

Intel International Science and Engineering Fair



Finalist Directory 2017

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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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American Committee for the Weizmann Institute of Science	Monsanto Company
American Geosciences Institute	Mu Alpha Theta, National High School and Two-Year College Mathematics Honor Society
American Institute of Aeronautics & Astronautics	National Aeronautics and Space Administration
American Intellectual Property Law Association	National Anti-Vivisection Society
American Mathematical Society	National Institute on Drug Abuse, National Institutes of Health and the Friends of NIDA
American Meteorological Society	National Oceanic and Atmospheric Administration–NOAA
American Physiological Society	National Security Agency Research Directorate
American Psychological Association	Office of Naval Research on behalf of the United States Navy and Marine Corps
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ASU Rob and Melani Walton Sustainability Solutions Initiatives	Society for Experimental Mechanics, Inc.
China Association for Science and Technology (CAST)	Society of Experimental Test Pilots
Coalition for Plasma Science (CPS)	SPIE, the international society for optics and photonics
Drexel University	U.S. Agency for International Development
Drug, Chemical & Associated Technologies Association (DCAT)	United States Environmental Protection Agency
Florida Institute of Technology	United Technologies Corporation
Fondazione Bruno Kessler	University of Arizona
GoDaddy	University of the Sciences in Philadelphia
IEEE Foundation	University of Toronto, Faculty of Applied Science & Engineering
Intel Foundation	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

- ANIM001** **Blue Light Effect Study: Impact on *Drosophila's* Cognitive Ability and Gender Ratios**
James Arnheim Staman, 18, Senior, The Bolles School, Jacksonville, Florida
- ANIM002** **Why Backward in Hunting? A Comprehensive Study of Antlions**
Xiwen Zhang, 15, Freshman, The High School Affiliated to Beijing Normal University, Beijing, China
- ANIM003** **Biocontrol of the *Taeniopoda reticulata* (Locust) Plague Using the Fungus *Metarhizium anisopliae***
Diego Alonso Martinez Gutierrez, 16, Freshman, Colegio Tecnico Profesional de Upala, Upala, Alajuela, Costa Rica
- ANIM004T** **Effect of the Survival Rate of Postlarvae Crayfish, *Cambarellus montezumae*, in Its Aquaculture Production**
Francisco Jesús Mota Rojo, 18, Junior,
Agustin Diaz Lorenzo, 18, Junior,
Centro de Estudios Tecnologicos en Aguas Continentales No. 2, Tezontepec de Aldama, Hidalgo, Mexico
- ANIM005** **The Effects of Spontaneous Mutations upon Male Fitness in *Caenorhabditis elegans***
Carlie Taylor, 17, Senior, The Villages Charter High School, The Villages, Florida
- ANIM006T** **Toxicity Analysis of Multiple Paraben Exposure on *Drosophila melanogaster***
Ella Suzanne Haefner#, 19, Senior,
Elaine Rosalie Adams#, 19, Senior,
Loyola Catholic School, Mankato, Minnesota
- ANIM007** **Optimizing Goat Skin Fibroblast Culture Conditions for Cloning**
Aakash Arora, 16, Sophomore, Veterans High School, Kathleen, Georgia
- ANIM008** **Shining Light on the Blind: Evolutionary Regression and Adaptive Progression in the Micro-Vertebrate *Ramphotyphlops braminus*, Year Three**
River Grace, 18, Senior, West Shore Junior/Senior High School, Melbourne, Florida
- ANIM009** **The Characterization of the Retinal Determination Network in *Drosophila melanogaster* in order to Optimize the Diagnosis and Treatment of Human Retinal Disease**
Devanshi Udeshi, 17, Junior, Stephen F. Austin High School, Sugar Land, Texas
- ANIM010** **The Effects of Secondhand Smoke on *Drosophila melanogaster***
Abigail Thyra Parker, 16, Freshman, Keystone School, San Antonio Texas, Texas
- ANIM011T** **Catch Size of *Anadara tuberculosa* (Black Cockle), at Charco Azul Mangrove in the Bay of Chame and Recommendations for Their Sustainable Management**
Elvis Walter Barahona, 19, Senior,
Genesis Mariane Bellido, 19, Senior,
Colegio Dr. Harmodio Arias Madrid, Panama, Panama
- ANIM012** **Analyzing the Effects of Herbal Supplements on the Heart Rate of Crayfish While under the Influence of Caffeine**
Kiana Marie Padilla, 16, Sophomore, Palm Bay Magnet High School, Melbourne, Florida
- ANIM013** **Home Ranges of Atlantic Great White Sharks, Phase II**
Kelly Jane van Woeseik, 18, Senior, Satellite High School, Satellite Beach, Florida
- ANIM014** **Re-Evaluating Reproduction: The Transgenerational Effect of High-Fat Dairy Intake on Fertility in *Drosophila melanogaster***
Evan James Mizerak, 18, Junior, Wachusett Regional High School, Holden, Massachusetts
- ANIM015** **High Fructose Corn Syrup and Sucrose: Effects on *Mus musculus* Physiology**
Cade Ray McGarvey, 18, Junior, Paulding High School, Paulding, Ohio
- ANIM016** **Predicting Pulsations: A Comprehensive Study to Determine the Effect of Grouping Patterns on *Cassiopea xamachana***
Allison Biddinger, 18, Junior, Bartlesville High School, Bartlesville, Oklahoma
- ANIM017** **A Study of the Behavior of *Mus musculus* in the Presence of Ultrasonic Frequencies to Test the Possible Viability of Ultrasonic Frequencies as a way to Reduce Wildlife Hazards on Roadways**
Maegan Yeary, 17, Junior, J.W. Nixon High School, Laredo, Texas
- ANIM018T** **Water Surface Vibration Signals Utilized by the Japanese Water Strider, *Aquarius elongatus*, to Locate Prey and Mate**
Aya Nobe, 18, Senior,
Norika Kondo, 18, Senior,
Sachiko Fukuzawa, 17, Senior,
Nagasaki Prefectural Nagasaki Nishi High School, Nagasaki, Nagasaki-Pref., Japan
- ANIM019** **Western Snowy Plover Nest Site Characteristics and Use of Drone Imagery in Predicting Potential Nesting Habitat**
Alyssa Rawinski, 16, Sophomore, Monte Vista High School, Monte Vista, Colorado
- ANIM020** **Comparison of ELISA to RIA as Predictors of Parturition in Goats**
Emily Ann Acevedo, 16, Sophomore, Bradford County High School, Starke, Florida
- ANIM021** **The Effects of Turmeric and Bovine Collagen on the Regeneration of *Dugesia dorotocephala***
Imane Bouzit, 17, Junior, Pioneer Charter School of Science II, Saugus, Massachusetts
- ANIM022** **Electromagnetoreception in *Planaria***
Alexandra Perez Tan, 17, Sophomore, Ball High School, Galveston, Texas
- ANIM023** **Grazing Sheep on Deadly Fireweed: A 'BaaaaD' Situation?**
Jade Taylor Moxey, 17, Senior, Sapphire Coast Anglican College, Bega, New South Wales, Australia
- ANIM024T** **Why Can House Gecko (*Cosymbotus platyurus*) Be Found In Your House? The Study Correlation of *Cosymbotus platyuru's* Lamellar Adhesion on the Level of Surface Roughness through Behavioral Observation**
Chyntia Silvi Yanti Hasan, 17, Junior,
Zahratul Jannah, 18, Senior,
State Senior High School 80 Jakarta, Jakarta Utara, DKI, Indonesia

- ANIM025 The Effects of Heart-Specific Downregulation of Histone Deacetylase, Rpd3, on Longevity**
Catherine Chen, 17, Junior, Academy for Health and Medical Sciences, Bridgewater, New Jersey
- ANIM026 Phase Two: Analysis of Effects of Carbo Activatus on Broiler Weight and Carcass Protein Content**
Olivia Raquel Wise-Dent, 18, Senior, James Madison High School, San Antonio, Texas
- ANIM027 Listening for Differences: Analyzing Bat Feeding Behavior**
Luke Kessler McGuire, 17, Junior, Beaufort High School, Beaufort, South Carolina
- ANIM028 Synthesis of a Soy Protein Hydrogel for Invasive Snail Control in Agricultural Settings**
Jessica E. Young, 19, Senior, Palm Beach Central High School, Wellington, Florida
- ANIM029 Elasmobranch Olfactory Organ Morphology**
Ayse Demircan, 18, Senior, Florida Atlantic University High School, Boca Raton, Florida
- ANIM030 Using Response Surface Methods to Optimize a Repellant for the Invasive Sri Lankan Weevil, *Myllocerus undecimpustulatus undatus* Marshall (Coleoptera: Curculionidae: Entiminae)**
Sana Shareef, 17, Junior, Saint Edward's School, Vero Beach, Florida
- ANIM031T Effects of E-Cigarette Vapor on *Drosophila melanogaster***
Sophia Renae Conant#, 17, Junior,
Abby Marie Klammer#, 18, Junior,
Adams Central Jr.-Sr. High School, Hastings, Nebraska
- ANIM032 Manipulating Odor-Driven Behavior in *Drosophila melanogaster*: A Model to Investigate γ -Aminobutyric Acid (GABA) Deficiency Disorders**
Charity Nia Russell, 18, Senior, Commack High School, Commack, New York
- ANIM033 The Effect of Different Genres of Music When Grooming a Horse on the Neck and Withers after Exercise**
Abigail Louise Faz, 17, Junior, Northridge High School, Layton, Utah
- ANIM034 Analyzing the Role of Intralipid in the Treatment of Beta-Adrenergic Blocker Overdose in *Daphnia magna***
Nicholas Lin, 16, Sophomore, Westfield High School, Chantilly, Virginia
- ANIM035 Erasure of Neural Extracellular Matrix to Ameliorate Aging-Dependent Cognitive Decline**
Alicia Lauren Smith, 19, Senior, Caddo Parish Magnet High School, Shreveport, Louisiana
- ANIM036 Effects of Two Pesticides on Expression of Genes Related to Energy Metabolism in Honey Bees (*Apis mellifera*)**
Waris Margarite Anderson, 18, Junior, Tucson High Magnet School, Tucson, Arizona
- ANIM037T The Effects of Exercise at Different Stages of Life on the Longevity of *C. elegans***
Grace Elizabeth Lyons, 18, Junior,
Jose Maria Garcia-Chope, 19, Senior,
Bancroft School, Worcester, Massachusetts
- ANIM038 No, Not the Trailer!**
Abigail Grace Larson, 17, Junior, Tioga High School, Tioga, North Dakota
- ANIM039 The Effect of Nosema on the Honey Bee's Brain**
Natalia Noel Jacobson, 18, Junior, Empire High School, Tucson, Arizona
- ANIM040 Red and Blue Silk Threads Obtained from Silkworms Reared on Artificial Diets Containing Rhodamine B and Methylene Blue**
Nodoka Fukumitsu, 19, Senior, Shimane Prefectural Masuda High School, Masuda, Shimane, Japan
- ANIM041T Differentiation of Song Patterns of the Cicada *Meimuna opalifera*: Possible Effects of Ancient Pyroclastic Flow**
Souma Taguchi, 18, Junior,
Eriko Tanda, 17, Junior,
Yuki Matsushita, 18, Junior,
Kagoshima Prefectural Kokubu High School, Kirishima, Kagoshima, Japan
- ANIM042T Neuro Test**
Beatriz Ines de Oliveira Ferreira Martins Gomes, 20, Senior,
Mariana de Pinho Garcia, 19, Senior,
Matilde Goncalves Moreira da Silva, 19, Senior,
Escola Secundaria de Arouca, Arouca, Portugal
- ANIM043T Association Floral of the Nectar Thief *Bombus terrestris* (Linnaeus, 1758) (Hymenoptera: Apidae) and Its Degree of Dispersion in Magallanes, Chile**
Pablo Sanhueza, 17, Junior,
Gianfranco Cavallieri, 17, Junior,
Colegio Luterano, Punta Arenas, Chile
Luterane College, Punta Arenas, Magallanes, Chile
- ANIM044T Effects of Varroa Mite Treatments on Bee Memory and Learning**
Jackson K. Damhorst, 15, Freshman,
Max Freedman, 16, Sophomore,
Alternative Family Education, Santa Cruz, California
- ANIM045 Photo- and Chemotactic Response of *Orconectes virilis*: Determining the Efficacy of a Positive and Negative Taxic System for Nuisance Crayfish**
Kelli Michelle Alford, 17, Sophomore, Camdenton High School, Camdenton, Missouri
- ANIM046 Survey and Shedding Characteristics of Trematodes in Catfish Ponds**
Allison Lauren Wise, 18, Senior, Saint Joseph's Catholic School, Greenville, Mississippi
- ANIM047T Olfactometer Assays to Measure the Response of *Culex quinquefasciatus* to Plant and Fungal Volatiles**
Emma Nicole Dauster, 16, Sophomore,
Cullen Stuart Duval, 16, Sophomore,
Kylie M. Evans, 16, Sophomore,
Brevard Senior High School, Brevard, North Carolina
- ANIM048T The Potential Use of Natural Essential Oils in Prevention from Ticks of *Dermacentor* and *Haemaphysalis* Genus**
Samuel Smoter, 18, Sophomore,
Miriam Feretova, 18, Sophomore,
Grammar School of St. Nicholas, Presov,
Presovsky, Slovakia
- ANIM049 Sustainable Mosquito Control: A Chemical-Free, Low-Cost Approach to Controlling *Aedes aegypti*, a Vector of Zika Virus**
Shantanu Jakhete, 17, Senior, South Fork High School, Stuart, Florida
- ANIM050 The Effects of Anoxic Conditioning on Oxidative Stress in Mosquitoes in Increasing Overall Antioxidant Capacity, Lifespan, and Activity**
Aubrey Anne Moedl, 18, Senior, American Fork High School, American Fork, Utah
- ANIM051 (Fly) Food for Thought**
Vivian Heleana Pryor, 16, Sophomore, St. Andrew's Episcopal School, Ridgeland, Mississippi

- ANIM052 The Effect of Expression Patterns of Ammonium Transporters on the Interaction between Corals and Their Symbiotic Dinoflagellates**
Amaar Abdulrazack Amir, 18, Junior, Dhahran Ahliyya Schools, Dhahran, Eastern Province, Saudi Arabia
- ANIM053 The Establishment of a Permanent Cell Line of the Native Pollinator *Bombus impatiens*: Applications in Entomology, Agricultural Science, and Nosema Research**
Olivia Ann Kline, 18, Junior, Camdenton High School, Camdenton, Missouri
- ANIM054T Developing a Novel 3D-Printed Solution to Aid Healing Fractured Wing Bones of Wild Birds**
Jeremy Chen-Hao Wang, 16, Freshman, Meena Niveda Ravishankar#, 16, Freshman, Vishakk Rajendran, 15, Freshman, Catalina Foothills High School, Tucson, Arizona University High School, Tucson, Arizona BASIS Tucson North, Tucson, Arizona
- ANIM055 Avian Gut Passage Time**
Kloe Kate Borja, 18, Senior, Kagman High School, Saipan, MP, Northern Mariana Islands
- ANIM056T Factors Affecting Polystyrene Foam Consuming Rate of Superworms (*Zophobas morio*)**
Nutchawara Moonkaew, 18, Junior, Jitranooch Chairach, 18, Junior, Bunyawat Witthayalai School, Lampang, Thailand
- ANIM057 Formation and Change of Vocal Dialects in Captive Gentoo Penguin *Pygoscelis papua* Colonies**
Andrea Dahl, 18, Senior, Olathe North High School, Olathe, Kansas
- ANIM058 The Rate of Embryonic Development in *Oncorhynchus mykiss* When Exposed to Heavy Metal Solutions**
Colton Rainier Curtis, 18, Senior, Meeteetse High School, Meeteetse, Wyoming
- ANIM059 Determining the Presence of *Wolbachia* in the *Speyeria* Genus: A Model for Examining Endangered Populations through a Related Species at Fort Indiantown Gap Military Reservation**
Kaitlyn Marie Galliher, 19, Senior, Susquenita High School, Duncannon, Pennsylvania
- ANIM060 Effects of P.G. 600 and CIDRs on the Ewe's Conception Rate**
Abbigale Elaine Steeke, 17, Sophomore, Scranton Public School, Scranton, North Dakota
- ANIM061 Using Fluorescence as a Death Assay for *Angiostrongylus cantonensis* Nematode**
Ina Henna Klasner, 16, Sophomore, Hilo High School, Hilo, Hawaii
- ANIM062 *Polycelis felina* Grows with the Flow**
Mackenzie Anne Martin, 16, Sophomore, South Terrebonne High School, Bourg, Louisiana
- ANIM063 Evaluating the Effects of Probiotics on Neurology in the Model Organism *Drosophila melanogaster* Adult Flies and Third Stage Instar Larvae Utilizing Environmental Stressors and Behavioral Assays**
Erika Eleonora Ravitch, 17, Junior, Cascia Hall Preparatory School, Tulsa, Oklahoma

Behavioral and Social Sciences

BEHA001T Quipukuna and Tocabukuna: The Mysterious Inca Books
Luz Lesslie Castillo Choque, 14, Freshman,
Allison Gabriela Ramos Olvea, 15, Freshman,
Institucion Educativa Privada de Señoritas Luz Andina Reyna de
Las Americas, Juliaca, Puno, Peru

BEHA002 Kemotions: Keys to Emotional Cues
Sapna Karina Patel, 17, Junior, Oviedo High School,
Oviedo, Florida

BEHA003 The Link between Toddlers and Scientists
Bianka Elain Reyneke, 18, Senior, Welkom Gimnasium High
School, Welkom, Free State, South Africa

BEHA004 To Vaccinate or Not to Vaccinate? That Is the Question
Olivia Sunshine McNair, 16, Freshman, Perham High School,
Perham, Minnesota

BEHA005T Self-Image of Athletes with Disability: A New Meaning
Maria Gabriela de Carvalho Leal, 18, Junior,
Isabela Lopes Dombrady, 18, Junior,
Julia Assuncao Rolim, 18, Junior,
Colegio Giordano Bruno, Sao Paulo, Sao Paulo, Brazil

BEHA006T RApp Chemistry
Diana Alejandra Hurtado Plata, 18, Senior,
Juan Carlos Munoz Bojorquez, 18, Senior,
Centro de Bachillerato Tecnologico Industrial y de Servicios
Number 37, Obregon, Sonora, Mexico

**BEHA007T Me, MySelfie and I: Experimental Evidence of the Value of
Self-Esteem and Selfies**
Kaitlin Renae Wells#, 17, Junior,
Kaybree Loren Keating#, 16, Sophomore,
Aubrey Lynne Wells, 19, Senior,
Fort Morgan High School, Fort Morgan, Colorado
Weldon Valley High School, Weldona, Colorado

**BEHA008 Investigating Triggers of Sundowner's Syndrome in Dementia
Patients in an Institutional Setting, Year Two**
Cassandra Odalys Blew, 17, Sophomore, La Veta High School, La
Veta, Colorado

**BEHA009 Feeling the Heat and the Need to Cheat: A Case Study of the
Correlation between Academic Dishonesty and Responses to
Common Stressors Experienced by Fourth through Twelfth
Grade Students in a Private School Setting in South Louisiana**
Hallee Mire, 15, Freshman, Catholic High School, New Iberia,
Louisiana

**BEHA010 The Effect of Paper, Electronic, and Audio-Electronic Reading
Modalities on Reading Comprehension in Adults Aged 60 and
Above**
Alison Thomas, 17, Sophomore, Oregon Episcopal School,
Portland, Oregon

**BEHA011 The Moral Sentence; Is It Right to Penalize People of
Generalized Social Classes by a Crowd-Sourced Judging of
Peers?**
Jareth Christopher Anderson, 18, Senior, Wilsonville High
School, Wilsonville, Oregon

BEHA012 Ingenuity in Arithmetic
Amaha Solomon Ghide, 17, Junior, The Academy of Science and
Technology, The Woodlands, Texas

**BEHA013T Reading as a Determinant Factor for Good Writing, in Ninth
and Eleventh Graders**
Maribel Janeth Navarro, 18, Junior,
Janeth Navarro, 15, Sophomore,
Colegio San Agustin, Panama, Chiriqui, Panama

**BEHA014 Psychophysiological Correlates of Language Processing
and Handedness**
Salim Adam Mouloua, 18, Senior, Paul J. Hagerty High School,
Oviedo, Florida

BEHA015 Psychosocial Turmoil
Meredith Blaise, 16, Sophomore, Bishop Feehan High School,
Attleboro, Massachusetts

**BEHA016 The Effect of Highway Font Type on Readability of Text Under
Blurred Conditions**
Jacob Hall, 18, Junior, H-B Woodlawn Secondary Program,
Arlington, Virginia

**BEHA017T Does Modern Information Technology Exacerbate Teen
Procrastination?**
Abigail Rose Lifferth, 18, Junior,
Carter Williamson Draney, 18, Junior,
Tiffany Liu##, 17, Junior,
The Villages Charter High School, The Villages, Florida

**BEHA018T The Effect of Stress Level and Work Environment on the
Accuracy of Eyewitness Testimony, Year III**
Patricia Kay McAuley##, 18, Senior,
Holley J. Meaney##, 18, Senior,
Lauren Alison Beall##, 19, Senior,
Pensacola High School, Pensacola, Florida

**BEHA019 Maternal Behavior Contributing to Early Life Adversity and the
Subsequent Neural and Behavioral Effects on Rat Pups**
Hannah Louise Brown, 19, Senior, Dobbs Ferry High School,
Dobbs Ferry, New York

**BEHA020 The Morality of "Larks" and "Owls": The Relationship Between
the Circadian Clock and Morality in Decision-Making**
Naama Schor, 20, Senior, High School for Environmental
Education, Midreshet Ben Gurion, Israel

BEHA021 EWS: Express without Stress
Tala Amjed Haddad, 17, Junior, Jubilee School,
Amman, Jordan

**BEHA022 Central Nervous System Sensitization Is Associated with
Chronic Pain in HIV**
Tyler Huang, 19, Senior, Alabama School of Fine Arts,
Birmingham, Alabama

BEHA023 Word Crimes: A Study on Bias, Justice, and Compassion
Alyson Elaine Marie Nichols, 18, Junior, Nettleton High School,
Jonesboro, Arkansas

**BEHA024 Kids on Track: Investigating the Effectiveness of a Rewards-
Based Fitness Program Using Activity Trackers with
Elementary Students**
Madison Lynn Stark, 16, Sophomore, Tuscumbia High School,
Tuscumbia, Missouri

**BEHA025 Lucid Dreaming: Its Electrophysiological Correlates and
Induction through Multiple Awakenings**
DeeAnn Guo, 18, Senior, John Jay High School, Cross River,
New York

BEHA026 Pink for Girls, Blue for Boys
Madelynn Shambles, 14, Freshman, Bartlesville High School,
Bartlesville, Oklahoma

BEHA027T How Effective Is Your Virtual Reality Experience?
Kevin Turcios, 18, Senior,
Cristian Figueroa, 19, Senior,
East Boston High School, East Boston, Massachusetts

**BEHA028 Education on Stereotypes: Are Children More Receptive than
Adults?**
Deepa Chittoor Bhuvanagiri, 18, Junior, Eureka High School,
Eureka, Missouri

- BEHA029 Evaluation of Gender Bias in Social Media Using Artificial Intelligence**
Nitya Parthasarathy, 17, Junior, Northwood High School, Irvine, California
- BEHA030 Impact of Carbon Tax Policies on the Global Agricultural Economy: A Computational Spatial Partial Equilibrium Modeling Approach**
Mary Zhu, 19, Senior, Nashua High School South, Nashua, New Hampshire
- BEHA031 Do Parents Really Know Best? Investigating the Relationship between Perceived Parental Goals and Academic Factors**
Anuj Gupta, 18, Senior, Roslyn High School, Roslyn Heights, New York
- BEHA032 The Dynamics of Habituation: A Neural Study of the Effects of Repeated Exposures to Risky Behaviors on Cognitive Control and Emotional Responses in the Adolescent Brain**
Kashfia Nehrin Rahman, 17, Junior, Brookings High School, Brookings, South Dakota
- BEHA033 Fighting the Silent Epidemic: The Effects of Stress-Reduction Techniques on PTSD, Depression, and Anxiety**
Quristienna Iris Bateman, 18, Senior, Bonneville High School, Washington Terrace, Utah
- BEHA034T Political Trends: Examining the Future of Politics**
Kailas Shekhar Sane, 19, Senior,
Veda S. Sane, 16, Sophomore,
University School of Milwaukee, Milwaukee, Wisconsin
- BEHA035 Student-Centered vs. Teacher-Centered Learning: An Examination of Performance and Preference**
Lara Paige Nicholson, 17, Junior, Saint Joseph's Academy, Baton Rouge, Louisiana
- BEHA036 Gas Prices and Buying Trends**
Amrit Singh, 17, Junior, Grangeville High School, Grangeville, Idaho
- BEHA037 Smart Museum**
Peter Ibrahim Khalil, 18, Senior, Gamal Abd Al Nasser, Alexandria, Egypt
- BEHA038T Correlation between Personality Type and Test Performance**
Dannis Rubio Cazarez, 18, Junior,
Courtland Stanley Hardy, 18, Junior,
Surry Early College High School of Design, Dobson,
North Carolina
- BEHA039 The Effect of Color Preference on Quick Problem-Solving in Young Students**
Sarah Barnica, 16, Sophomore, Timber Lake High School, Timber Lake, South Dakota
- BEHA040 The Effect of Dual Neurotransmission on Male Aggression and Courtship in *Drosophila melanogaster***
Lucy Ann Sirrs, 17, Sophomore, Hellgate High School, Missoula, Montana
- BEHA041T The Effect of Traumatic Brain Injury and Metformin on *Drosophila* Learning**
Hannah Rose Bilton, 18, Junior,
Emma Elizabeth Bilton, 18, Junior,
Yorktown High School, Yorktown Heights, New York
- BEHA042 The Black Plague and the Conception of Death**
Noga Yekutieli, 18, Senior, Israel Arts and Science Academy, Jerusalem, Israel
- BEHA043 Suggested Memory Therapy: A Novel Treatment for Psychological Inflexibility**
Ben Weiss, 17, Sophomore, Kalaheo High School, Kailua, Hawaii
- BEHA044 The Turban Myth**
JJ Singh Kapur, 18, Junior, Valley High School, West Des Moines, Iowa
- BEHA045 Evaluating Autism Connectivity Abnormalities through Functional Fingerprinting**
William Edwin Snyder, 19, Senior, Severna Park Senior High School, Severna Park, Maryland
- BEHA046 Dress to Impress: The Influence of the Enclothed Cognition Effect on Self-Esteem and Self-Efficacy**
Chloe Ann Levin, 18, Senior, Roslyn High School, Roslyn Heights, New York
- BEHA047T Effects of Cellular Devices on Teen Driving**
Makenna Mary Gabel, 17, Junior,
Karen Nicole Scharlau, 18, Junior,
Cochrane-Fountain City High School, Fountain City, Wisconsin
- BEHA048 Social Segregation in NYC Public High Schools**
Georja Agapi Fotiou, 18, Senior, Townsend Harris, Flushing, New York
- BEHA049 The Effects of Mother-Infant Interactions on Infants' Ability to Transition from Crawling to Walking**
Ryan Foo, 18, Senior, The Bronx High School of Science, Bronx, New York
- BEHA050 The Effects of the Number of Brake Lights Inferring Difference in Light Intensity on Reaction Time of the Following Driver**
Sarah Ricole Mason, 19, Senior, Southwest Livingston County R-I High School, Ludlow, Missouri
- BEHA051 Computational Modeling of Neuronal Networks: Clarifying Neural Dynamics for Neuropathological Investigations**
Zhitong Wang, 18, Senior, Jericho Senior High School, Jericho, New York
- BEHA052T Behave It or Not: A Novel Methodology for Health Integrating Behaviorism by Means of Mobile Devices**
Weng Lam Chan, 18, Senior,
Fan Lam Ng, 19, Senior,
Escola Keang Peng, Macao, Macao, China, Macao Special Administrative Region
- BEHA053 Social Media and Social Anxiety: How Does Social Media Presence Correlate with the Exhibition of Anxiety Characteristics?**
Josie Dylan Douglas-Brown, 16, Sophomore, Lakeside High School, Atlanta, Georgia
- BEHA054 Deep Learning for Autism Diagnosis: Insights into Genomic and Phenotypic Features**
Harkirat Bhullar, 16, Sophomore, Evan Hardy Collegiate Institute, Saskatoon, Saskatchewan, Canada
- BEHA055 And the Winner Is...: Developing a Computer Program to Investigate Neural Competition with Multimodal Stimuli**
Caleb Jireh Martonfi, 15, Freshman, Tuscumbia High School, Tuscumbia, Missouri
- BEHA056 Neglected Children: Case Study of Public Attitudes toward Children with HIV AIDS in 6 (Six) Sub-Districts in Surakarta**
Latifah Maratun Sholikhah, 17, Senior, State Senior High School 1 Teras, Boyolali, East Java, Indonesia
- BEHA057T Successful People Attitudes in Young People Actions**
Luis Ángel Ramos Hernandez, 14, Freshman,
Luis De La Luz Sanchez, 17, Freshman,
Carlos Monsivais, Puebla, Mexico
Universidad Interamericana, Puebla, Cholula, Mexico
- BEHA058T A Novel Way to Determine Sociometrics in the Real World**
Nicole Boucher, 18, Senior,
Natasha Ganesh, 18, Senior,
Hamilton High School, Chandler, Arizona

- BEHA060** **A Novel, Telemedicine Diagnosing and Monitoring Tool for Parkinson's Disease: The Use of Digital Action Unit Biomarkers Generated by Spontaneous and Posed Facial Expressions**
Erin Smith, 18, Junior, Shawnee Mission West High School, Overland Park, Kansas
- BEHA061** **Using a Virtual Environment to Indirectly Measure Racial Bias**
Daniel Fadi Busaba, 18, Senior, Spackenkill High School, Poughkeepsie, New York
- BEHA062T** **"Compassion Fade" and the Limitations of Student Subjects in Social Science Research**
Alexander Karl Sun, 18, Junior,
Emma Sun, 15, Freshman,
Hillcrest High School, Midvale, Utah
The Waterford School, Sandy, Utah
- BEHA063** **The Effects of Growing Up Multilingual on Cognitive Thinking**
Vera Escaja-Heiss, 16, Sophomore, South Burlington High School, South Burlington, Vermont
- BEHA064** **Do Wages Affect Scientific Learning? Evidence from the Programme for International Student Assessment**
Dawson Alexander Verley, 18, Senior, West Valley High School, Fairbanks, Alaska
- BEHA065** **RoboGlove: A Design for Engagement and Hedonic Motivation with Visual-Spatial for Deaf and Hearing Impaired Children, Phase II**
Hiba Muhyi, 18, Senior, Arrowhead Park Early College High School, Las Cruces, New Mexico

Biochemistry

- BCHM001 A Novel Whole-Cell Bacterial Sensor Utilizing the Chemiluminescent Interactions between 3-Aminophthalhydrazide and Metalloproteins**
Sai Aditya Sriram, 19, Senior, Vanguard High School, Ocala, Florida
- BCHM002 Optimizing and Evaluating Signal Peptide Peptidase Crystallization Conditions Using Electron Crystallography**
Ty Price, 17, Junior, Benjamin E. Mays High School, Atlanta, Georgia
- BCHM003 Enzyme Dynamics of Biofilm-Breaking Dispersin B**
Edward Sangyoon Kim, 18, Senior, Midway High School, Waco, Texas
- BCHM004 Investigating the Effects of 2,3-Dihydroxybenzoic Acid Extraction from *Salvinia molesta* as Means for Treatment in Harmful Microorganisms**
Blake Harrison Bathman, 16, Sophomore, Williams High School, Plano, Texas
- BCHM005 The Role of RAD51 Mutation in Cancer Development**
Karina Movsesian, 18, Sophomore, Prvni Ceske Gymnazium v Karlovych Varech, Karlovy Vary, Czech Republic
- BCHM006 Pathogenic Yeast *Candida parapsilosis* and Its Carbonic Anhydrase**
Jan Blaha, 18, Sophomore, Gymnazium a Stredni Odborna Skola Prelouc, Prelouc, Pardubicky Kraj, Czech Republic
- BCHM007T Microbiological Quality in Popular Foods**
Maria Fernanda Suarez Hernandez, 17, Junior, Viviana Guadalupe Cisneros Sumarraga, 18, Junior, Estephani Aylin Cervera Mendez, 18, Junior, Escuela Preparatoria Educacion y Patria, Merida, Yucatan, Mexico
Centro Educativo Antonio Betancourt Perez, Merida, Yucatan, Mexico
- BCHM008 Insights into the Interaction of N-APP with Death Receptor 6 in Inducing Neuronal Apoptosis**
Yingxuan (Jason) Tan, 18, Senior, College Station High School, College Station, Texas
- BCHM009 Is Tiny Mighty? Phase II**
Payton Danielle Scrivner, 17, Junior, Alma High School, Alma, Arkansas
- BCHM010 Utilization of Epigallocatechin Gallate and Serine/Asparagine Compounds as a Natural Therapeutic for Glycosylation-Inhibited Breakdown of the Zika Virus Ectodomain**
Sangita Vasikaran, 16, Sophomore, Jasper High School, Plano, Texas
- BCHM011 The Effect of Monosodium Glutamate on the Degranulation of Lymphocytes in Serum and Red Blood Cells**
Brynna Grier McFarland, 17, Junior, Durant High School, Plant City, Florida
- BCHM012 Aptamer Based Disruption of the CD47-SIRP α Interface for Anticancer Applications**
Pushkar Shinde, 17, Junior, Oregon Episcopal School, Portland, Oregon
- BCHM013 Synthesis of a Fusarochromanone Analog and Its Efficacy in Treating Triple Negative Breast Cancer**
Sunjay Letchuman, 18, Junior, Caddo Parish Magnet High School, Shreveport, Louisiana
- BCHM014 Rooibos Tea (*Aspalathus linearis*): Comparison of Antioxidant Activity between Authentic and Commercial Samples along with Their UHPL Finger Printing in Order to Address the Issue of Adulteration**
Fatima Laraib, 19, Senior, Oxford High School, Oxford, Mississippi
- BCHM015 Neuroprotective Potential of Coconut (*Cocos nucifera*) Leaf Extract using Transgenic *Caenorhabditis elegans***
Maries Ann Ramos Silvestre, 17, Sophomore, Juan R. Liwag Memorial High School, Gapan City, Nueva Ecija, Philippines
- BCHM016 Opening of Hollow Gold Nanoparticle-Liposome Composites Using Normal Human Body Temperature**
David Bruns, 17, Senior, Fisher's of Men Academy, Rosamond, Illinois
- BCHM017 Buffalo vs. Beef: Analyzing Lipid Components in Search of Potential Health Benefits**
Elsie Monique DuBray, 17, Junior, Timber Lake High School, Timber Lake, South Dakota
- BCHM018 A Novel Method to Prevent Digestive Disorders: The Creation of an Enzymatic Catalysis Enhancer for Bromelain from *Ananas comosus* (Pineapple) for the Digestive Function of Casein, Ovalbumin, *Glycine max* (Soy) and *Pisum sativum* (Pea) Proteins**
Christopher Ariel Martinez Tiru, 18, Senior, Specialized Science and Math Secondary School Thomas Armstrong Toro, Ponce, Puerto Rico
- BCHM019 Bioengineering Islet Cells Using 3D-Bio Printing Technology for the Treatment of Type-1 Diabetes**
Vishaal N. Balamurugan, 17, Junior, North Oldham High School, Goshen, Kentucky
- BCHM020 Effect of Nutraceutical Supplements on Beta Amyloid (A β) Nucleation and Growth**
Farhath Sulthana, 18, Senior, Joplin High School, Joplin, Missouri
- BCHM021 LRBA: A Possible Key Player in Cancer Cell Autophagy**
Kristina Marie Kohler, 18, Senior, American Fork High School, American Fork, Utah
- BCHM022 Physical-Chemical Analysis of *Hymenaea courbaril* Flour for the Development of Functional Food in Combating Anemia and Child Malnutrition**
Luis Claudio Lucena Duarte, 17, Junior, Centro de Ensino Nascimento de Morais, Imperatriz, Maranhao, Brazil
- BCHM023 Characterizing Effect of Glutamine Position on A-Beta Fiber Structure, Year II**
Andrea Augustine, 18, Senior, Eagle's Landing High School, McDonough, Georgia
- BCHM024 An Achilles Heel in Oncogenic Ras**
Evan Paul Yamaguchi, 18, Senior, Governor Thomas Johnson High School, Frederick, Maryland
- BCHM025 Behind the Cause: A Novel Role of a Natural Lipid Bilayer in Causing Alzheimer's Disease**
Elise Nicole White, 17, Junior, Binghamton High School, Binghamton, New York
- BCHM026 Role of Alpha-Synuclein (Alpha-syn) in Regulation of Retinal Iron Homeostasis by Promoting Uptake of Transferrin-Bound Iron (Tf-Fe) in Human RPE 47 Cells: Potential for Novel Treatment for Visual Manifestation of Parkinson's Disease (PD)**
Stuti Dalal, 16, Sophomore, Shawnee Mission East, Prairie Village, Kansas
- BCHM027 Biodetoxification of N-nitrosamines by *Symbiotaphrina kochii* and Quantification of N-nitrosamines via Gas Chromatography Mass Chromatography**
Katelynn Ryenne Salmon, 17, Sophomore, Palmer Ridge High School, Monument, Colorado
- BCHM028 Utilization of CRISPR/Cas9 to Knock Down Inflammatory and Angiogenic MicroRNAs in Endothelial Cells**
Julienne Chaqour, 17, Sophomore, High Technology High School, Lincroft, New Jersey

BCHM029T A Novel Iso-Enzyme Based Dot Blot Strip Test for Rapid Detection of Multiple Insecticide Residues

Divya Kranthi#, 17, Junior,
Suhani Sachin Jain#, 17, Junior,
Ambedkar College, Nagpur, India
Taywade College, Nagpur, India

BCHM030 Increasing the Efficiency of a Nasal Epinephrine Delivery System

Alexandra Anne Zelenski, 17, Senior, Burlington Community High School, Burlington, Iowa

BCHM031T Developing a Nanoscale DLD Array Using Immunosignature-Derived Aptamers to Effectively Separate and Analyze Tumor Exosomes

Sachin Jaishankar, 17, Junior,
Somil Jain, 18, Junior,
Hamilton High School, Chandler, Arizona

BCHM032 Treating Hypertension: Using Natural Compounds to Inhibit Angiotensin Converting Enzyme

Brindha Priya Rathinasabapathi, 16, Freshman, Eastside High School, Gainesville, Florida

BCHM033 Characterization and Testing of Compounds Produced by *Aspergillus turcosus* that Target Cancer-Associated Pathways

Niel Mondava, 17, Junior, Hellgate High School, Missoula, Montana

BCHM034 Lingering Heavy Metal and Metalliods in the *Allium cepa* Root Tip and Bulb from the Animas and San Juan Riverbeds, after the 2015 Gold King Mine Spill

Sunny Nez, 18, Senior, Navajo Preparatory School, Farmington, New Mexico

BCHM035 Development of a Simple and Efficient Method for Site-Specific Mutagenesis

Allen Yang Huang, 17, Senior, Oak Grove High School, Hattiesburg, Mississippi

BCHM036T Niacin and Beta-Curcumene from *Ziziphus spina-christi* Are the Most Promising Approaches to Treating Alpha-1 Antitrypsin Deficiency

Abdulah Ahmed AlSolaiman#, 18, Senior,
Saleh Al-Muhaizaa, 18, Senior,
AlShamal Secondary School for Boys, AlShamal, Qatar

BCHM037T Biocompatible Cell Encapsulation by Polyphenol Originated from Plant

Seok Yeong Jung, 18, Senior,
Dae Hun Um, 18, Senior,
Chungnam Science High School, Gongju Si, Chungcheongnamdo, South Korea

Biomedical and Health Sciences

- BMED001 The Effects of Secondhand E-Cigarette Vapor on *Drosophila melanogaster***
Lindsay Sophia Poulos, 17, Junior, Episcopal School of Jacksonville, Jacksonville, Florida
- BMED002 Enhancing Breast Cancer Treatment Efficiency Using Circadian Rhythm**
Julia Beth Hoffman, 17, Junior, Satellite High School, Satellite Beach, Florida
- BMED003T Protein Enriched Soup**
Luciana Victoria Jacquelin, 19, Senior, Emanuel Andres Cortez, 19, Senior, Instituto Provincial de Educacion Tecnica #267 Antonio Graziano, Bell Ville, Cordoba, Argentina
- BMED004 Effect of Physical Activity upon Mitochondrial Trafficking and Degradation in a Rat Model of Parkinson's Disease**
Carolina Eva Padilha, 18, Senior, Colegio Dante Alighieri, Sao Paulo, SP, Brazil
- BMED005 Potential Neuronal Toxicity Associated with Cellular Exposure to Electronic Cigarette Fluids**
Bayley Madison Burns, 17, Junior, Greybull High School, Greybull, Wyoming
- BMED006T Restraining the Zika Virus in Brazil: A New Design and Analysis Method for Drugs through Computational and Biological Approaches**
Myllena Cristyna Braz da Silva, 18, Junior, Gabriel de Moura Martins, 19, Junior, Escola de Ensino Medio Joaquim de Figueiredo Correia, Iracema, Ceara, Brazil
- BMED007T Development of New Generation "Live" Food Products Based On Rational Use of Georgia's Raw Resources**
George Pkhakadze, 18, Senior, Maria Eradze, 18, Senior, Georgian-American School "Progress", Kutaisi, Imereti, Georgia
Niko Nikoladze School, Kutaisi, Imereti, Georgia
- BMED008T Obesity in Adults, Sedentary Lifestyle and Technology**
Valentina Vila, 18, Senior, Antonella Clara Pascual, 18, Senior, Liceo No. 1 "Mario W. Long", Young, Río Negro, Uruguay
- BMED009 The Effects of Amino Acids on Preimplantation Mouse Embryo Development**
Emily Yang, 18, Senior, Kalani High School, Honolulu, Hawaii
- BMED010 The Effect of Boiling Time on the Vitamin C Concentration of Green Bell Peppers**
Amber Cui, 15, Freshman, Cookeville High School, Cookeville, Tennessee
- BMED011 Environmental and Dietary Interventions in the Pathogenesis of Rheumatoid Arthritis**
Aarushi Patil, 16, Sophomore, Cox Mill High School, Concord, North Carolina
- BMED012 Vitamin E Delta-Tocotrienol Targets Cancer Stem Cell Transcription Factors and Inhibits Human Pancreatic Cancer Metastasis**
Sayyada Kazim, 18, Senior, Tampa Bay Technical High School, Tampa, Florida
- BMED013 Searching for Biomarkers of Diabetic Nephropathy Using Proton NMR Metabolomics**
Ally Grace Puckett, 19, Senior, Poyen High School, Poyen, Arkansas
- BMED014 Apoptotic Activity of Diallyl Trisulfide in Cancer Cells**
Sakshi Garg, 15, Freshman, Little Rock Central High School, Little Rock, Arkansas
- BMED015 A Novel Method for Auto-Suturing in Robotic-Assisted Laparoscopic Coronary Artery Bypass Grafting Anastomosis**
Ethan Zvi Levy, 15, Freshman, Dr. Michael M. Krop Senior High School, Miami, Florida
- BMED016T Inhibiting the Growth of CAL-1 Cells with Retinol and Retinoic Acid to Prevent Blastic Natural Killer Cell Lymphoma**
Qingzeng Gao, 17, Junior, Kiara Luyando Harding, 18, Senior, Parkview High School, Lilburn, Georgia
- BMED017 The Difference between Electrolytes from Food and Drink Sources**
Brooke Alexandra Couvillon, 17, Junior, Ovey Comeaux High School, Lafayette, Louisiana
- BMED018 Assessing Epilepsy Medicine by Measuring the Planarian Neural Activity Using Suction Electrode and Patch Clamp Amplifier**
Anna Faye Zheng, 16, Junior, Saint John's Preparatory School, Colledgeville, Minnesota
- BMED019T The Correlation between Cortisol Induced PTSD and Diabetes as Seen in *Rattus norvegicus***
Jose Roberto Ramirez, 19, Senior, Bianca Laren Castro, 18, Senior, Weslaco East High School, Weslaco, Texas
UTRGV Mathematics and Science Academy, Edinburg, Texas
- BMED020T Polymorphisms in LEF-1 and TBX-21 in Association with the Susceptibility of HIV**
Yang Liu, 18, Senior, Gisell Chantilly Loreda, 19, Senior, Northside Health Careers High School, San Antonio, Texas
Health Careers High School, San Antonio, Texas
- BMED021T ACTN3, ACE, PPARD, and Outside Factors Influencing High School Male Athletes' Choice to Pursue a Sport**
Morgan Lee Fisher, 18, Senior, Carly Michele Porter, 18, Senior, Southwest Virginia Governor's School, Pulaski, Virginia
- BMED022 Crucial Role of Telomerase Activity in Mitigation of Chemotherapeutic/Cardiovascular Disease Induced Reactive Oxygen Species Mediated Oxidative Stress and Reconstitution of Microvascular (Endothelial) Function**
Nabeel Jami Quryshi, 17, Junior, University School of Milwaukee, Milwaukee, Wisconsin
- BMED023 Antioxidant Activity of Sesquiterpenic Lactones**
Viviana Esther Justin, 18, Junior, Instituto Fermin Naudeau, Panama, Panama
- BMED024 The Effect of Mutations in the Ligand Binding Pocket on the Function of Ftz F1**
Sumona Udayan Banerjee, 19, Senior, Niles North High School, Skokie, Illinois
- BMED025 Unsupervised Analysis of Gene Expression in Neurological Animal Models Reveals Spatiotemporal Differences between Developing Mouse and Human Brains**
Kevin Hu, 17, Junior, Massachusetts Academy of Math and Science, Worcester, Massachusetts
- BMED026 Toishabui Medicine**
Destany LittleSky Pete, 18, Junior, Owyhee High School, Owyhee, Nevada
- BMED027 The Effects of Bromelain on Coagulated Blood**
Jeremiah David Penick, 17, Junior, Brookville High School, Brookville, Ohio

- BMED028 Identifying Natural Compounds and Genes that Will Protect from UV Radiation**
Aniv Ray, 16, Freshman, Columbus Academy, Gahanna, Ohio
- BMED029 The Regulation of ATF4/CHOP by c-Myc in NSAID-Induced Chemoprevention**
Elizabeth Kuree Huh, 18, Senior, York Suburban Senior High School, York, Pennsylvania
- BMED030 Prevalence of *Plasmodium falciparum* Gametocytes in Asymptomatic Malaria Patients**
Ananya Kalahasti, 18, Senior, Hathaway Brown School, Shaker Heights, Ohio
- BMED031 Protective Effects of Chitosan oligosaccharide on Blue LED Induced Retinal Pigment Epithelial Cell Damage**
Hsiao-Han Huang, 19, Senior, Taipei First Girls High School, Taipei City, Taiwan, Chinese Taipei
- BMED032 The Effect of Exogenous Melatonin on the Memory Retention of Wingless *Drosophila melanogaster***
Jessica Tate Clatterbuck, 18, Senior, Mountain Vista Governor's School, Middletown, Virginia
- BMED033 Hum Your Way to Better Health to Investigate through Research and Experimentation: The Effect of Nasal Breathing and Meditative Humming Techniques on Lung Function**
Caolann Ellen Brady, 18, Senior, St. Wolstan's Community School, Celbridge, Leinster, Ireland
- BMED034 Imbalanced Folate Status Promotes Metabolic Stress, Cancer Stem Cell Phenotype, and Proteomic Signatures of Human Breast Cancer Cells**
Angel Huang, 19, Senior, Taipei American School, Taipei, Chinese Taipei
- BMED035 Cytosine to Thymine: Unveiling Cancer's Achilles Heel via a Genome-wide Discovery of CpG Methylation Signatures**
Daniel Danxu Zhang, 18, Junior, Westview High School, San Diego, California
- BMED036 Innovative Optimization for Malnutrition Treatment**
Garyk Jandl Brix, 16, Sophomore, Winston Churchill High School, Potomac, Maryland
- BMED037 A Novel Application of Microfluidic Assay to Evaluate the Role of Calponin in Platelet Function and Clot Formation**
Neha Seshadri, 17, Junior, Skyline High School, Ann Arbor, Michigan
- BMED038 The Effect of Oleic Acid on Intracellular Calcium through Liposome Formation**
Clairisse Eunhae Whang, 17, Junior, Academy for Medical Science Technology, Hackensack, New Jersey
- BMED039T Evaluating Head Accelerations in Men's Varsity Lacrosse**
David James Friedman, 18, Senior,
Jack Tygard Weitzner, 19, Senior,
Sleepy Hollow High School, Sleepy Hollow, New York
- BMED040 The Effects of Sex and Type 2 Diabetes on Alzheimer's Disease Pathology in Tg6799 Mouse Hippocampi and Cortices**
Sarah Anne Hoffman, 17, Junior, Ossining High School, Ossining, New York
- BMED041 Novel Method of Identifying and Confirming Candidate Genes Causing Resistance to Acute Myeloid Leukemia using CRISPR Cas9**
Megha Nitin Joshi, 16, Sophomore, South Salem High School, Salem, Oregon
- BMED042 Evaluation of the Most Efficient Detergent for Pancreatic Decellularization Aiming at the Development of a Bioartificial Pancreas for Type 1 Diabetes Treatment**
Gabriel Ronatty Tavares Santos, 18, Senior, ETEC Guaracy Silveira, Sao Paulo, SP, Brazil
- BMED043 Blood Types Identification Using Photons**
Zainab Bader Alnakkas, 17, Junior, Bayan High School for Girls, Bayan, Kuwait
- BMED044 Antibiotic Properties of *Moringa oleifera* to Combat Superbugs**
Srijith Nair, 18, Senior, American Heritage School of Boca Delray, Delray Beach, Florida
- BMED045 Smells Like a Solution Autophagy in Chemosensory Neurons Is Essential for Lipid Metabolism Regulated by Insulin-Like Signaling in *Caenorhabditis elegans***
Ray Jia, 17, Junior, Alexander W. Dreyfoos School of the Arts, West Palm Beach, Florida
- BMED046 "Catch a Whiff"**
Autumn Rose Smith, 16, Sophomore, Coral Academy of Science Las Vegas, Henderson, Nevada
- BMED047 Application of Motion Interpolation Algorithms to a Kinect Sensor via Microsoft Visual Studio to Accurately Render At-Home Physical Therapy Exercises: A Low-Cost, Systems-Engineered Approach to Assist Stroke Rehabilitation Patients**
Anjali Maheshwari, 18, Senior, Half Hollow Hills High School West, Dix Hills, New York
- BMED048 Discovery of Highly-Correlated Circadian Oscillations in Oral MicroRNA and Microbiome Levels Using Next Generation Sequencing of Human Saliva: Implications for Human Health and Disease**
Neil K. Khurana, 18, Junior, Fayetteville-Manlius High School, Manlius, New York
- BMED049 Rising Rates of Antibiotic Resistance among in Infants with Urinary Tract Infections**

Priyanka Bonifaz, 19, Senior, Barrington High School, Barrington, Rhode Island
- BMED050 Skin Deep: The Effect of Skin Temperature on Touch Perception**
Christopher Jon De Groot, 19, Senior, Unity Christian High School, Orange City, Iowa
- BMED051 The Relationship between Artificial Sugars and Increased Lipid Levels**

Alexander J. Rodriguez, 18, Senior, Mitchell High School, Mitchell, South Dakota
- BMED052T Artemisia Annua**
Noah Lee Heezen, 17, Sophomore,
Emma Elizabeth Heezen, 18, Senior,
Plankinton High School, Plankinton, South Dakota
- BMED053 The Effect of Antibacterial Toothpaste on the Ecology of Oral Flora**

Matthew Davis Staten, 16, Sophomore, Bonneville High School, Washington Terrace, Utah
- BMED054 Reversing High Glucose Levels through a Novel Approach: *C. elegans* as a Model for Treating Diabetes**
Abraç Nadir Nassar, 18, Junior, Sunnyside Senior High School, Sunnyside, Washington
- BMED055 Ototoxic Drug Levels in Cochlear Tissues: Validating Machine Segmentation of Drug Uptake in Individual Cells Types of the Cochlea in Confocal Images**
Tsering Shola, 16, Sophomore, Camas High School, Camas, Washington
- BMED056T Osteochondral Tidemark Region Synthesis: Application of Siglec-15 Overexpression and Novel Seeded Hydrogel**
Irene Antony, 17, Junior,
Farah Tiffany Rexha, 17, Junior,
Half Hollow Hills High School West, Dix Hills, New York
Jericho High School, Jericho, New York

- BMED057 eX Marks the Spot: A Novel Method in Diagnosing PCa via Exosome Analysis**
Labib-Daiyan Syed, 17, Junior, Centennial Regional High School, Green Field Park, Quebec, Canada
- BMED058T Chair of Hope**
Raghad O. A. Marie, 17, Junior,
Rose A. Y. Barakat, 17, Junior,
Anabta Secondary Girls School, Tulkarem, West Bank, Palestine
- BMED059T Ascitometer Belt**

Ranin A. J. Abahra#, 16, Sophomore,
Nour A. H. Sammoudi, 16, Sophomore,
Al Yamoun Secondary Girls School, Jenin, Palestine
- BMED060 Selective Inhibition of Metastatic Cancer Cell Migration**
Akshat Singh, 16, Sophomore, Century High School, Rochester, Minnesota
- BMED061 Development of Diet-Induced Insulin Resistance in *Drosophila melanogaster* and a Characterization and Comparison of the Anti-Diabetic Effects of Resveratrol and Pterostilbene, Part II**

Arko Somujjwal Dhar, 18, Junior, St. Andrew's Episcopal School, Ridgeland, Mississippi
- BMED062 Hepatic Stellate Cell-Targeting Nanoparticles for Hepatocellular Carcinoma Chemoprevention**
Mohamed Ehab El-Abtah, 18, Senior, Syosset High School, Syosset, New York
- BMED063 Rare Amino Acids Accelerate Cancer Growth**
Nathaniel Chung, 16, Freshman, Berrien County Math and Science Center, Berrien Springs, Michigan
- BMED064 A Patch Clamp Study of TRPM7 Ion Channels: East Indian Sandalwood Oil (EISO) as a Possible Therapeutic Target for Cancer, Year II**

Nia Myfanwy Clements, 17, Junior, Keystone School, San Antonio, Texas
- BMED065 Cell-Based Delivery of Gene-Silencing Products via Gap Junction Channels**
Erika Emily Nemeth, 18, Senior, Smithtown High School East, St. James, New York
- BMED066 Potential Therapeutic Effect of Novel Multivitamins and Minerals Combination for Alzheimer's: *In vitro* and *in vivo* Studies**

Ahmed Aly Sobhy, 18, Senior, Victoria College, Alexandria, Egypt
- BMED067T Omega-3 ALPHA-Linolenic Fatty Acid in Chia Seeds (*Aalvia hispanica L.*) and Its Influence on Human Performances**
Ines Bahlawane, 17, Junior,
Lavinia Marie Kadar, 17, Junior,
Ecole Europeenne Luxembourg II, Bertrange, Luxembourg, Luxembourg
- BMED068 A Scalable, Non-Invasive, and Digital Tool to Quickly Diagnose the Zika Virus by Applying Correlation Analysis, Edge Detection Methods, and K-Means Clustering to Fundus Images**
Arsh Banerjee, 15, Freshman, Bayonne High School, Bayonne, New Jersey
- BMED069 Anti-Skin Cancer Lotion**
Sadia Qadir, 18, Sophomore, Punjab Daanish School for Girls, Hasilpur, Punjab, Pakistan
- BMED070 The Antimicrobial Efficacy of Stainless Steel, Copper and Brass for the Reduction of Nosocomial Illness**
Margaret Anne Williams, 18, Senior, Ancaster High School, Ancaster, Ontario, Canada
- BMED071 Analysis of Electrodermal Activity to Quantify Stress Levels in Autism**
Kayley Noelle Ting, 17, Junior, The Academy for Gifted Children - P.A.C.E., Richmond Hill, Ontario, Canada
- BMED072 Role of Wnt Self-Renewal Pathway in Regulating Tumor Initiating Cells in Breast Cancer**
Omar Bakr Alammari, 17, Senior, Imam Al-Alousi High School, Riyadh, Riyadh, Saudi Arabia
- BMED073 Tacedinaline-Induced Expression of LL37: A Novel Approach to Treating Tuberculosis Infection**

Kira Griffith, 17, Senior, Good Hope Country Day School, Kingshill, St. Croix, United States Virgin Islands
- BMED074 Oncolytic Activity of Engineered Adenovirus Ad-TERT in Glioblastoma Multiforme**

Jooyoung Lee, 18, Senior, West Lafayette Junior/Senior High School, West Lafayette, Indiana
- BMED075 Identification of Remains**
Kennith James Goddard, 20, Senior, Fairview High School, Fairview, Oklahoma
- BMED076 The Effect of Pollutant Bisphenol A on Cancer Cell Proliferation**

Zhiyue Wang, 18, Senior, West Lafayette Junior-Senior High School, West Lafayette, Indiana
- BMED077 Hospitalization in Women with Turner Syndrome**

Isani Singh, 18, Junior, Cherry Creek High School, Greenwood Village, Colorado
- BMED078 The Effect of Wnt/Beta-Catenin Signaling Inhibition on Oral Squamous Cell Carcinoma**

Adam Benjamin Snowden, 19, Senior, Ponte Vedra High School, Ponte Vedra, Florida
- BMED079 Impact the Force: Effects of Insoles on Impact Force for Gymnasts**

William Broomhead, 16, Sophomore, Kenton County Academy of Innovation and Technology, Fort Mitchell, Kentucky
- BMED080 What Sun Protection Products Block Ultraviolet Radiation Best?**
Carlisle McCullough, 16, Sophomore, Savannah Arts Academy, Savannah, Georgia
- BMED081T Study on the Radio-Protection of Curcumin-Encapsulated Nanoliposomes on Human Lymphocytes**
Xuan Quynh Thi Nguyen, 17, Junior,
Tien Thuy Mai, 17, Junior,
Thang Long High School For The Gifted, Da Lat, Lam Dong, Vietnam
- BMED082 Effects of Gut Microbiota on *Drosophila* Models of Parkinson's Disease**
Vivek Vijay Kamarshi, 16, Sophomore, Monta Vista High School, Cupertino, California
- BMED083 Determining the Effect of Parkinson's Disease LRRK2 Mutations on Synaptic Vesicle Recovery**

Roshani Jha, 18, Senior, President Theodore Roosevelt High School, Honolulu, Hawaii

Biomedical Engineering

- ENBM001 The Preparation of PLGA Microspheres with Calcium Alginate Surface Modification**
Keyi Zheng, 16, Sophomore, Hangzhou No.14 High School, Hangzhou, Zhejiang, China
- ENBM002T Sleep Improvement Study with Wearable LED Goggles Based on Citopic Effect**
Yuanheng Zhou, 16, Sophomore,
YuLiang Wang, 17, Sophomore,
High School Affiliated to Fudan University, Shanghai, Shanghai, China
High School Affiliated Shanghai Jiao Tong University,
- ENBM003 Identifying Bacteria with "Fingerprints" Based on Laser Diffraction Patterns**
Katarina Barbara Chapman, 18, Senior, Gymnasium Hochrad, Hamburg, Germany
- ENBM004 Novel Point-of-Care, Non-Invasive Mild Traumatic Brain Injury (mTBI) or Concussion Diagnostic Tool**
Paritosh Suri, 17, Sophomore, Jasper High School, Plano, Texas
- ENBM005 Body Balance Ability Monitor Based on Acceleration Spectrum Analysis**
Zewei Shi, 18, Junior, Beijing No. 4 High School, Beijing, China
- ENBM006T Combo Infusion**
Yuval Feldman, 20, Senior,
Amalia Ben Asher, 19, Senior,
Tal Cohen, 19, Senior,
Ort Psagot, Karmial, Galilee, Israel
- ENBM007T Microsensors Monitoring Devices Regarding the Rehabilitation Process Carried Out After Orthopaedic Surgeries of the Lower Limb**
Miruna Alexandra Ojoga#, 17, Junior,
Ana-Maria Tudorache#, 18, Junior,
International Computer High School of Bucharest, Bucharest, Romania
- ENBM008 Neuro-Computer Interface as a Means of Increasing Efficiency of Mental Activity**
Olga Daniilovna Golovan, 17, Sophomore, Municipal Gymnasium of the City Fryazino, Fryazino, Moscow Region, Russian Federation
- ENBM009 Mechanized Collection of Organic Spider Silk**
Aubrey Anne Berger, 18, Junior, Eaglecrest High School, Centennial, Colorado
- ENBM010 Modeling and Engineering an Electricity Free Nebulizer**
Nicole Veloro Tayag, 17, Junior, Veterans High School, Kathleen, Georgia
- ENBM011 3D Printed Myoelectric Prosthesis without TMR Surgery**
Max Seidel, 16, Sophomore, Riverwood International Charter School, Atlanta, Georgia
- ENBM012 Designing Oral Implants to Dissipate Occlusal Load**
Behram Neville Dossabhoy, 18, Senior, Caddo Parish Magnet High School, Shreveport, Louisiana
- ENBM013 Modeling Neural Disorder via Involuntary Response Simulator**
Bergen Loren Sanderford, 19, Senior, Isidore Newman School, New Orleans, Louisiana
- ENBM014 Inexpensive Glucose Monitoring Device for Diabetics Using Capillary Action of Crosslinked Sensing Fluid, Year II**
Serena Liang Jing, 19, Senior, St. Paul Central High School, St. Paul, Minnesota
- ENBM015 Bioengineering the Lung: Directed Differentiation of Human Pluripotent Stem Cells into Definitive Endoderm on a Lung Extracellular Matrix**
Meghana Iyer, 18, Senior, Edina High School, Edina, Minnesota
- ENBM016 Predicting Mechanical Damage from Glioblastoma Tumor Growth**
Shobha Dasari, 17, Sophomore, Academy of Science and Technology, The Woodlands, Texas
- ENBM017 Utilizing Cardiac and Pulmonary Function with Piezoelectricity to Power a Cardiac Pacemaker, Year III**
Isuru Ashan Somawardana, 18, Senior, Keystone School, San Antonio, Texas
- ENBM018 Chitosan Gelatin Microspheres: Using Fluorescein as an Indicator for the Delivery of Drugs into CEM, HeLa, and HEK 293 Cells**
Deserie Miguel Pagatpatan, 18, Senior, Waipahu High School, Waipahu, Hawaii
- ENBM020T Development of 3D-Printed Electronic Stethoscope and Open-Source Android-Based Platform with Automated Diagnosis of Cardiac Conditions**
Abraham Riedel-Mishaan, 17, Senior,
Ryan Edward Folz, 18, Senior,
Praharshasai Paladugu##, 18, Senior,
duPont Manual High School, Louisville, Kentucky
- ENBM021 A Novel High-Efficiency System for Infant Warming through Secondary Heating Mechanisms**
Swathi Ravi Srinivasan, 18, Senior, Beachwood High School, Beachwood, Ohio
- ENBM023 Development of a Novel 3D Printed 2-Stage Hollow Fiber Filter to Reduce Pain on Injection of a Propofol Emulsion**
Conor Collins, 19, Senior, Monroe Woodbury High School, Central Valley, New York
- ENBM024 Inexpensive and Accurate Test Kit for Zika: Point-of-Care Diagnostics in 10 Minutes with Paper-Based Serological Flow Device**
Hsi-Min Chan, 16, Sophomore, Raffles Girls School (Secondary), Singapore, Singapore
- ENBM025T SmartRate: An Innovation in Automated Early Warning, Detection, and Prevention of Cardiac Death**
Sameer Sundrani, 17, Junior,
Nikhil Sundrani, 16, Sophomore,
University High School, Fresno, California
- ENBM026T Accurate, Low-Cost Diagnosis and Monitoring of Parkinson's Disease by Detecting Dysphonic Features through a Machine-Learning Algorithm**
Parth Saxena, 15, Freshman,
Rishik Kundhur Reddy, 15, Freshman,
Shiladitya Dutta, 15, Freshman,
Amador Valley High School, Pleasanton, California
Foothill High School, Pleasanton, California
- ENBM027 3D Printable Transtibial Prosthetic**
Everett Adien Jeffrey Kroll, 17, Sophomore, Stillwater Area High School, Stillwater, Minnesota
- ENBM028 Mosquito-Inspired Insertion Guide Prevents Flexible Intracortical Microelectrodes from Buckling during Implantation**
Suraj Sai Srinivasan, 17, Junior, Strongsville High School, Strongsville, Ohio
- ENBM029 Formulation of a Bovine Gelatin Crosslinked Scaffold for Potential Human Tissue Applications: Cost-Effective, Patient Specific Alternative Treatment of Acetabular Labral Tears of the Hip**
Sophie Elizabeth Edelstein, 16, Sophomore, Wilbur Cross High School, New Haven, Connecticut
- ENBM030 Year Two: Use of Intestinal Scaffolding as a Pumping Assist Solution to Heart Failure**
Rithvik Seela, 17, Junior, Lake Highland Preparatory School, Orlando, Florida

- ENBM031 Structure of Lys B28 Pro B29 Insulin**
Xingnan Frank Lin, 18, Junior, Hilton Head Preparatory School, Hilton Head Island, South Carolina
- ENBM032T SmartLeg - Smart Transfemoral Prosthesis II**
Leonardo Azzi Martins, 17, Senior,
Luciano Sampaio da Silva, 19, Senior,
Arthur de Freitas e Precht, 18, Senior,
Instituto Federal de Educacao, Ciencia e Tecnologia - IFSUL
Campus Charqueadas, Charqueadas, RS, Brazil
- ENBM033 Diagnosing Tumours Using fNIR Imaging System**
Khaled Saud Alhwaishel, 19, Senior, Kuwait National English School, Hawally, Kuwait
- ENBM034 An Electric Spark Scalpel**
Valeriia Olegovna Lebedeva, 17, Sophomore, Gymnasium #5, Korolyov, Moscow Region, Russian Federation
- ENBM035 High-Dimensional Single-Cell Cytometry Analysis for Understanding Cancer Stemness**
Madeleine Yang, 16, Sophomore, Detroit Country Day School, Beverly Hills, Michigan
- ENBM036 Detecting the Elusive Lyme Disease: Creating a Novel Lateral Flow Test for Detection of *Borrelia burgdorferi* in Ticks**
Luke Daniel Little, 17, Junior, Timber Ridge Scholars Academy, Pacific, Missouri
- ENBM037 Engineering Surface Chemistries to Improve Tissue-Material Integration in Medical Implants**
Vinjai Vale, 17, Junior, Phillips Exeter Academy, Exeter, New Hampshire
- ENBM038T The Influence of Metalized Graphene Oxide/Reduced Graphene Oxide and Sulfonated Polystyrene on Dental Pulp Stem Cell Differentiation and Protein Adsorption**
Rachel Sara Sacks, 18, Senior,
Gila Rachel Schein, 18, Senior,
Hebrew Academy of the Five Towns and Rockaway, Cedarhurst, New York
- ENBM039 Development of a Low Cost Multi-Analyte Microfluidic Device**
Srikrishnan Pillai Raju, 16, Sophomore, Lakeside High School, Evans, Georgia
- ENBM040T Design for an Alternate Wireless Medical Auscultation Device**
Hamza Asif Jamal, 18, Senior,
John Prosper, 19, Senior,
Central High School, Aberdeen, South Dakota
- ENBM041 Analysis of Retinal Fundus Images to Detect Macular Degeneration Using Machine Learning Methods**
Alexander Cheng, 16, Sophomore, Hillcrest High School, Midvale, Utah
- ENBM042 Isolating Motion Patterns in Compromised Human Gait as Proxy for Amputees Wearing Prosthetics**
Michael James Remley, 17, Junior, Northern Utah Academy for Math Engineering and Science, Layton, Utah
- ENBM043T X-Enhance: A New Technology of Color Enhancement for the Visually Impaired**
Sebastian Hernandez-Castro, 18, Senior,
Angelik Laboy-Torres##, 18, Senior,
Escuela Secundaria Especializada en Ciencias, Matematicas y Tecnologia, Caguas, Puerto Rico
- ENBM044 MyHealth: A Novel Wearable Solution for Early Detection and Monitoring of Parkinson's Disease and a Transformation from Subjective to Quantifiable Testing**
Surabhi Gopal Mundada, 18, Senior, Olympia High School, Olympia, Washington
- ENBM045 Synthesized Limpet Snail Teeth: A Novel Inexpensive Nanocomposite for Stronger Bio-Compatible Prosthetics**
Soham P. Dessai, 18, Senior, Academy of Science, Sterling, Virginia
- ENBM046 Investigating Tuned Magneto-Rheological Reservoirs, Compression Systems, and Shear Thickening Fluids to Improve Mean Peak Acceleration as Measured by High-G Accelerometers in Hockey Headgear**
Clara Elizabeth Wagner, 19, Senior, Saginaw Arts and Sciences Academy, Saginaw, Michigan
- ENBM047 A Novel 3-D Engineered Solution for Congenital Microtia of the Ear**
Vidya Mullangi, 17, Junior, Burlington Community High School, Burlington, Iowa
- ENBM048 Prosthetic Replacement Technology Mark 6 (PRT-6)**
Aristomenes Tambakis, 17, Sophomore, QSI Chengdu, Chengdu, Sichuan, China
- ENBM049 Toward Precision Medicine: Designing Injectable, Conductive Graphene-Doped Hydrogels and Robust Computational Models for Post-MI Cardiac Tissue Engineering and Drug Discovery**
Arvind Parasuram Sridhar, 19, Senior, Bellarmine College Preparatory, San Jose, California
- ENBM050 Reach into the Future II**
Joseph Eusebio Cilenti, 18, Senior, South Sumter High School, Bushnell, Florida
- ENBM051T Nanotopographical Control of Dental Pulp Stem Cell Fate Using Phase Segregated PLA/PS Thin Films**
Alice Guanyi Wu, 18, Senior,
Katherine Chen Cao, 18, Senior,
William Hu, 18, Senior,
Half Hollow Hill High School West, Dix Hills, New York
Homestead High School, Mequon, Wisconsin
Saratoga High School, Saratoga, California
- ENBM052 Novel Iron-Regulating Hydrogel for the Treatment of Diseases with Iron Dyshomeostasis**
Marc S. Henein, 18, Senior, College Jean-de-Brebeuf, Montreal, Quebec, Canada
- ENBM053T Improved Detection of Cardiac Troponin I with Reduced Antibodies**
Matthew Lin, 17, Junior,
Chia Chi Chang, 17, Junior,
Shanghai American School Pudong, Shanghai, China
- ENBM054T The Smart Bed to Protect Children from the High Temperature**
Khalifa Khalid Al-Marri, 16, Sophomore,
Ahmed Jamal Eliwa, 17, Junior,
Ahmad Bin Mohammad Secondary School, Doha, Qatar
- ENBM055 A Fully-Integrated and Self-Contained Lab-On-A-Chip Device for Sample Preparation, RNA Amplification, and Detection for Disease Diagnostics**
Benjamin Cheung Liu, 16, Sophomore, Arcadia High School, Arcadia, California
- ENBM056 A Path to Improving Gene Therapies for Liver-Related Diseases and Cancers through Selectable CRISPR-Cas9 Vectors**
Daniel Tang, 18, Senior, West Linn High School, West Linn, Oregon
- ENBM057T Real Time Monitoring of Mechanical Heart Valves**
Dekel Roth, 18, Senior,
Ariel Adar, 18, Senior,
Ort Grinberg Kiryat Tiv'on, Kiryat Tiv'on, Israel

- ENBM058 Diagnosing the Puzzle of Autism: A Wearable Micro-Movement Sensing Cap for Early Pediatric Screening**
Samuel Ferguson, 18, Senior, Christian Unified High School, El Cajon, California
- ENBM059 Hermes Braindeck: A Brain-Computer Interface for Communication with Patients Initially Classified as Comatose or Vegetative**
Luiz Fernando da Silva Borges, 19, Senior, Instituto Federal de Educacao, Ciencia e Tecnologia de Mato Grosso do Sul - Campus Aquidauana, Aquidauana, Mississippi, Brazil
- ENBM060 The Future of Prosthesis: The Design and Production of a Neural Prosthetic Comprised of Ionic Polymer-Metal Composites**
Sydney Victoria McDonald, 18, Senior, Bangor High School, Bangor, Maine
- ENBM061T SticKey Communication Made Easier!**
Connor Ehrgood, 17, Junior,
Emily Suzanne Richard, 18, Junior,
Fort Cherry Jr./Sr. High School, McDonald, Pennsylvania
- ENBM062 The Morris Orthotic: A Smart Orthotic for Diabetic Patients**
Margaret Elizabeth Richey, 17, Junior, Western Albemarle High School, Crozet, Virginia
- ENBM063 Membrane-Based Nanostructured Biosensor to Detect Hemolytic Bacteria**
Camila Moran-Hidalgo, 15, Freshman, Westdale Secondary School, Hamilton, Ontario, Canada
- ENBM064 Manipulating Matter on the Nanoscale: Incorporated Branched Junction Inside a DNA Tensegrity Triangle**
Mutahara Nurit Bhuiyan, 17, Junior, Jericho Senior High School, Jericho, New York
- ENBM065 Engineering and Evaluation of 3D Printed Polymer Scaffolds for Bone Tissue Regeneration**
Nipun Udara Jayatissa, 16, Sophomore, Maumee Valley Country Day School, Toledo, Ohio
- ENBM066 Engineering a Device to Improve Vision via Photoactivation**
Isabelle Louise Chambers, 15, Freshman, Woodhaven Academy, Fargo, North Dakota
- ENBM067 Identifying Limiting Nutrient on Stem Cell Spheroid Viability for Human Cardiac Tissue Regeneration**
Jenny Junru Yao, 17, Junior, Academic Magnet High School, North Charleston, South Carolina
- ENBM068 Refining a Novel Device to Decrease the Risk of Vesicovaginal and Rectovaginal Fistulae during Labor**
Lori Liu Zhang, 17, Junior, High Technology High School, Lincroft, New Jersey
- ENBM069 A Novel Isothermal Microfluidic Device to Detect Salivary MicroRNAs in Breast Cancer**
Lucas Jeffrey Penny, 18, Senior, Grimsby Secondary School, Grimsby, Ontario, Canada
- ENBM070 Efficient Genome Editing of Mammalian Cells via Novel sgRNA Architectures and Cas9 Endonuclease**
Rania Abdullah Alghamdi, 18, Senior, Dhahran Ahliyya Schools, Dhahran, Eastren Province, Saudi Arabia
- ENBM071 Flexible Low-Cost Sensory Patch for Chronic Wheezing Detection**
Abdullah Mohammed Almansour, 18, Junior, Dar Alfikr Schools, Jeddah, Makkah, Saudi Arabia
- ENBM072 Biophysical Validation of Electroporation as a Unique Method of Improving Oral Hygiene and Reducing Systemic Morbidity: Development of a Novel Electroporating Toothbrush (ePrush)**
Hemanth Ojas Asirvatham, 15, Freshman, Century High School, Rochester, Minnesota
- ENBM073 Developing a Cost Effective 3D Printed Hand with Speech Recognition**
Alan Wei Hwang, 18, Senior, Hershey High School, Hershey, Pennsylvania
- ENBM074T A Real-Time Vein Imaging System Using Image Processing Algorithms on Images Obtained from a Standard Smartphone Camera**
FNU Chaitanya, 18, Senior,
FNU Geeve, 18, Senior,
Little Rock Indian School, Brahmavar, Karnataka, India
- ENBM075T Nanopatterned Polystyrene Polymer with Bactericidal and Bacteriostatic Properties against *Salmonella enterica* ATCC 43975 and *Bacillus cereus* ATCC 14579**
Nishant Laxmikant Vekaria, 16, Sophomore,
Mansi Navin Hirani, 15, Sophomore,
Shree Cutchi Leva Patel Samaj School, Nairobi, Nairobi, Kenya
- ENBM076T Smart Sock: The Research of Tenoiresistive Sensors' Operating and Usage in Innovative Technologies**
Daniela Gods-Romanovska, 20, Senior,
Zane Greta Grants, 19, Senior,
Riga's French Lyceum, Riga, Vidzemes Priekspilseta, Latvia
- ENBM077 Alzheimer's Treatment: Solubilized Curcumin via Trans-Buccal Patch**
Kathryn Elizabeth Savage, 16, Sophomore, Sarasota High School, Sarasota, Florida
- ENBM078T Neo-Sole Accelerometer-Based Remote Communications Fall Detection Device**
Jake Evan Brooks, 16, Freshman,
Saurabh Dhaval Shah, 16, Sophomore,
Cherry Hill High School East, Cherry Hill, New Jersey
- ENBM079 Can of-CS and rVAR2 Methods Detect Early Stage Cancer?**
Frederikke Moll Engesgaard, 20, Senior, Norresundby Gymnasium & HF, Norresundby, Nordjylland, Denmark
- ENBM080 Investigation of a Novel Saccade-Based Diagnostic for Rapid Concussion Detection**
Helen Gordan, 19, Senior, Menlo-Atherton High School, Atherton, California
- ENBM081 A Technology Assisted Ketone Detecting Patch for the Noninvasive Detection of Type 1 Diabetes**
Anna Quinlan, 16, Sophomore, Menlo-Atherton High School, Atherton, California
- ENBM082T Cancer Application Using Magnetosomes**
Elena Fengyuan Yuan#, 18, Junior,
Cristian Ionut Costin#, 17, Junior,
International Computer High School of Bucharest, Bucharest, Romania
- ENBM084 Dilatant Insole to Reduce Damage Inflicted by Peripheral Neuropathy**
Emily Reid Tenzer, 17, Sophomore, Roanoke Valley Governor's School, Roanoke, Virginia
- ENBM085 Novel Nanoscale Approach to Combat Disease: Electrically Stimulated Drug Release from Biodegradable PCL Nanofilms**
Rohan Mehrotra, 17, Junior, Lynbrook High School, San Jose, California

Cellular and Molecular Biology

CELL001	Galectin-4 and the Functions of N- and C- Terminal Domains in Innate Immunity Marissa Rose McDonald, 18, Junior, Union Grove High School, McDonough, Georgia	CELL017	<i>Drosophila melanogaster's</i> Mutant Reaction to UV Radiation with a Link to the p53 Gene Katelin Marie Baird, 18, Senior, James Clemens High School, Madison, Alabama
CELL002	Temporal Dissection of Microtubule-Based Motor CENP-E in Mitosis Wuzhekai Zeng, 17, Junior, Hefei No. Eight Senior High School, Hefei, Anhui, China	CELL018	Role of Circular RNAs in <i>Drosophila</i> Innate Immunity Julia Situ, 16, Sophomore, Canyon Crest Academy, San Diego, California
CELL003	Effect of Thymol on Telomerase Systems: A Potential "Catch-All" Cure for Cancer Therapy Eric Yiyang Wang, 18, Senior, Chattahoochee High School, Johns Creek, Georgia	CELL019	Predicting Paths to Prostate Cancer: The Role of Inorganic Arsenic in Estrogen Receptor Mediated Signaling Pathways Anusha Ebrahim, 19, Senior, Whitney M. Young Magnet High School, Chicago, Illinois
CELL004	Optimization of Zinc Oxide Nanoparticles for Vaccine Delivery Hari Sowrirajan, 17, Junior, Cherry Creek High School, Greenwood Village, Colorado	CELL020	Tactile Stimulation of the Tongue Elicits the Activation of TrkC Neurons in the Trigeminal Ganglion Madison Andrea Sneve, 18, Junior, duPont Manual High School, Louisville, Kentucky
CELL005	Can Oxidative Stress Increase Transcriptional Mutagenesis and Aggregate Apha-Synuclein Protein? Jemma Elizabeth Clary, 17, Junior, Caddo Parish Magnet High School, Shreveport, Louisiana	CELL021	Epigenetic and Biotransformation Effects of Hookah Smoke Extract on Human Oral Keratinocytes Anusha Zaman, 16, Sophomore, Baton Rouge Magnet High School, Abton Rouge, Louisiana
CELL006	Controlling Noxa Protein Expression by a Novel Approach to Study Its Function in Leukemic Cells, Phase II Geetanjali Rajamani, 18, Senior, Highland Park Senior High School, Saint Paul, Minnesota	CELL022	The Role of PAG1 and the SFKs in Neuroblastoma Tumor Formation and Invasion # Shelby Auchincloss Kinch, 17, Junior, Hellgate High School, Missoula, Montana
CELL007	Exosomes as Vaccine Candidates for Flavivirus Including Zika Virus Floyd Jensen Rubonal, 18, Senior, Waipahu High School, Waipahu, Hawaii	CELL023	Identification of TBX3 as a Novel Regulator of Lung Angiogenesis Michael Lai, 18, Senior, Jericho Senior High School, Jericho, New York
CELL008	Using Genome Sequencing to Develop a Probiotic within the Turkey Gastrointestinal Tract Joshua Matthew Proehl, 17, Junior, New London-Spicer High School, New London, Minnesota	CELL024	Circumventing Traditional Bottlenecks in Glioma Genetic Therapy: Ultra-pH Sensitive Nanodelivery Vehicles Marc Huo, 17, Junior, Jericho High School, Jericho, New York
CELL009	Exploring the Relationship between the PITX3 Gene and Pituitary as a Site for Neural Regeneration through Blastocyst Complementation of Knockout Brains for the Treatment of Neural Degenerative Diseases Gauri Chitra Binoy, 18, Senior, Wayzata High School, Plymouth, Minnesota	CELL025	Assessing the Efficacy of Pentachloropseudilin as an Inhibitor of Slow Adaptation in Hair Cells Chinmai A. Deo, 18, Junior, Ossining High School, Ossining, New York
CELL010	The Mutagenesis of the PD-L1 Inhibitory Ligand to Identify the Binding Site of the Novel PD-L1/B7-1 Pathway Alyssa Nicole Klee, 17, Junior, Somers High School, Lincolndale, New York	CELL026	The Identification of Candidate NBA1 Interacting Proteins Jeffrey Zhang Ma, 17, Junior, Edgemont High School, Scarsdale, New York
CELL012	The Effects of Glucose on the Behavior and Nervous System of <i>C. elegans</i> Abhishek Shah, 17, Senior, John H. Guyer High School, Denton, Texas	CELL027	Development and Characterization of a Novel Zinc-Finger Construct for Targeted Epigenetic Modification # Jessica Jasing Sun, 18, Senior, Parkway Central High School, Chesterfield, Missouri
CELL013	STITCHER 2.0: Primer Design for Overlapping PCR Applications Isabel Uriagereka Herburger, 18, Senior, School Without Walls High School, Washington, District of Columbia	CELL028	Determining RNA Interference in Mouse Embryonic Stem Cells and Their Differentiated Cells Using a Novel dsRNA-Based Antiviral Assay ## Jason Guo, 18, Senior, Oak Grove High School, Hattiesburg, Mississippi
CELL014	Role of Autophagy on HIV Tat-Induced Intracellular Calcium Release in Murine Astrocytes Amanda Rocio Maytin, 18, Senior, Medical Academy for Science and Technology at Homestead, Homestead, Florida	CELL029	Understanding the Proteins Involved in Regenerative Angiogenesis Riya Palikonda, 18, Senior, The Governor's School for Science and Technology, Hampton, Virginia
CELL015	Development of an Antigen-Detection Diagnostic Assay for Lyme Disease Sophia Tang, 19, Senior, Boston Latin School, Boston, Massachusetts	CELL030	Moving Towards the Cure: Investigating the Effect of cAMP-Dependent Molecular Mechanisms on the Regulation of MAPT Gene Expression and the Formation of Neurofibrillary Tangles to Identify Drug Targets for Alzheimer's Disease ### Jay Chandar, 18, Senior, Canterbury School, Fort Myers, Florida
CELL016	Autism and Genetics: Understanding the Role of AUTS2 in the Pathology of Autism Spectrum Disorder Katherine Anne Miles, 18, Senior, Sleepy Hollow High School, Sleepy Hollow, New York	CELL031	Characterization of Platelet Endocytosis and Its Role in Immunity Thirushan Wignakumar, 17, Senior, Paul Laurence Dunbar High School, Lexington, Kentucky

CELL032	Division or Inhibition? The Effect of Antioxidants on Cell Division and Differentiation Gayathri Plakkot, 17, Junior, Huntingtown High School, Huntingtown, Maryland	CELL047	The Effects of Western Diet on Sarco/Endoplasmic Reticulum Ca²⁺-ATPase Expression and Calcium Dysregulation in the Brain Sarah Shirley, 16, Sophomore, Little Rock Central High School, Little Rock, Arkansas
CELL033	A Novel Approach to Understanding Cancer: The Effects of Antitumor Agents in P53 Gene Expression on the Early Development of Zebrafish Embryos Ashlynn Anne Gallagher, 18, Junior, W.F. West High School, Chehalis, Washington	CELL048	Lecithin-Retinol Acyl Transferase in Squamous Cell Carcinoma: The Relationship between Oncology and Wound Repair Emily Ann Peterson, 18, Senior, Smithtown High School East, St. James, New York
CELL034	The Synergistic Effect of Imatinib and Allicin: A Potential Therapeutic for BCR-ABL1-positive Leukemia # Jamie Lim, 17, Junior, Murphy High School, Mobile, Alabama	CELL049	An Investigation into Caffeine as a Migraine Treatment and Its Effects on the Severity of Spreading Depolarizations # Rusty Warren Ludwigsen, 17, Sophomore, The Early College Academy, Albuquerque, New Mexico
CELL035	Dimerization Domain of SSRP1 as a Dominant Negative FACT Inhibitor Thierry Juang, 17, Junior, City Honors School, Buffalo, New York	CELL050	Retain CHD7, an Epigenetic Regulator, in the Nucleus to Combat Breast Cancer Metastasis # Kenneth Jiao, 17, Junior, Indian Springs School, Pelham, Alabama
CELL036	A Novel Systemic Approach to Cardiometabolic Disease with Dual Therapeutics # Marissa Sumathipala, 17, Junior, Broad Run High School, Ashburn, Virginia	CELL051	The Effect of Tocotrienol on Apoptosis Nadley Aisuan, 17, Junior, Rialto High School, Rialto, California
CELL037T	Proliferation of Natural Killer Cells and the Anti-Inflammatory Cytokine Interleukin-4 in a Model of Infantile Spasms Lior Raz-Farley, 18, Senior, Michelle Zhang, 18, Senior, Ossining High School, Ossining, New York	CELL052	Alternative Splice Variant Expression of MCIDAS Does Not Induce Ciliated Cell Differentiation Saagar Jain, 18, Junior, Pine Crest School, Fort Lauderdale, Florida
CELL038	HuR Spatial Localization Is Affected by p38 MAPK Phosphorylation upon T-Cell Activation Rocio del Mar Aviles Mercado, 18, Senior, Pablo Colon Berdecia, Barranquitas, Puerto Rico	CELL053	A Morphokinetic and Machine Learning Model for Aneuploidy Screening of Human Preimplantation Embryos Davey Hideo Huang, 18, Junior, Iolani School, Honolulu, Hawaii
CELL039	Determining the Presence of Genetically Modified Organisms in Our Daily Foods Paulina Minguela Torres, 16, Sophomore, Liceo Aguadillano, Aguadilla, Puerto Rico	CELL054	Fixing Oxidative Damage: The Effect of Antioxidants on Telomere Length Nicole Ashley Tanenbaum, 18, Senior, Taunton High School, Taunton, Massachusetts
CELL040	Impact of Substance Use on Salivary Cytokine Levels in Healthy Female Individuals Miranda Li, 17, Junior, Crescenta Valley High School, La Crescenta, California	CELL055	Influence of Sub-Cellular Protein Localization on Cellular Growth Rate Arjun Raghav Somayazulu, 17, Junior, Westview High School, Portland, Oregon
CELL041	Alpha-Synuclein Oligomers and Mitochondrial Membrane Permeabilization: A Potential Cytotoxic Mechanism in Parkinson's Disease Bowen Jing, 18, Junior, West Lafayette Junior-Senior High School, West Lafayette, Indiana	CELL056	Using Commercial Oxygen MicroSensors to Measure Oxygen Consumption in Cell Cultures Clinton Smith, 17, Junior, The BEST Academy at Benjamin S. Carson, Atlanta, Georgia
CELL042	The Effect of Mechanical Compression on Cancer Cell Proliferation Katharine Tang Shao, 17, Junior, Detroit Country Day School, Beverly Hills, Michigan	CELL057	Detecting Dust and Dander Allergens in IgE Sensitized Individuals Using a Capillary Tube Precipitation Test: A New Non-Intrusive Antigen/Antibody Reaction Test Audrey Jules Bakerson, 15, Freshman, Berrien County Mathematics and Science Center, Berrien Springs, Michigan
CELL043T	Modeling and Experimental Characterization of IgE Receptor Signaling, Year Two # Alexander Latchesarov Ionkov#, 18, Junior, # Priyanka V. Velappan#, 18, Junior, Los Alamos High School, Los Alamos, New Mexico	CELL058	Testing the Geometrical and Chemical Structure of Methylbutenol Synthase: Finding a New Method for Rubber Production Zaid Haque, 17, Junior, Saginaw Arts and Sciences Academy, Saginaw, Michigan
CELL044	Elucidating the Roles of the REST C-Terminus and CoREST1 in Zebrafish Neural Development and Behavior Karen Jiang, 18, Senior, Horace Mann School, Bronx, New York	CELL059	Differentiation of Pluripotent Stem Cells into Pancreatic Progenitors # Sara Mohammed Alkabbji, 17, Junior, Qatar Banking Studies and BA High School for Girls, Doha, Qatar
CELL045T	Site-Specific Integration of Large DNA Fragments: Evaluating and Redesigning Genome Editing Systems # Kshitij Sachan#, 17, Junior, # Yesh Satyajit Doctor#, 17, Junior, Plano East Senior High School, Plano, Texas		
CELL046	Neurotrophin Receptor Isoform Expression Analysis in Breast Invasive Carcinoma: Potential Considerations for Targeted Therapy and Precision Medicine Vaishnavi Phadnis, 17, Junior, Nikola Tesla STEM High School, Redmond, Washington		

Chemistry

- CHEM001T Red as Blood: Development of a Low-Temperature Synthesis for Alpha-Aluminium Oxide-Based Gemstones**
Friedrich Wanierke, 19, Senior,
Christian Scharf, 20, Senior,
Paul Rathke, 20, Senior,
Albert-Schweitzer-Gymnasium, Erfurt, Thuringia, Germany
- CHEM002 Controllable Synthesis and Electro-catalytic Performance of the Anodic Catalysts for the Electro-oxidation of Methanol**
Tie Wang, 17, Junior, Experimental School of Beihang University, Beijing, China
- CHEM003T Formulation of a Coating for Tablets Based on Carboxymethylcellulose of *Opuntia spp.***
Maria Guadalupe Blancas Najera, 17, Freshman,
Ivan Emmanuel Cordova Rivera, 18, Junior,
Vianney Zulem Fernandez Valencia, 18, Junior,
Escuela Preparatoria Oficial Numero 19, San Martin de las Piramides, Edo. Mexico, Mexico
- CHEM004T Caffeine Termiticide: Caffeine as a Novel and Eco-friendly Termiticide**
Xian Jing Koay, 17, Junior,
Zhan Yi Chng, 17, Junior,
Chung Ling High School, Kampung Baru, Penang, Malaysia
- CHEM005 Tuning Carbon Dioxide Capture Behavior via Ion Exchange in Porous Organic Polymers**
Clarice Su, 19, Senior, C. Leon King High School, Tampa, Florida
- CHEM006T Utilization of Carbon Monoxide as a Reducing Agent for C-C and C-N Bond Formation: Application to Asymmetric Catalyst and Synthesis of New Effective Fungicide**
Alexandra Samoylova, 18, Junior,
Maria Makarova, 18, Junior,
Moscow Chemical Lyceum of Moscow South-Eastern Lyceum and Grammar School Complex, Moscow, Moscow, Russian Federation
- CHEM007 Doped Perovskites for Catalyzing Urea Oxidation**
Brian Ling Ho, 19, Senior, Plano West Senior High School, Plano, Texas
- CHEM008 Chlorophyll Cysteine Co-catalyzed Biodegradable Poly (Methyl 2-methylpropenoate)**
Yuk Chun Cheng, 18, Senior, King's College, Hong Kong, China, Hong Kong Special Administrative Region
- CHEM009 How to Stop the "Walking" Protein?**
Darina Gennadievna Vekhova, 18, Junior, Municipal School #41 "Harmony", Samara, Samara, Russian Federation
- CHEM010 Copper Oxide Nanoparticles for Adsorption of Phosphate in a Novel Gel-loaded Delivery System**
Kunal Upadya, 18, Senior, Vanguard High School, Ocala, Florida
- CHEM011 Starbucks: The New BP**
Siddharth S. Ananthan, 18, Senior, Sebring High School, Sebring, Florida
- CHEM012 An Analysis of Bisphenol-A, Bisphenol-S, Bisphenol-F in BPA-Free versus Ordinary Plastic Containers Using Gas Chromatography Mass Spectrometry**
Anna Kucera, 17, Junior, Canterbury School, Fort Myers, Florida
- CHEM013 A Novel Approach to Minimize Road Salt Contamination in Both Terrestrial and Aquatic Ecosystems**
Alyssa Marie Compton, 19, Senior, Loyola High School, Mankato, Minnesota
- CHEM014 Development of a Rapid, Reusable Sensing Mechanism for the Selective Identification of Heavy Metal Contaminants in Water: An Implementation of Functionalized Isotropic Silver Nanoparticles for Toxic Ion Detection**
Abhishek Mohan, 18, Junior, Texas Academy of Mathematics and Science, Denton, Texas
- CHEM015 A Pill's Perilous Pathway**
Roshni Sen, 18, Senior, Academy of Science and Technology, The Woodlands, Texas
- CHEM016 Unexpected Photochemical Transformations of Dithienylacetylenes**
Nikita Milevskii, 18, Junior, Moscow Chemical Lyceum of Moscow South-Eastern Lyceum and Grammar School Complex, Moscow, Russian Federation
- CHEM017 Investigating New Methods of Noninvasive Glucose Monitoring**
Sreten Dedic, 17, Junior, James W. Mitchell High School, New Port Richey, Florida
- CHEM018 Conductivity of Doped Polypyrrole Films Synthesized by Electropolymerization**
Vijay M. Shah, 19, Senior, Niles West High School, Skokie, Illinois
- CHEM019 A Study of the Effects of *Vibrio fischeri* on Atmospheric Carbon Dioxide Consumption**
Emily G. Mouser, 18, Senior, Dexter Senior High School, Dexter, Missouri
- CHEM020T High Efficiency TADF-based Transparent OLEDs**
Yun-Ching Wu, 17, Junior,
Yi-Chen Chen, 18, Junior,
Taipei First Girls High School, Taipei City, Taiwan, Chinese Taipei
- CHEM021 Cohesiveness of the Oscillating B-Z Reaction**
Olivia Gottlieb, 16, Sophomore, Dr. Michael M. Krop Senior High School, Miami, Florida
- CHEM022 Novel Column Designs for Improved Bioseparation of Complex Molecules using Counter Current Chromatography**

Dhweeja Dasarathy, 18, Senior, Hawken School, Gates Mills, Ohio
- CHEM023T Leading the Environment with Less Lead, Nano-Structured Jordanian Kaolinite for the Removal of Lead from Industrial Waste Water**
Ayah Hayel Shehadeh, 17, Junior,
Bayan Osama Abu Alragheb, 17, Junior,
Al-Hasaad Al-Tarbawi School, Amman, Jordan
- CHEM024T Semiconductor Cells for Photocatalytic Decomposition of Industrial Dyes under Visible Light**
Nichakorn Kheawkham, 19, Senior,
Preeyaporn Kande, 19, Senior,
Pimpayom Sudcharean, 18, Senior,
Princess Chulabhorn Science High School Pathumthani, Bo-Ngoen, Pathumthani, Thailand
- CHEM025 A Very Tense Subject**
Alex Hamilton Scharein, 15, Freshman, Rural Special High School, Fox, Arkansas
- CHEM026 Improving Photoelectrochemical Decomposition of Water Using Earth Abundant Metal Oxide Catalysts**
Jake Bringetto, 15, Freshman, Clovis West, Fresno, California
- CHEM027T A Novel Zwitterionic Superparamagnetic Iron Oxide Nanoparticle Synthesis**

Marlies Raskin Michielssen#, 18, Senior,
Shrikant Chand#, 17, Junior,
Washtenaw International High School, Ypsilanti, Michigan
Detroit Country Day School, Beverly Hills, Michigan
- CHEM028 Characterizing a Cu/Mn Alloy for Extracting Oxygen from Inert Gas Streams**
Grace Ann Lenhard, 18, Senior, Prattsburgh Central School, Prattsburgh, New York
- CHEM029 Controlling the Photocatalytic Activity of Hybrid Thin Films of Titanium Ethylene Glycol (Ti-EG) by Modifying the Thermal Annealing Conditions**
Hadar Rahav, 18, Senior, The Israel Arts and Sciences Academy (IASA), Jerusalem, Israel

- CHEM030T Saponin Anti Larvae Treatment (S.A.L.T)**
Raul Ram Vimal Kumar, 16, Sophomore,
Norman Sim, 16, Sophomore,
Penang Free School, Penang, Georgetown, Malaysia
- CHEM031 Sweet Strength: The Retarder of Cement**
Paris Charles Reuel, 17, Junior, V. Sue Cleveland High School,
Rio Rancho, New Mexico
- CHEM032 Spin-Orbit Coupling Induced Heterogeneous Excited-State Dynamics of 6-Coordinate Transition Metal Protodyes**
Archana Verma, 18, Senior, Jericho High School, Jericho,
New York
- CHEM033 Gold Nanoparticles as a Colorimetric Sensor for *Escherichia coli***
Aparna Paul, 18, Senior, Elizabethtown Area High School,
Elizabethtown, Pennsylvania
- CHEM034 Comparing Ethanol Yield from *Saccharomyces cerevisiae* in Healthy and Decaying Starch and Sugar Solutions**
Jake Henry Flakus, 18, Senior, Central High School, Aberdeen,
South Dakota
- CHEM035 The Effect of Natural Antioxidants on Reducing Oxidation**
Mizuho Obayashi, 18, Senior, Ogden Senior High School,
Ogden, Utah
- CHEM036 Detection of Nitroaromatic Pollutant Using Nanoparticle Sensor**
Yusuf Khan, 16, Sophomore, Benton High School, Benton,
Arkansas
- CHEM037 An "Organic" Organic Project: The Design of a Sustainable, Cost-Efficient, Multistep Project Beginning with the Teaberry Plant Utilizing the Fundamental Techniques of Organic Chemistry to Synthesize Aspirin**
Jessica Marie Frost, 18, Senior, Surry Early College High School
of Design, Dobson, North Carolina
- CHEM038 Toxic Residues and Unsuspecting Clients: Developing a Test Kit for Identifying Illicit Laboratory Wastes**
Rebecca Parham, 18, Senior, Arkansas School for Mathematics,
Sciences and the Arts, Hot Springs, Arkansas
- CHEM039T Carbon Dioxide Dry Reforming Over Novel Pt Catalyst Created Using Unconventional Fabrication Method**
Michelle A. Gan, 17, Junior,
Sahil Gupta, 18, Senior,
William G. Enloe High School, Raleigh, North Carolina
North Carolina School of Science and Mathematics, Durham,
North Carolina
- CHEM040T Biosynthesis of Metallic Nanoparticles with the Use of Extract from Macroalgae *Osmundaria obtusiloba***
Veronica Lacourt-Otero, 17, Junior,
Sophia Del Mar Rosa-Duran, 16, Junior,
Colegio Nuestra Senora de la Piedad, Carolina, Puerto Rico
- CHEM041 Use of a Polymer Derived from *Citrus sinensis* Peel to Remove Heavy Metals Dissolved in Water such as Hexavalent Chromium**
Marisabel Colon, 18, Senior, Specialized School of Science and
Mathematics Genaro Cautino Vazquez, Guayama, Puerto Rico
- CHEM042 Solution Grown and Tunable Plastic Magnets: Room Temperature Ferromagnetism in Mesoscopic Conjugated Polymer Rings**
Arnob Das, 18, Junior, Jesuit High School, Portland, Oregon
- CHEM043 Predicting the Efficiency of Chaotic Mixing of Granular Pharmaceutical Materials Using Image Processing**
Labanya Mukhopadhyay, 17, Junior, Evergreen Valley High
School, San Jose, California
- CHEM044 Water Spherification: Making Water Transportation and Consumption More Efficient for Astronauts While in Space**
Faith Marie King, 19, Senior, Joel E. Ferris High School, Spokane,
Washington
- CHEM045T Curcumin: Molecule which Captures Heavy Metals**
Gloria Cascio, 19, Senior,
Elena Sparaciar, 19, Senior,
Romina Paolucci, 19, Senior,
Istituto Istruzione Superiore Galileo Galilei, Jesi, Ancona, Italy
- CHEM046T Banana Peel: The Water Cleaner**
Ana Lucia Ferreira da Silva, 19, Senior,
Gustavo Rafael Rito Carvalho, 19, Senior,
Joana Amendoeira Cabaco, 19, Senior,
Azambuja High School, Azambuja, Ribatejo, Portugal
Escola Sencundária de Azambuja, Azambuja, Ribatejo, Portugal
- CHEM047 Development of an Algorithm to Filter and Assign Signals in Protein NMR Spectroscopy to Accelerate Drug Discovery**
Suganth Kannan, 18, Senior, American Heritage School,
Plantation, Florida
- CHEM048T Zerumbone Derivatives: New Candidates for Cancer Treatment**
Mai Phuong Do, 17, Junior,
Quan Do Minh Bui, 18, Senior,
Tran Phu Gifted High School, Hai Phong City, Viet Nam
- CHEM049T Design, Synthesis and Bioevaluation of Novel Hydroxamic Acids Incorporating 2-Oxoindoline Moiety as Histone Deacetylase Inhibitors and Anticancer Agents**
Khue Dan Tran, 17, Junior,
Nam Anh Thi Vu, 17, Junior,
High School for Gifted Students, Hanoi University of Science,
Hanoi, Viet Nam
- CHEM050 A New & Low Cost Technology of Electrochemical & Bionic Sensors**
Arqam Ali Khan, 17, Junior, Islamabad Model College for Boys,
G-10/4, Islamabad, Capital Territory, Pakistan
- CHEM051T Organic Dyes Based on [1,2,5] chalcogenadiazolo [3,4-c] pyridine: New Effective Materials for Solar Cells**
German Chkhetiani, 18, Junior,
Olga Ustimenko, 18, Junior,
Moscow South-Eastern Lyceum and Grammar School Complex,
Moscow, Russian Federation
- CHEM052 New Route to Benzoxazoles Based on Annulation Induced Transformations of 1,2,3-triazoles**
Uliana Dmitrievna Moskalenko, 17, Junior, Moscow South-
Eastern Lyceum and Grammar School Complex, Moscow,
Russian Federation
- CHEM053 Starch-Based Bioplastic as Optical Indicator for Ammonia in Processed Meat**
Stasa Gejo, 20, Senior, Il. Gimnazija Maribor, Maribor, Stajerska,
Slovenia
- CHEM054 Infrared Spectroscopic Analysis of Spin Induced Thermochromism in $[\text{Fe}(\text{NH}_2\text{trz})_3]\text{Br}_2 \cdot 2\text{H}_2\text{O}$**
Lukas Karl Gunnar Aniansson, 19, Senior, Katedralskolan, Vaxjo,
Kronoberg, Sweden
- CHEM055 Optimization of Temperature Conditions for Pristine Graphene Synthesis**
Govind Krishna, 17, Junior, duPont Manual HighSchool,
Louisville, Kentucky
- CHEM056 Shielding versus Not Shielding: Protecting Organic Solar Cells from UV Degradation**
Herbert Dillian Fountain, 17, Sophomore, West Canada Valley
Central High School, Newport, New York

- CHEM057 Effects of Sulfate Attack on Local Atomic Structure of Alkali-Activated Slag Cement**
Maya Ravichandran, 17, Senior, High Technology High School, Lincroft, New Jersey
- CHEM058 Silk Torsional Actuators: Automatic Moisture-Activated Emergency Locator for Aircraft Life Vests**
Joycelyn Yiu, 19, Senior, Plano Senior High School, Plano, Texas
- CHEM059T Photocatalytic Ceramic Paint to Purify Air**
Jesus Alfonso Martinez Aranda, 18, Junior,
Fernando Miguel Sanchez Villalobos, 18, Junior,
Jose Manuel Elizalde Esparza, 18, Junior,
Preparatoria 16, San Nicolas de los Garza, Nuevo Leon, Mexico
- CHEM060T The Design of Paper Based Colorimetric and Fluorescence Carbon Dioxide Sensors Adaptable to the Monitoring Process of Endotracheal Intubation**
Elif Doga Ulugol, 18, Senior,
Burcu Ozer, 18, Senior,
Ted Ankara College Foundation Private High School, Ankara, Golbasi, Turkey
- CHEM061 "Surface-Migrating" Additives to Improve Stain Resistance of Coatings**
Kairav Bhat Kukkala, 17, Junior, Ballard High School, Louisville, Kentucky
- CHEM062 Discovery and Characterization of an Undocumented Ferric Sulfate Compound Formed by the Reaction of Gold Ore with Sulfuric Acid**
Kyle Oskar Fridberg, 17, Junior, Fairview High School, Boulder, Colorado
- CHEM063 Improving Nitration Activity of Fused TxtE-CYP102AI Reductase Domain by Optimizing the Linker Length**
Padmavathi Reddy, 17, Senior, American Heritage School, Plantation, Florida
- CHEM064 Phosphorus Partitioning and Recovery from Riverbed Sediment Obtained from a Eutrophic Watershed in Southwest, MI**
Savannah Grace McDowell, 18, Senior, Kalamazoo Area Mathematics and Science Center, Kalamazoo, Michigan
- CHEM065T Single and Two-Photon DNA-Based Fluorescence Sensors for Pb²⁺ and Hg²⁺**
Nathaniel Goenawan, 17, Junior,
Liya Jiang Jin, 17, Junior,
Kalamazoo Area Mathematics and Science Center, Kalamazoo, Michigan
- CHEM066 Sustainable Graphene Oxide Support for Ruthenium Catalyst to Improve the Efficiency of the Hydrodesulfurization of Thiophenes**
Abdulaziz Yahya Alshahrani, 18, Junior, The First High School in Abha, Abha, Aseer, Saudi Arabia
- CHEM067 Chelation: Is Color the Proof?**
Grace Lauren Ericson, 18, Senior, Morgan High School, Morgan, Utah
- CHEM068 Search for New Chromophore Pairs for Triplet-Triplet Annihilation Upconversion**
Sumar Beauti, 18, Senior, Oak Grove High School, Hattiesburg, Mississippi
- CHEM069 Novel Experimentation in the Household Detection of Alpha and Beta Rays**
Xander Owen Jones, 16, Sophomore, Navajo Preparatory School, Farmington, New Mexico
- CHEM070T Green Synthesis of Biological Magnetic Eggshell Nanocomposite and Investigation of Its Magnetic Properties**
Tavga Badrkhan Ezzat, 17, Sophomore,
Mardin Majroom Dino, 17, Sophomore,
Soran Ishik High School, Soran, Iraq
- CHEM071T Extraction of Lanthanides from Electronic Waste Using Zeolite Prepared from Low Coast Precursors**
Ahmed Ateeq Alqemzi, 16, Sophomore,
Saeed Yousef Almeqbaali, 15, Sophomore,
Sweiha School, Al Ain, United Arab Emirates
- CHEM072T Chemical Fog Dispersion Technique**
Abdulla Obaid Alsuwaidi, 18, Senior,
Abdulla Arif Almheiri, 16, Senior,
Al Ittihad Private School - Al Mamzar, Dubai, United Arab Emirates
- CHEM073 Synthesis of Iron Oxide Nanorods**
Andrea Lynn Noronha, 17, Senior, Redlands High School, Redlands, California

Computational Biology and Bioinformatics

- CBIO001** **Mathematical Analysis of Melanocyte Patterns on *Danio rerio***
Frances Carol Slater, 18, Junior, Cloquet Senior High School, Cloquet, Minnesota
- CBIO002** **Detection of Premalignant Pancreatic Cancer via Computational Analysis of Serum Proteomic Profiles**
Shobhita Saroja Sundaram, 17, Junior, Greenwich High School, Greenwich, Connecticut
- CBIO003** **Seizure Prediction Using Spectral Density Analysis on Pediatric EEGs**
Maanasi Garg, 17, Junior, Stanton College Preparatory School, Jacksonville, Florida
- CBIO004** **A Combined Analytical and Computational Approach to Multiscale Modeling of Temperature Effects on Neural Dynamics**
Dominik Stanislaw Kufel, 19, Senior, S. Staszic High School No. 1, Lublin, Lubelskie, Poland
- CBIO005T** **Recognition of Anxiety Levels from the Analysis of Skin's Galvanic Response**
Alex Rodrigo Palacin La Torre, 15, Freshman, Alfred Addison Chillitupa Quispianca, 15, Freshman, Colegio de Alto Rendimiento de Arequipa, Arequipa, Peru
- CBIO006** **Data Analysis of the Epigenetics of Drug and Alcohol Dependence**
Nkima J. Stephenson, 18, Senior, Rockdale Magnet School for Science and Technology, Conyers, Georgia
- CBIO007T** **Development of a Software Tool for Protein-Protein Complex Prediction**
Daniil Reutskiy, 18, Junior, Aleksandr Ukhatov, 18, Junior, St. Petersburg Academic Lyceum "Physical-Technical High School", St. Petersburg, Russian Federation
- CBIO008** **A Non-Invasive Diagnosis Method for Eye Cancers Using Machine Learning Algorithms**
Suraj Modi, 16, Sophomore, Mountain View High School, Lawrenceville, Georgia
- CBIO009** **Window to the Brain: Using Retinal Biomarkers to Predict Progression of Alzheimer's and Parkinson's Diseases**
Archana Bhagyalakshmi Murali, 18, Senior, Breck School, Golden Valley, Minnesota
- CBIO010** **A Novel Pan-Cancer Approach to Quantify Tumor Mutational Burden and Clinical Data Predictors for Immunotherapy Response towards Personalized Medicine**
Aditya Jain, 17, Senior, Westview High School, Portland, Oregon
- CBIO011** **Advancing Microarray Technology: Efficient Design of Sequence Libraries Covering All k-mers with Degenerate Characters to Improve Interaction Measurement**
Ryan Ki-Hoon Kim, 17, Senior, Fayetteville High School, Fayetteville, Arkansas
- CBIO012** **Investigating the Role of Pseudogenes as the Source of Conserved Non-coding Elements in the Human Genome**
Joyce Muhan Liu, 18, Junior, Sentinel High School, Missoula, Montana
- CBIO013** **Developing Novel Gene Candidates (MEF2A, LTA, LGALS2, ALOX5AP, and PDE4D), through an Adaptive Genetic Algorithm, Support Vector Cluster, and Dynamic Bayesian Networks, to Analyze in a Learning Classifier System for a Highly Propitious CRISPR Therapy for Ischemic Heart Disease**
Anmol Warman, 17, Junior, Academy at the Lakes, Land O' Lakes, Florida
- CBIO014** **The Application of Machine Learning Algorithms on EEG Data to Predict and Detect Epileptic Seizures**
Neha Halkund, 17, Junior, Tesla STEM High School, Redmond, Washington
- CBIO015** **Unbiased Computational Estimation of Huntington's Disease Mutation Frequency and Repeat Instability**
Jiwoo Lee, 18, Senior, Academy for Medical Science Technology, Hackensack, New Jersey
- CBIO016** **An Immunologic Basis for the Pathogenesis of Autism Spectrum Disorder: Toll-like Receptor Mechanisms and Downstream Processes**
Kiruthika Devasenapathy, 18, Senior, West Windsor Plainsboro High School North, Plainsboro, New Jersey
- CBIO017T** **Computational Modeling of the Epidemiological Spread of Diseases Caused by *Aedes aegypti***
Amanda Ozava Fernandes, 18, Junior, Marcella Linhares Menezes, 19, Junior, Livia de Oliveira Rodrigues, 18, Junior, Centro Federal de Educacao Tecnologica de Minas Gerais - Campus Leopoldina, Leopoldina, MG, Brazil
- CBIO018** **Biological Networks and the Relation between Mitochondrial Genes and Functions with the Obsessive-Compulsive Disorder**
Giovanna Lemos Ribeiro, 18, Senior, Colegio Pentagono, Sao Paulo, SP, Brazil
- CBIO019T** **Novel Mathematical Approach to Aid in the Design of an Alert System for an Ongoing Focal Seizure**
Omar Alejandro Santiago-Reyes#, 17, Junior, Gustavo Xavier Santiago-Reyes#, 17, Junior, Escuela Secundaria Especializada en Ciencias, Matemáticas y Tecnología, Caguas, Puerto Rico
- CBIO020** **A Computational Model of CRISPR/dCas9 Genetic Circuits: Towards Programmable Gene Therapy**
Shaan Ram Bhandarkar, 16, Sophomore, Phillips Exeter Academy, Exeter, New Hampshire
- CBIO021** **Computational Analysis of Intron Retention Events in Alternatively Spliced mRNA**
Raymond Minor Huffman, 18, Senior, Manhasset High School, Manhasset, New York
- CBIO022** **A Novel Approach to Solve Target Mutation-Induced Drug Resistance for HIV-1 Fusion Inhibitors with the Hopfield Neural Network**
Michelle Chushan Xu, 17, Junior, Arnold O. Beckman High School, Irvine, California
- CBIO023** **Leaf Me to Die**
Marianne Nicole Beaulieu, 16, Sophomore, Great Mills High School, Great Mills, Maryland
- CBIO024** **Overcoming Lung Cancer with Novel Supervised Learning Algorithms for Drug Screening and Antibody Conjugated NFC Tags for Smartphone-Enabled Point-of-Care Diagnosis**
Pranav Sundar Neyveli, 17, Junior, Mills. E. Godwin High School, Henrico, Virginia
- CBIO025** **DNALoopR: A Novel High-Performance Machine Learning Predictor to Identify Genome-Wide 3D DNA Interactions in Cancer**
Prathik Naidu, 18, Senior, Thomas Jefferson High School for Science and Technology, Alexandria, Virginia
- CBIO026** **Effects of Altruistic Tendencies on the Survival of Cells in a Simulated Environment**
Wyatt Graham Brannon, 15, Freshman, InTech Collegiate High School, North Logan, Utah

- CBIO027 Quantification of Binding Free Energies in Amyloid-Antibody Systems Related to Alzheimer's and Enhancement of Antibody Binding Affinities**
Jennifer Rose Pan, 17, Junior, Arnold O. Beckman High School, Irvine, California
- CBIO028 Combating Neurovirulence of Zika and Flavivirus Epidemics Using In Silico Phylogenetic Analysis and RNAi Gene Silencing**
Mythri Ambatipudi, 17, Junior, Saint Francis High School, Mountain View, California
- CBIO029 Using Artificial Neural Networks to Predict Minimum Inhibitory Concentration of Candidate Antibiotics against *E. coli* and *X. alfalfae***
Jonathan Paul Sepulveda, 18, Junior, Paul J. Hagerty High School, Oviedo, Florida
- CBIO030 Identification of Natural Selection in *Mayetiola destructor* SNP Markers from Sequencing Data**
Luann C. Jung, 16, Junior, Manhattan High School, Manhattan, Kansas
- CBIO031 Computer Simulation of Genetically Modified *Aedes aegypti* Release Methods**
Gregory David Schwartz, 17, Junior, duPont Manual High School, Louisville, Kentucky
- CBIO032 Towards Accurate Copy Number Calling in High Ploidy Tumors**
Jessica Frank, 17, Junior, Riverdale Country School, Bronx, New York
- CBIO033 Using Machine Learning to Predict Postprandial Blood Glucose in Type 1 Diabetics**
Kimberly Ann Stahovich, 16, Sophomore, John W. North High School, Riverside, California
- CBIO034 Statistical Analysis of Graft vs. Host Disease and Immune Reconstitution in Humanized Mice**
Avi Swartz, 19, Senior, Cherry Creek High School, Greenwood Village, Colorado
- CBIO035 Discovery of Novel Genes Linked to Breast Cancer Progression Using a Bayesian Framework**
Shania Khatri, 17, Junior, Fox Chapel Area High School, Pittsburgh, Pennsylvania
- CBIO036 Investigation of Phytoestrogens as Treatments for Estrogen Receptor-Negative Breast Cancer**
Anna Margaret Clyburn, 18, Senior, North Carolina School of Science and Mathematics, Durham, North Carolina
- CBIO037T A Multi-Omics Predictive Pipeline for the Discovery of Cancer Driver Genes**
Adhya Beesam#, 17, Junior,
Shriya Beesam#, 17, Junior,
Plano East Senior High School, Plano, Texas
- CBIO038 SiteKey: A Novel Binding Site Predictor for Ordered Proteins Interacting with Intrinsically Disordered Proteins**
Sagar Maheshwari, 19, Senior, Unionville High School, Kennet Square, Pennsylvania
- CBIO039 A Novel Machine Learning Approach Using Convolutional Neural Networks to Identify Melanoma**
Savitha Srinivasan, 15, Freshman, Interlake High School, Bellevue, Washington
- CBIO040 Identification of Type 2 Diabetes Mellitus Related Single Nucleotide Polymorphisms in the Middle East with Comparative and Epigenetic Analysis**
Alea Abduljabbar Mohammed-Hussain, 18, Senior, AlAziziyah Private Schools, AlKhubar, Eastren Province, Saudi Arabia
- CBIO041 RNA-Seq Investigation of Transgenerational Acclimation to Thermal Stress in Coral Reef Fish**
Omar Ayman Fayoumi, 18, Senior, Dar Althikr Private School, Jeddah, Mecca, Saudi Arabia
- CBIO042 Modifying and Applying the kth Nearest Neighbor Algorithm to Enhance the Classification of Breast Cancer Tumors**
Rohit Khurana, 16, Sophomore, Brophy College Preparatory, Phoenix, Arizona
- CBIO043T Sustainability of *Katsuwonus pelamis* in California Pelagic Fisheries: Analysis of Natural and Fishing Mortality Data**
Daniel Samik Rostamloo, 16, Sophomore,
Marat Mustafaev, 16, Sophomore,
Anderson W. Clark Magnet High School, La Crescenta, California
- CBIO044 Computational Discovery of Potential NS3 Protease Inhibitors of Zika Virus**
Marcus Douglas Anthony Deans, 16, Sophomore, Academie Ste. Cecile International School, Windsor, Ontario, Canada
- CBIO045 Deep Learning Assessment of Tumor Proliferation in Histopathological Images for Categorical and Molecular Breast Cancer Severity Diagnosis**
Manan Ajay Shah, 18, Senior, The Harker School, San Jose, California
- CBIO046T The Revolutionary Refractometer**
Hedi Ben Daoud, 15, Freshman,
Omar Besbes, 15, Freshman,
Lake Banks Pioneer Prep School, Les Berges Du Lac 2, Tunis, Tunisia
- CBIO047 ALZCan: A Statistical Machine Learning Based Framework to Predict Future Onset of Alzheimer's Disease Using Genome-Wide Association Analyses, Polygenic Risk Scoring, and Multiple Neuroimaging Modalities (rs-fMRI, FDG-PET, Florbetapir-PET)**
Pravin Ravishanker, 18, Senior, Bellarmine College Preparatory, San Jose, California
- CBIO048 Fusion Genes as Drivers of Breast Metastasis**
Jahn timer Kurukulasuriya, 19, Senior, Pittsburgh Allderdice High School, Pittsburgh, Pennsylvania
- CBIO049 A Computational Model for Studying Cancer: Detecting Immediate Drivers for Malignant Tumor Progression**
Michael Miller, 19, Senior, Hershey High School, Hershey, Pennsylvania
- CBIO050 Engineering an Anti-Inflammatory Drug Delivery System for Islet Transplantation**
Jahizreal R. Aquart, 18, Senior, BEST Academy High School at Benjamin S. Carson, Atlanta, Georgia
- CBIO051T A Real-Time Predictive Modelling for Mitigation of Contagious Diseases- A Mathematical Approach**
Samriddhi Vishwakarma, 16, Sophomore,
Shresth Agrawal, 16, Sophomore,
Bhartiya Vidya Bhavan's R.K. Sarda Vidya Mandir, Raipur, Chhattisgarh, India

Earth and Environmental Sciences

- EAEV001 The Effect of EDTA Chelation as a Desorption Mechanism**
Madeline Shaw Burkey, 18, Junior, Rockdale Magnet School for Science and Technology, Conyers, Georgia
- EAEV002T Study and Modeling of Pressure and Temperature during a Geyser Eruption**
Jean-Baptiste Flieller, 18, Senior,
Elias Suvanto, 18, Senior,
Gymnase Jean Sturm, Strasbourg, Alsace, France
- EAEV003 Durio Plastico**
Munirah Suhada Mahdzir, 17, Senior, Sekolah Menengah Kebangsaan Buloh Kasap, Segamat, Johor, Malaysia
- EAEV004T Analysis of Possible Pollution in the San Francisco Stream**
Irene Dahiana Caballero, 17, Freshman,
Nicolas Alejandro Hernandez, 18, Senior,
Escuela Tecnica Minas, Minas, Lavalleja, Uruguay
- EAEV005 Improving Shade Balls**
Kenneth Marshall West, 17, Sophomore, Melbourne High School, Melbourne, Florida
- EAEV006 Investigating Flood Warning Systems**
Ray Mutsahuni, 13, Freshman, Irene Christian College, Harare, Zimbabwe
- EAEV007 Detection and Removal of Dinotefuran from the Environment: A Multi-Year HPLC-MS Analysis**
Raley Schweinfurth, 18, Junior, Oregon Episcopal School, Portland, Oregon
- EAEV008 Determination of Size and Concentration of Water Droplets in Experiments with Wilson Chamber**
Evgenij Sergeevich Goncharov, 19, Junior, Municipal Budget Educational Institution "Lyceum No. 3", Sarov, Nizhegorodskaya Region, Russian Federation
- EAEV009 Difference in Antibiotic Resistance on Biofilms vs. Whole Water Samples in an Aquatic Environment**
Gabrielle Amri Barreto, 15, Freshman, Skyview Academy, Highlands Ranch, Colorado
- EAEV010 Groundwater Quality of the Aquifers Underlying the Mississippi Embayment and the Gulf Coastal Plain**
Krishna K. Patel, 18, Senior, Arkansas School for Mathematics, Sciences, and the Arts, Hot Springs, Arkansas
- EAEV011T The Synthesis of High Oil Affinity Ester Macro Molecule with Renewable Resources**
Pok Him Michael Leung, 17, Junior,
King Lun Chan, 17, Junior,
Yu Hin Ching, 17, Junior,
Po Leung Kuk Ngan Po Ling College, To Kwa Wan, Kowloon, China, Hong Kong Special Administrative Region
- EAEV012 Use of Waste Carbon Dioxide as a Renewable Reagent to Catalytically Synthesize Commercially Useful Cyclic Carbonates**
Meghana Chowdary Bollimpalli, 16, Sophomore, Little Rock Central High School, Little Rock, Arkansas
- EAEV013T Black Carbon Detection: A Regional Snow Survey**
Nathaniel David Miner, 16, Sophomore,
Drake Lee Ludgate, 16, Sophomore,
Brush High School, Brush, Colorado
- EAEV014 The Effects of *Bacillus* Bacteria on the Invasive Species *Lemna minor* (Duckweed)**

Claire Elizabeth Wentzlaff, 18, Junior, Burnsville High School, Burnsville, Minnesota
- EAEV015 Testing the Waters: Development of A Novel Chitosan-Based Water Filter for Industrial and Third World Applications**
Khushi Thakkar, 15, Freshman, T. C. Jasper High School, Plano, Texas
- EAEV016 Impact of Ocean Acidification on Relative Fitness and Interspecies Interactions of Picophytoplankton**

Margaret Amelia Knight, 18, Senior, Alabama School of Fine Arts, Birmingham, Alabama
- EAEV017T Mass-Transfer Theory versus Pan Evaporation**
Jacob Carson Wells, 18, Senior,
Emily Morgan Hough, 18, Senior,
Casey James Ryan, 19, Senior,
South Sumter High School, Bushnell, Florida
- EAEV018 Arsenic Contamination through Tsunami Wave Movement in Hawaii: Investigating the Concentration of Heavy Metals in the Soil from the 1960 Hilo, Hawaii Tsunami**
Jared J.K. Goodwin, 16, Sophomore, Hilo High School, Hilo, Hawaii
- EAEV019 Are These Plants GMO?**
Luis Nicolau Pires, 16, Sophomore, Excel High School, Boston, Massachusetts
- EAEV020 The Effect of Wi-Fi on Plant Health**
Kristen Elizabeth Stawasz, 17, Junior, Westfield High School, Westfield, Massachusetts
- EAEV021 Taking the Pulse of Tar Creek: A Lab and Field Study of Macroinvertebrates in Tar Creek Coupled with a Heavy Metal Water Analysis**
Macey Middleton, 18, Senior, Grove High School, Grove, Oklahoma
- EAEV022 *Moringa oleifera*: Purify Your Water Supply**
Maya Cameron Navar, 16, Junior, Radford School, El Paso, Texas
- EAEV023 The Effect of Light on Fireflies**
Savannah Madison Long, 18, Senior, Mountain Vista Governor's School, Middletown, Virginia
- EAEV024T A Geochemical Investigation of Volcaniclastic Rocks from Northern Taiwan: A Provenance Study**
Pin-Lan Liu, 18, Senior,
Hsu-Feng Ou, 19, Senior,
The Affiliated Senior High School of National Taiwan Normal University, Taipei City, Taiwan, Chinese Taipei
- EAEV025T Crumb Rubber for Artificial Turf: The Effect on Water Systems by Heavy Metal Leaching**

Chase T. Cleveland##, 19, Senior,
Connor N. Cleveland#, 17, Junior,
Fort Walton Beach High School, Fort Walton Beach, Florida
- EAEV026 The Study of *Hemigrapsus sanguineus* Population Density and Genetic Variation**
Margaret Slein, 18, Senior, Archbishop Williams High School, Braintree, Massachusetts
- EAEV027 Determination of Soil VOC Content due to Coal Dust Deposition along Major Railroad Transportation Routes**
Sierra Nicole Spears, 17, Junior, Lingle-Fort Laramie High School, Lingle, Wyoming
- EAEV028 Investigating the Effects of Nanosilver in Pond Water Quality**
Laura Zampini, 18, Junior, American School of Campinas, Campinas, Sao Paulo, Brazil
- EAEV029 Characterization of the Pyroelectric and Piezoelectric Effect Exhibited by Alpha-Crystalline Silicon Dioxide: Potential Application as a Micro-Thermovoltic Transducer**

Jenna Marie Salvat, 17, Sophomore, Coronado High School, Colorado Springs, Colorado

- EAEV030 Increasing the Sustainability of a Heterotrophic Algae Biomass Production System: A Six Year Study of *Chlorella vulgaris***
Alexandra Katrina Gabrielski, 19, Senior, Viera High School, Viera, Florida
- EAEV031T To Drink or Not to Drink: The Lysis of *Escherichia coli* by Ultraviolet Light through a Makeshift Filtration System, Part Two**
Abigail Lynn Rademaker#, 19, Senior,
Taylor Michelle Lawrence#, 18, Senior,
Delavan High School, Delavan, Illinois
- EAEV032T Using 3D Modeling to Save our Reefs: Accuracy of Reef Assessment Techniques Using Structure from Motion**
Clara Megan Benadon, 16, Sophomore,
Allie Mary Battista, 16, Sophomore,
Poolesville High School, Poolesville, Maryland
Our Lady of Good Counsel High School, Olney, Maryland
- EAEV033 Impact of Road Salt Usage on Atmospheric Concentrations of Cl & Na PM 2.5**
Rashad Keith Prendergast, 18, Senior, Cass Technical High School, Detroit, Michigan
- EAEV034 Impacts of Altered Precipitation Regimes on the Distribution of Dryland Soil Nitrogen**
Jarek Vincent Kwiecinski, 17, Senior, Albuquerque Institute for Math and Science, Albuquerque, New Mexico
- EAEV035 Using Dropsonde Descending Speed to Determine Vertical Air Velocity in a Hurricane**
Megan Taiyue Tang, 17, Junior, York School, Monterey, California
- EAEV036 Phototactic Analysis of the Effects of the Chemorepellent Nitrate on Taxis-Based Vertical Column Orientation in Phytoplanktonic Flagellates**
Rohan Bhushan, 17, Junior, Monterey High School, Monterey, California
- EAEV037 Evaluating the Effectiveness of Lichen as Bioindicators**
Isaac Taylor Quinn Klementis, 18, Junior, Gresham High School, Gresham, Oregon
- EAEV038 A Comparative Study of Different Plant and Limestone Combinations, and Their Ability to Naturally Mitigate the Harmful Effects of Ocean Acidification on Coastal Coral Reef Health**
Lucas Alexander Tomita, 17, Sophomore, Hilton Head Preparatory School, Hilton Head Island, South Carolina
- EAEV039 Modeling the Effects of Land Use Change on Flooding in Pacific Northwest Streams to Promote Green Practices**
Adam C. Nayak, 17, Junior, Cleveland High School, Portland, Oregon
- EAEV040 A Longitudinal Study of Fluctuating Radiation Levels in Prince William Sound, Alaska: A Conclusion to a Four Year Study**
Jedediah Emmet Dean, 19, Senior, Colony High School, Palmer, Alaska
- EAEV041 Degradation of Nonpathogenic *Iridovirus* May Improve Food Nutrition in Insects**
Shreya Kambam Reddy, 16, Sophomore, Lincoln Park Academy, Fort Pierce, Florida
- EAEV042 Stormwater Treatment Area Performance Prediction Using Artificial Neural Networks**
William Gao, 17, Junior, Suncoast Community High School, Riviera Beach, Florida
- EAEV043 DSSCs and Their Potential for Clean Energy**
Joseph Andrew Davide, 18, Junior, Kosciusko Senior High School, Kosciusko, Mississippi
- EAEV044 A Study of Westward Recurring Tropical Cyclone Tracks in the Atlantic**
Abbigayle Emily Cuomo, 18, Senior, Commack High School, Commack, New York
- EAEV045 A Novel Method for Accurately Modeling Past Atmospheric Conditions Using Ice Core Data from Law Dome and WAIS Divide: An Approach to Monitor Future Climate Sustainability**
Gilbert Granger Spencer, 17, Junior, Half Hollow Hills High School West, Dix Hills, New York
- EAEV046 Impacts of 1,2-Propanediol Effluent Discharge on Reproductive Rates and Dispersion Patterns of *Anabaena inaequalis* and *Chlamydomonas reinhardtii***
Nicolas Maxwell Berg, 18, Senior, Bishop Hendricken High School, Warwick, Rhode Island
- EAEV047 Evaluating the Viability of Reducing Plastic Waste with *Tenebrio molitor***
Katee Brooke Hughes, 18, Senior, Bonneville High School, Washington Terrace, Utah
- EAEV048 The Correlation between Presence of Radon Gas in Residences and Diagnosis of Type 1 Diabetes**
Julia Kathryn Sherman, 18, Senior, West High School, Salt Lake City, Utah
- EAEV049 Investigating the Presence of Microplastics in the Gastrointestinal Tract of Mountain Whitefish in the Spokane River**
Isaac William Caruso, 18, Senior, Lewis & Clark High School, Spokane, Washington
- EAEV050 Estimating CO₂ and CH₄ Emissions from Washington DC Using Low Cost Sensors and Small Drone Technology**
Siona Prasad, 16, Sophomore, Thomas Jefferson High School for Science and Technology, Alexandria, Virginia
- EAEV051T From Global Warming to Stronger Economy**
Maysa Yasser Farag, 18, Senior,
Maha EL-Sayed Arafat, 18, Senior,
Maadi STEM School For Girls, El-Maadi, Cairo, Egypt
- EAEV052 A Study of the Mineralogy and Texture of the Hot Springs Sandstone**
Tristan Bailey Tompkins, 18, Senior, The Arkansas School for Mathematics, Sciences, and the Arts, Hot Springs National Park, Arkansas
- EAEV053 A Novel, Cost-Effective Water Filtration and Desalination Technique Based on Biodegradable Superabsorbent Polymers**
Joseph Galasso, 17, Junior, Galasso Homeschool, Tucson, Arizona
- EAEV054 An Innovative Solution for Water Filtration in Third World Countries**
Rohan Patel, 16, Sophomore, Mayo High School, Rochester, Minnesota
- EAEV055 Monitoring Drought Conditions in the Sequoia National Forest in California by Using Satellite Imagery**
Anthony David Weng, 17, Junior, Terre Haute South Vigo High School, Terre Haute, Indiana
- EAEV056 Determination of Lead in *Ostrea rhizophora* at Jobos Bay**
Nicole Alejandra Colon, 18, Senior, Specialized School of Sciences and Mathematics Genaro Cautino Vazquez, Guayama, Puerto Rico
- EAEV057 Mineralogical Characterization of Puerto Rico's Beach Sand and Its Relationship to Puerto Rico's Volcanic Origin**
Delian Colon, 16, Sophomore, Radians School, Cayey, Puerto Rico

- EAEV058 Detection of Built-Up Areas from ERS-2, Envisat and Sentinel-1 Synthetic Aperture Radar Data**
Eva-Maria Tonson, 20, Senior, Hugo Treffner Gymnasium, Tartu, Tartumaa, Estonia
- EAEV059T Comparison of Hazardness Caused by Different Levels of pH on Phytoplankton**
Sieun Park, 16, Freshman,
Isabella Machado Freitas Vilela Gouveia, 17, Freshman,
Escola Americana de Campinas, Campinas, Sao Paulo, Brazil
- EAEV060 Water Potability Device (W.P.D.)**
Eros Pegolo, 19, Senior, I.S.I.S. Malignani Udine, Udine, Udine, Italy
- EAEV061 The Ultimate Fate of Perfluoroamines in the Atmosphere**
Peace Mutwiri, 18, Senior, University High School, Tucson, Arizona
- EAEV062T Indium Prospecting Using Neural Nets**
Joshua L. Tucker, 18, Senior,
Spencer James Toll#, 19, Senior,
Vero Beach High School, Vero Beach, Florida
- EAEV063 Can Ants Help Save the Bees? Developing a Better Model for Screening Pesticide Effects on Honeybee Social Behavior**
James Donovan Sappington, 16, Sophomore, South River High School, Edgewater, Maryland
- EAEV064T Water Filtration Using Silver Nanoparticle Impregnated Filter-Paper**
Mackenzie Wiegand, 16, Sophomore,
Madison Clio Wiegand, 16, Sophomore,
Taylor Layne Jones, 16, Sophomore,
Simms High School, Simms, Montana
- EAEV065T Estimation of the Humidity in the Upper Troposphere Using Contrails Formed by Airplanes**
Mizuki Koshita, 18, Senior,
Hinata Koizumi, 17, Senior,
Shio Furuueda, 18, Senior,
Aomori Prefectural Aomori Minami Senior High School, Aomori, Japan
- EAEV066 Goo Be Gone! Cleaning Up Oil Spills with Magnets and Nanotechnology**
Vanessa Stephanie Siggers, 16, Freshman, Murphy High School, Mobile, Alabama
- EAEV067 Factors Affecting the Discharge of Micro-Plastic Fibers from Household Laundry**
Noel Katherine Lange, 16, Sophomore, Auburn High School, Auburn, Alabama
- EAEV068 Mathematically Cutting to the Bone: Solving Analytical Problems in ESR Dating the Paleolithic Site at Isimila, Tanzania**
Neeraj Sakhrani, 18, Senior, Bronx High School of Science, Bronx, New York
- EAEV069 A Novel Methodology for Co-Clustering Identification and Analysis for Endemic Plants with Applications to Conservation and Agricultural Planning**
Gregory Shogo Gueorguiev, 18, Senior, Bronx High School of Science, Bronx, New York
- EAEV070T Micro and Nano Engineering for Wastewater: Toxic Cr(VI) Remediation Using Biochar and Nanoparticle from Wastewater**
Pattiyage Shehan Kavishka, 19, Senior,
Alujjage Sankalpa Perera, 19, Senior,
S.De.S.Jayasinghe Central Collage, Dehiwala, Western, Sri Lanka
- EAEV071T Biodegradable Plastic from *Gelidium pusillum***
Hassan Rizwan, 17, Senior,
Mansoor Ahmed, 15, Freshman,
Pak Turk International School and Colleges, Karachi, Sindh, Pakistan
- EAEV072 The Extraction of Oil from Chlorophyta algae in Different Water Environments**
Raul Ignacio Vila-Olazabal, 17, Junior, Colegio San Ignacio de Loyola, San Juan, Puerto Rico
- EAEV073 Soil Quality in Developed and Agricultural Areas: How Does Neighborhood Development Degrade Homeowners' Soil?**
Jin Cho, 17, Junior, Paul Laurence Dunbar High School, Lexington, Kentucky
- EAEV074 Nanosilver: Biohazard or Breakthrough**
Bryan Martinez, 16, Freshman, Trenton High School, Trenton, North Dakota
- EAEV075 America's Farming Future: The Impact of Climate Change on Crop Yields**
Lillian Kay Petersen, 15, Freshman, Los Alamos High School, Los Alamos, New Mexico
- EAEV076 Population Dynamics in *D. magna* When Exposed to Minute Concentrations of Silica Gels**
Carl Arthur Whitesel, 18, Senior, Arizona College Preparatory-Erie, Chandler, Arizona
- EAEV077 Natural Attenuation of Titanium Dioxide (TiO₂) Nanoparticles Photo-Catalysis, Phase II: Marine Systems**

Rayna Shianne Ellison, 18, Junior, Latta High School, Ada, Oklahoma
- EAEV078 Bamboo Forest as a Natural Levee of Pyroclastic Flows in Merapi Volcano**
Azizah Dewi Suryaningsih, 18, Senior, State Senior High School 1 Yogyakarta, Yogyakarta, DI Yogyakarta, Indonesia
- EAEV079T Scientific Wisdom behind Yogyakarta Palace's Sustainable Resilience to Natural Hazards**
Najmuna Ratri Lakshita, 18, Senior,
Sakina Yaumul Fitri, 19, Senior,
SMA Negeri 1 Yogyakarta, Yogyakarta, D. I. Yogyakarta, Indonesia
- EAEV080 The Effects of Boat Traffic on Water Quality as Measured by Levels of Turbidity, Colored Dissolved Organic Matter, and Chlorophyll A**

Melissa June Marchese, 18, Senior, Canterbury School, Fort Myers, Florida
- EAEV081 Effect of Stream Nutrients on Benthic Algal Overgrowth in Vatia Bay**
Gabrielle Tepora Langkilde, 18, Senior, Fa'asao Marist High School, Pago Pago, American Samoa
- EAEV082 The Effects of Nanosilver on *Planaria***
Isabella Marie Sanchez, 15, Freshman, Manatee High School, Bradenton, Florida
- EAEV083 PET Degradation by *Ideonella sakaiensis*: A Hypothetical Model**
Angelica Mercedes Sinclair, 19, Senior, Starkville High School, Starkville, Mississippi
- EAEV084 The Effects of Low Levels of Radiation on *Physarum polycephalum***
Levi Stephen Hrabos, 17, Sophomore, Northwestern High School, Kokomo, Indiana
- EAEV085 Developing a Numerical Box Model to Compute Algae Concentration, Year Two**

Sichen Shawn Chao, 18, Senior, Oxford High School, Oxford, Mississippi
- EAEV086 Radiochemistry and AI: Development of an Analytical Capability Using Machine Learning Algorithms for Early Detection of Radionuclides in the Environment**
Anushka M. Nair, 17, Sophomore, Lake Oswego High School, Lake Oswego, Oregon

EAEV087T Cleaning It Up! Self Filtration Container

Riley James Watson, 18, Junior,
Mark Austin Palmertree, 19, Senior,
Kosciusko Senior High School, Kosciusko, Mississippi

EAEV088 An Innovative Crowdsourcing Approach to Monitoring Freshwater Bodies

Sahithi Rohini Pingali, 17, Junior, Inventure Academy, Bengaluru,
Karnataka, India

EAEV089 In Hot Water—Consequences for Global Fresh Water Quality: A Quantitative Study on the Effects of Rising Freshwater Temperatures on Water Chemistry and Microorganism Biomass and Productivity

Eleanor Lawton-Wade, 17, Junior, Presbyterian Ladies College
Sydney, Sydney, NSW, Australia

EAEV090T Air Purifier Using Water for Fine Particle Reduction in School

Hyeryeong Kim, 15, Freshman,
Nayoung Kim, 15, Freshman,
Buil Girls' Middle School, Incheon, Incheon Metropolitan City,
South Korea

EAEV091T Human Impacts on Coral Reefs

Shasta B. White, 17, Junior,
Sonata Yazmee Beasley, 17, Senior,
Kapaa High School, Kapaa, Hawaii

Embedded Systems

- EBED001 Silicon Diode Spectrometer**
Josef Gajdusek, 19, Senior, DELTA - Stredni Skola Informatiky a Ekonomie, Zakladni Skola a Materska Skola, S.R.O., Pardubice, Pardubicky Kraj, Czech Republic
- EBED002T AcquaNetwork: Measurement and Analysis System For Residential Water Consumption**
Jean Diego Silva Fontena, 20, Senior,
Rafael Hoffmann Zibetti, 19, Senior,
Fundacao Escola Tecnica Liberato Salzano Vieira da Cunha, Novo Hamburgo, Rio Grande do Sul, Brazil
- EBED003T A.T.S.P. (Autonomic Thermal Soaring Platform)**
Florian André Vahl, 18, Senior,
Etienne Philippe Neumann, 18, Senior,
Friedrich Maximilian Schiller, 18, Senior,
Johannes-Brahms-Schule, Pinneberg, Schleswig-Holstein, Germany
- EBED004 A Novel Anti-Interference & None Misjudgment Digital Optical Sensor**
Chentian Li, 17, Sophomore, No. 1 High School Zhuhai City, Zhuhai, Guangdong, China
- EBED005 Photosensitive Panoramic Photography Device**
Hin Wang Lin, 19, Senior, Yuen Long Merchants Association Secondary School, Hong Kong, China, Hong Kong Special Administrative Region
- EBED006 Safe with Me Now: A Novel System to Prevent Vehicular Hyperthermia in Children**
Jessica Mengxin Yu, 16, Sophomore, West Linn High School, West Linn, Oregon
- EBED007 Development of an Assistive and Rehabilitative Hand Orthosis and Its Complementary Control Systems**
Muhammad Nuhan Ahnaf, 18, Senior, Plano East Senior High School, Plano, Texas
- EBED008 A Smart Bionic Leg Brace: An Electromechanically Actuated Active-Assist Wearable Orthotic Device for Comprehensive Restoration of Gait Characteristics across Everyday Mobility Scenarios**
Syamantak Payra, 16, Junior, Clear Brook High School, Friendswood, Texas
- EBED009 Developing a More Efficient Quantum Protocol Using Vehicle Signals and Photon Polarization**
Evan McKenna Meade, 18, Junior, Keystone School, San Antonio, Texas
- EBED010T Homemade Cycling Power Meter**
Benjamin Marsan, 17, Sophomore,
Katelynne Giulia Marsan#, 19, Senior,
Dripping Springs High School, Dripping Springs, Texas
- EBED011 Smart Seniors Care**
Raad Amer Kloob, 15, Freshman, Al-Omaryah Schools, Amman, Jordan, Jordan
- EBED012 Automatically Reproducing Live Performances of Violins via Novel Sound-Post Controlled Electrification**
Aito Tanaka, 18, Senior, Hiroshima University High School, Fukuyama, Fukuyama-city, Hiroshima-pref., Japan
- EBED013 Battery System Optimization and Development of a Novel Rapid-Response Bioelectronics Device**
Rahul Lall, 18, Senior, Auburn High School, Auburn, Alabama
- EBED014 A Vibrating Watch for the Visually Impaired**
Michelle Loven, 17, Junior, The Massachusetts Academy of Math and Science, Worcester, Massachusetts
- EBED015 EYERONIC2**
Marc Miguel Cline Mirabal, 16, Freshman, Grants High School, Grants, New Mexico
- EBED016T Hi-Viz Bike**
Declan Lang Predavec, 14, Freshman,
Callum Lang Predavec, 16, Junior,
Mosman High School, Sydney, NSW, Australia
- EBED017 The Heat Free Car: Vehicular Heatstroke Prevention System (Second-Generation Prototype)**
Scott Andrew Soifer, 17, Junior, North Shore Hebrew Academy High School, Great Neck, New York
- EBED018 Epi-Phone Auto-Locator**
Maya Arie Van Houten, 16, Sophomore, Covenant Christian Academy, Huntsville, Alabama
- EBED019T Economical Optimal Optical Obstacle Proximity Detector**
Russell Collin Ro, 17, Junior,
Adam Walker, 17, Junior,
Advanced Technologies Academy, Las Vegas, Nevada
- EBED020 SafeSeat**
Andrew Barbaro, 18, Junior, Carroll High School, Dayton, Ohio
- EBED021 JustStep: Voice Message System for Tactile Ground Surface Indicator (TGSi)**
Lorena Santos Vilas Boas, 19, Senior, Instituto Federal da Bahia (IFBA) - Campus Salvador, Salvador, BA, Brazil
- EBED022 Highly Sensitive E. coli Bacteria Detection through the Integration of Gold Nanodisk Plasmon Resonance and Antibody-Antigen Binding**
Sophie Joy Guo, 17, Junior, James Clemens High School, Madison, Alabama
- EBED023 ResQ: A Low Cost, Wearable, Automatic Fall Detection Device for Senior Citizens**
Arya Vikranth Goutam, 17, Sophomore, The Nueva School, San Mateo, California
- EBED024 Increasing Wifi Signal Strength Using a Phased Array Helical Antenna System**
Alisa Yukina Hathaway, 17, Junior, Palos Verdes Peninsula High School, Rolling Hills Estates, California
- EBED025 Use of a Novel Arduino System as a Sensor for Detecting and Controlling Mosquito Populations**
Alberto Gustavo Rodriguez-Masso, 17, Junior, Colegio Rosa-Bell, Guaynabo, Puerto Rico
- EBED026 Smart Garden**
Frida Sofia Andrade Sierra, 18, Senior, Colegio de Estudios Científicos y Tecnológicos del Estado de Queretaro, Corregidora, Queretaro, Mexico
- EBED027 Smart Road Signs: The Bluetooth LE-Based Safety System for Pedestrians**
Seung Heon Song, 18, Sophomore, Gould Academy, Bethel, Maine
- EBED028 High Resolution Weather Tracking: A Micronet**
Brenden Chandler Duffy, 17, Junior, Lake Braddock Secondary School, Burke, Virginia
- EBED029T Clap Detecting System Using a Raspberry Pi**
Dania Maraliz Villafuerte-Gonzalez, 16, Sophomore,
Sofia El Badaoui-Rivero, 17, Sophomore,
Colegio Mater Salvatoris, San Juan, Puerto Rico
- EBED030 Visualizing Sound Decibels**
Daniela Del Mar Villafuerte, 18, Senior, Academia San Jose High School, Guaynabo, USA, Puerto Rico

- EBED031 LaserWAN - Laser Broadband Internet Connections**
Valerio Pagliarino, 17, Junior, I.I.S. Nicola Pellati, Nizza Monferrato, Asti, Italy
- EBED032 Real-Time Sound Localization Using a Microphone Array**
Joseph Aldo Sartini, 19, Senior, Arkansas School for Mathematics, Sciences, and the Arts, Hot Springs, Arkansas
- EBED033 Monitoring of Arsenic in Groundwater Sources using an Innovative IoT Sensor**
Anjali Chadha, 15, Sophomore, duPont Manual High School, Louisville, Kentucky
- EBED034T Smart Digital Psychrometer for Forecasting Local Weather**
Made Radikia Prasanta, 17, Junior,
Bagus Putu Satria Suarima Putra, 17, Junior,
SMA Negeri Bali Mandara, Buleleng, Bali, Indonesia
- EBED035T Bringing Back 'Sight' with 'Touch': Making Wearable Walking Assist Device for Blind**
Geonyeok Lee, 18, Senior,
Seungmok Han, 18, Senior,
Yuhwan Shin, 18, Senior,
Gyeongnam Science High School, Jinju-si, Gyeongsangnam-do, South Korea
- EBED036 Balance Temperature, Conveniently: Designing an Affordable and Easy-to-Implement Wireless Zoning System**
Benjamin Jiang, 17, Junior, duPont Manual Magnet High School, Louisville, Kentucky
- EBED037T Mind Hand: A Comprehensive Solution Supports Two-Way Communication for the Deaf Mute**
Thao Chi Hien Nguyen, 17, Junior,
Trang Ngan Thi Tran, 17, Junior,
Tran Phu Gifted High School, Hai Phong, Viet Nam
- EBED038T Translating Glove for the Deaf-Mute Compatible with Smartphones**
Minh Duc Hoang Chu, 17, Junior,
Tan Thien Pham, 17, Junior,
Le Hong Phong High School for the Gifted, Ho Chi Minh city, Viet Nam
- EBED039 Bracelet Aid for Blind People**
Mujtaba Sajjad Kamani, 17, Junior, Aga Khan Higher Secondary School, Karachi, Sindh, Pakistan
- EBED040 3D POV Display**
Evan Eugene Shrader, 18, Junior, Terre Haute North Vigo High School, Terre Haute, Indiana
- EBED041 Using Inertial Navigation Systems (INS) and the Kalman Filter in order to Create a Reliable Navigation Aid for the Blind**
Isabelle Paris Chong, 18, Senior, Byram Hills High School, Armonk, New York
- EBED042 Assembly of a Novel CO₂ Based Heat Zone Design to Optimize Absorption during Optic Fiber Processing**
Eric He, 17, Junior, High Technology High School, Lincroft, New Jersey
- EBED043 Gas Detector Alarm System**
Peter-Newman Giffa Messan, 17, Junior, Ghana Christian International High School, Accra, Greater Accra, Ghana
- EBED044 Development of Microresonator-Based Logic Gates Using Signal Conditioning Circuits**
Faisal Abdullah Shafiei, 18, Senior, Abdulrahman Fakieh School, Makkah, Makkah, Saudi Arabia
- EBED045 Paper Circuit Printer and Its Applications**
Chia-Yu Yeh, 19, Senior, Chung Shan Industrial & Commercial School, Kaohsiung City, Taiwan, Chinese Taipei
- EBED046T ThumbFi: Control All Your Devices with Your Fingertips**
Sarthak Sethi, 18, Senior,
Mohd Faiz Lnu, 18, Senior,
Maxfort School Dwarka, New Delhi, India
Daisy Dales Senior Secondary School, New Delhi, India
- EBED047 Eco-Phone: A Future Safe Phone with Visible Light and Infrared Communication**
Mohammed Sharief, 18, Senior, St. Aloysius Pre-University College, Mangalore, Karnataka, India
- EBED048 A Low-Cost, Clutter-Cancelling Life Detection System for First Response after Natural Disasters**

Sachin Ganesh Konan, 17, Junior, Hamilton High School, Chandler, Arizona
- EBED049 Design, Analysis, and Implementation of a Portable, Low-Cost, and Bluetooth ECG Device**
Osman Celikok, 17, Junior, Pleasant View School, Memphis, Tennessee
- EBED050 Less Water—More Food?: Real-Time Three-Dimensional Imaging of Soil Moisture Distribution for Intelligent Irrigation**

Vasily Antonovich Tremsin, 18, Junior, Campolindo High School, Moraga, California
- EBED051 Piezoelectric Based Pressure Sensing Matrix Array**
Shahab Fazal, 18, Senior, Loreto College, Manchester, Lancashire, United Kingdom
- EBED052 EZsleep: A Low-Cost Wearable Device for Early Diagnosis of Obstructive Sleep Apnea –Validated by a Machine Learning Technique**
Mustafa Muhyi, 16, Sophomore, Arrowhead Park Early College High School, Las Cruces, New Mexico

Energy: Chemical

- EGCH001 Potatoes Are the Ultimate Solution to our Electricity Problems in Zimbabwe**
Pelagia Maria Majoni, 18, Senior, Queen Elizabeth Girls High School, Harare, Zimbabwe
- EGCH002 Ultra-Thin Asymmetric Supercapacitor: Utilizing Nano-Porous Nickel and Graphene-Copper for a High Energy Density**
Alexander Graziani Mancevski, 17, Junior, Liberal Arts and Science Academy High School, Austin, Texas
- EGCH003 A Durable, Portable and Biodegradable Microbial Fuel Cell that Utilizes a Native Plant Based AC Electrode and Optimized Sizing**
Rohan Mahesh Wagh, 15, Freshman, Sunset High School, Portland, Oregon
- EGCH004 The Straw Carbon Material as the Cathode Material for Lithium-Sulfur Batteries**
Liyang Chang, 17, Junior, Shanghai Jianping High School, Shanghai, Shanghai, China
- EGCH005 A Cocktail of Natural Dyes as Photosensitizers for Dye-Sensitized Solar Cell**
Kai Yui Ho, 17, Junior, Pak Kau College, Hong Kong, China, Hong Kong Special Administrative Region
- EGCH006T Hybrid Photovoltaic Cells Based on Biologic and Polymeric Materials**
Ioana Andreea Stelea, 17, Sophomore,
Miruna Elena Vlad, 18, Junior,
International Computer High School of Bucharest, Bucharest, Romania
- EGCH007 Economical Oxygen Reduction Electrocatalysts: Alternatives to Platinum for Proton Exchange Membrane Fuel Cells**
Anusha Bhattacharyya, 16, Sophomore, Little Rock Central High School, Little Rock, Arkansas
- EGCH008 Artificial Photosynthesis: Novel Visible Light Response and Formic Acid Generation from Carbon Dioxide Using Tantalum Oxide/Tantalum Plate**
Huiyi Wu, 18, Junior, Ichikawa Gakuen Ichikawa High School, Ichikawa-city, Chiba-pref., Japan
- EGCH009 Optimization of Storage Capacity Using Activated Carbon Fibers from Sustainable Agricultural Sources for Hydrogen**
Sriram Satyavolu, 17, Junior, Kentucky Country Day School, Louisville, Kentucky
- EGCH010 Analyzing Algal Lipid Content to Optimize Biofuel Production**
Katherine Beadle, 19, Junior, Bishop Feehan High School, Attleboro, Massachusetts
- EGCH011 Hydrogenation as a Method for Upgrading Lignin-Based Bio-Oil to High Value Chemicals**
Gabriella T. J. Blatt, 18, Senior, Big Sandy High School, Big Sandy, Montana
- EGCH012T Eco-Flex Lite Capacitor**
King Fun Chow, 16, Sophomore,
Tsun Ting Sin, 16, Sophomore,
Guanqun Zhou, 16, Sophomore,
The Chinese Foundation Secondary School, Hong Kong, China,
Hong Kong Special Administrative Region
- EGCH013 Heating Our Way to the Future!**
Bryn Taylor Groff, 19, Senior, Sheldon High School, Sheldon, Iowa
- EGCH014 Thermoelectric Dry Energy**
Yousef Zaid Alnawafleh, 16, Sophomore, Wadi Musa Primary School, Wadi Musa, Jordan
- EGCH015T Hydrogen Fuel Cell: Titania Nanotubes as Photoanode**
Farah Nurshahira Binti Mohd Solehin, 16, Sophomore,
Zaiyani Binti Bahari, 17, Junior,
Mara Junior Science College Kubang Pasu, Jitra, Kedah, Malaysia
- EGCH016T Effects of Contaminants on Acid Gas Pyrolysis**
Hunter Noriesta Whaples, 18, Senior,
Duy Anh Nguyen, 18, Senior,
Eleanor Roosevelt High School, Greenbelt, Maryland
- EGCH017 A Smart Light-Tracker Using Machine Learning and Dye-Sensitized Solar Cells**
Malini Mukherji, 18, Junior, Notre Dame Preparatory, Pontiac, Michigan
- EGCH018 A Paper-Based Microbial Fuel Cell for Glucose Monitoring in Saliva**
Kendra Zhang, 17, Junior, Jericho High School, Jericho, New York
- EGCH019 Pack More and Charge Faster: To Improve the Capacity Retention and the Rate Performance of Lithium Batteries**
Sophia P. Zhou, 15, Sophomore, Dutch Fork High School, Irmo, South Carolina
- EGCH020 Analysis of Photocatalytic Performance in TiO₂-Dye Sensitized Solar Cells Doped with Nanostructure Diatoms**
Isaac Ryan Rost, 19, Senior, Baker High School, Baker, Montana
- EGCH021 Synthesizing Bio-Diesel from Different Vegetable Oils via Transesterification**
Jorge Alejandro Ruiz-Ruiz, 15, Freshman, Escuela Secundaria Especializada en Ciencias, Matematicas y Tecnologia, Caguas, Puerto Rico
- EGCH022T Utilization of Epigallocatechin gallate (EGCg) as a *Shewanella putrefaciens* ATP Synthase Inhibitor to Maximize Microbial Fuel Cell Performance**
Dahyun Park, 19, Senior,
Jordan Brett Sanford, 18, Senior,
Syosset High School, Syosset, New York
- EGCH023 The Fuel of the Future**
Daniel Austin Orr, 16, Sophomore, Northwestern High School, Mellette, South Dakota
- EGCH024T Better Biodiesels: Converting Autumn Olive Oil into Winterized Fuel**
Mariafernanda Tirado, 17, Sophomore,
Kelli Luann Buckaloo, 17, Sophomore,
McMinn County High School, Athens, Tennessee
- EGCH025T The Future of Potable Water: Air Cathode Microbial Desalination Cells**
Rishabh Kuldeep Jain, 17, Junior,
Alexandra Irene Schmid, 17, Junior,
George C. Marshall High School, Falls Church, Virginia
- EGCH026T Utilization of Water Hyacinth in Energy Production**
Mahmoud Reda Darwish, 17, Junior,
Islam GamalElDein Abousamra, 17, Junior,
STEM School of Alexandria, Burj El-Arab, Alexandria, Egypt
- EGCH027 Voltage Production by *Geobacter sulfurreducens* as a New Source of Renewable Energy**
Jose Luis Rodriguez, 18, Senior, Specialized Science and Math Thomas Armstrong Toro School, Ponce, Puerto Rico, Puerto Rico
- EGCH028T Electrochemical Application in a Battery with the Use of Fuel Cells**
Justin Enrique Melendez Campos, 18, Senior,
Joshua Soto, 18, Senior,
Voc. Metropolitana Miguel Such, San Juan, Puerto Rico
- EGCH029 BIO-CELL: A Novel MicroCHP pMMO Enzymatic Biofuel Cell for the Generation of Clean and Reliable Electrical Energy**
Thomas Raimundo Ribeiro, 17, Junior, Laval Senior Academy, Laval, Quebec, Canada

- EGCH030 Nanoscale Engineering: Activated Pecan Shell for EDLC Application**
Sarah Jin Zou, 18, Junior, Texas Academy of Mathematics and Science, Denton, Texas
- EGCH031 Development of Novel Additive-Enhanced Dye for Environmentally Friendly, Sustainable, and Efficient Dye Sensitized Solar Cells**
David Andrew Kravets, 18, Senior, Chesapeake Science Point, Hanover, Maryland
- EGCH032T Perovskite Tracking Solar Cell (PTSC)**
Mohamed Khaled Othman, 17, Junior,
Hossam Mostafa Ibrahim, 17, Junior,
6 of October STEM Egypt School, Giza, 6 of October, Egypt
- EGCH033 Development of a Novel Catalyst for the More Efficient Conversion of CO₂ in H₂O to Sustainably Produce Hydrocarbons as an Alternative Form of Energy**
Aditi Kumar, 17, Junior, Timberline High School, Lacey, Washington
- EGCH034 Designing a Thermostable Cellobiohydrolase: A Novel Approach to Sustainable Ethanol Production**
Sagarika Samavedi, 16, Sophomore, Interlake High School, Bellevue, Washington
- EGCH035 Wavelength Dependence of Light-Activated Transformation of Carbon Dioxide at Copper Oxide Electrodes**
John Cramsey, 19, Senior, Southeastern Junior/Senior High School, Augusta, Illinois
- EGCH036T The Feasibility of Using Bamboo as a Source of Ethanol for Fuel**
Ben Peter Charnay, 18, Senior,
Aaron Charnay, 18, Senior,
Sycamore High School, Cincinnati, Ohio
- EGCH037T Natural Dye of Red Dragon Fruit (*Hylocereus costaricensis*) Peel Extract for Dye Sensitized Solar Cells (DSSC) Application**
Miranti Ayu Kamaratih, 19, Senior,
Octiafani Isna Ariani, 19, Senior,
Al Hikmah Senior High School, Surabaya, East java, Indonesia
- EGCH038 A Novel Approach for the Preparation of High Efficiency Water Splitting Photocatalysts**
Dana Abdulwahab Alkhalidi, 18, Senior, KFUPM Schools, Dhahran, Eastern Province, Saudi Arabia
- EGCH039 Optimization of Inverted Planar Methylammonium Lead Halide Perovskite Solar Cells**
Noor Nezar Alkhonaizi, 18, Senior, Dhahran Ahliyya Schools, Dhahran, Eastern Province, Saudi Arabia
- EGCH040 Promising Fuel in Advanced Engines: Ignition Delay Measurements and Modeling of Straight Run Naphtha**
Abdulaziz Abdulrahman Alsalem, 18, Senior, Dhahran Ahliyya Schools, Dhahran, Eastern Province, Saudi Arabia
- EGCH041T Versatile Examination of the Biochar Products from Biol Mass Materials Subjected to Proliz Process**
Oguzhan Bas, 18, Senior,
Emre Pahal, 18, Senior,
Yilmaz Kayalar Fen Liesesi, Erbaa/Tokat, Turkey
- EGCH042T The New Solid State Mechanochemical Synthesis of Advanced Ni, Ni-Co and Ni-Al Hydroxides for Hybrid Supercapacitor Application**
Illia Samsonov, 16, Sophomore,
Kseniia Kovalenko, 16, Sophomore,
Chemical Ecological Lyceum, Dnipro, Dnipropetrovsk Region, Ukraine
- EGCH043 Carbon Coatings on a Copper Antimonide Anode for Enhanced Performance and Lifetime in Rechargeable Metal-Ion Batteries**
Jay Chandra, 17, Junior, Fossil Ridge High School, Fort Collins, Colorado
- EGCH044T An Analysis on the Upscaling of Biodiesel Production from Food Waste**
Tyler Michael Staten###, 19, Senior,
Riley Paul Midgley##, 19, Senior,
Bonneville High School, Ogden, Utah
Bonneville, Ogden, Utah
- EGCH045 Green Nano Supercapacitors**
Lawrence John van Staden, 18, Senior, St. Dominics Newcastle, Newcastle, KwaZulu-Natal, South Africa
- EGCH046 Quantifying the Evolution of Gas from Li-Ion Battery Materials**
Ryan Robert Armstrong, 19, Senior, Oak Ridge High School, Oak Ridge, Tennessee
- EGCH047 Symbiotically Grown Algal-Fungal Cultures for Economically Feasible and Sustainable Biofuel Production**
McKenna Kristin Loop, 18, Senior, Arizona College Preparatory-Erie, Chandler, Arizona
- EGCH048T Enhancement of the Behavior of a Species of NiHcd HER Electrode Using a Stable Ni(OH)₂-NiOOH Phase Transformation Redox Mediator in a Developed-Two-Step Alkaline Electrolysis Process Under Variable Current Densities**
Aparimeya Taneja, 17, Senior,
Jaskaran Singh Sethi, 17, Senior,
St. Columba's School, New Delhi, India
- EGCH049 Graphene Based Solar Panel**
Salama Rashed Alkhateri, 16, Junior, Al Khaleej National School, Dubai, United Arab Emirates

Energy: Physical

- EGPH001 Thermolectric Generator Powered Tracking Concentrated Photovoltaic System**
Camille Alden Miles, 18, Junior, Niceville High School, Niceville, Florida
- EGPH002 Power Moves: Harvesting Kinetic Energy to Generate Electricity**
Megan Grace Uszynski, 16, Freshman, McIntosh High School, Peachtree City, Georgia
- EGPH003 Independent**
Vanessa Ann Quintero, 17, Sophomore, Lopez Early College High School, Brownsville, Texas
- EGPH004 Novel Fabrication of Thin Film Luminescent Solar Concentrators**
Bryan Hoo Hao Chun, 19, Senior, Oregon Episcopal School, Portland, Oregon
- EGPH005T Innovative Technology of Increasing Solar Cells' Efficiency**
Vakhtang Kontridze, 18, Senior,
Giorgi Nioradze, 18, Senior,
AlA-GESS, Tbilisi, Qvemo QarTli, Georgia
- EGPH006 LED: Is it Really a More Efficient Future?**
Xiang Tang, 16, Sophomore, Caddo Parish Magnet High School, Shreveport, Louisiana
- EGPH007 Optimizing Micro-Geometric Bladeless Wind Turbines, Year Five**
Sarah May Palmer, 19, Senior, Friendswood High School, Friendswood, Texas
- EGPH008T Solar Panel Deployable Light Reflector Innovating Construction**
Beqa Mikadze#, 18, Senior,
Giorgi Margiani#, 19, Senior,
AlA-GESS, Tbilisi, Qvemo QarTli, Georgia
Akhali Litseumi, Tbilisi, Georgia
- EGPH009 Increased Tidal Barrage Energy Output through Pumping**
Peter Joseph Menart, 17, Junior, Carroll High School, Dayton, Ohio
- EGPH010 "Printenna": A 3D Printed Biquad Yagi Antenna for Transmission of Space Solar Power**
Samuel Brian Lossef, 16, Sophomore, School Without Walls High School, Washington, District of Columbia
- EGPH011 WWAG: Walk, Warm, and Generate**
Omar Mohammad Nassar, 16, Sophomore, Islamic Educational College, Amman, Jordan
- EGPH012T A Unique Solar System that Captures the Heat Energy of the Sun in an Efficient Way**
Rakan Raed Nasereddin, 17, Junior,
Tamer Shibley Al-Haddadin, 17, Junior,
Modern Montessori School, Amman, Jordan
- EGPH013 Development of a Non-Tracking Solar Thermal Concentrator Using the Simultaneous Multi-Surface Design Method**
Anthony Y. Zhou, 16, Sophomore, Mission San Jose High School, Fremont, California
- EGPH014 Renewable Hydrogen and Fuel Cells: The Future of Energy**
Claire Victor, 18, Senior, Centaurus High School, Lafayette, Colorado
- EGPH015 A Study on Sustainable, Environmentally-Friendly, Alternative Insulators**
Benjamin James Eisinger, 17, Sophomore, Hilton Head Preparatory School, Hilton Head Island, South Carolina
- EGPH016 The Clever GIRL (Global Intelligent Rip Locator)**
Maddison King, 18, Senior, Meriden School, Strathfield, NSW, Australia
- EGPH017 Catching the Sun with Transparent Solar Cells: Application of Natural Dye-Sensitized Solar Cells as BIPVs**
Sabahat Fatima, 18, Senior, Al Rahmah School, Windsor Mill, Maryland
- EGPH018 The Development of a Renewable Energy Phone Case**
Jack Harrison Kolosvary, 18, Junior, Columbia River High School, Vancouver, Washington
- EGPH019 Wind Energy: The Power of Pulleys**
Tanner John Kempf, 17, Sophomore, Ashley Public School, Ashley, North Dakota
- EGPH020T Solar-Powered Optics: Insight into a Renewable Energy Resource**
Giovanni Riyanto Budi, 18, Senior,
Andrea Lamas-Nino, 18, Senior,
Isaac Bear Early College High School, Wilmington, North Carolina
- EGPH021 Localizing Heat with Carbon Foam for Efficient Solar Desalination**
Oliver Leitner, 17, Junior, The Davidson Academy of Nevada, Reno, Nevada
- EGPH022 Smart Self-Sustaining Lighting System**
Karlos Lenniel Nicolas Miranda Garces, 18, Senior, Adela Rolon Fuentes, Toa Alta, Puerto Rico
- EGPH023T Transforming Alternate Current (AC) to Direct Current (DC) via Kinetic Energy**
Ensol David Tomassini Morales, 18, Senior,
Kevin Manuel Matias, 19, Senior,
Padre Anibal Reyes Belen, Hatillo, Puerto Rico
- EGPH024T Programmable System for the Extraction of Hydroelectric Energy**
Norman Ariel Toro Vega#, 18, Senior,
Emanuel Felipe Burgos Robles, 18, Senior,
Dr. Carlos Gonzalez High School, Aguada, Guaniquilla, Puerto Rico
- EGPH025T Utilization of *Rosoideae rosa* Nanostructures for Optimization of Solar Cell Light Management**
Benjamin Gu Li, 16, Sophomore,
Anthony Jiang, 16, Sophomore,
Jasper High School, Plano, Texas
- EGPH026 Go with the Flow: Increasing the Efficiency of the Tesla Turbine to Reduce the Cost of Cleaner Energy Generation from Natural Gas**
Daniel C. Bobbitt, 18, Junior, Niceville High School, Niceville, Florida
- EGPH027 From a Single Moment of Force to Sustainable Energy: Achieving Optimal Frequency for Piezoelectricity**
Arielle Ese Ainabe, 16, Sophomore, Garth Webb Secondary School, Oakville, Oakville, Canada
- EGPH028 A Roar for Energy: The Piezoelectric Effect**
Haseeb Ahmed Khawaja, 18, Senior, Aga Khan Higher Secondary School, Karachi, Sindh, Pakistan
- EGPH029 Solar Bimetallic Actuator**
Claudiu Nicolae Nitan, 18, Sophomore, Mihai Eminescu National College of Suceava, Suceava, Romania
- EGPH030T Design of Automatic Retractable Dome Structure Using Petal Arrangement Patterns**
Young-Soo Na, 17, Junior,
Minkyu Kim, 17, Junior,
Hyunwoo Lee, 17, Junior,
Incheon Academy of Science and Arts, Incheon Metropolitan City, Incheon, South Korea

- EGPH031 Developing a Novel Aeroelastic Flutter Based Piezoelectric Energy Harvester (AERO)**
Maanasa Mendu, 15, Freshman, William Mason High School, Mason, Ohio
- EGPH032 "Virtually Perfect" Photovoltaic Cells: A Novel and Adaptive Approach to Modeling Quantum Dot Templates Optimized for Varied Light Conditions**
Sathya Edamadaka, 16, Sophomore, High Technology High School, Lincroft, New Jersey
- EGPH034 Driving on Sunshine**
Kieran Hensleigh Walter-Sundaram, 16, Freshman, Good Hope Country Day School, Kingshill, United States Virgin Islands
- EGPH035 Developing an Optimal Novel Unconventional Wind Turbine**
Farid Muddassir Shahid, 16, Freshman, Parkland High School, Allentown, Pennsylvania
- EGPH036 Thin Panel, Cylinder-Arrayed, Solar Water Heater**
Nizhoni Tallas, 18, Senior, Navajo Preparatory School, Farmington, New Mexico
- EGPH037 The Converter of Three-Dimensional Oscillations into Electrical Energy**
Valeriia Tyshchenko, 17, Sophomore, Kherson Physical and Technical Lyceum of Kherson City Council Affiliated to National University of Dnipropetrovsk, Kherson, Ukraine
- EGPH038 Waste Heat Recovery to Reduce Engine Emissions**
Eric John Spilman, 18, Senior, Mandan High School, Mandan, North Dakota
- EGPH039 Recycling Energy and Reducing Solid Waste: A Novel Battery-Charging Device with Optical Concentrator Reflector Design that Optimizes Indoor Energy Harvesting**
Annie Ostojic, 15, Freshman, Munster High School, Munster, Indiana
- EGPH040T Multi Axial Motion Unifying Gear Arrangement to Capture Wave and Other Random Run Away Energy**
Sairandri Sathyanarayanan, 17, Senior,
Sacheth Sathyanarayanan, 16, Junior,
National Public School, Chennai, Tamil Nadu, India
- EGPH041 Investigation of the Performance of Home-Made Flywheel Energy Storage Systems**
Katinka Nell Wilkinson, 16, Sophomore, Herschel Girls High School, Cape Town, Western Cape, South Africa

Engineering Mechanics

- ENMC001 Integrated Self-Powered Bicycle Wheel Light**
Thomas J. Dorminy, 19, Senior, Sola Fide Home School, McDonough, Georgia
- ENMC002 Design and Production of an Innovative, Interactive Augmented Reality Projector**
Tobias Gerbracht, 20, Senior, Carl-Fuhlrott-Gymnasium, Wuppertal, Nordrhein-Westfalen, Germany
- ENMC003 A Wing Is Enough: An Improved Flying Wing Based on a Bell-Shaped Lift Distribution**
Ivo Zell, 19, Senior, Internatsschule Schloss Hansenberg, Geisenheim-Johannesberg, Hessen, Germany
- ENMC004T Fast & Self-Stabilized Image Platform**
YanYi Wang, 16, Freshman,
YuFei Li, 15, Freshman,
Beijing No.4 High School, Beijing, China
The High School Affiliated to Renmin University of China, Beijing, China
- ENMC005 Gaze: A Low Cost, Digital Optical Device Supporting Education in Developing Countries**
Gareth Reid, 19, Senior, Grosvenor Grammar School, Belfast, Northern Ireland, United Kingdom
- ENMC006 Design and Fabrication of Solar Water Pumping System with Smart Irrigation Technique**
Shahzaib Ejaz, 19, Senior, PakTurk International Schools and Colleges, Lahore, Punjab, Pakistan
- ENMC007T Construction of an Electric Reel to Collect a Strand of Electric Shepherd**
Lucia Fuentes, 20, Senior,
Sabrina Lujan Cornu, 19, Senior,
Agrarian School of Rosario, Rosario, Colonia, Uruguay
- ENMC008T Improving Forklift Maneuverability**
Reinier Conrad Scherman, 17, Junior,
Christiaan Bernard Myburg, 17, Junior,
Hoerskool Waterkloof, Pretoria, Gauteng, South Africa
- ENMC009 Avionic Engine Supremacy**
Carlos Alberto Mendez, 18, Junior, United High School, Laredo, Texas
- ENMC010 Improved Brushless DC Motor**
Michael Serge Pozmantir, 16, Freshman, Imagine International Academy of North Texas, McKinney, Texas
- ENMC011 A Brief Study in the Effects of the Bernoulli Principle when Applied to an Underwater, Inverted Foil**
Donald Edward Martin, 17, Sophomore, Academics Etc., Lake Charles, Louisiana
- ENMC012T High Efficiency Rocket Nozzles**
Luke Campbell, 17, Junior,
Brooklyn Jean Legg, 17, Junior,
Taylor Herndon, 17, Junior,
Vision Charter School, Caldwell, Idaho
- ENMC013T A Novel Aircraft De-icing System: Smart Piezoelectric Skin**
Hamid Salimov, 17, Junior,
Timur Kalyayev, 17, Junior,
Baku European Lyceum, Baku, Absheron, Azerbaijan
- ENMC014 Prevention Device for Non-Controllable Oil and Gas Blow Out**
Gudrat Muradli, 16, Sophomore, Istek Lyceum, Baku, Azerbaijan
- ENMC015T Electric Jet Engine**
Taylor Ann Benning, 19, Senior,
Adam Skora, 19, Senior,
Buena High School, Sierra Vista, Arizona
- ENMC016 Designing and Implementing an Algorithm to Accurately Control the Attitude of Free-Floating Satellites Using Extendable Manipulators**

Ashwin Nivas Datta, 19, Senior, Glencoe High School, Hillsboro, Oregon
- ENMC017 Cryogenic Thermosuit for Manned Mission to Titan**
Wittiker Benjamin Schlauch, 18, Senior, Clear Brook High School, Friendswood, Texas
- ENMC018 Plasma Actuator, "Not A Drag," Year II**
Robert Ezekiel Kollman, 19, Senior, Shallowater High School T-STEM Academy, Shallowater, Texas
- ENMC019 Single and Simple Groove Addition Improves Propeller Efficiency**
Kotaro Tabuchi, 18, Senior, Nanzan Boys' Senior High School, Nagoya-city, Aichi-pref., Japan
- ENMC020 Composites: Transforming T-Beams**

Danika Louw, 18, Senior, Holy Spirit Catholic High School, Tuscaloosa, Alabama
- ENMC021T Cost-Effective Remotely Operated Vehicles (ROVs) for Ecological Analysis**

Alex Yamada#, 18, Senior,

Eric Scott Schlitzkus#, 17, Junior,
Pearl City High School, Pearl City, Hawaii
- ENMC022 Reduction of Cranial Impact from High-Speed Lacrosse Shots Utilizing Multi-Durometer, External Helmet Padding: A "Deflection" Design**
Maximilian James Chmura, 16, Sophomore, St. Vincent - St. Mary High School, Akron, Ohio
- ENMC023 Synth-Etic: The World's First "Hood-Wind" Musical Instrument**
Justin Hughes Mitchell, 15, Freshman, St. Kevin's College Toorak, Toorak, Victoria, Australia
- ENMC024T Aircraft Nut Tension Monitoring Washer**
Grace Gao, 17, Junior,
Guanqun Zhou, 16, Sophomore,
Pui Shan Lee, 17, Junior,
Ka Ki Ng, 15, Freshman,
SKH Li Ping Secondary School, Hong Kong, China, Hong Kong Special Administrative Region
The Chinese Foundation Secondary School, Siu Sai Wan, China, Hong Kong Special Administrative Region
- ENMC025 External Combustion Open-Cycle Engine**
Ion Cerempei, 18, Senior, Theoretical High School "George Calinescu," Chisinau, Republic of Moldova
- ENMC026 Can Machines Learn to Design Better than Humans?**
Robert Connor van Zyl, 17, Sophomore, McIntosh High School, Peachtree City, Georgia
- ENMC027 Development of a Hybrid Direct Ink Write 3D Printer: A Novel Approach to 3D Printing Multi-Material Functional Devices and Flexible Electronics**

Joshua Murphy Jacob, 18, Junior, Saint Xavier High School, Louisville, Kentucky
- ENMC028T Solar Energy Out on a Limb: A Novel Photovoltaic Energy**
Hahnbee Lee, 17, Junior,
Jarrett J. Lash, 17, Junior,
The Governor's School @ Innovation Park, Manassas, Virginia
- ENMC029 An Altitude Control System for Long Duration, High Altitude Balloon Flights**
Natalie Celeste White, 15, Freshman, University High School, Fresno, California
- ENMC030 The Next Airbender: A Novel Approach to Airfoil Efficiency and the Optimization of the Lift-to-Drag Ratio**
Rachel Seevers, 16, Sophomore, Paul Laurence Dunbar High School, Lexington, Kentucky

- ENMC031 The Effects of Pre-Heating the Intake of an Engine on the Output of Emissions**
Kaycee Rae Smith, 17, Junior, Spring Creek High School, Spring Creek, Nevada
- ENMC032 The Development of an Unmanned Aerial Vehicle for Use in Silo Inspection**
Samantha Boyea, 17, Junior, Greenwich Junior-Senior High School, Greenwich, New York
- ENMC033 Effectiveness of Negative Stiffness Devices at Resisting Seismic Force in Buildings**
Derek Christopher DeMel, 18, Senior, Athens High School, The Plains, Ohio
- ENMC034T Analysis of Airborne Wind Energy Systems in a Wind Tunnel to Enhance Electricity Generation Efficiently**
Theo Calvin Guerin, 18, Senior,
Charles Johannes Fenske, 18, Junior,
Falmouth Academy, Falmouth, Massachusetts
- ENMC035T Modular Numerical Controlled Prototyper**
Laurenz Caspar Fussenegger, 18, Senior,
Elias Vogel, 18, Senior,
Hohere Technische Bundeslehr- und Versuchsanstalt Rankweil,
Rankweil, Vorarlberg, Austria
- ENMC036T FuelRFID**
Hala M. N. Ishtaiha, 16, Sophomore,
Lana A. Y. Haqsh, 15, Sophomore,
Tala' Al-Amal Secondary Schools, Nablus, West Bank, Palestine
- ENMC037 Protecting Civilians and Public Service Personnel through an Early Identification and Warning System for Airborne Chemicals: SEIAC**
Hannah Dorothy Herbst, 17, Sophomore, Florida Atlantic University High School, Boca Raton, Florida
- ENMC038 Mission To Mars: Designing a Spacecraft Impact Protection and Detection System with Radiation Shielding**
Grayson Hunstinger, 18, Junior, Lakeland Grace Academy/New Life Christian, Lakeland, Florida
- ENMC039 LifeSpin: Comprehensive Water Purification and Transportation via Induced Turbulent Flow in Conjunction with Faraday's Law of Induction**
Shane Tomaino, 17, Junior, Rye Country Day School, Rye, New York
- ENMC040 Building a Better Burner Improving Forge Efficiency**
Brendan Joseph Crotty, 15, Freshman, Home School, Muskogee, Oklahoma
- ENMC041 Development of a Low-Cost Articulated Arm 3D Printer**
Zachary Scott Allen, 17, Junior, Northridge High School, Layton, Utah
- ENMC042 Blown Away: Improving Propeller Efficiency with Natural Flow Propeller Shrouds**
Andrew Bennett, 17, Junior, Bountiful High School, Bountiful, Utah
- ENMC043 The Effect of the Removal of Mass on the Calculated Efficiency of Structural Beams**
Heather Dawn Wotton, 18, Junior, Mountain Vista Governor's School, Warrenton, Virginia
- ENMC044 An Investigation of Optimal Rural Building Designs for All Earthquake Zones of Turkey**
Lucas Robert Mayhew, 17, Sophomore, Mills E. Godwin High School, Henrico, Virginia
- ENMC045 Real-Time 3D Printing Error Detection and Correction**
William Makinen, 17, Junior, West Potomac High School, Alexandria, Virginia
- ENMC046T Algae Energy**
Seifeldin Abdelmoneim Mohamed, 19, Senior,
Dina Ahmed Abdelaal, 18, Senior,
Suez Advanced Industrial School, Suez, Egypt
- ENMC047 The Effects of Pitch on Propeller Thrust**
Anna Claire LeJeune, 16, Sophomore, Saint Joseph's Academy, Baton Rouge, Louisiana
- ENMC048 Investigating Flow in Rotating Cylindrical Tubes**
Hannah Elisabeth Lynn Farmer, 16, Freshman, Stillwater Area High School, Oak Park Heights, Minnesota
- ENMC049 Morphing Wing for Trucks: Greater Stability in Cornering**
Felix Junior Morales, 18, Senior, Colegio Congregacion Mita, San Juan, Puerto Rico, Puerto Rico
- ENMC050 Energy Saving SwimFin: Developing the Optimal Fin for Faster and Efficient Swimming**
Yuki Hayakawa, 17, Sophomore, Kyoto Municipal Tonan High School, Kyoto, Kyoto, Japan
- ENMC051 Feedback Control of Driverless Buses**
Taiga Yanagida, 17, Sophomore, Tamagawa Academy, Machida, Tokyo, Japan
- ENMC052 A Wooden CNC from Scratch: The True Established Mechanisms by Three Elements—Technology, Electronics and Software Are Out There!**
Tadashi Nishimiya, 16, Sophomore, Kokura High School, Kitakyushu, Fukuoka, Japan
- ENMC053 Hydraulic Operated Vice**
Walakuluge Sanuja Udantha Abeyawickrama, 18, Senior, Dharmasoka College, Ambalangoda, Galle, Sri Lanka
- ENMC054 Systematic Wall Constructing Tool**
Gangodawila Kankanamalage Navodya Wishvajith Gangodawila, 16, Junior, Mayurapada Central College, Narammala, North Western Province, Sri Lanka
- ENMC055 Angling Energy for Vitamin D3 Synthesis Efficiency**
Abigail Ann Arnashus, 15, Freshman, Von Steuben Metropolitan Science Center, Chicago, Illinois
- ENMC056 Silent Sounds**
Andra Moira Catherine Smith, 15, Freshman, Trinity Christian School, Williston, North Dakota
- ENMC057T Making 3D Printer Using Junk: Everyone Can Make!**
Juhwan Lim, 17, Junior,
Jigang Lee, 17, Junior,
Geunyong Park, 18, Senior,
Daegun High School, Daegu, South Korea
- ENMC058 Designing a Scalable 3D Printer with a Novel Elevation System**
Liam Fitzpatrick Johnson, 19, Senior, Arkansas School for Mathematics, Sciences, and the Arts, Hot Springs, Arkansas
- ENMC060 Enhancing Accessible Pedestrian Signals: Using Tactile Maps**
Mary Grace Murray, 17, Sophomore, Olentangy High School, Lewis Center, Ohio
- ENMC061T Solenoid Engine**
Mikhail Burlachenko, 17, Sophomore,
Andrei Perkov, 17, Sophomore,
State Budgetary Educational Institution of Moscow "Gymnasium No 1786", Moscow, Russian Federation
- ENMC062 Neolithic Engineering in the 21st Century: An Innovative Design Using the Ball-and-Socket Model to Mitigate Seismic Effects on Contemporary Pacific Structural Designs**
Youngyoon Seo, 17, Junior, Saint John's School, Upper Tumon, Guam

- ENMC063T No More Heat Awaiting in the Car**
Virginia Marie Martin, 16, Sophomore,
Esteban Josue Martinez, 16, Sophomore,
Col. Beato Carlos Manuel Rodriguez, Bayamon, Puerto Rico
- ENMC064 Iced Up Lowdown: Examining the Degrading Effects of Ice on Laminar Flow and Performance of Airfoils**
Elizabeth Grace Kent, 16, Sophomore, Kent Academy, Edmond, Oklahoma
- ENMC065 Utilization of the Spidron System for Generating Force Absorbing Structures**
Skyler Hughes, 18, Junior, Albuquerque Institute for Math and Science, Albuquerque, New Mexico
- ENMC066 A Novel Approach to Prevent Damage from Earthquakes and Tsunamis with the Utilization of a Proportional Surface Hexagonal Structure and Modified Underground Two-Part Hexagonal Damping Rubber Bearing Base Isolator**
Daniel Noon, 15, Freshman, Brophy College Preparatory, Phoenix, Arizona
- ENMC067 You're Out! An Electronic Baseball Umpire**
Elias Andersen, 17, Junior, Pretty River Academy, Collingwood, Ontario, Canada
- ENMC068T The Analyzer for Testing the Roughness Quality of Surfaces**
Chin leong Kong, 18, Senior,
Wen Jing Liang, 20, Junior,
The Workers' Children High School, Macau, China, Macao Special Administrative Region
- ENMC069 Engineering a Laser Technique to 3D Print Robust Hydrogels for Extracellular Matrices**
Joshua Dong, 18, Senior, North Carolina School of Science and Mathematics, Durham, North Carolina
- ENMC070T Calculation and Visualization of Bicycle Traffic Flows**
Gustav Lidberg, 19, Senior,
Martin Tjern, 19, Senior,
Lugnetgymnasiet, Falun, Dalarna, Sweden
- ENMC071 Using 3D Printing for the Fabrication of Gas Dynamic Virtual Nozzles**
Daniel Fay, 18, Senior, Mesquite High School, Gilbert, Arizona
- ENMC072 Stepping into the Future**
Ryan Macayan Ramsey, 18, Senior, Rialto High School, Rialto, California
- ENMC073 Nuclear Thermal Rockets: Mars and Beyond**
Sophia Li, 19, Junior, Los Alamos High School, Los Alamos, New Mexico
- ENMC074 The Effect of Dimple Configuration on Golf Ball Distance**
Hunter Twitchell, 17, Junior, Success Academy DSU, St. George, Utah
- ENMC075 Design of a Telepresence System to Operate at Mars Surface in a Pre-Colonial Context**
Joel Romero Hernandez, 17, Junior, Institut F.X. Lluch i Rafecas, Vilanova i la Geltru, Barcelona, Spain
- ENMC076 Thermoelectric-Evaporative Cloud Chamber**
Finlay James Joseph Cuffe, 19, Senior, Sutton Grammar School, Sutton, Surrey, United Kingdom
- ENMC077T Developing a Bicycle Attached Device for Manipulating Riders Attention for Increased Safety**
Anders Osterby, 19, Junior,
Vincent Olesen, 18, Junior,
Odense Tekniske Gymnasium, Odense, Fyn, Denmark
- ENMC078 Power Up with HOH**
Hayden James Heilig, 18, Senior, Moore High School, Moore, Montana
- ENMC079T Transparent Side**
Mousa Ghassan Rajab ALJawaheri, 17, Junior,
Mohammed Zaki Hamid Jabir ALJubori, 18, Junior,
Baghdad Ishik Boys College, Baghdad, Almansour, Iraq
- ENMC080 Green Belt**
Sharena Mohamed Alremeithi, 17, Senior, International Community School, Abu Dhabi, United Arab Emirates

Environmental Engineering

- ENEV001T Evaluation of Particulate Matter (PM10) Concentration: A Case Study in Camboriu, Brazil**
Beatriz Faga, 17, Senior,
Daniel Caldas de Oliveira, 18, Senior,
Instituto Federal Catarinense - Campus Camboriu, Camboriu,
Santa Catarina, Brazil
- ENEV002 Carbon Capture and Storage via Silver Nanoparticle Catalyzed Hydration of Carbon Dioxide**
Agustina Stefani, 18, Senior, Greenwich High School, Greenwich,
Connecticut
- ENEV003 Development of a Less Expensive Method for Radon Measurements**
Jose Alfredo Ocegueda Sanchez, 20, Senior, Centro de
Ensenanza Tecnica Industrial, Tonalá, Jalisco, Mexico
- ENEV004 Zapping the Pollutants! Electro-Oxidation for Pollution Control**
Rohan Sanjeev Jakhete, 14, Freshman, South Fork High School,
Stuart, Florida
- ENEV005 Do Herbicides and Fertilizers Found in Surface Runoff Affect the Oyster (*Crassostrea virginica*) and Clam (*Mercenaria mercenaria*) Ability to Naturally Filter and Improve the Overall Water Quality of the Indian River Lagoon?**
Kyle Wilson Bramblett, 15, Freshman, Titusville High School,
Titusville, Florida
- ENEV006 Phytodesalination of Saline Soil Using Native Hawaiian Halophytes**
Mika Alexandra Ishii, 16, Freshman, Kalani High School, Honolulu,
Hawaii
- ENEV007T "A Nice Fracking Solution," Phase III: The Implementation of a Testing Protocol to Test De-Icing Qualities of Fracking Salt Pellets When Compared to Road Salt (NaCl) and to Test Plausibility of Implementation of Fracking Salt Pellets as a Possible Northern Road De-Icer**
Levi Allen Peterson, 18, Senior,
Jacob Tyler Schmidt, 18, Senior,
Cloquet Senior High School, Cloquet, Minnesota
- ENEV008 Evaluating the Effectiveness of a Hydrogel/Fertilizer Matrix to Improve Seed Germination**
Dante Arther Sylvester, 18, Senior, Greybull High School,
Greybull, Wyoming
- ENEV009 Goldenrod: Alternative Raw Material for Pharmacology and Energetics**
Aliaksandra Kakhavets, 17, Sophomore, Zhodino Gymnasium No.
1, Zhodino, Minsk Region, Belarus
- ENEV010 Predicting Space Debris' Trajectory through the Atmosphere**
Esben Juel Porat, 20, Senior, Arhus Statsgymnasium, Aarhus,
Jylland, Denmark
- ENEV011 Alternatives of Bioremediation in the Management Waste of CETMAR 08**
Miriam Sugey Romero Osuna, 18, Senior, Centro de Estudios
Tecnologicos del Mar 08, Mazatlan, Sinaloa, Mexico
- ENEV012 Effective Remediation of Air Pollution and Sustainable Electricity Production using an Algal Bio Photo-Voltaic Fuel Cell (BPFC), Phase III**
Sai Sameer Pusapaty, 18, Senior, Liberal Arts and Science
Academy, Austin, Texas
- ENEV013 Signal Buoy**
Hans Anniste, 18, Junior, Poltsamaa Co-Educational Gymnasium,
Poltsamaa, Jogevasmaa, Estonia
- ENEV014 Phosphorus Recovery from Storm Water Runoff with Seawater-Mixed Perovskite Concrete for Reutilization as a Mineral Fertilizer**
Vincent Daamvin Hwang, 18, Senior, Southwestern Educational
Society, Mayaguez, Puerto Rico
- ENEV015T RecycloTrash: Barcodes vs. CV**
Jesus Rene Capo, 16, Sophomore,
David Alexander Perez, 16, Sophomore,
Christopher Columbus High School, Miami, Florida
- ENEV016 Engineering an Environmentally Friendly Drilling Fluid**
Jill Elizabeth Bohnet, 16, Sophomore, The Woodlands College
Park High School, The Woodlands, Texas
- ENEV017T Shocking! A Study of Electrocoagulation in Treatment of River Water**
Garrett Eric Curtis Guerrero, 15, Freshman,
Matthew Jeffrey Trees, 15, Freshman,
Guerrero Home School, San Angelo, Texas
Trees Family Home School, San Angelo, Texas
- ENEV018T A Magnetic Brush that Cleans Solar (PV) Cells from Dust and Sand without the Use of Water and Electricity**
Omar Ahmad Ahmad, 17, Junior,
Zaid Riyad Alatiyat, 17, Junior,
Modern Montessori School, Amman, Jordan
- ENEV019T Using Physics in Withdrawing and Purifying Air without Human Intervention**
Beshar Nijm Aldabbagh, 16, Junior,
Sanad Saleh Alkiswaani, 17, Junior,
Al-Hasaad Al-Tarbawi, Amman, Amman, Jordan
- ENEV020 Recycling of Cement Kilns Dust (CKD) to Improve the Mechanical Properties of the Base Course Layer in Highways**
Ban Ayoun Ghrair, 15, Freshman, Al-Husseini Preparatory School
for Girls - UNRWA, Amman, Amman, Jordan
- ENEV021T Investigation of the Pyrolysis and Chemical Activation of Expanded Polystyrene Foam to Form Activated Carbon**
Julia Nicole Bray, 16, Freshman,
Ashton Cameron Cofer, 15, Freshman,
Gahanna Lincoln High School, Gahanna, Ohio
Columbus Academy, Gahanna, Ohio
- ENEV022 Post-consumer PET as Stock for Additive Manufacturing**
Kaelum Robb Rodriguez Hasler, 18, Senior, Blacksburg High
School, Blacksburg, Virginia
- ENEV023 Removal of Radioactive Strontium from Contaminated Water Using Novel Cost-Effective Biosorbents**
Michael Hao Pang, 17, Junior, Mills Edwin Godwin High School,
Henrico, Virginia
- ENEV024T Versatile Usage of Spent Coffee as an Eco-friendly Water Purifier**
Dominic Wei Ting Yap, 17, Junior,
Shawn Hai Leong Lim, 17, Junior,
Bryan Wei Leong Lim, 17, Junior,
Hwa Chong Institution, Singapore, Singapore
- ENEV025 Removal of Heavy Metal Ions from Industrial Wastewater Using Algal Polysaccharide Alginate**
Matheus Colsato Bevilacqua, 19, Senior, Escola Americana de
Campinas, Campinas, Sao Paulo, Brazil
- ENEV026T Chemically Modified Jordanian Zeolitic Tuff for Removal of Heavy Toxic Metals from Industrial Water**
Hala Basheer Almajali, 17, Junior,
Tala Maen Mesmar, 17, Junior,
Jubilee School, Amman, Jordan

- ENEV027 The Development of an Algorithm through the Assessment of Nutrients in a Recycled Food Supplement for Canines to Reduce Waste Production**
Alexis Lauren Jones, 18, Junior, Auburn High School, Auburn, Alabama
- ENEV028 Engineered Environmental Containment: Using *Lemna minor L.* to Reduce Nitrate Levels in Aquatic Environments**
Aaron Alexander Wills, 18, Junior, Central Lee High School, Donnellson, Iowa
- ENEV029 The Construction of a Price Reduced 3D Printed Turbidity Meter**
Samuel Anthony Maher, 17, Junior, Arthur Hill High School, Saginaw, Michigan
- ENEV030 Environmental Impact of Artificial Sweeteners Acesulfame, Sucralose, and Saccharin in Nature**
Qihang Wang, 18, Junior, Oxford High School, Oxford, Mississippi
- ENEV031 Development of a Household Direct-Steam-Generation Solar-Powered Water Recovery System, Year II**
Anna Christine Benedict, 18, Senior, Palos Verdes Peninsula High School, Rolling Hills Estates, California
- ENEV032 Crowd-Sourced Detection and Mapping of Nitrate Water Pollutants via a Mobile Web-Based Image Analysis System**
Luca Jose Barcelo, 17, Junior, Greenwich High School, Greenwich, Connecticut
- ENEV033 Development of a CNT/ZnO/TiO₂ Membrane for Visible-Light Induced Photocatalytic Filtration of Water-Borne Organic and Bacterial Pollutants**
Michelle Jun Xiong, 17, Junior, Greenwich High School, Greenwich, Connecticut
- ENEV034 Novel Low-Temperature Carbon Capture Using Aqueous Ammonia and Organic Solvents**
Ethan Novek, 18, Senior, Greenwich High School, Greenwich, Connecticut
- ENEV035 Addressing Global Water Scarcity: Novel Dewatering Techniques for Hydrophilic Saponified Starch-Grafted-Polyacrylamide Hydrogel Based Desalination Using UV Light, Ca(OH)₂, and Dry Ice to Improve Reusability of Super-Absorbent Polymers**
Chaitanya Dasharathi Karamchedu, 18, Senior, Jesuit High School, Portland, Oregon
- ENEV036 Development of a Novel Biodegradable Plastic Film with *Passiflora edulis*' Byproduct**
Juliana Davoglio Estradioto, 17, Junior, Instituto Federal de Educacao, Ciencia e Tecnologia do Rio Grande do Sul - Campus Osorio, Osorio, RS, Brazil
- ENEV037 Functionalizing Biochar with Layered Double Hydroxides for Removal of Phosphate and Nitrate from Aqueous Solutions**
Stefan Wan, 18, Senior, Alexander W. Dreyfoos School of the Arts, West Palm Beach, Florida
- ENEV038 The Potential of Selected Agricultural Wastes as Sound Absorber and Thermal Insulator Based on Their Surface Morphology**
Ricky Dave Torres Mercado, 18, Junior, Nabuslot National High School, Pinamalayan, Oriental Mindoro, Philippines
- ENEV039 Harmful Algae Bloom Prevention Using *Stropharia* Mycofiltration**
Harshal Rajesh Agrawal, 16, Sophomore, Dr. Ronald E. McNair Academic High School, Jersey City, New Jersey
- ENEV040 Waste Embraced 2.0: A Novel Study of the Effects of Optimized Struvite Precipitation on Biogas Production and Resource Recovery from Municipal Landfill Leachate and Wastewater Centrate**
Tanisha Martheswaran, 17, Junior, Waterford School, Sandy, Utah
- ENEV041 Low-Cost Gravity Driven Filtration System Designed Using Iron Oxide Nanoparticle-Loaded PU Foam for Arsenic Removal from Polluted Water in Developing Countries**
Arundhati Pillai, 18, Senior, University School of Milwaukee, Milwaukee, Wisconsin
- ENEV042 The Ideal Electricity System**
Hossam Hassan Hassan, 17, Junior, S.T.E.M. Luxor School, Luxor, Egypt
- ENEV043T Integrated Recycling System**
Ahmad Yasser EL Gazzar, 18, Senior, Abdelrahman Khaled Abdo, 18, Senior, STEM High School for Boys, 6 of October, Giza, Egypt
- ENEV044 Efficient Removal of Pb²⁺, Cd²⁺, and UO₂⁺ from Water through Sustainable Nano Cellulose Coagulants Synthesized through One Step Modification of Raw Biomass**
Aurnov Chattopadhyay, 19, Senior, University High School, Irvine, California
- ENEV045 The Effects of *Brassica juncea* vs. *Eichhornia crassipes* on the Reduction of CrVI to CrIII through Phytoremediation**
Sara E. Zangi, 16, Sophomore, East Chapel Hill High School, Chapel Hill, North Carolina
- ENEV046 Modeling Realistic Factors for the Improvement of SODIS-AOP**
Helen Haiyue Peng, 17, Sophomore, Starkville High School, Starkville, Mississippi
- ENEV047T The Development of a Mechanized Approach to Rapidly and Sensitive Detect and Purify Water Contaminated with *Shigella*, *E. coli*, *Salmonella*, and *Cholera* through the Use of Carbon-Based Biosensors in Conjunction with Arduino-Controlled Micropipettes**
Rachel Chang, 17, Junior, Ryan Matthew Thorpe, 17, Junior, Manhasset High School, Manhasset, New York
- ENEV048 Slick and Clean: An Investigation into How Magnetite Can Be Used with Organic Sorbents in Oil Spill Clean-Up**
Rebekah Kang, 17, Junior, Presbyterian Ladies' College, Sydney, Sydney, New South Wales, Australia
- ENEV049T For Pure Life**
Ibrahim Mohamed Helmy Ali, 17, Junior, Mohamed Gamal Nafe, 18, Junior, Dr. Yusuf Ismail Secondary, Nag Hammadi, Qena, Egypt Red Sea STEM, Hurgada, Egypt
- ENEV050 Utilization of Triglycerides from Spent Coffee Grounds to Create Methyl Esters through Transesterification**
Regina Elizabeth Lee, 18, Senior, Palos Verdes Peninsula High School, Rolling Hills Estates, California
- ENEV051T Innovative Vapor Condenser Inspired by Bromeliad Plant**
Sureporn Triphetprapa#, 17, Junior,
Kanjana Komkla#, 18, Junior,
Thidarat Phianchat#, 18, Junior, Suratpittaya School, Suratthani, Thailand
- ENEV052 Powerless Desalination: The Development of a Novel PEGylated Membrane to Exploit Ambient Thermal Energy Gradients of the Ocean**
Hyrum Thomas Diesen, 19, Senior, Pleasant Grove High School, Pleasant Grove, Utah
- ENEV053T Sustainable and Appropriate Technology System (SATS) Using Spent Mushroom Substrate for Restoring Soil Ecosystem Health**
Mijoo Ryu, 17, Sophomore, Sun Woo Yoo, 17, Sophomore, Chaeyeon Lim, 17, Junior, Banpo High School, Seoul, South Korea

- ENEV054T Production of Multipurposed Bio-Bag with the Compound of Wild *Asphodelus aestivus* Root and Residual Marble Powder**
Muhammed Eyyup Alma, 17, Sophomore,
Necmettin Yururdurmaz, 18, Junior,
Ozel Mehmet Sait Temel Lisesi, Kahramanmaras/Onikisubat,
Kahramanmaras, Turkey
- ENEV055 Analyzing the Practical Application of Filtering Pb²⁺ Using Freshwater Algae, Phase Four**

Amanda Catherine Minke, 18, Senior, Immaculate Heart High School, Oro Valley, Arizona
- ENEV056 Bio-Accumulation of Oil by *Aurelia aurita* Mucus**
Karina Bjazevic, 18, Senior, Palos Verdes Peninsula, Rolling Hills Estates, California
- ENEV057 Chocolate Garden**
Amber Zhang Krackzowska, 15, Freshman, Pembroke School, Kensington Park, South Australia, Australia
- ENEV058T A Study on the Effectiveness and Use of Freshwater Snail Waste in the Production of Agricultural Materials**
Dongjun Ahn, 17, Junior,
Sooyeon Jang, 17, Junior,
Yeon Soo Choi, 17, Junior,
Changwon Science High School, Changwon-si, Gyeongsangnam-do, South Korea
- ENEV059T Efficient Hydrogen Sulfide Treatment by Hydrogensulfide: Fe-EDTA Fuelcell**
Jiyul An, 17, Junior,
HeeJae Park, 17, Junior,
Hong Sujin, 17, Junior,
Chungnam Science High School, Gongju, Chungcheongnam-Do, South Korea
- ENEV060 Filtering Turbidity Using Sediment Filters versus *Balfourianae* Filters**
Sydney Kay, 18, Junior, Success Academy DSU, St. George, Utah
- ENEV061 Graphene Oxide: A Novel Material for Water Filtration**
Ankush Dhawan, 16, Freshman, Signature School, Evansville, Indiana
- ENEV062 Aerobic Cometabolism of cis-DCE by *Rhodococcus rhodochrous* ATCC® 21198 with Isobutane Growth Substrate**
Lauren A. Waldman, 17, Junior, American Heritage School, Plantation, Florida
- ENEV063T Bangka's Tin Sea Sand-Fe₃O₄ as a Removal of Heavy Metals in By-Product of Tin Ore Processing**
Intan Utami Putri, 17, Senior,
Shofi Latifah Nuha Anfaresi, 17, Senior,
State Senior High School 1 Sungailiat, Sungailiat, Bangka, Bangka Belitung, Indonesia
- ENEV064T Smart Pleco: A Multi-Functional Eco-Friendly Unmanned Craft for Waterbodies Protection**
Chon Hou Leong#, 17, Junior,
Chon Hin Ho#, 18, Senior,
Pui Ching Middle School Macau, Macau, China, Macao Special Administrative Region
- ENEV065T Macauba Palm: A Fruitful Future**
Pauline Louise Ten Harmsen van der Beek, 18, Senior,
Eline Peeters, 19, Senior,
Melanie Martha Gesina Reijnaers, 19, Senior,
Gertrudis College, Roosendaal, Noord-Brabant, Netherlands
- ENEV066 Green Nanotechnology: Increasing Sewage Water Treatment Efficiency by Using Economical Porcelanite Nanoparticles**
Ruba Yosof Alsulami, 18, Senior, Jeddah Gifted School, Jeddah, Makkah Almukarramah, Saudi Arabia
- ENEV067 Converting Industrial Waste into Eco-Friendly Products for Pharmaceutical Applications**
Dana Abdullah Alghamdi, 17, Junior, KFUPM Schools, Dhahran, Eastern Province, Saudi Arabia
- ENEV068 Filtration of Copper-Contaminated Water Using *Crescentia cujete's* Shell Based Activated Carbon**
Jose Luis Ramirez-Colon, 18, Senior, Escuela Secundaria Especializada en Ciencias, Matematicas y Tecnologia, Caguas, Puerto Rico
- ENEV069T Worm Feed from Palm Oil Waste**
Chatchanok Klaitaphong, 17, Senior,
Nuengthida Kwandee, 17, Senior,
Pathompong Muangthong, 18, Senior,
Suratpitaya School, Muang Suratthani, Suratthani, Thailand
- ENEV070 Retrofit System for Smart Reduction of Detergent Usage by Washing Machines**
Anastasiia Livochka, 17, Junior, Lviv Lyceum of Technology, Lviv, Ukraine
- ENEV071 Reinventing Photobioreactors: Eliminating Industrial Emissions While Producing Energy**
Kevin Mark Matos, 16, Sophomore, The Villages Charter School, The Villages, Florida
- ENEV072 Unleashing the Way! Remediation of Lead Contaminated Water with *Coriandrum sativum* (Cilantro) Biochar**
Manashree Seth Padiyath, 15, Freshman, Woodbury High School, Woodbury, Minnesota
- ENEV073 Reducing Harmful Car Emissions by Interior Coating of a Non-Noble Metal Catalyst**
Gary Thanh Nguyen, 18, Junior, Mississippi School for Mathematics and Science, Columbus, Mississippi
- ENEV074 Biodegradation of Chlorpyrifos and Soil Remediation Using Native Soil Bacteria and Triton X-A Novel Approach**

Prashaant Ranganathan, 18, Junior, Carmel Junior College, Jamshedpur, Jharkhand, India
- ENEV075T Activated Carbon: Houseplant System as a Low Cost Method of Air Purification for Improving Indoor Air Quality in Urban and Sub Urban Areas in Kenya**
Zeel Yogeshkumar Patel, 16, Sophomore,
Priyen Devraj Pindoria, 15, Freshman,
Shree Cutchi Leva Patel Samaj School, Nairobi, Nairobi, Kenya
- ENEV076 Developing a pH Sensor Using a Raspberry Pi to Monitor Ocean Acidification, Year Two**

Evelyn Amal Haase, 16, Sophomore, Molokai High School, Hoolehua, Hawaii
- ENEV077 Crude Oil: Can Microbes Eat It?**
Shefali Chopra, 19, Senior, Clear Falls High School, League City, Texas
- ENEV078T Biodiversity of Microalgae and Use in Decontamination of Cheese Whey in Water Waste in the Tobal Carcasi**
Gelver Edilson Carvajal Medina, 16, Sophomore,
Eduar Cuadros, 19, Sophomore,
Institucion Educativa El Tobal, Carcasi, Santander, Colombia
- ENEV079 Nanotechnology and Environmental Clean-Up: A Refined Solution - Distillation of Oil**
William Philip Houf, 17, Sophomore, Santa Gertrudis Academy High School, Kingsville, Texas
- ENEV080 On the Go: A Solar Power Heater Kit**
Jordan Isaiah Pope, 17, Junior, Paul Laurence Dunbar High School, Baltimore, Maryland
- ENEV081 Single Chamber MFC: Filtration of Arsenic with an Exoelectrogenic Biofilm**
Nathan Michael Tidball, 16, Sophomore, Wilsonville High School, Wilsonville, Oregon

ENEV082T Moringa Filter

Fatema Naser Alhosani, 16, Sophomore,
Khawla Abdalla Alhammadi, 15, Sophomore,
International School of Creative Science, Sharjah, Sharjah, United
Arab Emirates

ENEV083T Newspaper Cuttings from Garbage to Gold

Rashed Wassim Kabbani, 16, Junior,
Mohammad Abdulredha Abualhassan, 16, Junior,
Abdulrahman Ali Abutalib, 16, Junior,
Al Ittihad Private School - Al Mamzar, Dubai, United Arab
Emirates
Al Ittihad Private School - Jumeirah, Dubai, United Arab Emirates

**ENEV084 Testing Seed Viability after Imbibition of Produced Water
Treated with Enzyme Additive to Bioremediate Residual Toxins**

Alana River Tessman, 16, Junior, Kern Valley High School, Lake
Isabella, California

Materials Science

MATS001T On the Glow: Assessing the Luminosity, Durability, and Reflectivity of Strontium Aluminate Applied to Road Striping

Meredith Claire Guidry#, 18, Senior,
Madison Ann Hasenkampf#, 18, Senior,
St. Joseph's Academy, Baton Rouge, Louisiana

MATS002 Fabrication of a Novel Nanoporous Hybrid and Multi-Layer Membrane for a Drug Delivery System

Devanik Biswas, 18, Junior, Stanton College Preparatory High School, Jacksonville, Florida

MATS003 Ion-Solid Interactions on the Nanoscale

Julia Sophie Graupner, 20, Senior, Carl-Zeiss-Gymnasium, Jena, Germany

MATS004T Polymeric Mortar of Brick and Block Laying: A Study of Marble Waste Incorporation

Rafael Flores#, 20, Senior,
Lucas Engelmann Flores#, 20, Senior,
Fundacao Escola Tecnica Liberato Salzano Vieira da Cunha, Novo Hamburgo, Rio Grande do Sul, Brazil

MATS005 Development of Novel Oil-Water Separating Apparatus Based on Superhydrophobic Metal-Mesh

Zhiheng Zhang, 17, Junior, Beijing 101 Middle School, Beijing, China

MATS006 ESCOMBLOCK (Block Based on Debris)

Yosselin Rodríguez Cuevas, 19, Senior, Centro de Bachillerato Tecnológico Industrial y de Servicios No. 132, Hermosillo, Sonora, Mexico

MATS007T ACON (Concrete Organic Additive Based on *Opuntia ficus*)

Jasai Jahdai Rodríguez Rivera, 18, Senior,
Francisco Javier Rivas Cebrenos, 19, Senior,
Centro de Bachillerato Tecnológico Industrial y de Servicios No. 132, Hermosillo, Sonora, Mexico

MATS008 The Revolution of Plastic

Joel Lee Zher Jong, 17, Junior, Sekolah Menengah Kebangsaan Batu Lintang, Kuching, Sarawak, Malaysia

MATS009 Novel Synthesis of Thermochromic VO₂ Nanocomposite Films for Energy-Efficient Windows

Joel Abraham, 18, Senior, Westwood High School, Austin, Texas

MATS010 Novel Formulation of Highly Stable Metal-Organic Inks for Printed Electronic Applications

Mason Richard Varuso, 19, Senior, Patrick F. Taylor Science & Technology Academy, Westwego, Louisiana

MATS011T A Wearable Electronic Anti-smog Face Mask

Qiaochu Fan, 17, Junior,
Kaining Zhou, 17, Junior,
Haoyu Zhang, 17, Junior,
Chengdu No. 7 High School, Chengdu, Sichuan, China

MATS012 Collisions of a Buckyball with Graphene and SiC Sheets at Supersonic Speeds

Emily Jiayuan Liu, 18, Senior, duPont Manual High School, Louisville, Kentucky

MATS013 Childproof?

Kylee Rene Porche, 18, Junior, South Terrebonne High School, Bourg, Louisiana

MATS014 Electromagnetic Applications

Jason Dong, 17, Junior, Alfred M. Barbe High School, Lake Charles, Louisiana

MATS015 Synthesizing 3D Printable Self-Healing Materials

Jessica Jiaxin Sun, 18, Senior, Red Lion Area Senior High School, Red Lion, Pennsylvania

MATS016 Bio-Polymeric Study for Recycling and Replacing Polyethylene Terephthalate (Through Reprocessed Polyurethane Polyols and Algal Bioplastic Substitute)

Andrew Dong-Hyun Kim, 18, Junior, The Woodlands College Park High School, The Woodlands, Texas

MATS017T Alumiracle: Coloring Anodized Aluminum with Natural Dyes

Satoe Tayama, 18, Senior,
Rika Kaminishi, 19, Senior,
Chiba Prefectural Sakura High School, Sakura-city, Chiba-pref., Japan

MATS018T Enhancement of Magnetorheological Fluids for Prosthetic Knee Applications

Kit Mun Chow#, 18, Senior,
Clara Keng#, 18, Senior,
River Valley High School, Singapore, Singapore
Raffles Institution, Singapore, Singapore

MATS019 Emergent Properties from WS₂ Empowered by Laser Sculpting and Au Nanoparticles Landscaping

Belle Miaoe Sow, 18, Senior, NUS High School of Mathematics & Science, Singapore, Singapore

MATS020 Graphene Odyssey 2: Graphene Production via Resonant Frequency Exfoliation

Indigo Buenaventura Acosta, 15, Freshman, Taos Tyger/Acosta Home School, Taos, New Mexico

MATS021T Bio-Absorbent from *Spondias pinnata* Gum for Pet Pads

Nutthamon Phaiyarat, 18, Junior,
Piyorose Prutisunchai, 18, Junior,
Thidaphon Thiyakham, 17, Junior,
Damrongratsongkroh School, Muangechiangrai, Chiangrai, Thailand

MATS022T The Multifunctional Shockproof Packaging for Longer Shelf Life of Climacteric Fruits

Pakjira Thayaeng, 17, Junior,
Samitanan Sunantawanit, 18, Junior,
Sireerak Dechpong, 18, Junior,
Princess Chulabhorn Science High School Phitsanulok, Phitsanulok, Thailand

MATS023 Optimization of Electro Pulsing on Yttria-Stabilized Tetragonal Polycrystalline Zirconia (3Y-TZP) Ceramic Water Filter Sintering

Richard Li Yang, 17, Junior, Troy High School, Troy, Michigan

MATS024 Investigating the Design of Nanoparticles to Target Difficult-to-Reach Tumors

Isha Lele, 17, Junior, Hathaway Brown School, Shaker Heights, Ohio

MATS025 Developing a Novel Flexible MoS₂ Biosensor to Detect Lower-Concentrated Area of Biological Molecules at the Femtomolar Level

Erika Yang, 17, Junior, Granada High School, Livermore, California

MATS026 Aqueous vs. Interfacial Routes of Polyaniline

Hazel Rose Galvan, 17, Sophomore, Von Steuben Metropolitan Science Center, Chicago, Illinois

MATS027 Heteromultivalent Approaches to Clot-Targeted Nanomedicine: Combination Targeting of Platelets and Fibrin

Amaya Najma Razmi, 17, Junior, Hathaway Brown School, Shaker Heights, Ohio

MATS028 Bioactive Glass Enhances Recovery of *Drosophila* and Sf9 Cell Mitochondrial Function Following Antibiotic Treatment

Lacie Elizabeth Pichler, 18, Junior, Conrad Weiser High School, Robesonia, Pennsylvania

- MATS029 A Comparative Analysis of Alternative Heating Methods of an Artificial Nylon Muscle**
Maile Summer Paulmeier, 16, Sophomore, Bluffton High School, Bluffton, South Carolina
- MATS030T Corn Cob Particleboard: Ecological Product Manufactured with Corn Cob and Husk Residue**
Marcelo Abraao de Melo Ramalho, 18, Senior, Beatriz da Costa Dantas, 17, Senior, Escola Estadual Joao de Abreu, Barauna, RN, Brazil
- MATS031 Co-Assembled Ultra Strong Hydrogel as a Potential Scaffold for Tissue Engineering**
Rina Sevostianov, 18, Senior, Makif Gimel Ashdod, Ashdod, Israel
- MATS032 Oh Crack**
Kristi Ann Webster, 18, Junior, Willcox High School, Willcox, Arizona
- MATS033 Novel Agarose Processing Techniques: Development and Impregnation of Hyper-Porous Agarose Emission Foam and Micro-Cylindrical Agarose Particles**
Hamzah Faiyaaz Jhaveri, 18, Junior, Lake Highland Preparatory School, Orlando, Florida
- MATS034T Graphene Doping**
Devin Daniel Harris, 19, Senior, Dylan Trevor Hall, 19, Senior, Collinsville High School, Collinsville, Illinois
- MATS035 New, But Reused: Recycled Insulation**
Abby Sarah Polsky, 17, Junior, Great Mills High School, Great Mills, Maryland
- MATS036 Optimization of Vertically Aligned Boron Nitride Nanotube Membranes via Magnetic Arrangement in a Lyotropic Precursor for Water Transport Applications**
Connor Li, 18, Senior, Greenwich High School, Greenwich, Connecticut
- MATS037 Novel Membranes for Synthetic Lungs and Planetary Applications**
Suparnamaaya Prasad, 17, Junior, York High School, Yorktown, Virginia
- MATS038 Development and Testing of 45S5 Bioglass via Acid and Base Sol-Gel Polymerization and Fusing onto *Gallus domesticus* Cervical Bones for Bone Grafting Treatment**
Aditi Bawa, 19, Senior, Loudoun County High School, Leesburg, Virginia
- MATS039 Nanofabrication and Electroanalysis of Carbon-MEMS: A Suspended Nanometric Gap for Sensitive Biosensing**
Suryaprakash Vengadesan, 17, Junior, Irvine High School, Irvine, California
- MATS040 Fabrication of Carbon Nanosphere-Based Gas Sensor**
Jose Luis Perez-Gordillo, 18, Senior, Petra Mercado Bougart, Humacao, Puerto Rico
- MATS041 Sugar Cane Bagasse as Raw Material to Minimize Deforestation and the Use of Plastics**
Andrea Torres-Acevedo, 15, Freshman, Academia San Agustin y Espiritu Santo, Sabana Grande, Puerto Rico
- MATS042 A Novel Method to Detect Alcohol Vapors Based in the Polymeric Nanofiber PEDOT-PSSA**
Marialis Casillas, 18, Senior, Specialized School in Science and Math Thomas Armstrong Toro, Ponce, Puerto Rico
- MATS043 Revolutionizing Engineering through Visible Light: The Safe and Cost-Effective Creation of Ultra-Light, Strong, and Easily Architected Materials**
Hari Nanthakumar, 17, Junior, Christian Brothers Academy, Syracuse, New York
- MATS044 Formation of TiO₂ Surface Structure under IR Laser Ablation of Titanium in C₂H₅OH (5% H₂O) Liquids Environment: Prospects for Subsequent Chemical Processing of the Modified Layer**
Maria Borisova, 18, Junior, Samara Regional Centre for Intellectually Gifted Children, Samara, Russian Federation
- MATS045 A Novel Approach for Sensing Seismic Events: Applications of Graphene Nanoflake Powder Composites**
Isaac Nicholas Jordan, 17, Junior, Animas High School, Durango, Colorado
- MATS046T Antimicrobial "Super" Joints: Adding Silver to Titanium Nitride Physical Vapor Deposition Coating for Artificial Joints**
Hanyue Terri Liu, 17, Junior, Xiangting Andrea Liu, 15, Freshman, International School of Beijing, Beijing, China
- MATS047T Green and Sustain Energy for Tomorrow: From Waste Vegetable Oil to Economical Iron Nanoparticles Embedded Carbon as Cathode Catalyst in Fuel Cell**
Surayouth Phuksawattanachai, 18, Junior, Kraiphum Kerdtthip, 18, Junior, Kamnoetvidya Science Academy, Rayong, Thailand
- MATS048 A Novel Methodology to Assemble Organic Nanomaterials via Magnetophoretic Alignment**
Vera Alexandra Zarubin, 17, Junior, The Bronx High School of Science, Bronx, New York
- MATS049 Multifunctional NGF-Au-SPIO Nanoparticles: Magnetically Directing Neurite Extension and Orientation**
Grace Hu, 18, Senior, Jericho High School, Jericho, New York
- MATS050 Cellulose Nanocrystals for Security Applications: Embedding Non-Optical Signatures Provided by Nanoparticles into Cellulose Nanocrystal Chiral Nematic Films**
Nicky Wojtania, 18, Senior, Plano West Senior High School, Plano, Texas
- MATS051 Bio-Implants for HRQoL Applications: RSM Model Optimization of the Laser Processing Parameters to Improve Bio-Compatibility of Ti-6Al-4V Alloys**
Ashwin Kumar, 18, Junior, Texas Academy of Math and Science, Denton, Texas
- MATS052 Exploring Piezoelectric Properties of Atomically Thin WSe₂ for 2-Dimensional Nanoelectromechanical Systems**
Terrance Li, 17, Sophomore, Newport Senior High School, Bellevue, Washington
- MATS053 Molecular Dynamics Simulation and Experimental Fabrication of Nanoporous Graphene Membranes for Optimal Water Permeability in Reverse Osmosis Desalination**
Apoorv Khandelwal, 18, Senior, Nikola Tesla STEM High School, Redmond, Washington
- MATS054 Using Specific Heat Capacity to Engineer a Thermal Evacuation Suit to Address Heat Transfer Processes**
Nick Perez, 16, Freshman, Temescal Canyon High School, Lake Elsinore, California
- MATS055 Novel Anti-Radiation Polypropylene-Eggshell Composite**
Tri Ardiansa, 18, Junior, SMA Negeri 3 Semarang, Semarang, Central Java, Indonesia
- MATS056 "Eye-Readable Life Saver," Development of Palladium Tungsten Oxide (Pd-WO₃) Nano-Sheet as Gasochromic Hydrogen Sensor**
Jaewoo Heo, 17, Junior, Seoul International School, Seoul, Gyunggi-Do, South Korea
- MATS057 Multidrug Resistant Superbugs: Selective Separation, Identification and Killing Using Fluorescent, Magnetic Multifunctional Carbon Dots**
Vikram Ruppa-Kasani, 17, Junior, Chattahoochee High School, Johns Creek, Georgia

- MATS058 Growth of Monolayer MoSe₂ and WSe₂ with the Assistance of Halide Catalysts**
Kristian Ming Nilsen, 18, Senior, Oceanside High School, Oceanside, New York
- MATS059 G - Glove: An Environmentally Friendly and Cost Effective Alternative to Present Day Surgical Gloves**
Jack Edward Mogus, 17, Junior, Garth Webb Secondary School, Oakville, Ontario, Canada
- MATS060 Development of Lithium Ion Battery Nano-Synthesized Electrode Materials Using Fe₃O₄ and rGO**
Minjung Park, 18, Senior, Chungbuk Science High School, Cheongju-Si, Chungcheongbukdo, South Korea
- MATS061 The Role of Materials and Surfaces in the Transmission of Bacteria in Public Places**
Camilla Hurst, 17, Junior, European School Luxembourg 1, Luxembourg, Luxembourg
- MATS062 Can We Improve the Efficiency of Fiber-Optics?**
Mason Chase Espinosa, 15, Freshman, Washington High School, Charles Town, West Virginia
- MATS063T Mathematical Characterization of Improved Efficiency of Solar Energy Collection Based on Quantum Biology**
Ashwin Kulshrestha, 18, Junior,
Jainith Jagdish Patel, 18, Junior,
Daniel Joseph Haller, 17, Junior,
Marvin Ridge High School, Waxhaw, North Carolina
- MATS064 Biocompatible Gold Nanorod-Embedded, Crosslinked Collagen Composites for Surgical Applications: Synthesis and Characterization**
Sachin Subramanian, 17, Junior, BASIS Chandler, Chandler, Arizona
- MATS066 Answers from Ashes**
Harrison Thomas Homan, 17, Sophomore, James F. Byrnes High School, Duncan, South Carolina
- MATS067 Enhancing LiFi and Lighting: CsPbBr₃ Zero-Dimensional Perovskite and Quantum Dot Based Color Converters**
Nadia Abdulrahman Almutlak, 18, Junior, AlTarbyah Allslamiya Schools, Riyadh, Saudi Arabia
- MATS068 Improving Resistive RAMs' Performance by Using Single Crystal MAPbBr₃ Perovskite**
Sara Ahmed Alrabiah, 18, Senior, AlTarbya Allslamyah Schools, Riyadh, Saudi Arabia
- MATS069T A Composite Material Made from Wastes of Glass, Polymers and Industrial Rubber as a Waste Management Initiative in Urban and Sub-Urban Areas in Kenya**
Bilhah Nyaboke Ontiriah, 17, Sophomore,
Mitesh Lalji Varsani, 16, Sophomore,
Shree Cutchi Leva Patel Samaj School, Nairobi, Nairobi, Kenya
- MATS071 Hydrothermal Synthesis of ZnO Nanorod Cluster Thin Films for Low-Dimensional Thermoelectric Applications**
Andres Esteban Lombo, 18, Senior, Saint Thomas Aquinas Catholic Secondary School, Oakville, Ontario, Canada
- MATS072 A Novel Corrosion Resistant Composite Material Developed from LPDE Waste Plastic and GGBFS (Ground Granulated Blast Furnace Slag)**
Swasthik Padma, 16, Sophomore, Vivekananda English Medium School, Dakshina Kannada, Karnataka, India
- MATS073 Shear Radial Strength: Combining Web Geometry with Shear Thickening Fluids to Create a Better Body Armor**
Lucas Carey Lynn, 18, Junior, Wetumpka High School, Wetumpka, Alabama
- MATS074 Modifying Substrate Mechanics to Bioengineer an *in vitro* Tumor Microenvironment**
Codi Joy Elliott, 18, Senior, Sarasota High School, Sarasota, Florida
- MATS075T Call and Charge the Mobile by Voice Communication**
Naeem Hassan, 18, Senior,
Ahmad Hassan, 18, Senior,
Muhammad Liaqat Ali, 18, Junior,
Daanish School Boys Chishtian, Chishtian, Punjab, Pakistan
- MATS076T VALIX: Obtaining and Implementing Polysaccharides (Banana, Cassava and Yam Starch) in the Gradual Replacement of Synthetic Polymers Used in the Manufacture of Packing or Packaging**
Valeria Valencia Henao, 18, Junior,
Maria Ximena Arredondo Montoya, 17, Junior,
Santiago Alexis Valencia Zapata, 18, Junior,
Institucion Educativa Colegio Loyola Para la Ciencia y la Innovacion, Medellin, Antioquia, Colombia
- MATS077 The Development of an Efficient Space Radiation Shielding Fabric**

Hannah Mae Steele, 17, Junior, Liberty High School, Bedford, Virginia
- MATS078T Fibrin Scaffold for Dentin-Pulp Regeneration with DPSCs**
Rose Mei Hong, 17, Junior,
Jasmin Gao, 19, Senior,
Del Norte High School, San Diego, California
Northview High School, Johns Creek, Georgia
- MATS079 Carbon Fiber Chain Mail Protective Armor**
Carson Wayne Weidman, 18, Senior, West Salem High School, Salem, Oregon
- MATS080 A Low Pressure Graphene Epitaxy on Cu from Activated Solid Amorphous Carbon**

Noah Bruno Manz, 18, Senior, Farmington High School, Farmington, New Mexico
- MATS081T Marine Degradable Plastic Based on Soybean By-Products**
Thajba Mohammed Al-Hail, 17, Junior,
Sharifa Ahmed Al-Muhanadi, 17, Junior,
Al-Khor Independent Secondary School for Girls, Al-Khor, Qatar

Mathematics

- MATH001 Affine Planes, Projective Planes and Latin Squares**
Jakub Novotny, 19, Junior, Gymnazium Brno-Reckovice, Brno, Jihomoravsky Kraj, Czech Republic
- MATH002 Bijections between Graphs and Tilings with Walkup Property**
Tanya Ivanova Otsetarova, 18, Junior, Akademik Kiril Popov High School of Mathematics, Plovdiv, Bulgaria
- MATH003 On the Distortion of Embedding Perfect Binary Trees into Low-Dimensional Euclidean Spaces**
Dona-Maria Radoslavova Ivanova, 19, Senior, Baba Tonka Upper Secondary High School, Ruse, Bulgaria
- MATH004 The Effect of Language on the Time Required to Convey a Message**
Kyle Thomas Carden, 16, Sophomore, Union Grove High School, McDonough, Georgia
- MATH005 The Iterations of Tent Maps**
Yang YuChen, 17, Junior, High School No.7 Chengdu Sichuan P.R.China, Chengdu, Sichuan, China
- MATH006 A Class of Convex Curves Arising in Capillary Floating Problem**
Shilun Li, 17, Junior, Guangdong Experimental High School, Guangzhou, Guangdong, China
- MATH007 On the Effective Hilbert Zero Point Theorem**
Yilan Tan, 17, Junior, No. 2 High School of East China Normal University, Shanghai, China
- MATH008T Motivic Symbols and Classical Multiplicative Functions**
Ane Kristine Espeseth, 19, Senior, Torstein Vik, 18, Junior, Fagerlia Videregaende Skole, Aalesund, More og Romsdal, Norway
- MATH009 An Exploration in Textual Analysis**
Grady Gerkin Daniels, 17, Junior, Bartow High School, Bartow, Florida
- MATH010 Polynomials in $\mathbb{Z}[x]$ and Irrationality Measure**
Griffin Nicolas Macris, 18, Senior, New Prague High School, New Prague, Minnesota
- MATH011 The Paradox of Doing It Wrong in Order to Do It Right**
Matthew Tiberius Favela-Tomlinson, 19, Senior, El Dorado High School, El Paso, Texas
- MATH012T A Method for Analyzing Basketball Teams**
Shuzheng Zheng, 19, Senior, Srijan Duggal, 18, Senior, Isidore Newman School, New Orleans, Louisiana
- MATH013 Generalized Problem of Apollonius**
Egor Morozov, 18, Senior, Lyceum "Second School," Moscow, Russian Federation
- MATH014 Identities of Perkins Monoid and Millennium Problem**
Dmitrii Mikhailovskii, 17, Sophomore, School 564, St. Petersburg, Russian Federation
- MATH015 Generalized Jacobi Identities and Jacobi Elements of the Group Ring of the Symmetric Group**
Savelii Alexandrovich Novikov, 17, Sophomore, School 564, St. Petersburg, Russian Federation
- MATH016 Systems of Tangent Circles Inscribed in Generalized Archimedes Arbelos**
Makar Volkov, 18, Junior, The Rostov Region Center of Additional Education, Rostov-on-Don, Rostov Region, Russian Federation
- MATH017 Optimizing the Search for Mersenne Primes**
Carson Scott Cato, 18, Senior, Arkansas School for Mathematics, Sciences, and the Arts, Hot Springs, Arkansas
- MATH018T Cylindrical Deformation of Triangles**
Nano Modosiani, 17, Sophomore, Mariam Bughadze, 16, Sophomore, Georgian-American School, Tbilisi, Tbilisi, Georgia
- MATH019T Ideal k -Surface**
Sandro Museliani, 15, Freshman, Nia Baramadze, 16, Sophomore, Georgian-American School, Tbilisi, Tbilisi, Georgia
- MATH020 Relative Entropy of Jackson Pollock's Art: Drip vs. Dark**
Elizabeth Stone, 16, Sophomore, Miami Country Day School, Miami, Florida
- MATH021 Determining Optimal Pitch Selection Using Run Values and PITCHf/x Data**
Cameron Benesch, 19, Senior, Niles North High School, Skokie, Illinois
- MATH022 Safer Security: A Novel Algorithm for Detecting Carmichael Numbers**
Sathwik Karnik, 17, Junior, Massachusetts Academy of Mathematics and Science, Worcester, Massachusetts
- MATH023 Independence of the Miller-Rabin and Lucas Probable Prime Tests**
Alec Maxwell Leng, 18, Senior, Lincoln High School, Portland, Oregon
- MATH024 Which Maps Are 4-list Colorable?**
Juei-Yin Lin, 17, Junior, Taipei First Girls High School, Taipei City, Chinese Taipei
- MATH025T Bounds on the Metric Dimensions for Families of Planar Graphs**
Carl Joshua Tiangco Quines, 17, Junior, Michael Haochun Sun, 17, Junior, Valenzuela City School of Mathematics and Science, Valenzuela, Manila, Philippines
Shanghai American School Puxi, Shanghai, China
- MATH026T The Locus of Mid-Tangent Points of Planar Curves**
Napob Na Ranong, 18, Senior, Kasidetch Thanyacharoen, 19, Senior, Ratthee Theerakiatsakul, 19, Senior, Princess Chulabhorn Science High School Phetchaburi, Cha-Am, Phetchaburi, Thailand
- MATH027 A Participant-Specific Estimate of Expected Organ Quality in Kidney Paired Donation**
Naveen Krishna Durvasula, 16, Sophomore, Montgomery Blair High School, Silver Spring, Maryland
- MATH028 Novel Application of Collatz-like Sequences to Cryptographically Secure Pseudo-Random Number Generation**
James Chen, 17, Senior, West Salem High School, Salem, Oregon
- MATH029 A Novel Approach to Collatz Conjecture Proof: Effect of Addition on Prime Factorization and Unique Numeric Potential Concept**
Matt Fosdick, 15, Freshman, Empire High School, Tucson, Arizona
- MATH030 Discrete Ricci Flow on Discrete 3-Manifolds**
Anton Wu, 17, Senior, Half Hollow Hills High School East, Dix Hills, New York
- MATH031 Upper Bound on the Burning Number of Graphs**
Max Ruikang Land, 18, Senior, Dutch Fork High School, Irmo, South Carolina
- MATH032T Benford's Law: Fact or Fiction?**
Jacob Lee Vreugdenhil, 18, Junior, Caden Glen Zonnefeld, 18, Junior, Unity Christian High School, Orange City, Iowa

- MATH033 A Novel Supervised Machine Learning Approach to Predicting Crime Information**
Palash Shah, 16, Sophomore, Westfield High School, Chantilly, Virginia
- MATH034 Benford's Law vs. the Boom: A Statistical Analysis of North Dakota Population from 1980 to 2015**
Wesley R. Kemp, 18, Junior, Cavalier Public School, Cavalier, North Dakota
- MATH035 Approximations of Zeros in Differentiable Functions**
Adrian Omar Olivera-Olivera, 17, Senior, Centro Residencial de Oportunidades Educativas de Mayaguez, Mayaguez, Puerto Rico, Puerto Rico
- MATH036 An Addition to the Problem of Points**
Daniel Alejandro Santiago, 16, Freshman, Centro Residencial de Oportunidades Educativas de Mayaguez, Mayaguez, Puerto Rico
- MATH037 Transposed Matrices in Archaeological Seriation to Analyze Aging and Distance between Archaeological Features in an Integrated Development Environment**
Alex Manuel Colon Vazquez, 17, Junior, Specialized Science and Math Secondary School Thomas Armstrong Toro, Ponce, Puerto Rico, Puerto Rico
- MATH038 Orthogonal Polynomials and the Two Dimensional Nevai Condition**
Gonen Zimmerman, 17, Junior, Kfar Hayarok High School, Ramat Hasharon, Center, Israel
- MATH039 The Reve's Puzzle**
Ilya Nikolaevich Stepanov, 17, Sophomore, Municipal Classical Lyceum, Kemerovo, Russian Federation
- MATH040 Efficient Point-Counting Algorithms for Superelliptic Curves via the Cartier Operator and the Hasse-Weil Bound**
Matthew Manchung Keisuke Hase-Liu, 18, Senior, Lynbrook High School, San Jose, California
- MATH041 Looking into the Past for Insight on the Future: Predictive Analytics and Machine Learning for Time Series Data**
Dahlia Dry, 17, Sophomore, Fort Myers High School, Fort Myers, Florida
- MATH042 Mapping Edges to Nodes by Utilizing Morton Codes in Stochastic Kronecker Graphs**
Arjun Srinivasan Ramani, 19, Senior, West Lafayette Junior-Senior High School, West Lafayette, Indiana
- MATH043T A 6-Chromatic Unit Distance Graph in Space**
Stephanie Li, 17, Junior,
Thomas Lee, 16, Sophomore,
Horace Mann School, Bronx, New York
Stuyvesant, New York, New York
- MATH044 n-Dimensional Fractions and a Generalized Calkin-Wilf Tree**
Ajmain Yamin, 18, Senior, Bronx High School of Science, Bronx, New York
- MATH045 Some Properties of the Jacobi Point in the Triangle**
Daria Leonidovna Orlova, 17, Junior, Municipal Budgetary Educational Institution 'Secondary School No. 40' Named after Rufina Ovsievskaya, Barnaul, Altai Region, Russian Federation
- MATH046 Decomposing Fractions into the Sum of Distinct Unit Fractions and Their Correlating Patterns**
AnaMaria Perez, 15, Freshman, Albuquerque Academy, Albuquerque, New Mexico
- MATH047 Investigating Novel Analysis by Benford Methodology for Fraud and Anomaly Detection**
Anish Raju, 15, Freshman, BASIS Chandler, Chandler, Arizona
- MATH048 The Homotopy Theory of Parametrized Objects**
Karthik Yegnesh, 17, Junior, Methacton High School, Eagleville, Pennsylvania
- MATH049 Chance or Coincidence-Counting 3-Arithmetic Progression in Block-Generated Thue-Morse String**
Yuan-Jung Juang, 18, Senior, National Tainan Girls' Senior High School, Tainan City, Chinese Taipei
- MATH050 The Application of the Complex Numbers to Solve Diophantine Equations by Finding the Relations between the Coefficients**
Yuliia Suprun, 16, Sophomore, Municipal Institution Sumy Specialized School of I-III Levels Named After the Hero of the Soviet Union O. Butko, Sumy, Ukraine
- MATH051T Generation, Construction, Matches: An Analysis of n-Sided Dice**
Shamay G. Samuel, 18, Senior,
Renasha Mishra, 18, Senior,
Delhi Public School, R. K. Puram, New Delhi, India
Delhi Public School R.K. Puram, Delhi, New Delhi, India
- MATH052T Encryption with Irrational Numbers**
Cenk Cankales, 19, Senior,
Mehmet Burak Donmez, 19, Senior,
Nafi Gural Fen Lisesi, Kutahya, Merkez, Turkey
- MATH053 A Novel Solution for Integer Factorization with Cryptographic Applications**
Evan Jason Kirby, 19, Senior, East Ridge High School, Clermont, Florida
- MATH054 A Geometrical Analysis of Harmony and Voice Leading in Music Using Quotient Orbifolds**
Aditya Sivakumar, 17, Junior, Beaverton High School, Beaverton, Oregon
- MATH055 Polygon Triangulation Problem**
Saya Haydar Qader, 19, Junior, Nilufer High School, Arbil, Iraq

Microbiology

- MCRO001T Use of Phosphorus Solubilizing Bacteria with Application in Agriculture**
Ana Cristina Valenzuela Cervantes, 17, Junior,
Misael Alexander Valenzuela Zuniga, 17, Junior,
Colegio de Bachilleres del Estado de Sinaloa "Prof. Hermes Gonzalez Maldonado", Guasave, Sinaloa, Mexico
- MCRO002 Performance of Lime, Chlorhexidine Gluconate Solution, Bleach Solution and Aeration of the Soil against *Mycoplasma bovis* in Recycled Sand Bedding, a Four Year Study**
Cady C. McGehee, 18, Senior, Okeechobee High School, Okeechobee, Florida
- MCRO003 Prevention Is Better than a Cure: A Novel Approach to Inhibit *Pseudomonas aeruginosa* from Creating Biofilms**
Perna Ravinder, 15, Freshman, Bartow High School, Bartow, Florida
- MCRO004 Biowarfare: How Do Bacteriophage Viruses Lyse Bacterial Cells?**
Angela Shar, 16, Sophomore, Vanguard High School, Ocala, Florida
- MCRO005 Mutagenesis of Soil Bacteria for Life on Mars**
Samuel Marin Scott, 17, Junior, Kahuku High and Intermediate School, Kahuku, Hawaii
- MCRO006 The Effect of Bacterial Metabolism and Bacterial Interaction on the Electrical Output of Microbial Fuel Cells**
Shakson Kyoh Isaac, 16, Sophomore, Mililani High School, Mililani, Hawaii
- MCRO007 How Does Dandelion Affect *E. coli*?**
Zhiwen Xu, 17, Sophomore, Fayetteville High School, Fayetteville, Arkansas
- MCRO008 Topical Antibiotics Consisting of Iron Oxide Nanoparticles**
Michelle Nguyen, 17, Junior, Rockdale Magnet School for Science and Technology, Conyers, Georgia
- MCRO009T Investigating a New Approach for Biosynthesis of Green Pesticide 5-Aminolevulinic Acid Using Engineered *E. coli* and Biomass**
Rebecca Yinbei Li, 16, Sophomore,
Alex Jie Li, 17, Junior,
Mounds View High School, Arden Hills, Minnesota
- MCRO010 Nano Today, Huge Tomorrow: Improving Antibiotic Drug Delivery for *S. epidermidis* Strains with a Novel CNT Dispersion**
Afeefah Fatimah Khazi-Syed, 18, Senior, Harmony School of Innovation - Fort Worth, Fort Worth, Texas
- MCRO011 Establishment of a Working System for Engineering Programmable Bacteriophages**
Candace Walther, 18, Senior, University School of Milwaukee, Milwaukee, Wisconsin
- MCRO012 Applied Bacterial Biomineralization: Increasing Magnetosome Formation within *Magnetospirillum magneticum* through Genetic Recombination of Genes Essential to Magnetosome Formation and Mutation Mediated by UV Radiation**
Seth Holden Young, 19, Senior, The Classical Academy, Colorado Springs, Colorado
- MCRO013 The Effectiveness of Oregano Oil in Treating *Ostertagia ostertagi***
Gretchen M. Lee, 17, Junior, Pettisville High School, Pettisville, Ohio
- MCRO014 Identification, Pharmacological Screening, and Antiviral Mechanistic Determination of Fractions and Compounds Isolated from *Chondrus crispus* and *Laminaria digitata* Extracts**
Beau Taylor Bingham, 18, Senior, Cascia Hall Preparatory School, Tulsa, Oklahoma
- MCRO015 The Effect of Tetracycline, Azithromycin, and Hypothermia on Populations of *Naegleria lovaniensis***
Joseph Li Du, 18, Junior, Jefferson Forest High School, Forest, Virginia
- MCRO016T Empowering the Antibacterial and Antifungal Effects of Juglone by Obtaining Juglone: Beta Cyclodextrin Binary System for Pharmaceutical Purposes**
Nadejda Hincu, 19, Senior,
Elena Tighineanu, 19, Senior,
Theoretical High School "Orizont", Chisinau, Republic of Moldova
- MCRO017 To Floss, or Not to Floss: An Oral Microbiome Investigation**
Vivek Gopalakrishnan, 18, Senior, Lexington High School, Lexington, Massachusetts
- MCRO018 A Comparative Methodology: Processing Laryngotracheal Swabs for 16S rRNA Gene Sequencing**
Madhu Gowda, 18, Senior, Middleton High School, Middleton, Wisconsin
- MCRO019 Self-Derived Peptides: Inhibition of Bacterial Growth without Resistance**
Amy Mei Zhou, 19, Senior, Queensland Academies - Health Sciences Campus, Southport, Queensland, Australia
- MCRO020T The Synergistic Effects of Silver Nanoparticles and Antibiotics on Drug-Resistant Bacteria**
Andy Jesse Zhao, 17, Junior,
Yuxin Sha, 17, Junior,
Kyra Ti Chan, 17, Junior,
Shanghai American School Puxi, Shanghai, China
- MCRO021 Tiny Titans: Induced Sporulation of *Bacillus anthracis***
Jeremy Turner Cotton Ward, 18, Junior, Ridgway Christian High School, Pine Bluff, Arkansas
- MCRO022 Elucidating the Mechanism of Virulence in *E. coli* O104:H4: Identification of the Role of Biofilms in Stx-Phage Induction**
Neehal Reddy Tumma, 15, Sophomore, Port Huron Northern High School, Port Huron, Michigan
- MCRO023 Analyzing the Antibiotic Properties of Snake Venom, Phase 1**
Cody Owen Smith, 17, Sophomore, North Toole County High School, Sunburst, Montana
- MCRO024T A Comparative Study of the Antimicrobial Effects of Transition Metal Nanoparticles**
Richard Joseph Romero, 18, Senior,
Fernando Guerrero, 18, Senior,
Rio Rancho High School, Rio Rancho, New Mexico
- MCRO025 Bacteria Hysteria: The Antibacterial Activity of Ginger**
Baotram Vu Nguyen, 18, Senior, Berks Catholic High School, Reading, Pennsylvania
- MCRO026 Bee Propolis, the Natural Antibiotic**
Kendrick Micheal Dobbs, 18, Senior, John Marshall High School, Glen Dale, West Virginia
- MCRO027 Construction and Mutational Analysis of a Heavy Metal Biosensor in *E. coli***
Anthony Joseph Eckdahl, 19, Senior, Central High School, Saint Joseph, Missouri

- MCRO028 Using Microbial Metabolites to Develop an Alternative to Combat *Klebsiella pneumoniae* carbapenemase (KPC)**
Maria Vitoria Valoto, 17, Senior, Colegio Interativa, Londrina, PR, Brazil
- MCRO029 An Early Warning System for Zika Virus in Mosquito Populations Based on Real-Time Field Detection of Viral RNA in Mosquito Saliva**
Rahul Subramaniam, 16, Sophomore, Greenwich High School, Greenwich, Connecticut
- MCRO030 Analysis of Toll-Like Receptor Expression in *Xenopus laevis* Macrophage Subsets**
Hannah Docter-Loeb, 18, Junior, School Without Walls, Washington, District of Columbia
- MCRO031 Investigating the Effects of UV Radiation on Yeast Colony Growth**
Nicholas Michael Couchara, 17, Sophomore, Gwinnett School of Mathematics, Science, and Technology, Lawrenceville, Georgia
- MCRO032 Saving the North American Ash Tree, Year Two: Establishing *Metarhizium anisopliae* as an Endophyte in *Fraxinus uhdei***
Nicolas A. Wamsley, 18, Junior, Timber Ridge Scholars Academy, Pacific, Missouri
- MCRO033 The Effects of Household Remedies on Mold**
Dylan Benjamin Benson, 17, Sophomore, Hankinson Public School, Hankinson, North Dakota
- MCRO034 The Effects of Nitazoxanide on Chaperone/Usher Pathway Assembled Virulence Factors in Gram-Negative Bacteria**
Raphael Leon Iskra, 17, Junior, Commack High School, Commack, New York
- MCRO035 Role of SRCR Domains in Collagen IV-Crosslinking Activity of LOXL2**
Abner Xavier Pena, 18, Junior, Escuela Secundaria Especializada en Ciencias, Matematicas y Tecnologia, Caguas, Puerto Rico
- MCRO036 Shifting Sun vs. Putrid *Pilobolus***
Jennel Mead, 18, Senior, Cheyenne South High School, Cheyenne, Wyoming
- MCRO037 The Effect of Tungsten Oxide on Disinfection of *E. coli***
Sabrina Ye, 15, Freshman, Mills E. Godwin High School, Richmond, Virginia
- MCRO038 Kimchi Bacteria Affects against Common Sinusitis Bacteria**
Tristen Kelson, 17, Junior, Ogden Senior High School, Ogden, Utah
- MCRO039T An Investigation into Immune Properties of Tetrahymena: The Effect of Environment and Genotype on *Tetrahymena thermophila* Dicer Upregulation, Survival, Morphology, and Phenotype**
Tyrell Johnathan Floyd#, 18, Senior, Anna Graciela Mancera, 19, Senior, Salt Lake Center for Science Education, Salt Lake City, Utah
- MCRO040 Unraveling the Role of Novel Type I Interferon in Human Paramyxovirus Infections**
Hannah Lizzette Miletello, 17, Junior, Saint Joseph's Academy, Baton Rouge, Louisiana
- MCRO041 Pyrimidine Derivatives Conjugated to Gold Nanoparticles to Combat Antibiotic Resistance**
Titash Biswas, 17, Junior, Crescenta Valley High School, La Crescenta, California
- MCRO042 Dethiosulfovibrio Strain F2b: A New Non-Thiosulfate Reducing Bacterium that Degrades Mariculture Waste**
Stephen Francis Grabowski, 19, Senior, Baltimore Polytechnic Institute, Baltimore, Maryland
- MCRO043 The Repercussions of Probiotic Supplementation of *Escherichia coli* Growth**
Jazmine Odeet Cardenas, 17, Junior, J.W. Nixon High School, Laredo, Texas
- MCRO044 A Quantitative Analysis of the Presence and Absence of a Variety of Mold Groups**
Josianna Mabel Prochnow, 17, Junior, Hankinson Public School, Hankinson, North Dakota
- MCRO045T Chewing Gum's Antimicrobial Activity Using Plant Derived Essential Oils and Xylitol**
Michelle Angelie Narvaez-Ramos, 17, Senior, Loren Aldarondo-Torres, 17, Senior, Centro Residencial de Oportunidades Educativas de Mayaguez, Mayaguez, Puerto Rico
- MCRO046 The Limits of *Pseudomonas chlororaphis* O₆ under Osmotic Stress**
Ariel Norman, 17, Junior, Woods Cross High School, Woods Cross, Utah
- MCRO047 Drastic Conditions Call for Drastic Measures: The Viability of Terrestrial Extremophiles in Simulated Martian UV Radiation**
Ana Sofia Mendez Uzsoy, 18, Senior, North Carolina School of Science and Mathematics, Durham, North Carolina
- MCRO048 Cutaneous Skin Bacteria: A Search for Antifungal Activity**
Taylor Michelle Mosley, 18, Senior, Arkansas School for Mathematics, Sciences and the Arts, Hot Springs, Arkansas
- MCRO049 Intra-Microcolony Spatial Positioning Affects Antibiotic Susceptibility in *Neisseria gonorrhoeae***
Mahmoud Abouelkheir, 18, Senior, Midwood High School, Brooklyn, New York
- MCRO050 A Novel Method to Induce and Upregulate the Production of Stable Antistaphylococcal Compounds via the Combined-Cultivation of *S. salivarius* and *Streptomyces***
Arjun Jain, 17, Junior, Westwood High School, Austin, Texas
- MCRO051 Assessing Rice Bran's Protective Efficacy against Porcine Rotavirus Infection in IPEC-J2 Cells**
Christine Longchau Flora, 17, Junior, Roanoke Valley Governor's School for Science and Technology, Roanoke, Virginia
- MCRO052 Inhibition of Bone Metastasis in MDA-MB-231 and PC-3 Cells by the Extracellular Adherence Protein of *Staphylococcus aureus***
Trishala Kumar, 16, Sophomore, American Heritage, Plantation, Florida
- MCRO053 Next-Gen Sequencing Analysis of Dental Biofilm Microbiome upon Gifts Nano Charcoal Cleaning**
Pranav Chhaliyil, 16, Sophomore, Maharishi School, Fairfield, Iowa
- MCRO054 Biochemical and Structural Study of the *Escherichia coli* Transcription Elongation Complex with Lambda-N and HK022 Nun**
Joel Lima, 18, Senior, Elmont Memorial Junior-Senior High School, Elmont, New York
- MCRO055T Probiotic Metabolites Promote Anti-Inflammatory Functions of Immune Cells**
Danielle Chen Wu, 17, Junior, Richard Hong Fu, 17, Junior, Indian Springs School, Indian Springs, Alabama Vestavia Hills High School, Vestavia Hills, Alabama
- MCRO056 The Host Range Specificity of Bacteriophage T4r**
Judy Tianhong Zhong, 16, Sophomore, Upper Dublin High School, Fort Washington, Pennsylvania
- MCRO057 The Effect of Circulation Rate on Bacteria within Library Books**
Cheyenne Nancy Deibert, 17, Sophomore, Clarksville Academy, Clarksville, Tennessee

- MCRO058 The Zone of Inhibition in *Streptococcus mutans* and *Streptococcus oralis* Using Antibacterials**
Maycee Dawn Redfearn, 17, Junior, DSU SUCCESS Academy,
St. George, Utah
- MCRO059 Purple Power**
Rachel Jones, 19, Senior, Liberal High School, Liberal, Kansas
- MCRO060 The Effects of Silver Nanoparticles on the Ionic Silver Resistance Plasmid (pMG101)**
Adam Radek Martinez, 15, Freshman, Waterloo Collegiate
Institute, Waterloo, Ontario, Canada
- MCRO061T The Effect of the Wavelength of Light on the Growth Rate of Cyanobacteria and Its Survival in a Martian Atmosphere**
Catherine Pelangi Aitken, 15, Freshman,
Dana Zhao Jian, 15, Freshman,
San Ramon Valley High School, Danville, California
- MCRO062 Engineering of Fusion Protein Constructs to Efficiently Combat Neurological Damage Caused by *E. coli* K1 Meningitis**
Sepehr Asgari, 17, Sophomore, Carmel High School, Carmel,
Indiana
- MCRO063 Tracking Seasonal Changes of Specific Pathogenic Bacteria around Mobile Bay**
Leanne Jeong, 17, Junior, Alabama School of Mathematics and
Science, Mobile, Alabama
- MCRO064 That Gut Feeling: Identifying the Gut Microbiota in Different Groups of Children**
Elora Rael Smith, 17, Sophomore, Sargent High School, Monte
Vista, Colorado
- MCRO065T The Influence of Pollution on the Bacterial Diversity in Dams**
Jacqueline Janse van Rensburg, 18, Senior,
Zamazimba Swelihle Madi, 17, Senior,
Hoerskool Oos-Moot, Pretoria, Gauteng, South Africa
Lyttelton Manor High School, Pretoria, Gauteng, South Africa
- MCRO066 Sweet Zones of Inhibition: The Antimicrobial Efficacy of Honey against Gram Positive and Gram Negative Bacteria as Compared with Antibiotics**
Allison Faith Bobnock, 17, Junior, Crestview High School,
Crestview, Florida
- MCRO067 Rescue of Nucleotide DNA Repair Deficiencies to UVB and Solar-Simulated Irradiation by Pyrimidine Dimer Glycosylases and UV Endonucleases**
Stuti Paavani Garg, 17, Junior, Westview High School, Portland,
Oregon
- MCRO068 Cell Membrane-Coated Nanodevice for Anti-Virulence Therapy against Antibiotic Resistant Bacteria**
Maggie Shin-Young Chen, 17, Junior, Canyon Crest Academy,
San Diego, California

Physics and Astronomy

- PHYS001 Determining Impulse of 3-D Printed Rocket Nozzles**
Weston Oliver Rogers, 18, Senior, Colquitt County High School, Norman Park, Georgia
- PHYS002T Big Bang Pickle**
Sonja Maria Elisabetha Gabriel, 18, Senior,
Hannes Hipp, 19, Senior,
Storck-Gymnasium, Bad Saulgau, Baden-Württemberg, Germany
Studienkolleg St. Johann Blonried, Aulendorf, Baden-Württemberg, Germany
- PHYS003 Behind a Wisp of Smoke: Study of the Morphology of Airflow and the Cause of Stripes Formed by Smoke Particles Over a Heat Source of Constant Temperature**
Xunjing Wei, 18, Senior, Shanghai High School, Shanghai, Shanghai, China
- PHYS004 Research on Abnormal Thermal Expansion Properties of MnNiGe-based Compounds**
Yufei Liu, 18, Junior, Capital Normal University High School, Beijing, China
- PHYS005 Asteroid Photometry with Small-Aperture Telescopes**
Junda Liu, 20, Senior, Suzhou High School of Jiangsu Province, Suzhou, Jiangsu, China
- PHYS006T Numerical Methods of Raytracing in Curved Spacetimes According to Einstein's Theory of General Relativity**
Jakub Krzysztof Szewczyk, 18, Senior,
Grzegorz Eugeniusz Uriasz, 19, Senior,
II Liceum Ogólnokształcące im. Generalowej Zamoyskiej i Heleny Modrzejewskiej w Poznaniu, Poznan, Wielkopolska, Poland
- PHYS007 The Thermoelectrically Refrigerated Cloud Chamber**
Antonin Badura, 19, Junior, Gymnazium Brno, Trida Kapitana Jarose, Prispěvkova Organizace, Brno, South Moravian Region, Czech Republic
- PHYS008 Porphyrine in Cell: Light-Triggered Killer Plus Viscosity Measurer**
Anna Aleksandrovna Kogan, 18, Junior, Lyceum #40, Nizhny Novgorod, Nizhegorodskaya Oblast, Russian Federation
- PHYS009T Identification of X-Ray Sources and Discovering New Variable Stars**
Sergey Timofeev, 16, Freshman,
Raul Karachurin, 15, Freshman,
Lyceum No.1568, Moscow, Russian Federation
- PHYS010 Shock Waves in Shallow Water on a Rotating Disk**
Kirill Smirnov, 18, Junior, The Advanced Education Science Center Kolmogorov's Boarding School of the Moscow State University, Moscow, Russian Federation
- PHYS011T Earthshine Spectrum: Earth as an Exoplanet**
Juhong Bae, 17, Sophomore,
Jeongin Park, 17, Sophomore,
Jongjun Park, 17, Sophomore,
Daegu-il Science High School, Daegu, South Korea
- PHYS012 Foiled: Testing Lift and Drag on Airfoils in a Wind Tunnel**
Chloe Elisabeth Ayers, 18, Senior, Colleyville Heritage High School, Colleyville, Texas
- PHYS013 Dancing with the Stars: Simulating Multi-Star Solar Systems and the Probability of Planetary Ejection**

Molly Megan Nehring, 16, Sophomore, Monte Vista High School, Monte Vista, Colorado
- PHYS014 Theoretical Asteroid Repulsion**
Zachariah Elijah Goodrich, 17, Junior, Grants High School, Grants, New Mexico
- PHYS015 Terraforming Mars: Can Its Soil Support Plant Life?**
Lydia Barron, 15, Freshman, Dora Consolidated Schools, Dora, New Mexico
- PHYS016 Surface vs. Bulk Chiral Orientation Effects in Liquid Crystals**
Catherine Leigh Areklett, 18, Senior, Hathaway Brown School, Shaker Heights, Ohio
- PHYS017 Driving Yourself to Deaf: Comparing Sound Levels Produced by Hand-held T-Post Drivers**
Ryan Dougherty, 16, Freshman, Prairiland High School, Pattonville, Texas
- PHYS018 The Mathematical Identification of Exoplanet Candidates through N-body Simulations**
Ana Luisa Tio Humphrey, 17, Sophomore, T.C. Williams High School, Alexandria, Virginia
- PHYS019T Experimental and Numerical Investigation of Relation between Color and Thickness of Extremely Thin Soap-Bubble Films**
Mai Inden, 18, Senior,
Arisa Kikuri, 16, Junior,
Aichi Prefectural Ichinomiya Senior High School, Ichinomiya, Aichi-Pref., Japan
- PHYS020T A Swinging Atwood's Machine that Hiccups**
Zi-Yi Tai, 18, Senior,
Shao-Yi Yu, 18, Senior,
Taipei Municipal First Girls, Taipei City, Taiwan, Chinese Taipei
- PHYS021 Multi-Orbit Space Debris Cloud Tracking Using Iterative Closest Points Registration with Machine Learning**

Amber Zoe Yang, 18, Senior, Trinity Preparatory School, Winter Park, Florida
- PHYS022 Fabrication of a Multilayer Graphene Based Single Electron Transistor with Chemically Transferred Graphene**

Parker Jean Coye, 19, Senior, Lake Highland Preparatory School, Orlando, Florida
- PHYS023 Entanglement Distillation: Building a QED Circuit to Alleviate Decoherence**
Elijah Keene Kaimiola Mossman, 17, Junior, Kamehameha Schools Kapalama High School, Honolulu, Hawaii
- PHYS024T Muon Scattering Tomography: Utilizing Silicon Photomultiplier Arrays to Trilaterate Muon Multiple Coulomb Scattering Events**
Trevor Daino, 18, Senior,
Michael Kronovet, 19, Senior,
Arpad Attila Voros, 18, Senior,
Marvin Ridge High School, Waxhaw, North Carolina
- PHYS025 Evaluation of Exoplanet Detection Methods: The Limits of Current Knowledge**
Keon Azar, 17, Junior, Harrison High School, Harrison, New York
- PHYS026T Using a Novel Methodology to Constrain the Supermassive Black Hole-Galaxy Coevolution and Analyze the Selection Bias**
Sahil Hedge, 18, Senior,
Shawn Brian Zhang, 17, Junior,
Prospect High School, Saratoga, California
Amador Valley, Pleasanton, California
- PHYS027T Effects of Neodymium Magnetic Fields on Rhizoclonium Algae**
Shaan Chaudhari, 18, Junior,
Ethan Leung, 17, Junior,
Jash Patel, 18, Senior,
Fort Myers High School, Fort Myers, Florida
- PHYS028 On T-Reflection via Analytic Continuation in Quantum Mechanics**
Sambuddha Chattopadhyay, 18, Senior, Montgomery Blair High School, Silver Spring, Maryland
- PHYS029 Quick Aligning Telescopes**
Dominic Catanzaro, 17, Senior, Cathedral Catholic High School, San Diego, California

- PHYS031 Study on Wireless Power Transfer Technology toward the Application for Cardiac Pacemaker**
Mengyang Li, 17, Junior, Chongqing Nankai Secondary School, ShaPingBa District, Chong Qing, China
- PHYS032 Nuclear-Precessional Hydroscope**
Andrei Sergeevich Poliakov, 18, Junior, Lyceum #40, Nizhny Novgorod, Russian Federation
- PHYS033 Extra Radial Muon Orbit Distortion with E821 Beta Function**
Rushabh Mehta, 18, Senior, Syosset Senior High School, Syosset, New York
- PHYS034 Swift XRT and UVOT Investigation of Low-Mass X-Ray Binary 1RXS J180408.9-342058**
Audrey Saltzman, 18, Senior, Byram Hills High School, Armonk, New York
- PHYS035 Spectral Measurements of Near-Earth Asteroids**

Kelsey Mackenna Barber, 18, Senior, Bountiful High School, Bountiful, Utah
- PHYS036 Identification of Asteroid Collisional Families and Orbital Groups through Computational Clustering Techniques**

Annie Tianjin Yun, 17, Senior, West High School, Salt Lake City, Utah
- PHYS037 On the Stability of Bahcall-Wolf Cusps of Dark Matter Orbiting Supermassive Black Hole Binary Systems**
Josef McCormack Zimmerman, 18, Senior, Academy of Science, Sterling, Virginia
- PHYS038 Quantum Eraser with Applications to Optical Quantum Information Processing of Polarization-Encoded Qubits**
Mary Catherine Lorio, 17, Junior, Saint Joseph's Academy, Baton Rouge, Louisiana
- PHYS039T Detecting Exoplanet Transits via CCD Photometry**
Kylie Yui Hansen, 18, Junior,
Kayson Taka Hansen, 16, Sophomore,
Twin Falls High School, Twin Falls, Idaho
- PHYS040 Deciphering the Sedimentary Record of Galle Crater, Mars**
Alida Schott, 17, Junior, Baltimore Polytechnic Institute, Baltimore, Maryland
- PHYS041 Laser Shielding Odyssey: A Novel Method for Confining Matter Transported at Relativistic Velocities in Vacuum by a Laser-Tube, Which May Solve a Problem of Stephen Hawking's "Star-Shot" Initiative**

Dana Yahia Arabiyat, 18, Senior, Alridwan Schools, Amman, Jordan
- PHYS042T Discovery of Qatar 6-b Exoplanet**
Amani Abdulrahman M S Al-Rajhi, 17, Junior,
Abeer Khalifa Al-Harbi, 17, Junior,
Qatar Secondary School For Girls, Doha, Qatar
- PHYS043 Deviation Patterns of the Orbital Trajectories of the Galilean Satellites**
Benjamin Breer, 17, Junior, The Gwinnett School of Mathematics, Science, and Technology, Lawrenceville, Georgia
- PHYS044 Finding the Perfect Slot**
Roarke Zimmer, 19, Senior, Alpine High School, Alpine, Texas
- PHYS045 Analysis of Gerchberg-Saxton Algorithm**
Mateusz Sieniawski, 19, Senior, Zespol Szkol Uniwersytetu Mikolaja Kopernika Gimnazjum i Liceum Akademickie, Torun, Warminko-Mazurskie, Poland
- PHYS046 Investigating the Properties of Dark Matter**

Gabriel Mintzer, 18, Senior, Central Campus, Des Moines, Iowa
- PHYS047 A Novel Spectroscopic-Chemical Sensor Using Photonic Crystals**

Sulekh Frederic Fernando-Peiris, 17, Junior, Mount Vernon High School, Mount Vernon, Ohio
- PHYS048 3D Printed Micro Patterned Gas Electron Multiplier**

Adam Syndergaard, 18, Senior, Maple Mountain High School, Spanish Fork, Utah
- PHYS049 The Search for Newborn Stars: Observing Bok Globules in the Visible and Infrared**
Anderson Thrasher, 17, Junior, Henry W. Grady High School, Atlanta, Georgia
- PHYS050 Astronomical Image Processing: A Novel Application of Image Proessing Aimed at Asteroid Detection**
Tucker Edison Honeycutt, 17, Sophomore, Covenant Christian Academy, Huntsville, Alabama
- PHYS051 A Linked Learning Approach to Automated Galaxy Morphology Classification**

Zhengdong Wang, 19, Senior, Hamilton High School, Chandler, Arizona
- PHYS052 Stability Statistics: The Effect of Incremental Stability Deviations on Rocket Flight Optimization and Precision**
Giancarlo Dimitri Cabeza, 17, Junior, Western High School, Davie, Florida
- PHYS053 Determining the Ages and Distances of Open Clusters**
Erica Alesa Sawczynec, 18, Senior, Kihei Public Charter High School, Kihei, Hawaii
- PHYS054 Study of the Change of the Halomass in Galaxies Depending on Their Proximity to Filaments in the Universe**
Queralt Portell de Montserrat, 18, Senior, Institut Manuel Carrasco i Formiguera, Barcelona, Barcelona, Spain
- PHYS055 Parallax Modelling of OGLE Microlensing Events**
Elias Waagaard, 20, Senior, Bromangymnasiet, Hudiksvall, Gavleborg, Sweden
- PHYS056 27.5" or 29" Rolling Friction vs. Agility**
Colton Anthony Ziemba, 16, Junior, Russell Christian Academy, Meridian, Mississippi
- PHYS057 Radiation from Telecom Devices: Impact on Life and Combating Threats**
Akshaj Mishra, 15, Freshman, Signature High School, Evansville, Indiana
- PHYS058 Case Study of Data Mining in Observational Astronomy: The Search for New OB Stars in the Small Magellanic Cloud**
Cormac James Larkin, 20, Senior, Colaiste an Spioraid Naomh, Cork City, Munster, Ireland
- PHYS060 All About that Bass**
Caroline Isabella Whisonant, 15, Freshman, Winnfield Senior High School, Winnfield, Louisiana
- PHYS061 Identification of Type Ia Supernova Explosion Mechanisms in Dwarf Spheroidal Galaxies**
Rachel Guo, 17, Junior, Justin Xie, 17, Junior, Irvington High School, Fremont, California

Plant Sciences

- PLNT001T Production of Strawberry in Inert Substrate**
Greta Yanett Vivero, 20, Senior,
Fatima Edith Cardozo, 18, Senior,
Instituto De Enseñanza Agropecuaria No. 7, Garupa, Misiones,
Argentina
- PLNT002 BioPatriam: Biodiversity Preservation with Brazilian Native Plant**
Maria Eduarda Santos de Almeida, 18, Senior, Instituto Federal de Educacao, Ciencia e Tecnologia do Rio Grande do Sul (IFRS) - Campus Osorio, Osorio, Rio Grande do Sul, Brazil
- PLNT003T Evaluation of Biofungicidal Activity of the Castor Oil Plant (*Ricinus communis*) Seed for the Control of Anthracnose (*Colletotrichum gloeosporioides*) in Avocado (*Persea americana*) in vitro**
Sofia Pacheco-Thomas, 18, Junior,
Priscilla Solera-Rodriguez, 18, Junior,
Colegio Tecnico Profesional Piedades Sur, San Ramon, Alajuela,
Costa Rica
- PLNT004 Identification of dsRNA Mycoviruses in Plant-Pathogenic Fungus *Fusarium oxysporum***
Martin Matl, 18, Sophomore, Gymnazium Brno, Trida Kapitana Jarose, Prispěvkova Organizace, Brno, Jihomoravsky Kraj,
Czech Republic
- PLNT005T Production and Application of Efficient Microorganisms (E.M.) Technology and Dissemination of Their Advantages for the Cultivation of Coffee, in the Ballota Farm, Huancabamba District**
Koraima Elizabeth Tamayo Cisneros, 16, Freshman,
Ariana Koryn Casimiro Salazar, 17, Freshman,
Institucion Educativa San Francisco de Asis, Oxapampa,
Pasco, Peru
- PLNT006T Multiplication of Weberbauer Cactus Seedlings Using HAS (Hydroponic Autotrophic System), from Microcuttings of Vitroplants for Its Reforestation**
Brayan Miguel Maidana Lopez, 15, Freshman,
Santiago Mauricio Valdivia Cervantes, 16, Freshman,
Institucion Educativa San Juan Bautista de La Salle, Arequipa,
Peru
- PLNT007 The Best Affordable Alternative Nanofertiliser**
Carol van Rooyen, 18, Senior, Queen Elizabeth Girls High School,
Harare, Zimbabwe
- PLNT008 Essential Oil of Some Species of the Family Asteraceae Dumort East Kazakhstan**
Rodion Yurievich Ivashchenko, 19, Junior, High School #38 for Gifted Children, Ust-Kamenogorsk, Vostochno-Kazakhstanskaya,
Kazakhstan
- PLNT009 The Effect of Acid Precipitation on the Vascular and Endocrine System of Plants**
Qiao Jiao, 18, Junior, Canterbury School, Fort Myers, Florida
- PLNT010 Soil Amendment Optimization, Phase IV: Enhancing the Performance of Biochar and Hydrophilic Polymer Enriched Soils with the Incorporation of Corn Gluten Meal**
Samantha Jo Guldán, 17, Junior, Cathedral High School, New Ulm, Minnesota
- PLNT011 Better with Bacteria: The Effects of Bacteria on *Chlorella vulgaris***
James Bryan Martinez, 17, Junior, Bartlesville High School,
Bartlesville, Oklahoma
- PLNT012T Polyphenols in Georgian Grapes**
Giorgi Tabagua, 18, Junior,
Ketevan Tkeshelashvili, 17, Junior,
Georgian-American School, Tbilisi, Tbilisi, Georgia
- PLNT013 Bad Altitude: Climate Change in the Alpine May Alter Beneficial Relationships between Plants and Their Fungal Symbionts**
Isabella Ivy Bowland, 17, Junior, Fairview High School, Boulder,
Colorado
- PLNT014 Creating a Model System for Micronutrient Fortification**
Sedra Khutija Khan, 18, Senior, Niles Township West High School,
Skokie, Illinois
- PLNT015 Mycorrhizal Fungi as an Alternative to Conventional Fertilizers**
Connor Joseph Bock, 17, Sophomore, Oak Ridge High School,
Oak Ridge, Missouri
- PLNT016 Glyphosate Concentrations in Organic vs. Conventional Wheat**
Tyler Shaud Schwarzbach, 16, Sophomore, Big Sandy High School, Big Sandy, Montana
- PLNT017 Up the Creek**
Mary-Anne Sandra Poyitt, 17, Junior, Redeemer Baptist School,
North Parramatta, New South Wales, Australia
- PLNT018 Extracting Neem and Epazote Compounds by HPLC Methods**
Anjeli Nandwani, 19, Senior, Lake Highland Preparatory School,
Orlando, Florida
- PLNT019 The Reaction of Vegetation to Cultivation after Remaining Undisturbed for 15 Years**
Neeraj Bhakta, 18, Junior, C. H. Yoe High School, Cameron, Texas
- PLNT020 Salinity Solutions**
Lachlan John Dick, 19, Senior, Hellyer College, Burnie, Australia
- PLNT021 Analyzing the Effects of Anionic Polyacrylamide on Row Crop Health and Emergence**
Darrin Andrew McFall, 19, Senior, Buffalo Island Central High School, Monette, Arkansas
- PLNT022 Inhibition of *Sclerotinia sclerotiorum* via Cover Crop, *Coniothyrium minitans*, and Foliar Application**
Mason Carl Burlage, 18, Junior, Beckman Catholic High School,
Dyersville, Iowa
- PLNT023T Revolution of Self-Fertilizing Crops: Novel Transformation of IFS1 and IFS2 Genes Using Binary Vector for the Stimulation of a Symbiotic Bond between *B. japonicum* and Host Plant**
Jared Wieland, 15, Freshman,
Kristopher Wieland, 19, Senior,
Wilsonville High School, Wilsonville, Oregon
- PLNT024 A Neurotoxin in the Pollen of Southern African Cycads**
Anika Carmen Meyer, 15, Freshman, Waterkloof Hoerskool,
Pretoria, Gauteng, South Africa
- PLNT025T The Lethal Effect of the Peppermint Oil on the White Fly**
Farah Bassam Al Shloul, 17, Junior,
Lana Saed Mughrabi, 17, Junior,
Um-Al-Summaq Secondary School, Amman, Umm Al Sommaq,
Jordan
- PLNT026 Investigation of the Disparity between the Abundance of *Tamalia spp.* Galls on *Arbutus unedo* and *Arctostaphylos spp.***
Kaden Zayne Thabet Agha, 17, Junior, York School, Monterey,
California
- PLNT027 A Study of Circadian Genetics and Abiotic Stress towards Sustainable Agriculture**
Maya N. Geradi, 17, Junior, Wilbur Cross High School, New Haven, Connecticut
- PLNT028T Insecticidal Activity of Acacia (*Samanea saman*) Bark Extract against Adult Rice Black Bug (*Scotinophora sp.*)**
Myrelle Angela T. Colas, 16, Freshman,
Rubeliene Chezka Fernandez Gloria, 16, Freshman,
Nadine Antonette Obafial, 17, Freshman,
Davao City National High School, Davao City, Davao del Sur,
Philippines

- PLNT029** **The Effects of Auxins and Cytokinins on the Survival of *Azospirillum lipoferum* and *Azospirillum brasilense* and the Root Colonization of Zea mays**
Brock Patrick Vetick, 19, Senior, Lyons-Decatur Northeast High School, Lyons, Nebraska
- PLNT030** **The Effectiveness of Algae as a Negative Emission Technology**
Daniel Ulion Joshua, 16, Sophomore, Madison Central High School, Madison, Mississippi
- PLNT031** **Effects of North Dakota Road Dust on *A. thaliana*: An Assay of Chlorophyll and Ascorbate Peroxidase**
Monica Rose Zent, 18, Senior, Dickinson High School, Dickinson, North Dakota
- PLNT032** **Does Water pH Affect Plant Growth?**
Addie James Schnabel, 18, Junior, Ashley Public School, Ashley, North Dakota
- PLNT033** **Identification of Volatiles Produced by Agrobacterium**
Michael XiYang Lin, 17, Junior, Farragut High School, Knoxville, Tennessee
- PLNT034** **The Effect of Irrigation Rates on the Growth and Yield of *Gossypium hirsutum* L.**
David Anthony Mendoza, 18, Senior, Christ the King Cathedral School, Lubbock, Texas
- PLNT035T** **The Effects of an Infusion of Pine Tree Needles (*Pinus pinaster*) Using It as Herbicide over Weeds in a Home Garden**
Katiria Marie Santiago Lozada, 16, Junior, Jeylimar Fuentes Rivera, 17, Junior, Francisco Morales Rivera, Naranjito, Puerto Rico
- PLNT036T** **Control of Tomato Yellow Leaf Curl Disease with Biopesticide Extracted from Goat Weed *Ageratum conyzoides* Linn**
Naruephon Phaengma, 16, Sophomore, Janyaporn Kotimanusvanij, 17, Sophomore, Witchakon Nanthaikueakun, 17, Sophomore, The Demonstration School of Khon Kaen University (Modindaeng), Khon Kaen, Thailand
- PLNT037T** ***Spondias pinnata* Gum Coating on Longan Fruits Can Prolong Their Freshness during Storage**
Pawared Donloei, 19, Senior, Watunyoo Boonruang, 19, Senior, Thanakorn Yodkham#, 19, Senior, Damrongratsongkroh School, Muang, Chiangrai, Thailand
- PLNT038** **Mistletoe on Novel Hosts**
Seneca Riley Blank, 17, Junior, Tucson High Magnet School, Tucson, Arizona
- PLNT039** **The Reversal of Harms Done by the Drought: How the Carbon and Nitrogen Levels Affect *Fusarium oxysporum* f.sp. *Lycopersici* Race 3 in Soils to Impact *Solanum lycopersicum* (Tomato) Plant Growth**
Teevyah Yuva Raju, 17, Junior, Mira Loma High School, Sacramento, California
- PLNT040** **Corn Silage Yield Test**
Jace Michael Marriott, 15, Freshman, Fremont High School, Plain City, Utah
- PLNT041** **Microclimatological Feedbacks at Treeline**
Michelle T. Kummel, 16, Junior, William J. Palmer High School, Colorado Springs, Colorado
- PLNT042** **Make Way for Duckweed: Observing the Growth Rates of *Lemna* and Its Effect on Atmospheric Carbon Dioxide Concentrations in a Simulated Carbon Sink**
Casey John Shaw, 17, Junior, Liberty High School, Joes, Colorado
- PLNT043** **Supercharged Plants to Fight Global Warming: Data Mining for Key Genes of Photosynthetic Acclimation to Climate Change**
Megan May Zou, 17, Junior, Ransom Everglades School, Miami, Florida
- PLNT044** **Molecular Characterization and Enhanced Efficacy in the Development of a Novel Host-Specific Bioherbicide Candidate for *Cyperus rotundus***
Hanिया Shareef, 17, Junior, Lincoln Park Academy, Fort Pierce, Florida
- PLNT045T** **Optimization of Algal Biomass Production under Salt Water Conditions**
Lindsay Hikari Chow Shiroma, 16, Sophomore, Min Hua Tsou, 16, Sophomore, Mililani High School, Mililani, Hawaii
- PLNT046** **The Effect of Sodium Chloride on Hybrid Taxodium Species**
Anna Colleen Koonce, 17, Junior, St. Joseph's Academy, Baton Rouge, Louisiana
- PLNT047** **Molecular (DNA) and Biochemical Investigations into Agricultural Weed Populations of the South Eastern United States**
Indu Priya Nandula, 16, Sophomore, Cleveland High School, Cleveland, Mississippi
- PLNT048** **Modeling the Spatio-Temporal Dynamics of Late Blight: Optimization, Validation, and Applications**
Benjamin Firester, 18, Junior, Hunter College High School, New York, New York
- PLNT049** ***In vitro* and *in vivo* Efficiency Assessment of Selected Biopesticides against the Sweet Potato Whitefly, *Bemisia tabaci* (Genadius) Biotype B on Tomato Plants**
Ana Laura Trevino, 18, Senior, Weslaco East High School, Weslaco, Texas
- PLNT050** **Developing Rapid Technologies to Access Root Cell-Type Specific Gene Regulation in Rice (*Oryza sativa* L.)**
Yushan Su, 17, Junior, Martin Luther King High School, Riverside, California
- PLNT051** **Fabulous Molecular Markers: Preventing Favism by Identifying Faba Bean Mutants**
Melody Song, 17, Junior, Evan Hardy Collegiate Institute, Saskatoon, Saskatchewan, Canada
- PLNT052T** ***Cnidocolus aconitifolius*, *Azadirachta indica*, *Moringa oleifera* and *Mentha spicata* as an Organic Plaguicide for the Prevention of Premature Crops**
Laina Sofia Llano, 18, Junior, Tyrone O. Nieves, 17, Junior, Residential Center of Educational Opportunities in Ceiba, Ceiba, Puerto Rico
- PLNT053** **The Effects of Mycorrhizal Fungi on *Ustilago maydis***
Amanda Grace Wilson, 17, Sophomore, Northwestern High School, Kokomo, Indiana
- PLNT054T** **Pollen Count and Analysis of Store Honey and NC Honey Samples for Content and Purity**
Larry Lee McCallum, 16, Sophomore, Swathi Gadipudi, 18, Junior, Elizabeth Madison Rogers, 18, Senior, Lumberton High School, Lumberton, North Carolina Terry Sanford High School, Fayetteville, North Carolina Cumberland International Early College High School, Fayetteville, North Carolina
- PLNT055** **A Method to Control Microwave Radiation Impact on *Solanum lycopersicum* (Tomato), Using *Zingiber officinale* (Ginger) Extract**
Marian Shobita Rajamohan, 17, Junior, South Pacific Academy, Pago Pago, American Samoa
- PLNT056** **Testing the Effect of *Derris malaccensis* (Ava Niukini) Plant Extract on *Rhipicephalus sanguineus* (Brown Dog Tick)**
Daln Myung, 16, Sophomore, South Pacific Academy, Pago Pago, American Samoa

- PLNT057T Optimization of Cellobiase Function in Breakdown of Cellulosic Material Using Co-Enzymes: A Model for Biofuel Enhancement**
 # Jay Maturi#, 18, Junior,
 Pranav Ramkumar Sriram, 17, Junior,
 University High School of Indiana, Carmel, Indiana
 Carmel High School, Carmel, Indiana
- PLNT058T CAgel Accelerated Tyrosine Pathway to Combat Leukotrichia**
 Harsh Jain, 17, Senior,
 Tanya Goyal, 17, Senior,
 Maharaja Agarsain Public School, Delhi, India
- PLNT059 A Novel Strategy Using Amino Acids as Elicitors to Combat Pathogenicity Caused by *Alternaria solani* on Selected Crops**
 Prakruthi R U Kumar, 16, Sophomore, Army Public School,
 Parachute Regiment Training Centre, Bangalore, Karnataka, India
- PLNT060 Novel Methods of Augmenting Plant Pollination**
 Paul R. Gauvreau, 17, Junior, Canyon Crest Academy,
 San Diego, California
- PLNT061T Innovative Method of Raising Paddy Seedlings by an Economically Viable and Ecologically Sustainable Method: A Boon to Farmers**
 Ramkumaar Ekambaram Thondaiman, 15, Freshman,
 Siva Bharathi Anbu Bharathi, 14, Freshman,
 Nsn Matriculation Higher Secondary School, Chennai, Tamil Nadu, India
- PLNT062 Amplifying DNA Sequences Representative of Genetically Modified Products Using the Polymerase Chain Reaction**
 Gaurav Mittal, 15, Freshman, Manheim Township High School,
 Lancaster, Pennsylvania
- PLNT063T The Effects of Mycorrhizal Fungi on the Growth of Tomato Plants**
 Rashawn Shaw, 19, Senior,
 Andrew Paradis, 20, Senior,
 Excel High School, Boston, Massachusetts
- PLNT064 Effects of the Hartmann Lines in the Cultivation of *Phaseolus vulgaris***
 Krystal Arianne Rosario Cruz, 15, Freshman, S.U. Dr. Cayetano Coll y Toste, Arecibo, Puerto Rico
- PLNT065 Investigation into *Arabidopsis thaliana* Circadian Systems**
 Abigail Marie Hunt, 18, Junior, Wentzville Holt High School,
 Wentzville, Missouri

Robotics and Intelligent Machines

- ROBO001 Drone Defense System: Detection, Tracking, Classification and Targeting of Flight Objects in 3D and Real Time**
Tassilo Constantin Schwarz, 18, Senior, Johannes-Heidenhain-Gymnasium Traunreut, Traunreut, Bayern, Germany
- ROBO002 Program for the Deaf and Dumb**
Elgun Alishev, 17, Sophomore, R.Pirnazarov, Baku, Absheron, Azerbaijan
- ROBO003 Using Reinforcement Learning to Guide Game Rule Design**
Yu Lou, 18, Senior, Beijing Number 4 High School, Beijing, China
- ROBO004 Simulation and Improvement of Non-Obstacle Flocking for Multi-agents System with a Virtual Leader**
Dongqing Wang, 18, Senior, The Experimental High School Attached to Beijing Normal University, Beijing, China
- ROBO005T Self-Adapting Machines on Basis of Microcontroller**
Dimitri Korkotashvili#, 16, Sophomore,
Aleksandre Khokhiashvili#, 17, Junior,
Tamar Korkotashvili, 15, Freshman,
LPPL Vladimer Komarovi Tbilisi Physics and Mathematics No. 199 Public School, Tbilisi, Tbilisi, Georgia
- ROBO006 Android Application Development for Algorithmic Music Generation through Artificial Neural Networking**
Sriram Gopalakrishnan, 18, Senior, Centennial High School, Boise, Idaho
- ROBO007 Device for Teaching and Learning the Braille Alphabet**
Luis Javier Mora Barrantes, 18, Junior, Colegio Tecnico Profesional de Mora, Ciudad Colon, San Jose, Costa Rica
- ROBO008T The Next Generation Multi-Robot Exploration: Biased Viewpoint Sampling via Dynamic Voronoi Space Partitioning and Receding Horizon Scheme**
Jaeho Lee, 18, Senior,
Chaeju Lee, 18, Senior,
Woochang June, 18, Senior,
Korea Science Academy of KAIST, Busanjin-Gu, Busan, South Korea
- ROBO009 Vision Based Robot Intelligence**
Ved Kumar, 16, Sophomore, Guilderland High School, Guilderland, New York
- ROBO010 Mars Habitation Constructor: An Autonomous Device Capable of Printing Structures on the Surface of Mars Using Native Materials**
Cole J. Tucker, 17, Junior, Thomas Worthington High School, Worthington, Ohio
- ROBO011T The Development of an Intelligent and Dexterous Robotic Arm**
Thomas Tran Anderson, 17, Junior,
Ryan Christopher Gross#, 17, Junior,
Spring Mills High School, Martinsburg, West Virginia
- ROBO012T FRUIT: Food Retrieval Utilizing Intelligent Technology**
Bradley David Neureuther, 17, Sophomore,
Liam Ray Sayward, 17, Junior,
Justin Matthew Bokus, 17, Junior,
Home School, West Chazy, New York
Home School, Schuyler Falls, New York
Hilltop Home School, Plattsburgh, New York
- ROBO013T A Bionic Cognitive Based SLAM System**
Cheng-Hsun Ho, 18, Junior,
Yang Yeh, 18, Junior,
Taipei Municipal Jianguo High School, Taipei City, Taiwan, Chinese Taipei
- ROBO014 Implementing New Methods of Prosthetic Control**
Qingfeng Li, 16, Sophomore, Laramie High School, Laramie, Wyoming
- ROBO015 Safecopter: Developing a Collision Avoidance System Based on an Array of Time-of-Flight 3D Cameras**
Robert Gabriel Tacescu, 17, Junior, Clovis North High School, Fresno, California
- ROBO016 Computer-Aided Bleeding Detection in Wireless Capsule Endoscopy Images Using Deep Convolutional Neural Networks**
Eunji Lee, 17, Junior, Sacred Heart Academy, Hamden, Connecticut
- ROBO017 UAV Obstacle Avoidance and Collision Prevention System**
Ryan Westcott, 16, Freshman, Oregon Episcopal School, Portland, Oregon
- ROBO018 Disability Breaker**
Maikl Amged Ghaly, 16, Sophomore, Sohag Secondary Military School, Sohag, Egypt
- ROBO019 The Prototype of Mars Rover**
Artem Pavlenko, 18, Junior, City Palace of Children's (Youth) Creativity, Omsk, Russian Federation
- ROBO020 Autonomous Off-Road Vehicle Using Computer Vision for Surveillance Applications**
Guadalupe Bernal, 16, Sophomore, Folsom High School, Folsom, California
- ROBO021 Detecting Abnormal Cells Using Artificial Intelligence**
Gaurav Behera, 18, Junior, Century High School, Rochester, Minnesota
- ROBO022 Genetic Algorithms and Sorting Data**
Benjamin Garrett DeVries, 15, Freshman, Woods Cross High School, Woods Cross, Utah
- ROBO023 Providing a Method for Neural Networks to Justify Their Conclusions in Both Prediction and Classification Problems**
Robert George Barrat, 18, Senior, Jefferson High School, Shenandoah Junction, West Virginia
- ROBO024 An Early Myocardial Infarction Detection System Using Complex Artificial Intelligence**
Abhinav Gundrala, 16, Sophomore, Olympia High School, Olympia, Washington
- ROBO025 Utilizing Machine Learning Techniques to Identify Cancerous Skin Lesions**
Christopher Thomas Kang, 15, Sophomore, Hanford High School, Richland, Washington
- ROBO026 ARG0: Anthropomorphic Facial Emotion Recognition and Generation Objective through Machine Learning**
Gabrielle Kaili Liu, 16, Sophomore, Ravenwood High School, Brentwood, Tennessee
- ROBO027T The Implementation of RBF Kernel Support Vector Machine Classifiers with Discrete Wavelet Transform on an Electroencephalographically Controlled, Finite Elementally Analyzed, and PID Stabilized Exoskeleton**
Srinidhi Pradyumna Krishnamurthy, 17, Junior,
Nithin Emil Dass, 17, Junior,
Yashasvi Bolisetty, 17, Junior,
Thomas Jefferson High School for Science and Technology, Alexandria, Virginia
- ROBO028T Mitosis Detection and Tumor Grading Using Deep Convolutional Neural Networks**
Anika Cheerla, 16, Sophomore,
Nikhil Cheerla, 18, Senior,
Monta Vista High School, Cupertino, California
- ROBO029 Predicting Lung Cancer Survival and Treatment Using Machine Learning**
Kevin Rao, 17, Junior, Mills E. Godwin High School, Richmond, Virginia

- ROBO030T Advanced Cell Recognition and Clustering Based on Deep Learning**
Gyusung Cho, 18, Senior,
Jaewoong Ahn, 18, Senior,
Dongyun Lee, 18, Senior,
Sejong Academy of Science and Arts, Sejong-si, South Korea
- ROBO031 Unlocking History: An Algorithm to Virtually Unfold 3D Computed Tomography Scans of Unopened Historical Documents**
Holly Marie Jackson, 17, Junior, Notre Dame High School San Jose, San Jose, California
- ROBO032 Deep Learning-Based Automated Tool Detection and Analysis of Surgical Videos to Assess Operative Skill**
Amy Yue Jin, 17, Junior, The Harker School, San Jose, California
- ROBO033 A Novel Multiparameter Optical Sensor Using CMOS Imaging and Remote Neural Networks for Microbial Analysis**
Sharon Lin, 19, Senior, Stuyvesant High School, New York, New York
- ROBO034 Autonomous Vehicle for Convoys**
Nikola Djordjevic-Kisacanin, 16, Freshman, Jasper High School, Plano, Texas
- ROBO035 Prosthetic Arm Controlled by Legsâ€™ Transmitter for Disabled People**
Huy Pham, 17, Junior, Quang Tri Town High School, Quang Tri Town, Viet Nam
- ROBO036T Study of the Movements of the Eye with Applications in Electromechanical Unconventional Micro-Drives**
Andra Maria Ciutac, 18, Senior,
Carmen Gabriela Popa, 19, Senior,
National Bilingual High School "Geroge Cosbuc", Bucharest, Europe, Romania
- ROBO037 Planning, Building & Programming an Autonomous Robot**
Jack Kendall, 20, Senior, Stiftsschule Einsiedeln, Einsiedeln, Schwyz, Switzerland
- ROBO038 The Two-Stage Cognitive System for Teaching Robots**
Vladyslav Maksymovych Marchenko, 17, Junior, Lviv Physics and Mathematics Lyceum, Lviv, Ukraine
- ROBO039 Adaptive Variational Memory Encoding for Recurrent Data Synthesis**
Samuel Williamson Griesemer, 18, Senior, Joplin High School, Joplin, Missouri
- ROBO040 The Universal Learning Lab - NLU, ASR and AI Enabled Voice and Text Based Research/Mini Lab**
Sayli Pankaj Bande, 14, Freshman, JSS Public School, Bangalore, Karnataka, India
- ROBO041 Cyclos - Preventing Low Back Pain Among Cyclists Using the Autoregressive Model with a Real-Time Feedback Mechanism**
Kunj Siddharth Dedhia, 18, Senior, Dhirubhai Ambani International School, Mumbai, Maharashtra, India
- ROBO042 TACo: Think And COnverse - Brain-Actuated Aids for the Disabled using Improved Electroencephalographic Techniques**
Manan Rai, 18, Senior, Amity International School, Pushp Vihar, New Delhi, India
- ROBO043 The Centauri Project: Using a Friendly Robot with Portable EEG Headset on Robot Operating System (ROS) for Facilitating the Lives of Paralyzed People**
Kagan Inan, 18, Senior, Trabzon Akcaabat Science High School, Trabzon, Akcaabat, Turkey
- ROBO044 Assistive Robot for Blind and Low Vision Travelers**
Valerii Andreevich Chernov, 18, Junior, Presidential Physics and Mathematics Lyceum No 239, Saint-Peterburg, Russian Federation
- ROBO045 Maze Solving Optimization through Genetic Programming**
Trevor Michael Houchens, 18, Senior, South Burlington High School, South Burlington, Vermont
- ROBO046 Utilizing Artificial Neural Networks in Data Analysis**
Vincent Paul August Moeykens, 18, Junior, Windsor High School, Windsor, Vermont
- ROBO047 Braille Reading and Training System**
Maggie Ford, 19, Senior, Mississippi School for Mathematics and Science, Columbus, Mississippi
- ROBO048 Using Inverse Kinematics and Virtual Reality to Control a Robotic Arm**
Samuel M. Cadotte, 16, Sophomore, Iolani School, Honolulu, Hawaii

Systems Software

- SOFT001 Applying Machine Learning to WiFi Channel State Information for Smart, Safe, Energy Saving Buildings**
Emily Jamie Wang, 16, Sophomore, William G. Enloe High School, Raleigh, North Carolina
- SOFT002 Linux Processes' Memory Visualization**
Vasilen Rosenov Tsvetkov, 18, Junior, High School of Mathematics "Dr Petar Beron," Varna, Bulgaria
- SOFT003 My ePass—Your Digital Identity**
Stefan Nikolaev Genchev, 18, Junior, Galabov-Gymnasium, Sofia, Sofia, Bulgaria
- SOFT004 Design and Construction of Smart DNS System Based on Distributed Smart Router and Cloud**
He Huang, 18, Junior, YK Pao School, Shanghai, China
- SOFT005 Mutasd!: Interactive Software for Learning and Practicing Sign Language**
Roland Krisztian Horvath, 16, Sophomore, Szechenyi Istvan High School, Sopron, Hungary
- SOFT006 ClickOnThePic.com: An Online Universal Relative-Ranking System**
Mehdi Oueslati, 18, Junior, Lycee Pierre Mendes France, Tunis, Tunisia
- SOFT007 ElHyOS**
Elshan Naghizade, 16, Sophomore, 291 Ecological Lyceum, Baku, Absheron, Azerbaijan
- SOFT008 AirPhone: Cloud Generation Smartphones**
Uladzislau Hadalau, 18, Junior, State Institution of Education "Secondary School No 11 the Town of Slutsk", Slutsk, Minsk Region, Belarus
- SOFT009T Protium: A Future of Web-Development**
Dmitriy Ussoltsev, 17, Junior, Ruslan Jankurazov, 16, Junior, Republican School in Physic and Math after Zhautykov, Almaty, Kazakhstan
- SOFT010 Variable Density Cubic Infill for Fused Filament Fabrication**
Martin James Boerwinkle, 18, Senior, Arkansas School for Mathematics, Sciences, and the Arts, Hot Springs, Arkansas
- SOFT011 Power-efficient, Delay and Spatial Error Tolerant, Dynamic 3D Network Analysis**
Rucha Joshi, 17, Junior, Westwood High School, Austin, Texas
- SOFT012 Security from DDOS**
Revaz Epadze, 16, Sophomore, Georgian-American School, Tbilisi, Georgia
- SOFT013 Image Explanation Software for the Blind**
Taewon Kang, 15, Freshman, Sejong Academy of Science and Arts, Sejong, South Korea
- SOFT014 Adding Data-Aware Sort Optimizations to the Python Interpreter**
Elliot Gorokhovskiy, 18, Senior, Fairview High School, Boulder, Colorado
- SOFT015 Adaptive School Bus Routing Using a Genetic Algorithm**
Jiedong Duan, 19, Senior, Niles North High School, Skokie, Illinois
- SOFT016 MATCHLESS: A Linear Algebraic Approach to Duplicate File Identification**
Michael William Litt, 18, Senior, Orange High School, Pepper Pike, Ohio
- SOFT017T Traffic Congestion Reduction Using Ant Colony Optimization**
Julian Luke Nazareth#, 19, Senior, Neville Nazareth#, 16, Sophomore, Nicolet High School, Glendale, Wisconsin
- SOFT018T UOK? A Baby Monitoring System for the Visually Impaired Parents**
Jihye Park, 17, Sophomore, Youngchae Chee, 17, Junior, Daejeon Dongsin Science High School, Daejeon, South Korea
- SOFT019T Behave: An Authentication System Based on Keyboard and Mouse Dynamics**
Igor Moscalet, 15, Freshman, Sandu Chirita, 17, Sophomore, "B.Z.Herzl" ORT Technological Lyceum, Chisinau, Republic of Moldova
- SOFT020 Cloud-Based Data Preparation for Medical Observational Research**
Varun Sathyan, 17, Senior, Athens High School, Troy, Michigan
- SOFT021 Creating an Assistive Technology for People with Orthographic Dyslexia by Reducing the Orthography Depth of Internet Web Pages**
Pranav G.R. Krish, 17, Junior, Yorktown High School, Yorktown Heights, New York
- SOFT022 Temporal Amplification of Photoplethysmographic and Biometric Signals Hidden in Video Streams for Contactless Monitoring of Cardiovascular Health and Identity Authentication**
Eshika Saxena, 16, Sophomore, Interlake High School, Bellevue, Washington
- SOFT023 PrediMed: Predicting Health with a Custom-Built Machine Learning Ensemble**
Alexander Zlokapa, 18, Senior, Golden Hills Academy, Danville, California
- SOFT024 Optimizing Supercomputer Topologies: Developing Probabilistic Algorithms to Construct More Efficient Node Networks to Increase Supercomputer Speed**
Talia Miriam Blum, 18, Senior, Plainview–Old Bethpage John F. Kennedy High School, Plainview, New York
- SOFT025 3D Computer Vision: Human/Machine Interaction via Kinect**
Benjamin Thomas McDonough, 16, Freshman, McCallie School, Chattanooga, Tennessee
- SOFT026 Lumos: Automated Smartphone-Based Ophthalmic Screening for Glaucoma Using Computer Vision and Deep Learning Algorithms through Low-Cost and Non-Mydriatic Retinal Fundus Imaging**
Shalin Vipul Shah, 18, Senior, Tesoro High School, Las Flores, California
- SOFT027T Automating Identification of Terrorist Recruitment on Social Media Platforms**
Mihir Patel, 17, Junior, Nikhil Sardana, 17, Junior, Thomas Jefferson High School for Science and Technology, Alexandria, Virginia
- SOFT028 AzureWare: A Novel Approach for Quantifying Tremors and Progression of Parkinson's Disease through an Android App and Bluetooth Low Energy Technology**
Koushik Sridhar, 16, Freshman, Ardrey Kell High School, Charlotte, North Carolina
- SOFT029 Applications of Statistical Machine Learning Algorithms in the Kidney Exchange**
Kireet Venkata Panuganti, 18, Senior, North Carolina School of Science and Mathematics, Durham, North Carolina
- SOFT030 Edison Vein ID (EVID) System: User Authentication through Peripheral Vein Biometrics**
Ritik Patnaik, 16, Sophomore, Plano East Senior High School, Plano, Texas

- SOFT031 Zarad**
Taymaa Z. M. Abdalhadi, 17, Junior, Ramallah Girls High School, Ramallah, West Bank, Palestine
- SOFT032 Developing a Predictive Model for On-Campus Crime Using Machine Learning Algorithms and Reporting via Mobile App**
Aratrika Ghatak, 17, Junior, Evergreen Valley High School, San Jose, California
- SOFT033T myCAST: A Personalized Cerebrovascular Accident Self Test**
Swagat Bhattacharyya, 17, Junior,
Michael Jarek Yan, 17, Junior,
Morgantown High School, Morgantown, West Virginia
- SOFT034T Encryption in Everyday Life**
Joel Toivo Tapio Jakko, 18, Junior,
Max Mecklin, 18, Junior,
Valkeakosken Tietotien Lukio, Valkeakoski, Pirkanmaa, Finland
- SOFT035T Braille Printer by Internet of Things**
Navaroot Prirungruang, 19, Senior,
Narongorn Booncharoen, 18, Senior,
Kakkanet Suttirat, 19, Senior,
Princess Chulabhorn Science High School, Cha-Am, Phetchaburi, Thailand
- SOFT036 Music Braille Converter for Non-Braille Translator**
Yoon-Kon Nam, 17, Senior, Boin, Seoul, Songpa-gu, South Korea
- SOFT037 Applying Deep Learning on EEG to Control Bionic Limbs with Humanlike Performance**
Akram O. J. Sbaih, 16, Junior, Kafr Rai High School, Jenin, West Bank, Palestine
- SOFT038 Emergency Goods Distribution Model over Finite Time Interval using Genetic Algorithm**
Worameth Chinchuthakun, 17, Junior, Mahidol Wittayanusorn School, Nakhonpathom, Thailand
- SOFT039 Chemoscope: An Android Application Integrated Augmented Reality and Mixed Reality to Assist Chemistry Learners**
Thu Anh Tran Thi, 18, Senior, Bao Loc High School for the Gifted, Bao Loc, Lam Dong, Viet Nam
- SOFT040T Pyco: An Algorithmic Composer**
Lassi Olavi Kaimio, 19, Senior,
Iikka Hauhio, 19, Senior,
Maunulan Yhteiskoulu ja Helsingin Matematiikkalukio, Helsinki, Uusimaa, Finland
- SOFT041 DriveLife Simulator**
Anton Zinkevich, 17, Sophomore, Non-Typical Comprehensive Institution "Municipal Classical Lyceum", Kemerovo, Kemerovskaya Oblast, Russian Federation
- SOFT042 MFT: Improving Convolutional Object Tracking with Feed Separated Learning**
Michael Yoomin Lee, 19, Senior, Manhasset High School, Manhasset, New York
- SOFT043T Working Safety-Application**
Eemil Kristian Rintala, 16, Freshman,
Aukusti Tuomas Parikka, 16, Freshman,
Saynatsalon Yhteinaiskoulu, Jyväskylä, Central Finland, Finland
- SOFT044T The Novel Real-Time Sidewalk Direction Recognition Algorithm for Visually Impaired**
Joonsung Kim#, 18, Senior,
Dongmin Kim, 19, Senior,
Korea Digital Media High School, Kyeong-Gi Do, Kyeong-Gi Do, South Korea
- SOFT045T Reaching the Individuals in the Fight against Obesity through Game**
Turgut Berk Yuksek, 17, Junior,
Mert Cakmaktepe, 17, Junior,
Sivas Fen Lisesi, Sivas, Sivas, Turkey
- SOFT046 Mitigating Effects of Database Breaches with Stronger Password Storage Strategies**
Bradley Michael Walters, 17, Junior, DSU SUCCESS Academy, St. George, Utah
- SOFT047 A Computational Approach to Predicting College Player Success in the NBA**
Shardul Kothapalli, 17, Junior, Hamilton High School, Chandler, Arizona
- SOFT048 Comparative Analysis of Graph Coloring Algorithms**
Maha Fahad Alrashed, 18, Senior, ALOlayya Private Schools, Riyadh, Saudi Arabia
- SOFT049 Developing an Algorithm to Simulate and Visualize Abelian Sandpiles on Three Types of Lattices**
Razan Fouad Alkawai, 18, Senior, The Sixth High School, Qatif, Eastern Province, Saudi Arabia
- SOFT050 Mobile Real-Time OCR for Visually Impaired Individuals**
Divya Amirtharaj, 16, Sophomore, Westview High School, Portland, Oregon
- SOFT051 Using Bayesian Networks and Entropy Coding for High Fidelity Video Compression**
Rochan Venkat Avlur, 18, Senior, AECS Magnolia Maaruti Pre-University College, Bangalore, Karnataka, India
- SOFT052 Language Identification Based on the Variations in Intonation Using Multi-Classifer Systems**
Shinjini Ghosh, 17, Junior, South Point High School, Kolkata, West Bengal, India
- SOFT053 An Investigation and Computer Simulation on the Temperature Dependence for Hall Mobility and Quality Factor in GaAs**
Zachary Scott Rolfness, 18, Junior, Paradise Valley High School, Phoenix, Arizona
- SOFT054 The Ultimate Platform for Plankton Education**
Matthew Jung Woo Fala, 19, Senior, Iolani School, Honolulu, Hawaii
- SOFT055 Using Smart Phones to Capture and Analyze Heart Data: HeartEra App**
Amir Helmy, 16, Junior, Eastside Highschool, Gainesville, Florida
- SOFT056 Scin: An Application to Detect and Diagnose Plant and Skin Diseases Utilizing a Feed Forward Convolutional Neural Network**
Neil Deshmukh, 15, Freshman, Moravian Academy, Bethlehem, Pennsylvania
- SOFT057 Creating a Database-Powered Web Service to Preserve Biodiversity in Hawaii**
Luke Timothy Jones, 18, Senior, Kihei Charter Public High School, Kihei, Hawaii
- SOFT058 Creating an Optimised Algorithm for EEG Wave Separation and an Accompanying Graphic Interface**
Richard Alexander Pope, 16, Sophomore, Pensacola High School, Pensacola, Florida
- SOFT059T Fuzzy Little Television Watching Problemine Fuzzy Logic Approach**
Esra Topcu#, 20, Senior,
Tugce Manavoglu, 19, Senior,
Turk Telekom Mesleki Ve Teknik Anadolu Lisesi, Eskisehir, Turkey

Translational Medical Science

- TMED001 Stimulus Changing in Three-Dimensional Movement Due to Horse Gait Amplitude Variations and Its Effects on Hippotherapy Practitioners**
Milena Julia Chirulli, 18, Senior, Instituto Federal de Educacao Ciencia e Tecnologia Catarinense - Campus Rio do Sul, Rio do Sul, Santa Catarina, Brazil
- TMED002 "Anaphylactic Shocker!": The Use of a Dynamic QR Code Medical Bracelet to Administer a Practice Epinephrine Auto-Injector during a Staged Medical Emergency**
Katelyn Jo France, 17, Junior, Hinckley-Finlayson High School, Sandstone, Minnesota
- TMED003 Inhibiting the Proliferation of Patient-Derived Glioblastoma Multiforme (GBM) Cells and U-87 MG Cell Line Using Leaf Extract of *Bacopa monnieri***
Tejas S. Athni, 17, Junior, Stratford Academy, Macon, Georgia
- TMED004 Sabah Snake Grass: Nature's Way of Healing**
Isaac Chung De Wei, 17, Junior, SMK Batu Lintang, Kuching, Sarawak, Malaysia
- TMED005 Finding a Cure for Zika: Antiviral Effects of PI3 Kinase Inhibitors**
Jennifer Zhang, 16, Sophomore, Little Rock Central High School, Little Rock, Arkansas
- TMED006 Repelling What Bugs You: Creating an All Natural, Antiseptic, Safe, and Effective Biopesticide Mosquito Repellent**
Matthew David Fanguie, 17, Junior, Catholic High School New Iberia, New Iberia, Louisiana
- TMED007 Novel Blood Tests to Diagnose Preeclampsia: Saving the Lives of Mothers and Children**
Tanya Kumar, 18, Senior, Clear Brook High School, Friendswood, Texas
- TMED008 Neuroprotective Effects of Melatonin following TBI**
Andrew Robert Mazdak Kamali, 18, Senior, Fox Tech High School for Health & Law Professions, San Antonio, Texas
- TMED009T Multisensory Sleep Enhancer and Regulator**
Muhammad Akram Bin Ahmad, 17, Senior,
Kai Bo Lee, 17, Senior,
Felix D' Marvin, 17, Senior,
Sekolah Menengah Kebangsaan Ibrahim, Sungai Petani, Kedah, Malaysia
Smk ibrahim, Sungai Petani, Kedah, Malaysia
- TMED010 Optimizing Bioavailable Iron in Water**
James Paul Verheyden, 17, Junior, Cascades Academy, Bend, Oregon
- TMED011 Label-free Immunosensors for Early and Expeditious Diagnosis of Multi-Organ Failure**
Paula Nazarene Evangelista Say, 18, Senior, National Junior College, Singapore, Singapore
- TMED012 Developing a High-throughput Platform for Drug Toxicity Screening**
Andrea York Tiang Teo, 17, Junior, Raffles Institution, Singapore, Singapore
- TMED013 Can Tender Coconut Water Inhibit the Growth of HepG2 Liver Cancer Cells?**
Vaitheesh L. Jaganathan, 15, Freshman, Ballard High School, Louisville, Kentucky
- TMED014T The Miracle Pill, III**
Ajitha Karpagam Anand, 17, Junior,
Nandika Nair, 17, Junior,
Sreshta Varcesvi Margan, 17, Junior,
The Academy of Science and Technology, Conroe, Texas
- TMED015 A Novel Approach to the Engineering of a Gold Nanorod Based Multiplex Biosensor**
Grace Katherine Ranft-Garcia, 18, Senior, Robert E. Lee High School, San Antonio, Texas
- TMED016 SMART ARMOR - Improving Outcomes for Radiotherapy Breast Cancer Patients**
Macinley Neve Butson, 17, Junior, The Illawarra Grammar School, Mangerton, New South Wales, Australia
- TMED017T Toxicity and Gastroprotective Activity of Taro Stem Extract (*Colocasia esculenta L. Schott*) in Acetylsalicylic Acid-Induced Gastric Mucosal Injuries in Rats**
Muhammad Farhan, 19, Senior,
Aiman Hilmi Asaduddin, 18, Senior,
State Senior high School 1 Yogyakarta, Yogyakarta, DKI, Indonesia
- TMED018T Metabolic Analysis as a Method of Breast Cancer Diagnosis**
Jason Scott Provol, 19, Senior,
Matthew Henry Bronars, 19, Senior,
Scripps Ranch High School, San Diego, California
- TMED019 Machine Learning Tool for Accurate, Cost-Effective, and Rapid Prediction of Small Cell Lung Cancer Stage: Significantly Increase Patient Survival in One Minute**
Jessika Baral, 18, Senior, Mission San Jose High School, Fremont, California
- TMED020 The Development of Specific Colon Cancer microRNA Profiles for Early and Accurate Diagnosis**
Emily Claire Neeson, 18, Senior, Chicago High School for Agricultural Sciences, Chicago, Illinois
- TMED021 Exploiting Migration and Metabolism: A Novel Approach to Metastatic Cancers**
John Roy Bularan Lozada, 18, Senior, Academy for Medical Science Technology, Hackensack, New Jersey
- TMED022 Predicting Lung Cancer Onset Using Segmentation and Classification**
Neelay N. Trivedi, 16, Sophomore, Watchung Hills Regional High School, Warren, New Jersey
- TMED023 Transient Visual-Evoked Potentials as a Novel Biomarker for Autism and Phelan-McDermid Syndrome**
Lauren Hallie Singer, 18, Senior, Scarsdale High School, Scarsdale, New York
- *TMED024T Heart Donation after Circulatory Determination of Death: The Impact of Fatty Acids on Hemodynamic Recovery and a Future Outlook**
Jan Erik Vognstrup, 20, Senior,
Lucas Busser, 21, Senior,
Alte Kantonsschule Aarau, Aarau, Aargau, Switzerland
- TMED025 Anti Proliferative and Apoptotic Effects of Acidified Sodium Chlorite on Osteosarcoma SJS-1 and MDA-MB-231 *in vitro***
Modhi Alajmi, 17, Junior, American Creativity Academy, Hawalli, Kuwait
- TMED026 The Cytotoxicity Effect of *Nephelium lappaceum* Leaf Extract on Human Cancer Cells**
Farhah Nabilah Rosli, 17, Junior, Batu Pahat MARA Junior Science College, Batu Pahat, Johor, Malaysia
- TMED027 Anticancer Effects of Plant-Derived Compounds on the NF-κB Signaling Cascade**
Rahul Sai Guda, 16, Sophomore, Millard North High School, Omaha, Nebraska
- TMED028 Early Detection of Malaria Infection with Portable and Electricity Free Isothermal Loop Amplification (LAMP)**
Nikhil S. Gopal, 17, Junior, The Lawrenceville School, Lawrenceville, New Jersey

- TMED029T A Novel Model to Efficiently Embody Platelet Morphological Change**
Sahil Chaudhry, 18, Senior,
Rahul Chaudhry, 18, Senior,
Syosset High School, Syosset, New York
- TMED030 The Effects of Phytoestrogens, Resveratrol, and Lycopene on *Agrobacterium tumefaciens* Induced Tumors**
Thea Lauren Patrick, 17, Junior, Mitchell High School, Mitchell, South Dakota
- TMED031 The Application of Photochromism in Sun Protection as an Indicator of Sunscreen Efficacy**
Farah Shaik, 17, Junior, Star College Girls' High School, Durban, KwaZulu Natal, South Africa
- TMED032 A Novel Approach to Improving Photodynamic Therapy through Analysis of the Effects of Induced Hypoxia and Utilization of Bioluminescence**
Shannen Kelly Prindle, 17, Junior, Oakton High School, Vienna, Virginia
- TMED033 Reinventing the Catheter: Inhibiting UTIs by Creating a Novel Material Integrated with *Castanea sativa* to Inhibit Quorum Sensing among Nosocomial Infection Causing Bacteria**
Devina Thapa, 18, Senior, Academy of Science, Sterling, Virginia
- TMED034 An Early Tri-Biomarker Sputum Diagnostic for Cystic Fibrosis in the Developing World**
Zoe Weiss, 16, Sophomore, Lakeside High School, Atlanta, Georgia
- TMED035 Developing an Alternative Treatment to Luminal B Breast Cancer by Targeting DNA Repair Mechanisms**
Lily Margaret Waddell, 17, Junior, Bangor High School, Bangor, Maine
- TMED036T Inexpensive Mobile Diagnosis of Diabetic Retinopathy Using Deep Learning**
Kavya Kopparapu, 17, Junior,
Justin Zhang, 18, Junior,
Neeyanth Kopparapu, 15, Freshman,
Thomas Jefferson High School for Science and Technology, Alexandria, Virginia
- TMED037 Development of a Rapid, Low-Cost Assay Based on ZIKV NS1 Protein Functionalized Gold Nanorods on a Plasmonic Paper Substrate for ZIKV Diagnosis**
Yatin J. Chandar, 16, Sophomore, The Davidson Academy of Nevada, Reno, Nevada
- TMED039 The Effects of Electrical Discharge Plasma Treatment on Cellular Growth and Wound Healing**
Nathan Leonard Kinsey, 18, Junior, Eugene Ashley High School, Wilmington, North Carolina
- TMED040T Development of Novel Method Using RNA Template for Detection of Mutation with Superior Sensitivity**
Duc Trong Nguyen, 18, Senior,
Ngoc Minh Thi Pham, 17, Junior,
Hanoi - Amsterdam High School for the Gifted, Hanoi, Viet Nam
- TMED041T Improving Subjective Sleep Quality and Deep Sleep Duration in High School Students**
Juraj Vasek, 19, Junior,
Dominika Gaborova, 19, Junior,
Gymnazium Viliama Palinyho - Totha, Martin, Zilinsky Kraj, Slovakia
- TMED042 The Structural, Mechanistic, and Clinical Applications of NT5C2 in Drug Resistance and Relapse of T-ALL**
Sarah Marie Romanelli, 18, Senior, Oceanside High School, Oceanside, New York
- TMED043 The Effect of Nutrient Levels on Chemotherapeutic Drug Efficacy in NCI-H460, Non-Small Cell Lung Carcinoma Cells**
Jillian Rose Pesce, 18, Senior, Smithtown High School East, St. James, New York
- TMED044 Potent Treatment of Renal Fibrosis: A Novel Inhibitor of HIPK2-Smad3 Interaction**
Ruiwen Fu, 19, Senior, Jericho Senior High School, Jericho, New York
- TMED045 Designing and Testing a Novel Drug Targeting the Distinct Metabolic Roles of the Isoforms of PPARGamma**
Dylan Li, 18, Senior, Hunter College High School, New York, New York
- TMED046 ABT263 (Navitoclax) and the IPF-Treatment Drugs for a Healthier Aging**
Hemant Srivastava, 18, Senior, Alabama School of Fine Arts, Birmingham, Alabama
- TMED047 Solving the Hip Fracture Crisis: Utilizing Silica Nanoparticles to Synthesize a Flexible, Affordable, and Bio-Friendly Shear Thickening Fluid Based Innovation**
Avni Jain, 15, Sophomore, Eden Prairie High School, Eden Prairie, Minnesota
- TMED048 Harnessing Anti-Inflammatory and Immunomodulatory Potentials from Nature for Cancer Therapy**
Claire Tse, 15, Freshman, Methacon High School, Eagleville, Pennsylvania
- TMED049T The Effectiveness of a Preventive Remedial Program to Treat the Flat Foot Deviation of Primary Boy-Students (6:9 Years)**
Fahed Almkhlef, 19, Senior,
Ahmad Rajab Alasmar, 19, Senior,
Ibn Taymiyyah Independent Secondary School For Boys, Doha, Doha, Qatar
- TMED050 Ultrastructural Characterization of MCF-7 Breast Cancer Cells Exposed to Cerium Oxide Nanoparticles Using TEM and SEM Analysis**
Danya Salah Aljishi, 18, Senior, Sixth Secondary School, Qatif, Eastern Province, Saudi Arabia
- TMED051T Rapamycin as a Novel Therapeutic for Alzheimer's Disease: An Imaging Assessment of Prevention and Treatment through *in vivo* Brain Vasculature, Metabolism, and Cognition**
David Wang Ma#, 17, Junior,
Amy C. Wang#, 18, Senior,
Paul Laurence Dunbar High School, Lexington, Kentucky
- TMED052 Dirty Lab Coats: Thinking Inside of the Box to Prevent H.A.I.s**
Tatiana Victorovna Ortiz, 17, Sophomore, Flour Bluff High School, Corpus Christi, Texas
- TMED053 Celiac Disease Treatment: Mitigating Gluten Intolerance Using Punarnavine**
Tushar Aggarwal, 18, Junior, Maharaja Agarsain Public School, Delhi, India
- TMED054T Conjugated Linoleic Acid, Kefiran and Interferon Beta-1a's Anti-Proliferative and Anti-Carcinogenic Effects *in vitro* BT-474 (ATCC® HTB-20™) Cell Lines for Breast Cancer Treatment**
Vinita Kanwar Rathore, 15, Sophomore,
Tejashvi Pravin Pindoriya, 16, Sophomore,
Shree Cutchi Leva Patel Samaj School, Nairobi, Nairobi, Kenya
- TMED055T Illegal Substance Biodetectives: Apta-Liposomes**
Dilge Kocabas, 17, Junior,
Dilara Alev Ortel, 19, Senior,
Takev Fen Lisesi, Izmir, Narlidere, Turkey
- TMED056 Immunotherapy for Multiple Myeloma Cell Lysis**
Sanjna Suhas Shelukar, 18, Senior, Wissahickon High School, Ambler, Pennsylvania

- TMED057 Characterization of Patient-Derived Glioblastoma Cell Lines**
Ritika Bharati, 18, Senior, Hamilton High School, Chandler, Arizona
- TMED058 Ameliorating Alpha-Synuclein Aggregation in Parkinson's Using Optimized Chaperones: An in silico Approach**
Jeremiah Thomas Pate, 19, Senior, BASIS Oro Valley, Oro Valley, Arizona
- TMED059 Necrosis of Lung Adenocarcinoma by Targeting a Novel Egg-Specific Protein**
Mriganka Mandal, 16, Sophomore, Albemarle High School, Charlottesville, Virginia
- TMED060 Nanocarrier Delivery of siRNA for Glioma Therapy**
Adriana Camila Mares, 18, Senior, Mission Early College High School, El Paso, Texas
- TMED061 The Effects of Rock Steady Boxing on Cognition in Parkinson's Disease**
Ali Rose DeLambo, 19, Senior, Academic Magnet High School, North Charleston, South Carolina
- TMED062 New Home Hazard: Exploring Flexible Flooring Cytotoxicity**
Analisa Marie Conway, 18, Junior, Assumption High School, Louisville, Kentucky

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