

# Intel International Science and Engineering Fair



## Finalist Directory 2019

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Intel ISEF 2019 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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Air Force Research Laboratory on behalf of the United States Air Force	K. Soumyanath Memorial Award
American Chemical Society	King Abdul-Aziz & his Companions Foundation for Giftedness and Creativity
American Committee for the Weizmann Institute of Science	Mu Alpha Theta, National High School and Two-Year College Mathematics Honor Society
American Geosciences Institute and the Geological Society of America	National Aeronautics and Space Administration
American Institute of Aeronautics & Astronautics	National Anti-Vivisection Society
American Mathematical Society	National Center — Junior Academy of Sciences of Ukraine
American Meteorological Society	National Institute on Drug Abuse, National Institutes of Health and the Friends of NIDA
American Psychological Association	National Oceanic and Atmospheric Administration — NOAA
American Statistical Association	National Security Agency Research Directorate
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China Association for Science and Technology (CAST)	Sigma Xi, The Scientific Research Honor Society
Drexel University	SPIE, the international society for optics and photonics
Drug, Chemical & Associated Technologies Association (DCAT)	U.S. Agency for International Development
Florida Institute of Technology	United States Environmental Protection Agency
Fondazione Bruno Kessler	United Technologies Corporation
GoDaddy	University of Arizona
IEEE Foundation	Wolfram Research, Inc.
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# Intel ISEF 2019 Finalist Directory

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

An \* identifies non-competing projects

T: precedes the name of the Teacher-Sponsor of the Finalist

A T after the booth ID number indicates a Team Project

## Animal Sciences

**ANIM001** **How Do SuperDFM Strong Microbials Affect *Varroa destructor* in Relation to *Lactobacillus* within *Apis mellifera*?**

Kaitlyn Taylor, 16, Junior, The Villages Charter High School, The Villages, FL

**ANIM002T** **Diurnal Butterflies Population as Indicator Environmental Quality of the Natural Park "San Francisco," Torti, Panama**

Janai Dominguez, 17, Junior,  
Genisis Almanza, 17, Junior,  
Centro Educativo Bilingue de Torti, Panama, Panama

**ANIM003T** **Developing Novel, Low-Cost Methods to Support Citizen Scientists in the Conservation of Bat Species**

Richard Beattie, 17, Junior,  
Dylan Bagnall, 17, Junior,  
The King's Hospital, Dublin, Leinster, Ireland

**ANIM004** **Effect of E-Cigarette Aerosol Exposure on Cardiac Development and Cytosine Methylation in Embryonic *Danio rerio***

Charles Stone, 18, Senior, Wentzville Holt High School, Wentzville, MO

**ANIM005** **Cancer-inhibiting Diet-Derived Alkaloids in Secretions from Hawaii Poison Dart Frog *Dendrobates auratus***

Aslan Cook, 18, Senior, Kamehameha Schools Kapalama Campus, Honolulu, HI

**ANIM006T** **Identifying the Effect of Limiting Micronutrients on the Ecological Footprint of *Bellamyia chinensis***

Malachy Bloom, 17, Junior,  
Luke Drummer, 17, Junior,  
Mankato East High School, Mankato, MN

**ANIM007** **Mosquito Fecundity and Parasite Transmission: Influence of TOR Pathway**

Shiqi Yang, 17, Junior, The Second Middle School Attached to Fudan University, Shanghai, China

**ANIM009** ***Silybum marianum* and *Rauwolfia serpentina* as Novel Agents for Alzheimer's Disease Treatment and Lifespan Extension in a *Caenorhabditis elegans* Model**

#  
Sindhuja Uppuluri, 17, Junior, Westwood High School, Austin, TX

**ANIM010** **Modeling Prenatal Nicotine Exposure with *Hydra littoralis***

Christopher Calizzi, 18, Senior, College Park High School, The Woodlands, TX

**ANIM011T** **Adaptive Significance of the Experimentally Obtained Diploid Male Fertility in the Japanese Bumblebee *Bombus ignitus* with Complementary Sex Determination**

Rintaro Mori, 17, Junior,  
Tazuru Kobayashi, 17, Junior,  
Akito Yoshida, 16, Sophomore,  
Yasuda Gakuen Junior and Senior High School, Sumida-ku, Tokyo, Japan

**ANIM012T** **Aliens Invade Hong Kong: First Record of the New Guinea Flatworm (*Platydemus manokwari*) as an Invasive Species in Hong Kong, China**

#  
Muhua Yang#, 17, Junior,  
Elysia Ye#, 16, Junior,  
St. Joseph's College, Hong Kong, China, Hong Kong Special Administrative Region  
Chinese International School, Hong Kong, China, Hong Kong Special Administrative Region

**ANIM013** **Reef Relief: Investigating the Allelopathic Effects of Soft Corals on the Health of Large and Small Polyp Stony Corals**

Lauren Nonnenmocher, 15, Freshman, Lakeland Christian School, Lakeland, FL

**ANIM014** **Study on a Novel Analgesic Peptide from the Digestive Juice of Land Leeches**

Chenxi Zeng, 17, Junior, The First High School of Changsha, Changsha, Hunan, China

**ANIM015T** **Bird Environmental DNA from the Air**

Yuma Okamoto, 17, Junior,  
So Tsukamoto, 17, Junior,  
Shizuoka Prefectural Kakegawa-Nishi High School, Kakegawa City, Shizuoka Prefecture, Japan

**ANIM016T** **Novel Subtle Acoustic Communication: Successful Elucidation of the Cryptic Ecology of Runner Plant Bugs (*Hallodapus* spp.) with Emphasis on Their Stridulatory Mechanisms**

Yui Tamada, 17, Junior,  
Ayana Miyazaki, 17, Junior,  
Haruka Hinami, 17, Junior,  
Nagasaki Prefectural Nagasaki Nishi High School, Nagasaki-City, Nagasaki-Pref., Japan

**ANIM017** **Gait Analysis of *Periplaneta americana* Cockroaches Exposed to Limonene**

Sophie Chen, 17, Junior, Oregon Episcopal School, Portland, OR

**ANIM018T** **Study of the Achupalla Worm (From the *Schistothecha* Family) in the Biodegradation of Low Density Polyethylene (LDPE)**

Johan Suclli Machacca, 14, Freshman,  
Willian Aguilar Pauccar, 17, Sophomore,  
Daniel Estrada Perez, Quispicanchis, Cusco, Peru

- ANIM019T Evaluation of the Biodegradable Effect of *Tenebrio molitor* "Flour Worm" in the Polystyrene "Styrofoam Residues" to Reduce the Environmental Pollution and Generate Conscience to the Population of Huanuco 2018**  
Fabricio Camara Caldas, 16, Sophomore,  
Perla Miraval Cano, 16, Sophomore,  
Isaac Newton, Huanuco, Peru
- ANIM020 Impact of Horizontal vs. Vertical Positioning of *Gallus gallus* Eggs during Incubation**  
Alicia Montemayor, 18, Senior, Agriscience Magnet Program, San Antonio, TX
- ANIM021 Reproductive Strategy for a Surf Clam, *Chion semigranosa* (Dunker), Accumulating in the Intertidal Zone of Exposed Sandy Beach in Summer in Tsu, Mie Prefecture, Japan**  
Yuko Nakano, 15, Freshman, Kogakkan High School, Ise-City, Mie, Japan
- ANIM022 Metformin as a Novel Method for Polychlorinated Biphenyl Induced Non-alcoholic Fatty Liver Disease Remediation in *Danio rerio* as a Model for Human Livers**  
# Anna Spektor, 18, Senior, Nicolet High School, Glendale, WI
- ANIM023 Nematode *Caenorhabditis elegans*: Population Growth Response to Various Sugar Solutions**  
Louie Martinez, 17, Junior, Grants High School, Grants, NM
- ANIM024 Caffeine as a Natural Larvicidal in Reducing the Malaria Transmission of *Anopheles quadrimaculatus* Mosquitoes**  
Pooja Veerareddy, 16, Sophomore, Caddo Parish Magnet High School, Shreveport, LA
- ANIM025 How Will Different Ticks Respond to Carbon Dioxide?**  
Grant Roseman, 15, Freshman, Roseman High School, Jackson, MO
- ANIM026 A Novel Approach to Challenge the Mutualistic Symbiosis between Algae and Sea Anemones**  
Lina Al-Alshaikh, 18, Senior, Dhahran Ahliyya School, Dammam, Eastern Province, Saudi Arabia
- ANIM027 Year Two: Understanding the Effects of *Bifidobacterium infantis* on Honeybee Gut Parasite *Nosema ceranae***  
Varun Madan, 14, Freshman, Lake Highland Preparatory School, Orlando, FL
- ANIM028 Visual Monitoring of Neural Activity in Hydra**  
Zainab Almuallim, 17, Senior, Second High School, Safwa, Saudi Arabia
- ANIM029 Assessing the Effect of Light Pollution on Courtship Behavior of *Drosophila melanogaster***  
Haidyn Washburn, 17, Junior, Sanger High School, Sanger, CA
- ANIM030 Control of *Varroa destructor* Infestation with a Dual-Function, Thymol-Emitting Honey Bee Hive Entranceway**  
# Raina Jain, 16, Junior, Greenwich High School, Greenwich, CT
- ANIM031 The Prevalence of *Cryptosporidium* in Various Ages of Calves**  
Jessica McWatters, 17, Junior, Pettisville High School, Pettisville, OH
- ANIM032 The Effect of Rosmarinic Acid and the Pesticide Thiamethoxam on the Survival and Circadian Rhythm of Honey Bees (*Apis mellifera*) in Puerto Rico**  
Alejandra Gruber, 17, Junior, University Gardens High School, San Juan, Puerto Rico
- ANIM033 Hypoxia Inducible Factor-1 in the Sea Cucumber *Holothuria glaberrima***  
Carlos Ortiz-Quintana, 17, Senior, Escuela Secundaria Especializada en Ciencias, Matematicas y Tecnologia, Caguas, Puerto Rico
- ANIM034T The Effect of Dewormers on Rams' Fertility**  
Jaycee Bennett, 17, Junior,  
Kaleb Kearn, 15, Sophomore,  
Fremont High School, Plain City, UT
- ANIM035 Habitat Preference Drives Brain Shape in Crocodylomorphs**  
Anthony D'Amore, 17, Senior, Smithtown High School East, St. James, NY
- ANIM036 Prevention of Oxidative Stress Induced Diseases through the Effects of Curcumin on Planarial Stem Cells and Regeneration**  
Sanjita Pamidimukkala, 15, Sophomore, Dougherty Valley High School, San Ramon, CA
- ANIM037 The Cardiovascular Effects of Electronic Cigarette Components on *Daphnia magna*: An Investigation into Decreased Heart Elasticity**  
Ian Bailey, 16, Sophomore, Garden City High School, Garden City, NY
- ANIM038 The Effect Wood, Paper, Litter, and Hay Beddings Have on the Release of Ammonia from Rabbit Waste**  
Taleah Heaton, 17, Junior, Success Academy DSU, St. George, UT
- ANIM039 Use of Pulsed Photobiomodulation in Nerve Regeneration after Injury-Induced Peripheral Neuropathy in *Danio rerio*: Effect of Mitochondrial Protein Genetic Variant, mpv17, in A Delta and C Nerve Fiber Growth**  
Nadia Ansari, 15, Freshman, Sage Hill School, Newport Beach, CA
- ANIM040 A Minecraft Project**  
Oeystein Haukaas, 19 Senior, Ole Vig Videregaende Skole, Stjoerdal, Troendelag, Norway

- ANIM041 The Variance of Nitrogen and Phosphorus Levels in Chicken Manure Induced by Flock Age**  
Jesse Shepherd, 15, Freshman, Spanish Fork Junior High School, Spanish Fork, UT
- ANIM042 The Effects of *cisd* Gene Family Disruption in *Caenorhabditis elegans* Fertility**  
Zihan Zhao, 16, Junior, Texas Academy of Mathematics and Science, Denton, TX
- ANIM043 What Is Honey? A Comparison of Honey from Iowa Beekeepers vs. National Store Brand Honey Using Pollen and Chemical Analyses**  
Amara Orth, 15, Freshman, Lewis Central High School, Council Bluffs, IA
- ANIM044 A Solution to Varroa Mite Infestations Using RNA-interference**  
# Elizabeth Wamsley, 17, Junior, Timber Ridge Scholars, Pacific, MO
- ANIM045T The Sixth Sense: Evaluation of Magnetoreception in *Culex quinquefasciatus* for Potential Mosquito Control**  
# Hunter Bishop#, 18, Senior, Fritz Ruppert#, 16, Junior, Brevard Senior High School, Brevard, NC
- ANIM046T Nesting Behavior of Baya Weaver (*Aves: Ploceidae*): Implications for Local Conservation Practice**  
Sunisa Phuetphanphaisan, 16, Sophomore, Napaporn Phoncharoen, 17, Junior, Takhampittayakom School, Phanatnikom, Chonburi, Thailand
- ANIM047 The Use of Chickens (*Gallus gallus domesticus*) as Bio-recyclers of Household Organic Waste#** Emma Serisier, 17, Senior, Bishop Druitt College, North Boambee Valley, New South Wales, Australia
- ANIM048T Adaptive Features of Semiaquatic Mass Migrating Shrimp *Macrobrachium dienbienphuense***  
Atid Techanitisawad#, 17, Junior, Piwat Suppawittaya, 15, Sophomore, Bangkok Christian College, Bangkok, Thailand
- ANIM049 A Survey of Lake Crescent for Endemic Salmonid Spawning Sites Using eDNA**  
Vita Olson, 16, Junior, Sequim High School, Sequim, WA
- ANIM050T Increasing the Population of *Danaus plexippus* by Manipulating Food Choice Behavior**  
Abigail Wittkamp#, 17, Senior, Sara Dodge#, 17, Senior, Burlington Community High School, Burlington, IA
- ANIM051T The Neural Mechanism Underlying Stimulus Evaluation of the Honeybee Brain**  
Angela Ding, 16, Junior, Nisha Kulkarni, 17, Junior, Corona del Sol High School, Tempe, AZ BASIS Chandler, Chandler, AZ
- ANIM052 Varying Deer and Elk Population Over the Period of Two Years**  
Marisa Armijo, 16, Junior, West Las Vegas High School, Ribera, NM
- ANIM053 The Effect of Chronic Exposure to Artificial Light at Night on the Development & Fecundity of *Manduca sexta***  
Carolyn Almonte, 15, Sophomore, Burlington Township High School, Burlington, NJ
- ANIM054 Modeling the Effects of Invasive Species on Crocodilian Populations**  
# Karin Ebey, 15, Sophomore, Los Alamos High School, Los Alamos, NM
- ANIM055 What Is the Efficacy of Iminosugars in Inhibiting Glucosylceramide Synthase in Canine Macrophages?**  
Benjamin Scarpino, 17, Senior, Astronaut High School, Titusville, FL
- ANIM056T Plant Pesticide to Combat Termites**  
Lamya Al Handhali, 14, Freshman, Marwa Al Handhali, 14, Freshman, Habiba Al Handhali, 15, Freshman, Al Ghubra School, Ibra, Oman

## Behavioral and Social Sciences

- BEHA001** **Combating Stuttering via an Empowered Multi-modal Neural Network based on Facial and Audio Recognition Data**  
 Ronald Xu, 17, Junior, Winter Springs High School, Winter Springs, FL
- BEHA002** **Validate the Impact of Evidence Based Instruction in Increasing the Phonological Awareness Skills for Individuals with Dyslexia**  
 Mary Salmon, 17, Junior, St. Joseph's Academy, Baton Rouge, LA
- BEHA003** **iSense: Artificial Intelligence Based Early Detection Tool to Identify Linguistic Bio-Markers of Mood Disorders and Recognize At-Risk Individuals**  
 Divya Nori, 15, Sophomore, Milton High School, Milton, GA
- BEHA004** **Real-Time Analysis of Emotions for Neurological Disorder Patients**  
 # Shreya Ramesh, 16, Junior, Milton High School, Milton, GA
- BEHA005** **The Impact of High School Scheduling on Test Scores**  
 # Olivia McNair, 17, Junior, Perham High School, Perham, MN
- BEHA006** **Feature Weighting in Multimodal Affect Prediction and Emotional Inference**  
 Virginia good Keziah, 18, Senior, Fairview High School, Boulder, CO
- BEHA007** **Ultrasonic Behaviors**  
 Esther Morales, 17, Senior, Dr Leo Cigarroa High School, Laredo, TX
- BEHA008** **Teaching Physics in Middle School**  
 Julio Lopez Lopez, 17, Senior, Preparatoria UAS Guamuchil, Guamuchil, Salvador Alvarado, Sinaloa, Mexico
- BEHA009** **Procrastination versus Perceived Consequences**  
 # Alyssa Knowles, 17, Junior, Friendswood High School, Friendswood, TX
- BEHA010** **The Attachment Theory and Emotional Development: A Twin Study**  
 Paeen Luby, 15, Sophomore, Benjamin Franklin High School, New Orleans, LA
- BEHA011T** **Clinical Approach to Predict Cognitive Disorders in Multiple Sclerosis: The Use of Biomarkers Generated by Eye Movement Disorders**  
 Lana Alakhras, 16, Junior, Raseel Shwaiki, 17, Junior, Al-Hasaad Al-Tarbawi School, Amman, Amman, Jordan
- BEHA012** **DRAWIT: Predicting Children Physiological State, Behavioral Tendencies and Personality Characteristics Using Guided Drawing**  
 # Dania Almubiden, 16, Sophomore, Al Ridwan Schools, Amman, Khalda, Jordan
- BEHA013** **A Study of the Speech-to-Song Illusion**  
 Eric Lian, 17, Sophomore, Oregon Episcopal School, Portland, OR
- BEHA014** **Good Night Sleep Tight: A Study of the Impact of Co-Sleeping on the Child, the Mother, and the Parental Relationship**  
 # Hallee Mire, 17, Junior, Catholic High School, New Iberia, LA
- BEHA015** **The Neural Mechanisms Underlying the Other Race Effect for Expression Perception**  
 Tsung-Tien Hsiung, 17, Junior, Taipei First Girls High School, Taipei, Taiwan
- BEHA016T** **Indigenism in Peru of the XX Century**  
 Fiorella Manosalva Diaz, 16, Sophomore, Antonella Paredes Aquino, 16, Sophomore, High Performance College of Cajamarca, Cajamarca, Peru
- BEHA017T** **Tambomachay: Rock Art of the Archaic Man of Qanchis**  
 Pamela Vargas Cabrera, 16, Sophomore, Yorch Quispe Condori, 13, Freshman, Julio Alberto Ponce Antunez De Mayolo, Canchis, Cusco, Peru
- BEHA018T** **TEMEN (Terapi Autisme Online): An Online Autism Therapy with YouTube**  
 Angeline Halim, 18, Senior, Anglila Paramarthastri, 18, Senior, Yogyakarta 8th State Senior High School, Yogyakarta, Daerah Istimewa Yogyakarta, Indonesia
- BEHA019T** **Paper Characters: An Educational Game Material**  
 Sudenur Bulut, 16, Junior, Sinemis Isik Ilday, 17, Junior, Adana Bilim ve Sanat Merkezi, Cukurova, Adana, Turkey
- BEHA020** **Trends and Factors for Risky Behavior among Adolescents**  
 Nikita Rohila, 15, Sophomore, Stuttgart High School, Stuttgart, AR
- BEHA021** **Effects of an Instructor's Ideology on a Student's Perspective**  
 Rose Long, 18, Senior, University High School, Tucson, AZ
- BEHA022** **Effect of Bilingualism on Stroop Interference**  
 Cameron Neidhard, 16, Sophomore, Carroll High School, Dayton, OH
- BEHA023T** **The Effects of Blue Light on the Circadian Rhythm of Madagascar Roaches**  
 Jonathan Gonzalez, 17, Junior, Estefania Hernandez-Medrano, 16, Junior, Buford High School, Buford, GA
- BEHA024** **Is Consciousness Necessary for Semantic Integration to Occur? An EEG Study**  
 Shir Sagy, 17, Senior, Ben Gurion Regional School, Emek Heffer, Kfar Monash, Israel

<b>BEHA025</b>	<b>Vaccine Hesitancy and the Web: An Analysis of Online Resources Cited by Vaccine Hesitancy Blogs</b>	<b>BEHA037</b>	<b>Improve Mental Health by Virtual Reality</b>
#	Sophia Hawley, 17, Senior, West Salem High School, Salem, OR		Mia Hines, 17, Junior, Timber Ridge Scholars, Pacific, MO
<b>BEHA026</b>	<b>FRUGGIE: Building Healthy Food Pyramids with Technology</b>	<b>BEHA038</b>	<b>Chest Wall Muscle EMG Activity and Arm Force during Functional Tasks: Implications After Open Heart Surgery</b>
	Annika Huprikar, 17, Junior, Deerfield High School, Deerfield, IL		Ansel LaPier, 15, Freshman, Central Valley High School, Spokane Valley, WA
<b>BEHA027</b>	<b>Sensory Integration in Adolescents with a History of Multiple Concussions</b>	<b>BEHA039</b>	<b>A Neuromodulator Exerts Antagonistic Effects on the Network State of <i>Aplysia californica</i></b>
	Giovanni Santucci, 18, Senior, Ossining High School, Ossining, NY		Lucian Dobroszycki, 18, Senior, The Bronx High School of Science, Bronx, NY
<b>BEHA028</b>	<b>Unveiling the Nature of Graffiti Disapproval in NYC: A Novel Mapping Method for Defining the Trends of Graffiti Complaints</b>	<b>BEHA040</b>	<b>A Tool to Predict Sex Discrimination</b>
	Kellen Cooks, 17, Senior, Ossining High School, Ossining, NY	#	Troilus White, 17, Junior, Cedar City High School, Cedar City, UT
<b>BEHA029</b>	<b>Now You See It, Now You Don't! Test Your Peripheral Vision</b>	<b>BEHA041</b>	<b>Analyzing and Evaluating Pupillary Diameter in Migraine Patients and Non-headache Patients Under the Effect of Light Stimuli</b>
	Averi Smith, 14, Freshman, Keyser High School, Keyser, WV		Akshra Paimagam, 16, Sophomore, Myers Park High School, Charlotte, NC
<b>BEHA030</b>	<b>Conformity Among Ages</b>	<b>BEHA042</b>	<b>Collaborative Economy Suspended: The Legal Challenges of Uber and BlaBlaCar in Spain and the EU. Job Precarity? Unfair Competition?</b>
	Kaylee Stewart, 17, Junior, Weber High School, Pleasant View, UT		Gines Marin-Martinez, 18, Senior, IES Alcantara, Alcantarilla, Murcia, Spain
<b>BEHA031</b>	<b>Diagnosing Autism with Machine Learning: Binary Classification for Eye Movement in Virtual Reality Environment</b>	<b>BEHA043</b>	<b>The Public Perception of Meat Labeling</b>
	Rhythm Garg, 17, Junior, Texas Academy of Mathematics and Science, Denton, TX	##	Abbigale Steeke, 18, Senior, Scranton Public School, Scranton, ND
<b>BEHA032</b>	<b>Emotional Interactive Storytelling Robots: An Interactive Design of an Upper Limb Motor Re-learning Method for Neurological Diseases</b>	<b>BEHA044T</b>	<b>Promoting the Values of the Relics of Temple of Literature and the Imperial Academy to Bring into Play the Traditional Fondness for Learning</b>
##	Mustafa Muhyi, 17, Senior, Las Cruces High School, Las Cruces, NM		Xuan Dat Tran, 16, Junior, Truong Chinh Le, 16, Junior, Nguyen Hue High School for Gifted Students, Hanoi, Vietnam
<b>BEHA033</b>	<b>A Data-Driven Optimization of Economic Resource Allocation</b>	<b>BEHA045</b>	<b>A Card and Board Game to Reduce Gender-Based Implicit Biases Using Perspective-Taking and Counter Stereotyping and Other Methods of Influence</b>
	Vihaar Nandigala, 16, Sophomore, Walled Lake Western, Walled Lake, MI		Prerna Magon, 18, Senior, Police DAV Public School, PAP Campus, Jalandhar, India, Jalandhar, Pujab, India
<b>BEHA034</b>	<b>The Novel Volumetric Quantification of the Chemobrain Phenomenon within a Pediatric Population</b>	<b>BEHA046</b>	<b>Reward Schedule and Pacing in Video Games and Their Effects on Popularity</b>
	Jessica Goldstein, 17, Senior, Plainview-Old Bethpage John F. Kennedy High School, Plainview, NY		Cooper Crowther, 16, Sophomore, Good Hope Country Day School, Kingshill, United States Virgin Islands
<b>BEHA035</b>	<b>Brain Inflammatory Responses Compromise NG2-Glial Homeostasis during Depression</b>	<b>BEHA047T</b>	<b>Anxiety Disorder Detection and EMDR Treatment Using Optical PCCR Eye Tracking</b>
#	Matthew Mullahy, 18, Senior, Smithtown High School East, St. James, NY	##	Nicole Gunderson, 18, Senior, Rachel Freeman, 18, Senior, Abhinav Gundrala##, 17, Senior, Olympia High School, Olympia, WA
<b>BEHA036</b>	<b>Evaluating the Relationship between Concussion Knowledge and Reporting Tendencies in High School Athletes</b>	<b>BEHA048T</b>	<b>Hope Glasses for Blind</b>
	Joseph Atherall, 17, Senior, Yorktown High School, Yorktown Heights, NY		Mohammed Owda, 15, Sophomore, Qossay Rida, 15, Sophomore, Qusra Secondary School for Boys, Nablus, South Nablus, Palestine



- BEHA049**    **Predicting Opioid Use Disorder (OUD) Using Machine Learning**  
Adway Wadekar, 16, Sophomore, Saint John's High School, Shrewsbury, MA
- BEHA050**    **A Novel Noninvasive and Inexpensive Biomarker for Diagnosing Major Depressive Disorder (MDD): Using Machine Learning Model *in silico* and *Drosophila melanogaster* Model *in vivo***  
Anvitha Addanki, 16, Junior, Canton High School, Canton, MA
- BEHA051**    **Testing of the Future: Should Standardized Tests Be Taken on Paper or Online?**  
Zoe Frantz, 17, Junior, Avon Grove High School, West Grove, PA

## Biochemistry

- BCHM001** **A Novel Study on Lactose Intolerance: The Correlation between the Chirality of Isomer D-Lactose and Observed Rotation of Polarized Light**  
# Angela Shar, 17, Senior, Vanguard High School, Ocala, FL
- BCHM002** **Purification of Glycerol-3-Phosphate Dehydrogenase and Testing Its Sensitivity to Metformin**  
# Isha Shah, 17, Junior, Veterans High School, Kathleen, GA
- BCHM003T** **Study and Characterization of *Zea mays* Stigma Extract: An Alternative to Obtain Eugenol**  
Muriel Krohn, 19, Senior,  
Maria Ferreira, 19, Senior,  
Fundacao Escola Tecnica Liberato Salzano Vieira da Cunha, Novo Hamburgo, Rio Grande do Sul, Brazil
- BCHM004** **Development of a Urinalysis Immunoassay for Cortisol Detection**  
Sarah Burkey, 16, Junior, Rockdale Magnet School for Science and Technology, Conyers, GA
- BCHM005** **Functional Studies of Methyl-CpG-binding Domain Protein 4 (MBD4)**  
Michelle Lee, 17, Junior, Westwood High School, Austin, TX
- BCHM006** **Targeted Drug Delivery for Drug Resistant Cancer**  
Ashton Body, 17, Junior, Episcopal School of Jacksonville, Jacksonville, FL
- BCHM007** **Coupling Multiple Stresses to the Activation of Akt-Kinase Signaling Pathway**  
Amogh Bhatnagar, 17, Junior, University School of Milwaukee, Milwaukee, WI
- BCHM008T** **The Development of Lactase Hydrogel to Alleviate Lactose Intolerance from Dairy Beverages**  
Verena Yiu, 17, Senior,  
Ngai Ming Maisie Luk, 18, Senior,  
St. Paul's Convent School, Hong Kong, China,  
Hong Kong Special Administrative Region
- BCHM009T** **Discovery of a Remarkable Oscillatory Color Change in the Iodine Starch Reaction during the Early Stage of Acid Hydrolysis of Potato Starch**  
Momoko Hayashida, 18, Senior,  
Hayato Shoyama, 18, Senior,  
Shintaro Yamamoto, 19, Senior,  
Fukuoka Prefectural Meizen High School,  
Kurume, Japan
- BCHM010** **The Effect of Senolytic Drugs on the Brain Shape or Functional Ability of Alzheimer Tau *Drosophila***  
# Ashara Somawardana, 17, Senior, BASIS San Antonio Shavano Campus, San Antonio, TX
- BCHM011** **Synthesis and Characterization of Platinum Anticancer Compound Oxalato (1,4-dimethylpiperzine) Platinum(II)**  
Sasha Sairajeev, 18, Senior, The Carol Martin Gatton Academy of Mathematics and Science in Kentucky, Bowling Green, KY
- BCHM012** **RNA Regulation: Identifying and Preventing AMP Depurination in Early Life RNA Polymerization**  
Michelle Nazareth, 16, Sophomore, Georgiana Bruce Kirby Prep School, Santa Cruz, CA
- BCHM013T** **Optimizing Bone Marrow Cryopreservation for Primitive Hematopoietic Stem Cell Compartment Studies Using Flow Cytometry Analysis**  
Dongwon Lee, 18, Senior,  
Yewon Lee, 15, Freshman,  
James Clemens High School, Madison, AL
- BCHM014** **Deuterium Oxide (D<sub>2</sub>O) on Maintaining Viability in Coliphage Bacteriophages under Low Temperatures to Model Live Attenuated Viral Vaccine Additives**  
Annika Morgan, 18, Senior, Joel Barlow High School, Redding, CT
- BCHM015T** **Chemotaxis in *Physarum***  
Anneke Dykhouse, 15, Sophomore,  
Emily Busto, 15, Sophomore,  
East Ridge High School, Clermont, FL
- BCHM016** **Development of a Method Towards the Metabolic Monitoring of TCA Cycle Compounds Observed in Rat Urine Using NMR Spectroscopy**  
Sai Sumedha Bobba, 16, Junior, James Clemens High School, Madison, AL
- BCHM017** **Detecting Chicken  $\gamma$ -globulin in Vegan Products Utilizing Immunoassay, ELISA, Techniques**  
Lukas Keller, 18, Senior, Emmett High School, Emmett, ID
- BCHM018** **A Simple Method for Protein Purification**  
Kaushik Sampath, 17, Junior, Fayetteville High School, Fayetteville, AR
- BCHM019** **Effects of Acute and Chronic Alcohol Consumption on the Blood-Brain Barrier**  
# Grace Sun, 17, Junior, Caddo Parish Magnet High School, Shreveport, LA
- BCHM020** **The Assembly of Collagen IV in *Drosophila***  
Madison Yarbrough, 17, Junior, Poyen High School, Poyen, AR
- BCHM021T** **Application of Supercharged Protein to Allow Secretion-Based Production of a Broad Range of Recombinant Proteins through the ABC-Transporter System**  
Jiheun Ha, 17, Junior,  
Hongwook Lee, 18, Senior,  
Seungmin Kim, 18, Senior,  
Korea Science Academy of KAIST, Busan, Busan, South Korea

- BCHM022** **Analysis of the Anthocyanin of *Vaccinium myrtillus* as an Effective Anti-Inflammatory in Human Primary Cells of Asthmatic Bronchial Smooth Muscle**  
Patricia Rodriguez Rodriguez, 16, Junior, Dr. Pedro Albizu Campus, Ponce, Puerto Rico
- BCHM023** **How Does Exposure to Ultraviolet Light Denature Protein Structure?**  
Isabella Revels, 14, Freshman, South Pointe High School, Rock Hill, SC
- BCHM024T** **Agrochemicals and Neurological Diseases: A New Method for Searching Biological Process Networks through Molecular Docking Codes**  
Jose Matias, 16, Junior,  
Yanne Pinheiro, 17, Junior,  
Escola de Ensino Medio Joaquim de Figueiredo Correia, Iracema, Ceara, Brazil
- BCHM025** **Creating Potential Guidelines Based on the Effects of Silver Nanoparticles and Cadmium Quantum Dots on *Saccharomyces cerevisiae***  
Daniel Kim, 15, Sophomore, Kickapoo High School, Springfield, MO
- BCHM026** **Effects of Insulin-Like Growth Factor-1 on Neurotransmitters of Memory**  
Akshay Padala, 14, Freshman, Little Rock Central High School, Little Rock, AR
- BCHM027T** **An Innovative Method of Room Temperature Biospecimen Preservation via Tetramethyl Orthosilane (Sol-Gel) Encapsulation and Polyethylene Glycol Extraction**  
Jack Boylan, 17, Junior,  
Kavya Koneru, 16, Junior,  
duPont Manual High School, Louisville, KY
- BCHM028** **Detection of Lung Cancer Biomarkers: A Catalytic Assay Strategy Based on Gold Alloy Nanoparticles**  
Jerry Hou, 16, Junior, Corning-Painted Post High School, Corning, NY
- BCHM029** **Does Exposing Lactaid Pills to Acid Impact Enzyme Activity**  
Gianfranco Yee, 18, Junior, Urban Science Academy, Boston, MA
- BCHM030** **QuitPuff: A Point-of-Care Diagnostic for Early Risk Detection of Oral Pre-Cancer and Cancer in Chronic Smokers**  
Nikhiya Shamsher, 16, Junior, Greenwood High International School Bangalore, Bangalore, Karnataka, India
- BCHM031** **Improve Algae Biotechnology**  
Roumany Sefin, 18, Senior, Industrial Advanced Technical School, Port Said, Port Fuad, Egypt
- BCHM032** **Synthetic Virus-Like Particles: The Future of Targeted Drug Delivery**  
Joshua Yu, 17, Senior, Urbana High School, Ijamsville, MD
- BCHM033** **Characterizing the Role of Nuclear Flap Endonuclease 1 as a Mitochondrial Long Patch DNA Base Excision Repair Enzyme *in vitro***  
# Tong Ye, 17, Junior, Half Hollow Hills High School East, Dix Hills, NY
- BCHM034** **Fats: How Much Fats Are in Your Food?**  
Halle Rivinius, 15, Freshman, Grant County High School, Elgin, ND
- BCHM035T** **The Effect of Nitrate in Polluted Water on *Daphnia***  
Stefania Yee, 16, Sophomore,  
Tashaina Huezto-Santiago, 17, Sophomore,  
Urban Science Academy, West Roxbury, MA
- BCHM036** **Amino Acid Residue-Specific Interaction between gC1qR and Cytotoxic Peptides of Various Pathogenic Microorganisms with Homology to HIV-1 gp41 3S**  
Chidera Ejikeme, 17, Senior, Half Hollow Hills High School West, Dix Hills, NY
- BCHM037** **Exploring the Biomechanics of Red Blood Cells: Paving the Way to Efficient and Physiological Modeling of Erythrocytes in Shear Flow**  
# Prathysha Kothare, 16, Sophomore, Parkland High School, Allentown, PA
- BCHM038** **Anacardic Acid Analogs for the Inhibition of Matrix Metalloproteinase-2**  
Maanasi Kademani, 16, Junior, Martin Luther King High School, Riverside, CA
- BCHM039** **Organic Charcoal for Industrial Dyes**  
Farah AlMutawa, 16, Sophomore, Alrawda High School, Hawally, Kuwait
- BCHM040** **Loss of O-GlcNAc Transferase Alters Mitochondrial Function**  
Amy Qiang, 18, Senior, Shawnee Mission West High School, Overland Park, KS
- BCHM041** **Pharmacokinetic Modeling of *in vitro* Diffusion Rates for Antiviral Drug Acyclovir**  
Nikitha Sridhar, 16, Junior, Auburn High School, Auburn, AL
- BCHM042** **IFN $\gamma$  Susceptibility in Chordoma**  
Ananthan Sadagopan, 15, Sophomore, Westborough High School, Westborough, MA
- BCHM043** **Development of Integrase Inhibitors**  
Kimberlynn Mai, 17, Junior, Laurel High School, Laurel, MS

## Biomedical and Health Sciences

- BMED001** **Inhibition of Glutamate Excitotoxicity in Glaucoma by Liposomes**  
Alexandr Zarivnij, 19 Junior, Cirkevni Gymnazium Nemeckeho Radu, Olomouc, Czech Republic
- BMED002** **Accuracy of a Novel Method to Measure In-Stent Restenosis Using Embedded Nanosensors**  
## Ethan Levy, 16, Junior, Dr. Michael M. Krop Senior High School, Miami, FL
- BMED003** **The Role of NGAL as a Biomarker for Early Detection of Acute Kidney Injury**  
# Evelyn Bodoni, 17, Junior, Cherry Creek High School, Greenwood Village, CO
- BMED005** **CAM and TENS Are Effective in Opioid Tapering in High Risk Patients**  
Ishan Viradia, 15, Sophomore, Stratford Academy, Macon, GA
- BMED006T** **Sleep Deprivation and Ganwei Medication Rescue Resistance to Oxidative Stress and Alter Reproductive Output in *Drosophila melanogaster* with Alzheimer's Disease**  
Tina Liu, 17, Junior,  
Lili Peng, 16, Junior,  
Shanghai High School International Division,  
Shanghai, China
- BMED007** **Characterization of the Immune Response in a Pre-Clinical Model of Severe Trauma**  
Ayanna Prather, 18, Senior, Coretta Scott King Young Women's Leadership Academy, Atlanta, GA
- BMED008** **Tracking the HIV Epidemic in the Philippines Using Phylogenetic Analysis**  
# Brandon Nguyen, 15, Junior, Henry J. Kaiser High School, Honolulu, HI
- BMED009** **A Novel Approach to a Mutagenic Study of Carcinogenic Properties and Dietary Supplementation Using Reverse Mutation to Test the Toxicity of Iron Chloride and Ascorbic Acid on *Salmonella typhimurium***  
Myesha Choudhury, 17, Senior, Canterbury School, Fort Myers, FL
- BMED010** **Mortality Evaluation of Peg Gold Nanorods on Zebrafish Embryos**  
Colton Walker, 17, Junior, Veterans High School, Kathleen, GA
- BMED011** **Behind the "Screens" and Our Sleep**  
Maggie Reeves, 15, Sophomore, Alfred M. Barbe High School, Lake Charles, LA
- BMED012** **Effect of Flavonoids (ZGM1) on the Aggregation of Beta-amyloid Peptides and Mechanisms**  
# Xiwen Zhang, 16, Junior, Beijing No. 161 High School, Beijing, China
- BMED013** **Meloxicam: A Potential Treatment for Idiopathic Pulmonary Fibrosis**  
Meredith Kottom, 17, Junior, Schaeffer Academy, Rochester, MN
- BMED014** **Reversing Tumor-Induced T Cell Suppression through Activation of TLR8 Pathway**  
Cindy Wang, 17, Junior, Ladue Horton Watkins High School, St. Louis, MO
- BMED015** **Understanding Fibrinolysis in Sickle Cell Disease: Characterization of *in vitro* Blood Clot Resolution by Monocytes**  
Niara Botchwey, 17, Senior, Charles R. Drew Charter School, Atlanta, GA
- BMED017** **Mini-hugs: Electrically Inflatable Cuffs to Reduce Stress and BP**  
Joyabhishek Charles, 16, Junior, Americus Sumter High School, Americus, GA
- BMED018** **Mitochondrial Effects of High Energy High Charge (HZE) Irradiation on the Liver**  
# Alexandra Tan, 19 Senior, Ball High School, Galveston, TX
- BMED019** **Methylated Glutamic-Oxaloacetic Transaminase-2: A Therapeutic Target for Pancreatic Cancer**  
Bo-Rong Chen, 17, Senior, Taichung First Senior High School, Taichung, Taiwan
- BMED020** **Determination of Mutant JUP Localization in an iPSC Model of ARVC: Implications for Diagnosis and Pathogenesis**  
Ethan Dincer, 17, Senior, Saint Paul Academy and Summit School, Saint Paul, MN
- BMED021T** **How Does the Level of Pungency from Pepper Extract of the *Solanaceae* Family Affect the Rate of Growth of Bacterial Colonies?**  
Malena Gronda, 15, Freshman,  
Marta Pantin, 15, Freshman,  
American School of Madrid, Madrid, Spain
- BMED022** **Cancer's Other Half: Limiting Metastasis by Restricting Blood Vessel Formation** Maiya Mao, 18, Senior, Bergen County Academies, Hackensack, NJ
- BMED023** **Pif1 Gene Integration to Inhibit Telomerase Activation in Cancer**  
Maximilian Zhang, 16, Junior, Bergen County Academies, Hackensack, NJ
- BMED024** **Analysis of KLF11 Sequence in Type One Diabetic and Wild Type Mice**  
Jacob Satake, 17, Junior, North Central High School, Spokane, WA
- BMED025** **Using a Crispr-Cas9 Method to Knockout AURKA in Pancreatic Cancer Cells**  
Kavitha Vudatha, 18, Senior, Stanton College Preparatory School, Jacksonville, FL
- BMED026** **The Cure in an Algae: *Arthrospira spirulina* as a Suppressive Substance of Cell Line SKOV3 of Ovarian Cancer through Photodynamic Technique**  
Fabiola Moreu Muniz, 17, Senior, Dr. Pedro Albizu Campus, Ponce, Puerto Rico

- BMED027** **Spatiotemporal Characterization of Ligand-Receptor Interactions in Blood Stem Cell Rolling Assay**  
Zaina Alabandi, 17, Senior, Dhahran Ahliyya School, Dammam, Eastern Province, Saudi Arabia
- BMED028** **Efficacy of Anti-Annexin 2 Antibodies on Retinal Neoangiogenesis in a Model of Oxygen-Induced Retinopathy**  
Angela Youn, 18, Senior, Tenafly High School, Tenafly, NJ
- BMED029** **The Effect of Different Dilutions of Pomegranate Juice, Pineapple Juice, Orange Juice, and Coconut Milk on the Growth of HT29 and OVCAR8 Cell Lines**  
Raj Mehta, 17, Senior, W.P. Davidson High School, Mobile, AL
- BMED030** **Copy Number Implementation and Analysis of Ovarian Germ Cell Tumors**  
# Rahul Ram, 17, Senior, Camas High School, Camas, WA
- BMED032** **Ending the EpiPen Epidemic: Creating an Intestinal Organoid to Understand the Immune Mechanisms Involved in a Peanut Allergy**  
# Isabella Heffernan, 15, Sophomore, Saint Mary Academy Bayview, Riverside, RI
- BMED033** **An In-Depth Patch-Clamp Study of HCN2 Channel (Year II): Identification of Novel Biomarkers and Therapy for Ih Current Suppression in Autism Spectrum Disorders**  
# Perisa Ashar, 16, Sophomore, Maggie L. Walker Governor's School, Richmond, VA
- BMED034T** **The Use of *C. elegans* as an Indicator for Toxins in Feminine Hygiene Products**  
Sarah Mahan, 18, Senior, Erin Hucke, 17, Senior, Joel E. Ferris High School, Spokane, WA
- BMED035** **The Effect of a Low-Carbohydrate Diet on Cardiovascular Disease Risk Factors**  
Elizabeth "Libby" Terrell, 16, Junior, Western Albemarle High School, Crozet, VA
- BMED036** **Finding a Therapy for Wolfram Syndrome: Exploring a Calcium Signaling Pathway as a Target for a Disease without a Cure**  
Saira Munshani, 17, Junior, Hopkins School, New Haven, CT
- BMED037** **shRNA-Mediation of UGGT1 to Modulate Excessive Procollagen Secretion: A Novel Approach to Treatment of Cardiac Fibrosis**  
Kaitlyn Wang, 17, Junior, Canyon Crest Academy, San Diego, CA
- BMED038T** **Healing a Broken Heart: Examining the Role of Polycomb Group Protein Asxl2 in Cardiomyocyte Proliferation**  
Rachel Gunderson, 17, Junior, Boatemaa Agyeman-Mensah, 17, Junior, Breck School, Golden Valley, MN
- BMED039** **The Potential Pathophysiological Role of STING in the Development of Hypertensive Nephropathy**  
Rohan Anne, 15, Sophomore, University School of Milwaukee, Milwaukee, WI
- BMED040** **Examining the Role of Transcription Factors, Nr4a1, Foxp1, and Olig2, in the Development of Medium Spiny Neurons from the Q175 Mouse Model of Huntington's Disease**  
Samantha Abbruzzese, 18, Senior, Byram Hills High School, Armonk, NY
- BMED041** **Identifying the Role of TEAD Proteins and the Pharmacological Disruption of YAP1 to Inhibit the Function of Oncogenic YAP1 Fusions**  
Aditi Subramanyam, 17, Junior, Nikola Tesla STEM High School, Redmond, WA
- BMED042** **Cellular Perception: Analyzing and Translating the Impact of Cell Phone Radiation**  
Sydney Gilbert, 17, Senior, Piedra Vista High School, Farmington, NM
- BMED043** **Effect of Erythromycin on Infantile Hypertrophic Pyloric Stenosis**  
Krusha Bhakta, 18, Senior, Joplin High School, Joplin, MO
- BMED044** **The Effect of *Annona muricata* (Soursop) Leaf Extract on Colon Cancer Cells**  
Jaime Dominguez, 17, Senior, Jose Rojas Cortes, Orocovis, Puerto Rico
- BMED045** **Acute Effects of Cocaine on the Respiratory Function of Mitochondria in the Brain**  
Jorge Garcia-Baez, 18, Senior, The San Juan Math, Science and Technology Center, San Juan, PR
- BMED046** **A Novel, Noninvasive Approach to Melanoma Diagnosis Using Optical Coherence Tomography and Bioconjugated Gold Nanoparticles**  
# Shriya Reddy, 15, Sophomore, Northville High School, Northville, MI
- BMED047** **Enabling Influenza Virus-like Particles (VLPs) as a Universal Vaccine**  
## Madeleine Yang, 17, Senior, Detroit Country Day School, Beverly Hills, MI
- BMED048T** **The Neuromodulatory Effect of Rosmarinic Acid on Spinal Locomotor Activity**  
Claudia Morales-Diaz, 18, Senior, Andrea Diaz-Pacheco, 14, Freshman, Colegio Marista, Guaynabo, Puerto Rico
- BMED049** **Antioxidants and Their Effects on Reducing the Adverse Impacts of Diesel Exhaust on Lung Cancer Cells**  
Ankit Garg, 15, Freshman, Logan High School, Logan, UT

- BMED050** **How Do Gastrointestinal Microorganisms React with 5-fu?**  
Quincy Koons, 15, Freshman, DaVinci Academy of the Science and the Arts, Ogden, UT
- BMED051** **Computational Screening of Small Molecules for Antibacterial Agents that Target T-Box Riboswitches**  
Shifra Narasimhan, 16, Senior, Athens High School, The Plains, OH
- BMED052** **Exploring the Role of Circulating miR-134 in Breast Cancer Recurrence**  
Lauren Chen, 15, Junior, Dutch Fork High School, Irmo, SC
- BMED053** **p53-Bad: A Novel Mitochondrially Targeted Gene Therapy for Ovarian Cancer**  
Madeline Joklik-McLeod, 18, Senior, Juan Diego Catholic High School, Draper, UT
- BMED054T** **The Plant *Chamaecostus cuspidatus* (*Costus igneus*) and Its Properties, by the Infusion Method, in Blood Glucose Levels for Patients with Diabetes Mellitus Type 2**  
Angel Zayas, 18, Senior,  
Yulimar Bonilla, 15, Sophomore,  
Specialized School of Science and Mathematics Genaro Cautino Vazquez, Guayama, Puerto Rico
- BMED055** **Negative Pressure Wound Therapy: Cancer Metastasis Stimulated by HIF-1ALPHA Regulated MALAT1 and SOX Cooperation**  
# Shruithi Shekar, 18, Senior, Jericho High School, Jericho, NY
- BMED056** **Cardiovascular Catastrophe**  
Taren Tschetter, 18, Senior, Doland High School, Doland, SD
- BMED058** **Precision Care for Leukemia: Discovery of Novel Therapeutics for High-Risk ALL via Epigenetic and Computational Transcriptome Profiling**  
# Ruhi Sayana, 18, Senior, The Harker School, San Jose, CA
- BMED059** **Effects of Alcohol and Aspartame on the Heart Rate of *Daphnia magna***  
Deeandria Nafreere, 17, Junior, Foxborough Regional Charter School, Foxborough, MA
- BMED060T** **Development of a Microscope for Fully Automated Real-Time Cancer Cell Tracking**  
# Nicole Segaran#, 17, Junior,  
Yannik Singh, 17, Junior,  
Carmel High School, Carmel, IN
- BMED061T** **Menu with Calories: One Step Toward Healthy Eating**  
Nino Makasarashvili, 19, Senior,  
Erekle Tabagari, 19, Senior,  
Tamari Dekanoidze, 15, Sophomore,  
LEPL Sachkhere Ilia Chavchavadze #2 Public School, Sachkhere, Imereti, Georgia
- BMED062** **Study of the Juul E-Cigarette through Investigation of Factors which Contribute to Popularity#** Liam-Gavin Dell, 16, Sophomore, City Honors School, Buffalo, NY
- BMED063** **Big Data Analytics: Identification of Novel Cancer Progression Gene Signatures for Precision/ Personalized Medicine**  
Kevin Sheng, 16, Junior, Roanoke Valley Governor's School for Science and Technology, Roanoke, VA
- BMED064** **The Effect of 460 Nm Light on Seizure-Like Activity (SLA) in Bang-Sensitive *Drosophila* as Measured by Seizure Velocity, Distance Traveled and Seizure Duration**  
Margaret Farr, 18, Senior, Saratoga Springs High School, Saratoga Springs, NY
- BMED065** **Prostate Carcinomas in African Americans Have Distinct miRNA Expression and Biological Markers for Poor Prognosis**  
Malhaar Agrawal, 17, Junior, Horace Mann School, Bronx, NY
- BMED066** **Induction of Apoptosis by Curcumin in Cancer Cells**  
# Sakshi Garg, 17, Junior, Little Rock Central High School, Little Rock, AR
- BMED067T** **The Novel Value of Omija as a Material of Functional Cosmetics**  
Sumin Kim, 18, Senior,  
Yeongseo Kim, 17, Senior,  
Da Ye Jeong, 17, Senior,  
Mungyeong Girls' High School, Mungyeong-si, Gyeongsangbuk-do, South Korea
- BMED069** **Involvement of the AhR in Reproductive Function with Exposure to PCB 126** Radha Velamuri, 18, Senior, Valley High School, West Des Moines, IA
- BMED070** **Segmentation of Lung Lobe Structures using a Novel Artificial Intelligence Framework for Precise Lung Cancer Radiation Therapy**  
Shrila Shah, 18, Senior, Yorktown High School, Yorktown Heights, NY
- BMED071** **The Identification and Characterization of PRDM1 Co-factors in HEK Cells**  
Melissa Pittard, 17, Senior, Paul D. Schreiber High School, Port Washington, NY
- BMED072** **Studying the NT-proBNP as a Biochemical for Diagnosing and Predicting Early Heart Failure in Primary Hypertension Patients Classified by the ACC/AHA Categories of Hypertension in 2017**  
Bao Chau Phan Nam, 17, Senior, Le Quy Don High School for The Gifted, Quy Nhon, Binh Dinh, Vietnam

- BMED073 The Development of a Novel Treatment for Lactose Intolerance Using Synbiotic Formulations**  
Eliza Martin, 17, Junior, PLC Sydney, Sydney, NSW, Australia
- BMED074T The Effect of Silver Nanoparticles Socks on the Treatment of Diabetic Foot**  
Abdulhadi Jallab, 18, Senior,  
Hareth Omar, 15, Sophomore,  
Jassim Hamad Independent Secondary School for Boys,  
Doha, Qatar
- BMED075 An *in silico* Analysis of Glioblastoma Patients for the Identification of a miRNA Signature as a Diagnostic Biomarker**  
Anirudh Iyer, 16, Junior, Nikola Tesla STEM High School,  
Redmond, WA
- BMED076 Arc, GAD67, and the Orbitofrontal Cortex: Reconsidering the Molecular and Systemic Basis of Major Depressive Disorder**  
Joseph Sexton, 18, Senior, West Forsyth High School,  
Cumming, GA
- BMED077T Near Infrared Light Photobiomodulation and *C. longa* Mitigates the Expression of Mutant Amyloid-Beta Precursor Protein Pathway in *D. melanogaster***  
#  
Hoang Le#, 18, Senior,  
Laura Allen#, 18, Senior,  
Western High School, Davie, FL
- BMED078 Evaluation of *Muntingia calabura* Linn. as a Natural Antidiabetic and Antioxidant**  
Maria Isabel Layson, 16, Sophomore, Iloilo National High School, Iloilo City, Philippines
- BMED079 The Effect of FGF2 in Chronic Wound Healing**  
Zuzana Sevcikova, 18, Junior, Gymnazium Brno-Reckovice, Brno, Jihomoravsky Kraj, Czech Republic
- BMED080 The Effect of Cucurbitacin B and I on Colon Cancer Cell Proliferation**  
Peyton Panovich, 18, Senior, Shawnee Mission West High School, Overland Park, KS
- BMED081 Mathematical Model to Predict Mortality from Early Onset *Pneumonia* in Acute Myocardial Infarction**  
Samaya Baljepally, 17, Junior, Bearden High School,  
Knoxville, TN
- BMED082T Identifying Key Pathways/Mechanisms for the Generation of Pancreatic Beta Cells by Trans-differentiation of Acinar Cells**  
Abby Liu, 17, Junior,  
Thalia Liu, 17, Junior,  
Ella Ai, 17, Junior,  
Hamilton High School, Chandler, AZ
- BMED083 Expansion of Hematopoietic Stem Cells from Cord Blood in Culture *in vitro***  
Nataliia Maliuk, 16, Junior, Ukrainian Medical Lyceum National Medical University the Name of O. O. Bogomolets, Kyiv, Ukraine
- BMED084 Sulforaphane Improves Oxidative Stress Response in *Caenorhabditis elegans* via SKN-1**  
Nitya Thakkar, 17, Senior, Saint Paul Academy and Summit School, Saint Paul, MN
- BMED085 Multicatheter Radioactive Implant Navigation with Machine Learning for Rapid, Efficient High Dose Rate (HDR) Brachytherapy Treatment Planning**  
Benjamin Yan, 16, Junior, Century High School,  
Rochester, MN
- BMED086 Epigenetic Targets in Longevity Control in *Drosophila melanogaster* (Common Fruit Fly)**  
Shrimayi Patel, 16, Sophomore, Red River High School,  
Grand Forks, ND
- BMED087T Reverse Testing Chemotherapies on *Drosophila* Models to Determine Protein-Kinase Pathways Affected by Hypertrophic Cardiomyopathy**  
#  
Aditya Sood, 15, Freshman,  
Himani Sood#, 18, Senior,  
Westview High School, Portland, OR
- BMED088T Dia-Subsisto**  
Gana Desouky, 16, Junior,  
Radwa ElNour, 16, Junior,  
Maadi STEM School for Girls, Cairo, Egypt
- BMED089 *Ptychosperma macarthurii* (MacArthur Palm) Seeds Inhibit Growth of *ex vivo* Cancer Cells**  
Nalani Miller, 18, Senior, Kamehameha Schools  
Kapalama Campus, Honolulu, HI
- BMED090 Maternal Marijuana Use: Effects on Neonatal Abstinence Syndrome Withdrawal and Treatment**  
#  
Tatiana Adkins, 17, Senior, Palmetto Scholars Academy, North Charleston, SC

## Biomedical Engineering

- ENBM001** **Detection of Influenza Virus by Impedimetric Biosensor**  
Aneta Dunajova, 17, Junior, Grammar School of St Cyril and Methodius, Snina, Presov, Slovakia
- ENBM002** **The Effects of Curcumin and Near Infrared Light on Wound Healing and Tissue Regeneration**  
Vrinda Patel, 16, Sophomore, South Sumter High School, Bushnell, FL
- ENBM003T** **Research Theme Regarding Contributions in the Microsurgical Domain**  
Luca Glavan, 17, Junior,  
David Voicu, 17, Junior,  
Colegiul National "Spiru Haret", Bucharest, Romania
- ENBM004** **Development of a Novel Biohybrid Nanorobot for Detection and Treatment of Disease**  
# Akhil Shiju, 17, Junior, Lawton Chiles High School, Tallahassee, FL
- ENBM005** **TheraArm: Orthosis Therapy for Arm Rehabilitation and Movement Assistance**  
Andrei Spiride, 17, Junior, Plano East Senior High School, Plano, TX
- ENBM006** **Solar Powered Ozone and UVC-Based Decontaminator**  
# Alyssa Keirn, 17, Junior, Rocky Mountain High School, Fort Collins, CO
- ENBM007** **A Novel Optical Diagnostic Method for Non-Invasive Detection of Blood Glucose Using Reverse Iontophoresis Modulation and Personalized Neural Networks**  
# Rohan Ahluwalia, 17, Junior, Westview High School, Portland, OR
- ENBM008** **Utilizing Computer Vision and Machine Learning Systems to Develop a Live Time Navigational and Surgical Aid for Spinal Reconstructions**  
# Krithik Ramesh, 16, Junior, Cherry Creek High School, Greenwood Village, CO
- ENBM009T** **A Breakthrough Body-Powered Prosthetic Hand**  
Yuet Tung Cheung, 15, Sophomore,  
Ka Man Ng, 16, Sophomore,  
Tung Laam Leung, 15, Sophomore,  
Skh Li Ping Secondary School, NT, China, Hong Kong Special Administrative Region
- ENBM010** **Effect of Conductive Inks in Silicone Based Wearable Technology on the Human Body**  
Setareh Gooshvar, 18, Senior, Trinity Preparatory School, Winter Park, FL
- ENBM011** **Engineering a Novel Wearable Biosensing Mechanism through the Implementation of Microelectromechanical Systems and Machine Learning to Realize Anomalies Hinting towards Future Cardiac Episodes**  
Prerit Choudhary, 16, Junior, College Park High School, The Woodlands, TX
- ENBM012** **Employing Computer Vision to Provide Artificial Eyes for the Visually Impaired and Blind**  
Vincent Yang, 14, Freshman, Radford School, El Paso, TX
- ENBM014** **Computer Surgery System Development**  
Obaida Darrs, 17, Junior, Secondary Sahab Boys, Sahab, Jordan
- ENBM015** **The Intelligent Medical Stapler: Ending the Emergency Room Crisis**  
Arnav Jain, 17, Junior, Gwinnett School of Mathematics, Science, and Technology, Lawrenceville, GA
- ENBM016** **Applying Thermopile Array Sensors and Machine Learning to Detect Falls of Older Adults**  
Melissa Nie, 17, Junior, Saint Paul Academy and Summit School, Saint Paul, MN
- ENBM017** **Automatic Traumatic Injury and Concussion Alert System (ATICAS)**  
Reagan Shoop, 18, Senior, Hewitt Trussville High School, Trussville, AL
- ENBM018** **A Novel Nanomaterial as a Multifunctional Contrast Agent for Targeted X-ray and Fluorescent Biomedical Imaging**  
Arjun Jain, 16, Junior, Catlin Gabel School, Portland, OR
- ENBM019T** **Suspension Knee Brace**  
Madi Facer, 18, Senior,  
Hayli Austin, 18, Senior,  
Pocatello High School, Pocatello, ID
- ENBM020T** **A 5th Generation CAR T-Cell: MicroRNA Guided Radiogenetics for T-Cell Engineering**  
# Marlee Feltham#, 18, Senior,  
Rishima Mukherjee#, 17, Senior,  
West Linn High School, West Linn, OR
- ENBM021** **Stereoscopic Three-Dimensional X-Ray Reconstruction Processing: A Low-Radiation Cost-Effective Versatile Medical Imaging Procedure for Safe and Rapid Scanning**  
# David Yue, 18, Senior, Texas Academy of Mathematics and Science, Denton, TX
- ENBM022** **Engineering a Mechanical Finger Prosthetic**  
Bryson Spencer Manuel, 18, Senior, Waipahu High School, Waipahu, HI
- ENBM023** **The First Treatment with Silica Nanoparticles (SiO<sub>2</sub>) Loaded with Ruthenium (Ru(bpy)<sub>3</sub><sup>2+</sup>) to Eliminate Pancreatic Cancer Cells**  
Kevin Torres Rios, 18, Senior, Dr. Pedro Albizu Campus, Ponce, Puerto Rico
- ENBM024** **Interaction of Brilliant Cresyl Blue with Gold Nanoparticles Modified with BETA-cyclodextrin as a Sensor for Warfarin**  
Amee Lopez-Rodriguez, 18, Senior, Ramon Power y Giralt, Las Piedras, Puerto Rico



ENBM025	<b>The Reliever: An Exercise in Port Protection</b> Logan Klein, 19 Senior, Yuma High School, Yuma, CO	ENBM039	<b>Bioelectric Potential Telemetry: Detection, Measurement and Application</b> # Gaurav Mittal, 16, Junior, Manheim Township High School, Lancaster, PA
ENBM026T	<b>TremorWear: A Smart-Sensing, Device-Independent Tremor-Suppression Library for Wearable Tremor Orthoses</b> Alex Zhang, 17, Junior, Charles Ma, 16, Junior, Montgomery High School, Skillman, NJ	ENBM040	<b>The Development of a Novel Prediction Model for Bipolar-I Disorder Utilizing Radiomic Analysis</b> Julia Brandenstein, 17, Senior, Plainview-Old Bethpage John F. Kennedy High School, Plainview, NY
ENBM027	<b>Design and Construction of a Cost-Effective Full Arm Prosthetic with Computer Vision</b> Noam Yakar, 15, Sophomore, Tenafly High School, Tenafly, NJ	ENBM041	<b>Kabartgac: An Electronic Ring that Helps Visually Impaired to Sense 2D Pictures via Vibrations</b> Bahadir Alp Selay, 16, Junior, Izmir Atatürk High School, Izmir, Turkey
ENBM028T	<b>3D Printed Carpal Tunnel Splint</b> William Alexander, 18, Senior, Adam Barousse, 18, Senior, William Delatte, 18, Senior, St. Thomas More Catholic High School, Lafayette, LA	ENBM042	<b>Non-Invasive Electronic Wireless Knee Biomechanical and Physiology Monitoring for Post-Operative Rehabilitation</b> Rachel Naidich, 18, Senior, Thomas Jefferson High School for Science and Technology, Alexandria, VA
ENBM030	<b>Rapid, Smartphone-Based Diagnosis of Skin Melanoma through Differences in Tumor Cell Thermal Regulation Combined with Diffuse Spectroscopic Analysis</b> Melissa Woo, 16, Junior, Greenwich High School, Greenwich, CT	ENBM043	<b>Hydrogel Modification to Encapsulate and Release Exosomes for Targeted Delivery</b> Anagha Aneesh, 17, Junior, Walter Payton College Preparatory High School, Chicago, IL
ENBM031	<b>A Step Towards Solving Foot Pain: A Revolutionary Shoe with Magnetic Levitation to Reduce Ground Reaction Force</b> Dev Lochan, 16, Sophomore, Cumberland Valley High School, Mechanicsburg, PA	ENBM044	<b>Saving Skin: A Model of Optimal Sunscreen Reapplication Time, Integrated into a Pre-Existing Mobile Application</b> # Mercy Oladipo, 17, Senior, Whitney M. Young Magnet High School, Chicago, IL
ENBM032	<b>What is a Step and Why Does It Matter? A Comparison of Devices to Track Activity</b> Samuel Latz, 17, Senior, Covington Latin School, Covington, KY	ENBM045	<b>Flash Life</b> Dylan Ribeiro, 15, Freshman, Laval Senior Academy, Laval, Quebec, Canada
ENBM033	<b>Body Anomaly Detection through 3D Body Scanning, Image Processing, and Machine Learning</b> # Andrew Karam, 18, Senior, Arundel High School, Gambrills, MD	ENBM046	<b>Stimulating Gamma Brain Waves via the Visual System Using Flashing LED Lights: Optimizing a Potential Treatment for Alzheimer's</b> Meredith Hillier, 14, Freshman, Newport Senior High School, Bellevue, WA
ENBM034	<b>Navigational Support Cane</b> Peyton Brink, 15, Freshman, Plankinton High School, Plankinton, SD	ENBM047	<b>Designing, Prototyping and Testing of a Multi-Lumen Urinary Catheter with Sustained Unidirectional Biocide Flow</b> Ishaan Brar, 16, Sophomore, Stockdale High School, Bakersfield, CA
ENBM035	<b>A Novel Approach to Environmental Biosensors Using a Two-Step Genetic Circuit</b> Jakar Dhillon, 16, Sophomore, Bloomfield Hills High School, Bloomfield Hills, MI	ENBM048T	<b>Application of Physical Properties of Purple Sea Urchin Barb Structure to Medical Suture Devices</b> Chae Ryeon Lee, 17, Sophomore, Esther Ji Young Lee, 16, Junior, Jaewoo Song, 16, Sophomore, Incheon Posco Academy, Incheon, Yeonsu-gu, South Korea
ENBM036	<b>Improving Spinal Fusions: Redesigned Pedicle Probe to Prevent Vertebral Breaches</b> Nicolas Fedrigo, 18, Senior, Claremont Secondary School, Victoria, British Columbia, Canada	ENBM050	<b>Praesidium 1</b> Adrian Alamillo II, 17, Senior, Richard King High School, Corpus Christi, TX
ENBM037T	<b>Design of a Forearm Cumulative-Trauma-Disorder Risk Detector Using EMG Sensor Data Sent through an Arduino to a Mobile Application via Bluetooth</b> # Dania Villafuerte Gonzalez#, 18, Senior, Larissa Cortes-Morales, 18, Senior, Colegio Mater Salvatoris, San Juan, Puerto Rico	ENBM051	<b>Assessing the Angular Dependence of Skull-to-Brain Impact Dynamics to Inform Future Bicycle Helmet Design</b> Jeffrey Wisoff, 16, Junior, Amador Valley High School, Pleasanton, CA
ENBM038	<b>Smart Microfluidics-based Impedance Aggregometry Biosensor for Detection of Platelet Hyperaggregation</b> Eeshani Behara, 16, Junior, American Heritage School of Boca Delray, Delray Beach, FL		

- ENBM052 Virtual Colonoscopy: Engineering a Deep Learning Algorithm for Bio-Imaging Colon Segmentation to Diagnose Colorectal Cancer**  
Ramy Khodeir, 17, Junior, duPont Manual High School, Louisville, KY
- ENBM053 The Music Box: Control of Music through the Use of a SSVEP-Based Brain Computer Interface System**  
Olivia Zhou, 17, Senior, Shaker High School, Latham, NY
- ENBM054 A Novel & Robust Computer Vision-Based Algorithm for Heart Rate Estimation Using Cameras**  
Mohammadou Gningue, 17, Senior, Bronx High School of Science, Bronx, NY
- ENBM055 A Novel Multimodal Wearable Sensor System for Continuous Monitoring of Chronic Diseases**  
Jason Li, 17, Junior, North Carolina School of Science and Mathematics, Durham, NC
- ENBM056T Fishiotherapy: Providing Affordable Physiotherapy Using Mixed Reality**  
Yashish Mohnot, 16, Junior,  
Aayush Shah, 16, Junior,  
Pace Junior Science College, Mumbai,  
Maharashtra, India
- ENBM057 Investigating the Interactions between LINGO1, EGFR, and the Trefoil Factor Family and Their Relation to Colorectal Cancer**  
Joshua Worth, 16, Sophomore, Kamehameha Schools Maui, Makawao, HI
- ENBM058T Acellular Treatment from *Clarias sp.* Collagen for Skin Loss**  
Muhammad Haziq Afnan Hamizi, 17, Junior,  
Muhammad Haiqal Syahmi Muhammad Helmi, 17, Junior,  
MRSM Langkawi, Kuah, Langkawi, Malaysia
- ENBM059 Under Pressure: Customized Insoles for Plantar Pressure Ulcers**  
Hannah Puhov, 16, Junior, Massachusetts Academy of Math and Science at WPI, Worcester, MA
- ENBM060 Tomographic Thermometry with Color CT and Deep Learning to Guide HIFU Surgery**  
Nathan Wang, 16, Junior, Shaker High School, Latham, NY
- ENBM061T Quantification of Spastic Ankle Joint Based on Parameter Optimization Algorithm**  
Jooyoung Lee, 17, Senior,  
Gun Hee Park, 17, Senior,  
Korea Science Academy of KAIST, Busan, Busan,  
South Korea
- ENBM062T Scan Your Skin**  
Mostafa Ayyad, 16, Junior,  
Mohamed Abohadid, 16, Junior,  
Menofya STEM School, Sirs Eel Lian, Menofya, Egypt
- ENBM063 Catheter Design Using Transmission of Antimicrobial Blue Light to Fight Catheter Related Infections**  
Sana Shaik, 16, Junior, Star College Girls' High School, Durban, KwaZulu Natal, South Africa
- ENBM064T SAVIUTS: Sensory Aid for the Visually Impaired Utilizing Time-of-flight Sensors**  
Joseph Henning, 18, Senior,  
Ben Swihart, 18, Senior,  
Wyatt Hooper, 18, Senior,  
New Prairie High School, New Carlisle, IN
- ENBM065 A Lumbar-Spine Motion Capture Suit for Physiotherapeutic Use in Sports#** Petteri Haverinen, 17, Junior, Lahden Lyseo, Lahti, Pajjat-Hame, Finland
- ENBM066T Do I Need an Antibiotic?**  
Majd Ayyad, 15, Sophomore,  
Haya Abuhlal, 14, Freshman,  
The Orthodox School of Bethany, Bethany, Palestine
- ENBM067 GATTII: Wearable Portable Screening Device for Gait Analysis**  
Sidharth Jain, 15, Freshman, Jamnabai Narsee International School, Mumbai, Maharashtra, India
- ENBM068 Bio-ink: Evaluation of Protein as Biomaterials for 3D Bioprinting**  
Jiwon Choi, 18, Senior, Saint Mark's School, Southborough, MA
- ENBM069 Naturally 3D Printing Away Fatal Catheter-Associated Urinary Tract Infections, Year Two**  
# Mitchell Sampson, 16, Sophomore, Northview High School, Brazil, IN
- ENBM070 Project ATTIS: An Assistive Aid for Parkinson's Patients Using Vibrational White Noise to Reduce Resting Tremors**  
Anne Jing, 17, Senior, Assumption College School, Brantford, Canada
- ENBM071 An Improved Inexpensive Closed-Loop Insulin Pump for Automatic Management of Types 1 and 2 Diabetes**  
### Anna Quinlan, 17, Senior, Menlo-Atherton High School, Atherton, CA
- ENBM072T The Mobile Ammunition**  
Yasmin Daik, 15, Freshman,  
Nada Hamada, 15, Sophomore,  
Banat Omran Basic School, Jericho, Palestine
- ENBM073 A Smartphone-Based, Point-of-Care Iron Sensor Utilizing Colorimetric Techniques**  
# Mindy Long, 18, Senior, Hamilton High School, Chandler, AZ

**ENBM074 An RNA-based Early Detection Method for Prostate Cancer Using Nanotechnology**

Daisy Wang, 16, Junior, Boston Latin School,  
Boston, MA

**ENBM075 Aroma Virtual Reality**

# Fatma Albastaki, 16, Senior, Dubai National School -  
Al Barsha, Dubai, United Arab Emirates

**ENBM076T Smart Shoes and Exosuit**

Sara Fekri, 17, Senior,  
Hessa Ibrahim, 15, Junior,  
Dubai National School - Al Barsha, Dubai,  
United Arab Emirates

**ENBM077 Advancing Biotechnology in Africa**

Darlsy Chingono, 17, Senior, Queen Elizabeth Girls' High  
School, Harare, Zimbabwe

## Cellular and Molecular Biology

CELL001	<p><b>Phase IV: The Effects of Epigallocatechin-3-Gallate on Breast and Cervical Carcinomas</b></p> <p>Stephen Litt, 14, Freshman, Kennesaw Mountain High School Academy of Mathematics, Science and Technology, Kennesaw, GA</p>	CELL013	<p><b>GATA6 and GATA4 CRISPR Cas-9 and shRNA Technology to Investigate Human Gastric Development and Disease Using Human Organoid Model Systems</b></p> <p># Afiya Quryshi, 17, Junior, University School of Milwaukee, Milwaukee, WI</p>
CELL002T	<p><b>Chemotaxis of the Slime Mold <i>Physarum polycephalum</i> and the Interaction with Different Molds</b></p> <p>Anna Schick Tanz, 17, Junior, Florian Merx, 17, Junior, Mara-Sophie Montag, 16, Junior, Albert-Schweitzer-Gymnasium, Erfurt, Thuringen, Germany</p>	CELL014	<p><b>Essential Oils Inhibit <i>E. coli</i></b></p> <p>Jelena Wright, 17, Junior, Mission Early College High School, El Paso, TX</p>
CELL003	<p><b>The Effects of Aging on Nucleolar and Ribosomal Function in <i>Drosophila melanogaster</i></b></p> <p>Maci Mannina, 16, Junior, St. Joseph's Academy, Baton Rouge, LA</p>	CELL015	<p><b>EpCAM Enhances Gefitinib-induced Drug Resistance in Colon Cancer Cells</b></p> <p>Yun-Chi Chen, 18, Senior, Taipei First Girls High School, Taipei, Taiwan</p>
CELL004	<p><b>The Effects of Cell-Cell Crosstalk on Glucose Stimulated Insulin Secretion</b></p> <p>Sarah Schlueter, 17, Junior, Eastside High School, Covington, GA</p>	CELL016	<p><b>Physiologic Oxygen Tension Enhances Proliferation, Resistance to Hypoxic Stress, and Telomerase Activity of Mouse Cardiac Mesenchymal Stem Cells</b></p> <p>Robi Bolli, 15, Freshman, duPont Manual High School, Louisville, KY</p>
CELL005	<p><b>The Presence of <i>Borrelia burgdoeferi</i> in <i>Ixodes scapularis</i></b></p> <p>Carlyn Frie, 17, Senior, Cochrane-Fountain City High School, Fountain City, WI</p>	CELL018	<p><b>The Effect of Inhibiting DNA-Protein Kinase and ADP-Ribose Polymerase on Head and Neck Squamous Cell Carcinoma Survivability</b></p> <p>Eric Cheng, 17, Senior, Alabama School of Fine Arts, Birmingham, AL</p>
CELL006	<p><b>Analyzing the Effects of CRISPR</b></p> <p>Melannie Nimocks, 17, Junior, College Park High School, The Woodlands, TX</p>	CELL019	<p><b>Developing Molecular Genetic Assays for the Detection of Mountain Lion (<i>Puma concolor</i>) DNA from Snow-Tracks</b></p> <p>Mia Foster, 17, Junior, Hellgate High School, Missoula, MT</p>
CELL007T	<p><b>Novel QD-Conjugated DRD2/HER Antineoplastic Therapy</b></p> <p>Khaylie Boothe, 17, Senior, Jacqueline Gomez, 17, Senior, Rockdale Magnet School for Science and Technology, Conyers, GA</p>	CELL020	<p><b>Engineered Atsttrin Protein Stabilizes Dysregulated Macrophage Polarization, Subsequent Osseous and Cartilaginous Tissue Remodeling in Ankylosing Spondylitis</b></p> <p>Magdalene Ford, 18, Senior, Ossining High School, Ossining, NY</p>
CELL008	<p><b>Investigation of the Effects of DNA Concentration on Polyethyleneimine Transfection Success and the Efficacy of the Serp-2 Secretion Signal</b></p> <p>Cynthia Sheng, 18, Senior, Fort Myers High School, Fort Myers, FL</p>	CELL021	<p><b>Novel CRISPR Knockout of Hif-1a in U251 Glioblastoma Cells</b></p> <p>Eric Gillespie, 15, Freshman, Millcreek Junior High School, Bountiful, UT</p>
CELL009	<p><b>Personalized Cancer Cell Weapons using CRISPR Genetic Engineering, Year Three</b></p> <p>Nina Reddy, 18, Senior, Satellite High School, Satellite Beach, FL</p>	CELL022	<p><b>The Effect of Fungicide on Fungal Communities Associated with <i>Glycine max</i> Roots</b></p> <p># Kylie Orris, 18, Senior, Southeastern Junior/Senior High School, Augusta, IL</p>
CELL010	<p><b>The Effect of Interaction with Neural Stem Cells on the Migration, Proliferation, and Proteome of GBM Cells</b></p> <p>Raha Riazati, 16, Junior, Stanton College Preparatory School, Jacksonville, FL</p>	CELL023	<p><b>Optical Induction of Membraneless Organelles</b></p> <p>Michelle Tong, 18, Senior, West Windsor Plainsboro High School North, Plainsboro, NJ</p>
CELL011	<p><b>The Role of Aging, Antioxidants, and Mutant Huntington Lowering in the Oxidative Stress Response of HD Neurons</b></p> <p># Ritika Jeloka, 17, Junior, Melbourne High School, Melbourne, FL</p>	CELL024	<p><b>Alpha-synuclein Enhances Toxicity of Tau Oligomers <i>in vitro</i></b></p> <p>Katelynne Berland, 18, Senior, New Horizons Governor's School for Science and Technology, Hampton, VA</p>
		CELL025	<p><b>Immunomodulation of Human Leukemia Cell Lines by Components of Probiotic Sources</b></p> <p>Saitheja Pucha, 16, Sophomore, Lakeside High School, Atlanta, GA</p>

<b>CELL026T</b>	<b>Bioremediation of Elevated Arsenite Concentrations in Groundwater via the Arsenite Oxidase Gene Cluster in Transgenic Bacteria</b> Hunter Rees, 16, Sophomore, Eli Jones, 16, Sophomore, Jackson Senior High School, Jackson, MO	<b>CELL037T</b>	<b>Observing the Advancement of a Mitotic Index on <i>Allium cepa</i> L. Root Cells whilst Exposed to Diethyl Phthalate</b> Maria Jose de La Concha, 17, Junior, Alicia Ribeiro, 16, Junior, Escola Americana de Campinas, Campinas, Sao Paulo, Brazil
<b>CELL027</b>	<b>Effect of CYP3A Inhibitor Bergamottin on Androgen Receptor Signaling in Prostate Cancer Cells</b> Opalina Vetrichelvan, 17, Junior, Ed W. Clark High School, Las Vegas, NV	<b>CELL038</b>	<b>Development of a CD4+ Neoantigen Vaccine in the Panc02 Tumor Model</b> Jocelyn Mathew, 17, Senior, Centennial High School, Ellicott City, MD
<b>CELL028</b>	<b>Enhancing Microtubule Dynamics with Fidgetin-Like 2 Depletion</b> Jed Katzenstein, 18, Senior, Dobbs Ferry High School, Dobbs Ferry, NY	<b>CELL039</b>	<b>Increasing Metabolic Substrates Improves Spreading Depolarization Recovery in a Brain Slice Model of Stroke: An Innovative Therapy for Reducing Brain Injury after Stroke</b> Rusty Ludwigsen, 18, Senior, Early College Academy, Albuquerque, NM
<b>CELL029</b>	<b>Epigenetic Therapy for Liver Cancer: The Effect of 5-azacytidine on the Expression of Tumor Suppressor Genes p15INK4b, p16INK4a, and SOCS-1</b> Shreya Kamra, 18, Senior, Stevenson School, Pebble Beach, CA	###	
<b>CELL030</b>	<b>Utilizing Ligand Structuring Metaservers to Model Pathogenic p16, Mutation Effects on Binding Sites of Cell Signaling Pathways</b> Christopher Li, 16, Sophomore, West High School, Salt Lake City, UT	<b>CELL040</b>	<b>Modeling Neurodegeneration <i>in vitro</i>: A Dynamic Study of Tau in a Microfluidic Chamber System via Quantum Dot Labeling</b> Allison Jia, 17, Junior, The Harker School, San Jose, CA
<b>CELL031</b>	<b>Palbociclib Treated MDA-MB-231 Breast Cancer Cells Exhibit Increased Invasive Behavior in Zebrafish Xenograft Model</b> Matthew Weltmann, 17, Senior, Half Hollow Hills High School East, Dix Hills, NY	<b>CELL041</b>	<b>Identification of GREB1 as a Potential Mutant Estrogen Receptor Coactivator in Breast Cancer</b> Esther Chai, 16, Junior, Townsend Harris High School, Flushing, NY
<b>CELL032</b>	<b>ETM* Is Indispensable to Endothelial Cell Physiology during Pathological Angiogenesis</b> Madhav Subramanian, 18, Senior, Jericho High School, Jericho, NY	<b>CELL042</b>	<b>Using Zika Virus Proteins NS4A and NS4B to Investigate Oncolytic Virus Therapy against Glioblastoma Cancer</b> Sowmya Chundi, 15, Freshman, Carmel High School, Carmel, IN
<b>CELL033</b>	<b>3D Spatiotemporal Profiling of Adrenergic and Cholinergic Transmission</b> Paula Zhu, 17, Junior, Albemarle High School, Charlottesville, VA	<b>CELL043</b>	<b>Characterization of the Role of Catalases in Hydroxyurea Toxicity and Their Potential as Novel Chemotherapeutic Targets</b> Natalie Wang, 16, Junior, Lincoln High School, Portland, OR
<b>CELL034</b>	<b>EnLIGHTened Therapeutics: Engineering Light-Activated Proteins for Optogenetic Applications</b> Arundathi Nair, 16, Junior, Laramie High School, Laramie, WY	#	
<b>CELL035T</b>	<b>The Effects of UVB Radiation on <i>Planaria's</i> Cell Regeneration through Cultural and DNA Analysis</b> Haiden Grandpre, 15, Freshman, Teryn Sparling, 14, Freshman, Northwestern High School, Mellette, SD	<b>CELL044</b>	<b>Proteasome Inhibitor A as an Alternative Medicine to Fumagilin in the Treatment of <i>Nosema ceranae</i> in Honey Bee Colonies</b> Sun Graham, 16, Junior, Somers High School, Lincolnndale, NY
<b>CELL036</b>	<b>Investigation of Aspects of Neuron Function in Schizophrenia Using hiPSC Cells</b> Ryan Onatzevitch, 17, Senior, Yorktown High School, Yorktown Heights, NY	<b>CELL045</b>	<b>Evaluation of a Rare PMS1 Germline Variant as a Putative Hereditary Breast Cancer Risk Allele</b> Kelly Xu, 16, Junior, South Burlington High School, South Burlington, VT
		<b>CELL046</b>	<b>tRNA Dynamics between the Nucleus and Cytoplasm</b> Leon Wu, 17, Junior, Upper Arlington High School, Upper Arlington, OH
		<b>CELL047</b>	<b>The Role of <math>\alpha 5</math> Single Nucleotide Polymorphism on Nicotine Dependence</b> Sid Thakker, 15, Sophomore, James Madison High School, Vienna, VA

CELL048	<b>Isolating Exosomes in Urine and Saliva to Detect Dust and Dander Allergens in IgE Sensitized Individuals Using a Capillary Tube Precipitation Test: A New Non-Intrusive Antigen/Antibody Reaction Allergy Test</b>	CELL059	<b>Direct Evolution of Antibody Fragments Targeting CD32a for Application in Immunotherapy to Eradicate HIV Latency</b>
##	Audrey Bakerson, 17, Junior, Berrien County Mathematics and Science Center, Berrien Springs, MI		Long Ngo, 18, Senior, Oregon Episcopal School, Portland, OR
CELL049	<b>Developing a Novel Retroviral Vector Capable of Inducible Knockdown in CD8 T Cells</b>	CELL060	<b>Differential Expression of Retrotransposons in Stem Cell Lineages of the Preimplantation Embryo</b>
	Priyanka Parikh, 18, Senior, Columbus High School, Columbus, GA		Eddie Dai, 16, Junior, Olathe North High School, Olathe, KS
CELL050	<b>Improved Treatment for Alzheimer's by Enhancing Tyrosine Phosphorylation of the DAB1 Protein through Lauric Acid</b>	CELL061	<b>Discovery of New Genetic Mutations in Uveal Melanoma Patients by Analyzing Nitrogenous Base Pair Anomalies</b>
	Siya Goel, 14, Freshman, West Lafayette Junior/Senior High School, West Lafayette, IN		Hersh Nanda, 15, Freshman, BASIS Chandler, Chandler, AZ
CELL051	<b>HIF1-<math>\alpha</math> Promotes ID2 Expression through Novel HRE Sites in the ID2 Promoter</b>	CELL062	<b>Sea Cucumber Extracts (<i>Holothuria cinerascens</i> and <i>Holothuria impatiens</i>' Cuvierian Tubules) Decrease Cancer Cell Viability</b>
	Abigail Haffey, 17, Senior, Homeschool, Walkersville, MD		Kaeko Kekumano, 16, Junior, Kamehameha Schools Kapalama Campus, Honolulu, HI
CELL052T	<b>X-Inactivation: (It's the Cat's Meow!) Random or Predetermined?</b>		
	Gina Sobinovskiy, 16, Sophomore, Lisa Sobinovskiy, 16, Sophomore, Hedgesville High School, Hedgesville, WV		
CELL053T	<b>CCDC11 Regulates Efficient Midbody Recruitment of Ist1 Suggesting Impaired Organization of ESCRT Machinery</b>		
#	Jillian Parker#, 17, Senior, Jiachen Lee#, 18, Senior, Arooba Ahmed#, 17, Senior, Half Hollow Hills High School West, Dix Hills, NY Half Hollow Hills High School East, Dix Hills, NY		
CELL054	<b>The Executioner Protein: Targeting BAX to Induce Apoptosis in Anaplastic Thyroid Cancer Cells</b>		
	Francesca Di Cristofano, 18, Senior, Pelham Memorial High School, Pelham, NY		
CELL055	<b>Can Tumor Cells Stimulate Macrophages through Cell to Cell Communication without Contact?</b>		
	Lauren Cassou, 17, Senior, Manhattan High School, Manhattan, KS		
CELL056	<b>Study on Produce Transgenic Up-Eucalyptus Plant (<i>E. urophylla</i> x <i>E. pellita</i>) for Increasing Fiber Length</b>		
	Thi Thuy Trang Dao, 17, Junior, Hung Vuong Gifted High School, Pleiku, Gia Lai, Vietnam		
CELL057	<b>Regulation of SREBP-1 by Polyunsaturated Fatty Acids</b>		
	Zhuoran Wang, 18, Senior, Colleyville Heritage High School, Colleyville, TX		
CELL058T	<b>Targeting Susceptibility in Mutations in the Cell Cycle: Knockout of the Ade2 Gene Using CRISPR</b>		
	Ezequiel Ponce, 18, Senior, Sophia Tran, 17, Senior, Helen Nguyen, 18, Senior, Andrew Putnam Hill High School, San Jose, CA		

## Chemistry

- CHEM001** **Synthesis of HIV-1 Reverse Transcriptase Inhibitors**  
Tereza Gistrova, 20 Senior, Gymnazium Zlin - Lesni Ctvrt, Zlin, Zlínský Kraj, Czech Republic
- CHEM002** **Determination of Iodate in Cooking Salt Using an Electrochemical Probe**  
Rafael Alessandro De Lima, 17, Senior, Colegio Degraus, Jundiá, Sao Paulo, Brazil
- CHEM003** **BuckyPaper: Investigating the Viability of Multi-Walled Carbon Nanotubes in Sensors for the Detection of Various Gases**  
Andy Shar, 13 Sophomore, Vanguard High School, Ocala, FL
- CHEM004T** **Extracting Polysaccharides from Rhodophyta Plantae to Make Biodegradable Plastic**  
Kindle Hon, 18, Senior,  
Taylor Hubbard, 18, Senior,  
Chloe Johnson, 18, Senior,  
South Sumter High School, Bushnell, FL
- CHEM005** **Synthesis and Characterization of Complex-Forming Properties of Imino Pyranoses**  
Konstantin Urban, 19 Senior, Martin-Andersen-Nexo-Gymnasium, Dresden, Sachsen, Germany
- CHEM006** **Influence of Vegetated Coverage on Surface Runoff Losses of the Insecticide, Bifenthrin**  
Hailey Lewy, 16, Junior, Saint Joseph's Academy, Baton Rouge, LA
- CHEM007** **Sustainable Manufacturing of Gamma Butyrolactone**  
Tianyu Dong, 15, Freshman, Northview High School, Johns Creek, GA
- CHEM008** **Controllable Synthesis and Photocatalytic Degradation to Organic Pollutants of Heterogeneous Cu<sub>2</sub>O-Au-TiO<sub>2</sub> Nanocomposite**  
Jiajun Ren, 17, Junior, The High School Affiliated to Xian Jiaotong University, Xian, Shaanxi, China
- CHEM009** **Experimentally Designing Sustainable Clay-Based Adsorbents to Remove Arsenic from Drinking Water**  
Rajat Doshi, 17, Senior, Henry B. Plant High School, Tampa, FL
- CHEM010** **Synthesis of Topological-Insulator Enhanced Heteronanostructure for Bifunctional Water Splitting**  
Chenyang Li, 16, Junior, Hefei NO.1 High School, Hefei, Anhui, China
- CHEM011** **Assessment of *Allium sativum* and *Persea americana* as a Natural Corrosion Inhibitor on Carbon Steel**  
Sreelakshmi Raghav, 16, Sophomore, Little Rock Central High School, Little Rock, AR
- CHEM012** **Formation of Large Sized Aragonite Crystals by Using Gel Method**  
Miu Muto, 17, Junior, Shibaura Institute of Technology Kashiwa Junior and Senior High School, Kashiwa, Japan
- CHEM013** **Evaluating the Efficacy of Smoke-Water towards the Ripening of Banana**  
Rameesha Khursheed, 16, Sophomore, Siddeeq Public School, Rawalpindi, Punjab, Pakistan
- CHEM014** **Distillation as a Method of Wastewater Treatment**  
Kathryn McIntyre, 15, Sophomore, Bartlesville High School, Bartlesville, OK
- CHEM015** **Analysis of Carbon Dioxide to Oxygen Using Ultra Violet Light**  
Maya Almanaseer, 15, Sophomore, Umm Al-Summaq Secondary School, Amman, Khalda, Jordan
- CHEM016T** **Synthesis of Enantiomerically Pure Tryptamine Derivatives, Potential Antitumour Drugs**  
Pavel Gurevich, 17, Sophomore,  
Andrei Zaitsev, 17, Junior,  
Moscow South-Eastern School Named After V. I. Chuikov, Moscow, Russian Federation
- CHEM017T** **Mineral Paper Production Using Calcium Carbonate Obtained from Eggshells Mixed with Recycled Polyethylene**  
Susana Esquivel Murillo, 16, Junior,  
Sara Juarez Ortega, 16, Sophomore,  
Preparatoria Oficial No. 19 San Martin De Las Piramides, San Martin de Las Piramides, Mexico
- CHEM018T** **Removal of Nickel Ions from Electroplating Wastewater Using Nano-Kaolinite Extracted from Sweileh Sand Deposits**  
Tala A. Natour, 16, Junior,  
Rand Alqudah, 17, Junior,  
Jubilee School, Amman, Jordan
- CHEM019** **Water Purification by Capillary Action in Paper Towels**  
Vongayi Marazanye, 18, Senior, High Achievers Coach Educational Centre, Harare, Zimbabwe
- CHEM020T** **Synthesis of Silver Nanoparticles and Their Effects on Cancer Cells**  
Min Dong Zhang, 17, Junior,  
Jose Merino-Gardez, 17, Junior,  
Transmountain Early College High School, El Paso, TX
- CHEM021T** **Morphology Effects of Electrocatalytic Carbon Dioxide Reduction onto Copper/Silver Bimetallic Nanostructures**  
Yu-Hsien Chang, 17, Junior,  
Wei-Ying Chien, 17, Junior,  
Taipei First Girls High School, Taipei, Taiwan
- CHEM023** **Liposome Nanoparticle for the Treatment of Vascular Diseases**  
Claire Jun, 16, Sophomore, Hoover High School, Hoover, AL
- CHEM024** **The Construction of a Nephelometer and Its Use for the Determination of Chloride in Water Samples**  
Clayton Garnett, 18, Senior, Moberly High School, Moberly, MO

- CHEM025** **Synthesis of Dyes for DSSC's with a Novel Type of Acceptor Moiety: An Attractive Way to Low Cost and Eco-Friendly Energy Production**  
Olga Chechekina, 18, Junior, Moscow South-Eastern School Named After V. I. Chuikov, Moscow, Russian Federation
- CHEM026T** **Thermal Pyrolysis as an Alternative to the Problem of Plastic Waste in the Landfill of Villa Tambores**  
Carina Texeira, 16, Freshman, Sofia Etchecopar, 16, Freshman, Liceo Dr. J. M. Dalto, Tambores, Tacuarembó, Uruguay
- CHEM027** **Comparative Study on the Properties of Magnetized Water versus Tap Water** Roberto Rodriguez-Garcia, 16, Junior, Florencia Garcia High School, Las Piedras, Las Piedras, Puerto Rico
- CHEM028** **Selective Hydrogen Production from Formic Acid with a Ruthenium Catalyst for Power Generation in Automobiles**  
Mohammed Alkhourisi, 17, Senior, Riyadh School for Boys and Girls, Riyadh, Saudi Arabia
- CHEM029** **Improving Affinity-Based Drug Delivery with Convenient Computational Models**  
# Alison Xin, 18, Senior, Hathaway Brown School, Shaker Heights, OH
- CHEM030** **CuO Nanostructure Incorporated Epoxy for Building Blocks of Antimicrobial Efficient Water Pipes and Kitchen Countertops**  
Rowaid Baamer, 18, Senior, Al-Aqsa Private Schools, Jeddah, Saudi Arabia
- CHEM031** **Investigating the Effect of Activated Charcoal on the Absorption of Medicines**  
Maeve Stillman, 16, Sophomore, St. Mary's College, Derry, Londonderry, United Kingdom
- CHEM032** **Effect of Photodegradation on Dihydroxynaphthalene for Decomposition of Polyaromatic Hydrocarbons**  
Josh Roy, 18, Senior, Nacogdoches High School, Nacogdoches, TX
- CHEM033** **UiO-66 Metal Organic Frameworks (MOFs) Decorated with Cadmium Sulfide Quantum Dots: An Investigation of the Effectiveness of (MOFs) as a Drug Delivery System for Melanoma Treatment**  
Lasya Damaraju, 17, Junior, West Shore Junior/Senior High School, Melbourne, FL
- CHEM034** **Bisphenols: An Investigation of Baby Food Containers**  
# Rachel Stratton, 16, Junior, Hilton Head Preparatory School, Hilton Head Island, SC
- CHEM035** **Green Synthesis of Medicinally Privileged Thio-Heterocycles**  
Valeria Stevens, 18, Senior, McAllen High School, McAllen, TX
- CHEM036** **Smog Buster**  
Hibba Muhammad Hanif Thara, 17, Senior, Aga Khan Higher Secondary School, Karachi, Sindh, Pakistan
- CHEM037T** **Colors in the Dark**  
Manuela Ficco, 17, Junior, Linda Grainca, 17, Junior, Margherita Tarocco, 16, Junior, Istituto Tecnico Industriale G. Omar, Novara, Italy
- CHEM038** **Concentration of Red Dye in Sports Drinks**  
Abigail Goyette, 18, Senior, Westfield High School, Westfield, MA
- CHEM039** **From Juice to Water: Using Organic Chemistry Techniques to Extract the Water from Watermelon Juice**  
Ruqiyah Shaik, 18, Senior, Rome Free Academy, Rome, NY
- CHEM040** **Novel Colorimetric Sensors for Detecting Chemicals in Vapor, Liquid, and Solid Phases**  
Helena Jiang, 16, Junior, F. W. Buchholz High School, Gainesville, FL
- CHEM041** **Green Tea (*Camellia sinensis*): Comparison of Antioxidant Activity between Authentic and Supplement Samples via the Briggs-Rauscher Reaction along with their UHPLC Fingerprinting in order to Address the Issue of Adulteration**  
Fawaz Ahmad, 16, Sophomore, Oxford High School, Oxford, MS
- CHEM042** **Silk Fibroin as an Aqueous Coating Material for the Sustained Delivery of Hydrophilic Drugs**  
Amy Wahba, 17, Junior, Bayonne High School, Bayonne, NJ
- CHEM043T** **Leonardo's Eternal Last Supper**  
Beatrice Alparone, 18, Senior, Elisa Cuzzo, 18, Senior, I.I.S. Carlo Emilio Gadda, Paderno Dugnano, Milan, Italy
- CHEM044** **Comparison Methods of Food Storage**  
Kirstin Parkhurst, 18, Senior, Northwest Technology Center, Fairview, OK
- CHEM045** **Phosphorous/Nitrogen Co-Doped Carbon Derived from Soybean as High-Performance Electrode Material for Supercapacitor**  
Amna Khan, 15, Freshman, Little Rock Central High School, Little Rock, AR
- CHEM046** **Synthesis of Silver Compounds with Potential Anti-Cancer Activity: Silver(I) Complexes with Xylyl-Substituted Heterocyclic Thiones and Selones**  
Aakriti Lakshmanan, 15, Sophomore, Ardrey Kell High School, Charlotte, NC
- CHEM047** **The Effects of a Silica Coating on the Aggregation of Gold Nanoparticles**  
Paige Sherman, 15, Sophomore, Hunter College High School, New York, NY
- CHEM048T** **Chloramine Test Kits for an Efficient Process of Swimming Pools' Disinfection**  
Napat Sajjamongkol, 17, Junior, Athicha Santilinnon, 17, Junior, Natprawe Pattayawij, 17, Junior, Mahidol Wittayanusorn School, Nakhon Pathom, Nakhon Pathom, Thailand



- CHEM049T The Development of an Innovative Systemic Catalytic Mechanism for the Removal of Free Radicals Associated with Colorectal Cancer**  
Jaxon Henderson, 17, Junior,  
Jackson Pool, 17, Junior,  
Zachary Uhren, 17, Junior,  
Cascia Hall Preparatory School, Tulsa, OK
- CHEM050 Synthesis and Use of Robust Cobalt (II) Catalysts for the Reduction of CO<sub>2</sub> to CO**  
##  
Ankush Dhawan, 17, Junior, Signature School,  
Evansville, IN
- CHEM051 Silica Aerogels and Silica Aerogel-Carbon Composites for Adsorption of Micropollutants**  
Francesca van Swaaij, 19 Senior, Liceo Cantonale di  
Lugano 2, Savosa, Ticino, Switzerland
- CHEM052T Cassia Cinnamon Crude Extract as a Novel, Cost Effective and Eco-Friendly Mosquito Larvicide**  
Melwin Choon Lei Cheng, 16, Sophomore,  
Yong Shiang Tham, 16, Sophomore,  
Chung Ling High School Penang, Georgetown, Malaysia
- CHEM053T A Study on the Solution of Cold Damages by Finding Optimal Conditions of Antifreeze Protein**  
Jinah Jeon, 17, Senior,  
Gwanwoo Baek, 17, Senior,  
Eunjae Jo, 17, Senior,  
Gyeongnam Science High School, Jinju-si,  
Gyeongsangnam-do, South Korea
- CHEM054T Research, Design of the MnO<sub>2</sub>/Cellulose Acetate Nano-Filter Membrane Equipment System Applied to Treat Wastewater Containing Pb<sup>2+</sup>, Cd<sup>2+</sup>, TSS, COD, E. coli and Coliform into Domestic Water**  
Tuan Kiet Vo, 16, Junior,  
Thien Hieu Tran, 17, Junior,  
Le Quy Don Secondary School for the Gifted, Quy Nhon,  
Binh Dinh, Vietnam
- CHEM055 Miacro: A Reverse-Engineering Framework for Non Invasive Carcinogenic Acrylamide Removal Using Predictive Neural Networks to Rectify Industry Procedures for Sustainable, Next Generation Consumer Health**  
Sara Makboul, 17, Junior, Kennesaw  
Mountain High School, Kennesaw, GA
- CHEM056 Rearrangements of Fluorinated Cyclopropylboronates as a Novel Approach towards Fluoroalkene-Based Peptidomimetics**  
Igor Mezentsev, 17, Junior, Moscow South-Eastern  
School Named After V.I. Chuikov, Moscow,  
Russian Federation
- CHEM057T New Diethylenetriaminepentaacetic Acid-Derived Lanthanide Tags for NMR Screening in Drug Discovery**  
Vasily Miturich, 17, Sophomore,  
Mikhail Boym, 16, Sophomore,  
Moscow South-Eastern School Named After V. I.  
Chuikov, Moscow, Russian Federation
- CHEM058 C60 Buckminsterfullerene Derivatives for DNA-Encoded Libraries, Fullerene-Supported Synthesis, and High-Throughput Screening**  
John-Mark Phillips, 18, Senior, Seminole Ridge  
Community High School, Loxahatchee, FL
- CHEM059 Analyzing the Difference in the Sorption Concentrations of Copper and Iron in Polylactic Acid and High-Density Polyethylene Plastic Bags**  
Rose Tomiak, 17, Junior, Southwest Virginia Governor's  
School, Pulaski, VA
- CHEM060 Organic Biodegradable Alternative to Plastic**  
Shaziyah Laher, 16, Junior, Nizamiye Al Azhar Institute,  
Port Elizabeth, Eastern Cape, South Africa
- CHEM061 Using Molecular Dynamics Simulations to Study the Self-Assembly of Patchy Alkane-Tethered Nanoparticles**  
Caroline Spindel, 18, Senior, Harpeth Hall, Nashville, TN
- CHEM062 3-Hydroxy-1-Azoalkenes and Their Ester Derivatives: New Cytotoxic Agents for Cancer Treatment**  
Hung Son Pham, 16, Junior, Tran Phu Gifted High  
School, Hai Phong, Vietnam
- CHEM063 Novel Artificial Synthesis of Sugars from Non-Organic Compounds for Renewable Cellular Energy**  
#  
Sky Harper, 17, Junior, Navajo Preparatory School,  
Farmington, NM
- CHEM064 The New "Smart" Corrosion Protective Pigment based on Tripolyphosphate- intercalated Zn-Al Layered Double Hydroxide: Synthesis and Characterisation**  
Sofiiia Rusakevych, 15, Sophomore, Chemical Ecological  
Lyceum, Dnipro, Dnipropetrovsk Region, Ukraine
- CHEM065 Analysis of Manufacturing Process of D-Glucose-Based Thermoformed-Polymers**  
Suvin Sundararajan, 15, Sophomore, Westfield High  
School, Westfield, MA
- CHEM066T How Dangerous Are E-Cigarettes? An Analysis of Metals and Chemicals Affecting Users**  
Kaylee Bourgeois#, 18, Senior,  
Caihren Wood, 17, Senior,  
Lutcher High School, Lutcher, LA  
St. James High School, St James, LA
- CHEM067T Crystallization Studies of Pharmaceutically Active Substance Apremilast**  
Arina Manukova, 18, Senior,  
Gunita Paidere, 18, Senior,  
Riga State Gymnasium No. 1, Riga, Latvia
- CHEM069T A Novel Approach to the Synthesis of 3,5-disubstituted delta-2-isoxazoline as a Precursor to Various Diabetic Medications**  
Suhaas Narayanan, 17, Junior,  
Charles Wang, 16, Sophomore,  
Fort Collins High School, Fort Collins, CO  
Fossil Ridge High School, Fort Collins, CO
- CHEM070 How Ironic?: Developing a Ferrofluid**  
Serenity Engel, 18, Senior, Hot Springs High School,  
Hot Springs, SD

**CHEM071 Constructing Earth-Abundant Core Shell Plasmonic Photocatalysts for Hydrogen Production via Water Splitting**

William Porayouw, 15, Sophomore, Redlands High School, Redlands, CA

**CHEM072T Absorption of Heavy Metals from Industrial Effluents Using Fish Scales**

Shaima Alhammadi, 17, Senior,  
Fatima Alsuwaidi, 16, Junior,  
Al Resalah International School of Science, Sharjah,  
United Arab Emirates

## Computational Biology and Bioinformatics

<b>CBIO001</b>	<b>Brain Cells Phenotyping via Unsupervised Machine Learning Using Autoencoder and Clustering</b> Nikolaj Pashov, 18, Senior, 91. High School of German Language "Professor Konstantin Galabov", Sofia, Bulgaria	<b>CBIO012</b>	<b>A Novel Spatiotemporal Model for Epidemics in Dynamic Populations</b> # Hamilton Wan, 17, Senior, Mississippi School for Mathematics and Science, Columbus, MS
<b>CBIO002</b>	<b>Modelling Differences in Protein Interactions Caused by Familial Hypercholesterolemia for Personalised Medicine</b> Frederik Gade, 19 Senior, Odense Tekniske Gymnasium, Odense, Fyn, Denmark	<b>CBIO013</b>	<b>Identifying miR-331-3p as a Unique Blood-Based Biomarker for Lung Adenocarcinoma through Random Forest Classification</b> Madden Moore, 18, Senior, Academies of Loudoun, Leesburg, VA
<b>CBIO003</b>	<b>Statistical Evaluation of Three Computer Models to Determine the Minimum Size of a Large Population Which Remains in Hardy-Weinberg Equilibrium</b> Emma Johnston, 18, Senior, Manatee High School, Bradenton, FL	<b>CBIO014</b>	<b>Fighting Zika: Computational Discovery of New Drugs to Inhibit the NS2B-NS3 Protease of the Zika Virus</b> Sayalee Patankar, 16, Sophomore, Adlai E. Stevenson High School, Lincolnshire, IL
<b>CBIO005</b>	<b>Tracing Cell Lineages from Single-Cell Data using Markov Affinity Estimation</b> # Lauren Li, 18, Senior, Westview High School, Portland, OR	<b>CBIO015</b>	<b>An Iterative Transfer Learning Approach to Multiobjective <i>de novo</i> Drug Design with Recurrent Neural Networks and Nondominated Sorting</b> Jacob Yasonik, 17, Junior, Homestead High School, Mequon, WI
<b>CBIO006</b>	<b>Predicting the Development of Secondary Central Nervous System Cancer through Ensemble Learning Methods</b> Julia Christina Camacho, 16, Junior, Texas Academy of Mathematics and Science, Denton, TX	<b>CBIO016</b>	<b>Enabling Personalized Medicine: A Novel Deep Learning Tool for Classifying Genetic Mutations Using Text from Clinical Evidence</b> Jason Ping, 17, Junior, Bergen County Academies, Hackensack, NJ
<b>CBIO007T</b>	<b>Bidirectional Promoters in Human Genome</b> Seljan Nurullayeva, 15, Sophomore, Vagif Mammedzada, 17, Junior, School #177, Baku, N. Narimanov District, Azerbaijan Lyceum Named after Academician Zarifa Aliyeva, Baku, Azerbaijan	<b>CBIO017</b>	<b>Development of an Antimicrobial Peptide Activity Detector Using Machine Learning for the Discovery of New Drugs</b> # Michael Lu, 16, Sophomore, Starkville High School, Starkville, MS
<b>CBIO008</b>	<b>A Novel PCA-Based Wishart Filtering Method for Reduction of Unstructured Noise in fMRI and Connectomes to Improve Diagnosis of Neurodegenerative Diseases</b> Nikhil Boddu, 16, Junior, Marquette High School, Chesterfield, MO	<b>CBIO018</b>	<b>A Novel Method for Skeletal Age Estimation Based on Cranial Suture Analysis</b> Andrey Gizdov, 18, Senior, Ackworth School, Pontefract, Ackworth, United Kingdom
<b>CBIO009</b>	<b>Classifying Cancer Using Machine Learning in Order for CRISPR/Cas9 Technology to Be More Effective</b> Shreeya Arora, 16, Sophomore, duPont Manual High School, Louisville, KY	<b>CBIO019</b>	<b>MetaLyzer: A Novel Analyzer for the Metagenomic Bacteria Using Deep Learning</b> Cameron Sharma, 15, Freshman, Mills E. Godwin High School, Henrico, VA
<b>CBIO010T</b>	<b>A Novel Approach on G6PD Enzyme Deficiency Treatment: Drug Repurposing</b> Ipek Akyol, 16, Junior, Nilufer Kemer, 17, Junior, Izmir Ozel Ege Lisesi, Izmir, Bornova, Turkey	<b>CBIO020</b>	<b>Deep Learning to Evaluate the Combinatorial Impact of Genetic Variants on Gene Expression</b> Collin Wang, 17, Senior, Detroit Country Day School, Beverly Hills, MI
<b>CBIO011T</b>	<b>Finding the Most Influential Factors which Control the Healing of Chronic Wounds</b> Rithik Reddy, 17, Senior, Abdullah Ateyeh, 17, Senior, The Carol Martin Gatton Academy of Mathematics and Science in Kentucky, Bowling Green, KY	<b>CBIO021T</b>	<b>An Epidemiological Study Quantifying Differences in Thyroid Cancer Risk across Birth Cohorts and I-131 Exposure Levels</b> Anisa Habib, 16, Junior, Tejita Agarwal, 17, Junior, West High School, Salt Lake City, UT
		<b>CBIO022T</b>	<b>Computational Study of Amyloid Fibril Inhibition Mechanism by Hydrogen Sulfide</b> Wester Aldarondo Torres, 16, Senior, Ana Santiago-Russe, 17, Senior, CROEM HS, Mayaguez, Puerto Rico, Puerto Rico

<b>CBIO023</b>	<b>A Novel Mathematical Model for the Early Detection of Dengue Fever using SIR Infectious Disease Epidemiological Compartments, Ordinary Differential Equations, and Statistical Computing</b> Tarun Kumar Martheswaran, 15, Sophomore, The Waterford School, Sandy, UT	<b>CBIO034</b>	<b>CeRNetwork: A Platform for in silico Discovery and Classification of Competing Endogenous RNA Molecules for Multi-Omic Network Diffusion and Novel miRNA-Sequestering Drug Design</b> # David Toomer, 17, Senior, Hayfield Secondary School, Alexandria, VA
<b>CBIO024</b>	<b>NMF-based Machine Learning for Alzheimer's Disease Biomarker Identification and Diagnosis</b> Aaron Abraham, 17, Senior, Webber Academy, Calgary, Alberta, Canada	<b>CBIO035</b>	<b>Discretizing a Hybrid Cardiac Reconstruction: A Novel Simulation of Sustained Fibrillation</b> Arianna Pahlavan, 17, Senior, Jericho High School, Jericho, NY
<b>CBIO025</b>	<b>A Novel Computational Model to Predict Subcellular Protein Localizations</b> Kevin Hu, 17, Junior, Sir John A. Macdonald Secondary School, Waterloo, Ontario, Canada	<b>CBIO036</b>	<b>Decoding Neural Networks: Novel Computational Methods to Discover Anti-Tumor B Cell Receptor Binding Motifs</b> Cynthia Chen, 16, Junior, The Harker School, San Jose, CA
<b>CBIO026T</b>	<b>Using Bioinformatics Techniques to Identify Gene Expression and Potential Genetic Pathways in Preeclampsia</b> Claire Martel, 18, Senior, Christina Curran, 17, Senior, Barrington High School, Barrington, RI	<b>CBIO037</b>	<b>Characterization of NADPH Binding Patterns for the Rational Design of a Photoactivatable NADPH Analog</b> Charles Huang, 17, Senior, Lynbrook High School, San Jose, CA
<b>CBIO027T</b>	<b>Molecular Dynamics Approach to Pharmacophore Modelling of Mu Opioid Receptor Ligands and DAMGO</b> Janani Rajadurai, 18, Senior, Pooja Rajadurai, 18, Senior, Yorktown High School, Yorktown Heights, NY	<b>CBIO038T</b>	<b>A Modular and Dynamic GPU-based Maize Simulation Using L-Systems</b> Govind Pimpale, 17, Junior, Nitish Reuben, 17, Senior, Marek Pinto, 16, Sophomore, Santa Teresa High School, San Jose, CA
<b>CBIO028</b>	<b>Meta-Analysis of Cancer-Related Gene Sets: Linking Craniosynostosis and Endometrial Cancer</b> Suchir Misra, 16, Junior, Jericho High School, Jericho, NY	<b>CBIO040</b>	<b>Novel Analysis of the Growth of the Fetus: A Much Needed Method in the Precise Diagnosis of Microcephaly and Other Growth Diseases</b> Tahmid Ahamed, 18, Senior, Bronx High School of Science, Bronx, NY
<b>CBIO029</b>	<b>Investigating the Principle of Adaptive Plasticity in Variably Epistatic Systems</b> ## Wyatt Brannon, 16, Junior, InTech Collegiate High School, North Logan, UT	<b>CBIO041</b>	<b>An <i>in silico</i> Approach to Study Bacteria Protein Determinants of Antibiotic Resistance</b> Mohini Parvate, 16, Sophomore, Dublin Jerome High School, Dublin, OH
<b>CBIO030T</b>	<b>Using Machine Learning Techniques to Detect Mutant p53 Transcriptional Activity</b> Sanjana Kargi, 15, Junior, Dua Azhar, 16, Junior, Beehive Science and Technology Academy, Sandy, UT	<b>CBIO042</b>	<b>A Novel Design for Investigating Cell Deconvolution Methods for Tumor Microenvironment</b> Virginia Ma, 17, Senior, Columbus Academy, Gahanna, OH
<b>CBIO031</b>	<b>Using Three-Dimensional Modeling to Analyze the Vascular System and Radiation-Induced Lung Damage</b> Karen Copeland, 18, Senior, Alexander W. Dreyfoos School of the Arts, West Palm Beach, FL	<b>CBIO043</b>	<b>A Computational Model of the Stimulus Response of <i>Mimosa pudica</i></b> Anantharaman Iyer, 14, Freshman, National Public School, Bengaluru, Karnataka, India
<b>CBIO032</b>	<b>Investigation of Protein Tertiary Structure and Intermolecular Forces of Ligand Associations through Computer Modeling</b> Logan Vogel song, 18, Senior, Elizabethtown Area High School, Elizabethtown, PA	<b>CBIO044</b>	<b>Investigating Cancer Mutations: Improving the Analysis of Cancer Data with Software</b> Caroline Cunningham, 17, Junior, Washington-Lee High School, Arlington, VA
<b>CBIO033</b>	<b>Identification of Dysregulated Pathways Unifying Neurodegenerative Disease</b> Ayush Noori, 16, Junior, Phillips Exeter Academy, Exeter, NH	<b>CBIO045T</b>	<b>Examining the Effectiveness of Convolutional Neural Networks for Determining Visual Fixation Using fMRI</b> Harrison Huang, 17, Senior, Erik Scarlatescu, 17, Junior, Roanoke Valley Governor's School for Science and Technology, Roanoke, VA

- CBIO046T** **Segmenting CT Slices: Optimizing Lesion Detection through Mask Region-based Convolutional Neural Networks**  
Nitish Dashora, 17, Junior,  
Liam Chen, 17, Junior,  
Olentangy Liberty High School, Powell, OH
- CBIO047** **Protein Function Inference via Artificial Intelligence: Predicting Cancer-Related Gene Functions**  
# Charles Strauss, 16, Junior, Los Alamos High School,  
Los Alamos, NM
- CBIO048** **Drugs to Defeat Diabetes: Comparing Diabetes Drug Treatment Efficacy after Metformin Using Big Data**  
Flavien Moise, 15, Freshman, Council Rock High School  
North, Newtown, PA
- CBIO049** **Classification of Full EEGs (Electroencephelograms) for Biometrics and Medical Applications through Machine Learning and AI**  
Sarvesh Babu, 15, Sophomore, duPont Manual High  
School, Louisville, KY
- CBIO050** **Development of an Efficient Radiobiokinetic Calculation Method Using Matrices and Vectors**  
David Joy, 18, Senior, Oak Ridge High School,  
Oak Ridge, TN
- CBIO051T** **A Web Based Mobile Healthcare System that Aims to Reduce Under 5 Child Mortality Rate (U5CM) and Maternal Deaths in Kenya: A Case Study Dadaab Refugee Camp**  
Supraja Sayee Srinivasan, 15, Sophomore,  
Kunjal Dhokiya, 15, Sophomore,  
Shree Cutchi Leva Patel Samaj School, Nairobi, Kenya
- CBIO052** **Retina: A Non-Invasive, Predictive Smartphone Application to Test for Cardiovascular Risk and Diabetic Retinopathy via Analysis of Cardiovascular Risk Factors and Retinal Fundus Images**  
Kasyap Chakravadhanula, 16, Sophomore, BASIS  
Scottsdale, Scottsdale, AZ
- CBIO053** **Discovery of Hidden Gene Regulators: A Novel Machine Learning Approach to Transcriptional Pause Site Determination**  
Anudeep Golla, 16, Junior, Fairview High School,  
Boulder, CO

## Earth and Environmental Sciences

- EAEV001** **Well-Being of Large Forest Ecosystems: Ask *Aphylloroid macromycetes***  
Ivan Artamonov, 16, Freshman, Municipal Lyceum #3, Sarov, Nizhny Novgorod Region, Russian Federation
- EAEV002** **The Effect of Salt Spray, Ungulate Fencing, and Soil Type on Coastal Plant Distribution and Abundance on the Kalaupapa Peninsula, Molokai**  
# Cameryn Rae Kahalewai, 17, Senior, Molokai High School, Ho'olehua, HI
- EAEV003T** **What Effect Do Local Factors (Lake Breeze, Industry, Topography, Harbor, and Weather) versus Regional Factors (Statewide Transport) Have on Ozone Levels in Duluth, Minnesota?**  
Payten Schneberger, 18, Senior, MacKenzie Brummer, 18, Senior, Cloquet Senior High School, Cloquet, MN
- EAEV004T** **Synthesis of Organic Pinene Pyrethrum Attractant for *D. frontalis***  
Andrew Schilling, 18, Senior, Cameron Snyder, 18, Senior, Jasper County High School, Monticello, GA
- EAEV005T** **An Analysis of Natural Soil Amendments Applied to Ryegrass and Switchgrass to Reduce the Effects of Road Salt**  
# Anna Prchal#, 18, Senior, Julianne Pankow#, 18, Senior, New Prague High School, New Prague, MN
- EAEV006** **Real-Time Sinkhole Detection Using Civil Engineering Techniques, the Internet of Things (IoT), and Artificial Intelligence**  
# Sophia Wang, 16, Junior, Amity Regional High School, Woodbridge, CT
- EAEV007** **Analyzing the Mitigating Effects of *Ipomoea aquatica* on the Kapakahi Stream at the Pouhala Marsh of Oahu**  
Brea Swartwood, 16, Junior, Mililani High School, Mililani, HI
- EAEV008** **What Can Lead Tell Us about Celtic Life? Tracing the Origin of Lead in Celtic Artifacts Using Mass Spectrometry**  
Vojtech Hybl, 19 Junior, Gymnazium Dr. Josefa Pekare, Mlada Boleslav, Stredocesky Kraj, Czech Republic
- EAEV009T** **Bioremediation of Tetracycline Polluted Soils: How Antibiotic Resistance Can Reduce Antibiotic Pollution in the Environment and a Solution to Groundwater Antibiotic Pollution**  
Sriya Teerdhala, 15, Freshman, Sanjana Hiremath, 15, Freshman, Plano East Senior High School, Plano, TX
- EAEV010** **The Role of Fluorescent Pigments in Protecting Zooxanthellae**  
Emma Wetsel, 16, Junior, Oregon Episcopal School, Portland, OR
- EAEV011** **Bioremediation of Wastewater - Effect of Algae in Bioremediation of Nitrate and Phosphate Content in Wastewater**  
Hrshika Roychoudhury, 14, Freshman, Ardrey Kell High School, Charlotte, NC
- EAEV012T** **The Effect of *Margaritifera margaritifera* on Nitrates in Hastings NE**  
Tyler Slechta, 16, Sophomore, Tristan Weston, 16, Sophomore, Adams Central Jr.-Sr. High School, Hastings, NE
- EAEV013T** **POLIPLASTIK: From Waste to a Sustainable Biopolymer**  
Cristian Lorenzo Aldana, 17, Junior, Alex Hernandez Gil, 16, Junior, Colegio de Bachilleres del Estado de Hidalgo, Actopan, Hidalgo, Mexico
- EAEV014T** **Analysis of the Concentration of Particles by Air Pollution due to the Port Activity in the Sector of the Bellamar Promenade in the District of San Antonio**  
Stephania Vergara, 15, Freshman, Valentina Osorio, 15, Freshman, Colegio Fenix, San Antonio, Chile
- EAEV015** **Water Quality Analysis of the Gulpha Creek Watershed**  
# Rachel Stall, 18, Senior, Arkansas School for Mathematics, Sciences and the Arts, Hot Springs, AR
- EAEV016** **Long-Term Visual Monitoring Revealed Importance of Sea Wind in Causing Sudden Showers in Japanese Mountain Basin**  
Aihisa Kamijo, 17, Junior, Matsumoto Fukashi Senior High School, Matsumoto-City, Japan
- EAEV017T** **Mobile Weather Station and Databank**  
Asli Dogu, 16, Sophomore, Berk Alaattin Bektemur, 15, Sophomore, Private Anabilim Anatolian High School, Istanbul, Turkey
- EAEV018** **Big Problem, Tiny Solution; Is Nanotechnology the New Oil Spill Clean Up Solution?**  
Maha Achour, 16, Sophomore, Bartlesville High School, Bartlesville, OK
- EAEV019T** **Effect of Acidity on Seed Germination of Selected Varieties of Paddy**  
Ramanayakage Senevirathna, 19, Senior, Hikkaduwa Denuwan Hashela, 18, Senior, Sandaradura Sachin De Silva, 19, Senior, Gnanodaya Maha Vidyalaya, Kalutara, Western Province, Sri Lanka
- EAEV020** **The Effect of Smoke on Farm Crops**  
Paige Lindsley, 18, Senior, Grangeville High School, Grangeville, ID
- EAEV021T** **Remote Heavy Rainfall from Tropical Cyclone**  
Chieh-Hsiang Fan, 18, Senior, Bo-Jhieh Hsiao, 18, Senior, The Affiliated Senior High School of National Taiwan Normal University, Taipei City, Chinese Taipei
- EAEV022T** **Potential Identification and Application of the *Rhizophora apiculata* and *Sonneratia alba* as a Bio Antifouling Agent for Antifoulant Paints**  
Wiratathya Putramas I Made, 17, Junior, Carolline Nggebu, 18, Senior, Denpasar 3rd State Senior High School, Denpasar, Bali, Indonesia

EAEV023	<b>Tracking Microplastics through a Food Chain to Determine the Effectiveness of Plastic Biodegradation in Mealworms</b>	EAEV033	<b>The Introduction of Different Nitrogen and Phosphorus Levels to Regulate Phytoplankton Growth in Aquatic Habitats</b>
##	Alyssa Rawinski, 18, Senior, Monte Vista High School, Monte Vista, CO		Amelia Cave, 16, Junior, Edward Douglas White Catholic High School, Thibodaux, LA
EAEV024	<b>Beetles Beware: Effects of Various Biopesticides on <i>Callosobruchus maculatus</i> Behavior</b>	EAEV034	<b>Brake Pad Dust Particulates on the Fertility and Vitality Rates of <i>Drosophila melanogaster</i></b>
	Adele Shirmer, 18, Senior, Susquenita High School, Duncannon, PA		Josie Westmoreland, 17, Junior, Odessa High School, Odessa, WA
EAEV025	<b>Investigating How Water Vapor Emission Impacts the Temperature of the Troposphere</b>	EAEV035	<b>Metals and Metalloids in Corn Detected with the Inductively Coupled Plasma-Mass Spectrometer</b>
	Annalisa Minke, 16, Junior, Immaculate Heart High School, Oro Valley, AZ		McKayla Gilbert, 16, Sophomore, Farmington High School, Farmington, NM
EAEV026	<b>Forest App: Redesign the Urban Landscape so Birds Will Return to San Jose, Costa Rica</b>	EAEV036	<b>Reducing Water Turbidity Using Natural Coagulant <i>Mangifera indica</i> (Valencia Pride Mango)</b>
	Luis Carlos Bustamante Leon, 19 Senior, Colegio Tecnico Don Bosco, San Jose, San José, Costa Rica	#	Gloria Park, 17, Senior, Pacific Horizons School, Pago Pago, American Samoa
EAEV027	<b>A Geochemical and Petrographic Analysis of Metamorphic Lithologies Proximal to the Cripple Creek and Victor Alkaline Diatreme Complex</b>	EAEV037T	<b>Utilizing Google Earth Engine to Retrieve the Devon Ice Cap's Equilibrium Line Altitude</b>
###	Jenna Salvat, 18, Senior, Coronado High School, Colorado Springs, CO		Kevin Zhou, 17, Junior, Peizhi Liu, 17, Senior, Troy High School, Troy, MI
EAEV028	<b>A New Experimental Approach for Study Metasomatism of Peridotite in the Earth's Mantle</b>	EAEV038	<b>Multidecadal Trends in Tropical Cyclone Behavior within Tropical North Atlantic Sub-basins</b>
	Tal Blonder, 16, Junior, Midrashiya Hartman, Jerusalem, Israel		Kelsey Ge, 17, Senior, Ward Melville High School, East Setauket, NY
EAEV029	<b>Optimizing Metformin HCl Removal: Utilizing Molecular Sieves and Absorbents within Sand Filtration Units</b>	EAEV039	<b>Bagasse Fibers Used in Construction</b>
#	James Licato, 16, Sophomore, Washington-Lee High School, Arlington, VA		Rabail Palijo, 15, Sophomore, PakTurk International Schools and Colleges, Gulshan-e-Iqbal Girls Campus, Karachi, Sindh, Pakistan
EAEV030	<b>Rock On: Limestone's Potential to Improve Water Quality in the Alamosa River Drainage</b>	EAEV040	<b>Effects of Gasoline on RGB Values of <i>Montipora capricornis</i> and <i>Pavona frondifera</i> Corals</b>
#	Amber Michel, 18, Senior, Monte Vista High School, Monte Vista, CO		Ainsley LaPlante, 18, Senior, Southwest Virginia Governor's School, Pulaski, VA
EAEV031	<b>Utilizing Native Hyper-Accumulators to Determine Efficient Methods for Heavy Metal Phytoremediation</b>	EAEV041	<b>Algal Bioplastics: Developing a Sustainable Cycle of Compostable and Water-Soluble Plastics by Repurposing Waste Products of Algal Biofuel Production</b>
	Sid Singh, 18, Senior, Alabama School of Fine Arts, Birmingham, AL	#	Melanie Quan, 16, Sophomore, Las Lomas High School, Walnut Creek, CA
EAEV032	<b>A Survey of Lichen Diversity in Fulton County OH Cemeteries and Spectrophotometric Analysis for Use as Air Quality Indicators, Year Two</b>	EAEV042	<b>Pretreatment of <i>Brassica rapa</i> with Pyrabactin Increases Tolerance to Drought Conditions</b>
	Carsyn Hagans, 15, Freshman, Archbold High School, Archbold, OH		Yuktha Chiguripati, 17, Junior, W. Tresper Clarke High School, Westbury, NY
		EAEV043	<b>Carbon Capture Using Solid Sorbents. CO<sub>2</sub>/N<sub>2</sub> Selectivity with Amine-Tethered Polystyrene and Polyacrylic Polymers</b>
		#	Glenn Grimmett, 17, Junior, American Heritage School of Boca Delray, Delray Beach, FL
		EAEV044	<b>Machine Learning Classifiers to Predict Red Tide in Florida</b>
		#	Marvin Li, 16, Sophomore, James M. Bennett High School, Salisbury, MD

EAEV045	<b>An New Estimate of Marine Ice under Amery Ice Shelf</b> Madeleine Maylath, 18, Senior, Chapin High School, Chapin, SC	EAEV056T	<b>Spotting Space Weather: Finding a Correlation between Kp Index and Error Magnitude</b> Elisabeth Peirce, 16, Junior, Deirdre Cross, 17, Junior, Elk Point Jefferson High School, Elk Point, SD
EAEV046	<b>Novel Unmanned Environmental DNA Collection Technique</b> Angelina Guerra, 17, Senior, Edgewood Junior Senior High School, Merritt Island, FL	EAEV057	<b>A Novel Method of Monitoring the Health of Our Global Fresh Water Supply Using DNA Barcoding of Chironomidae (Diptera)</b> # Sonja Michaluk, 16, Junior, Hopewell Valley Central High School, Pennington, NJ
EAEV047	<b>Evaluating Nano-Ferrofluid as a Technique for Microplastic Removal in Water</b> # Katie Lu, 18, Senior, Central High School, Springfield, MO	EAEV058	<b>Using a Collaborative Robot to Simulate How Topography Impacts Tornado Intensity</b> Joseph Walker, 16, Junior, Berks Catholic High School, Reading, PA
EAEV048	<b>Hydrothermal Synthesis and Treatment of Jadeite</b> Varvara Grigorieva, 17, Junior, School #1553 Named after V. I. Vernadskiy, Moscow, Russian Federation	EAEV059T	<b>The Bioaccumulation, Toxicity, and Electrical Discharge Plasma-Treatment of the Emerging Perfluorinated Contaminant, GenX</b> Uma Voley, 14, Freshman, Elizabeth Kinsey, 18, Senior, John T Hoggard High School, Wilmington, NC North Carolina School of Science and Mathematics, Durham, NC
EAEV049	<b>Large-Scale Field Testing of Stropharia Mycelium Buffer Strips for Harmful Algae Bloom Prevention, Year 5</b> ## Harshal Agrawal, 17, Senior, Dr. Ronald E. McNair Academic High School, Jersey City, NJ	EAEV060	<b>Achroia grisella as Effective Decomposers of Polyethylene</b> Haley Donovan, 17, Senior, Wetumpka High School, Wetumpka, AL
EAEV050T	<b>A Comprehensive Spatiotemporal Model for Interpolation of Tropospheric Fine Particulate Matter Concentration</b> Vayd Ramkumar, 16, Junior, Esmond Tsang, 16, Junior, Mississippi School for Mathematics and Science, Columbus, MS	EAEV061T	<b>Papainor: A Novel Eco-Friendly Organic Fabric Softener</b> Krisada Ooi, 15, Sophomore, Netaji Rao Murali, 15, Sophomore, Penang Free School, Penang, Malaysia
EAEV051T	<b>Excess Carbon Dioxide Compromises Shell Integrity, Reproduction, and Behavior in the Freshwater Gastropod <i>Melanoides tuberculata</i></b> Keith Kim, 18, Senior, Eric Suh, 18, Senior, The McCallie School, Chattanooga, TN	EAEV062	<b>Natural Air Filters</b> Dana Alkandari, 15, Sophomore, Qurtoba High School, Kuwait City, Kuwait
EAEV052	<b>Ash Me Again! Looking for U in All the Unusual Places at Golema Pest, Macedonia</b> Jialin Zhuo, 18, Senior, Bronx High School of Science, Bronx, NY	EAEV063T	<b>Eniac Se'avarador: Providing Safe Water for Agriculture Use</b> Farah Wadhihah Rosli, 16, Senior, Puteri Irdina Sofea Jazlan, Arif, 17, Junior, MRSM Tun Abdul Razak, Pekan, Pahang, Malaysia
EAEV053	<b>An Analysis of Microbial Reductions Methods for Lake Water</b> # Emerson Falk, 16, Sophomore, Hankinson Public School, Hankinson, ND	EAEV064	<b>Evaluating Severe Weather Prediction Methods from Thermodynamic Profiles</b> Maria Geogdzhayeva, 17, Junior, Hunter College High School, New York, NY
EAEV054	<b>Application of Biotechnologies for Receiving Nano-Dimensional Pigments</b> Oleg Zagorulko, 17, Junior, Belgorod Engineering Youth Boarding School, Belgorod, Russian Federation	EAEV065	<b>U-Pb Geochronology of Fluid Flow Events in the Barstow Formation, California</b> Ethan Sontarp, 17, Junior, Commack High School, Commack, NY
EAEV055T	<b>How Can We Make Local Plants Grow Well in Severe Environment?</b> Jihyun Kim, 14, Freshman, Huigyeong Kim, 15, Freshman, Jiwon Eom, 14, Freshman, Seokjeong Girls' Middle School, Yeongwol, Yeongwol, South Korea	EAEV066	<b>Saving Our Seas: A Solid Solution to Reducing Carbon Dioxide and Ocean Acidification</b> ## Alyssa Kemp, 17, Senior, Cavalier Public High School, Cavalier, ND
		EAEV067	<b>Thermodynamics: Analysis of Wildfire Ash, and the Melting Effect on Alaska's Mount Hunter</b> Leena Vyas, 17, Senior, Tippecanoe High School, Tipp City, OH



- EAEV068** **Sargassum's Impact on Ocean Acidification**  
## Vivian Pryor, 18, Senior, St. Andrew's Episcopal School, Ridgeland, MS
- EAEV069** **Evaluating the Impact of Coal Ash Pollution through a *C. elegans* Developmental Model**  
Mary Giles, 17, Junior, Roanoke Valley Governor's School for Science and Technology, Roanoke, VA
- EAEV070** **(H<sub>2</sub>O)h My!**  
# Mikayla Wolfe, 18, Senior, Tioga High School, Tioga, ND
- EAEV071** **The Effect of Carboxymethyl Cellulose on the Filtration Capabilities of Zebra Mussels**  
Jack Delli-Santi, 18, Senior, Lake Travis High School, Austin, TX
- EAEV072** **The Environmental Impact of Sodium in Nature**  
# Bryan Martinez, 17, Junior, Trenton High School, Trenton, ND
- EAEV073** **Sierra Streams: The Effect of Glacial Melt on Fall Flow**  
Ellery McQuilkin, 14, Freshman, Lee Vining High School, Lee Vining, CA
- EAEV074** **Solar Powered Arduino Based Deforestation Alert System (Device) for Real Time Forest Monitoring**  
Maryjoise Karla Buan, 16, Sophomore, Pangasinan National High School, Lingayen, Pangasinan, Philippines
- EAEV075** **Mapping Arsenic Movement due to Tsunami Events: Developing a Comprehensive Hot Spot Map of Arsenic Contamination in Wailoa State Park in Hilo, Hawaii**  
# Jared Goodwin, 18, Senior, Hilo High School, Hilo, HI
- EAEV076** **Augura: Flood Risk Prediction Using Machine-Learning and Geographic Information Systems**  
# Sagnik Anupam, 17, Junior, Delhi Public School, R. K. Puram, Delhi, New Delhi, India
- EAEV077** **The Implementation of a Novel Phosphate Device for the Mitigation of Harmful Algal Blooms**  
# Savio Le, 18, Senior, Holy Rosary Academy, Anchorage, AK
- EAEV078** **A Novel Arsenic Filtration System for Low-Income Families in Rural Bangladesh**  
Ishraq Haque, 16, Sophomore, Academic Magnet High School, North Charleston, SC
- EAEV079** **Tsunami Forecasting and Risk Analysis**  
Robert Strauss, 14, Freshman, Los Alamos High School, Los Alamos, NM
- EAEV080** **Induced Seismicity: Relationships between Earthquake Frequency and Magnitude to Saltwater Injection in Oklahoma Arbuckle Group**  
Skylar Gale, 18, Senior, Evergreen Senior High School, Evergreen, CO
- EAEV081T** **Absorb Heavy Metals from the Polluted Soil by Using Zeolite Till Reach the Required Value of Heavy Metals**  
Asmaa Abdel Salam, 17, Junior,  
Amany Abd El Khalik, 17, Junior,  
Dakahlia STEM School, Gamasa, Dakahlia, Egypt
- EAEV082** **Mitigation of Florida Red Tide (*Karenia brevis*) Blooms through Flocculation with Enhanced Local Sediments**  
# Mark Leone, 16, Junior, Estero High School, Estero, FL
- EAEV083T** **Biochar Filtrate: A Novel Solution to Lead Contamination through Adsorption**  
# Aris Zhu, 16, Sophomore,  
Shreya Tripathi#, 16, Sophomore,  
Hamilton High School, Chandler, AZ
- EAEV084** **Evaluating Pollution Concentrations with a Drone**  
Matthew Sparling, 15, Freshman, Penncrest High School, Media, PA
- EAEV085** **Water Recycling: The Effect of Soap Nut Grey Water on the Environment (Soil Microbiome, Year 4)**  
Shreya Ramachandran, 15, Sophomore, American High School, Fremont, CA

## Embedded Systems

- EBED001T** **Material Study with Carmen Sylva Spectrometric Device - CSSD**  
Ana Olteanu, 16, Sophomore,  
Alina Negraia, 16, Sophomore,  
Delia Eremia, 16, Sophomore,  
Carmen Sylva High School, Eforie Sud,  
Constanta, Romania
- EBED002** **Particulate Raindrop Analysis for More Accurate Storm Forecasts**  
Max von Wolff, 19 Senior, Megina Gymnasium Mayen,  
Mayen, Germany
- EBED003** **Natural Phenomena Early Warning System**  
# Aziz Hanafi, 15, Freshman, International School of  
Carthage, Tunis, Carthage, Tunisia
- EBED004T** **PALMIO: Assistive Insole with Reading and Monitoring of Orthopedical Information**  
Iuri Ataide, 18, Senior,  
Eduardo Marques, 17, Senior,  
Fundacao Escola Tecnica Liberato Salzano Vieira da  
Cunha, Novo Hamburgo, Rio Grande do Sul, Brazil
- EBED005** **Freeze Protected Vaccine Cold Box for Off-Grid Locations, Year Three**  
# Susanna Dorminy, 17, Senior, Sola Fide Home School,  
McDonough, GA
- EBED006T** **The Sensor Embedded Cane for the Visually Impaired**  
Terry Njogu, 17, Senior,  
Mary Kavuu, 17, Senior,  
Maryhill Girls' High School, Thika, Kiambu, Kenya
- EBED007** **Augmented Reality for Autism**  
Albert Manrique, 17, Junior, MAST at FIU Biscayne Bay  
Campus, North Miami, FL
- EBED008** **Development of an Autonomous Aerial Vehicle Using Computer Vision and Artificial Intelligence to Assist First Responders in Dangerous Situations**  
## Samuel Cadotte, 17, Senior, Kalaheo High School,  
Kailua, HI
- EBED009** **Is Your Smartphone Leaking? A Four Year Project**  
# Camila Rimoldi Ibanez, 16, Sophomore, Sebring High  
School, Sebring, FL
- EBED010** **Digitizing Marketing Collateral: An Alternative for Printing Large Quantities**  
Selen Qarajeh, 15, Sophomore, Al-Omaryah Schools,  
Amman, Jordan
- EBED011T** **Engineering a Portable, Low-Cost Refreshable Braille Display for Communication with the Deaf-Blind Population**  
Katelynn Salmon, 18, Senior,  
Josh Nakka, 17, Junior,  
Palmer Ridge High School, Monument, CO
- EBED012** **Engineering an Automated Chloramine Testing Device**  
Anna Morgan, 16, Sophomore, duPont Manual High  
School, Louisville, KY
- EBED013** **"Wand" for the Upper Limbs Limitations: A Voice and Motion Recognition Based Remote Control**  
Yuhan Xiao, 17, Junior, Beijing 101 Middle School,  
Beijing, Beijing, China
- EBED014** **Technological Aid for the Visually Impaired**  
Henrique Monaci de Pauda, 17, Junior, Escola  
Americana de Campinas, Campinas, Sao Paulo, Brazil
- EBED015T** **aWear: An Assistive Wearable System to Assist Nurses and Residents of Aged Care Homes**  
Mitchell Torok, 18, Senior,  
Ivy Brain, 19, Senior,  
Rosny College, Hobart, Rosny, Australia  
Launceston College, Launceston, Tasmania, Australia
- EBED016T** **SkyHound: A Low-Cost 3D Printed Autonomous WiFi Tracking Search Drone to Locate Missing Victims of Natural Disasters**  
Pooja Jain, 18, Senior,  
Neel Jain, 15, Sophomore,  
West Linn High School, West Linn, OR
- EBED017T** **Children's Monitoring and Safety in Indoor Environment**  
Manuel Antonio Correia Nunes, 18, Senior,  
Ruben Eduardo Freitas Vieira, 19, Senior,  
Vania Marisa Mendes Ferreira, 18, Senior,  
Escola Profissional de Felgueiras, Felgueiras, Portugal
- EBED018T** **Effects of a Battery Equalizer on a Solar Powered System**  
Jeremy Zimprich, 17, Senior,  
Nicholas Pratt, 17, Junior,  
Zachary Bennett, 17, Senior,  
Sonoran Science Academy Davis-Monthan, Tucson, AZ
- EBED019** **Portable Laser-Based Sensor for Low-Concentration Benzene Detection in Ambient Air**  
Bakur Madini, 17, Senior, Dar AlFikr Schools, Jeddah,  
Makkah, Saudi Arabia
- EBED020** **MADSA: Musical Accuracy Development Using Spectral Analysis**  
Cary Xiao, 15, Sophomore, Alabama School of  
Mathematics and Science, Mobile, AL
- EBED021T** **Frontiers of 5G: Sparse Adaptive Battery-less Ambient Backscatter Communication Networks**  
Jamil Ahmad, 17, Junior,  
Moaaz Akbar, 16, Junior,  
Clovis North High School, Fresno, CA
- EBED022** **Predicting and Monitoring Collision in Helmets Using Microcontroller and Sensor Array**  
Daniel Stara, 18, Senior, Aquinas Catholic Middle High  
School, David City, NE
- EBED023** **Oh No, Watch Out for the . . .**  
Kobi Robinson, 18, Senior, From the Heart Christian  
School, Suitland, DC

- EBED024T Alternative Communication Device for People with Amyotrophic Lateral Sclerosis**  
Evandro da Costa Junior, 17, Senior,  
Hillary Santos, 17, Senior,  
Saulo Curty, 16, Senior,  
Instituto Federal de Educacao, Ciencia e Tecnologia  
Baiano Campus Valenca, Valenca, Bahia, Brazil
- EBED025 Developing Three-Dimensional Spatial Cognition for the Visually Impaired Using Computational Depth Mapping and Vibro-Tactile Display**  
# Tyler Delargy, 17, Senior, Bangor High School,  
Bangor, ME
- EBED026 Safe Gas Regulator**  
Wahalamuni Udapola, 16, Junior, Sandalankawa Central  
College, Sandalankawa, North Western Province,  
Sri Lanka
- EBED027T BMCI-Net: A Novel Approach to Non-Invasive, Fully Mobile Prosthetic Control Using Robust Pattern Detection and Filtration of EMG and EEG Signals through Supervised Machine Learning**  
Divjot Bedi, 17, Junior,  
Rishabh Misra, 17, Junior,  
Thomas Jefferson High School for Science and  
Technology, Alexandria, VA
- EBED028T A Wearable Sensory Tactile Aid Device for Visually Impaired Individuals**  
Alexandria Mooney, 18, Senior,  
Isabel Vasquez, 17, Senior,  
Arkansas School for Mathematics, Sciences and the  
Arts, Hot Springs, AR
- EBED029 Virtual Laboratory: The Solution to Improving the Efficiency of Learning in High School**  
Hoang Khoi Do, 17, Junior, Kim Lien High School,  
Hanoi, Vietnam
- EBED030 SARFISH: Safety Alert for Rock Fishing**  
Isaac Heagney, 18, Senior, St Columba Anglican School,  
Port Macquarie, New South Wales, Australia
- EBED031 Doppler Radar Flash Flood Detector**  
# Ammon Wallace, 15, Sophomore, Salem Hills High  
School, Salem, UT
- EBED032 Ambient Computing Based Approach to Help in Device Diagnostics, Create Opportunities to Reduce Power Consumption and Carbon Footprint**  
# Sayli Bande, 15, Sophomore, JSS Public School,  
Bangalore, Karnataka, India
- EBED033T Multifunctional Orientation System**  
Inna Larina, 17, Junior,  
Nataliya Ivlieva, 17, Junior,  
University Lyceum No. 1511, Moscow, Russian  
Federation
- EBED034T Undocumented Instructions in Microprocessors**  
Vid Smole, 17, Senior,  
Urban Meznar, 17, Senior,  
Upper Secondary School of Electrical and Computer  
Engineering and Technical Gymnasium Ljubljana,  
Ljubljana, Slovenia
- EBED035T LIDAR-Based Navigational Aid for the Artificial Reconstruction of Facial Vision for the Visually Impaired**  
Luke Gardner, 17, Junior,  
Luke Suess, 17, Junior,  
Patrick Henry High School, Roanoke, VA  
Roanoke Valley Governor's School for Science and  
Technology, Roanoke, VA
- EBED036 Development of a Flexible Durometer Sensor for Improving Hardness Tactile Modality Using Piezoelectric Polymers**  
Carrie Hsu, 16, Junior, Herricks High School,  
New Hyde Park, NY
- EBED037T Arduino-Based Self-Guided Satellite Recovery System**  
Seungmin Shin, 16, Junior,  
Haneulbit Kim, 16, Junior,  
Bundang High School, Seongnam-si,  
Gyeonggi-do, South Korea
- EBED038T Safety and Communication Device for Motorbike**  
Isaac Olufunmiyi, 11, Freshman,  
Princess Ubazuonu-Christian, 12, Freshman,  
Doregos Private Academy, Lagos, West Africa, Nigeria
- EBED039 Students' Monitor and Anti-Kidnapping Device**  
Saddam Bakare, 15, Junior, Doregos Private Academy,  
Ipaja, West Africa, Nigeria
- EBED040T A Prototype for a Smart School Uniform to Manage Stress in Autistic School Children**  
Thuraya Khalid Saleh Al-Hajri, 16, Sophomore,  
Noora Hamad M. F. Al-Marri, 15, Sophomore,  
Al Wakra Secondary School for Girls, Al Wakra, Qatar
- EBED041 midiKEY: A Novel Low Cost Resistive Soft Crochet Stretch Sensor as Applied to a Wearable Bluetooth Keyboard Text Input Device**  
Amanda Shayna Ahteck, 17, Senior, Holmdel High  
School, Holmdel, NJ
- EBED042 The Integration System**  
Manar Salama, 16, Junior, Maadi STEM School for Girls,  
Cairo, Egypt
- EBED043T Laseric Messenger**  
Mostafa Hassan, 16, Junior,  
Omar Ayyad, 16, Junior,  
The Red Sea STEM High School, Hurghada,  
Red Sea, Egypt
- EBED044T Field Yield Revealed: Creating a Radar-Based System for Pre-Harvest Potato Yield Mapping**  
James Clinton, 17, Junior,  
Nathan Rockafellow, 17, Junior,  
Breck School, Golden Valley, MN
- EBED045T Essameter: A Noble Device for the Visually Impaired and the Deaf Learners for Measuring Length**  
Esther Anyanzwa, 18, Senior,  
Salome Njeri, 19, Senior,  
Keriko Mixed Day Secondary School, Nakuru,  
Rift Valley, Kenya

## Energy: Chemical

- EGCH001** **Al(III)-Mediated Ionic Conduction in New Abundant Metakaolin Solid Electrolyte for Safe, Efficient Power Grid Na-Ion Batteries**  
Alexander Kosyakov, 17, Senior, Greenwich High School, Greenwich, CT
- EGCH002** **Titanium Dioxide Nanoparticle Coatings May Be Used to Coat Solar Panels to Make Them Safer for Birds**  
Michael Li, 17, Senior, North Carolina School of Science and Mathematics, Durham, NC
- EGCH003T** **Optimizing and Fine-Tuning Electrode Pore Sizes Utilizing Varying Ratios of the Immiscible Polymer Blend PAN-PS for High Energy Density and Wide Temperature Range Supercapacitors**  
# Ashna Shah#, 18, Senior,  
Ashay Shah#, 18, Senior,  
Plano East Senior High School, Plano, TX
- EGCH004** **Alternative Energy: Harnessing the Power of Mud-based Microbial Fuel Cells**  
Neica Joseph, 17, Senior, North Miami Beach Senior High School, North Miami Beach, FL
- EGCH005** **Highly-dispersed Ni Supported by N-doped Carbon Derived from Silk for Electrocatalytic CO<sub>2</sub> Reduction**  
Shicheng Hu, 17, Junior, Shanghai Foreign Language School Affiliated to SISU, Shanghai, China
- EGCH006** **Nature-inspired Biomass Material: from Cr-containing Wastewater Purification to Efficient Energy Storage**  
# Yutong Wang, 17, Junior, The High School Affiliated to Renmin University of China, Beijing, Beijing, China
- EGCH007** **Garbage Fermentation Fuel Cell: Participant of Electricity Generation and Soil Pollution Control**  
Mian Affan Anwar, 16, Sophomore, Siddeeq Public School, Rawalpindi, Punjab, Pakistan
- EGCH008** **A Novel Method in the Fabrication of Dye-Sensitized Solar Cells Using Spin Coated Ordered Mesoporous Carbon as Effective Counter Electrodes**  
Jong Min Choi, 18, Senior, Hong Kong International School, Hong Kong, China, Hong Kong Special Administrative Region
- EGCH009** **Nutrient Manipulation in *C. moewusii* to Activate [Fe-Fe] Hydrogenase Reserves: A Continued Study in Increasing the Cost-Efficiency of Green Hydrogen Fuel Production**  
# Alexander Walker, 18, Senior, Patrick F. Taylor Science & Technology Academy, Westwego, LA
- EGCH010T** **Using Carbon Nanotubes to Create Flexible Fuel Cells**  
Nora Boumaraf, 15, Sophomore,  
Ayla Saeed, 15, Sophomore,  
Austin Peace Academy, Austin, TX
- EGCH011** **Biochar Technology: A Carbon-Negative Energy System**  
Vivian Chinoda, 17, Junior, Queen Elizabeth Girls' High School, Harare, Zimbabwe
- EGCH012T** **Second Generation Biofuel from the Reuse of Discarded Citrus Fruits**  
Claudia Santisteban Rodríguez, 15, Sophomore,  
Juan Armas Santisteban, 15, Sophomore,  
Benjamin Franklin, Ascope, La Libertad, Peru
- EGCH013** **Exploration Study of the Potential of Microalgae *Spirulina maxima* as a Source of Renewable Electric Energy Based on Dye Sensitized Solar Cell**  
Putu Diwyandaani Priyahita, 16, Junior, Denpasar 7th State Senior High School, Denpasar, Bali, Indonesia
- EGCH014** **The Effects of Temperature on Hydrogen Fuel Cell Efficiency**  
Vitor Therezo, 14, Freshman, Escola Americana de Campinas, Campinas, Sao Paulo, Brazil
- EGCH015** **Comparing the Glucose Concentration of Lignocellulosic Biomass Generated by Cellulase Across Six pH Buffers**  
Hope Gasvoda, 17, Junior, Big Sandy High School, Big Sandy, MT
- EGCH016** **Optimizing Bioethanol Production from Eastern Red Cedar Sawdust**  
Landon Estes, 17, Junior, Latta High School, Ada, OK
- EGCH017** **A Novel Approach to Renewable Energy: Light Stimulated Active Cation Transport Membrane via Covalent Modification with a Photoacid**  
## Matthew Fosdick, 17, Junior, Empire High School, Tucson, AZ
- EGCH018** **Flexible and High-Powered Supercapacitor from Low-Cost and Simple Building Method**  
# Brayden Noh, 17, Sophomore, Auburn High School, Auburn, AL
- EGCH019** **The Best Electrode Spacing for the Generation of Hydrogen as a Clean Energy Source**  
Gabriel Lopez, 16, Junior, Radians School, Cayey, Puerto Rico
- EGCH020** **Enhanced High-Performance, Rechargeable Aqueous Zinc Ion Batteries Using V<sub>2</sub>O<sub>5</sub>/PEDOT as a Cathode**  
Maryam Alshaikh, 18, Senior, Riyadh School for Boys and Girls, Riyadh, Saudi Arabia
- EGCH021** **Optimizing the Production of Biodiesel from Marine Algae Using Novel Carbonaceous Acid Catalysts**  
Aseel Bukhari, 16, Junior, KFUPM Schools, Dhahran, Eastern Province, Saudi Arabia
- EGCH022** **Fabrication of Light Responsive Super Capacitor for Energy Harvesting & Energy Storage Applications**  
Woud AlSadoun, 17, Junior, KFUPM Schools, Dhahran, Eastern Province, Saudi Arabia

- EGCH023 Landfills as Energy Bioreactors: Testing a Leachate Recirculation Technique for Optimization of Methane Recovery**  
Trevor Amarante, 18, Senior, Fowler High School, Fowler, CA
- EGCH024T FotoFlex**  
Valentin Rezsnyak, 19, Senior,  
Boris Cergic, 19, Senior,  
HTL Dornbirn, Dornbirn, Vorarlberg, Austria
- EGCH025 Improvement of Perovskite Solar Cell Efficiency through PLA Additive Induced Boundary Passivation with Application of Machine Learning in Crystal Image Analysis**  
Aum Upadhyay, 18, Senior, Interlake High School, Bellevue, WA
- EGCH026T Hybrid Battery: Super-Capacitor Electrode Combined of Mo<sub>6</sub>S<sub>8</sub> (Chevrel Phase) and Ti<sub>3</sub>C<sub>2</sub> (MXene)**  
Aviad Gvili, 17, Senior,  
Daniel Markovich, 17, Junior,  
Amit Kfar Batya, Ra'anana, Israel, Israel  
Tamar Ariel (Shapira) School, Netanya, Israel
- EGCH027 Discovery of FAZnF<sub>3</sub>, a Hybrid Organic-inorganic Perovskite for Photocatalytic Water Splitting**  
Kaiken Yang, 16, Sophomore, Thomas Jefferson High School for Science and Technology, Alexandria, VA
- EGCH028 The Effectiveness of Biomass in the Production of Biogas**  
Abner Gonzalez Hernandez, 17, Junior, Ramon Quinones Medina, Yabucoa, Yabucoa, Puerto Rico
- EGCH029T Application of Electrospun Poly(acrylic acid)-Platinum/Carbon Catalyst Ink to Optimize Polymer Electrolyte Membrane Fuel Cell Performance**  
Danielle Kelly, 18, Senior,  
Audrey Shine, 18, Senior,  
Friends Academy, Locust Valley, NY  
Plainview-Old Bethpage John F. Kennedy High School, Plainview, NY
- EGCH030 Perovskite Solar Cell: A Simple Hot Casting Method to Formulate High-quality, Lead-free, Sn-based Perovskite Films with Reduced Pinholes**  
Smriti Somasundaram, 14, Freshman, Olympia High School, Olympia, WA
- EGCH031 Effect of Grilling Time on the Generation of Benzo [a] pyrene in Meat Using Different Fuels**  
Pearl Mayilule, 15, Sophomore, Maphokwane High School, Phalaborwa, Limpopo, South Africa
- EGCH032 A Novel Process to Fabricate Stable Bipolar Membranes for the Next Generation of Hydrogen Fuel Cells**  
Nikhita Bontha, 14, Freshman, Hanford High School, Richland, WA
- EGCH033 Investigation of Thin-Film Silver as Top Electrode Material for Transparent Organic Solar Cells**  
Jing-Jing Shen, 17, Senior, Beachwood High School, Beachwood, OH
- EGCH034T The Effectiveness of Local Photosynthetic Aquatic Microorganisms in Biophotovoltaic Solar Cells**  
Ada Weaver, 15, Sophomore,  
Marli Cohen, 16, Sophomore,  
Brevard Senior High School, Brevard, NC
- EGCH035 Comparing Heat Production between Corn Oil, Beef Lard and Plastic-Based Diesel**  
Paulina Naydenkov, 16, Sophomore, Albuquerque Institute for Math and Science, Albuquerque, NM
- EGCH036T Novel Alternative Energy: Seawater Electric Generator Improved by the Catalyst from Waste Lard**  
Chawit Kaewnuratchadasorn, 18, Senior,  
Puttaranun Boonchit, 18, Senior,  
Putuchon Vongvorakul, 18, Senior,  
Kamnoetvidya Science Academy, Rayong, Thailand
- EGCH037 Supercapacitor Electrodes Synthesised from *Aquilaria malaccensis* Bagass**  
Ariff Haziq Ahmad Fahidin, 16, Junior, MRSM Langkawi, Kuah, Langkawi, Malaysia
- EGCH038T Green and High-Performance Supercapacitor Prepared by NiO Embedded Carbon and Nanocellulose from Corn Wastes**  
Chayutapon Punyaratyuenyong, 16, Sophomore,  
Methasit Tantiplubtong, 16, Sophomore,  
Mancharat Tangtrongkijcharoen, 16, Sophomore,  
Kamnoetvidya Science Academy, Rayong, Thailand
- EGCH039T Harnessing Energy Using Soil-Based Microbial Fuel Cells (MFC)**  
Ashvini Wickramasundara, 15, Freshman,  
Eshi Wickramasundara, 16, Junior,  
Manhattan High School, Manhattan, KS
- EGCH040 Alternative of Renewable Energy Resources Microbial Fuel Cells**  
Umut Atacan Pamuk, 18, Senior, Ankara Ozel Zafer Fen Lisesi, Ankara, Baglica, Turkey
- EGCH041 Utilizing a Modified Wastewater-Based Medium as a Feedstock for Engineered *Saccharomyces cerevisiae* to Biologically Produce Fatty Alcohols and Carboxylic Acids as Alternatives to Petrochemicals**  
Rajat Ramesh, 16, Junior, American Heritage School, Plantation, FL
- EGCH042 Z-Scheme Photocatalysis: A More Systematic Approach with  $\alpha$ -Fe<sub>2</sub>O<sub>3</sub>@Au@P-SiO<sub>2</sub>@Cu<sub>2</sub>O Nanostructure**  
#  
Laura Noronha, 16, Junior, Redlands High School, Redlands, CA
- EGCH043 Aluminum, Batteries, and Carbon**  
Jacob Zhao, 16, Sophomore, Bend Science Station, Bend, OR
- EGCH044T From Waste to Watts**  
Abdulrahman Mahmoud, 17, Junior,  
Abdulrahman Soliman, 16, Junior,  
6 of October STEM Egypt School, Giza, Egypt
- EGCH045T The Plasma Battery**  
Mustafa Kamal#, 17, Junior,  
Mohammed Hamagareeb, 15, Junior,  
Erbil Ishik Boys College, Erbil, Iraq

## Energy: Physical

- EGPH001 The Influence of Various Biological and Chemical Properties on the Efficiency of Nanocrystalline Solar Cells**  
Anna Skierska, 17, Junior, II Liceum Ogólnokształcące im. Mieszka I w Szczecinie, Szczecin, Zachodniopomorskie, Poland
- EGPH002T Generation of Giant Energy Using Nanomembranes**  
Daria Radu, 17, Senior, Alexandru Abrudan, 18, Senior, Mihai Viteazul National High School, Bucharest, Bucharest, Romania  
Tudor Vianu National High School of Computer Science, Bucharest, Romania
- EGPH003 Energy Through Wind Induced Oscillation: Investigating the Effectiveness of Various Oscillatory Amplification Methods of Polyvinylidene Fluoride Piezoelectric Strips when Applied to a Bladeless Wind Harvester as well as the Employment of Vortex Shedding Effects to Further Increase Oscillation**  
Junwei Tan, 15, Freshman, Florida Southwestern Collegiate High School - Lee Campus, Fort Myers, FL
- EGPH004T Rainergy**  
Reyhan Jamalova, 16, Sophomore, Zahra Gasimzade, 16, Sophomore, School No. 283, Baku, Azerbaijan  
Lyceum Named after Academician Zarifa Aliyeva, Baku, Azerbaijan
- EGPH005 It's Getting Hot in Here!**  
Gavin Baker, 16, Sophomore, Fleming Island High School, Fleming Island, FL
- EGPH006 Bamboo as a New Thermoelectric Material**  
Chih-I Luo, 18, Senior, Taipei Fuhsing Private School, Taipei, Chinese Taipei
- EGPH007 Harvesting the Blue Wave Energy by Circular Electromagnetic Generator**  
Kerui Yang, 17, Junior, Edina High School, Edina, MN
- EGPH008 A Green Nanotechnological Approach for Energy Efficiency and Conservation: Tungsten-Doped Vanadium Dioxide Thermochromic Smart Windows**  
Cynthia Chen, 17, Junior, Greenwich High School, Greenwich, CT
- EGPH009 What Material Is the Most Shocking?**  
Meghan Fox, 15, Freshman, Buena High School, Sierra Vista, AZ
- EGPH010 Determine the Efficiency of Novel Non-fullerene Acceptor Material in Organic Solar Cells**  
Masarah Ahmed Hussain, 17, Senior, Dar Al-Tarbia Al-Hadetha, Jeddah, Saudi Arabia
- EGPH011 Exploring the Effect of Vortex Generators on Boundary Layer Separation and Laminar Flow in a Venturi and Determining the Potential Improvement on Efficiency of Vertical Axis Wind Turbines (VAWTs)**  
Rachel Pizzolato, 15, Freshman, John Curtis Christian School, River Ridge, LA
- EGPH012T Optimization of High-Efficiency Organic-Inorganic Lead Halide Perovskite Solar Cells via a Novel Polycaprolactone Additive Pathway**  
Sirina Prasad, 17, Senior, Anisa Prasad, 17, Senior, Staples High School, Westport, CT
- EGPH013 Dual-Purpose Highway Turbine**  
Sadaf Naushad, 18, Junior, PakTurk International Schools and Colleges, Karachi, Sindh, Pakistan
- EGPH014 Sensory Solar Panels**  
Abigail Greenhalgh, 15, Sophomore, Georgetown Visitation Preparatory School, Washington, DC
- EGPH015 Solar Updraft Tower-Wind Turbine Hybrid: Maximizing Power Output through Vortex Shedding, Water Droplet Atomization and Arduino Servo Control Feedback Loop**  
# Rachel Spaulding, 18, Senior, Eastern High School, Louisville, KY
- EGPH016T Roadside Wind Converter**  
Lauren Singleton, 15, Freshman, Austin Kline, 15, Freshman, McMinn County High School, Athens, TN
- EGPH017 The Effect of Cadmium Telluride Thickness on the Current and Voltage Output of Thin-Film Solar Cells**  
Prashamsa Koirala, 14, Freshman, Ottawa Hills Junior/Senior High School, Ottawa Hills, OH
- EGPH018 3D Printed Dimpled Wind Turbine Blade Designs**  
Hunter Mashak, 18, Senior, Baker High School, Baker, MT
- EGPH019 Microlens-enhanced Flexible Gallium Arsenide Microcell Array for Low-cost, Roof-top Photovoltaics for Automobiles**  
# Kumaran Selva, 17, Junior, Clear Lake High School, Houston, TX
- EGPH020 "Harvesting Friction to Shine a Light": Study on the Transparent & Flexible Triboelectric Energy Harvesting Device Using Bilayer Graphene**  
Jihye Heo, 15, Freshman, Seoul International School, Seoul, Gyunggi-Do, South Korea
- EGPH021T Harnessing Energy from Random Vibrations Using the Triboelectric Effect: A Novel Approach**  
Stuti Lohani, 16, Senior, Aryaman Trivedi, 17, Senior, Amity International School, Noida, Noida, Uttar Pradesh, India  
Amity International School, Mayur Vihar, Delhi, New Delhi, Delhi, India
- EGPH022T Development of Novel Wind Turbines Hybridized between Permanent Magnet Disks and Additional Motor/Generator for Extending Operating Range and Enhancing Conversion Efficiency**  
Rungsiman Kulpetjira, 18, Senior, Jittapon Khajonpirom, 18, Senior, Phitsanulok Pittayakom School, Phitsanulok, Thailand

- EGPH023 Analytical Interpretations of Geophysical Fluid Mechanics in Coaxial Borehole Heat Exchangers and Respective Applications**  
Richard Lee, 17, Senior, Manhasset High School, Manhasset, NY
- EGPH024T SHOWPAM: System of High-efficiency Ocean Wave Power with Acoustic Metamaterial**  
Joonyoung Lee, 17, Senior,  
Mincheol Park, 18, Senior,  
Korea Science Academy of KAIST, Busan, Busan, South Korea
- EGPH025 Improving the Harnessing of Solar Energy Using a Hybrid Photovoltaic Thermal System**  
Hritik Mitha, 16, Sophomore, Bryanston High School, Johannesburg, Gauteng, South Africa
- EGPH026 The Transfer of Electricity Using Induction Coils**  
Keira Van Niekerk, 15, Sophomore, Northcliff High School, Northcliff, Johannesburg, Gauteng, South Africa
- EGPH027 Harnessing Renewable Power to Charge a Device**  
Chase Himschoot, 18, Senior, Salem High School, Salem, AR
- EGPH028T Approach to Reduce Reverberation Time of Korean Traditional Drum, Jang-gu**  
Su Bin Hwang, 16, Junior,  
Ji Hyun Hwang, 17, Junior,  
Jin Seo Park, 18, Senior,  
Ilsan Daejin High School, Goyang City, South Korea

## Engineering Mechanics

- ENMC001T Axial Flow Rotor to Remove Seeds' Appendages**  
Estefania Tomas, 19, Senior,  
Francisco Panadeiro, 19, Senior,  
Escuela Provincial Educacion Tecnica Numero 7,  
Intendente Alvear, La Pampa, Argentina
- ENMC002 Permanent Magnet Synchronous Motor with Innovative Stator-Rotor Structure to Extend Torque and Speed Range**  
Haosong Zhong, 17, Junior, Boren Sino-Canadian School, Jiangmen, Guangdong, China
- ENMC003 Unconventional Microaccelerometers for Nanosatellite-Specific Attitude Control Systems**  
Stefan Ursu, 17, Sophomore, Colegiul Nicolae Titulescu, Brasov, Brasov, Romania
- ENMC004 Drones: Reducing Risks and Encouraging Participation in an Emerging Field, Utilizing a Parachute Deployment System**  
William Dannelly, 15, Freshman, McIntosh High School, Peachtree City, GA
- ENMC005 The Effect of Varying Micro-Perforated Acoustical Tape on the Sound Intensity of a HVAC System Using a Scale Model and Two and Three Dimensional Modeling Software**  
# Abigail Smith, 16, Junior, Cloquet Senior High School, Cloquet, MN
- ENMC006 Automated Supplementary Greenhouse Lighting Controller**  
Rebekah Dorminy, 15, Sophomore, Sola Fide Home School, McDonough, GA
- ENMC007 Construction and Control of a Mobile Platform with Omnidirectional Drive**  
Vincent Voigtlaender, 19 Senior, Martin-Andersen-Nexo-Gymnasium, Dresden, Germany
- ENMC008 Development of a Sample Collector Device Able to Access Hard-to-Reach Areas Using a Hexacopter Drone**  
Gustavo Sanches, 17, Senior, Colegio Interativa de Londrina, Londrina, PR, Brazil
- ENMC009T SafeSwim: Lifesaving Swimwear that Makes You Swim Safe**  
Katrine Markoew, 19, Senior,  
Christian Kej, 19, Senior,  
Odense Tekniske Gymnasium, Odense, Fyn, Denmark
- ENMC010 Smart Nest for Birds**  
Guo Li, 14, Freshman, Beijing No. 166 High School, Beijing, China
- ENMC011 Using a Hybrid Rocket Engine to Create Controllable Lift**  
## Donald Martin, 18, Senior, Academics Etc., Lake Charles, LA
- ENMC012T AMSD (Autonomic Modular Scouting Drone): In Services for Society**  
Jakub Jurzak, 19, Senior,  
Szymon Stasik, 19, Senior,  
Liceum Ogolnoksztatcaae nr I im. Marii Sklodowskiej-Curie w Suchej Beskidzkiejm, Sucha Beskidzka, Malopolska, Poland
- ENMC013 Sweatshirt: Fabric Biofuel Cells for Energy Harvesting from Perspiration**  
Rohit Nemani, 17, Senior, Cox Mill High School, Concord, NC
- ENMC014 Development of a Fully Reusable and Autonomously Landing Suborbital Launch Vehicle**  
## Ryan Westcott, 17, Junior, Oregon Episcopal School, Portland, OR
- ENMC015 Simple Problem, Simple Solution: Backpack with Built-In Desk**  
Grayson Barron, 15, Freshman, John Curtis Christian School, River Ridge, LA
- ENMC016 Miniature Underwater Bridge Pier Cleaning Robot**  
# Jingke Hu, 18, Junior, Hangzhou Xuejun High School of Zhejiang Province, Hangzhou, China
- ENMC017 Portable Graphene Oxide Desalination**  
Marcus Schlauch, 18, Senior, Clear Brook High School, Friendswood, TX
- ENMC018 Zonal Differentiating Soundbar**  
Dylan Ryan, 18, Senior, Lyman High School, Longwood, FL
- ENMC019T Cracking Under Pressure**  
Bryce Goodin, 15, Sophomore,  
Colton McCullough, 16, Sophomore,  
Bartlesville High School, Bartlesville, OK
- ENMC020 Agriculture Soil Probe Rover**  
Tate Schrock, 15, Freshman, Arickaree School, Anton, CO
- ENMC021T Hybrid Rocket Engine**  
Caleb Chakmakjian#, 16, Sophomore,  
Wyatt Tyson, 16, Sophomore,  
Live Oak Classical School, Waco, TX
- ENMC022T The "iWheel": A Motorized Assisting Device for Manual Wheelchair**  
Yee Ting Ho, 19, Senior,  
David Ng, 17, Junior,  
Buddhist Wong Wan Tin College, Shatin, China, Hong Kong Special Administrative Region
- ENMC023T Improving Motorcyclist Safety: A New Helmet Integrity Monitoring Technology**  
Ronin Burke, 16, Junior,  
Jeremiah Elizabe, 16, Junior,  
College Park High School, The Woodlands, TX



- ENMC024 The Development and Application of Harvesting Kinetic Energy from Marine Fish**  
Huai-Pu Chen, 16, Junior, Keelung Municipal Anle Senior High School, Keelung City, Taiwan
- ENMC025 Bioinspired Submersible Dual Propulsion System: A Novel Approach to Ultra-Efficient Submarine Propulsion Utilizing Starting and Stopping Vortex Rings Mirroring Jellyfish Motion**  
## Rachel Seevers, 17, Senior, Paul Laurence Dunbar High School, Lexington, KY
- ENMC026 The Stability of an Aircraft Wing with Varied Winglets**  
Osman Warfa, 16, Sophomore, Burnsville High School, Burnsville, MN
- ENMC027 Reducing Wingtip Vortex by Adjusting Wingtip Angle: Experimental and Computational Analysis**  
William William, 17, Senior, Santa Laurensia Senior High School, Tangerang Selatan, Banten, Indonesia
- ENMC028 Doppler Effect in Circular Motion on an Angled Plane: Investigate How the Angle of the Plane of Rotation Influences the Shift in Frequency of a Wave Source**  
Yash Ramchandani, 18, Senior, United World College Red Cross Nordic, Flekke, Norway
- ENMC029 How Hard Are Welds?**  
Clayton Serna, 15, Freshman, Socorro High School, Socorro, NM
- ENMC030 Origami Paper Parachutes in HADR Operations**  
Natalie Yam, 17, Senior, Anglo-Chinese School (Independent), Singapore, Singapore
- ENMC031 Cubitum Viribus: How Does the Angle of Rotation of the Mechanical Arm Affect Torque and Load Capacity?**  
Ethan Vang, 17, Junior,  
Logan Hall, 17, Junior,  
Deepshay Ray, 17, Junior,  
Gresham High School, Gresham, OR
- ENMC032 An Innovative Hybrid Diffusion Burner Design for NO<sub>x</sub> Reduction in High Temperature Applications, Year Three of an Ongoing Study**  
## Brendan Crotty, 17, Junior, Hickory Hill Academy Homeschool, Muskogee, OK
- ENMC033 Determining the Drag Coefficient of the Falcon 9 Block 5 Rocket**  
Tyler Mapes, 17, Junior, Franklin High School, Portland, OR
- ENMC034 Is Amplification of Rays Better than Creating New Light Sources?**  
Usaid Ahmed, 14, Freshman,  
Ahmed Zafar, 15, Freshman,  
Generation's School, Karachi, Sindh, Pakistan
- ENMC035 Adaptive Elevation Device for Wheelchairs (AEWheelchair)**  
Hazel Bolanos Alfaró, 16, Junior,  
Daniela Murillo Rodriguez, 18, Junior,  
Roy Rojas Santamaria, 17, Junior,  
Colegio Científico de Costa Rica Sede San Carlos, San Carlos, Alajuela, Costa Rica
- ENMC036 Design and Engineering of a Cam-Based Infinitely Variable Transmission for Automotive Use**  
Anton Lok, 17, Junior,  
Steven Davis, 17, Junior,  
Palos Verdes High School, Palos Verdes Estates, CA
- ENMC037 Creation of an FDM 3D Printer Constructed Entirely by Parts Created with Additive Manufacturing Techniques**  
Brian Minnick, 15, Sophomore, Academies of Loudoun, Leesburg, VA
- ENMC038 Aerodynamic Bicycle**  
Christian Gasdaska, 17, Junior, Susquenita High School, Duncannon, PA
- ENMC039 EXFA on the Fly: Testing the In-Air Performance of the EXtended Flaps and Airbrakes (EXFA) System**  
Lucas Hung, 17, Junior, Home School, Miamisburg, OH
- ENMC040 Phase 3: A High-Performance Rowing Oar with Design Inspired by Biomimicry**  
Lucy Lake, 18, Senior, Barker College, Sydney, New South Wales, Australia
- ENMC041 Alternate Vehicular Traffic Direction System Utilizing Solar Energy**  
Sebastian Medina Maysonet, 15, Sophomore, Brigida Alvarez Rodriguez Mathematics and Science High School, Vega Baja, Puerto Rico
- ENMC042 Analysis of Laser Signal Disruption for Sensitive Compartmented Information Facilities via Oscillation of Reflecting Media**  
# Sharmi Shah, 17, Senior, Colonia High School, Colonia, NJ
- ENMC043 A Robotics Assistive Device Application in Minimizing Manibus Tremors and Persons Afflicted with Bradykinesia**  
Shaylee Stanger, 15, Freshman, Clearfield High School, Clearfield, UT
- ENMC044 Water Injection on the Gasoline Heat Engine**  
Joseph Kopka, 17, Senior, Saginaw Arts and Sciences Academy, Saginaw, MI
- ENMC045 Innovative Tree Branch Removing Device**  
Mohamed Zamny Ayyash, 16, Junior, Zahira College - Mawanella, Mawanella, Sabaragamuwa Province, Sri Lanka
- ENMC046 Prototype for Real-Time Hydration Monitoring Using BIA**  
Coral Lemasters, 16, Sophomore, Hilton Head Preparatory School, Hilton Head Island, SC

- ENMC047 MotorMate: A Multi-Terrain Device to Aid the Transport of Boat Outboard Engines**  
Jack Davies, 19 Senior, Ysgol Uwchradd Aberteifi, Cardigan, Ceredigion, United Kingdom
- ENMC048 Designing a Universal Liquid 3-Dimensional Printer Utilizing a Novel Liquid Transport System**  
Jeffrey Yu, 17, Senior, Roslyn High School, Roslyn Heights, NY
- ENMC049T Development of Predictive Software for the Engineering & Optimization of Reliable Rocket Components**  
# Ryan Pearson#, 16, Junior,  
Chad Brown#, 17, Junior,  
Woods Cross High School, Woods Cross, UT
- ENMC050 Art or Science? String-Bow Interactions on a Novel Optoelectronic Cello**  
Andrew Land, 16, Junior, Carlmont High School, Belmont, CA
- ENMC051 Saving Our Waterways: Autonomous Dissolved Oxygen Generation Vehicle**  
# Rohan Jakhete, 16, Junior, South Fork High School, Stuart, FL
- ENMC052T Warning Device to Alert Driver in Case a Child Is Forgotten within a Vehicle**  
Claudia Colon, 16, Sophomore,  
Natalia Herrera, 15, Sophomore,  
Colegio Evangelico Capitan Correa, Arecibo, Puerto Rico
- ENMC053 Increasing Scanning Range of MemS Mirrors for Endoscopic Optical Systems via Submersion in High Ri Fluids**  
Kevin Zhu, 17, Senior, Pine View School, Osprey, FL
- ENMC054 Welcome to "Sistance": A New Form of Base Communication for Deaf-Blind Children**  
Mackenzie Hunt, 17, Junior, New Tech Institute, Evansville, IN
- ENMC055T The Effect of Sweep Angle on a Wing's Lift Force**  
Thomas DeMasi, 15, Freshman,  
Stanley Chen, 15, Freshman,  
Michael Dubuisson, 15, Freshman,  
Boston Latin Academy, Boston, MA
- ENMC056 Pneumatic Cannon for Emergency Delivery of Light Goods over Short Distance**  
Egor Belashov, 16, Sophomore, Advanced Educational Scientific Centre, A. N. Kolmogorov Boarding School, Moscow, Moscow, Russian Federation
- ENMC057T Safety Zip**  
Jadon Miller, 15, Sophomore,  
Jamar Miller, 14, Freshman,  
Friendship Technology Preparatory Academy, Washington, DC
- ENMC058T A Continued Study of a More Realistic Solution to Refugee Housing Using the Isoperimetric Honeycomb Conjecture**  
# Samantha Davis#, 18, Senior,  
Alicia Kuhlmann#, 18, Senior,  
Bingham High School, South Jordan, UT
- ENMC059T eTouch Project: An Affordable Braille e-Reader with the Cloud-Based Digital Library for the Blind**  
Artem Laptiev, 19, Junior,  
Antonina Zakorchemna, 18, Senior,  
Fryeburg Academy, Fryeburg, ME
- ENMC060T Fungi Strength**  
Josie Gonzalez, 15, Freshman,  
Kallie Elam, 15, Freshman,  
Eastern Alamance High School, Mebane, NC
- ENMC061T Amphibious House Modeling to Overcome Flash Flooding Problem (Noah's Ark 2.0)**  
# Mandy Low, 17, Junior,  
Tzy Ying Tung, 17, Junior,  
Kai Wern Wong#, 17, Senior,  
Heng Ee High School, George Town, Penang, Malaysia
- ENMC062 Tru-Alert: A Smoke Alarm with Steam Sense Technology**  
Kelvin Du, 18, Senior, Newington College, Stanmore, New South Wales, Australia
- ENMC063 Modeling Mass Flow Distribution in a Multistage Rocket Concept Design**  
Albert Farah, 16, Junior, Medford High School, Medford, MA
- ENMC064 The Mini-Workstation for Astronauts Redefined**  
Darryl Previtor, 18, Senior, College Park High School, The Woodlands, TX
- ENMC065 Design and Numerical Analysis of a Novel Co-Flow Jet System to Improve the Lift, Range, and Fuel Efficiency of a Commercial Airline Wing**  
Hans Ehrnrooth, 18, Senior, Pine Crest School, Fort Lauderdale, FL
- ENMC066 A Research into and the Designing of the 'Ideal' Hydrofoils for a Laser**  
Tycho Melles, 18, Senior, Het 4e Gymnasium, Amsterdam, Noord Holland, Netherlands
- ENMC067T Ultrasonic Aided Cutter**  
Olayinka Ojuolape, 17, Junior,  
Favour Akintunde, 15, Junior,  
Zee Excellent Schools, Atan-Ota, West Africa, Nigeria
- ENMC068 Engineering a Low Cost, UV Crosslinking Hydrogel Bioprinter**  
Christian Knuth, 17, Junior, Sarasota High School, Sarasota, FL
- ENMC069 A Safer Pipeline Design**  
Brody LaRoque, 17, Junior, Trenton High School, Trenton, ND
- ENMC070 The Effect of Architectural Design on Supertall Building Flutter Acceleration**  
Allison Stocks, 16, Junior, Yorktown High School, Arlington, VA

- ENMC071 AccessO<sub>2</sub>: An Innovative, Non-Electric, Life-Saving, Oxygen Concentrator**  
Sanjit Thangarasu, 16, Sophomore, Poolesville High School, Poolesville, MD
- ENMC072T Avinocular: An Autonomous Mobile Robot for Aircraft Inspection**  
Su Fong, 15, Freshman,  
Hei I Lei, 15, Sophomore,  
Pui Ching Middle School, Macao,  
Macao, China, Macao Special Administrative Region
- ENMC073 Multi-Terrain Robot**  
Carter Gassler, 16, Sophomore, Avon Grove Charter School, West Grove, PA
- ENMC074 Saving One Child's Life at a Time**  
Elizabeth Newberry, 17, Junior, Jackson County High School, Gainesboro, TN
- ENMC075 Riding Revolution: Electric Skateboard Modifications**  
##  
Kieran Walter-Sundaram, 17, Junior, Good Hope Country Day School, Kingshill, United States  
Virgin Islands
- ENMC076 Aeronautics Science behind Airplanes**  
Tanatswa Musariri, 14, Senior, St. Johns Emerald Hill, Harare, Zimbabwe
- ENMC077T Fire Retardant**  
Ibraheem Saad Ismaiel Shakarchi, 16, Sophomore,  
Ayoob Mohammed Alaade, 14, Freshman,  
Baghdad Ishik Boys College, Baghdad, Iraq
- ENMC078 Bridge Design**  
Shouyu Du, 15, Junior, Agape Christian School,  
Saipan, Northern Mariana Islands
- ENMC079 Engineering Weighted 3D Printed Vests for Sea Turtles with Bubble Butt Syndrome**  
Gabriela Queiroz Miranda, 18, Senior, Minnetonka High School, Minnetonka, MN
- ENMC080T ESEG (Environment Saving Electric Generator)**  
Laith Hachim, 17, Junior,  
Omar Al-Bayati, 17, Junior,  
Kirkuk Cag Boys College, Kirkuk, Iraq
- ENMC081 How to Build a GEV: A Computational and Experimental Approach to the Design of Ground Effect Vehicles in the Modern World**  
Aidan Powers, 18, Senior, Perry High School,  
Chandler, AZ
- ENMC082T The Frozen Iron Machine**  
Israa Al Kindi, 15, Sophomore,  
Arwa Al Yahmadi, 16, Sophomore,  
Um Waraqah Al Ansaryah (8-10), Muscat,  
Mabeelah, Oman

## Environmental Engineering

- ENEV001** **A Holistic Engineering Plan Incorporating Predictive Data Modeling into the Process of Remediating Cyanophyta Algae Blooms and Applying Photoautotrophic Prokaryotes Biomass to Improve Agricultural Outcomes**  
Griffin Wagner, 17, Junior, Vero Beach High School, Vero Beach, FL
- ENEV002** **The Prototype of a Vehicle which Takes Preventive Measurement of Soil Conditions Autonomously**  
Piotr Lazarek, 18, Junior, Zespol Szkol Ogolnoksztalcacych Filomata, Gliwice, Slask, Poland
- ENEV003** **The Biodegradation of Styrofoam Using Invertebrates--The Third/Fourth Research: The Impact of Superworms (*Zophobas morio*) on the Biodegradation of Different Types of Styrofoam**  
Agata Momot, 19 Senior, I Liceum Ogolnoksztacace imienia Adama Mickiewicza w Stargardzie, Stargard, Wojewodztwo Zachodniopomorskie, Poland
- ENEV004** **Stepping Down into Cooler Water (Fountains vs. Waterfalls)**  
Zoe Diederich, 14, Freshman, Coral Reef Senior High School, Miami, FL
- ENEV005** **Biodegradability of 3D Engineered Polylactic Acid/Thermoplastic Polyurethane Ammunition**  
Joseph Orduno, 17, Junior, United High School, Laredo, TX
- ENEV006T** **Paper and Ink: An Alternative Strategy for Reusing Paper and Ink**  
Juan Delgado, 16, Junior,  
Jonathan Rodriguez, 16, Junior,  
Ismael Perdomo Borrero, Gigante, Huila, Colombia
- ENEV007T** **ReUse in Space: Waste Recycling on Interplanetary Stations** Lara Neubert, 19, Senior,  
Adrian Schorowsky, 19, Senior,  
Leni Termann, 19, Senior,  
Gymnasium Reutershagen, Rostock, Germany
- ENEV008** **The Impact of Soluble Calcium on Phosphate Uptake Efficiency of *Pistia stratiotes*** Emily Song, 16, Junior, Shanghai American School - Puxi Campus, Shanghai, Shanghai, China
- ENEV009** **Open-source, In-field Android and iOS Detection and Mapping of Waterborne Diseases via Time-Based Spectroscopic Sensing and RGB Luminance with a New 3D Printable Optical Interface**  
Nicholas Liu, 18, Senior, Greenwich High School, Greenwich, CT
- ENEV010** **Biodegradable Plastic Shoe Made from a Cornstarch and Glycerin-Based Plastic**  
Kailen Parks, 16, Sophomore, Dutchtown High School, Hampton, GA
- ENEV011** **Designing an Algae-Immobilized Membrane Bioreactor for Wastewater Bioremediation and High-Density Algae Production**  
##  
Min Tsou, 18, Senior, Mililani High School, Mililani, HI
- ENEV012** **Solar Energy Driven Membrane Distillation Process to Produce Fresh Water from Undrinkable Water**  
Claire Han, 14, Freshman, Pensacola High School, Pensacola, FL
- ENEV013** **Lowering the Level of Toxic Wastes in the Environment with the Use of Ionisation Principles**  
Nigar Bakhshaliyeva, 16, Sophomore, School-Lyceum 6, Baku, Azerbaijan
- ENEV014** **When Graphene Combines Cotton: Study on Synthesis of Adsorption Materials for the Removal of Marine Hazardous Chemicals**  
Yumeng Cheng, 16, Junior, No. 2 High School of East China Normal University, Shanghai, Shanghai, China
- ENEV015** **Agrobotics: An Autonomous Arduino Uno/Due Computer Vision Based Raspberry Pi High Throughput Plant Phenotyping Precision Agriculture Robot Using Dual Linear Mechanisms**  
Risha Dianne Valera, 17, Junior, Plano West Senior High School, Plano, TX
- ENEV016** **A Novel Environmentally Friendly Approach to Controlling Marine Growth Using Complex Ultrasonic Waveforms**  
#  
Isabela Perdomo, 16, Sophomore, MAST at FIU Biscayne Bay Campus, North Miami, FL
- ENEV017T** **Solar Water Disinfection and the Advanced Oxidation Process: Design of a Sustainable Water Treatment Process**  
##  
Helen Peng##, 18, Senior,  
Reggie Zheng, 16, Junior,  
Mississippi School for Mathematics and Science, Columbus, MS
- ENEV018T** **Filtration of Carbonic Acid Out of Water**  
Jack Maher, 17, Senior,  
Jasmine Narine, 18, Senior,  
Muskego High School, Muskego, WI
- ENEV019** **Self-Sufficient Micro and Macro Plastic Water Cleaning System**  
Joseph Enguidanos, 17, Junior, Niceville High School, Niceville, FL
- ENEV020T** **System of Retention and Transformation of Polluting Substances Generated by Gasoline Automobiles**  
Sarah Diaz Martinez, 19, Senior,  
Martin Morales Trejo, 18, Senior,  
Centro de Bachillerato Tecnológico Industrial y de Servicios No. 118, Corregidora, Queretaro, Mexico
- ENEV021** **A Novel Method to Alleviate the Water Crisis in Uganda**  
#  
Michael Chen, 16, Junior, Ridgeview High School, Orange Park, FL

ENEV022	<b>A Concrete Solution for Oyster Recruitment and Growth: Designing an Artificial Structure to Increase Oyster Shell Growth and Oyster Spat Settlement Using Calcite Media</b>	ENEV033	<b>The Effect of Bamboo Fiber on the Tensile Strength of Tapioca-Based Bioplastic</b>
#	Kyle Bramblett, 17, Junior, Titusville High School, Titusville, FL		Natalie Torres, 16, Junior, Central Virginia Governor's School for Science and Technology, Lynchburg, VA
ENEV023T	<b>Application of Engineered Natural Materials for Phosphorus Removal to Control Algae Blooms in Eutrophic Water with Insight into Chemical Mechanisms and Large-Scale Feasibility Analysis</b>	ENEV034	<b>Effective Utilization of Transparent Waste as Thermal Insulation for Heating and Energy Saving</b>
	Steven Wu, 18, Senior, Richard Zhang, 18, Senior, Clear Lake High School, Houston, TX		Farheen Shaikh, 13 Freshman, PakTurk International Schools and Colleges LUMHS Jamshoro, Jamshoro, Sindh, Pakistan
ENEV024T	<b>SUBURIFY</b>	ENEV035T	<b>Production of CFH Filter Using Discarded Chicken Feather and Cotton Fabric</b>
	Malek Aldebsi, 17, Junior, Abdallah Abusaleemeh, 17, Junior, Al-Hasaad Al-Tarbawi School, Amman, Amman, Jordan		Jiwung Lee, 18, Senior, Dohun Kim, 17, Senior, Taewon Eum, 18, Senior, Chung-Buk Science High School, Cheongju-Si, Chungcheongbukdo, South Korea
ENEV025	<b>Using Calcium Chloride to Source Drinking Water in Arid Climates: H<sub>2</sub>O Absorption and CaCl<sub>2</sub> Regeneration Rates in Relation to Desiccant Surface Area</b>	ENEV036	<b>Optimized Homemade Water Purification System: The Solution to the Worldwide Potable Crisis</b>
	Ryan Helmer, 15, Sophomore, Jefferson Montessori Academy, Carlsbad, NM	#	Jeancarlos Melendez, 18, Senior, Jose Rojas Cortes, Orocovis, Puerto Rico
ENEV026	<b>Power to the Plants</b>	ENEV037T	<b>The Implementation of Silver Nanoparticle Water Filtration Incorporating Ultraviolet Sterilization</b>
	Surabhee Eswaran, 16, Sophomore, Little Rock Central High School, Little Rock, AR		Madison Wiegand##, 17, Senior, Mackenzie Wiegand##, 17, Senior, Simms High School, Simms, MT
ENEV027	<b>SymBead Aquatic Technologies: The Development of a Low-Impact, Cost-Effective, Multi-Pollutant Bioremediation System</b>	ENEV038	<b>Combatting Lead Contamination Crisis Using Macrophytes</b>
#	Braden Milford, 17, Senior, Cascia Hall Preparatory School, Tulsa, OK		Austin Murray, 16, Sophomore, Brookland High School, Brookland, AR
ENEV028	<b>Collecting Moisture by Static Electricity</b>	ENEV039	<b>Removing Hydrocarbons/Organic Contaminants from Water Using a Novel Ultrahydrophobic/Oleophilic Self-Cleaning Polypropylene Material</b>
	Abdallah Omari, 16, Junior, Modern Systems School, Amman, Amman, Jordan		Abdullah Alsinan, 17, Junior, Dhahran Ahliyya School, Dammam, Eastern Province, Saudi Arabia
ENEV029T	<b>System of Capturing Carbon Dioxide in Factories and Transportation</b>	ENEV040	<b>Visible-light Responsive Multifunctional Membrane for the Separation of Oil-Water Mixtures and Simultaneous Water Decontamination Supported by Theoretical Models</b>
	Ammr Batarseh, 16, Junior, Omar Bakar, 16, Junior, Jerash Secondary School, Jerash, Jordan		Shouq Madani, 16, Junior, KFUPM Schools, Dhahran, Eastern Province, Saudi Arabia
ENEV030	<b>Portable Hydrogarden</b>	ENEV041	<b>Improving the Performance of WO<sub>3</sub> for the Photodegradation of Organic Dyes in Wastewater</b>
	Jana Algharaibeh, 15, Sophomore, International Academy - Amman, Amman, Jordan		Deemah Almulhim, 16, Junior, KFUPM Schools, Dhahran, Eastern Province, Saudi Arabia
ENEV031	<b>H2Go: A Construction and Analysis of a Novel Purification Device</b>	ENEV042	<b>Analysis of the Bioremediation Potential of the Microbial Communities Isolated from Termites "<i>Nasutitermes genus</i>" and Ruminants "<i>Capra aegagrus hircus</i>," in Selective Media and Bioassays of Carboxymethylcellulose (CMC) with <math>\beta</math>-D-Glucose, Phase II</b>
	Haneul Hyun, 16, Junior, Colleyville Heritage High School, Colleyville, TX		Jovangelis Gonzalez Del Toro, 17, Junior, Superior Vocacional Benjamin Harrison, Cayey, Puerto Rico
ENEV032T	<b>Development of Biodegradable Potato Starch-Based Biopolymers</b>		
	Olga Prosianchina, 18, Senior, Alexei Adamco, 17, Junior, Theoretical Lyceum Dimitrie Cantemir, Balti, Republic of Moldova		

- ENEV043T How Does Fertilizer Affect the Effluent of Agricultural Drain Tile in Fields?**  
Callie Berndt, 17, Senior,  
Lauren Sees, 17, Senior,  
Avon High School, Avon, SD
- ENEV044 Using Raw Bamboo Waste to Sustainably Purify Water**  
Akash Rathod, 18, Senior, Okemos High School,  
Okemos, MI
- ENEV045 The Solution to Pollution Is...Plastic? Accelerating Oil Spill Remediation by Using Polymer Exposure to Destabilize Emulsions**  
Zoe Gotthold, 16, Sophomore, Richland High School,  
Richland, WA
- ENEV046 Application of Microbial Fuel Cell Biosensors in Detecting Water Pollution**  
Anna Vargas, 16, Junior, Tabb High School,  
Yorktown, VA
- ENEV047 Graphene Sand Synthesis and Applications in Water Filtration and Desalination**  
Neha Narayan, 17, Junior, Salem High School,  
Canton, MI
- ENEV048 Repurposing Produced Gas Well Water as an Alternative Water Source for Agriculture, Year III**  
Mikailah Feinman, 15, Freshman, Primero Junior/Senior  
High School, Weston, CO
- ENEV049T 1.21 Gigawatts: Optimizing Electrical Efficiency to Improve Water Quality through Electrocoagulation, a Green Technology**  
## Matthew Trees##, 16, Junior,  
Garrett Guerrero##, 17, Junior,  
Trees Family Home School, San Angelo, TX  
Guerrero Home School, San Angelo, TX
- ENEV050T From Waste to Bioplastic: Sustainable Production of Bioplastic**  
Joao Pedro Silva Gomes, 18, Senior,  
Patricia Silva Cruz, 18, Senior,  
Maria Miguel de Castro, 18, Senior,  
Escola Secundaria Julio Dinis, Ovar, Portugal
- ENEV051 Cleaning Up the Environment from Plastic by Encapsulated Bacteria**  
Dmytro Solomianiuk, 17, Junior, Lviv Lyceum of  
Technology, Lviv, Ukraine
- ENEV052 The Use of Micellar Water to Aid Filtration of Oil-Based Contaminants in Pools**  
Bhuvna Murthy, 17, Senior, Huron High School, Ann  
Arbor, MI
- ENEV053T *Tenebrio molitor* as a Bioreactor for Synthetic Polymers Biodegradation**  
Patricia Varela Ferreira Silva, 18, Senior,  
Sophie Lenehan, 18, Senior,  
Ines Isabel Gomes de Oliveira, 18, Senior,  
Escola Secundaria Dr. Manuel Candeias Goncalves,  
Odemira, Baixo Alentejo, Portugal
- ENEV054 Improved Energy Production in Microbial Fuel Cells by Means of Organic Mediation**  
Sean Deresh, 17, Senior, Colegio San Ignacio de Loyola,  
San Juan, Puerto Rico
- ENEV055T Optimizing the Removal of Methylene Blue from Aqueous Solution Using *Cucurbita pepo* and an Analysis of Desorption Efficiency and Material Reusability**  
Serena Zhao, 16, Junior,  
Samantha Chen, 15, Sophomore,  
Manhasset High School, Manhasset, NY
- ENEV056T RICE.R. CO<sub>2</sub>: Raw Materials from Rice Husk to Capture CO<sub>2</sub>**  
Arianna Berardi, 17, Senior,  
Daniele Dalla Bona, 18, Senior,  
Matteo Pesarini, 17, Senior,  
Istituto Tecnico Industriale G. Omar, Novara, Italy
- ENEV057 An Interdisciplinary Approach to Deforestation and Lung Disease: Using Photovoltaic Systems to Build Low-Cost Solar Cookers**  
Aarthi Muthukumar, 17, Junior, Dublin High School,  
Dublin, CA
- ENEV058 Developing a Solution to Ocean Acidification Using Excess Carbon Dioxide from Power Plants with Nickel Nanoparticles**  
# Alexis Base, 18, Senior, Florida Atlantic University High  
School, Boca Raton, FL
- ENEV059 Photocatalytic Oxidation Utilizing Doped Titanium Dioxide for Air Purification**  
Adyant Shankar, 17, Junior, Nashua High School South,  
Nashua, NH
- ENEV060T SAMIS: Corn Cob to Replace Polystyrene, Year II**  
Amanda Maloste, 17, Senior,  
Jessica Burda, 17, Senior,  
Sesi College in Campo Largo, Campo Largo,  
Parana, Brazil
- ENEV061T ENDOPISO: Reusing *Cocus nucifera* Endocarp Wood to Produce Alternative Floors**  
Cibele Vasconcelos, 17, Senior,  
Nicolly Oliveira, 15, Junior,  
Escola Estadual de Educacao Profissional Julio Franca,  
Bela Cruz, Ceara, Brazil
- ENEV062 *Moringa oleifera* Seeds: A Solution to Eutrophication in Rivers and Lakes**  
Patricia Moreira, 19 Senior, SENAI Vila Canaa, Goiania,  
Goias, Brazil
- ENEV063T Key to Eliminating the Plastic Problem: Degradation of Polyethylene Plastic Using *Bacillus* sp. YP1 and *Enterobacter asburiae* YT1 from Wax Worm Gut**  
Grace Thompson, 18, Senior,  
Taeseung Um, 19, Senior,  
Travis Koenig, 18, Senior,  
Oviedo High School, Oviedo, FL

- ENEV064 Optimizing Thermal Hydrolysis for Increased Biogas Generation in Wastewater Treatment**  
# Rachel Joseph, 18, Senior, Somers High School, Lincolndale, NY
- ENEV065 An Application of Titanium Dioxide Coatings to Reduce Nitrogen Oxides**  
# Abigail Post, 15, Sophomore, Hankinson Public School, Hankinson, ND
- ENEV066 Novel Bioremediation of Plastic Straws and Cigarette Filters by Wax Worms (*Galleria mellonella*)**  
Roger Dezotell, 16, Junior, Ausable Valley Middle High School, Keeseville, NY
- ENEV067 SWARN: An ICT Based International Collaborative Business Model for Limiting Generation, Disposal and Ensuring Public Participatory Management of Waste**  
Rishu Kumar, 16, Junior, Jawahar Navodaya Vidyalaya, Vrindavan, West Champaran, Bettiah, Bihar, India
- ENEV068 Is Larvae the Solution to Decreasing Plastic Waste?**  
Kirstin Springer, 14, Freshman, Coral Academy of Science Las Vegas, Henderson, NV
- ENEV069 Fly Ash Sustainability: Transforming Dredged Soils into Construction Material**  
Aaban Syed, 15, Freshman, North County High School, Glen Burnie, MD
- ENEV070 Mechanism Leveraging eWaste to Enhance Water Condensation through Effective Use of Solid-State Magneto-Caloric Thermal Cooling**  
Soham Joshi, 14, Freshman, Columbus Academy, Gahanna, OH
- ENEV071 Designing a Solar Powered Ultrasonic Cyanobacteria Growth Inhibitor**  
Virginia Snyder, 17, Junior, Windsor High School, Windsor, VT
- ENEV072T Optimizing Hydrogels in Cosmetics: Creating Effective Self-Assembled Nanostructures Coupled with an Antioxidant-Rich and High SPF Pollution-fighting Soybean Oil Cream**  
Arvind Prasad, 15, Sophomore, Govind Nadathur, 16, Sophomore, Sycamore High School, Cincinnati, OH
- ENEV073 Eco-Friendly Insulator and Packing Material Using Natural Waste**  
Anusha N, 14, Freshman, St. Philomena Aided High School, Puttur, Dhaksina Kannada, India
- ENEV074T Modernize Packaging Mimic from Pill Millipede Integrated with Honeycomb**  
Kanyarat Samphan, 17, Junior, Jiranant Phoolsawat, 17, Junior, Chutinan Sriphetpool, 17, Junior, Suratpitaya School, Muang Suratthani, Suratthani, Thailand
- ENEV075T The Greenovation of Low-Cost Super-Adsorbent Polymer for Co-Treatment of Industrial Wastewater**  
Supaporn Klabklaydee, 18, Senior, Yutthapichai Aiadthum, 17, Junior, Princess Chulabhorn's College Nakhon Si Thammarat, Nakhon Si Thammarat, Nakhon Si Thammarat, Thailand
- ENEV076 Cilantro Leaf, Lead Relief: An Investigation into Which Form of Cilantro (Fresh Leaves, Fresh Stems or Dried Leaves) Is Most Effective in Removing Lead from Lead-Contaminated Water**  
Sophie Angus, 16, Junior, PLC Sydney, Sydney, NSW, Australia
- ENEV077 Autonomous Water Monitoring System**  
Olivia Arvanitis, 16, Junior, Meriden School, Strathfield, NSW, Australia
- ENEV078T Zero Lost Drop**  
Abdel Rahman Hanafy, 17, Senior, Salma Lateef, 18, Senior, STEM School of Alexandria, Alexandria, Egypt
- ENEV079 A Systems Dynamics Model Exploring the Continuous Biodegradation of Plastic**  
Kreesha Saha, 14, Freshman, West Lafayette Junior/Senior High School, West Lafayette, IN
- ENEV080 Pressure-Assisted Cryogenic Carbon Dioxide Extraction: A Novel Method of Carbon Sequestration**  
Zachary Schneider, 18, Senior, Saint Xavier High School, Louisville, KY
- ENEV081 Green to Clean: Algae – A Novel Method for Oil Spill Remediation**  
# Angelina Arora, 16, Senior, Sydney Girls High School, Sydney, NSW, Australia
- ENEV082T A Novel Computational Tool to Inform Cost-Effective Nutrition Interventions in Sub-Saharan Africa**  
## Lillian Petersen##, 16, Junior, Garyk Brixi#, 18, Senior, Los Alamos High School, Los Alamos, NM  
Winston Churchill High School, Potomac, MD
- ENEV083T A Suggestion for Optimal Fine Dust Removal Model Using Acoustic Levitation**  
Dohyun Kim, 18, Senior, Junsung Lee, 17, Senior, Sejong Academy of Science and Arts, Sejong, Chungcheong, South Korea
- ENEV084T Porous Xylem Plastic (P.X.P)**  
Chaerin Kim, 17, Senior, Yedam Lee, 17, Senior, Gahyeon Cho, 17, Senior, Boyoung Girls' High School, Dongducheon-si, Kyeonggi-do, South Korea
- ENEV085 Creating a Sustainable Engineering System for Urban Green Roof Drainage Irrigation via a Two-Way Heavy Metal Removal Mechanism Involving Photocatalytic Reduction and Phytoremediation**  
Jason Cho, 18, Junior, Fayetteville-Manlius High School, Manlius, NY

- ENEV086** **Designing an *in situ* Soil Conductivity Monitoring System for Precision Agriculture and Water Management**  
# Rohan Wagh, 17, Junior, Sunset High School, Portland, OR
- ENEV087** **Value-Added Sensors from Environmental and Industrial Waste**  
Ajlan Al-Kaabi, 17, Senior, Omar Bin Al-Khattab Secondary School, Doha, Qatar
- ENEV088** **Na/Ca/K Pollution Scrub: A Domestic Approach to Chemical Carbon Capture**  
Dimple Amitha Garuadapuri, 15, Freshman, Eleanor Roosevelt High School, Eastvale, CA
- ENEV089** **Water Is Right for Everyone**  
Yafa Jaradat, 16, Junior, Seir Secondary Girls School, Seir, Hebron, Palestine
- ENEV090** **Water Pollution Indicator**  
Fatima Qurie, 16, Sophomore, The Orthodox School of Bethany, Bethany, Palestine
- ENEV091** **Magnetic and Non-magnetic *Zea mays* L. Stalk Biochar Composites: Its Adsorptive Capability in the Treatment of Phosphate-Contaminated Aquaculture Ponds**  
Nathaniel Reyes, 16, Junior, Quezon National High School, Lucena City, Quezon Province, Philippines
- ENEV092T** **An E-Waste Management Initiative for Developing Countries: Using Acrylonitrile Butadiene Styrene, High Impact Polystyrene, Polypropylene, Polyvinyl Chloride, Rubber and Aluminosilicate Glass to Make a Composite Material**  
Harnil Jham, 14, Freshman,  
Isha Jobanputra, 15, Sophomore,  
Shree Cutchi Leva Patel Samaj School, Nairobi, Kenya
- ENEV093** **Mirror Reflecting Machine to Increase Solar Power**  
Camry Gach, 15, Freshman, Seabury Hall Upper School, Makawao, HI
- ENEV094** **Development of New Thermal Insulating Materials from Naturally Structured Materials**  
Roberts Jaunarajs-Janvaris, 19 Senior, Liepaja Rainis 6 High School, Liepaja, Kurzeme, Latvia
- ENEV095T** **Autonomous Real-Time Testing of *Escherichia coli* in Oak Creek Watershed**  
Arianna Comes, 18, Senior,  
Julie Larsen, 17, Senior,  
Red Mountain High School, Mesa, AZ
- ENEV096T** **An Industrial Water Quality Management System that Enhances Water Quality Monitory for Developing Countries**  
Mohana Varahabhatla, 14, Sophomore,  
Manav Patel, 15, Sophomore,  
Shree Cutchi Leva Patel Samaj School, Nairobi, Kenya
- ENEV097** **TLC – Tigernut Liquid Coagulant: An Undiscovered Biocoagulant for Water Turbidity Reduction**  
Sabrina Mogus, 14, Freshman, White Oaks Secondary School, Oakville, Ontario, Canada
- ENEV098** **OceanBioplas: The Plasticity of Marine Exoskeleton-Inspired Materials and Their Degradability in the Environment (Soil and Seawater/Saltwater)**  
Jacqueline Prawira, 14, Freshman, Mountain House High School, Mountain House, CA
- ENEV099T** **Activated Carbon Foam Surfaced Carbon Dioxide Scrubber with an Environmentally Sustainable Gas Purification System Using Bicarbonate Ions**  
Madison Nichols, 17, Senior,  
John Richardson, 18, Senior,  
Massanutten Regional Governor's School, Mt. Jackson, VA
- ENEV100** **Nature's Water Filters: The Impact of Temperature on the Filtration Efficiency of Mussels**  
Maria Karakousis, 14, Freshman, Julia Reynolds Masterman Laboratory and Demonstration School, Philadelphia, PA
- ENEV101T** **Finding the Optimal Way to Detect Rapid Ohia Death Utilizing Aerial Photography**  
Alexander Bell, 16, Sophomore,  
Nicholas White, 15, Sophomore,  
Evan Curry, 16, Sophomore,  
Kealakehe High School, Kailua-Kona, HI
- ENEV102T** **Automated Electrocoagulation Ozone Technology for Wastewater Treatment**  
Ahmed AlHammadi, 17, Senior,  
Sultan AlHammadi, 17, Senior,  
Applied Technology High School - Fujairah, Fujairah, United Arab Emirates



## Materials Science

- MATS001 Application of Biodegradable Polymer Materials Based on Manioc Starch in the Manufacture of Seedling Bags and Organic Fertilizers, Phase II**  
Lucas Zenni, 18, Senior, Colegio Estadual Jardim Porto Alegre, Toledo, Brazil
- MATS002T Complete Study of Viscosity Influence on the Heating Power of Superparamagnetic Nanoparticles**  
Alice Rousseau, 17, Senior,  
Marine Tellier, 17, Senior,  
Lucille Marin, 17, Senior,  
Lycee Polyvalent Marie-Louise Dissard Francoise, Tournefeuille, France
- MATS003 The Flash Shade: Directional Darkening Technology**  
Adrien Jathe, 17, Junior, Metropolitan School Frankfurt gGmbH, Frankfurt am Main, Germany
- MATS004 Glass Foams Obtained Using Solid Waste and Its Characterization**  
Maria Aparecida Da Silva, 19 Senior, Instituto Federal de Educacao, Ciencia e Tecnologia de Mato Grosso do Sul - Campus Corumba, Corumba, Mato Grosso do Sul, Brazil
- MATS005T GREENROAD Panel**  
Luis Rojas Lara, 18, Senior,  
Emilio Anguiano del Castillo, 18, Senior,  
Colegio Carol Baur, Queretaro, Mexico
- MATS006T Design and Formulation of Food Coating Based on Vegetable Waste**  
Montserrat Alva Brito, 17, Junior,  
Paula Roque Sanchez, 16, Junior,  
Preparatoria Oficial No. 19 San Martin De Las Piramides, San Martin de Las Piramides, San Martin de Las Piramides, Mexico
- MATS008 Flexible Polymer Electrolyte for All-Solid-State Lithium Batteries**  
Zihao Huang, 16, Junior, Shanghai Jianping High School, Shanghai, Shanghai, China
- MATS009 Novel Nanostructured Metal Powder by Simple Hot Water Treatment: An Economic and Sustainable Oil-Water Separation**  
## Anusha Bhattacharyya, 17, Senior, Little Rock Central High School, Little Rock, AR
- MATS010 Transparent Superhydrophobic Coating Using Nanoparticle Embedded Teflon**  
# Hetvi Shah, 16, Junior, Little Rock Central High School, Little Rock, AR
- MATS011 Year Two – Time of the Month: Bad for the Environment?**  
# Tykera Moore, 17, Senior, Rockdale Magnet School for Science and Technology, Conyers, GA
- MATS012 Get a Grip: Creating Soft Robotic Grippers via Self-folding by Infrared Activation**  
Ana Ratanaphruks, 17, Junior, Wake STEM Early College High School, Raleigh, NC
- MATS013T Atomic Engineering on Water Wetting: Life-Like Superhydrophobicity and Temperature Control**  
Xuechun Wei, 17, Sophomore,  
Hao Fang, 15, Sophomore,  
Beijing Zhongguancun High School, Beijing, Beijing, China  
Beijing 101 Middle School, Beijing, Beijing, China
- MATS014 Development of the Gypsum Board Materials Containing Eggshell Aiming at the Solution of Sick Building Syndrome**  
Taito Tanaka, 19 Senior, National Institute of Technology, Yonago College, Yonago-City, Tottori-Pref., Japan
- MATS015T Carbon Nanotubes in Future's Spacesuits**  
Tala Gammoh, 17, Freshman,  
Leen Salameh, 14, Freshman,  
Al Asriyya Schools, Amman, Jordan
- MATS016 Equus caballus Hair as a Suture Material: Hair Color as Related to Tensile Strength**  
Cecily Puckett, 16, Sophomore, Kamiah High School, Kamiah, ID
- MATS017 Novel Luciferase-Fluorescent Nanodiamond Assay for Cytotoxic Evaluation of Chemotherapy Drugs in Cancer and Mesenchymal Stem Cells**  
Shu-Yun Cheng, 17, Junior, Taipei Fuhsing Private School, Taipei, Chinese Taipei
- MATS018 Gold Nanoring Sensing Membrane Application for Hydrogen Peroxide Detection as Myocardial Marker Study**  
Gardin Muhammad Saputra, 17, Senior, Boyolangu 1st State Senior High School, Tulungagung, Tulungagung, East Java, Indonesia
- MATS019T Alternative Tessellation and Inner Cone Design for Helmets**  
Yunseo Ham, 19, Senior,  
Yunha Ham, 18, Senior,  
Peachtree Ridge High School, Suwanee, GA
- MATS020 Effectiveness of Detergents Analysed Using Rotating Magnetic Nanoparticles**  
Jovan Yap, 18, Senior, Dunman High School, Singapore, Singapore
- MATS021 Development of MicroCT Techniques for Quantifying Thrombus Formation in Cardiovascular Biomaterials**  
Avi Gupta, 17, Senior, Catlin Gabel School, Portland, OR
- MATS022 Acrylate Polymerization: Formation of UV-Curable Antimicrobial Copolymers**  
## Nathan Tidball, 17, Senior, Wilsonville High School, Wilsonville, OR
- MATS023T Graphene-Enabled Templating Synthesis of Metal Origami for Next-Generation Soft Robotics**  
Harish Kumaar, 18, Senior,  
Clive Choong, 17, Senior,  
Elden Yap, 18, Senior,  
NUS High School of Mathematics & Science, Singapore, Singapore, Singapore
- MATS024 Biodegradable Backlash**  
Hailey Kintz, 16, Junior, Guthrie Center High School, Guthrie Center, IA

- MATS025T** **Developing Honey-based Antibacterial Wound-healing Agents by Integrating Glucose Oxidase Enhancement with Pectin Hydrogels**  
Zhiyuan Li, 18, Senior,  
Rohan Parikh, 17, Senior,  
Academies of Loudoun, Leesburg, VA
- MATS026** **Using Grain Refinement to Improve the Corrosion Resistance and Mechanical Properties of A205-T7 Aluminum Alloy**  
Neil Dogra, 16, Sophomore, University School of Milwaukee, Milwaukee, WI
- MATS027T** **Zinc Oxide-Capped Carbon Nanoforest: Novel Method of Defects Engineering via Focused-Laser-Beam Modification**  
Zhong Wei Isaac Kwek, 17, Senior,  
Valerie Tan Yi Jie, 17, Senior,  
Dunman High School, Singapore, Singapore
- MATS028** **Magneto-Optical Modulation of Signals Using Colloidal Strontium Hexaferrite Nanoplatelets**  
Danila Deiankov, 17, Junior, Advanced Educational Scientific Centre, A. N. Kolmogorov Boarding School, Moscow, Moscow, Russian Federation
- MATS030** **Making a Bio-Polymer from Starch of a Sweet Potato (*Ipomea batata*) Baulegard Variety that Germinates Seeds**  
Gipsy Duran Araya, 16, Sophomore, Colegio Tecnico Profesional de Turrubares, Turrubares, San Jose, Costa Rica
- MATS031** **Novel Surface-Passivated CsPbCl<sub>3</sub> Perovskite Nanocrystals for UV-Photodetectors**  
Nora Aldossary, 18, Senior, Dhahran Ahliyya School, Dammam, Eastern Province, Saudi Arabia
- MATS032** **Direct Color Tuning of Pure CsPbBr<sub>3</sub> Nanocrystals as a Potential Material for LEDs with Bright Emissions**  
Faisal Aldabesh, 17, Senior, Manarat Al-Riyadh, Riyadh, Saudi Arabia
- MATS033** **Characterization of InGaN LEDs for Higher Efficiency Optical Devices**  
Arwa Albaltan, 18, Senior, Riyadh School for Boys and Girls, Riyadh, Saudi Arabia
- MATS034** **Improving the Efficiency and Stability of Perovskite-Based Photodetectors by Using 2D/3D Perovskite Single Crystals**  
Lena Alabdulwahab, 16, Junior, KFUPM Schools, Dhahran, Eastern Province, Saudi Arabia
- MATS035** **Thrombus-Directed Drug Delivery Systems for Targeted Fibrinolysis**  
Tejal Pendekanti, 16, Junior, Hathaway Brown School, Shaker Heights, OH
- MATS036T** **Superhydrophobic Textile**  
Matheo Munoz Bentancur, 16, Junior,  
Yuliana Yadira Morales, 17, Junior,  
María de la Paz Lopera, 17, Junior,  
Institucion Educativa Colegio Loyola para la Ciencia y a Innovacion, Medellin, Antioquia, Colombia
- MATS037T** **Development of in situ Fabrication Techniques of Martian Construction Material**  
#  
Cristian Rodriguez#, 18, Senior,  
Srikar Godilla#, 17, Senior,  
CREC Academy of Aerospace and Engineering, Windsor, CT
- MATS038** **Fabrication Optimization of Flexible 3D Micro-/Nano-structures for Potential Sensor Applications**  
Alice Cai, 16, Sophomore, Fayetteville High School, Fayetteville, AR
- MATS039** **Selective Phase Corrosion of Al-Cu Alloys to Fabricate Porous Metals**  
Natalia Arroyo, 16, Junior, CROEM HS, Mayaguez, Puerto Rico
- MATS040T** **Replacement of Synthetic UV-Absorbents by Lignin**  
Jan Matufka, 19, Senior,  
Peter Skripko, 19, Senior,  
Grammar School of St. Nicholas, Presov, Presovsky, Slovakia
- MATS041** **Development of a Modern Design for Roads and Highways Made from GFRC (Glass Fiber Reinforced Concrete)**  
Camilo Cordero-Correa, 18, Senior, The San Juan Math, Science and Technology Center, San Juan, Puerto Rico
- MATS042** **Using Self-Assembled Monolayers for the Fabrication of Implantable Strain Gauge Sensors**  
Justin Hu, 16, Junior, James Madison High School, Vienna, VA
- MATS043T** **Characterization of a Novel Method for the *in situ* Deposition of Silver Nanoparticles on 3D-Printed Polylactic Acid to Synthesize an Anti-Bacterial Implant Material**  
Anastasia Popova, 18, Senior,  
Isha Brahmhatt, 16, Junior,  
Hackley School, Tarrytown, NY  
Ardsley High School, Ardsley, NY
- MATS044** **The Universe in a Nutshell: Bacterial Cellulose Membrane Using Macadamia Byproduct**  
##  
Juliana Davoglio Estradioto, 18, Senior, Instituto Federal de Educacao, Ciencia e Tecnologia do Rio Grande do Sul (IFRS) - Campus Osorio, Osorio, Rio Grande do Sul, Brazil
- MATS045** **Lighting Up the Brain: Development of a Novel Molecular Probe for the Early, Minimally-invasive Diagnosis and Treatment of Alzheimer's Disease**  
Shaan Baig, 18, Senior, Dawson College, Montreal, Quebec, Canada
- MATS046** **Development of Piezoelectric Nonwoven Polymer Composites Fibers**  
Samya Ahsan, 17, Junior, UTRGV Mathematics and Science Academy, Edinburg, TX

- MATS047 Evidence of Gain in Cleaved Facet II-VI Quantum Well Structures through Photoluminescence Spectroscopy**  
Ange Louis, 18, Senior, Brooklyn Technical High School, Brooklyn, NY
- MATS049 Development of Optimal Microstructure Morphology in Organic Solar Cell Active Layer through Genetic Algorithm**  
Caine Ardayfio, 15, Sophomore, University High School of Indiana, Carmel, IN
- MATS050 Designing High-Performing, Low-Cost Shock Absorbing Composites for Injury Protection by Impregnating Woven Fabrics with Shear Thickening Fluids**  
Aaditya Saha, 15, Freshman, Chamblee Charter High School, Chamblee, GA
- MATS051 The Use of Chicken Feathers as Fibers in Fiber Reinforced Concrete**  
#  
Loulou Neff, 16, Sophomore, Elko High School, Elko, NV
- MATS052 Optical Damage to Irradiated Scintillators and Induced Optical Recovery Techniques**  
Jeffrey Li, 17, Junior, Gilman School, Baltimore, MD
- MATS053 Effect of Stationary Magnetic Fields on Zinc Oxide Nanowires**  
Liesel Robinson, 14, Freshman, Early Light Academy, South Jordan, UT
- MATS054 Honeycomb Structures as a Helmet Liner Material: Use of Artificial Neural Network Modeling to Predict Helmet Liner Safety for Known and Experimental Helmet Liner Materials**  
Garrett Blum, 17, Junior, University School, Chagrin Falls, OH
- MATS055 Carbonized Biofilms as a Green, Affordable Material for Water Purification and Pollutant Removal**  
William Hummel, 15, Freshman, Brookings High School, Brookings, SD
- MATS056 Aluminum SiO<sub>2</sub> Coated Optical Mirror Deterioration with Epoxy Resin**  
Shayla Wilhelm, 17, Junior, Portville Central School, Portville, NY
- MATS057T Bio-TiO<sub>2</sub> Nanoparticle-Impregnated Bacterial Cellulose for Water Treatment**  
Nicharee Pasuntaviroj, 17, Sophomore,  
Salisa Apiwatgaroon, 17, Sophomore,  
Kamnoetvidya Science Academy, Rayong, Thailand
- MATS058T Oil Absorbent Material Based on Natural Rubber**  
Punpom Sukjuntra, 17, Junior,  
Apisara Chaisawat, 17, Junior,  
Demonstration School of Prince of Songkla University, Mueang Pattani, Pattani, Thailand
- MATS059T Novel Membrane for Wound Dressing Applications**  
Fares Fathy, 17, Junior,  
Ganna Allah Khedr, 17, Junior,  
STEM School of Alexandria, Alexandria, Egypt
- MATS060 Smart ComBoo Using Nanofillers for Aerospace Structural Applications**  
Yan Nian Chok, 16, Senior, Sekolah Menengah Abdul Rahman Talib, Kuantan, Malaysia
- MATS061 Preparation of Nanostructured Silicon with Optimal Optical Parametres**  
Amelie Shakim, 16, Sophomore, Nazarbayev Intellectual School of Physics and Math, Almaty, Kazakhstan
- MATS062 A Novel 3D-Printing Methodology of Inverse Opals from Free-Standing Crystalline Structures for Next-Generation Optical Sensing**  
#  
Benjamin Liu, 17, Senior, Arcadia High School, Arcadia, CA
- MATS063T Implementation of Hydrophobic Surface by Simulating Microstructure of Bird Feathers**  
Yurim Kim, 17, Junior,  
Jun Hyeok Sim, 17, Junior,  
Chanjoo Lee, 18, Junior,  
Changwon Science High School, Changwon-si, Gyeongsangnam-do, South Korea
- MATS064T Hibla: An Alternative Sound Absorption Material**  
Shaira Gozun, 18, Junior,  
Neil David Cayanan, 17, Junior,  
E'van Relle Tongol, 16, Sophomore,  
Angeles City Science High School, Angeles City, Pampanga, Philippines
- MATS065 Novel Graphene Nanoplatelet and Ketjenblack Embedded Pigmentless Acrylic Emulsions for Next Generation Flexible Electronics**  
#  
Daniel Kang, 17, Junior, John F. Kennedy High School, Tamuning, Guam
- MATS066T Gas Sensor Research Based on Insect Wing Hierarchical Microstructure**  
Man Lei Lam, 19, Senior,  
Zheng Zhong, 18, Senior,  
Escola De Aplicacao Anexa A Universidade De Macau, Macao, China, Macao Special Administrative Region
- MATS067 Manufacturing Thermally and Mechanically Enhanced Concrete Bricks Using Glass Waste and Reducing Building Energy Consumption** Saif Jabari, 15, Sophomore, Al Hussein Bin Ali Secondary School, Hebron, Hebron, Palestine
- MATS068 Facilitating Emergency Thermal Protection via an Integration of Materials Augmented by an Endothermic Process**  
#  
Nicholas Perez, 17, Junior, Temescal Canyon High School, Lake Elsinore, CA
- MATS069T Egg Shell Plaster**  
Muhammad Syukur Amin Mohd Badrulsham, 16, Junior,  
Muhammad Alif Haidar Ahmad Khalil, 16, Junior,  
Mohamad Firdaus Danial Anuar, 12, Junior,  
Penang Free School, Penang, Georgetown, Malaysia
- MATS070 Tardigrade Mech: Boron Nitride Nanotube Composites for Space Radiation Protection**  
##  
Arielle Ainabe, 18, Senior, Garth Webb Secondary School, Oakville, Ontario, Canada
- MATS071T HemaDrop: A Novel Elemental Composition Technology for Microliter-Size Blood Droplets via Solid State Techniques**  
Nikhil Suresh, 16, Sophomore,  
Saaketh Narayan, 18, Senior,  
BASIS Scottsdale, Scottsdale, AZ

- MATS072T Throw It: A Separation System to Synthesize Biodegradable Plastic from Organic Wastes and Plastic Concrete from Plastic Wastes**  
Omar Sayed, 18, Senior,  
Ahmed Elsayed, 17, Senior,  
6 of October STEM Egypt School, Giza, Egypt
- MATS073 Biofabrication of 3-Dimensional Polymeric Hydrogels for Tissue Regeneration Scaffolds and Delivery Devices**  
Naisha Chowdhury, 15, Freshman, Pleasant View School, Memphis, TN
- MATS074 Developing a Bacterial Cellulose and Kombucha Tea Waste Product-Based Scaffold with an Integrated Oxygen Generating Construct for Islet Cell Transplantation**  
Angelin Mathew, 16, Sophomore, American Heritage School, Plantation, FL
- MATS075 Heat Loss through a Wall Made with Optimum Insulating Bricks**  
Isha Mohapatra, 18, Senior, Moravian Academy, Bethlehem, PA
- MATS076 The Effect of Bentonite Clays and Nanoclays on the Fresh and Hardened Properties of Cement and Concrete for Applications in 3D Cement Printing (3DCP)**  
Iyinoluwa Tugbobo, 17, Senior, Elmont Memorial Junior-Senior High School, Elmont, NY
- MATS077T Refushields**  
Dhabia Alhosani, 17, Senior,  
Reem Alhajeri, 18, Senior,  
Aamena Almarzooqi, 17, Senior,  
Al Mawaheb School, Abu Dhabi, United Arab Emirates
- MATS078T Tougher Boats Made from Local Fiber**  
Hamad Alyammahi, 17, Senior,  
Waleed Alnaqbi, 17, Junior,  
Hussain Abdelnabi, 16, Junior,  
Secondary Technical School - Fujairah,  
Fujairah, United Arab Emirates

## Mathematics

- MATH001** **Evaluation of the Complexity of Fully Homomorphic Encryption Schemes in Implementations of Programs**  
Dimitar Chakarov, 17, Junior, Model High School of Mathematics "Akademik Kiril Popov", Plovdiv, Bulgaria
- MATH002** **Testing Chebyshev's Bias for Prime Numbers Up to  $5 \cdot 10^{15}$**   
Andrey Shchebetov, 18, Junior, Lomonosovskaya School, Moscow, Russian Federation
- MATH003** **Optimal Bounds for a Gaussian Arithmetic-Geometric Type Mean by Quadratic and Contraharmonic Means**  
Junxuan Shen, 16, Junior, Hangzhou Foreign Languages School, Hangzhou, Zhejiang, China
- MATH004** **New Proofing Method with Syllogism**  
Zamin Huseynov, 16, Junior, Baku European Lyceum, Baku, Absheron, Azerbaijan
- MATH005** **The Mathematical Method to Construct Time-distance Maps for Analyzing Transportation and Economy**  
Peiru Xu, 18, Senior, High School Affiliated to Fudan University, Shanghai, China
- MATH006** **Analysis of the Error Convergence and Efficiency of Numerical Quadrature Algorithms for Approximating Different Integrals**  
Raphael Brosula, 17, Senior, Strawberry Crest High School, Dover, FL
- MATH007T** **The Mathematical Correlations in an Origami Coiled Structure**  
## Drake Ludgate##, 18, Senior,  
Nathaniel Miner##, 17, Senior,  
Brush High School, Brush, CO
- MATH008** **Predicting Short Term Equity Price Change Using Internet Search Trends Valence Data**  
### Benjamin Weiss, 18, Senior, Kalaheo High School, Kailua, HI
- MATH009** **Implementing EconoPhysics to Predict Mixed Migration**  
Brendan Alam, 17, Junior, College Park High School, The Woodlands, TX
- MATH010** **Geodesics in the Discrete Heisenberg Group**  
Ruslan Magdiev, 17, Junior, School 564, St. Petersburg, Russian Federation
- MATH011** **On Stallings Geodesic Braids Conjecture**  
Geidar Mamedov, 18, Junior, School 564, St. Petersburg, Russian Federation
- MATH012T** **Geometric and Algebraic Properties of Twin Groups**  
Daniil Kudriavtsev, 17, Junior,  
Aleksei Krivovichev, 17, Junior,  
School 564, St. Petersburg, Russian Federation
- MATH013** **Applied Mathematical Modeling of Continuous Dynamic Systems of Fluids in Pipe Flows**  
Anne DeForge, 17, Senior, Liberty High School, Hillsboro, OR
- MATH014** **Finding Chebyshev-Type Functions**  
Zong-Hong Cheng, 17, Senior, The Affiliated Senior High School of National Taiwan Normal University, Taipei City, Chinese Taipei
- MATH015** **Construction of a Conformal Mapping: Glitter**  
Callen Gast, 18, Senior, Arkansas School for Mathematics, Sciences and the Arts, Hot Springs, AR
- MATH016** **Generating Set for Nonzero Determinant Links under Skein Relation**  
Aayush Karan, 17, Senior, University School of Milwaukee, Milwaukee, WI
- MATH017** **On the Application of Heat Diffusion across a Manifold for Dimensionality Reduction**  
John Piwinski, 16, Sophomore, BASIS San Antonio Shavano Campus, San Antonio, TX
- MATH018** **Geodesic Lines on Archimedean Solids**  
Stepan Akinshin, 15, Freshman, Moscow South-Eastern School Named After V. I. Chuikov, Moscow, Russian Federation
- MATH019** **Analysis of Pythagorean Triples and a Generating Formula**  
Hector Lugaro, 15, Freshman, Centro Residencial de Oportunidades Educativas de Mayaguez, Mayaguez, Puerto Rico
- MATH020** **Loop Spaces, P-Curvature, and Homotopy**  
## Daniel Santiago, 17, Junior, Centro Residencial de Oportunidades Educativas de Mayaguez, Mayaguez, Puerto Rico
- MATH022** **Performance of Quantum-Inspired Matrix Completion: The Impact of Sampling Strategies**  
Sophie Lu, 16, Sophomore, Centro Residencial de Oportunidades Educativas de Mayaguez, Mayaguez, Puerto Rico
- MATH023** **Applications of Hyperdimensional Linear Algebra and Complex Analysis**  
James Baker, 18, Senior, Choctawhatchee High School, Fort Walton Beach, FL
- MATH024** **Classifying Quaternion Identities**  
# Theodore Ehrenborg, 17, Senior, Henry Clay High School, Lexington, KY
- MATH025T** **On the Largest Axes-Parallel Rectangle among Points in a Square**  
Taeyang Park, 16, Sophomore,  
Seo Yeong Kwag, 16, Junior,  
Peddie School, Hightstown, NJ  
Blair Academy, Blairstown, NJ
- MATH026** **Classifying Magic Squares and Their Associated Symmetries Using a Chord Diagram Approach**  
## AnaMaria Perez, 17, Junior, Albuquerque Academy, Albuquerque, NM

- MATH027 Analysis of ADHD among School Students**  
Yuansong Wang, 18, Junior, Stevenson School, Pebble Beach, CA
- MATH028T Jump Return Problem on the Circle**  
Pin-Hsien Yang, 17, Senior,  
Wei-Lun Chang, 17, Senior,  
National Feng-Shan Senior High School,  
Kaohsiung City, Taiwan
- MATH029 An Analysis of Growth Rates in One-Dimensional Cellular Automata**  
Jared Bank, 17, Senior, Half Hollow Hills High School East, Dix Hills, NY
- MATH030 The Bilman-Trogon Inverse Scattering Transform for the Toda Lattice**  
Mitchell Smith, 18, Senior, Eleanor Roosevelt High School, Greenbelt, MD
- MATH031 Are MVPs Really the Most Valuable Players?**  
Chase Hartsell, 17, Junior, Lakeside High School, Hot Springs, AR
- MATH032 Dynamics of the Tangent Map**  
Andrei Mandelshtam, 15, Sophomore, University High School, Irvine, CA
- MATH033 A New Rule on Divisibility by  $(c - 1) \cdot c^k$  and Its Application in Cryptology**  
Ibrahim Muhammed Cevik, 18, Senior, Tofas Fen Lisesi, Nilufer/Bursa, Turkey
- MATH034 Solving a Cryptography Problem Using the Master Pyraminx**  
Alexander Zhang, 14, Freshman, Lynbrook High School, San Jose, CA
- MATH035T Convex Hull of Intersection of Conic Sections and Random Points**  
Kanyawee Kamkongkaew, 18, Senior,  
Methat Phophli, 18, Senior,  
Chutipphan Charoensuk, 18, Senior,  
Princess Chulabhorn Science High School Phetchaburi, Cha-Am, Phetchaburi, Thailand
- MATH036 The Study of Moment of Inertia of any Polyhedron by the Use of Mass Projection of the Polyhedron**  
Phurich Teerakosone, 17, Junior, Nakhon Sawan School, Nakhonsawan, Thailand
- MATH037T Private-Key Cryptosystem Using  $p \times p \times p$  Rubik's Cube Group**  
Pasawat Viboonsunti, 18, Senior,  
Sirada Rungruengsakorn, 18, Senior,  
Kamnoetvidya Science Academy, Rayong, Thailand
- MATH038 A Trust Model in Bootstrap Percolation**  
# Rinni Bhansali, 18, Senior, Half Hollow Hills High School East, Dix Hills, NY
- MATH039 Modifying the Tau-Value to Better Approximate Player Value in Cooperative Games**  
Joseph Melkonian, 18, Senior, Paul D. Schreiber High School, Port Washington, NY
- MATH040 Predictive Analytics Algorithm for the Health System**  
Alanis Perez-Montalvo, 14, Freshman, Escuela Especializada en Ciencias, Matematicas y Tecnologia, Caguas, Puerto Rico
- MATH041 Planetary Transfer Calculator**  
Callum Predavec, 17, Senior, Mosman High School, Sydney, NSW, Australia
- MATH042 Applying the Black-Scholes Model to Modern-Day American-Style Stock Options: A Novel Approach**  
Rithvik Musuku, 16, Junior, BASIS Chandler, Chandler, AZ
- MATH043 Contradictions in the Banach-Tarski Paradox within Euclidean Space**  
## Xander Jones, 17, Senior, Navajo Preparatory School, Farmington, NM
- MATH044 Mersenne Primes: An Exploratory Study of Patterns and Some New Conjectures**  
Rajat Lohan, 17, Senior, Delhi Public School, Hapur, Uttar Pradesh, India

## Microbiology

- MCRO001** **The Use of *Lemna minor* as a Human Model to Study the Effect of Acetylsalicylic Acid (Aspirin) on *Staphylococcus epidermidis* Biofilm Development**  
# Emma Wells, 17, Senior, Cloquet Senior High School, Cloquet, MN
- MCRO002** **Novel Combination Treatment of Protease, DNase I, and Antibiotic for Biofilm-Involved *Staphylococcus epidermidis* Infections**  
Vincent Xin, 15, Freshman, Shanghai American School - Puxi Campus, Shanghai, Shanghai, China
- MCRO003** **Cloning of *Serratia marcescens* *chiA* Gene as a Biocontrol Alternative for Plants Targeted by Pathogenic Fungi**  
Nicole Frey, 18, Senior, Paulding County High School, Dallas, GA
- MCRO004** ***Reinhardtii* Remediation**  
Liz Diaz, 15, Sophomore, H.L. Bourgeois High School, Gray, LA
- MCRO005** **Green Watts: Investigating Power Production of a Single Chamber Plant Microbial Fuel Cell in a Modular System Comparing Crop Plants, *Triticum aestivum*, *Saccharum officinarum* and *Zea mays* – A Novel Fifth Year Study**  
# Luke Long, 18, Senior, Canterbury School, Fort Myers, FL
- MCRO006** **How Does Temperature Characterize Bacteriophage Infecting *Mycobacterium smegmatis*?**  
Nichapa Dancharnjitt, 16, Sophomore, Lincoln Park Academy, Fort Pierce, FL
- MCRO007** **The Development of Zika Virus Pseudoparticles: A Novel Model for the Future**  
Dhenu Patel, 18, Senior, Maclay School, Tallahassee, FL
- MCRO008** **Germicidal**  
Vanessa Cordova Heraldez, 18, Senior, Centro de Bachillerato Tecnológico Industrial y de Servicios No. 132, Hermosillo, Sonora, Mexico
- MCRO009** **The Effect of Antifungal Plant Derivatives on the Growth of *Candida albicans***  
Stephanie Nguyen, 15, Freshman, The Villages Charter High School, The Villages, FL
- MCRO010** **An Optimal, Low-Cost Microbial Consortium for Oxidation of Biodegradable Waste in a Waste-Based Microbial Fuel Cell**  
Gargi Porwal, 17, Junior, Plano West Senior High School, Plano, TX
- MCRO011** **Dirt-tricity**  
Kyle Keneker, 18, Senior, South Terrebonne High School, Bourg, LA
- MCRO012** **Demonstrating Transfer of Antibiotic Resistant Genes in the Rhizosphere and Experimenting with Auxins on the Rate of Transference**  
Rebecca Kottke, 14, Freshman, Blaine High School, Blaine, MN
- MCRO013** **First Isolation and Characterization of Bacteriophages "*Liamboii*" and "*Ostambo*" Infecting *Streptomyces antibioticus***  
## Sangita Vasikaran, 17, Senior, Texas Academy of Mathematics and Science, Denton, TX
- MCRO014** **Implications for Biogas Energy Use via Methanogenesis in Mars Conditions**  
Alexandria Montgomery, 18, Senior, West Salem High School, Salem, OR
- MCRO015** **Nanocermic Coating of Central Venous Catheters Has Inhibitory Effect on Colonization by *E. coli* and *Bacillus cereus***  
Varsha Naga, 15, Freshman, Winter Springs High School, Winter Springs, FL
- MCRO016** **From Water Purification to Carbon Capture and Nutrient Supplementation: A Potential Zimbabwean Solution**  
ChenChen Zha, 18, Senior, Hellenic Academy, Harare, Zimbabwe
- MCRO017** **An Algorithmic Platform to Optimize the Prescription of Antibiotics to Minimize Antibiotic Resistance Developing in Patients or Communities**  
Sophie Kearney, 17, Junior, Midway High School, Waco, TX
- MCRO018T** **Natural Alternative to Synthetic Drugs: Juglone-Sodium Alginate Binary Systems**  
Anastasia Zdrobau, 17, Senior, Catarina-Severina Martin, 18, Senior, Theoretical High School "Orizont, Durl esti", Chisinau, Republic of Moldova
- MCRO019** **The Effects of Sugar Substitutes and Prebiotics on the Virulence of Gastrointestinal Bacteria**  
# Elaina Render, 16, Sophomore, duPont Manual High School, Louisville, KY
- MCRO020** **The Effects of Different Amplitudes of a Particular Song on the Antibiotic Susceptibility of *Escherichia coli* against Ampicillin**  
Shardul Naphade, 17, Junior, Central Virginia Governor's School for Science and Technology, Lynchburg, VA
- MCRO021** **The Effects of Sugar Alcohols on *S. epidermidis* and *M. luteus***  
Josiah Cheng, 18, Senior, Queensland Academy for Science, Mathematics and Technology, Brisbane, Queensland, Australia
- MCRO022** **Are We Butchering the Effectiveness of Antibiotics?**  
Kylie Guiles, 15, Sophomore, Mancos High School, Mancos, CO
- MCRO023** **Nature-Inspired Bactericidal Nanotextured Surfaces with ZnO Nanostructures**  
Yee Lin Tan, 18, Senior, National Junior College, Singapore, Singapore, Singapore

- MCRO024 Food Preservation, Not Perversion: Development of a New Preservation Method for Alimentary Products**  
Maitane Alonso Monasterio, 18, Senior, Avellaneda Ikastetxea, Sodupe (Guenes), Spain
- MCRO025 The Role of Cholesterol in Hantavirus Entry and Infection of Host Cells**  
Astha Ray, 15, Sophomore, Dallastown Area High School, Dallastown, PA
- MCRO026 Assessing the Effectiveness of Iron Oxide Nanoparticles against Bacterial Growth**  
Jeena Alborano, 16, Sophomore, North Toole County High School, Sunburst, MT
- MCRO027T A Comparison of the Biofilm Forming Potential of Native Microbiota of Various Leafy Greens on Different Food Contact Surfaces**  
##  
Meena Ravishankar##, 17, Junior,  
Vishakk Rajendran##, 16, Junior,  
Jeremy Wang#, 17, Junior,  
University High School, Tucson, AZ  
BASIS Tucson North, Tucson, AZ  
Catalina Foothills High School, Tucson, AZ
- MCRO028 Innovative Approach to the Antibacterial and Prebiotic *Lycium barbarum* Extract: Solution after the Antibiotic Era**  
Blanka Novak, 19 Senior, Istvan Dobo Secondary Grammar School, Eger, Heves, Hungary
- MCRO029 Thyme and Thyme Again! Investigation of Synergistic Antimicrobial Activity of *Thymus vulgaris* Essential Oil in Combination with 'Superfood' Essential Oils**  
##  
Manashree Padiyath, 17, Junior, Woodbury High School, Woodbury, MN
- MCRO030 Improved Efficacy of Sulfadimethoxine with Herbal Supplements to Inhibit the Growth of *Paramecium aurelia***  
Ryan Ballou, 16, Sophomore, Carroll High School, Dayton, OH
- MCRO031 Discovering a Bacteriophage**  
Melina Mohammadi, 14, Freshman, Treasure Valley Math and Science Center, Boise, ID
- MCRO032 Human Photosynthesis: Functional Chloroplast Sequestration in Human Mesenchymal Stem Cells**  
Brent Perlman, 17, Senior, Byram Hills High School, Armonk, NY
- MCRO033 Analysis of the Antimicrobial Efficacy of the Lichen Extract Usnic Acid, Year Two**  
#  
Joshua Devier, 18, Senior, Saint Paul's School, Covington, LA
- MCRO034 The Inhibition of Methane-Producing Bacteria Using Novel Compound:  $\beta$ -carboline**  
David Kang, 16, Sophomore, John Randolph Tucker High School, Richmond, VA
- MCRO035 Turning Over a New Phage: A Novel Approach to Phage Therapy**  
Emily Kang, 16, Sophomore, Canyon Crest Academy, San Diego, CA
- MCRO036T Pathogens and Biocontrol: Fungi Associated to *Theobroma cacao* in Guna Yala, Panama**  
Lianne Francis, 18, Senior,  
Carla Chanis, 18, Senior,  
Smart Academy Panama, Panama, Panama
- MCRO037T What's in Your Air? A Microbial DNA Analysis of a Filter System**  
Carly Keller, 16, Sophomore,  
Danielle Clapper, 16, Sophomore,  
Southeast Goshen County High School, Yoder, WY
- MCRO038 Fight the Bite: Identifying Aerobic and Anaerobic Bacteria Commonly Found in the Oral Cavities of Shark Populations Located in Beaufort County, South Carolina, in Order to Better Prescribe Antibiotics to Shark Bite Patients**  
###  
Lucas Tomita, 18, Senior, Hilton Head Preparatory School, Hilton Head Island, SC
- MCRO039 Identifying Novel Mechanisms of Quorum-Sensing Receptor Protein RpfR: Relevance to the BDSF Quorum-Sensing Signaling Pathway**  
##  
Neehal Tumma, 17, Senior, Port Huron Northern High School, Port Huron, MI
- MCRO040 The Use of *Manihot esculenta* Starch for Inhibition and Prevention of Bacterial Growth**  
#  
Raphael Acevedo Rivera, 17, Senior, Escuela Superior Especializada Vocacional Agricola de Corozal Pablo David Burgos Marrero, Corozal, Puerto Rico
- MCRO041 Study of the Effect of Different Concentrations of *Solanum torvum* on *Staphylococcus aureus***  
Nimar Cisneros Figueroa, 16, Junior, Colegio Puertorriqueno de Ninas, Guaynabo, Puerto Rico
- MCRO042T The Bacteriostatic Effect of *Illicium verum* and *Citrus x limon* in *Staphylococcus aureus* and Beta-hemolytic *Streptococcus* (GBS)**  
Wilmarty Santana, 16, Junior,  
Bryan Rosado, 16, Junior,  
University Gardens High School, San Juan, Puerto Rico
- MCRO043 Viruses to the Rescue?: Using Microtiter Assays and an In-Lab Developed Simulated Anatomic Lung Model to Determine the Effectiveness of Bacteriophage Therapy as a Preventative Measure against Poly-Microbial Biofilms in Cystic Fibrosis Patients**  
#  
Divyam Goel, 17, Senior, West High School, Salt Lake City, UT
- MCRO044 Effect of Iron Treatments on the Bacteria *Mycobacterium smegmatis* and *Escherichia coli* and the Role of *Escherichia coli* FhuA Iron Uptake Receptor on Phage Infections**  
Rachel Rost, 16, Junior, Baker High School, Baker, MT



- MCRO045T The Varying Effects of Different Concentrations of Colloidal Silver on Bacteria**  
Alison Reyes, 17, Junior,  
Paloma Santiago Walker, 17, Junior,  
American Academy, Inc., Gurabo, Puerto Rico
- MCRO046 The Use of Yeast to Prevent Fungal Diseases in Horticultural Produce**  
Michelle Song, 16, Junior, Horton High School,  
Greenwich, Nova Scotia, Canada
- MCRO047 The Effects of Temperature on Ampicillin Resistant *E. coli*: A Case Study on the Degradation of Biodiversity**  
George Monroe, 17, Junior, St. Andrew's Episcopal School, Ridgeland, MS
- MCRO048 Fishing for New Crop-Benefiting Soil Bacteria through Plant-Microbe Interactions**  
Gary Zhan, 14, Freshman, Logan High School, Logan, UT
- MCRO049 The Development of *Bacillus subtilis* as an Environmental Competitor for Bacterial Leaf Streak**  
#  
Katie Bathke, 18, Senior, Allen Consolidated Schools, Allen, NE
- MCRO050 Controlling the Chikungunya Virus Disease in Dengue Endemic Areas through the Development of a Peptide Vaccine**  
#  
Sruthi Kalavacherla, 16, Junior, Amador Valley High School, Pleasanton, CA
- MCRO051 Resisting the Nucleotide in Oligonucleotide-Directed Mutagenesis**  
Maximus Schieman, 17, Junior, Satellite High School, Satellite Beach, FL
- MCRO052T Investigating the Role of the Novel ESCRT-III Recruiter CCDC11 in HIV Viral Budding: Identifying a Potential Target for Antiviral Therapy**  
Poojan Pandya, 16, Junior,  
Leo Takemaru, 16, Junior,  
Half Hollow Hills High School West, Dix Hills, NY  
Ward Melville High School, East Setauket, NY
- MCRO053 Development of a qPCR Assay for Quantification of *Saccharibacteria***  
John Lin, 16, Sophomore, Boston Latin School, Boston, MA
- MCRO054 The Acidifying Ocean's Effect on Protease Activity in *Alteromonas***  
Noah Glasgow, 16, Sophomore, Falmouth Academy, Falmouth, MA
- MCRO055 Effects of i-Motifs and G-quadruplexes on Bacterial Gene Transcription**  
Isabella Wiebelt-Smith, 16, Sophomore, Central High School, Saint Joseph, MO
- MCRO056 Identifying Antibiotic Molecules in *Ceanothus leucodermis* and Quantifying Their Antibacterial Activity with a Novel, Simulation-Aided Method**  
Daniel Feng, 15, Sophomore, University High School, Irvine, CA
- MCRO057 The Antiviral Function of XAF1 during Immune Response**  
Cheryl Luo, 18, Senior, Yorktown High School, Yorktown Heights, NY
- MCRO058 A Method for Water Purification Using Bacteriophage**  
#  
George Santarpia, 17, Junior, Albuquerque Institute for Math and Science, Albuquerque, NM
- MCRO059 Identification and Characterization of Freshwater *Vibrio* Phages from Pittsburgh, Pennsylvania**  
Rachel Bina, 16, Sophomore, North Allegheny Senior High School, Wexford, PA
- MCRO060 Serum Marker of Glyphosate Exposure Associated with Changes in Oral and Gut Microbiome Composition**  
Aria Eppinger, 17, Junior, Winchester Thurston School, Pittsburgh, PA
- MCRO061 Evolution of *Aspergillus fumigatus* in Cystic Fibrosis Lungs to Higher Virulence in a Hyperosmotic Environment**  
#  
Emily Dean, 15, Sophomore, Woodstock Union High School Middle School, Woodstock, VT
- MCRO062 Isolation and Characterization of an Environmentally Sourced Bacteriophage for *Serratia marcescens***  
Demetri Massow, 18, Senior, Crown Point High School, Crown Point, IN
- MCRO063 Antimicrobial Properties of Skin Secretions from Salamanders**  
Jakobi Deslouches, 18, Senior, Pittsburgh Allderdice High School, Pittsburgh, PA
- MCRO064 Investigating the Role of *Fusobacterium nucleatum* in Esophageal Adenocarcinoma**  
Richard Han, 16, Junior, Horace Mann School, Bronx, NY
- MCRO065T Antifungal Activity of Bacteria Isolated from the Endangered Green Salamander, *Aneides aeneus***  
#  
Nicole Rideout#, 18, Senior,  
John Nguyen#, 18, Senior,  
Brevard Senior High School, Brevard, NC
- MCRO066 Investigating the Bactericidal and Anti-Biofilm Effects of Naringenin on *Enterobacter cloacae***  
#  
Vanessa Siggers, 17, Junior, Murphy High School, Mobile, AL
- MCRO067T Cyanocide: A Novel Strategy for Harmful Algal Bloom Mitigation via Initiation of Programmed Cell Death**  
#  
Sarah Syed#, 16, Junior,  
Saijai Supanklang#, 16, Junior,  
Miamar Burgos-Rosario#, 17, Junior,  
Hayfield Secondary School, Alexandria, VA
- MCRO068 Investigation of Essential Oil Constituents for Biofilm Prevention and Resistance Modification with Applications on Orthopedic Implants**  
Zane Asebai, 15, Freshman, Little Rock Central High School, Little Rock, AR
- MCRO069 DNA Sequencing of Soil Microbiota from Mulching: A Novel Rotational Fragment Farming for Efficient Agriculture**  
##  
Pranav Chhaliyil, 18, Senior, Maharishi School of the Age of Enlightenment, Fairfield, IA

- MCRO070 Use of Glutamate, Arginine, Glucose to Enhance the Survival of Probiotic Bacteria in an Artificial Gastric Environment**  
Meena Ramadugu, 15, Freshman, John F. Kennedy High School, Cedar Rapids, IA
- MCRO071 Metal and Hyperglycemia-induced Neurotoxicity Using a *Caenorhabditis elegans* RAGE Model**  
Michael Lawes, 18, Senior, Elmont Memorial Junior-Senior High School, Elmont, NY
- MCRO072 The Effects of a Simulated Mars Environment on the Primary Productivity of Select Cyanobacteria**  
Olivia Nalley, 17, Junior, Cascia Hall Preparatory School, Tulsa, OK
- MCRO073 Dynamic Roles of Epstein-Barr Virus Reactivation: Identifying Novel Mechanisms of EBV-Positive Lymphoma Progression and Treatment**  
# Logan Dunkenberger, 18, Senior, Roanoke Valley Governor's School for Science and Technology, Roanoke, VA
- MCRO074T Two Part Study of Novel Ways to Alleviate Droughts Using Cloud Seeding Methods with Bacterial Ice Nucleators**  
Ji Ho Lee, 18, Senior,  
Suma Ejanthkar, 18, Senior,  
Auburn High School, Auburn, AL
- MCRO075 Design and Application of an Affordable Air Sampler for the Detection of Bacterial Aerosols in Poultry Farms**  
Aaron Wan, 15, Sophomore, Starkville High School, Starkville, MS
- MCRO077 Effects of Grape Components on *Periodontitis***  
Anne Liang, 16, Sophomore, duPont Manual High School, Louisville, KY
- MCRO078T Biocontrol Potential of Endophytic Bacteria against Brown Eye Spot in Coffee**  
Anna Beatriz Suavengco, 18, Senior,  
John Eric Aggarao, 18, Senior,  
Kathleen Chloie Antonio, 18, Senior,  
Taguig Science High School, Taguig, Metro Manila, Philippines
- MCRO079 Red Light Green Light: Microarray Gene Expression Data to Analyze Differences in Healthy and Cancerous Prostate Tissues**  
Jocelyn Zonnefeld, 17, Junior, Unity Christian High School, Orange City, IA
- MCRO080 The Effect of Endocytosis-Altering Substances on Vacuole Formation in *Tetrahymena***  
Caden Traversari, 15, Junior, Springside Chestnut Hill Academy, Philadelphia, PA
- MCRO081 Rethinking Honey: A Promising Investigation of Synthetic Honey as a Bacteriostatic Salve**  
# William Deering, 17, Junior, IDEA Homeschool, Anchorage, AK
- MCRO082 Inhibition of *Staphylococcus epidermidis*: Correlation between Mode of Action and Gram Stain**  
Madison Ackroyd, 15, Freshman, Aiken Scholar's Academy, Aiken, SC
- MCRO083T Genomic Analysis of *Pseudomonas aeruginosa* Resistance to Carbapenem Isolates in Three Major Hospitals in Hanoi (2011-2015)**  
Hai Anh Tran, 17, Junior,  
Minh Thao Nguyen, 17, Junior,  
High School for Gifted Students, Hanoi University of Science, Hanoi, Vietnam
- MCRO084T The Antimicrobial and Antibiotic Activity of the Local Flora from Camden County against Aerobic Activity**  
Vijay Ramu, 15, Sophomore,  
Saarth Chaturvedi, 15, Sophomore,  
Riya Chaturvedi, 15, Sophomore,  
Cherokee High School, Marlton, NJ  
Eastern Regional High School, Voorhees Township, NJ
- MCRO085 Investigating the Role of G3BP in Poliovirus-Induced Stress Granule Formation**  
Shaun Victor, 17, Senior, Hamilton High School, Chandler, AZ
- MCRO086 The Binding Mechanisms of Probiotics Isolated from Commercial Yogurts**  
Lucie LeBlanc, 17, Junior, Brookhaven Academy, Brookhaven, MS
- MCRO087T A Gut Feeling: The Effects of Melatonin on the Proliferation of *Enterobacter aerogenes*, a Key**  
Maria Kaltchenko, 17, Senior,  
Bertha Mireles, 17, Junior,  
Mississippi School for Mathematics and Science, Columbus, MS
- MCRO088T The Effect of Vitamin D3 and Vitamin D3+ on the Resistance of Various Antibiotics to Gram-Negative and Gram-Positive Bacteria**  
Caitlin Nguyen, 16, Junior,  
Sophie Pazzo, 17, Junior,  
Cascia Hall Preparatory School, Tulsa, OK

## Physics and Astronomy

- PHYS001 High-Accuracy Measurements of Gas Velocities in Regions of Star Formation**  
Mikhail Zolotavin, 17, Junior, Municipal School No. 45, Nizhny Novgorod, Russian Federation
- PHYS002T Optimization of Drone Flight Patterns for Use in Extraterrestrial Cave Mapping**  
Sydney Tran, 18, Senior,  
Lauren Amos, 18, Senior,  
Vero Beach High School, Vero Beach, FL
- PHYS003 Sustainable Energy: Can This Be Accomplished with a Permanent Magnet Generator?**  
# Haylee Darling, 15, Sophomore, Saint John Lutheran High School, Ocala, FL
- PHYS004 Development of an Interdisciplinary Test Stand to Unravel the Myth of Rubber-Powered Flight**  
Noah Dormann, 17, Senior, Chiemgau-Gymnasium Traunstein, Traunstein, Germany
- PHYS005 Ground-based Followups of TESS Exoplanet Candidates**  
# Sarah Tang, 16, Junior, Fairview High School, Boulder, CO
- PHYS006 Investigation of Falling Parachutes**  
Isabela Lopes, 18, Senior, Escola Suico - Brasileira De Sao Paulo, Sao Paulo, Brazil
- PHYS007 Plotting New Horizons: A Statistical Analysis of Potential Factors Influencing the Probability of Planetary System Formation**  
## Dahlia Dry, 18, Senior, Fort Myers High School, Fort Myers, FL
- PHYS008 The Properties and Rate of Stars with Blazhko Effects from Gaia and OGLE Surveys**  
Nan Jiang, 16, Junior, Beijing No. 2 Middle School, Beijing, China
- PHYS009 Plasma Characterization Applied to an Understanding of Ion Acoustic Waves**  
Yiyang Shi, 18, Senior, West High School, Madison, WI
- PHYS010 Cell Circuits: Using Nyquist Plot to Find Equivalent Circuit Models to Human Keratinocyte Cells**  
# Michael Bregar, 17, Senior, MAST at FIU Biscayne Bay Campus, North Miami, FL
- PHYS011 Faraday Heaping Unravalled: Study of Heaping Behavior of Granular Materials under Vertical Vibration**  
Qingyi Wang, 17, Junior, No. 2 High School of East China Normal University, Shanghai, Shanghai, China
- PHYS012 Research and Application of Micro-Nano Structure of Mosquito Leg and Mouth**  
Xinyi Ba, 17, Junior, The High School Attached to Northwest Normal University, Lan Zhou, Gan Su, China
- PHYS013 Testing the Accuracy of the Tangent Point Method for Determining the Milky Way's Rotation Curve**  
Camille Chiu, 16, Sophomore, College Station High School, College Station, TX
- PHYS014 A Networked Body Temperature Monitoring System Based on Single Chip and Reverse Carnot Cycle**  
Tang Jing, 16, Sophomore, Peiyuan Middle School, Quanzhou, China
- PHYS015 The Flight of Arrows**  
Deniz Erdag, 16, Sophomore, Little Rock Central High School, Little Rock, AR
- PHYS016 Faraday's Return**  
# Sebastian Saenz, 16, Sophomore, College Park High School, The Woodlands, TX
- PHYS017 Sound Velocity in Corrugated Pipes**  
Rinka Kai, 17, Junior, Hiroshima Prefectural Fuchu High School, Fuchu-City, Hiroshima, Japan
- PHYS018 Study of the Influence of Terahertz Radiation and a Magnetic Field on Blood Characteristics**  
Ilia Zagurskii, 17, Senior, Municipal Autonomous Educational Institution "Lyceum No. 28 Named After Academician Boris Korolyov", Nizhny Novgorod, Nizhny Novgorod Oblast, Russian Federation
- PHYS019T Making Microbubbles with Spiral Method**  
Keita Watanabe, 18, Senior,  
Yuta Koshobu, 18, Senior,  
Ryotaro Ishiko, 19, Senior,  
Hiroshima University High School, Hiroshima, Japan
- PHYS020 Addressing Redshift Controversies through Non-Doppler Redshifts Induced by Light-Matter Interactions**  
Levon Tabirian, 16, Junior, Trinity Preparatory School, Winter Park, FL
- PHYS021 Search for Variations in the Strength and Frequency of Earth's Gravitational Field Using a Homemade Fiber Optic Gravimeter**  
Catherine Taboada, 15, Sophomore, BASIS San Antonio Shavano Campus, San Antonio, TX
- PHYS022 G-Force: Angles Helping Pilots Go Faster**  
Victoria Whitehead, 14, Freshman, Holy Spirit Catholic High School, Tuscaloosa, AL
- PHYS023 Chance of Non-Nucleated Light Source Superposition on Ultra-Diffuse Galaxy Centers**  
Max Michaud, 18, Senior, University High School, Tucson, AZ
- PHYS024 VIVID: A 3D Visualization Tool for Computer Simulations**  
Naftali Deutsch, 17, Senior, The Hebrew University Secondary School, Jerusalem, Israel
- PHYS025 Capital X: Designing and Testing a Procedure for Building an Inexpensive X-ray Generator**  
Catherine Blevins, 17, Junior, Covenant Christian Academy, Huntsville, AL

<b>PHYS026</b>	<b>Forecasting International Space Station Transits of the Sun</b> Trevor Winstral, 19 Senior, Schweizerische Alpine Mittelschule Davos (SAMD), Davos Platz, Grisons, Switzerland	<b>PHYS038</b>	<b>Disentangling Spatial Correlations from Inhomogeneous Materials with Shift-Invariant Artificial Neural Networks: A Novel Approach to Study Superconductivity</b> Kaylie Hausknecht, 17, Senior, Lynbrook Senior High School, Lynbrook, NY
<b>PHYS027</b>	<b>Tune Less, Play More</b> Austin Brown, 14, Freshman, Providence Academy, Rogers, AR	<b>PHYS039</b>	<b>Simulation of Timescale Matching between Organic and Metallic Phase-change Materials for Transient Thermal Reduction</b> # Justin Wang, 18, Senior, Chantilly High School, Chantilly, VA
<b>PHYS028</b>	<b>Touchdown Events during Drop Impact of Newtonian Fluid</b> Michael Frim, 18, Senior, Evanston Township High School, Evanston, IL	<b>PHYS040</b>	<b>Synthesis and Analysis of Strontium Titanate (STO): Can It Replace Silicon for Power Electronic Applications?</b> Alexander Kwon, 16, Junior, Sage Hill School, Newport Beach, CA
<b>PHYS029</b>	<b>A Search for Exoplanets in High Metallicity Open Clusters Using a Large-Scale Photometric Algorithm</b> Ashini Modi, 15, Freshman, Caddo Parish Magnet High School, Shreveport, LA	<b>PHYS041</b>	<b>Examining the Potential of Selective Bacterial Lysis through Pulsed Magnetic Fields at the Resonant Frequency of the <i>Escherichia coli</i> Cell Membrane</b> Joshua Harmon, 18, Senior, Camdenton High School, Camdenton, MO
<b>PHYS030</b>	<b>Applications of Helium-4 Doubly Forbidden Singlet-Triplet Transition Lines in Astronomical Spectroscopy</b> Christine Ye, 14, Freshman, Eastlake High School, Sammamish, WA	<b>PHYS042</b>	<b>Heisenberg-Scaling Measurement Protocol for Analytic Functions with Quantum Sensor Networks</b> Kevin Qian, 18, Senior, Montgomery Blair High School, Silver Spring, MD
<b>PHYS031</b>	<b>The Unpredictability of Photons</b> Adam Thomas, 15, Freshman, Bonneville High School, Washington Terrace, UT	<b>PHYS043</b>	<b>Effect of Epitaxial Compression on Structural and Electrical Transport Properties of 3D Topological Dirac Semimetal Cd<sub>3</sub>As<sub>2</sub></b> Nikita Salunke, 16, Junior, Evergreen Valley High School, San Jose, CA
<b>PHYS032</b>	<b>Effects of Clothing on the Aerodynamics of a Mountain Biker</b> Isaac Staten, 15, Freshman, Bonneville High School, Washington Terrace, UT	<b>PHYS044</b>	<b>Tatooine Found! Discovery, Confirmation, and Characterization of the First-Ever Circumbinary Planet Detected Using Doppler Spectroscopy</b> # Brian Wu, 17, Junior, Horace Mann School, Bronx, NY
<b>PHYS033</b>	<b>Improving Particle Classification in WIMP Dark Matter Detection Experiments Using Neural Networks</b> Brendon Matusch, 15, Junior, Lo-Ellen Park Secondary School, Sudbury, Ontario, Canada	<b>PHYS045T</b>	<b>Recycling against Radiation: A Comparison between Recycled and Non-Recycled HDPE for Radiation Shielding</b> George French, 17, Junior, Zane Vandivere, 16, Junior, Governor's School at Innovation Park, Manassas, VA
<b>PHYS034</b>	<b>An Optimized Multigrid Algorithm for Enabling Efficient Physical Simulations on Realistic Geometries</b> Mason Holst, 15, Sophomore, Canyon Crest Academy, San Diego, CA	<b>PHYS046</b>	<b>Solving the Tyranny of the Rocket Equation: A Theoretical and Experimental Study of Laser Propulsion</b> Natan Dominko Kobilica, 19 Senior, Gimnazija Bezigrad, Ljubljana, Slovenia
<b>PHYS035</b>	<b>Quantum Calculator: Investigating How a Quantum Computer Works through Simulation</b> Rebecca Amatucci, 17, Senior, Liceo Scientifico Galileo Ferraris, Torino, TO, Italy	<b>PHYS047T</b>	<b>Laser Processing of AlN Ceramics for Obtaining a Conductive Low-Resistance Metallized Layer</b> Ivan Maraev, 17, Junior, Iurii Batrakov, 18, Junior, Lyceum No. 1511 Affiliated with MEPHI, Moscow, Russian Federation
<b>PHYS036</b>	<b>Utilization of 3D-Printed Honeycomb Variations as Potential Housing Structures for Future Planetary Colonization</b> Ashlyn Ewen, 17, Senior, Greybull High School, Greybull, WY	<b>PHYS048</b>	<b>Modelling Energy Extraction via the Penrose Process in Analog Black Holes</b> Luke Mrini, 17, Senior, Lake Braddock Secondary School, Burke, VA
<b>PHYS037</b>	<b>Characterizing the WLM Galaxy Using the Properties of RR Lyrae Variable Stars</b> Subhash Kantamneni, 17, Junior, Suncoast Community High School, Riviera Beach, FL		

- PHYS049** **K-edge X-ray Absorption Near Edge Structure (XANES) Analysis Methodology: A Case Study on Thiophenic Sulfur Compounds**  
Kayla Huang, 16, Junior, Whitney M. Young Magnet High School, Chicago, IL
- PHYS050** **Glue Busters II: The Effects of Accelerated Cure Time on the Ultimate Shear Strength and Efficiency of CA and PVA Glue**  
Kaitlyn Zuravel, 15, Freshman, Terry Sanford High School, Fayetteville, NC
- PHYS051** **Novel Approach to Efficient Growth of Iron Selenide (FeSe) High-Temperature Superconductors**  
Saaketh Medepalli, 17, Senior, Kalamazoo Area Mathematics and Science Center, Kalamazoo, MI
- PHYS052** **Electromagnetic Braking: Efficiency Relative to Position**  
Bryce Goettle, 18, Senior, Ashley Public School, Ashley, ND
- PHYS053** **The Hunt for the Shadow of an Asteroid: Observation of 479 Caprera's Occultation of HIP33753**  
Fabian Lundell, 19 Senior, Backangsgymnasiet, Boras, Vastergotland, Sweden
- PHYS054** **Quantifying Asymmetries in Supernovae: A Study on the Deaths of Massive Stars**  
Miranda Jaderling, 19 Senior, Blackebergs Gymnasium, Stockholm, Sweden
- PHYS055** **On Detecting Cherenkov Radiation with a Cellphone: A Proposal for a New, Cheaper and Simpler Method for Detection of Cherenkov Radiation**  
Ellen Hammarstedt, 19 Senior, Kitas Natur, Gothenburg, Sweden
- PHYS056** **Flock Fragmentation: The Dispersal of Saturated Flocks in a System of Self-Propelled Particles**  
# Parker Jou, 17, Senior, Carmel High School, Carmel, IN
- PHYS057** **Searching for Hidden Black Holes: An Investigation of Chaotic Regimes in Non-Linearly Coupled Harmonic Oscillators**  
Rebecka Mahrng, 19 Senior, Viktor Rydbergs Gymnasium Odenplan, Stockholm, Stockholm, Sweden
- PHYS058T** **Young Stellar Objects in L1688: Searching for Evidence of Star Formation Using Infrared Data**  
Jacie Erickson, 18, Senior,  
Joseph Erickson, 18, Senior,  
Bracken Jolley, 18, Senior,  
South Sevier High School, Monroe, UT
- PHYS059** **The First Hard X-Ray Survey of the Central 30 Parsecs of the Galactic Center Searching for Faint High Mass X-Ray Binaries**  
Jung Kyu Jang, 18, Senior, Chadwick International School, Incheon, South Korea
- PHYS060** **Probing Stellar Remnant for Planet Candidate; Analysis of K2 Target 251248385**  
Stephanie Yoshida, 16, Sophomore, Punahou School, Honolulu, HI
- PHYS061** **Implementing Quantum Dot Qubits in Optimized Linear Quantum Computing Architectures through Evolutionary Computational Modeling**  
Lucas Braun, 16, Sophomore, School of Science & Technology, Beaverton, OR
- PHYS062** **Graphene Solar-Photon Sail: A Novel Approach to the Application of Monolayer Graphene on Aluminumized Polyimide Film Using a Figure of Merit of a Solar-Photon Sail Membrane for Interstellar Space Exploration**  
Morgan Barkhurst, 16, Sophomore, Florida SouthWestern Collegiate High School - Lee Campus, Fort Myers, FL
- PHYS063** **A Research of Cooling Characteristics of Liquid in Different Containers**  
Ville Rosendahl, 16, Freshman, Rantakylan Yhtenaiskoulu, Mikkeli, Etela-Savo, Finland
- HYS064** **Using Dimple Technology to Optimise the Aerodynamics of Heavy Motor Vehicles**  
Rune Edeling, 18, Senior, Eunice High School, Bloemfontein, Free State, South Africa
- PHYS065** **Asteroid Families Mechanics with Application to the Family Eunomia**  
Adam Krivka, 18, Junior, The St. Cyril and Methodius Comprehensive School and Pedagogical High School Brno, Brno, Brno-Mesto, Czech Republic
- PHYS066** **Optical Characterization of Fe and Cr Doped ZnS and ZnSe Polycrystals for Mid-IR Lasing Applications**  
Eesha Banerjee, 15, Junior, Alabama School of Fine Arts, Birmingham, AL
- PHYS067** **Development of a Thin and Inexpensive Open-Air Proton Beam Detector for Characterizing the Beam Profile and Position**  
Ethan Rosenfeld, 17, Junior, Phoenix Country Day School, Paradise Valley, AZ
- PHYS068** **Nanoscale Optical Probing of Two-Dimensional Heterostructures Suspended on Nano-Slits**  
Joy Ma, 17, Junior, Fairview High School, Boulder, CO
- PHYS069T** **Hand-Held Detector with Retro-Reflective Mosaic Screens to Visualize Optical Inhomogeneities**  
# Dea Ilarionova#, 18, Senior,  
Shorena Gudzhabidze#, 17, Senior,  
Marina Gudzhabidze#, 18, Senior,  
Cervantes Gymnasium AIA-GESS, Tbilisi, Georgia

## Plant Sciences

PLNT001T	<b>The Intelligent Plant: Electrophysiology of the Venus Flytrap</b> Christoph Schutze, 16, Junior, Sarah Schnoge, 17, Junior, Fabian Obermair, 16, Sophomore, Holty-Gymnasium Celle, Celle, Niedersachsen, Germany	PLNT012	<b>RCHSSE: Remotely Controlled Hydroponic System by Solar Energy</b> # Shatha Al Thyabat, 16, Sophomore, King Abdullah II School for Excellence, Ma'an, Ma'an, Jordan
PLNT002	<b>Comparative Analysis of Animal Manure through Supplementary Heating: An Evaluative Study on the Quality of Agricultural Production</b> # Caio Souza, 17, Senior, Escola Estadual Gabriel Almeida Cafe, Macapa, Amapa, Brazil	PLNT013	<b>Fractals and Catastrophic Bifurcation: Exploring Treeline Structure Using Drones and Mathematical Models in R</b> # Kathryn Kummel, 15, Sophomore, William J. Palmer High School, Colorado Springs, CO
PLNT003	<b>Natural Antioxidants Reduce the Toxic Effect of Heavy Metals on the Growth of Rice (<i>Oryza sativa</i> L.)</b> Hongjia Yang, 17, Junior, High School Affiliated to Shanghai Jiao Tong University, Shanghai, Shanghai, China	PLNT014	<b>Development of the Lucky Clover: Effects of Phosphate and Auxin on the Number of Leaflets in White Clover</b> Minori Mori, 17, Junior, Meikei High School, Tsukuba, Ibaraki-Pref., Japan
PLNT004	<b>Investigating the Effect of the Removal of Red Mangrove Trees on the Ecosystem of Kauai</b> Isabella Parsons, 15, Freshman, Kauai High School, Lihue, HI	PLNT015T	<b>Comparison of Substrates in Sexual Propagation of the Quina Tree (<i>Cinchona officinalis</i>)</b> Stefany Vasquez Meza, 13, Freshman, Marlitt Barboza Hernandez, 15, Sophomore, Jose de San Martin, Bongara, Amazonas, Peru
PLNT005	<b>Pectin Feeds the Seeds: The Effect of Extracted Pectin on Various Seed Growth Mediums in Relation to Soil Moisture Retention and Plant Growth</b> Rachel Mammen, 15, Freshman, Jasper High School, Plano, TX	PLNT016T	<b>Isolation of Native Soil Bacteria that Solubilizes the Phosphorus: A New Approach to Formulate an</b> Frederick Baca Pena, 14, Freshman, Victor Llatance Novoa, 13, Freshman, San Agustin, Zarumilla, Tumbes, Peru
PLNT006	<b>Using Guaiacol to Measure the Effect of a Natural Hormone (N-Acetyl-5-Methoxytryptamine) and Artificial Substitutes on the Rate of Photosynthetic Reactions and Oxygen Production, Year III</b> # Chase Olivanti, 17, Junior, Wiregrass Ranch High School, Wesley Chapel, FL	PLNT017T	<b>Forced Cellular Dilation: A Novel Approach to Increasing Auxin Levels in Native Stem Cuttings for Habitat Rehabilitation and Greenhouse Production through the Use of a Vacuum Chamber</b> Shannon Anderson#, 17, Junior, William Anderson, 15, Sophomore, Anderson Christian Academy, Seguin, TX
PLNT007	<b>Evaluation of Surface Characteristics of Natural and Synthetic Athletic Fields</b> Michael Chaloupka, 14, Freshman, Christ the King Cathedral School, Lubbock, TX	PLNT018	<b>Stop and Smell the Flowers: A Continuation of the Assessment of the Effects of Aeration in Regards to the Lifespan and Bacteria Presence of the <i>Chrysanthemum grandiflorum</i></b> # Hannah Taylor, 18, Senior, Agriscience Magnet Program, San Antonio, TX
PLNT008	<b>Reducing Water Requirements in the Greenhouse Production of <i>Solanum lycopersicum</i> with Soil Amendments</b> # Benjamin Wanjura, 18, Senior, Christ the King Cathedral School, Lubbock, TX	PLNT019	<b>C-Rice: Computational and Experimental Design Development of Transgenic Rice to Fulfill the Nutritional Demand of Carnosine in Humans</b> Michaela Samanta, 18, Senior, Smak Penabur, Tangerang, Banten, Indonesia
PLNT009	<b>A Comprehensive Analysis of Agronomic and Disease Resistance Gene Mutations in Katy Rice Mutants through DNA Next-generation Sequencing</b> Mary Jia, 17, Senior, Arkansas School for Mathematics, Sciences and the Arts, Hot Springs, AR	PLNT020	<b>Density-Dependent Signaling in the Model Eukaryote <i>Chlamydomonas reinhardtii</i></b> Pooja Shah, 17, Junior, West Shore Junior/Senior High School, Melbourne, FL
PLNT010T	<b>Adubater: Biofertilizer Derived from Aquatic Weeds</b> Cesar Garcia Zequera, 14, Sophomore, Brian Foster Garcia, 15, Sophomore, Escuela Secundaria Estatal Quetzalcoatl, Balancan Tabasco, Tabasco, Mexico	PLNT021T	<b>Soil Biology: Is It the Missing Link in Pasture Production? Evaluating the Effects of Biological and Chemical Amendments on Soil Biology and Pasture Biomass Production</b> Tiarra Meier, 17, Senior, Anne Zimmerman, 15, Sophomore, Danthonia Home School, Elsmore, New South Wales, Australia
PLNT011	<b>Susceptibilities of Various Growth Stages of <i>Metrosideros polymorpha</i> to <i>Ceratocystis lukuohia</i> Infection</b> Shwe Win, 15, Sophomore, Hilo High School, Hilo, HI	PLNT022	<b>Farming on Mars: Potential Strategies for Sustainable Agriculture</b> Pooja Kasiviswanathan, 16, Junior, Ames High School, Ames, IA

PLNT023	<b>A Novel Application of Gold Nanoparticles to Increase the Efficiency of Plant Photosynthesis</b> Alexander Nelson, 15, Freshman, Nelson Home School, Tucson, AZ	PLNT036T	<b>The Effect of Fermentation on Corn Silage Nutritional Composition</b> ## Cheyenne Breeding#, 18, Senior, Jace Marriott##, 16, Junior, Fremont High School, Plain City, UT
PLNT024	<b>Organic Stimulation of Plant Growth: Inoculation of Bacterial Endophytes from <i>Leersia oryzoides</i></b> # Adham Kassem, 18, Senior, College Park High School, The Woodlands, TX	PLNT037	<b>Combating Undernutrition in Developing Countries with a Compact Aeroponics System Utilizing Contaminated Water</b> Haley Jostes, 18, Senior, Stillwater Area High School, Stillwater, MN
PLNT025T	<b>Trails, Soil, and Sudden Oak Death</b> Natalie Owens, 18, Senior, Trevor Cambron, 17, Senior, San Lorenzo Valley High School, Felton, CA	PLNT038	<b>Growth Promotion and Yield Enhancement of Crop Seeds with Plant Products: Effects of Extracts, Endophytic Symbionts, and Endosperm</b> # Damian Galasso, 16, Sophomore, Galasso Homeschool, Tucson, AZ
PLNT026	<b>Impact of Different Chemicals on Plant Types</b> Abigail May, 16, Sophomore, St. Vincent - St. Mary High School, Akron, OH	PLNT039	<b>How Plants Respond to Heavy Metal: Insights from Genes and Metabolites</b> Anna Volkova, 17, Junior, Gymnasium No. 2, Chernivtsy, Ukraine
PLNT027T	<b>Acclimating Algae for Mariculture and Other Commercial Uses</b> John Luke Czerwinski, 18, Senior, Marlin Tucker, 18, Senior, Jonah Shiroma, 18, Senior, Waipahu High School, Waipahu, HI	PLNT040	<b>NanoAOX: Localization of Antioxidants via Nanoparticles to Enhance Plant Growth</b> Dheiksha Jayasankar, 14, Freshman, Sir Winston Churchill Secondary School, St. Catharines, Ontario, Canada
PLNT028	<b>Using Zaxinone to Postpone Leaf Senescence in Rice Plants</b> Haya Altuwaijry, 18, Senior, Riyadh School for Boys and Girls, Riyadh, Saudi Arabia	PLNT041T	<b>The Effect of Surface Tension on Plant Growth in Fogponics</b> Sabrina Zaidi, 17, Senior, Kamron Zaidi, 17, Senior, Richmond Hill High School, Richmond Hill, Ontario, Canada
PLNT029	<b>Engineering the Rice Genome via CRISPR/Cas9 to Achieve Herbicide Resistance</b> Abdulrahman Almulla, 18, Senior, Dhahran Ahliyya School, Dammam, Eastern Province, Saudi Arabia	PLNT042	<b>Accelerating Plant Growth to Improve Crop Production and Soil Fertility: Analyzing the Effects of Macronutrients and Mycorrhizal Fungi for <i>Zea mays</i>, Phase III</b> Kayla Livesay, 16, Sophomore, Van Buren Community Schools, Keosauqua, IA
PLNT030	<b>The Influence of Soil Microbes on the Restoration Success in the Critically Endangered <i>Widdringtonia whytei</i></b> Gurleen Kaur, 18, Senior, Wheeling High School, Wheeling, IL	PLNT043	<b>The Differential Responses via Growth &amp; Photosynthetic Rates of Non-Calcifying <i>I. galbana</i> &amp; Calcifying <i>T. chuii</i> to Calcium &amp; Foreign Algae Exposure</b> ## Daniel Joshua, 18, Senior, Madison Central High School, Madison, MS
PLNT031	<b>Use of Biological Control Agents to Inhibit the Growth of Phytopathogenic Bacteria</b> Cooper Bassham, 17, Junior, Salem High School, Salem, AR	PLNT044T	<b>Green Network: Solutions for Supply Chain Traceability and Monitoring of Environmental Parameters to Support Agriculture and to Improve Product Quality</b> Marco Morelli, 18, Senior, Alessio Piva, 18, Senior, Istituto Superiore "Enrico Fermi", Mantova, Mantova, Italy
PLNT032	<b>Analyzing the Effect of Tomato Variety and Maturity Date on Yield</b> Evan Blaha, 17, Senior, Avon High School, Avon, SD		
PLNT033	<b>Lead Phytoremediation in Contaminated Soils Using Ornamental Landscape Plants</b> Danna Thompson, 16, Sophomore, St. Joseph's Academy, Baton Rouge, LA		
PLNT034	<b>A New Spin on Botany: The Effect of Gravitational Resistance during Germination on Plant Growth</b> Jacob Bennett, 16, Sophomore, Woods Cross High School, Woods Cross, UT		
PLNT035	<b>Effect of Pleosporales Fungi on Commercial Crop Growth and Germination</b> ## Jayleigh Peuster, 18, Senior, Southeastern Junior/Senior High School, Augusta, IL		

PLNT045	<b>Edible Coatings in Post Harvest of Oranges (<i>Citrus sinensis</i>)</b> Joao Pedro Silvestre Armani, 16, Junior, Colegio Gabriela Mistral, Palotina, Parana, Brazil	PLNT057T	<b>Saponin Hydrogel for Controlling Snail Invasion</b> Phan-Anong Chuenchokchai, 18, Senior, Ramita Chueamuangphan, 18, Senior, Natthamon Sriprom, 18, Senior, Damrongratsongkroh School, Muangchiangrai, Chiangrai, Thailand
PLNT046	<b>Allelopathic Effect of <i>Leucaena leucocephala</i> on <i>Lactuca sativa</i> Subsp. <i>Crispa</i>, <i>Cecropia pachystachya</i> and <i>Campomanesia adamantium</i></b> Thailenny Rezende, 17, Senior, Escola Estadual Teotonio Vilela, Campo Grande, Mato Grosso do Sul, Brazil	PLNT058T	<b>Coating Highland Rice Seeds with Local <i>Spondias pinnata</i> Gum Can Reduce Seedling Mortality Caused by Water Deficit during Rain Delay</b> Namphung Panya, 18, Senior, Jetsada Sittikhankaew, 18, Senior, Phirachat Kochanil, 18, Senior, Damrongratsongkroh School, Muangchiangrai, Chiangrai, Thailand
PLNT047	<b>Eliciting Plant Defensive Mechanisms via Mycorrhizal Stimulation</b> ## Amanda Wilson, 18, Senior, Northwestern High School, Kokomo, IN	PLNT059	<b>Testing the Effectiveness of Mycorrhizae in the Phytoremediation of Heavy Metals from Stormwater</b> Amara Ifeji, 17, Junior, Bangor High School, Bangor, ME
PLNT048	<b>A Minimally-Invasive 3D-Printed Microneedle Array Applicator System (MU-NAAS) for Delivery of Therapeutics to Citrus Leaf Tissue</b> # Laboni Santra, 15, Sophomore, Oviedo High School, Oviedo, FL	PLNT060	<b>Propagating Welsh's Milkweed</b> Jacob Robinson, 17, Junior, South Sevier High School, Monroe, UT
PLNT049	<b>A Field Study: Sustaining Crop Growth in a Flooded Area with the Application of <i>Oscillatoria</i></b> # Jacob Martin, 16, Sophomore, Northwestern High School, Kokomo, IN	PLNT061	<b>Identifying Differential Expression and Conserved Alternative Splicing (AS) Events in <i>Zea mays</i> (Maize)</b> # Pragati Muthukumar, 18, Senior, Commack High School, Commack, NY
PLNT050	<b>Using Soil Enhancements to Increase <i>Zea mays</i> Profitability in Limited Production Agricultural Areas</b> Emma Kratcha, 15, Freshman, Hankinson Public School, Hankinson, ND	PLNT062	<b>Increased Yield Production of Chasmogamous and Cleistogamous <i>Glycine max</i> Using <i>Apis mellifera</i>, Organic Kaolinite Pesticide on <i>Aphis glycines</i>, and More Natural Potassium Fertilizer (Phase III)</b> # Brooklyn Pardall, 18, Senior, Central Lee High School, Donnellson, IA
PLNT051	<b>Death by Black Walnuts</b> Kynsie Wallace, 18, Senior, Northwest Technology Center, Fairview, OK	PLNT063	<b>Space Botanist: Effects of Fertilizer on Tomatoes Grown Upside Down in 75% Regolith</b> Emily Crawley, 15, Freshman, Brenham High School, Brenham, TX
PLNT052	<b>NanoSide: A Potential New Insecticide for Controlling Hairy Caterpillar in Jute</b> Aranyo Ray, 16, Sophomore, Auxilium Convent School Barasat, Kolkata, West Bengal, India	PLNT064T	<b>Novel Suction-Bait Trap to Manage Infestation of Melon Fruit Flies in Cucurbits</b> Richard Joseph, 16, Junior, Manya M. Kumar, 17, Senior, Kendriya Vidyalaya No.1 Naval Base Kochi, Kochi, Kerala, India
PLNT053	<b>Determining the Presence of <math>\beta</math>-carotene in the Pericarp of the Kernel in a Heritage Breed of <i>Zea mays</i></b> Caleb Mark, 15, Freshman, Greenwood Home School, Hardin, MT	PLNT065	<b>The T/Ha Yield Potential of Simulated Herbicide Drift on <i>Glycine max</i></b> ## Prescott Jeckel, 17, Junior, Delavan High School, Delavan, IL
PLNT054	<b>A Method of Utilizing Nutrients from Martian Resources for Use in a Hydroponic Plant System</b> Isaiah Lefler, 16, Sophomore, Brevard Senior High School, Brevard, NC	PLNT066T	<b>Development of Food Poisoning Resistant Lettuce Using Endophytes in <i>Petasites Japonicus</i> Leaves</b> Yoonji Kim, 18, Senior, Jihyun Ra, 17, Senior, Kangwon Science High School, Wonju, South Korea
PLNT055	<b>An Assessment of the Impacts of Organic Mulching Materials on Pak Choi (<i>Brassica rapa Chinensis</i>) Plant Performance and Growth</b> Carl Daniel Balauro, 17, Senior, Fa'asao Marist High School, Pago Pago, American Samoa		
PLNT056T	<b>Environmentally Friendly Seedling Nursery Balls from Cow Dung</b> Sutthida Iamsaard, 18, Senior, Thirakarn Wannakarn, 18, Senior, Phanomsarakham "Phanom Adun Witthaya" School, Chachuengsao, Thailand		



- PLNT067** **Determining the Most Effective Salt Concentration of Irrigation Water for *Trichoderma harzianum* to Confer Salt Tolerance through Symbiosis to *Oryza sativa* Plants**  
Manasvini Calmidi, 17, Junior, Nikola Tesla STEM High School, Redmond, WA
- PLNT068T** **Automated Temperature and Humidity Monitoring System for Quality Control, Drying and Storing of Rice Varieties**  
Alpha Cassandra Leonille Acain, 17, Senior,  
Lester John Sabadao, 17, Senior,  
Lia Denise Tan, 17, Senior,  
Cagayan National High School, Tuguegarao City,  
Cagayan, Philippines
- PLNT069** **Novel Anti-Cancer, Anti-Bacterial, and Anti-Inflammatory Properties of the Rare Plants of the Florida Ridges Implicates Urgency of Conservation**  
# Rohin Patel, 16, Junior, Sebring High School, Sebring, FL
- PLNT070** **Algal Fertilizer: Enhancing American Beachgrass Growth on Dunes**  
Claudia Schreier, 18, Senior, Marine Academy of Technology and Environmental Science,  
Manahawkin, NJ
- PLNT071T** **Increasing the Efficiency and Sustainability of**  
Meshaal Al-Dosari#, 15, Freshman,  
Khalid Al-Naama, 13, Freshman,  
Qatar Science and Technology Secondary School for Boys, Doha, Ain Khalid, Qatar
- PLNT072** **The Role of Plant Hormones in the Appearance of Pseudonodules within *Populus deltoides*** Ryan  
Hardin, 17, Junior, Union County High School,  
Lake Butler, FL
- PLNT073T** **A Novel Approach to Increasing Crop Yields: Effects of Soybean Curd Residue on Soil Productivity**  
Ella Wang, 15, Freshman,  
Breanna Tang, 14, Freshman,  
BASIS Chandler, Chandler, AZ
- PLNT075** **Historic Spatial Arrangement and Potential Fire and Disease Risk Reduction in Coastal Forests**  
Samuel Hooley, 18, Senior, Tillamook High School,  
Tillamook, OR

## Robotics and Intelligent Machines

- ROBO001 Study of the Flagellar Movement in Biology with Applications in MEMS and Micro Robotics**  
Alexandru Constantin, 17, Junior, Tudor Vianu National High School of Computer Science, Bucharest, Romania
- ROBO002T Third-Eye Driver Assistant**  
Maksim Bushuev, 17, Junior,  
Gleb Gorkaev, 16, Freshman,  
School of Computer Science VECTOR++, Sarov,  
Russian Federation
- ROBO003 A Novel, Self-balanced Robot with Leading Technology in Crossing All Angles of Transmission Lines** Bradley Xu, 16, Sophomore, Shanghai American School - Pudong Campus, Shanghai, Shanghai, China
- ROBO004 An Intelligent Security System for High-Terrorism-Risk Cities: Real-Time Prediction, Weapon Detection and Instant Solution (ISTC)**  
# Hedi Ben Daoud, 16, Junior, Bourguiba Pioneer High School, Tunis, Tunisia
- ROBO005 SmartCap**  
Bacem Etteib, 18, Junior, Pioneer Prep School  
Medenine, Medenine, Medenine, Tunisia
- ROBO006 Fast MRI: Reconstructing MR Images Using Undersampled k-space and a GAN**  
Siddarth Ijju, 16, Junior, Cherry Creek High School, Greenwood Village, CO
- ROBO007 Fast Braille: Multi-Function Printer to Assist the Writing of the Visually Impaired II**  
Bruna Cruz, 19 Senior, Fundacao Escola Tecnica Liberato Salzano Vieira da Cunha, Novo Hamburgo, Rio Grande do Sul, Brazil
- ROBO008T MIKE: Autonomous Multi-Species Robotic Sower Using Our Own Database and GPS Location to Determinate the Type of Vegetation**  
Jesus Resendiz Cruz, 17, Senior,  
Miguel Verdi Resendiz, 18, Senior,  
Angel Vazquez Servin, 17, Senior,  
Centro de Bachillerato Tecnologico Industrial y de Servicios No. 118, Corregidora, Queretaro, Mexico
- ROBO009T Braille Translator**  
Max Garcia Esquivel, 17, Junior,  
Jaime Hernandez Adame, 17, Junior,  
Universidad Autonoma de la Laguna, Torreón,  
Coahuila, Mexico **ROBO010 Thermocloud: A Smart Collaborative Thermostat**  
Harshal Bharatia, 14, Freshman, Vines High School, Plano, TX
- ROBO011 Generation of Classified Image Libraries to Train Machine Learning Algorithms to Identify Different Marine Phytoplankton**  
# Sreya Banik, 16, Junior, Lincoln Park Academy, Fort Pierce, FL
- ROBO012 Electromagnetic Wall Climber, Year 2**  
# Matthew Graham, 16, Sophomore, Polk Pre Collegiate Academy, Auburndale, FL
- ROBO013 Using a Computer Program Applied to an Electromagnetic Walking Apparatus to Simulate Earth's Gravity in Space**  
# MaryAlice Young, 17, Junior, Bishop Kenny High School, Jacksonville, FL
- ROBO014 Cross-Modal Text-Image Retrieval Algorithm Based on Model Transfer Learning**  
Muyao Li, 17, Junior, Chengdu No. 7 High School, Chengdu, Sichuan, China
- ROBO015 Smart Keyboard/Mouse Switch Robot**  
Pengrun Chen, 17, Senior, The High School Affiliated to Renmin University of China, Beijing, Beijing, China
- ROBO016 Extension of the Disease Detection Method of Lung Using Deep Learning with Visualization**  
Sean Ishiyama, 17, Junior, Meihokan High School, Shinagawa, Tokyo, Japan
- ROBO017 The Effect of Atmospheric Conditions on Flash Flood Prediction Using Deep Learning**  
Nalin Mehra, 17, Senior, Wiregrass Ranch High School, Wesley Chapel, FL
- ROBO018 Optimizing Driving Algorithms for High Speed Autonomous Ambulances**  
Kwadwo Osafo, 17, Junior, United World College International School of Asia, Karuizawa, Japan, Karuizawa, Japan
- ROBO019 PIC-TALK: Creating a Digital Ecosystem that Consists of Open Source Hardware and Software Products for Visually Impaired People**  
Musa Sadik Unal, 19 Senior, Kartal Anadolu Imam Hatip High School, Istanbul, Turkey
- ROBO020 Drones for Invasive Species Monitoring**  
Zachary Hohl, 18, Senior, Edgewood Junior Senior High School, Merritt Island, FL
- ROBO021 Autism Diagnostics Tool Using Gesture Recognition and Machine Learning**  
Alan Michael, 16, Sophomore, Allen D. Nease High School, Ponte Vedra, FL
- ROBO022T The Development of a Holistic System for Broad-Spectrum Crop Disease Diagnosis and Treatment**  
# Shreshth Srivastava#, 17, Junior,  
Pranav Senthilvel#, 17, Junior,  
duPont Manual High School, Louisville, KY
- ROBO023 Development of Efficient Vision Processing Algorithm Using Color Border Recognition**  
Jin Kwon, 17, Senior, Cheonan Shindang High School, Cheonan, South Korea
- ROBO024 Data Analytics for Fake News Detection**  
Haohui Liu, 17, Junior, Raffles Girls School (Secondary), Singapore, Singapore, Singapore

<b>ROBO025</b>	<b>Robust Autonomous Micro Aerial Vehicle (MAV) Navigation with Onboard, Environment-Agnostic, Multi-Sensor SLAM</b>	<b>ROBO037</b>	<b>Hardware Integrated LiDAR Simulation for the Development of Collision Avoidance Algorithms</b>
#	Parthiv Krishna, 17, Senior, Minnetonka High School, Minnetonka, MN		Matthew Tan, 18, Senior, Cranbrook Kingswood School, Bloomfield Hills, MI
<b>ROBO026</b>	<b>The Effect of a Genetic Algorithm on Traffic Efficiency</b>	<b>ROBO038</b>	<b>Artificial Neural Network Based Target Localization Method for Multi-Static Passive Radar Systems</b>
	Laura Thompson, 17, Junior, Mountain Vista Governor's School, Warrenton, VA		Sean Pak, 18, Senior, Commack High School, Commack, NY
<b>ROBO027</b>	<b>Development and Comparison of Pathfinding Algorithms in Topographic Mapping</b>	<b>ROBO039</b>	<b>Real-Time Freespace Segmentation Using Deep Learning on Autonomous Robots for Detection of Negative Obstacles</b>
	Benjamin Davis, 15, Sophomore, Auburn High School, Auburn, AL		Anish Singhani, 16, Junior, Monte Vista High School, Danville, CA
<b>ROBO028</b>	<b>Project Simon: Development of an Advanced Telerobotic System</b>	<b>ROBO040</b>	<b>A Game of Jamming: A Multi-Agent Game Theoretic Learning Based Cognitive Anti-Jamming Communication System to Combat an AI Jammer</b>
##	Marc Mirabal, 18, Senior, Grants High School, Grants, NM		Milidu Jayaweera, 14, Freshman, La Cueva High School, Albuquerque, NM
<b>ROBO029</b>	<b>The Higgs Boson: Improving the Detection of Fundamental Particles Using Neural Networks</b>	<b>ROBO041</b>	<b>Autonomous Visual Tracking of Unmanned Aerial Vehicles</b>
	Kasper Fredenslund, 19 Senior, Ringkjoebing Gymnasium, Ringkobing, Denmark		Carla Rose, 18, Senior, Eleanor Roosevelt High School, Greenbelt, MD
<b>ROBO030T</b>	<b>Developing and Simulating Self-Driving Car A.I. for a Crash Free Autonomous Intersection</b>	<b>ROBO042</b>	<b>Predicting Earthquake Aftershocks with Machine Learning</b>
	Liam Douglas, 17, Junior, Alec Warren#, 18, Senior, Harrisburg Academy, Lemoyne, PA		Forrest Hutchison, 15, Sophomore, St. Andrew's Episcopal School, Ridgeland, MS
<b>ROBO031T</b>	<b>DeepLetters: A Convolutional Long Short-Term Memory (CNN-LSTM) Approach to Fingerspelling Translation</b>	<b>ROBO043</b>	<b>Fast Technology of Automatic Markup and Teaching a Robot to Recognize Objects</b>
	Saarthak Maheshwari, 17, Senior, Riley White, 18, Senior, Stone Bridge High School, Ashburn, VA		Serhii Lysin, 16, Sophomore, Polytechnic Lyceum NTUU "KPI", Kyiv, Ukraine
<b>ROBO032</b>	<b>Nintendo Da Vinci: Implementing a Novel Control System to Improve Performance in Robotic Surgery</b>	<b>ROBO044</b>	<b>Protection of Deep Neural Networks against Adversarial Attacks with Application to Facial Recognition</b>
#	Ibrahim Al-Akash, 16, Sophomore, Veterans Memorial High School, Corpus Christi, TX		Alice Guo, 15, Freshman, Morgantown High School, Morgantown, WV
<b>ROBO033</b>	<b>Frugal Flight: Indoor Stabilization of a Computationally Independent Drone without GPS</b>	<b>ROBO045</b>	<b>Auto Arranger Based on Deep Learning Methods</b>
#	Nikhil Devanathan, 17, Junior, Kennewick High School, Kennewick, WA		Petr Shumnov, 17, Junior, Lyceum 1533 of Information Technologies, Moscow, Russian Federation, Russian Federation
<b>ROBO034</b>	<b>Machine Learning Approach for Harmonizing Songs</b>	<b>ROBO046</b>	<b>Creating Playlists with Artificial Intelligence</b>
	Tommy Winetraub, 17, Junior, Eylon Holon, Holon, Israel		Tobia Ochsner, 19 Senior, Kantonsschule Schaffhausen, Schaffhausen, Switzerland
<b>ROBO035</b>	<b>Bowed Stringed Instrument Raw Audio Synthesis with Generative Neural Networks</b>	<b>ROBO047</b>	<b>ExploreYourMind: Software for Harmonic Combination of Video and Music</b>
##	Benjamin DeVries, 17, Junior, Woods Cross High School, Woods Cross, UT		Nazar Ponochevnyi, 16, Junior, Specialized School #52 in Kyiv with In-depth Study of Information Technology, Kyiv, Kyivs'ka Oblast, Ukraine
<b>ROBO036</b>	<b>Autonomous Maze Solving</b>		
	John Watson, 17, Senior, Elko High School, Elko, NV		

- ROBO048** **Developing a Novel, Accurate, and Rapid Machine Learning-based Skin Disease Diagnosis Algorithm and Mobile Application**  
Raghav Ganesh, 17, Junior, Lynbrook High School, San Jose, CA
- ROBO049T** **Novel Reinforcement Learning Methods in Collaborative Environments** Ashish Rao, 16, Junior, Bidipta Sarkar, 16, Junior, Tejas Narayanan, 16, Junior, Cupertino High School, Cupertino, CA
- ROBO050** **Textual Origin Classification and Implicit Bias Detection with Deep Recurrent Neural Networks**  
Jerry Wei, 15, Sophomore, Oakton High School, Vienna, VA
- ROBO051** **Vision Based Robot System**  
Dhruv Bala, 15, Sophomore, Lane Technical College Prep High School, Chicago, IL
- ROBO052** **PhonoNet: Deep Learning for Raga Identification in Indian Classical Music**  
Sauhaarda Chowdhuri, 16, Junior, Westview High School, San Diego, CA
- ROBO053** **WormBot: Mimicking Earthworm Locomotion**  
# Ari Firester, 16, Junior, Hunter College High School, New York, NY
- ROBO054** **Development of a Machine Learning Algorithm for Generating Random Numbers**  
Abraham Wieland, 17, Junior, Aberdeen Central High School, Aberdeen, SD
- ROBO055** **A Novel Approach to the Diagnosis of Heart Disease Using Machine Learning and Deep Neural Networks**  
Sahithi Ankireddy, 15, Sophomore, James B. Conant High School, Hoffman Estates, IL
- ROBO056** **Design and Analysis of Fast Algorithms for Interactive Machine Learning**  
Jagdeep Bhatia, 16, Junior, Watchung Hills Regional High School, Warren, NJ
- ROBO057** **Horus: Using Sensor Fusion to Combine Infrastructure and On-Board Sensing to Improve Autonomous Vehicle Safety**  
Sanjay Seshan, 16, Sophomore, Fox Chapel Area High School, Pittsburgh, PA
- ROBO058** **Using Machine Learning to Diagnose Fatigue**  
Akshat Shah, 16, Junior, Little Rock Central High School, Little Rock, AR
- ROBO059** **Looking through Walls with Artificial Intelligence: An Innovative Solution for Real-Time Retrieval of the Human Figure behind Visual Obstruction**  
# Kevin Meng, 16, Junior, Plano West Senior High School, Plano, TX
- ROBO060** **Feeding Robot Using Image Processing Technology for Parkinson Patients**  
Long Vu, 17, Senior, Lao Cai High School No. 1, Lao Cai, Vietnam
- ROBO061T** **An Alternate Approach to Predict Elections beyond the Poll**  
Zachary Nowak, 18, Senior, Ethan Saari, 18, Senior, Governor's School at Innovation Park, Manassas, VA
- ROBO062** **Enhancing Wind Power Predictions by Using Weather Data and Improving LSTMs**  
# Maximilian Du, 16, Junior, Fayetteville-Manlius High School, Manlius, NY
- ROBO063** **The Next Artificial Intelligence Revolution: AI Making Decisions without Human Models or Knowledge of Rules to Create Completely Independent Solutions**  
Michael Brockman, 16, Sophomore, Bartlesville High School, Bartlesville, OK
- ROBO064T** **Optimizing Cell Quantification in Biological Assays Using a Convolutional Neural Network**  
Varun Pai, 17, Senior, Vineel Vanam, 17, Senior, Vatsal Varma, 18, Senior, Ardrey Kell High School, Charlotte, NC
- ROBO065** **Real-Time Monitoring of Physical Activity Using Accelerometer Data**  
Dennis Lee, 16, Junior, The Mississippi School for Mathematics and Science, Columbus, MS
- ROBO066** **myRadioloGIST: Early Detection of Lung Cancer from Hidden Gist Signals in CT Scans with Deep Neural Networks and Transfer Learning**  
## Eshika Saxena, 17, Senior, Interlake High School, Bellevue, WA
- ROBO067T** **Implementing LiDAR in Simultaneous Localization and Mapping Systems**  
Gareth Starratt, 15, Sophomore, Julian McOmie, 15, Sophomore, Camas High School, Camas, WA
- ROBO068T** **Development of Software for Mental Illness Diagnostics: Facial Expression Classification through Machine Learning**  
Geela Margo Ramos, 17, Senior, Fabio Ibanez, 15, Sophomore, Miramar High School, Miramar, FL
- ROBO069T** **Maximizing the Potential of a Recycling Machine Using Image Classification**  
Alvin Kang, 18, Senior, Jee Soo Baik, 16, Junior, Sejong Science High School, Seoul, South Korea
- ROBO070** **sEMG Classification and Prosthetic Hand**  
# Yeom Jangun, 17, Junior, Gyeongsin High School, Daegu, Gyeongsang, South Korea
- ROBO071** **KEVAN: Kevan the Efficient Videogame-Playing Artificially Intelligent Neural Network**  
Megan Beyer, 17, Junior, Litchville-Marion High School, Marion, ND

- ROBO072T GloveSpeaker**  
 Nurdaulet Taumergenov, 16, Sophomore,  
 Karen Dolmagambetov, 17, Junior,  
 Nazarbayev Intellectual School, Aktobe,  
 Aktobe, Kazakhstan
- ROBO073T Universal Device for the Blind**  
 Mariam Bakhtadze, 15, Sophomore,  
 Anna Kalandarishvili, 15, Sophomore,  
 Milana Gagulia, 16, Sophomore,  
 St. Alexi Shushania's School-Gymnazium, Senaki,  
 Samegrelo Zemo-Svaneti, Georgia
- ROBO074 Positively Identifying Species Using CNNs and  
 Hypernetworks to Aid Wildlife Conservation Efforts**  
 Aditya Radhakrishnan, 16, Sophomore, Suguna PIP  
 School, Coimbatore, Tamil Nadu, India
- ROBO075T Underwater Budget Drone**  
 Ahmad Zafran bin Faisal, 17, Junior,  
 M. Bahari Muhammad Adib Syahmi Bin, 17, Senior,  
 Sekolah Sultan Alam Shah, Putrajaya,  
 Wilayah Persekutuan, Malaysia
- ROBO076 Robotic Revolution in the Construction Industry: An  
 Autonomous Roof Shingling Robot**  
 # Joseph Saturnino, 16, Sophomore, Bishop Ryan  
 Catholic Secondary School, Hannon, Ontario, Canada
- ROBO077T Diagnosing Plant Diseases Using Convolutional  
 Neural Network**  
 Huy Do, 16, Junior,  
 Nguyen Nam Khoa Pham, 7, Junior,  
 Le Quy Don High School for the Gifted, Da Nang,  
 Da Nang, Vietnam

## Systems Software

- SOFT001** **Development of a Highly Parallel BEM-Solver**  
Robin Christ, 18, Senior, Lessing Gymnasium  
Lampertheim, Lampertheim, Hessen, Germany
- SOFT002** **A Brain-Computer Interface Application for the Assessment of Cognitive Aging**  
Saraswati Sridhar, 15, Sophomore, Southwestern  
Educational Society, Mayaguez, Puerto Rico
- SOFT003** **Digital Image Denoising Based on Sphere-Constrained Total Variation Optimization with an Additional Noise Component**  
Ivaylo Zhelev, 19 Senior, High School of Mathematics  
and Nature Sciences "Vasil Levski", Smolyan, Bulgaria
- SOFT004** **Lava Lamp Based User Authentication in Chat Room**  
Marten Reinaas, 16, Freshman, Rapla Kesklinna Kool/  
Rapla Basic School, Rapla, Rapla County, Estonia
- SOFT005** **Stock Up: Connection of the Manufacturer with the Buyer Bypassing the Mediator**  
Ruslan Bayramov, 16, Sophomore, Lyceum Named after  
Academician Zarifa Aliyeva, Baku, Azerbaijan
- SOFT006** **Distributed Creation of Machine Learning Agents for Blockchain Analysis**  
# Zvezdin Besarabov, 18, Senior, National School of  
Mathematics and Natural Sciences, Sofia,  
Sofia-City, Bulgaria
- SOFT007T** **Visual Control**  
Jose Garcia Ibarra, 17, Senior,  
Cristian Rodriguez Castillo, 18, Senior,  
Juan Perez Martinez, 18, Senior,  
Colegio de Estudios Cientificos y Tecnologicos del  
Estado de Coahuila, Allende, Coahuila, Mexico
- SOFT008** **Blockchain Optimization Model Based on Consistent Hash Algorithm**  
Chang Su, 17, Junior, Shimen Middle School, Nanhai,  
Guangdong, China
- SOFT009** **Automatic Mosaic and Real-time Measuring System for UAV Images**  
Zeqing Yuan, 17, Junior, Xiamen No.1 High School of  
Fujian, Xiamen, Fujian, China
- SOFT010T** **Preventing Left Turn Road Accidents Using Photosensory Technologies and Computer Vision**  
Humza Salim, 16, Sophomore,  
Yousuf Ahmad, 16, Sophomore,  
T.C. Jasper High School, Plano, TX  
Jasper High School, Plano, TX
- SOFT011** **The Encryption and Decryption of Messages with an Intelligent Chatbot through the Usage of Polygraphs**  
Srikar Parsi, 15, Sophomore, Strawberry Crest High  
School, Dover, FL
- SOFT013** **A Secure Implementation of Mendelian Randomization via Multi-Party Computation**  
## Divya Amirtharaj, 17, Senior, Westview High School,  
Portland, OR
- SOFT014** **Enhanced Image Caption Using Scene-Graph Generation**  
Feiyu Zhu, 17, Junior, The High School Affiliated to  
Renmin University of China, Beijing, Beijing, China
- SOFT015T** **PanOculus: A Novel, Multifaceted Diagnostic Tool for Skin Cancer, Diabetic Retinopathy, and Otitis Media**  
Abhinav Sinha, 16, Sophomore,  
Naail Lakhani, 16, Sophomore,  
Jayanth Pratap, 16, Sophomore,  
John Foster Dulles High School, Sugar Land, TX
- SOFT016** **It's Break Time: An Iris-Based Eye Fatigue Monitor**  
Yufeng Sun, 17, Junior, The Experimental High  
School Attached to Beijing Normal University, Beijing,  
Beijing, China
- SOFT017** **Helping the Environment through the Use of Web Development and Machine Learning**  
Timoteo Sumalinog III, 17, Senior, Waipahu High School,  
Waipahu, HI
- SOFT018** **A New Algorithm for Generating Gray Code: Chinese Rings Approach**  
Tsz Tung Tsei, 17, Sophomore, Maryknoll Fathers'  
School, Hong Kong, China, Hong Kong Special  
Administrative Region
- SOFT019T** **E.S.-Deaf: Home Emergency Device for the Deaf**  
Mario Mayorga, 16, Sophomore,  
Fernanda Munoz, 16, Sophomore,  
Liceo Bicentenario San Jose UR, Puerto Aysen, Chile
- SOFT020** **Myelofon: Way of Expressing Thoughts for the People with Speech Disorders**  
# Daniil Kazantsev, 16, Sophomore, Municipal Lyceum  
#12, Ekaterinburg, Russian Federation
- SOFT021T** **Classroom 2.0**  
Karen Huaman Quintana, 16, Sophomore,  
Jhorch Quispe Laura, 17, Sophomore,  
Luis Alberto Sanchez, Chincheros, Apurimac, Peru
- SOFT022T** **Sign Language Translator**  
Arda Mavi, 18, Senior,  
Zeynep Dikle, 17, Senior,  
Ayranci Anadolu Lisesi, Ankara, Cankaya, Turkey  
Nazmi Arikan Fen Bilimleri High School, Ankara,  
Cankaya, Turkey
- SOFT023** **A Deep Learning-Based Drowning Detection Method for Dynamic Swimming Pool Environments Using Spatiotemporal Neighborhood Analysis**  
# Jessica Yu, 17, Senior, West Linn High School,  
West Linn, OR
- SOFT024T** **Developing a Twitter 'Bot' Identification Application for Public Use**  
# Adam Rilatt#, 16, Junior,  
Daniella Feistritz#, 16, Junior,  
Central York High School, York, PA

<b>SOFT025T</b>	<b>Inclusive Translator for People with Hearing Impairment</b> David Monge_Ricaurte, 17, Junior, Diego Reyes_Caton, 18, Junior, Marcos Mata_Baltodano, 17, Junior, CTP Carlos Manuel Vicente Castro, Golfito, Puntarenas, Costa Rica	<b>SOFT036</b>	<b>Multifactorial Optimization, Personalized Navigation</b> Bach Nguyen, 18, Junior, Oxford High School, Oxford, MS
<b>SOFT026T</b>	<b>Implementation of Basic Machine Learning and Iterative Algorithms into a Self-Tuning PID System</b> # Joaquin Gomez#, 16, Junior, Paul Martin Oramous, 17, Junior, Benjamin Franklin High School, New Orleans, LA	<b>SOFT037</b>	<b>Exploring the Potential Use of a Novel Integrated ID-Mounted RFID Tag Software System Coupled with Ultrasonic Sensors for Asset Tracking and School Security</b> Lucas Mosher, 18, Senior, Camdenton High School, Camdenton, MO
<b>SOFT027</b>	<b>Through Computer Experiment to Understanding Neural Networks</b> Oleg Kashurin, 16, Sophomore, State Budgetary Educational Institution of the City of Moscow "School No. 777 Named after the Hero of the Soviet Union E. V. Mikhailov", Moscow, Russian Federation	<b>SOFT038</b>	<b>The Method of Automatic Analysis of Information Understanding</b> Artem Agvanian, 16, Sophomore, Mariupol Technical Lyceum, Mariupol, Donetsk' oblast, Ukraine
<b>SOFT028</b>	<b>Exploring a Novel Method of Foveated Rendering in Virtual Reality with an Object Based Approach</b> Varun Aggarwal, 18, Senior, Lake Highland Preparatory School, Orlando, FL	<b>SOFT039</b>	<b>3D Drawer</b> Artem Ageev, 17, Sophomore, Summer Camp LANAT, Moscow, Russian Federation
<b>SOFT029</b>	<b>General Distributed Backtracking Framework for Solving Combinatorial Constraint Satisfaction Problems</b> David Vulakh, 17, Junior, Paul Laurence Dunbar High School, Lexington, KY	<b>SOFT040</b>	<b>Mad Mind Mazes: Video Game to Improve the Academic Performance of Kids Diagnosed with ADHD</b> Gianni Plaza-Pizarro, 17, Senior, The San Juan Math, Science and Technology Center, San Juan, Puerto Rico
<b>SOFT030</b>	<b>Asguardian Cyber: A Customized Cybersecurity Program to Prevent Intrusions from Hackers</b> Thor Gavin, 17, Junior, Academy of Excellence, Sierra Vista, AZ	<b>SOFT041</b>	<b>Weight Friction: A Simple Method to Overcome Catastrophic Forgetting and Enable Continual Learning in Neural Networks</b> ## Gabrielle Liu, 17, Senior, Ravenwood High School, Brentwood, TN
<b>SOFT031</b>	<b>Utilizing High Performance Computing to Implement a Compressed Sensing Algorithm to Better Analyze Exoplanet Data</b> Yosef Alsuhaibani, 17, Senior, Manarat Al-Riyadh, Riyadh, Saudi Arabia	<b>SOFT042T</b>	<b>The Impact of an Interactive Mobile Application on the Quality of Cardiopulmonary Resuscitation</b> Adeel Arif, 17, Junior, Amber Arif, 17, Junior, Ardsley High School, Ardsley, NY
<b>SOFT032</b>	<b>An AI-based System for Discovering Potential Adverse Drug Events Using Open Data</b> # Brandon Fan, 16, Junior, Blacksburg High School, Blacksburg, VA	<b>SOFT043</b>	<b>Using C++ to Code the Baby-Step Giant-Step Decryption Algorithm for RSA and Elliptic Curve Cryptography</b> Sofia Flynn, 18, Senior, Georgetown Visitation Preparatory School, Washington, DC
<b>SOFT033</b>	<b>Mobile Application to Facilitate the Transmission and Interpretation of Biometric Data to Enable the Early Detection of Cardiovascular Disease</b> Andrew Lebowitz, 17, Junior, Solon High School, Solon, OH	<b>SOFT044T</b>	<b>The Fifth Sense: A Novel Aid Device for Visually Impaired People, Translating Computer Vision into Surround Sound for Obstacle Detection</b> Ian Langleben, 18, Senior, Liana Martins-Medina, 18, Senior, Dawson College, Westmount, Quebec, Canada Marianopolis College, Westmount, Quebec, Canada
<b>SOFT034</b>	<b>Visual Analysis of Arbitrary Binary Data</b> Matthew Spiker, 17, Junior, Jefferson High School, Shenandoah Junction, WV	<b>SOFT045T</b>	<b>Developing a 3D Modeling Application Based on a Bezier Surface Reconstruction Algorithm for the Rebuilding of Natural Disaster and War Damaged Areas</b> Raymond Suo, 17, Junior, Naomi Kenyatta, 17, Junior, Allen Wu, 16, Junior, duPont Manual High School, Louisville, KY Horace Mann School, Bronx, NY
<b>SOFT035</b>	<b>Should I Trust What's in My Computer? Using Current Draw Analysis to Identify Malicious Firmware in Solid State Drives</b> Ryan McDowell, 17, Junior, Rockbridge Academy, Millersville, MD	<b>SOFT046</b>	<b>Go0: Reimagining Data, Privacy, and the Internet with Zero-Knowledge Computing and Distributed Systems</b> # Mohammed Suhail China Salimpasha, 18, Senior, The Learning Centre, Mangalore, Karnataka, India

<b>SOFT047T</b>	<b>Design of Analytic Application for Music Therapy Focused on Function between EEG and Sound Using Machine Learning Approaches</b> Hyogi Kim, 16, Sophomore, Dongyeong Kim#, 15, Sophomore, Minseo Eun, 16, Sophomore, Ewha Womans University High School, Seoul, South Korea Korea Digital Media High School, Ansan-si, South Korea Gwangyang Jecheol High School, Gwangyang-si, Jeollanam-do, South Korea	<b>SOFT058</b>	<b>Colorizing Grayscale Photographs with a Neural Network</b> Jaroslav Urban, 19 Senior, Stredni Prumyslova Skola Strojni a Elektrotechnicka a Vyssi Odborna Skola,
<b>SOFT048T</b>	<b>SmartCane Mobile Application for the Wearable White Cane</b> Julia Strauss, 17, Junior, Anna Puca, 17, Junior, Kalamazoo Area Mathematics and Science Center, Kalamazoo, MI	<b>SOFT059</b>	<b>Recovering History: A Multifaceted System to Enhance, Classify and Reconstruct Broken Parts of Artifacts by Using a Custom Machine Learning Ensemble</b> Raghav Puri, 17, Junior, Delhi Public School, Dwarka, Delhi, India
<b>SOFT049</b>	<b>Improved Gate Level Simulation of Quantum Circuits</b> Adam Kelly, 17, Junior, Skerries Community College, Co. Dublin, Ireland	<b>SOFT060</b>	<b>Periphery Sweep Algorithm: Conquering A* Algorithm at Graph Traversal Solutions</b> Richik Sen, 18, Senior, Delhi Public School - Vasant Kunj, New Delhi, Delhi, India
<b>SOFT050T</b>	<b>Approximating the Weight of Sweet Corn Kernels from Digital Images Using Washer Integration</b> Chanikarn Prompat, 18, Senior, Pornchanun Mangmeethanapiboon, 18, Senior, Neeranuch Sudcharoen, 18, Senior, Princess Chulabhorn Science High School Phetchaburi, Cha-Am, Phetchaburi, Thailand	<b>SOFT061</b>	<b>Photon Robot: Developed Algorithms that Turns Light to Data that the Blind's Brain Can Process</b> Lama Abed, 17, Junior, Al- Najah Secondary School, Al- Bireh, Ramallah and Al-Bireh, Palestine
<b>SOFT051</b>	<b>FASTCAT: A Predictive Neural Network Based Fire Size Classifier</b> Dylan Wichman, 17, Junior, Billings Central Catholic High School, Billings, MT	<b>SOFT062</b>	<b>Non-Periodic Pseudo-Random Number Generator Using Sinai Billiards</b> Advay Koranne, 17, Junior, Catlin Gabel School, Portland, OR
<b>SOFT052</b>	<b>Detecting Privacy Violations in Children's Apps Using HPCs</b> # Suha Hussain, 17, Senior, Queens High School for the Sciences at York College, Jamaica, NY	<b>SOFT063T</b>	<b>Wearable One-Handed Typing System: ANAX</b> Seon Yong Oh, 16, Junior, Seongwon Yang, 18, Junior, Daykey High School, Jeju-si, South Korea North London Collegiate School Jeju, Seogwipo-si, Jeju-do, South Korea
<b>SOFT053</b>	<b>Computational Models and Algorithms for Dynamic Resource Distribution</b> Dev Chheda, 15, Sophomore, Ardrey Kell High School, Charlotte, NC	<b>SOFT064T</b>	<b>Alcohol Sensor</b> Rufaro Mutogo, 17, Senior, Tinotenda Zimhunga, 18, Senior, Chisipite Senior School, Harare, Zimbabwe
<b>SOFT054T</b>	<b>Creating a Technological Device that Enhances Autistic Children's Communication Skills</b> Sama Ayoub, 16, Sophomore, Khadija Elmagarmid, 16, Junior, Qatar Academy Senior School, Doha, Al-Rayyan, Qatar	<b>SOFT065T</b>	<b>Computer Vision: To Control Computers' Cursors</b> Gasser Galal, 15, Sophomore, Mostafa Abdelmohaimn, 16, Sophomore, Elnasr Boys' School, Alexandria, Egypt
<b>SOFT055</b>	<b>An Interactive Tool for Self-Studying or Teaching the Inner Workings of a Simple 8-Bit Central Processing Unit</b> Henri Ahola, 15, Freshman, European School Luxembourg 1, Luxembourg, Luxembourg	<b>SOFT066</b>	<b>Development of a High Efficiency Pattern Recognition Algorithm Using Neural Networks</b> Sara Nehring, 15, Sophomore, Monte Vista High School, Monte Vista, CO
<b>SOFT056</b>	<b>Hash Chaining: A Theoretical Model Using Salted Hashes to Generate Ethereal Keys</b> Samuel Berkley, 16, Junior, The Governor French Academy, Belleville, IL	<b>SOFT067</b>	<b>An Adaptive, Low-Cost Device for Automated &amp; Offline Medical Analysis Utilizing Neural Networks with Reinforcement Learning Optimization</b> # Neil Deshmukh, 16, Junior, Moravian Academy, Bethlehem, PA
<b>SOFT057T</b>	<b>Mobile Keyboard Optimized for Two Fingers</b> Vihtori Sova, 17, Junior, Jaakko Takala, 17, Junior, Paivola School of Mathematics, Valkeakoski, Finland	<b>SOFT068</b>	<b>EducationGo</b> Saad Mankarious, 17, Junior, Assuit Science, Technology, Engineering and Mathematics High School, Assuit, Mankabad, Egypt



## Translational Medical Science

- TMED001** **The Effects of Different Glucose Ketone Index (GKI) Values on the Proliferation of VM-M3 Brain Cancer Cells**  
Cheyenne Shirley, 14, Freshman, South Sumter High School, Bushnell, FL
- TMED002** **Investigating the Effects of Chaga Mushroom Extracts on the Development of a Specific Tumor Cell Line**  
Bailee Foster, 18, Senior, Greybull High School, Greybull, WY
- TMED003T** **Reaction of Mast Cells in the Presence of Particulate Matter from Panama City Air Samples**  
Paula Palacios, 18, Senior,  
Natalia Cassino, 16, Senior,  
Colegio Real de Panama, Panama, Panama
- TMED004** **Process Development for Thermographic Breast Cancer Diagnostics**  
Jule Thaetner, 19 Senior, Elisabeth-Knippling-Schule Kassel, Kassel, Germany
- TMED005** **Developing Diagnostic Tools for Vascular Disease Using RNA Markers, Year Two**  
##  
Brindha Rathinasabapathi, 17, Junior, Eastside High School, Gainesville, FL
- TMED006** **Battling Blindness in Premature Babies: An Image Processing and Machine Learning Based Application for Early Detection and Prevention of Retinopathy of Prematurity**  
#  
Ishaan Maitra, 17, Junior, North Carolina School of Science and Mathematics, Durham, NC
- TMED007** **Determining the Cytotoxicity and Mechanism of Novel Piperlongumine Analogs**  
Spoorthy Good Reddy, 17, Senior, Fairview High School, Boulder, CO
- TMED008** **The Protective Effects of Insulin in Cardiomyocytes against Iron-mediated Cell Death**  
Carina Tanaka, 18, Senior, Kamehameha Schools Kapalama Campus, Honolulu, HI
- TMED009** **Neural Networks and Cancer Detection**  
Iwalani Campbell, 15, Sophomore, President William McKinley High School, Honolulu, HI
- TMED010** **Deployment of a Scalable Single Shot Detector (SSD) Mobile Architecture for the Localization and Classification of Pneumonia Chest Radiographs**  
Daniel Fleury, 17, Junior, John Marshall High School, Rochester, MN
- TMED011** **Characterizing Matcha Green Tea as an Anti-Cancer Agent**  
#  
Michael Hwang, 17, Junior, Jenks High School, Jenks, OK
- TMED012** **Development of a Recombinase Polymerase Amplification, Lateral Flow Assay to Detect *Angiostrongylus cantonensis* in Slug Tissue**  
Elizabeth Atkinson, 18, Senior, Hilo High School, Hilo, HI
- TMED013** **Using Dendrimers and PLGA Nanoparticles for Targeted Drug Delivery to Treat Neuroinflammation**  
Bridget Li, 16, Junior, Vandegrift High School, Austin, TX
- TMED014T** **ADIRIS: Alzheimer's Disease Screening through the Iris**  
#  
Raad Kloob#, 17, Junior,  
Hala Al-Jaberi, 17, Junior,  
Jubilee School, Amman, Jordan
- TMED015T** **SHAMA: Strabismus Horner Anisocoria Miosis Application**  
Mo'Men Gazlate, 17, Junior,  
Mira Al Qousi, 17, Junior,  
Jubilee School, Amman, Jordan
- TMED016** **Transdermal Lactate Collection with Agarose Gels for Noninvasive and Painless Monitoring of Patients**  
Sina Moshfeghi, 17, Senior, Palos Verdes Peninsula High School, Rolling Hills Estates, CA
- TMED017** **G-CSF as a Preventative Treatment for Traumatic Brain Injury in *Drosophila melanogaster***  
#  
Beril Saygin, 17, Junior, Keystone School, San Antonio, TX
- TMED018** **Tender Coconut Water Inhibits the Growth of HepG2 Cancer Cell by Reversing 'Epithelial to Mesenchymal Transition' Process**  
#  
Vaitheesh Jaganathan, 17, Junior, Ballard High School, Louisville, KY
- TMED019** **Reconstituted High-Density Lipoproteins for the Treatment of Pediatric Cancer**  
#  
Ruhani Ahluwalia, 15, Sophomore, Harmony School of Innovation - Fort Worth, Fort Worth, TX
- TMED020** **A Novel Approach to Assessment and Classification of Pulmonary Function in Early Onset Scoliosis**  
Ananya Ganesh, 17, Junior, The Westminster Schools, Atlanta, GA
- TMED021** **Inhibition of UCP2 Suppresses Cell Proliferation and Migration of Cholangiocarcinoma through the Regulation of Epithelial-Mesenchymal Transition**  
Lawrence Shi, 17, Senior, Caddo Parish Magnet High School, Shreveport, LA
- TMED022** **CRISPR/Cas9-Mediated Knockout of AEG-1 Promotes Sensitivity to Sorafenib in Human Hepatocellular Carcinoma (HCC)**  
#  
Anusha Puri, 16, Junior, Science, Math, and Technology Center at Mills E. Godwin High School, Henrico, VA
- TMED023** **The SMART System: Magnetic Deflection and Absorption Shielding of Treatment Contaminants to Enhance Radiotherapy Cancer Patient Outcomes by Reducing Normal Tissue Injuries**  
###  
Macinley Butson, 18, Senior, The Illawarra Grammar School, Mangerton, NSW, Australia

<p><b>TMED024</b>    <b>Priming the Tumor Microenvironment with Cyclophosphamide to Enhance Nanoparticle Delivery: An Imaging Study</b> Renner Kwittken, 18, Senior, Byram Hills High School, Armonk, NY</p>	<p><b>TMED035</b>    <b>A Fast, Sensitive, and Non-Invasive Approach to Detecting Breast Cancer Using a Fully Convolutional Neural Network</b> Ishana Shastri, 17, Senior, Poolesville High School, Poolesville, MD</p>
<p><b>TMED025</b>    <b>Diagnosis of Various Diseases Using Neural Network Classification Based on Retinal Fundus Images</b> # Aneesh Gupta, 17, Senior, Oregon Episcopal School, Portland, OR</p>	<p><b>TMD036T</b>    <b>A Novel and Innovative Chemical Strategy for Mosquito Repellent Cotton Textiles</b> Suneetha Murje Prabhu, 15, Sophomore, Sanjeev Hotha, 14, Freshman, Sri Dharamasthala Manjunatheshwara English Medium School, Mangalore, Karnataka, India Kendriya Vidyalaya Ganeshkhind, Pune, Maharashtra, India</p>
<p><b>TMED026T</b>    <b>Phytodermsunscreen</b> Alejandro Garcia Colorado, 19, Senior, Gabriela Marin Martinez, 17, Senior, Centro de Bachillerato Tecnológico Industrial y de Servicios No. 165, Coatepec, Veracruz, Mexico</p>	<p><b>TMED037</b>    <b>Serotonin and Cortisol Response in Relation to Ashwagandha Root Treatment in <i>C. elegans</i>: A Model Organism for Antidepressant Studies</b> Ellie Chibirka, 18, Senior, Conrad Weiser High School, Robesonia, PA</p>
<p><b>TMED027</b>    <b>Sharks Take a Bite Out of Infection! An Antibacterial, Reusable Bandage for Post-Operative Patients</b> ## Hannah Herbst, 18, Senior, Florida Atlantic University High School, Boca Raton, FL</p>	<p><b>TMED038</b>    <b>Investigating the Potentially Lethal Effects of Kratom When Combined with Over the Counter Medications and Readily Available Household Products on <i>Daphnia</i> Heart Rate to Mimic the Dangers of Teen Drug Fabrication and Abuse</b> Jay Hunter, 17, Senior, Cato-Meridian, Cato, NY</p>
<p><b>TMED028</b>    <b>Development of Smart Bandages to Control the Healing Process of Chronic Wounds</b> Pablo Vidal, 17, Junior, UTRGV Mathematics and Science Academy, Edinburg, TX</p>	<p><b>TMED039</b>    <b>Tuning Vaccine Physical Properties to Improve Anti-tumor Response Using Polyplexes</b> Allie Amerman, 17, Senior, Wheaton High School, Silver Spring, MD</p>
<p><b>TMED029</b>    <b>Hexokinase Domain Containing 1 (Hkdc1): A Metabolic Regulator of Nonalcoholic Fatty Liver Disease (NAFLD)</b> Caroline Yu, 17, Senior, Jericho High School, Jericho, NY</p>	<p><b>TMED040</b>    <b>A Novel Peptide Drug as a Therapeutic in Sickle Cell Anemia</b> Rutik Thorat, 18, Senior, Dayanand Anglo Vedic Public School, Navi Mumbai, Maharastra, India</p>
<p><b>TMED030</b>    <b>Going Green to Prevent Breast Cancer: The Effect of Epigallocatechin Gallate (EGCG) on Tumor Growth in <i>Planaria</i></b> Ellia Sweeney, 16, Sophomore, Bishop Feehan High School, Attleboro, MA</p>	<p><b>TMED041</b>    <b>Tampr-X: A Novel Technology to Combat Prescription Opioid Abuse</b> Aditya Tummala, 14, Freshman, Brookings High School, Brookings, SD</p>
<p><b>TMED031</b>    <b>Bioactive Catheter to Prevent Systemic Infection Using Cashew Nut Shell Liquid (CNSL)</b> Ekarinny Medeiros, 18, Senior, Escola Estadual Professor Hermogenes Nogueira da Costa, Mossoro, Rio Grande do Norte, Brazil</p>	<p><b>TMED042</b>    <b>EyeSpy Diagnosis: Developing a Smartphone-Based Non-Invasive Intelligent Device and Application for the Accurate and Affordable Diagnosis of Eye Fundus Anomalies via Machine Learning</b> # Kabir Jolly, 17, Junior, College Park High School, The Woodlands, TX</p>
<p><b>TMED032</b>    <b>Site-Specific Delivery of Immune Agonists for Antitumoral Response of the Tumor Microenvironment</b> Shruthi Ravichandran, 15, Sophomore, Hathaway Brown School, Shaker Heights, OH</p>	<p><b>TMED043</b>    <b>Investigating the Role of the Cat-2 Gene in Substance Dependence</b> Zakwan Khan, 18, Junior, Woodstock High School, Woodstock, GA</p>
<p><b>TMED033</b>    <b>Investigating the Use of Pelargonium sp. in Haemostatic Wound Dressing to Decrease Platelet Activation Time in Swine Blood</b> Lerissa Brits, 17, Junior, Diamantveld High School, Kimberley, Northern Cape, South Africa</p>	<p><b>TMED044</b>    <b><i>Ficus exasperata</i> Vahl: A Health Resource for Diabetes</b> Balikis Lawal, 15, Junior, Doregos Private Academy, Lagos, West Africa, Nigeria</p>
<p><b>TMED034</b>    <b>A Lung Cancer Prediction and Detection System Using Nodule Based Methods and Machine Learning Algorithms</b> # Sathvik Nallamalli, 15, Sophomore, Olympia High School, Olympia, WA</p>	

- TMED045T** **TMZ+X: siRNA-based Synthetic Lethal Screening and Synergism with TMZ as a Novel Approach to Inhibition of Proliferation in GBM**  
Arnav Garyali, 17, Junior,  
Adarsha Pokkulandra, 18, Senior,  
Dulles High School, Sugar Land, TX
- TMED046T** **An Automated Microfluidic Platform for Food Safety and Human Allergy Analysis**  
# Hoi Ian Hui, 16, Sophomore,  
Chun Hei Fong#, 15, Sophomore,  
Pui Ching Middle School, Macau, China, Macao Special Administrative Region
- TMED047T** **Kanna: A Deep Learning Approach for Screening Amblyopia Using Facial Images** Viswesh Krishna,  
18, Senior,  
Vrishab Krishna, 16, Sophomore,  
National Public School, Indiranagar, Bangalore,  
Karnataka, India
- TMED048** **DOPA Reaction with Vacuum Filtration as a New Method for Diagnosing of Circulating Melanoma Cells and Metastasis**  
Olha Kharasakhal, 17, Junior, Mariupol Technical Lyceum, Mariupol, Ukraine
- TMED049** **A New Method to Study the Human Microbiome**  
# Isabelle Chambers, 16, Junior, Woodhaven Academy,  
Fargo, ND
- TMED050** **Can the Longevity Compound Rapamycin Rescue Brain Tissue in Age-Related Diseases in Old Mice?**  
Chinmayi Balusu, 16, Senior, Vista del Lago High School,  
Folsom, CA
- TMED051** **Identifying and Drug Susceptibility of Gram-Negative Bacteria Found in *Bactrocera xanthodes* (Pacific Fruit Fly)**  
## Da In Myung, 18, Senior, South Pacific Academy,  
Pago Pago, American Samoa
- TMED052** **Ultrasensitive Detection of Early-Stage Cancer Using ctDNA Sequencing with UMIs**  
Elizabeth Ding, 16, Junior, Lexington High School,  
Lexington, MA
- TMED053** **Chaga Mushroom Extract as an Inhibitor of HNSCC Cell Migration**  
Victoria Dushane, 18, Senior, Sherman Indian High School, Riverside, CA
- TMED054** **Transforming *in vitro* Studies of Hypertonic Dextrose Injections for Osteoarthritis: A Wide Range Investigation of Effective Dose with a Physiologically Relevant Model**  
Elisha Johnston, 15, Sophomore, Palos Verdes Peninsula High School, Rolling Hills Estates, CA
- TMED055T** **Study on Chemical Composition, Preventive and Treatment Effects of *Blumea lacera* Extract on Experimental Chronic Renal Failure**  
Linh Trinh, 15, Sophomore,  
Van Cuong Tran, 17, Junior,  
HUS High School for Gifted Student, Hanoi, Vietnam

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