera* Milky Sap on Putty**
Xingqiao Xu, 15, Sophomore,
Beijing 101 Middle School, Beijing, Beijing, China

- MCRO028T Microbial Analysis and Categorization of School Surfaces**
Camryn Ivette Flores, 17, Junior,
Britley Sierra Jones, 17, Junior,
Lanier High School, Buford, Georgia
- MCRO029 Examining the Effect of Temperature on the Photosynthetic Rates of Green Algal Species: Year Three of Ongoing Study**
Abhishek Chetan Joshi, 17, Junior,
Lane Technical College Prep High School, Chicago, Illinois
- MCRO030 The Effect of Black Carbon on Antibiotic Resistance**
Amy Lynn Cotter, 17, Junior,
Kennett High School, North Conway, New Hampshire
- MCRO031 The Effects of Nitazoxanide on Bacterial Virulence Factor Assembly by the Chaperone/Usher Pathway**
Raphael Leon Iskra, 18, Senior,
Commack High School, Commack, New York
- MCRO032 Characterization of Bacteria Living on the Teeth and Gums of Sharks, First Steps to Identify Potential Treatments in Case of Shark Bites**
Lucas Alexander Tomita, 17, Junior,
Hilton Head Preparatory School, Hilton Head Island,
South Carolina
- MCRO033 Novel Use of Phenolic Compounds for Epstein-Barr Virus Lytic Induction**
Logan Dunkenberger, 17, Junior,
Roanoke Valley Governor's School for Science and Technology,
Roanoke, Virginia
- MCRO034 Using *Penium margaritaceum* to Investigate Cytokines Conservation**
Yolanda Aileen Shen, 17, Senior,
Dougherty Valley High School, San Ramon, California
- MCRO035 Identifying Novel Mechanisms of Quorum Sensing Receptor Protein RpfR: Relevance to the BDSF Quorum Sensing Signaling Pathway**
Neehal Reddy Tumma, 16, Junior,
Port Huron Northern High School, Port Huron, Michigan
- MCRO036 The Role of *Apis mellifera* on the Preservation of Organic Tissue**
Piper Cai Deamer, 16, Sophomore,
Fremont High School, Plain City, Utah
- MCRO037 Viruses to the Rescue: Using *D. tsuruhatensis* to Demonstrate Phage Therapy's Effectiveness Against Antibiotic Resistant Bacterial Biofilms in a Medical Setting**
Divyam Goel, 16, Junior,
West High School, Salt Lake City, Utah
- MCRO038 Identifying the Components in Basil that Protect Lung Cells from *Pneumonia***
Arundhathy Suresh, 16, Junior,
Pioneer High School, Ann Arbor, Michigan
- MCRO039 Antimicrobial Efficacy of Bacterially Secreted Peptide Microcins Compared to Antibiotic Nitrofurantoin**
Billy M. Ngo, 18, Senior,
North Carolina School of Science and Mathematics, Durham,
North Carolina
- MCRO040 The Effects of *Bacillus cereus* as a Biological Control Agent on *Xanthomonas vasicola pathovar vasculorum***
Katie Joyce Bathke, 17, Junior,
Allen Consolidated Schools, Allen, Nebraska
- MCRO041 Utilizing Kefir Bacteria to Target NF- κ B of the Bax Gene to Induce Apoptosis in Colorectal Adenocarcinoma Cells**
Tushar Sanjay Shenoy, 16, Junior,
American Heritage School of Boca Delray, Delray Beach, Florida
- MCRO042 Point-of-Care Identification and Determining the Susceptibility of Causative Organisms in Skin Infections, Using Chromogenic Principles**
Alecia Brits, 18, Senior,
Diamantveld High School, Kimberley, Northern Cape, South Africa
- MCRO043T An Innovative Approach to the Detection of Ringworm**
Sara Katherine Dodge, 16, Junior,
Abigail Grace Wittkamp, 16, Junior,
Burlington Community High School, Burlington, Iowa
- MCRO044T Screening of Yeasts in Azalea Nectar for Bioethanol Production**
Chihiro Ota, 18, Senior,
Natsuno Shimoyama, 18, Senior,
Notre Dame Seishin Gakuen Seishin Girl's High School, Kurashiki City, Okayama-Pref., Japan
- MCRO045 Which Brand of Disinfectant Is the Most Resistant to Bacterial Growth?**
John David Lewis, 15, Sophomore,
Patrician Academy, Butler, Alabama
- MCRO046 Isolation of a Potential Microbial Agent for Controlling Dengue Vector Mosquitoes in Sri Lanka**
Kawudugama Ralalage Rimal Induwara, 15, Junior,
Ch/Ananda National School, Chilaw, North Western Province,
Sri Lanka
- MCRO047 Investigating the Effect of Floral Source on the Antimicrobial Action of Synthetic Honey**
Will Joseph Deering, 16, Sophomore,
IDEA Homeschool, Anchorage, Alaska
- MCRO048 Exploring the Use of Bacteria in Mitigating Fungal Disease**
Hannah Skocypec, 17, Senior,
Basha High School, Chandler, Arizona
- MCRO049T What Effect Does the pH of a Solution Have on the Growth of a Possible Cancer Linked Fungi *Candida albicans*?**
Ty Nelson, 15, Freshman,
Nathaniel James Diehn, 15, Freshman,
Vivian Clair Pellegrino, 14, Freshman,
Paul M. Dorman High School, Roebuck, South Carolina
- MCRO050T Antimicrobial Activity of Endophytes Isolated from Transylvania County Spray Cliff Plants**
Nicole Marisha Rideout, 17, Junior,
Matthew Bailey, 17, Senior,
John Van Nguyen, 17, Junior,
Brevard Senior High School, Brevard, North Carolina
- MCRO051T Isolation of Entomopathogenic Fungi from Mosquito Larvae and Evaluation of Potential for Mosquito Control**
Emily Clare Trusler, 16, Junior,
Cullen Stuart Duval, 17, Junior,
Brevard Senior High School, Brevard, North Carolina
- MCRO052T UT-WHY? Effects of Household Beverages on UTI Causing Bacteria**
Audrey J. Swanson, 18, Senior,
Sierra Dawn Edvall, 17, Junior,
Perham High School, Perham, Minnesota
- MCRO053T Discovery, Isolation, Purification, Amplification, and Characterization of Mycobacteriophage HSavage**
Grace Ludlow, 18, Senior,
Hannah Dreesbach, 18, Senior,
Capital High School, Helena, Montana
- MCRO054 Tardigrade Mech: A Biomimetic System for Advanced Radiation Protection in Space**
Arielle Ese Ainabe, 17, Junior,
Garth Webb Secondary School, Oakville, Ontario, Canada

- MCRO055 The Presence of the Bacterial Growth in Cow's Milk for Human Consumption in Puerto Rico Before and After Hurricane Maria**
Raphael Gabriel Acevedo Rivera, 16, Junior,
Escuela Superior Especializada Vocacional Agricola de Corozal
Pablo David Burgos Marrero, Corozal, Puerto Rico
- MCRO056 An Effective Peptide Vaccine Against the Zika Virus**
Sruthi Kalavachera, 15, Sophomore,
Amador Valley High School, Pleasanton, California
- MCRO057 Potential Gene Therapy of Human Liver Cancer with Recombinant AAV3 Flp-FRT Vectors**
Nivetha Aravind, 17, Senior,
Viera High School, Viera, Florida
- MCRO058 Treating SSSI Using an Antibiotic Silk Fibroin Solution**
Michelle Nguyen, 17, Senior,
Rockdale Magnet School for Science and Technology,
Conyers, Georgia
- MCRO059 An Antibacterial and Antifungal Comparison of Countertop Disinfectant**
Emerson Anna Falk, 15, Freshman,
Hankinson Public School, Hankinson, North Dakota
- MCRO060 Belly Button Bacteria**
Kathleen Marie Schmidt, 18, Senior,
Ashley Public School, Ashley, North Dakota
- MCRO061T Cultivation Using Self-Germinating Fungus Capsules**
Sultan Saif SL AL-Misaifri, 15, Sophomore,
Talal Sarhan Alsayed, 16, Junior,
Jassim Hamad Independent Secondary School for Boys, Doha,
Doha, Qatar
- MCRO062 Investigating Auranofin Ability to be Repurposed as a Decolonizing Drug for Vancomycin-Resistant *Enterococci***
Khalifa Elmagarmid, 16, Junior,
Qatar Academy Senior School, Doha, Al-Rayyan, Qatar
- MCRO063 Adopting Lactobacillus and Organic Acids as Alternative Treatments to Necrotic Enteritis**
Javad A'arabi, 17, Senior,
Starkville High School, Starkville, Mississippi
- MCRO064 Bacteriophage MS2 Transmission Across a High School Classroom and the Effect of an Antimicrobial Intervention**
Jack Lansing Picton, 18, Senior,
Canyon del Oro High School, Oro Valley, Arizona
- MCRO065 Optimizing *Escherichia coli* Energy Usage for Chemotaxis and Reproduction Through Experimental Evolution**
Camryn Franke, 17, Junior,
Washington Technology Magnet, Saint Paul, Minnesota
- MCRO066T Diversity and Effect of Endophytic Fungi Isolated from Conifers on Growth Inhibition of Pathogenic Micro-Organism**
Sanmaru Um, 18, Senior,
Sohyun Park, 18, Senior,
Kangwon Science High School, Wonju, South Korea
- MCRO067 Mind Your Language: A Host Produced AI-2 Mimic Mediated Communication to Inhibit Bacterial Pathogenesis**
Harshit Jindal, 17, Senior,
Maharaja Agarsain Public School, Delhi, New Delhi, India
- MCRO068 Fabrication of Highly Specific Electrochemical Genosensor for the Detection of *Escherichia coli***
Kunal Singh, 17, Senior,
Maharaja Agarsain Public School, Delhi, New Delhi, India
- MCRO069 The Stage Development Preference of *Bactrocera xanthodes* (Pacific Fruit Fly) on *Artocarpus altilis* (Breadfruit) and the Effect of Bacteria Found in *B. xanthodes* on *A. altilis***
Da In Myung, 17, Junior,
South Pacific Academy, Pago Pago, American Samoa
- MCRO070 Can Bacteriophage Be Used to Treat Bacterial Imbalances Associated with IBS and IBD?**
George Walter Santarpi, 16, Sophomore,
Albuquerque Institute for Math and Science, Albuquerque,
New Mexico
- MCRO071 Successful Inhibition of *Candida albicans* Utilizing Borate-Based Bioactive Glass: An Emerging Antifungal Material**
Madison Leigh Bright, 18, Senior,
Conrad Weiser High School, Robeson, Pennsylvania
- MCRO072T The Effect of Nanotechnology on Purifying Water Supply in the Developing World**
Patrick Gerard Berry, 16, Junior,
Matthew Kian Baharmast, 17, Junior,
James Madison High School, Vienna, Virginia

Physics and Astronomy

- PHYS001 Challenging Limitations: Using Deep Learning, Time Series Analysis, and Statistical Methods for Noise Reduction to Develop an Innovative Approach to Exoplanet Candidate Detection Using Earth-Based Telescopes**
Dahlia Dry, 17, Junior,
Fort Myers High School, Fort Myers, Florida
- PHYS002 Using Two-Mode-Squeezing for Room-Temperature Photon-Number-Resolving Detection**
Deepti Vaidyanathan, 18, Senior,
Baton Rouge Magnet High School, Baton Rouge, Louisiana
- PHYS003 Time Domain Calculations of Scalar Self-Force and Radiation from an Orbiting Point Charge in Schwarzschild Spacetime**
Karna Ashwin Morey, 17, Senior,
North Carolina School of Science and Mathematics, Durham, North Carolina
- PHYS004 Viscous Fluid Mixing in an Annular Slot**
Maria Milovanova, 17, Junior,
Advanced Educational Scientific Centre, A.N.Kolmogorov Boarding School, Moscow, Moscow, Russian Federation
- PHYS005 How to Improve the Quality of a Laser Beam by Homogenization**
Iuliia Dmitrievna Bulgatova, 16, Sophomore,
Lyceum #40, Nizhny Novgorod, Nizhny Novgorod Region, Russian Federation
- PHYS006 Using a Computer Program to Compensate for the Force Differentiation Between Two Electromagnets Simulating Earth's Gravity in Space**
MaryAlice Diana Young, 16, Sophomore,
Bishop Kenny High School, Jacksonville, Florida
- PHYS007 Discovery and Study of a New Cataclysmic Variable Star**
Danil Panov, 17, Sophomore,
Lyceum "Erudite", Rubtsovsk, Russian Federation
- PHYS008 A Runaway Star Candidate Selection and Analysis, Year Two**
Celeste Maida Jongeneelen, 18, Senior,
Home School - Maui, Kula, Hawaii
- PHYS009 A Novel Method for the Separation and Detection of Macroscopic Particles Using Ion-Trap Mass Spectrometry in the Presence of Atmospheric Gases**
Jannik Sonke Meyer, 16, Junior,
Jacob-Grimm-Schule Kassel, Kassel, Germany
- PHYS010T Galileo's Ladder Problem: Rope Ladders Falling Faster than Gravity**
Lennart Nikolai Resch, 17, Senior,
Tim Noah Kubetzko, 18, Senior,
Hans Thoma Gymnasium, Lorrach, Germany
- PHYS011T Liquid Stream Hits Rough Surfaces--Showing an Extraordinary and Stable Wave Pattern**
Matthias Paul Grutzner, 17, Junior,
Julian Egbert, 17, Senior,
Arne Jakob Geipel, 17, Senior,
Herder-Gymnasium, Berlin, Germany
- PHYS012 Using Spectral Analysis to Calculate Space/Time Distribution**
Kelli Ann Lynch, 18, Senior,
Satellite High School, Satellite Beach, Florida
- PHYS013 Parallax, Part III: A Study on the Effects of Time Duration on a Stellar Parallax's Accuracy**
Antonio Martin Arant, 17, Sophomore,
Trinidad High School, Trinidad, Colorado
- PHYS014 Angular Reconstruction Algorithm for Galactic Cosmic Ray Shower Arrays**
Yufei Xiao, 17, Junior,
Iolani School, Honolulu, Hawaii
- PHYS015T Variations in the Evolution of Star-Forming Galaxies Through the Last 10 Gyr**
Ivo Jose Goncalves, 19, Senior,
Helena Isabel Dias Pereira Marques Silva, 17, Junior,
Agrupamento de Escolas D. Maria II, Braga, Portugal
- PHYS016 Energy Transformation Associated with the Creation of an Electromagnetic Field**
Haylee Adelaide Darling, 14, Freshman,
St. John Lutheran School, Ocala, Florida
- PHYS017T New Method for Changing Physical-Chemical Properties of Oil**
Aliagha Abdullayev, 16, Sophomore,
Adnan Bunyatov, 15, Sophomore,
Zarifa Aliyeva Lyceum, Baku, Yasamal, Azerbaijan
- PHYS018 Spooky Actions at a Distance--On the Problem of Quantum Correlations**
Silvio Barandun, 19, Senior,
Liceo Cantonale di Locarno, Locarno, Switzerland
- PHYS019 The Birth Rate of La Supernovae in Nearby Universe**
Jichen Zhang, 18, Junior,
United World College Changshu China, Changshu, Suzhou, Jiangsu, China
- PHYS020T Dynamics of Bubble-Ring--A Mechanism Which Realizes High Stability and Efficient Energy Transfer**
Goki Muramoto, 18, Senior,
Yui Kobayashi, 18, Senior,
Kouhei Yamamoto, 18, Senior,
Yamaguchi Senior High School, Yamaguchi City, Yamaguchi, Japan
- PHYS021 Investigation of the Force Between Two Positively Charged Conducting Spheres**
Madeline Metcalf Tveite, 19, Senior,
Gjovik Upper Secondary School, Gjovik, Norway
- PHYS022T Nanobubble Conductors -The Unexpected Hall and Temperature Characters**
Cheng-Jui Yang, 18, Senior,
Yu-Chi Wang, 17, Junior,
Han-Yuan Hsu, 17, Junior,
National Chiayi Senior High School, Chiayi City, Taiwan
- PHYS023 Design and Simulation of a Novel Concentric Cone Antihydrogen Gravity Experiment**
Sahil S. Patel, 18, Senior,
Texas Academy of Mathematics and Science, Denton, Texas
- PHYS024 Faraday's Bicycle**
Sebastian Saenz, 15, Freshman,
Academy of Science and Technology, The Woodlands, Texas
- PHYS025 Designing a Practical Quantum Network Using Standard Basis Rotation and Blockchain Verification**
Evan McKenna Meade, 18, Senior,
Keystone School, San Antonio, Texas
- PHYS026 The Search for Newborn Stars: Observing Bok Globules Using Infrared Archival Data**
Anderson Thrasher, 17, Senior,
Henry W. Grady High School, Atlanta, Georgia
- PHYS027 Far Out! Analyzing NASA's Kepler Space Telescope Data Using the Transit-Timing Variation Method to Discover Additional Exoplanets in Planetary Systems**
Molly Megan Nehring, 17, Junior,
Monte Vista High School, Monte Vista, Colorado
- PHYS028T Analysis of Various Wing Structures for Hovering Capacity**
Drake Lee Ludgate, 17, Junior,
Nathaniel David Miner, 16, Junior,
Brush High School, Brush, Colorado

- PHYS029 Measuring Exoplanetary Radii Using Transit Photometry**
Sarah Tang, 15, Sophomore,
Fairview High School, Boulder, Colorado
- PHYS030 Are We on the Dark Side of the Universe?**
Michael Bregar, 16, Sophomore,
MAST at FIU Biscayne Bay Campus, North Miami, Florida
- PHYS031 An Algorithm to Determine the Spectral Types of Stars**
Jieyan Wang, 15, Sophomore,
Moscow High School, Moscow, Idaho
- PHYS032 A Geant4 Monte Carlo Simulation of a Quantum Entanglement Experiment of the Decay of Spin-Singlet State Positronium: Computer Replication and Multiple Scattering Mitigation**
Jerry Zhang, 18, Senior,
Marquette High School, Chesterfield, Missouri
- PHYS033 An Investigation into Efficient Wireless Power Transmission**
James Boudreaux, 16, Sophomore,
Bartlesville High School, Bartlesville, Oklahoma
- PHYS034 Modeling and Integrating the Orbit of Near-Earth Asteroid 2003 QB90 (242211)**
David Fang, 18, Junior,
Oregon Episcopal School, Portland, Oregon
- PHYS035 Three-Dimensional Trajectories of 2016, Perseid Meteors Over West Japan Obtained Through Multi-Site Observations**
Kota Uekawa, 17, Senior,
Konko Gakuen Junior & High School, Asakuchi City, Okayama-Pref., Japan
- PHYS036 Topological Analysis of Non-Symmetric Circuit Laplacians and an Experimental Verification of the Su-Schrieffer-Heeger Topological Circuit**
Russell Qi Xun Yang, 18, Senior,
NUS High School of Mathematics & Science, Singapore,
Singapore, Singapore
- PHYS037 Asteroid Ring Formation Through 3-Dimensional Inelastic Collisions**
Justin Lee, 17, Senior,
Adlai E. Stevenson High School, Lincolnshire, Illinois
- PHYS038T Procedural Determination of Novel Stoichiometric Topological Superconductors through Surface and Pressure Effects**
Carissa Wu, 18, Senior,
Abhishek Nikhileswar Allamsetty, 17, Junior,
Winston Churchill High School, Potomac, Maryland
Thomas Jefferson High School for Science and Technology,
Alexandria, Virginia
- PHYS039 The Relationship Between the Primary Pulsation Period and the Blazhko Effect in RR Lyrae Variables**
Leonardo Clarke, 18, Senior,
Minnetonka High School, Minnetonka, Minnesota
- PHYS040 Speech Intelligibility Analysis of Sound-Modulated Laser Signal Countermeasures**
Sharmita Shah, 16, Junior,
Colonia High School, Colonia, New Jersey
- PHYS041 Saving Lives with AFLOAT: Airbag Flotation Anti-Drowning System**
Joaquin Haces-Garcia, 15, Freshman,
Santa Gertrudis Academy High School, Kingsville, Texas
- PHYS042T The Effect of a Solar Eclipse on Muon Count Rates**
Markie Whitney, 16, Sophomore,
Perry Wayne Martin, 16, Junior,
Newcastle High School, Newcastle, Wyoming
- PHYS043T Research of Some Electrolytes' Water Solutions' Electrical Characteristics**
Amir Atigayev, 17, Junior,
Amina Karymsak, 16, Sophomore,
#93 Gymnasium, Karagandy, Kazakhstan
Republican School in Physics and Math after Zhautykov, Almaty,
Karagandy, Kazakhstan
- PHYS044 Determination of the Orbital Elements of Near-Earth Asteroid 1999, LO28, Using the Method of Gauss**
Gautam Govind Pradeep, 16, Junior,
Mira Loma High School, Sacramento, California
- PHYS045T Magnetic vs. Electromagnetic Helmets**
Jackson Wesley Diltz, 18, Senior,
Eric John Bone, 18, Senior,
Westfield High School, Westfield, Massachusetts
- PHYS046 High-Resolution Near-Field Nanoscopy Simulation Platform for Nanomaterial Characterizations**
Chiu Fan Bowen Lo, 18, Senior,
Jericho High School, Jericho, New York
- PHYS047 Observation of the Chiral Magnetic Effect in the Quark-Gluon Plasma Produced in Au+Au Collisions at the Relativistic Heavy Ion Collider**
Cindy Wang, 17, Senior,
William A. Shine Great Neck South High School, Great Neck,
New York
- PHYS048 Single Crystal Synthesis, Structure, and Magnetic Properties of CrAl₃Bi₂O₉, the First Cr-Al-Bi-O Compound**
Jaylyn Umana, 16, Junior,
Long Beach Senior High School, Lido Beach, New York
- PHYS049 Can Parachutes Be Used to Replace Runaway Ramps?**
Benjamin Thomas Gardner, 17, Junior,
Sale Creek Middle High School, Sale Creek, Tennessee
- PHYS050 The Effect of Spectral Content of Acoustic and Synthesized Timbre**
Justin Wang, 17, Junior,
Chantilly High School, Chantilly, Virginia
- PHYS051 Balloon Based Observation of Sporadic Meteors from the Stratosphere**

Natalie Celeste White, 15, Sophomore,
University High School, Fresno, California
- PHYS052 Modeling of Phenomena in Multiple Stellar Systems**
Dmytro Dmytriiev, 16, Sophomore,
Odesa Specialized School 117, Odesa, Ukraine
- PHYS053 A Novel Method for Simulating Diffracted Light**

Mary Catherine Lorio, 18, Senior,
Saint Joseph's Academy, Baton Rouge, Louisiana
- PHYS054 Fast-Neutron Yield of Alpha-Neutron Sources Using Varying Targets**
Joshua Almeida Guertler, 15, Freshman,
Barrington High School, Barrington, Rhode Island
- PHYS055 Why Are We 3D: Modelling the N-Dimensional Electron Orbitals**
Benjamin Muntz, 19, Senior,
H.C. Orsted Gymnasiet i Lyngby, Kongens Lyngby, Denmark
- PHYS056T Whether Insects See Anomalous Images Located Near a Lens or Not? Verification of Lens Equations for Anomalous Images and Application of the Simple Eye of an Insect**
Norika Narimatsu, 17, Senior,
Ayaka Kosai, 17, Senior,
Akiho Takata, 17, Senior,
Kumamoto Prefectural Uto High School, Uto-City, Kumamoto-Pref., Japan

- PHYS057 Exploring Lunar Impact Basin Porosity Through a Weighted Least-Squares Fit Model**
Tara Kamala Venkatadri, 17, Senior,
Ardsley High School, Ardsley, New York
- PHYS058 Lunar Origin: Is It Really Made of Cheese?**
Sky A. Harper, 16, Sophomore,
Navajo Preparatory School, Farmington, New Mexico
- PHYS059 The Response of Field Effect Transistors**
Christian Lee Ortiz, 17, Junior,
Academy for Health Science Professions-STEM, La Joya, Texas
- PHYS060 Finding Exoplanets by Assessing the Dynamical Packing of Kepler Three- and Four-Candidate Systems**

Ana Luisa Tio Humphrey, 17, Junior,
T.C. Williams High School, Alexandria, Virginia
- PHYS061 A Novel Layered System to Prevent High-Energy, Ionizing Radioactive Photon Transmissions and Control Particle Behavior with the Utilization of Monte Carlo Transport Modeling via SPENVIS-Based Modular Implementation**

Daniel Noon, 16, Sophomore,
Brophy College Preparatory, Phoenix, Arizona
- PHYS062 Highly Efficient Low Power Nuclear Jet Engine**
Artur Kachur, 16, Junior,
Gymnasium 5, Chernivtsi, Ukraine
- PHYS063 Quantum Gravity: The (SEPs) Symmetry of QCD Constituents Solves the Mass Gap for Quantizing EFE as the Glue-Balls**
Yazeed Turki Alharbi, 16, Junior,
AL-Falah High School, Makkah, Saudi Arabia
- PHYS064 Wet Chemical Etching of Native Oxides on Si and GaAs Studied by Ion Beam Analysis (IBA)**
Sukesh Ram, 17, Junior,
BASIS Peoria, Peoria, Arizona
- PHYS065 The Impact of Rotational Damping on the Collective Motion Exhibited by Systems of Self-Propelled Particles**
Parker Jou, 16, Junior,
Carmel High School, Carmel, Indiana
- PHYS066 Stochasticity on Astronomical Scales: A Half-life Formalism for Predicting the Disruption of Small-N Body Systems**
Timur Ibragimov, 18, Senior,
Staten Island Technical High School, Staten Island, New York
- PHYS067 An MRI Approach to the Quantification in vivo of Cerebral Blood Volume at High Resolution**
Raphael Hotter, 18, Senior,
Marianopolis College, Westmount, Quebec, Canada
- PHYS068 Kepler-Keck Double Check: Confirming Exoplanet Candidates Using Keck Radial Velocity Data**
Mary Alice Fitzpatrick Jouve, 17, Junior,
McGill-Toolen Catholic High School, Mobile, Alabama
- PHYS069 Future Board**
Lachlan John Bolton, 19, Senior,
Redeemer Baptist School, North Parramatta, NSW, Australia
- PHYS070 Application of a Styrene-Butadiene Copolymer Membrane to Di-Commissioned Level A5 Aramid Fibers to Evaluate the Distribution of Impact Force and Their Resistance to Projectiles**
Lyeme Nicole Rosado, 18, Senior,
Dr. Pedro Albizu Campus, Ponce, Puerto Rico
- PHYS071 Optimization of the Efficiency of Photovoltaic Cells for Laser Light: An Application to Laser Power Beaming**
Akarsh Kumar, 18, Senior,
Arkansas School for Mathematics, Sciences and the Arts,
Hot Springs, Arkansas
- PHYS072T Finding the Next Tatooine: Discovery of Giant Planets, Brown Dwarfs, and the First-Ever Circumbinary Planet Using Doppler Spectroscopy**
Brian Yikang Wu, 16, Sophomore,
Bi Tian Yuan, 16, Junior,
Horace Mann School, Bronx, New York
Columbia Grammar and Preparatory School, New York City,
New York
- PHYS073 Dynamics of the Flows with Moving Contact Line**
Anna Malgorzata Len, 19, Senior,
Lodz University of Technology High School, Lodz, Poland
- PHYS074 Development of a YBCO Quantum Processor**

Elijah Keene Kaimiola Mossman, 17, Senior,
Kamehameha Schools Kapalama Campus, Honolulu, Hawaii
- PHYS076 Effects of Geometry and Voltage on Ion Engine Design**
Isabela Guadalupe Ceniceros, 15, Freshman,
Bernalillo High School, Bernalillo, New Mexico
- PHYS077 Asteroid Repulsion**

Zachariah Elijah Goodrich, 17, Senior,
Grants High School, Grants, New Mexico
- PHYS078T Secondary Crater Morphology with Distance from Primary Crater**
Dante Dalton, 18, Senior,
Brad Walter Taylor, 17, Junior,
South Sevier High School, Monroe, Utah
- PHYS079 Single vs. Multiple Planetary Systems: Insights from Analysis of Exoplanetary Data**
Antara Raaghavi Bhattacharya, 13 Freshman,
G.D. Somani Memorial School, Mumbai, Maharashtra, India
- PHYS080 Automated Identification and Inference of Organic Molecular Structure and Relative Concentrations from Infrared Spectral Data**
Cameron Cole Jones, 16, Junior,
The Harker School, San Jose, California
- PHYS081 The Hofstadter Butterfly on a Ring Lattice: Exploring the Discrete Case & Translating to a Continuous Model with a Bichromatic Sinusoidal Potential**
Ankitha Manjunatha, 15, Freshman,
Parkland High School, Allentown, Pennsylvania
- PHYS082 Determining Space Debris Orbits for Collision Prediction Using Chaos Theory**
Aswath Suryanarayanan, 15, Junior,
Devi Academy Senior Secondary School, Chennai, India
- PHYS083 The Brachistochrone Curve**
Jack Falconer, 15, Freshman,
Good Hope Country Day School, Kingsthill, United States
Virgin Islands
- PHYS084 The Effect of Geomagnetic Activity in the Ionosphere on GPS Signal**
Alexandria Jewel Stephenson, 17, Senior,
Olathe North High School, Olathe, Kansas
- PHYS085 Flexible, Low Cost Solar Cells Using High Efficiency Gallium Arsenide Compound Semiconductors**
Kumaran Selva, 16, Sophomore,
Clear Lake High School, Houston, Texas
- PHYS086 The Effect of Varied Surface Gravity on the Gravitational Radiation (Luminosity) Produced by a Binary System of Black Holes**
Medha Majety, 16, Junior,
Science, Math, and Technology Center at Mills E. Godwin High School, Henrico, Virginia

PHYS087 The Creation of a Portable Detector for Recording Extensive Air Showers

Roman Nikolaenko, 17, Junior,
LyceumA– 1511 Affiliated with MEPHI, Moscow,
Russian Federation

PHYS088T The Acoustics of a Room

Ailyn Dannae Carter, 17, Senior,
Rocio Tania Rojas, 18, Senior,
Colegio Santa Marta de Valdivia, Valdivia, Chile

PHYS089 Universal (Alpha, Beta, Gamma, n) Geiger Detector

Maksim Mamchur, 17, Junior,
Samara Regional Centre for Intellectually Gifted Children,
Samara, Samara, Russian Federation

PHYS090 Silent Information

Khalid Yunis Almarzooqi, 17, Senior,
Emirates Science Club, Dubai, United Arab Emirates

Plant Sciences

- PLNT001 Biological Activity and Phytochemical Approach of the Medicinal Plant *Barbatimao (Stryphnodendron adstringens)***
Vanessa Aparecida Vasconcelos de Freitas, 18, Senior,
Escola Estadual Domingos Justino Ribeiro, Mateus Leme, Minas Gerais, Brazil
- PLNT002 Investigating Plant Telomere Motifs Using Bioinformatics**
Martin Matl, 19, Senior,
Gymnazium Brno, Trida Kapitana Jarose, Prispevkova
Organizace, Brno, South Moravian Region, Czech Republic
- PLNT003 Propagation of Allelopathic Properties Present in *Ailanthus altissima* and *Juglans nigra* for Efforts in Circumventing Holistic Debilitation in Response to Occupational Herbicide Exposure**
Jorge Abel Guillen, 18, Senior,
South Sumter High School, Bushnell, Florida
- PLNT004 The Antimicrobial Potential of Tree Bark Extracts**
Niamh Ann Kelly, 18, Senior,
Our Lady's College, Drogheda, Leister, Ireland
- PLNT005T BIOFOMEX: Mexican Foliar Biofertilizer**
Irvin Alfredo Feliciano Siles, 18, Senior,
Cruz Francisco Salazar Alvarado, 18, Senior,
Colegio de Estudios Cientificos y Tecnologicos del Estado de Chihuahua No. 7, San Isidro, Juarez, Chihuahua, Mexico
- PLNT006 Microneedle-Assisted Delivery of Model Therapeutics in Plant Tissue**
Laboni Santra, 14, Freshman,
Oviedo High School, Oviedo, Florida
- PLNT007 Co-overexpression of AVP1 and PP2A-C5 Increases Plant Tolerance to Multiple Stresses**
Phyllis Ann Zhang, 17, Junior,
Lubbock High School, Lubbock, Texas
- PLNT008 *In vitro* Establishment and Acclimatization of Coffee (*Coffea arabica*) in Three Costa Rican Traditional Varieties and in a Promising Variety Resistant to Leaf Rust (*Hemileia vastatrix*)**
Heilyn Calvo-Vargas, 17, Junior,
Colegio Tecnico Profesional de Acosta, Acosta, San Jose, Costa Rica
- PLNT009 Reducing Water Requirements in the Establishment of Bermudagrass with Polymer Coated Sand, Year Two**
Benjamin Luke Wanjura, 17, Junior,
Christ the King Cathedral School, Lubbock, Texas
- PLNT010T Risk Analysis: Pyrrolizidine Alkaloids in Honey and the Distribution of *Senecio jacobaea***
Jessica Kirchner, 18, Senior,
Jonas Boukamp, 19, Senior,
Berufskolleg Rheine, Rheine, Germany
- PLNT011T Effect of Traditional Organic Technique (BAMI) in the Development of Cucumber Plants of *Cucumis sativus L.***
Yarisa Segura-Marin, 17, Junior,
Pristly Segura-Marin, 19, Junior,
Luis Fernando Rios-Hidalgo, 16, Sophomore,
Liceo Unesco, Perez Zeledon, San Jose, Costa Rica
- PLNT012 Effect of *Ceratocystis* Species A and B Isolate Mutations on Disease Aggressiveness in *Metrosideros polymorpha***
Anne Akiko Nakamoto, 18, Senior,
Waiakea High School, Hilo, Hawaii
- PLNT013 DNA Sequencing and Phylogenetics for the Conservation of the Florida Ridge Biodiversity**
Rohin Pankaj Patel, 15, Sophomore,
Sebring High School, Sebring, Florida
- PLNT014 Crude Extraction of *Amana edulis* Induces Liver Cancer Apoptosis**
Yueyang Fan, 16, Junior,
No. 2 High School of East China Normal University, Shanghai, Shanghai, China
- PLNT015T The Effect of Electromagnetic Fields on the Growth and Development of Plants**
Mariami Bukia, 16, Sophomore,
Nino Machaidze, 15, Sophomore,
Georgian-American School, Tbilisi, Georgia
- PLNT016 Remotely Controlled Hydroponic System by Solar Energy (RCHSE)**
Shatha Salah Al Thyabat, 15, Freshman,
King Abdullah II School for Excellence, Ma'an, Ma'an, Jordan
- PLNT017 How Are the Timings of Flower Opening and Closing Controlled in *Nymphaea tetragona*?**
Masumi Suzuki, 17, Junior,
Tokyo Metropolitan Nishi High School, Sugunami-ku, Tokyo, Japan
- PLNT018T Stop and Smell the Flowers: The Assessment of the Effects of Aeration in Regards to Lifespan and Bacteria Presence of the *Lilium orientalis***
Ashley Nicole Walker, 17, Senior,
Hannah Noelle Taylor, 17, Junior,
Agriscience Magnet Program, San Antonio, Texas
- PLNT019T The Effect of pH on Plant Growth**
Emily Lam, 15, Sophomore,
Kimberly Chen, 15, Sophomore,
Boston Latin Academy, Boston, Massachusetts
- PLNT020 Exploring the Facilitative Relationship Between *Rhamnus cathartica* and *Lumbricidae***
Flannery Enneking-Norton, 18, Senior,
Saint Paul Academy and Summit School, Saint Paul, Minnesota
- PLNT021 Lichen as Bioindicators: A Study into the Relationship Between Lichen Thallus Structures and Their Sensitivity to NOx and SOx**
Isaac Taylor Quinn Klementis, 18, Senior,
Gresham High School, Gresham, Oregon
- PLNT022 Streaks on the Flowers of the Morning Glory, *Pharbitis nil*, Promote Water Absorption by the Flower and Play a Critical Role in Flower Blooming**
Misato Okano, 16, Junior,
Saitama Prefectural Kawagoe Girls' Senior High school, Kawagoe City, Saitama-Pref., Japan
- PLNT023 The Effects of Ionizing Radiation on *Glycine max* (Soybean) mRNA Accumulation in Radicle Tissue**
Mohammed Abuelem, 15, Junior,
Pulaski Academy, Little Rock, Arkansas
- PLNT024 Novel Strategy to Increase Fruit Production via CRISPR-Cas9, Genome Editing**
Alina Virginia Pollner, 16, Sophomore,
Canyon Crest Academy, San Diego, California
- PLNT025 Maximizing Growth of *Lactuca sativa* with a Polyculture in Aquaponics**
Katherine Jean Benstead, 16, Junior,
Niles Township West High School, Skokie, Illinois
- PLNT026 Light Sensitive Turntable: Effects on *Brassica rapa***
Cheaheon Lim, 16, Junior,
Northfield Mount Hermon School, Gill, Massachusetts
- PLNT027 Environment Saving Biodegradable Plastics**
Dylan Thomas Long, 18, Senior,
Dexter High School, Dexter, Missouri

- PLNT028T** **Improving Coccolithophore (*Emiliana huxleyi*) Tolerance to Ocean Acidification Through Artificial Directional Selection**
Hannah Maria Budroe, 17, Junior,
Michelle Pauline Stevens, 17, Junior,
Wilsonville High School, Wilsonville, Oregon
- PLNT029** **The Effects of Coronatine on Drought Stress Tolerance in *Zea mays***
Daniel O'Neill Vogwill, 18, Senior,
Chicago High School for Agricultural Sciences, Chicago, Illinois
- PLNT030** **Ecological Restoration Zones Within the Monkey River Area (Belize) Using Community Grown Nurseries to Produce Plants for Riparian Strips**
Anna Colleen Koonce, 18, Senior,
Saint Joseph's Academy, Baton Rouge, Louisiana
- PLNT031** **Agriculture Production Increase with Carbon Dioxide Seed Treatment, Phase II**
Joao Americo Macori Barboza, 17, Senior,
Colegio Londrinense - Instituto Filadelfia Londrina, Londrina, PR, Brazil
- PLNT032** **What All the Buzz Is About: Contained Production and Increased Yield of *Glycine max* and Other Crops with the Aid of *Apis mellifera* and Natural Fertilizers (Phase II)**
Brooklyn Leann Pardall, 17, Junior,
Central Lee High School, Donnellson, Iowa
- PLNT033** **Phylogenetic Analysis to Provide Insight on the Trihelix Gene Function in *Arabidopsis thaliana***
Pragati Muthukumar, 17, Junior,
Commack High School, Commack, New York
- PLNT034T** **Corn Silage Yield and Nutritional Testing**
Jace Michael Marriott, 15, Sophomore,
Cheyenne Marcheta Breeding, 17, Junior,
Fremont High School, Plain City, Utah
- PLNT035** **High-Resolution Genetic Profiling of Rice Pinpoints Critical Sugar Transport Genes for Engineering of Flood Resistant Crops**
Yushan Su, 17, Senior,
Martin Luther King High School, Riverside, California
- PLNT036T** **Effect of Simulated Microgravity on Antioxidant Activity and Total Antioxidants Metabolite Contents of Germinated *Triticum aestivum* Extract**
Raneem Mahmoud Abuelghanam, 16, Junior,
Lujain Shaher Alshakhanbeh, 17, Junior,
Malak Ahmad Ma'ayah, 16, Junior,
King Abdullah II School for Excellence - Maddaba, Maddaba, Jordan
- PLNT037** **Starch Statoliths as Gravity Sensors in *Arabidopsis thaliana***
Anru Tian, 17, Junior,
Athens High School, The Plains, Ohio
- PLNT038** **Optimizing Hydroponic Plant Growth and Energy Usage with LED Spectral Manipulation**
April Elizabeth Pivonka, 18, Senior,
Camp Hill High School, Camp Hill, Pennsylvania
- PLNT039** **The Effect of Acid Rain on Wheat Grass**
Alicia Colleen Johnson, 17, Senior,
Wilbur-Creston High School, Wilbur, Washington
- PLNT040** **The Effect of Organic Plant Extracts on Seed Germination and Seedling Growth**
Damian Galasso, 15, Freshman,
Galasso Homeschool, Tucson, Arizona
- PLNT041** **The Effects of Acetic Acid Concentrations as a Natural Herbicide**
Sydney Elaine Hefty, 15, Freshman,
DeKalb High School, Waterloo, Indiana
- PLNT042** **Effect of Fungi on Arid Grasses and Commercial Crops Under Varying Environmental Conditions**
Jayleigh Michelle Peuster, 17, Junior,
Southeastern Junior/Senior High School, Augusta, Illinois
- PLNT043** **The Mosquito Whisperer**
Laina Sofia Llano Jorge, 18, Senior,
Centro Residencial de Oportunidades Educativas de Ceiba, Ceiba, Ceiba, Puerto Rico
- PLNT044T** **An Analysis Examining the Phenotype in Chloroplast RNA Editing of the orrm1xorm6, Double Mutants in *Arabidopsis thaliana***
Zoha Aqeel, 18, Senior,
Sanjna Chalasani, 17, Senior,
Kalamazoo Area Mathematics and Science Center, Kalamazoo, Michigan
- PLNT045** **Creating Two Novel Strigolactone (SL) Analogs (C-13 and C-26) for the Benefits of Combatting Parasitic Seed Infestation**
Faisal Adel Aldossary, 18, Senior,
Dhahran Ahliyya School, Dammam, Eastren Province, Saudi Arabia
- PLNT046** **Increasing the Lipid Density of *Chlorella* Algae with Aquatic Plants**
Phillip Matthew Arnston, 16, Sophomore,
St. John Paul II Catholic High School, Huntsville, Alabama
- PLNT047** **Integrating MFC-MEC Technology into Farms for More Efficient Hydrogen and Food Production**
Taylor Herndon, 17, Senior,
Vision Charter School, Caldwell, Idaho
- PLNT048** **Analyzing the Pesticidal Properties of *Trichoderma harzianum***
Amanda Grace Wilson, 17, Junior,
Northwestern High School, Kokomo, Indiana
- PLNT049** **A Study of the Carbon Dioxide Consumption and Sequestration by *I. galbana* and *A. platensis* Under Pyrolytic Conditions**
Daniel Ulion Joshua, 17, Junior,
Madison Central High School, Madison, Mississippi
- PLNT050** **The Effect of Oscillatoria on Flooded *Glycine max***
Jacob Liam Martin, 15, Freshman,
Northwestern High School, Kokomo, Indiana
- PLNT051** **The Web of Mycorrhizal Fungi: Identifying Associations Between Orchids, Ceratobasidium Fungi, and Trees**
Simone Alma Evans, 17, Senior,
South River High School, Edgewater, Maryland
- PLNT052T** **Enhancing Seed Viability for Space Travel with Silk Protein Polymers**
Yae-won Michelle Jung, 17, Junior,
Andre Nguyen, 17, Junior,
Gareema Dhiman, 17, Junior,
Logan High School, Logan, Utah
- PLNT053** **Dehiscence of Creeping Woodsorrel's Capsule**
Nattaboon Sirisangtragul, 18, Senior,
The Demonstration School of Khon Kaen University (Modindaeng), Muang Khonkaen, Khonkaen, Thailand
- PLNT054** **AE Space Herbs: The Future in Aeroponics**
Marco Battisti, 19, Senior,
Istituto Superiore "Enrico Fermi", Mantova, Mantova, Italy
- PLNT055** **Progesterone Hormone Effects on *Coriandrum sativum* Growth and Development *in vitro* and Soil Seeding**
Gabriela M. Lebron, 18, Senior,
Specialized School of Science and Mathematics Genaro Cautiño Vázquez, Guayama, Puerto Rico

- PLNT056 Iodine Biofortification of *Lactuca sativa* var. *longifolia* in an Ebb and Flow Hydroponic System**
Julia Elizabeth Downes, 17, Junior,
Episcopal School of Jacksonville, Jacksonville, Florida
- PLNT057 *Mimosa pudica* as Indicator for Comparative Adverse Effects of Topical Anesthetics**
Makayla Gates, 16, Sophomore,
Valencia High School, Los Lunas, New Mexico
- PLNT058T Hydroponic Agriculture: Commercial vs. Individual Growth in New Mexico**
Uriah S. Sanchez, 17, Junior,
Xavier McTeigue, 17, Junior,
Gabriel M. Holesinger, 17, Junior,
Los Alamos High School, Los Alamos, New Mexico
- PLNT059 Molecular-Based Genotypic Selection for Anthocyanin in *Lactuca sativa*, Year Three**
Sophia Edith Swartz, 18, Senior,
Central Bucks High School South, Warrington, Pennsylvania
- PLNT060T *Chlorella pituita* for an Obesity Free World; By Regulating Obesogen Activity**
Tanya Goyal, 17, Senior,
Sharen Ganesh Mangalam Chamu, 16, Junior,
Maharaja Agarsain Public School, Delhi, New Delhi, India
- PLNT061 Applying the West, Brown, and Enquist Fractal Branching Model on Palo Verde Trees**
Zoey Zhao, 17, Senior,
Empire High School, Tucson, Arizona
- PLNT062 Disruption of Circadian Rhythm: Its Effects on Glucose Production and Photosynthesis Activity**
Jewel Williams, 17, Senior,
New Orleans Charter Science and Mathematics High School,
New Orleans, Louisiana
- PLNT063 Are Plant Growth Regulators Always Effective When Treating Wheat?**
Hannah Marie Johnson, 16, Junior,
Grenora Public School, Grenora, North Dakota
- PLNT064 Droplet Vitrification - A Viable Method of Cryopreservation for *Deeringothamnus rugelii*, *Deeringothamnus pulchellus*, and *Asimina tetramera***
Caroline Frances Karbowski, 18, Senior,
The Summit Country Day School, Cincinnati, Ohio
- PLNT065 A Low-Cost Technique to Combat Eutrophication and Soil Contamination in Organic Agricultural Communities**
Kavya Muralidhar, 16, Sophomore,
Plano East Senior High School, Plano, Texas
- PLNT066T Cyanofertilization: A Comparative Analysis of Biological and Environmental Impacts**
Sarah Sajila Syed, 15, Sophomore,
Miamar Gloria Burgos-Rosario, 16, Sophomore,
Saijai Supanklang, 15, Sophomore,
Hayfield Secondary School, Alexandria, Virginia
- PLNT067 The Effect of Native Velvet Mesquite (*Prosopis velutina*) and Non-Native African Sumac (*Rhus lancea*) on Biodiversity in the Sonoran Desert**
Cassidy Sumbria Chamillard, 17, Junior,
Tucson High Magnet School, Tucson, Arizona
- PLNT068 Using Guaiacol to Measure the Effect of a Hormone with Antioxidant Properties (N-Acetyl-5-Methoxytryptamine) on the Rate of Photosynthetic Reactions in Plants via Oxygen Production**
Chase Olivanti, 16, Sophomore,
Wiregrass Ranch High School, Wesley Chapel, Florida
- PLNT069 The Plant Doctor: An Artificial Intelligence Based Collaborative Platform for Plant Disease Identification, Tracking and Forecasting for Farmers**
Kaushik Kunal Singh, 15, Sophomore,
Inventure Academy, Bengaluru, Karnataka, India
- PLNT070 The T/Ha Yield Potential of Simulated Herbicide Drift on *Glycine max***
Prescott Oz Jeckel, 16, Sophomore,
Delavan High School, Delavan, Illinois
- PLNT071 The Study and Description of Musci Mountain Tundra of the North-East of Sakha (Yakutia)**
Ilya Andreevich Balakirev, 16, Sophomore,
Municipal Budgetary Educational Institution "Ust-Nerskaya High School", Ust-Nera, Republic of Sakha (Yakutia), Russian Federation

Robotics and Intelligent Machines

- ROBO001T Self-Learning Robotic Arthropod**
Radu-Bogdan Caprita, 18, Junior,
Razvan-Gabriel Dumitru, 17, Junior,
Alin Hertoiu, 18, Junior,
Colegiul National "Gheorghe Lazar" Sibiu, Sibiu, Romania
- ROBO002 Affordable Autonomous Vehicle System**
Parkaranjot Singh, 16, Sophomore,
Dutchtown High School, Hampton, Georgia
- ROBO003T Cuboide - Screenless Robot Programmable by Children**
Matias Julian Apablaza, 19, Senior,
Matias Alejandro Munoz, 19, Senior,
Instituto Tecnologico del Comahue, Neuquen, Argentina
- ROBO004T Myelofon: The Way of Expressing Thoughts for People with Speech Disorders**
Daniil Vladimirovich Kazantsev, 15, Freshman,
Daniil Maksimovich Semenov, 16, Freshman,
Municipal Lyceum #12, Yekaterinburg, Russian Federation
- ROBO005T Developing an Algorithm for Detecting Diabetic Retinopathy from Retinal Images Using Machine Learning**
Gianna Nana Ama Boadi Torpey, 16, Junior,
William Thibaud Manirakiza, 16, Sophomore,
SOS-Hermann Gmeiner International College, Tema, Greater Accra Region, Ghana
Liberty American School, Accra, Greater Accra Region, Ghana
- ROBO006 Using Artificial Intelligence to Create a Self-Driving Car Compatible with Bad Infrastructure**
Nader Jemel, 17, Junior,
Pioneer School of Gabes Tunisia, Gabes, Tunisia
- ROBO007 Improving the Performance of Unitary Recurrent Neural Networks and Their Application in Real-Life Tasks**
Ivan Danielov Ivanov, 18, Senior,
American College of Sofia, Sofia, Bulgaria
- ROBO008 The Creation of a Wearable Device Using Artificial Intelligence Technologies to Aid the Visually Impaired**
Omar Shareef, 16, Junior,
Saint Edward's School, Vero Beach, Florida
- ROBO009 Predicting Parkinson's Disease Using AI and Machine Learning**
Shreya Ramesh, 15, Sophomore,
Milton High School, Milton, Georgia
- ROBO010T Multipurpose Platform Stabilization System (MPSS)**
Migran Sharoian, 17, Sophomore,
Pavel Khakimov, 16, Sophomore,
Municipal Classical Lyceum, Kemerovo, Russian Federation
Municipal Budgetary Educational Institution, Leninsk-Kuznetskiy, Kemerovo Region, Russian Federation
- ROBO011 Edge Detection in the Line of Sight**
Aditya Singh, 15, Freshman,
Allen D. Nease High School, Ponte Vedra, Florida
- ROBO012 A Novel Approach to Recognize Emotion from Speech Using Machine Learning Algorithms to Aid Social Interaction of Kids with Autism**
Anwasha Mukherjee, 14, Sophomore,
Westview High School, Portland, Oregon
- ROBO013 Vehicle Action Prediction with Artificial Intelligence: An Innovative Way to Transform Advanced Driver Assistance Systems from Reactive to Proactive**
Kevin Meng, 15, Sophomore,
Jasper High School, Plano, Texas
- ROBO014 Changing the Ratio of an Image Intelligently According to Its Contents: An Image Processing Tool Based on Pixel Weight and Face Detection**
Han Qi, 17, Junior,
Tianjin Nankai High School, Tianjin, China
- ROBO015T To Europa and Beyond**
Annai Cuvelier, 16, Junior,
Alexa Hernandez, 17, Junior,
Jenny Cha, 16, Junior,
El Dorado High School, El Paso, Texas
- ROBO016 A Sensor-Enhanced Digital Stethoscope (SEDS): Design and Development of an Intelligent Sensor-Enhanced Digital Stethoscope for Patient-Friendly Remote Auscultation**

Syamantak Payra, 17, Senior,
Clear Brook High School, Friendswood, Texas
- ROBO017 Utilizing Gesture Recognition with 3D Printed Prosthetics**

Qingfeng Li, 16, Junior,
Laramie High School, Laramie, Wyoming
- ROBO018T Machine Learning Approach to Computer Assisted Diagnosis of Skin Diseases**

Daniel Joseph Haller, 18, Senior,
Ashwin Kulshrestha, 18, Senior,
Jainith Jagdish Patel, 18, Senior,
Marvin Ridge High School, Waxhaw, North Carolina
- ROBO019 Robot Forest Pathologist: Autonomous Robotic Complex for Forest Monitoring**
Maxim Mikhaylov, 16, Sophomore,
Presidential Physics and Mathematics Lyceum No 239, Saint-Peterburg, Saint-Peterburg, Russian Federation
- ROBO020T Neural Action: A Real-Time and Accurate Gaze Tracking Application for a More Natural Human-Computer Interaction with User Interfaces**
Heejun Lee, 18, Junior,
Jonghyeon Ham, 17, Junior,
Dongan High School, Anyang-si, Gyeonggi-do, South Korea
Korea Digital Media High School, Ansan-si, South Korea
- ROBO021T Multitec Project**
Adriana Milagros Perez Rios, 17, Junior,
Juan Gabriel Caceres Cahuana, 16, Junior,
Santa Cruz, Puerto Maldonado, Tambopata, Peru
- ROBO022 Deep Learning of Mammogram Images to Enable Automatic and Accurate Breast Cancer Screening**
Erik Y. Han, 16, Junior,
Paul Laurence Dunbar High School, Lexington, Kentucky
- ROBO023T CARL: A Convolutional Neural Network Powered Self-Driving Car**
Michael Raymond Hall, 18, Senior,
Daniel Ellis, 18, Senior,
Saint Paul Academy and Summit School, Saint Paul, Minnesota
- ROBO024 Neural Network Generator: Technology-Neutral Design and Technology-Specific Generation**
Hyun Jin Kim, 16, Junior,
North London Collegiate School Jeju, Seogwipo-si, Jeju-do, South Korea
- ROBO025 A Novel Approach to Call Quality Assessment Using Deep Neural Networks**

Sandu Chirita, 18, Junior,
B. Z. Herzl ORT Technological Lyceum, Chiinafu, Republic of Moldova
- ROBO026 Early Diagnosis of Alzheimer's Disease Using Machine Learning**
Patrick Song, 17, Junior,
Davis Senior High School, Davis, California

- ROBO027** **Agricultural Drones: The Development of an Unmanned Aerial System for Use in Semi-Autonomous Silo Inspection**
Samantha Boyea, 17, Senior,
Greenwich Junior-Senior High School, Greenwich, New York
- ROBO028** **Autonomous Quadcopter-Based Indoor Mapping System**
Pedro Henrique Capp Kopper, 17, Senior,
Fundacao Escola Tecnica Liberato Salzano Vieira da Cunha,
Novo Hamburgo, Rio Grande do Sul, Brazil
- ROBO029** **The Dexterous Hand of Sign Language**
Ruixi Jiang, 17, Junior,
Beijing No.2 Middle School, Beijing, China
- ROBO030** **Safecopter: Developing a Collision Avoidance and Mapping System Based on an Array of Time-of-Flight 3D Cameras**
Robert Gabriel Tacescu, 18, Senior,
Clovis North High School, Fresno, California
- ROBO031** **Analyzing the Efficiency of Subsequent Convolutional Layers with Small-Scale Images**
Anjo Baes Pagdanganan, 14, Freshman,
Salinas High School, Salinas, California
- ROBO032T** **Context Aware Medical Image Super Resolution Using Convolutional Neural Networks**
Matthew Dong, 14, Sophomore,
Pratham Soni, 16, Sophomore,
Troy High School, Troy, Michigan
- ROBO033** **Using Deep Learning to Identify Critical Documents for Clinical Decision Support Systems**
Brandon Xu Fan, 15, Sophomore,
Blacksburg High School, Blacksburg, Virginia
- ROBO034** **Using Deep Convolutional Neural Networks and Feature Matching Algorithms to Develop Smarter Autonomous Cars**
Alexander Wan, 15, Freshman,
Novi High School, Novi, Michigan
- ROBO035** **Non-Invasive Detection of Sudden Infant Death Syndrome (SIDS) Through Recurrent Neural Networks**
Maximilian Junqi Du, 15, Sophomore,
Fayetteville-Manlius High School, Manlius, New York
- ROBO036** **AI-Powered Multi-Spectral Intelligent Robotic System for Search and Rescue**
Aryia Dattamajumdar, 15, Sophomore,
Niskayuna High School, Niskayuna, New York
- ROBO037** **Creating a Simulation of an Intersection of Self-Driving Cars Without Traffic Lights**
Alec Timothy Warren, 17, Junior,
Harrisburg Academy, Lemoyne, Pennsylvania
- ROBO038** **Response-Based Scaling Models the Binding Problem in Top-Down Visual Search**
Matthew Tran Radovan, 17, Senior,
Ridgeline High School, Millville, Utah
- ROBO039** **Development of Semi-Supervised Machine Learning Models to Predict Enhancer Regions in Polygenic Developmental Diseases**
Savitha Srinivasan, 16, Sophomore,
Interlake High School, Bellevue, Washington
- ROBO040** **Emotion Recognition from Human Speech Using Temporal Information and Deep Learning**
John Kim, 17, Junior,
Menlo School, Atherton, California
- ROBO041** **Deep, Multimodal Representation Learning for Pan-Cancer Prognosis Prediction**
Anika Cheerla, 16, Junior,
Monta Vista High School, Cupertino, California
- ROBO042T** **The Development of a Holistic Cardiovascular Disease Screening System Utilizing a Low-Cost Electrocardiogram and a Machine Learning Algorithm**
Karthik Jetty, 16, Sophomore,
Pranav Senthilvel, 16, Sophomore,
Shreshth Srivastava, 16, Sophomore,
duPont Manual High School, Louisville, Kentucky
- ROBO043** **Can Deep Reinforcement Learning Solve Misere Combinatorial Games?**
Abraham James Oliver, 18, Senior,
Brown County High School, Nashville, Indiana
- ROBO044** **SMART Plate**
Amin Mohd Razak, 16, Senior,
SMK Dato' Abdul Rahman Yassin, Johor Bahru, Johor, Malaysia
- ROBO045T** **Smart and Safe Driving Monitor**
Ayomide Emmanuel Ayoola, 14, Junior,
Oluwapelumi El-Faithful Fadairo, 14, Junior,
Doregos Private Academy, Lagos, West Africa, Nigeria
- ROBO046T** **The Reminder... The Locator**
Ugochukwu Daniel Nnaji, 14, Junior,
David Oluwagbemiga Adekoya, 15, Junior,
Doregos Private Academy, Lagos, West Africa, Nigeria
- ROBO047T** **Smart Farming**
Rowan Ashraf Qushta, 17, Junior,
Yasmeen Amr Eltawil, 18, Junior,
STEM School of Alexandria, Alexandria, Egypt
- ROBO048** **Arya-X4 Advanced Smart Drone**
Mohamed Ashraf Ahmed, 19, Senior,
Martyr Osama Ahmed Ismael Language High School, Nasr City,
Cairo, Egypt
- ROBO049** **Improving Aviation Safety Using Low-Cost Low-Fidelity Sensors Augmented with Extended Kalman Filters to Develop an Accurate 3D Dynamic Sense-and-Track System**
Rohan Deshpande, 18, Senior,
East Chapel Hill High School, Chapel Hill, North Carolina
- ROBO050** **Concealed Weapon Detection Using Infrared Image Processing and Machine Learning**
Andrew Adel Karam, 17, Junior,
Arundel High School, Gambrills, Maryland
- ROBO051T** **Iago: A Study of Neural Networks, Othello, Difficulty, and Intelligence**
Nathan Zachary Hayes, 18, Senior,
Jim Chaebum Kong, 18, Senior,
William Kirby Longworth, 18, Senior,
Northern High School, Owings, Maryland
- ROBO052** **A Fast and Accurate Open-Source Solo Musical Instrument Classifier**
Hanna Yip, 18, Senior,
The Spence School, New York, New York
- ROBO053** **Autonomous Window Cleaning Robot for Commercial High Rise Buildings**
Oliver Grant Nicholls, 18, Senior,
Barker College, Sydney, New South Wales, Australia
- ROBO054** **Using a Neural Network to Detect Threats Inside of TSA Images**
Nikolos Antonio, 18, Senior,
Timberland High School, Wentzville, Missouri
- ROBO055T** **Low Cost 3-D Printed Robot Arm**
Conner Joe Torrence, 18, Senior,
Nathan Joseph Rook, 19, Senior,
Aberdeen Central High School, Aberdeen, South Dakota

- ROBO056 Biomechanical Effect of a Novel Designed Passive Knee Exoskeleton for Human Augmentation**
Brayden Noh, 16, Freshman,
Auburn High School, Auburn, Alabama
- ROBO057T Bridging the Gap Between Robot and Human Interaction**
Ethan William McKinley, 17, Senior,
Landon Medlock, 17, Junior,
Alma High School, Alma, Arkansas
- ROBO058T Improving Breast Cancer Detection in Fine-Needle Aspiration Biopsies Through Machine Learning**
Dhanvee Ivaturi, 16, Senior,
Philip Kabranov, 16, Junior,
Silver Creek High School, San Jose, California
- ROBO059 Development of Autonomous Unmanned Aerial Systems for Semi-Dense Point Cloud Generation in Disaster Scenarios**
Parthiv Nandakumar Krishna, 16, Junior,
Minnetonka High School, Minnetonka, Minnesota
- ROBO060 Low-Cost Flatpack SCARA 3D Printer**
Joshua Luke Mitchell, 18, Senior,
Holmes Chapel Comprehensive School, Crewe, Cheshire,
United Kingdom
- ROBO061 Phishing Website Detection Using Support Vector Machines and Nature-Inspired Optimization Algorithms**
Sagnik Anupam, 16, Sophomore,
Delhi Public School, R. K. Puram, Delhi, New Delhi, India
- ROBO062 Propulsion Performance Evaluation of a Lego-Based Carangiform Mechanism for a Prototype Robotic Fish Unmanned Underwater Vehicle (UUV)**
Adrian Maglasang, 19, Senior,
City of Bogo Science and Arts Academy, Bogo City, Cebu,
Philippines
- ROBO063T Robotic Exoskeleton for Rehabilitation Applications**
Maxwell James Rader, 16, Junior,
Christopher Richard Simmons, 17, Senior,
Minnetonka High School, Minnetonka, Minnesota
- ROBO064 Optical Navigation System for All-Terrain Robot**
Simon G. Armijo, 18, Senior,
Carlsbad High School, Carlsbad, New Mexico
- ROBO065T A Generalized Machine Learning Framework for Fingerprinting Disease Based on Gene Expression Profile**
Prathik Abhay Chakravarthy, 17, Junior,
Sudarshan Venkat Chakravarthy, 16, Sophomore,
Beavercreek High School, Beavercreek, Ohio
- ROBO066 Guide Bot: A Robotic Guide Dog**
Arya Eledath, 14, Freshman,
Greenwood Laboratory School, Springfield, Missouri
- ROBO067 Dense Face Detection and Improving Temporal Convolutional Networks for Automatic Image Captioning**
Nikita Zozoulenko, 18, Senior,
Katedralskolan in Linkoping, Linkoping, Sweden
- ROBO068 Teaching an Artificial Intelligence with an Artificial Intelligence: Image Completion Using Tensorflow**
Charles Shelby Strauss, 15, Sophomore,
Los Alamos High School, Los Alamos, New Mexico
- ROBO069 Solar Powered Intelligent Irrigation System**
Jackson Wolfe Windhorst, 16, Junior,
Fort Myers High School, Fort Myers, Florida

Systems Software

- SOFT001 Predicting Digital Asset Market Based on Blockchain Activity Data**
Zvezdin Borisov Besarabov, 17, Junior,
National High School of Mathematics and Natural Sciences
"Acad. Luybomir Chakalov", Sofia, Bulgaria
- SOFT002 Optical Recognition of Cursive Handwriting**
Bretislav Hajek, 19, Senior,
Gymnazium Cesky Brod, Cesky Brod, Czech Republic
- SOFT003 Simplex RPG Engine**
Matej Stagl, 19, Senior,
Gymnazium Ceska Lipa, Ceska Lipa, Liberecky Kraj,
Czech Republic
- SOFT004 CSE-Lab**
Kamil Mudrunka, 19, Senior,
Gymnazium Pardubice, Dasicka 1083, Pardubice, Czech Republic
- SOFT005 Minimal Footprint Hypervisor**
Ilya Zakharov, 17, Junior,
Lyceum 1533 of Information Technologies, Moscow, Russian
Federation, Russian Federation
- SOFT006T Using Spam Filters to Detect Malware: A Machine Learning Approach to Malware Detection**
Chan Woo Kim, 17, Junior,
Austin Liu, 17, Junior,
Shanghai American School - Puxi Campus, Shanghai, Shanghai,
China
- SOFT007T Corn Price Forecasting Using Artificial Intelligence Techniques**
Mario De Jesus Lopez Najera, 17, Senior,
Jesus Miguel Lugo Yolimea, 17, Junior,
Colegio de Bachilleres del Estado de Sinaloa, Mazatlan, Sinaloa,
Mexico
- SOFT008 Developing a Full Featured Graphic Design Software for iOS**
Mihai Vladimir Danila, 18, Senior,
Lessing Berufskolleg Dusseldorf, Dusseldorf, Germany
- SOFT009 Using SONAR, LIDAR, and Computer Vision to Assist the Visually-Impaired**

Samuel M. Cadotte, 16, Junior,
Kalaheo High School, Kailua, Hawaii
- SOFT010 The Construction and Accuracy of a Glove-Based Joint Sensor**
Sam Paul Triplett, 16, Sophomore,
McIntosh High School, Peachtree City, Georgia
- SOFT011 Implementing Deep Learning Techniques to Detect Abnormal Cells**

Gaurav Kumar Behera, 18, Senior,
Century High School, Rochester, Minnesota
- SOFT012 Faster R-CNN over Attention: Shared Bikes Detection in Surveillance Video**
Xuelin Yang, 16, Junior,
The Affiliated High School of South China Normal University,
Guangzhou, Guangdong, China
- SOFT013 Seeing Clearly and Farther: Augmented Perception for Safe Driving in Adverse Weather and Reduced Visibility Conditions**
Ruihua Chou, 16, Junior,
The High School Affiliated to Renmin University of China,
Beijing, China
- SOFT014 Optimizing Reinforcement Learning Through Dynamic Environment Manipulation**

Mihir Patel, 18, Senior,
Thomas Jefferson High School for Science and Technology,
Alexandria, Virginia
- SOFT015T BookGazers: An Interactive Mobile Application for Reading**
Arjun Krishna, 15, Junior,
Arthi Krishna, 15, Sophomore,
Bentonville High School, Bentonville, Arkansas
- SOFT016 An Electroencephalographic Brain-Computer Interface to Restore Communication to the Paralyzed**
Triston Zhang, 17, Senior,
Plano Senior High School, Plano, Texas
- SOFT017T The Development of Self-Verifiable E-Voting System Using Blockchain Technology**
Dongyeong Kim, 14, Freshman,
Jaehyun Bhang, 14, Freshman,
Jinsoo Ok, 15, Freshman,
Shinmyung Middle School, Seoul, South Korea
Mokdong Middle School, Seoul, South Korea
Dae-Shin Middle School, Seoul, South Korea
- SOFT018 Creation of a Mobile Application to Enhance Communication in Children with Autism**
Joshua Ricardo Santiago-Ibarra, 17, Junior,
Escuela Especializada en Ciencias, Matemáticas y Tecnología,
Caguas, Puerto Rico
- SOFT019 accAAD: Efficient Append-Only Authenticated Dictionary for Transparency Logs**

Vivek Bhupatiraju, 16, Senior,
Lexington High School, Lexington, Massachusetts
- SOFT020 Dewey Wins: Predicting United States Presidential Elections**
Hava Susan Kantrowitz, 17, Junior,
Massachusetts Academy of Math and Science at WPI, Worcester,
Massachusetts
- SOFT021 EmerSave: A Novel Crowdsourcing Emergency Response Application**
Vishnu Sai Penubarthi, 16, Junior,
Massachusetts Academy of Math and Science at WPI, Worcester,
Massachusetts
- SOFT022 Revealing Unseen Motion: Eulerian Magnification Applied to Live Video**
Anders Knospe, 16, Junior,
St. Anne's-Belfield School, Charlottesville, Virginia
- SOFT023T TreLop**
Jeyla Huseynzade, 14, Freshman,
Javid Huseynzade, 16, Sophomore,
Lyceum Named after Academician Zarifa Aliyeva, Baku,
Azerbaijan
- SOFT024 One-Handed Operation UI on Smartphone**
Jihong An, 17, Senior,
Yangyoung Digital High School, Seongnam-si, Gyeonggi-do,
South Korea
- SOFT025 JUGI-JUGI : Chemical Education Program to Use Wearable Robot Hand**
Jangun Yeom, 16, Sophomore,
Gyeongsin High School, Daegu, South Korea
- SOFT026 Contributing Factors of Louisiana Teenage Driver Injury Levels in Motor Vehicle Crashes**
Corrine Michelle Hutchinson, 17, Junior,
Saint Joseph's Academy, Baton Rouge, Louisiana
- SOFT027 A Novel Kalman Filter Latent State Estimator for GPS/INS Reference Point Acquisition**
Kyle Markland, 17, Senior,
Rocky Point High School, Rocky Point, New York
- SOFT028T Integrating OCR Technology into a Business Card Wallet**
Abhishek Ravi, 17, Senior,
Shiva Kittusamy, 18, Senior,
Advanced Technologies Academy, Las Vegas, Nevada

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|-----------------|---|-----------------|---|
| SOFT029 | Saving Skin: A Mobile Application for the Prevention of Skin Cancer, Using Risk Analysis Mercy Oladipo, 16, Junior, Whitney M. Young Magnet High School, Chicago, Illinois | SOFT043 | Survival of the Fittest: Using Biological Concepts to Maximize Efficiency Helen Dover, 17, Senior, South River High School, Edgewater, Maryland |
| SOFT030 | It's Possible to Improve Your Eyesight Naturally Mohamed Ayman Hafez, 15, Sophomore, Saint Fatima Abbassia Language School, Cairo, Egypt | SOFT044 | Using BLE (Bluetooth Low Energy) Beacons and 2D (Two Dimensional) Trilateration in a Smartphone Application as an Affordable Positioning System to Assist People Suffering from Severe Vision Loss and Blindness with Indoor Navigation and Spatial Awareness Louisa Wood, 14, Freshman, Nicolet High School, Glendale, Wisconsin |
| SOFT031 | Using Machine Learning to Optimize Key-Length Prediction for Polyalphabetically Encrypted Text Shriya Pingali, 17, Junior, West High School, Salt Lake City, Utah | SOFT045 | Pearfect - A Modern Interpreted Programming Language Which Efficiently Unites Functional and Object-Oriented Programming Michal Paszkowski, 16, Freshman, Publiczne Gimnazjum nr 7, w Belchatowie, Belchatow, Poland |
| SOFT032 | Development of a Computer Aided System for the Classification of Breast Lesions from Mammogram Scans William Christopher Peterson, 18, Senior, Loudoun County High School, Leesburg, Virginia | SOFT046T | VoiceEDx: A Novel, Voice-Based End-to-End Multi-Disease Diagnostic Platform Featuring a Highly Accurate and Expandable Artificial Intelligence Engine Integrated into a Secure Blockchain Network # Shiladitya Dutta, 15, Sophomore, # Rishik Reddy, 15, Sophomore, # Parth Saxena, 16, Sophomore, Foothill High School, Pleasanton, California Amador Valley High School, Pleasanton, California |
| SOFT033 | A Novel Cryptographic Hash Code Algorithm Based on Cellular Automata Rishabh Mohanka, 17, Junior, Suncoast Community High School, Riviera Beach, Florida | SOFT047 | EEG-Based Person Authentication Method with Deep Learning Using Visual Stimulation Supawich Puengdang, 17, Junior, Mahidol Wittayanusorn School, Nakhon Pathom, Thailand |
| SOFT034 | Utilizing Machine Learning to Generate Efficient Quantum Algorithms # Christopher Thomas Kang, 16, Junior, Hanford High School, Richland, Washington | SOFT048 | AllWatch - A Software Unification Framework for Wearables Emil Mateusz Markiewicz, 19, Senior, Publiczne Liceum Ogólnokształcące Katolickiego Stowarzyszenia Wychowawców im. Bt Natalii Tutasiewicz, Poznan, Wielkopolska, Poland |
| SOFT035 | Developing an Efficient Algorithm for Measuring Density in Axisymmetric Airflows Based on Background Oriented Schlieren Frank Sleigh Smuts, 18, Senior, Parklands College Secondary, Cape Town, Western Cape, South Africa | SOFT049 | Architecture Tweaking Image Analysis S/W for Automated Identification of Land Features in Satellite Images Param Singh Gujral, 17, Senior, La Martiniere for Boys, Kolkata, Kolkata, West Bengal, India |
| SOFT036 | Preventing Domestic Violence Using Emotion Recognition in Speech # Gabrielle Kaili-May Liu, 16, Junior, Ravenwood High School, Brentwood, Tennessee | SOFT050T | A Public Interactive Funds Monitoring System that Enhances Efficiency in Budgeting, Procurement and Expenditure to Reduce Misuse of Funds in Developing Countries - A Case Study of Kenya # Priyen Devraj Pindoria, 15, Sophomore, Sanjana Rajeshkumar Pillay, 15, Sophomore, Shree Cutchi Leva Patel Samaj School, Nairobi, Nairobi, Kenya |
| SOFT037 | AzureVoice: A Novel Approach for the Early Detection of Parkinson's Disease Using Android Apps and Artificial Intelligence # Koushik Sridhar, 16, Sophomore, Ardrey Kell High School, Charlotte, North Carolina | SOFT051T | Native Language Companion: The Multilingual Platform Bradley Agwa, 17, Senior, Jim Aloo, 17, Senior, Kanga High School, Nairobi, Kenya |
| SOFT038 | An Algorithmic Approach with Matching Theory for Effective Prediction of Kidney Waitlist Times and Post-Transplant Survivability Sameer Ponnaluri, 16, Sophomore, Maclay School, Tallahassee, Florida | SOFT052T | Support Material Reduction for Fused Filament Fabrication Utilizing Compound Bridging and Constrained Steiner Trees Wesston Reed McCollum, 18, Senior, Justin Austin, 18, Senior, Stephen Brad Greenway, 17, Senior, Arkansas School for Mathematics, Sciences and the Arts, Hot Springs, Arkansas |
| SOFT039 | Wireless Brainwave Classification for Alzheimer's Patients via Efficient Neural Network Computation Grant Sheen, 17, Junior, Sage Hill School, Newport Beach, California | SOFT053 | Comparison Between Gradient Descent and Newton Method Optimization Algorithms Resulting in the Creation of a Unique Algorithm # Matthew Fosdick, 16, Sophomore, Empire High School, Tucson, Arizona |
| SOFT040T | Deep Learning Real-Time Object Detection Through Convolutional Neural Networks Using OpenCV and Optical Flow Algorithms for the Visually-Impaired Prachi Bhagavatha, 18, Senior, Jasmine Ngo, 18, Senior, Silver Creek High School, San Jose, California | SOFT054 | Do You See What I'm Saying? A Voice to Text Human-Machine Interface for the Hearing Impaired Alex Johnson, 16, Sophomore, Rutherford High School, Panama City, Florida |
| SOFT041 | A New Method for the Exploitation of Speech Recognition Systems Suha Hussain, 16, Junior, Queens High School for the Sciences at York College, Jamaica, New York | | |
| SOFT042T | Heuristic Redesign of the Hungarian Graph Algorithm for an Automated Asteroid Detection Ignasi Segura, 15, Sophomore, Javier Lopez-Contreras, 18, Senior, Col legi Casp - Sagrat Cor de Jesus, Barcelona, Spain Aula Escola Europea, Barcelona, Catalunya, Spain | | |

- SOFT055 Utilizing Blockchain to Revolutionize Privacy and Security of Medical Records**
Divya Amirtharaj, 16, Junior,
Westview High School, Portland, Oregon
- SOFT056 Software Techniques for Rendering Fractals**
Cade Brown, 17, Junior,
L&N STEM Academy, Knoxville, Tennessee
- SOFT057 Diagnosing Manifestations of Cardiovascular, Renal, and Liver Disease in the Fingernail Through a Convolutional Neural Network in a Smartphone Application**
Varun Annamalai Lakshmanan, 16, Junior,
South Fork High School, Stuart, Florida
- SOFT058 Dynamic Authentication Protocol to Improve Cyber Security Utilizing Near Field Communication**
Mason M. Eaton, 17, Junior,
Central High School, Saint Joseph, Missouri
- SOFT059 Childsafe Web Browser Based on Age Estimation from Fingerprints Through Discrete Wavelet Transform and Singular Value Decomposition**
Paritosh Dahiya, 16, Senior,
DAV Multipurpose Public School, Sonipat, Haryana, India
- SOFT060 A Novel Machine Learning Approach for Determining the Confounding Factors for Cancer Identification: An Integration of Neural Learning and Decision Tree**
Shinjini Ghosh, 17, Senior,
South Point High School, Kolkata, West Bengal, India
- SOFT061 Developing an Efficient Solution to Personal Computer Security**
Jared Callen, 18, Senior,
Wetumpka High School, Wetumpka, Alabama
- SOFT062 Conclusive, Unbiased Medical Diagnosis System Using a p2p Consensus Mechanism**
Parth Raghav, 18, Senior,
K.R.Mangalam World School, New Delhi, Delhi, India

Translational Medical Science

- TMED001 Returning to Roots: A Study on the Antibacterial Properties of Herbal Extracts Found in Traditional Chinese Medicine**
Jeffrey Zheng, 17, Senior,
Shanghai American School - Puxi Campus, Shanghai,
Shanghai, China
- TMED002 Honeybee Melittin Apitherapy for Targeted Cancer Cell Suppression and Decimation**
Dante Grace Minichetti, 17, Senior,
Greenwich High School, Greenwich, Connecticut
- TMED003 Synergistic Relationship of Cisplatin and Withaferin A in the Treatment of Triple-Negative Breast Cancer**
Terric Tojo Abella, 18, Senior,
Kamehameha Schools Kapalama Campus, Honolulu, Hawaii
- TMED004 Bruxism: A Novel Diagnostic Approach**
Edwin Christopher Bodoni, 17, Junior,
Cherry Creek High School, Greenwood Village, Colorado
- TMED005 Lipoprotein-based Therapeutic Approach to Combat Breast Cancer**
Ruhani Kaur Ahluwalia, 14, Freshman,
Harmony School of Innovation - Fort Worth, Fort Worth, Texas
- TMED006 New Potential Therapy for Ovarian Cancer: Stearoyl-CoA Desaturase-1 (SCD1) Inhibition with the Novel Compound SSI-4**
Yara Maria Chehade, 18, Senior,
Allen D. Nease High School, Ponte Vedra, Florida
- TMED007 Redox in CABG: A Tale of Two Cell Types**
Sunjay Letchuman, 18, Senior,
Caddo Parish Magnet High School, Shreveport, Louisiana
- TMED008 The Development of a High Sensitive Home Diagnosis Kit for Group A Streptococcus Bacteria (GAS)**
Michelle Mai, 17, Junior,
Century High School, Rochester, Minnesota
- TMED009 Screening Malignant Glioma Using an Electrical Differential Impedance Spectrometer and Artificial Neural Network**
Anna Faye Zheng, 17, Senior,
Saint John's Preparatory School, Collegeville, Minnesota
- TMED010 When East Meets West: Panax Notoginseng Alginate Diabetic Wound Dressing**
Natalie Cho, 17, Junior,
Pui Ching Middle School, Hong Kong, China, Hong Kong Special Administrative Region
- TMED011 Synstatin-Mediated Inhibition of Syndecan-1 in Aggressive Hodgkin Lymphoma**
Grace Yujin Lee, 17, Junior,
Academies at Englewood, Englewood, New Jersey
- TMED012 Detection of Melanoma via Deep Learning**
Sophie Jane Andrews, 16, Junior,
Chatham High School, Chatham, New Jersey
- TMED013 Sabah Snake Grass: Nature's Solution to Superbug Reservoirs**
Isaac De Wei Chung, 18, Senior,
Sekolah Menengah Kebangsaan Batu Lintang, Kuching, Sarawak, Malaysia
- TMED014T Cytotoxic Activity of Rambutan (*Nephelium lappaceum*) Fruit Skin Extract on Jurkat Leukemia Cell Line**
Norman Sim, 17, Senior,
Kee Khien Loo, 16, Junior,
Penang Free School, Penang, Georgetown, Malaysia
- TMED015 Controlled-Release Delivery of Ovarian Anticancer Paclitaxel via Vortex Ring, Donut-Shaped Hydrogels**
Emily C. Philippides, 17, Senior,
Greenwich High School, Greenwich, Connecticut
- TMED016 Development of an Innovative Drug-Delivery System for Improving the Bioavailability and Release of Curcumin Using Phosphatidylcholine and Silica-Based Nanoparticles**
Eish Maheshwari, 15, Junior,
Herricks High School, New Hyde Park, New York
- TMED017T Dyslipidemia Screening by Detecting Corneal Arcus Through Corneal Imaging**
Saleh Mahmoud Malkawi, 17, Junior,
Saba Khaldoun Showman, 16, Junior,
Jubilee School, Amman, Jordan
- TMED018 Using Bioactive Compounds to Develop an Alternative to Control *Candida spp.***
Maria Vitoria Valoto, 18, Senior,
Colegio Interativa de Londrina, Londrina, PR, Brazil
- TMED019 The Effects of Beta-Hydroxybutyrate on the Effects of Beta-Amyloid in *Caenorhabditis elegans***
Anwen Lin, 16, Junior,
Santa Rosa High School, Santa Rosa, California
- TMED020 Detection of Early-Stage Alzheimer's Disease via Hierarchical Classification of Proteomic and Clinical Profiles**
Shobhita Saroja Sundaram, 17, Senior,
Greenwich High School, Greenwich, Connecticut
- TMED021 Engineering PD-L1 Specific Diabodies for PET Imaging**
Saaz Malhotra, 17, Junior,
Northville High School, Northville, Michigan
- TMED022 The Plausibility of Using Plant Based Extracts as Acetylcholinesterase Inhibitors**
Thea Lauren Patrick, 18, Senior,
Mitchell High School, Mitchell, South Dakota
- TMED023 A Novel Approach to Improving Photodynamic Therapy Through Analysis of the Effects of Induced Hypoxia and Utilization of Bioluminescence, Year Two**
Shannen Kelly Prindle, 17, Senior,
Oakton High School, Vienna, Virginia
- TMED024T Enhanced Alzheimer's Treatment via External Gamma Brain Wave Stimulation**
Krystal Rose Horton, 16, Junior,
Tanner John Packham, 17, Senior,
Western Center Academy, Hemet, California
- TMED025 Human Oral Bacteria Strains vs. Xylitol (C5H7(OH)5) and Other Common Health Care Products**
Joshua Dean Mackley, 17, Junior,
Weber High School, Pleasant View, Utah
- TMED026T Miswak Reduces the Toxic Effect of Phenytoin**
Dima Nidal Younes, 16, Junior,
Sara Bashar Alkhalidi, 17, Junior,
Dur Al-Manthur School, Amman, Jordan
- TMED027 Mucoadhesive HA-Based Film Releasing Metronidazole to Treat Bacterial Vaginosis**
Marina Lee Gerton, 16, Junior,
West High School, Salt Lake City, Utah
- TMED028 A Novel Point-of-Care Theranostic for Gram-Negative Sepsis: Synthesis and Application of Polymer Nanoparticles for Rapid Endotoxin Capture**
Sriharshita Musunuri, 18, Senior,
Henry M. Jackson High School, Bothell, Washington
- TMED029 A Novel Approach to Early Stage Melanoma Diagnosis Using Bioconjugated Gold Nanoparticles and Molecular Optical Coherence Tomography**
Shriya Gampala Reddy, 14, Freshman,
Northville High School, Northville, Michigan

- TMED030 Antimicrobial Peptide Derivatives as Potential Drug Candidates for Ebola Virus Disease**
Amanda Kai Zhang, 17, Junior,
Brownell-Talbot School, Omaha, Nebraska
- TMED031 Novel Nanotechnology for the Detection of Circulating Tumor Cells**
Alyssa Wu, 17, Junior,
Chamblee Charter High School, Chamblee, Georgia
- TMED032 Development of a Loop-Mediated Isothermal Amplification (LAMP) Assay for the Detection of Powassan Virus**
Cheryl Ann Blackmer, 16, Sophomore,
Ballard Community Senior High School, Huxley, Iowa
- TMED033 Anti-Cancer Effects of Novel Morphologies of 2,3-Dichloro-1,4-Naphthoquinone Nano-Particles in MCF7, Breast Cancer Cells**
Deemah Khalid Ghazi, 17, Senior,
AlBassam Schools, Dammam, Saudi Arabia
- TMED034T A New System Combined with a Smart Phone Application for On-Site Doping Analysis: Mobil-Dopsens**
Semiha Doga Firat, 18, Senior,
Yagmur Akyaz, 18, Senior,
Takev Science High School, Azmir, Aegean, Turkey
- TMED035 Inhibition of LPS-Induced Inflammation in Macrophages Through Natural Anti-Inflammatory Compounds**
Anusha Puri, 15, Sophomore,
Mills E. Godwin High School, Henrico, Virginia
- TMED036 Investigating an Alternative Treatment Protocol for Commonly Occurring Pathogenic Bacteria: *Escherichia coli*, *Methicillin-Resistant Staphylococcus aureus*, and *Listeria Monocytogenes***
Rahil Ishan Samlal, 17, Senior,
St. Dominic's Newcastle, Newcastle, KwaZulu Natal, South Africa
- TMED037 Ultra-Sensitive Cardiac Biomarker Detection Using Gold Nanocavity Localized Plasmon Resonance for Early and Rapid Diagnosis of Myocardial Infarction**

Sophie Joy Guo, 17, Senior,
James Clemens High School, Madison, Alabama
- TMED038 Heart Smart: A Novel Deep Learning Approach to Improving Heart Disease Diagnosis**
Sofia Tomov, 14, Freshman,
Homeschool, Knoxville, Tennessee
- TMED039T Cancer Screening Mobile Application: A Novel Machine Learning Based Approach Utilizing Retrospective Data**
Viraj Mehta, 15, Freshman,
Roshan Ravi Pillai, 15, Freshman,
BASIS Scottsdale, Scottsdale, Arizona
- TMED040 A Precision Medicine Approach to Cancer: Epigenetic Inhibitors Induce Highly-Specific Apoptosis in High Risk Acute Lymphoblastic Leukemia**
Ruhi Sayana, 17, Junior,
The Harker School, San Jose, California
- TMED041 Development of a Novel Organic Chemiresistor Sensor for Disease Detection Through Breath: Applied Through a Computational Model**
Akhil Kadamala Shiju, 16, Sophomore,
Lawton Chiles High School, Tallahassee, Florida
- TMED042 Development of a Drug-Likeness Rule for Natural Products**
Saadh Ahmed, 17, Senior,
Northview High School, Johns Creek, Georgia
- TMED043 Plastics Destroying Your DNA: An Inquiry into the R-Loop Inducing Behaviors of Bisphenol A and Its Implications**
Amy Xin-Yi Zhong, 17, Junior,
University High School, Irvine, California
- TMED044 Novel Warning Mechanism for At-Risk Stroke and Epilepsy Patients Through Detection of Harmful Levels of Cortisol**
Ryan Bose-Roy, 15, Sophomore,
Hunter College High School, New York, New York
- TMED045 VANGUARD: An Opensource Approach to Predict Cancer Generation and Evolution by the Use of Nanoparticle SERS, Probabilistic Analysis, and Collaborative Data Processing**

Joel Romero Hernandez, 17, Senior,
Institut F.X. Lluch i Rafecas, Vilanova i la Geltrú, Barcelona, Spain
- TMED046T UCH-L1 and s100B in Saliva as Novel Biomarkers for Severe Traumatic Brain Injury**
Anjay Saklecha, 17, Junior,
Krish Brij Kapadia, 17, Junior,
The Harker School, San Jose, California
- TMED047T Fabrication of 3D-Nano-Cellulose Network (3DNC) from Green Tea Fermentation, Used for Loading and Releasing to Increase Bioavailability of Famotidine**
Thi Huyen Vy Phan, 16, Junior,
Minh Thy Bui, 17, Junior,
Hung Vuong Upper Secondary School for the Gifted, Pleiku, Gia Lai, Viet Nam
- TMED048 KetoPatch: A Novel Method for Early Detection of Diabetic KetoAcidosis**
Nehali Gupta, 16, Junior,
Parkland High School, Allentown, Pennsylvania
- TMED049 How Does Poor Posture Affect the Human Body?**
Ariel Maire Baiano, 16, Sophomore,
Marine Academy of Technology and Environmental Science,
Manahawkin, New Jersey
- TMED050 Reducing Dopaminergic Neurodegeneration and Motor Dysfunction Using Crude Ethanolic Bamboo (*Bambusa vulgaris*) Leaf Extract on a Transgenic *Caenorhabditis elegans* Model of Parkinson's Disease**
Roehann Mykael Bulaclac Zabat, 16, Sophomore,
Juan R. Liwag Memorial High School, Gapan City, Nueva Ecija, Philippines
- TMED051 Cytotoxic Effects of Sulindac, Metformin, and TBHP on *in vitro* Lung Cancer Cells and the Effects of Glucose Level on Efficiency of the Treatment**

Shreya Reddy, 16, Junior,
Lincoln Park Academy, Fort Pierce, Florida
- TMED052 Assessing Progression of Alzheimer's Disease: Predicting Cognitive Impairments and Amyloid Deposition Through PET and MRI**

David Wang Ma, 18, Senior,
Paul Laurence Dunbar High School, Lexington, Kentucky
- TMED053 Effectiveness of Neratinib in Inhibiting or Reversing Hepatic Stellate Cell Activation**
Alexander Jordan Duh, 17, Junior,
Gilman School, Baltimore, Maryland
- TMED054T Vertical Flow Assay Detection for GM2-AP in Simulated Urine of Non Small Cell Lung Cancer Patients**
Alexa Reynders, 18, Senior,
Benjamin Larson, 18, Senior,
Benilde-St. Margaret's, St. Louis Park, Minnesota
- TMED055T Urine as an Alternative to Blood for Cancer Liquid Biopsy and Precision Medicine**
Adam Ming Zhang, 17, Junior,
Jonathan Ruibo Cheng, 16, Junior,
Methacon High School, Eagleville, Pennsylvania
- TMED056 Methylene Blue May Mitigate Symptoms of Traumatic Brain Injury**
Beril Lara Saygin, 16, Sophomore,
Keystone School, San Antonio, Texas

TMED057 digiTAC: An Automated and Inexpensive Solution for Visual Acuity Testing in Preverbal Children Using Deep Convolutional Neural Networks

Ishita Mangla, 17, Junior,
Delhi Public School, R. K. Puram, Delhi, New Delhi, India

TMED058T Ultralow-Cost Pre-Symptomatic Diagnostic Paper Tool for Protein-Energy Malnutrition

Mohammed Suhail Chinya Salimpasha, 17, Senior,
Swasthik Padma, 16, Junior,
St. Aloysius Pre-University College, Mangalore, Karnataka, India
Vivekananda Pre-University College, Dakshina Kannada,
Karnataka, India

TMED059 Neural Networking System for Detecting and Analyzing Heart Pathologies

Solomiia Leno, 16, Junior,
LEC "Primary School - Gymnasium", Lviv, Ukraine

TMED060 Endogenous Peptide as an Alternative to Antibiotics: Investigating the Antibacterial Properties of Vicryl Sutures Coated with TCP-25

Erik Anton Artur Hartman, 18, Senior,
Katedralskolan, Lund, Sweden

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