



# THINK BEYOND

**Intel Science Talent Search  
2016 Semifinalists**



# 2016 SEMIFINALISTS

The Intel Science Talent Search (Intel STS), a program of Society for Science & the Public, is the nation's most prestigious pre-college science competition. Alumni of STS have made extraordinary contributions to science and hold more than 100 of the world's most distinguished science and math honors, including the Nobel Prize and the National Medal of Science. Each year, 300 Intel STS semifinalists and their schools are recognized. From that select pool of semifinalists, 40 student finalists are invited to Washington, DC in March to participate in final judging, display their work to the public, meet with notable scientists, and compete for awards, including the top three awards of \$150,000 each.

**ALABAMA****Birmingham****Alabama School of Fine Arts****He, Adam, 17**

Investigation of the Orbital Stability of Circumbinary Planets in the Habitable Zone of Kepler-16

**Huntsville****Covenant Christian Academy****Prevost, Drew, 18**

Design and Construction of a Scalable Active Battery Management System for Electric and Hybrid Electric Vehicles

**ARIZONA****Chandler****Chandler Preparatory Academy****Boisvert, Katelyn, 17**The Impact of Rising Sea Surface Temperature and Altered Nutrient Availability on the Abundance and Growth Behavior of the Phytoplankton *Thalassiosira***Hamilton High School****Rudrapatna, Akshata, 18**

Applying Viral Nanoparticles in a Treatment Vector for Alzheimer's Disease Using Molecular Dynamics Simulations

**Phoenix****Desert Vista High School****Shen, Simon Polaris, 17**

Single Cell Motion Characterization System – a New, Automated Tool for High Throughput Studies of Surface-bound Bacteria

**Yuma****Carpe Diem Collegiate High School****Jawaid, Zeeshan, 16**Comparison Between Pleistocene Horse (*Equus, Perissodactyla*) Populations from Sonora, Mexico and Rancho La Brea, Southern California Testing Bergmann's Rule Using Second Phalanges**CALIFORNIA****Arcadia****Arcadia High School****Hou, George, 17**

Separating Mixed Signals in Noise-polluted Environments Using Global Optimization

**Atherton****Sacred Heart Preparatory School****Safreno, Dina, 17**

VBee: Vision-based Artificial Pollination

**Cupertino****Cupertino High School****Shen, Ethan, 17**Genetic Lineage Tracing of Axin2<sup>+</sup> Cells Reveals a Stem/Progenitor Cell Population that Executes Skeletal Regeneration**Homestead High School****Guo, Daniel, 17**

Analysis of Heterochiasmy and Recombination Rates in Gibbons

**Monta Vista High School****Cho, Julia Hayoung, 17**Genetically Encoded Bioluminescence Resonance Energy Transfer (BRET)-based Ca<sup>2+</sup> Indicator for *in vivo* and Deep Tissue Imaging

**Monta Vista High School**

***Gupta, Meghal, 17***

Bounding the Extremal Functions of Forbidden Patterns

**Monta Vista High School**

***Jain, Ajay, 17***

Mobile Robot Pursuit and Evasion: Developing a System for Distributed Robotic Chase and Targeting

**Monta Vista High School**

***Srinivas, Pranav, 17***

Boolean Network Modeling for Systematic Identification of Deregulated Pathways and Anticancer Drug Resistance

**Monta Vista High School**

***Zeng, Albert, 18***

Single Molecule X-ray Imaging of Bio Structures

**Danville**

**Monte Vista High School**

***Jain, Varun, 17***

Novel Relationships Between Circular Planar Graphs and Electrical Networks

**Fremont**

**Irvington High School**

***Gopi, Ajay, 17***

A Novel Computer Vision Model for the Estimation of Scene Structure:  
Texture Gradient Estimation

**Mission San Jose High School**

***Chen, Andrew Liu, 18***

Enhancing Imaging Resolution and Depth with Adaptive Optics Focal Modulation  
Two-photon Microscopy

**Fresno**

**Clovis North High School**

***Sandhu, Onkar, 17***

Heart Attacks in Young Adults of Central California

**Irvine**

**Northwood High School**

***Rau, Amrit, 17***

A Time-staggered Combinatorial Antibiotic Treatment Strategy Mitigates MDR Cost  
*in silico*

**Northwood High School**

***Zhu, Clare, 17***

Quantifying the Complexity of Conformational Transitions in the Partial and Biased  
Activation of G-protein-coupled Receptors

**La Canada**

**Flintridge Preparatory School**

***Liu, Vick Cheung, 18***

A Handheld Hematology Analyzer Using Acoustic Enhanced Blood Smear Microfluidic  
Devices

**Flintridge Preparatory School**

***Nakano, Clarence Masato, 18***

Biological Electron-transfer Dynamics in Multiheme Cytochrome Complexes

**Los Angeles**

**Yeshiva University High School of Los Angeles**

***Willner, Asher Justin, 17***

Experimental Demonstration of 20 Gbit/s Efficient Data Encoding and 2 ns Network  
Channel Hopping Using Orbital-angular-momentum Spatial Mode Patterns

<b>Mountain View</b>	<p><b><u>St. Francis High School</u></b>  <b><i>Karthik, Anjini, 17</i></b>  Rapid and Selective Detection of Viruses Using Virus Imprinted Polymer Films</p>
<b>Palo Alto</b>	<p><b><u>Castilleja School</u></b>  <b><i>Sparkman, Lea Margie, 18</i></b>  Studying “Orphan” Globular Star Clusters in the Virgo Cluster of Galaxies</p> <p><b><u>Henry M. Gunn High School</u></b>  <b><i>Cheng, Audrey, 17</i></b>  Enhancing the Efficiency of Self-assembled Organic Solar Cells with the Addition of a Second Electron Donor and Graphene</p> <p><b><u>Henry M. Gunn High School</u></b>  <b><i>Zhou, Sherry, 17</i></b>  Rapid, Low-cost, On-chip Isolation and Enrichment of Exosomes for Early Cancer Detection</p>
<b>Pebble Beach</b>	<p><b><u>Robert Louis Stevenson School</u></b>  <b><i>Caddell, John Chapman Alexander, 18</i></b>  The Leidenpump: A Novel Means of Continuous Fluid Transport</p>
<b>Pleasanton</b>	<p><b><u>Amador Valley High School</u></b>  <b><i>Shimanuki, Luke, 17</i></b>  A New Algorithm for the Optimization of Autonomous Vehicle Routing</p> <p><b><u>Amador Valley High School</u></b>  <b><i>Tu, Catherine, 17</i></b>  Computer Aided Analysis of Massive Mutation Data of TP53 Tumor Suppressor Gene — Proposing the Disturbed Biological Off-balance State Theory of Carcinogenesis</p>
<b>Sacramento</b>	<p><b><u>Mira Loma High School</u></b>  <b><i>Aggarwal, Muskaan, 18</i></b>  Activation of TMEM16A Calcium Activated Chloride Channel by Divalent Cations</p> <p><b><u>Mira Loma High School</u></b>  <b><i>Burch, Claire Bernadette, 17</i></b>  A Two-filter Photometric Approach for Detection of Candidate Hot Jupiter Exoplanetary Systems: Applying Lomb-Scargle and Box-fitting Least Squares Analysis to Gravitational Lensing</p>
<b>San Diego</b>	<p><b><u>Canyon Crest Academy</u></b>  <b><i>Vaughn, Julie Renee, 17</i></b>  Chemically Patterned Paper-based Microfluidic Devices for Point-of-care Diagnostics</p> <p><b><u>Francis W. Parker School</u></b>  <b><i>Bose, Anoushka, 17</i></b>  Constraining the Extragalactic Background Light Spectrum Using a Delta Gamma Model</p>
<b>San Jose</b>	<p><b><u>Bellarmino College Preparatory School</u></b>  <b><i>Bandyopadhyay, Ayan, 18</i></b>  The Effect of Cobalt Biomineralization on Power Density in a Microbial Fuel Cell</p> <p><b><u>Bellarmino College Preparatory School</u></b>  <b><i>Sayana, Anin, 17</i></b>  Accelerating Cancer Immunotherapy: Optimization of an EGFRVIII-based Cancer Vaccine via Computationally-aided Analysis of Proteasome Processing for Improved Glioblastoma Prognosis</p>

**Evergreen Valley High School**

***Revanur, Swetha, 17***

Enabling Precision Medicine with Big Data: Development and Application of Computational Frameworks to Characterize Gene Presence, Function, and Interactions

**Lynbrook High School**

***Ganesh, Durga, 17***

NUSAP1 is a Novel Therapeutic Target for Aggressive Prostate Cancer

**Lynbrook High School**

***Nene, Ajinkya Kishore, 17***

Creation of a Mock Universe: Photometric Astronomy on Simulations

**Presentation High School**

***Varma, Maya, 17***

A Wireless Smartphone-based System for Diagnosis of Pulmonary Illnesses

**The Harker School**

***Kosaraju, Vineet Sai, 17***

Rational RNA Riboswitch Design through a Massive Open Laboratory

**The Harker School**

***Luo, Sophia Yuting, 17***

Integrative Multi-cohort Analysis of Preeclamptic Placenta Identifies Perturbation of the P53 Pathway, Similarity to Certain Cancer Subtypes, and Clinically Relevant Drugs

**The Harker School**

***Ma, Jonathan, 17***

Genomics-based Cancer Drug Response Prediction through the Adaptive Elastic Net

**The Harker School**

***Malladi, Sadhika, 18***

Application of EMDomics to Identify Age-associated Expression and Treatments in Cancer

**San Ramon**

**Dougherty Valley High School**

***Zhang, George, 17***

Identification of Novel Genes Involved in Antitubulin Drug Resistance in Breast Cancer by Functional Genomic Screen

**Saratoga**

**Saratoga High School**

***Li, Alexander, 17***

Coronal Energy Buildup through Sunspot Rotation in Solar Active Region NOAA 11158

**Saratoga High School**

***Tang, Dorrie, 17***

Design, Implementation, and Evaluation of a Social Networking Application Running on Named Data Networking

**Saratoga High School**

***Zhang, Kristine Alexandra, 17***

A New Molecular Model for Amyloid Beta-Congo Red Interaction: Implications for Diagnosis and Inhibition of Brain Plaque Formation in Alzheimer's Disease

**South Pasadena**

**South Pasadena High School**

***Gilmartin, Raymond, 17***

Effect of Laser Focusing-induced Longitudinal Electric Field Components on Rotational Anisotropy Optical Second Harmonic Generation from Crystals

<b>Stanford</b>	<p><b><u>Stanford University Online High School</u></b>  <b><i>Davis, Anne Blythe, 18</i></b>            Effects of Conductivity on Phytoplankton Concentration and Species Composition in the Presence of Nitrogen and Phosphorus in Lake Mattamuskeet</p> <p><b><u>Stanford University Online High School</u></b>  <b><i>Morgan, Trevor Christopher, 18</i></b>            An Alternative Thermal Maturity Indicator for Black Shale Formations: Nickel-Cobalt Ratios of the New Albany Shale</p>
<b>Torrance</b>	<p><b><u>West High School</u></b>  <b><i>Devalapurkar, Sanath, 15</i></b>            Algebraic K-theory Is Stable and Admits a Multiplicative Structure for Module Objects</p>
<b>COLORADO</b>	
<b>Pueblo</b>	<p><b><u>Pueblo West High School</u></b>  <b><i>Sun, Eric, 18</i></b>            A Machine Learning Framework for Calculating Biological Aging Rates and Examining the Human Aging Effect</p>
<b>CONNECTICUT</b>	
<b>Greenwich</b>	<p><b><u>Greenwich High School</u></b>  <b><i>Szabo, Nicholas, 18</i></b>            Investigation of Transition Metal-based Acetylacetonate Species for Optimized Performance of Non-aqueous Redox Flow Batteries</p>
<b>New Haven</b>	<p><b><u>Hopkins School</u></b>  <b><i>Zhou, Michael, 17</i></b>            Prevention of Cellulose Carbonization during Hydrothermal Treatment and Related Catalytic Redox Techniques</p>
<b>Wallingford</b>	<p><b><u>Choate Rosemary Hall</u></b>  <b><i>Klegar, Jacob, 17</i></b>            Bounded Tiling-harmonic Functions on the Integer Lattice</p>
<b>Woodbridge</b>	<p><b><u>Amity Regional High School</u></b>  <b><i>Liu, Helen, 18</i></b>            Developing a Novel Progranulin-derived Biologic for Gaucher Disease</p>
<b>FLORIDA</b>	
<b>Bartow</b>	<p><b><u>International Baccalaureate School</u></b>  <b><i>Ravinder, Divya, 17</i></b>            The Battle Against a Complication of Cystic Fibrosis: A Novel Approach that Uses Natural Substances to Treat Cystic Fibrosis Patients with <i>P. aeruginosa</i> Respiratory Infections</p>
<b>Fort Lauderdale</b>	<p><b><u>Pine Crest School</u></b>  <b><i>Odzer, Nicole, 17</i></b>            Toxicity of Naphthalene, a Polycyclic Aromatic Hydrocarbon, on <i>Porites divaricata</i>: The Effect of a Major Crude Oil Component on Corals Using a Novel Passive Dosing Technique</p>
<b>Gainesville</b>	<p><b><u>Buchholz High School</u></b>  <b><i>Ge, Beverly, 17</i></b>            Novel Chromogenic Vapor Sensors Enabled by Shape Memory Polymers</p>

**Eastside High School**

***Liu, Danielle, 17***

Exploration of the Development of Self-cleaning and Self-assembled Antireflection Coatings

**Oak Hall Private School**

***Sharma, Anu, 18***

Sustainable Green Production of Carboxycellulose Nanofibers

**Miami**

**Christopher Columbus High School**

***Tsaoussis, Simon Peter, 18***

Two Transistor Ternary Random Access Memory - TTTRAM

**Panama City**

**Rutherford High School**

***Li, Shixuan Justin, 18***

Clathrate-assisted Freezing/Melting Seawater Desalination

**Tampa**

**C. Leon King High School**

***Bhethanabotla, Vignesh Chandra, 17***

Enhanced Performance of Er<sup>3+</sup> and Yb<sup>3+</sup> Doped TiO<sub>2</sub>

**Chamberlain High School**

***Parrish, Margaret Katherine, 17***

Design, Construction, and Optimization of a Low-cost Portable Enterococci Test (PET) Kit

**West Palm Beach**

**Oxbridge Academy of the Palm Beaches**

***Grimmett, Maria Elena, 17***

Adsorption of Sulfamethazine by Hypercrosslinked Adsorbent MN250 in Aquatic Systems

**GEORGIA**

**Atlanta**

**The Westminster Schools**

***Sarda, Nilai, 16***

Dynamical Simulations of 3-striped Charged Colloidal Particles

**Milton**

**Cambridge High School**

***Kumar, Parth, 17***

Blended Wing Body Propulsion System Design

**IDAHO**

**Boise**

**Boise High School**

***Marshall, Nathan Charles, 17***

Rapid Climate Change in the Prehistoric Greenhouse World: A Foreshadowing of Our Future?

**ILLINOIS**

**Chicago**

**The University of Chicago Laboratory High School**

***Das, Anjali, 18***

Examining the Genetic Basis of Alzheimer's Disease in the Hutterite Population

**Evanston**

**Evanston Township High School**

***Kashner, Zane Ryan W., 18***

Albedo and Heat Recirculation of Hot Jupiter Exoplanets: The Effect of Phase Shifts

**Naperville**

**Naperville North High School**

***Lin, Michael, 18***

Deployment of Different Industrial Solid Wastes for Carbon Capture and Utilization as Supplementary Cementitious Materials: A Comparative Study



Urbana	<p><b><u>University High School</u></b>  <b>Schiffer, Benjamin, 18</b>            Elucidating the Mechanism of a Human Transcription Factor's Movement Along DNA with Molecular Dynamics Simulations</p>
Villa Park	<p><b><u>Willowbrook High School</u></b>  <b>Nijim, Sally, 17</b>            The Oncogenic Role of Mer in the Nucleus</p>
<b>INDIANA</b>	
Carmel	<p><b><u>Carmel High School</u></b>  <b>Vemuri, Sreya, 17</b>            Effect of Time-dependent Gain and Loss in a PT-symmetric Optical Waveguide Array</p>
Fort Wayne	<p><b><u>Canterbury School</u></b>  <b>Dun, Peter, 17</b>            Harnessing the Prokaryotic CRISPR/Cas Foreign Nucleic Acid Defense System for Antiviral Therapy in Canine Fibroblast Tumor Cells</p> <p><b><u>Homestead High School</u></b>  <b>Devanathan, Nirupama, 17</b>            An Analysis of the Impact of Chlorophyll Levels on the Condition of Crooked Lake, Whitley, and Noble Counties, Indiana</p>
Terre Haute	<p><b><u>Terre Haute South Vigo High School</u></b>  <b>Cui, Tingyue, 17</b>            Torsional Potential Energy Surfaces of Ethane and Butane: Origin of the Rotation Barriers</p>
<b>KANSAS</b>	
Overland Park	<p><b><u>Blue Valley North High School</u></b>  <b>Ding, Yifeng, 17</b>            Cholesterol Overload Impairs Lysosomal Functions in Hepatocytes</p> <p><b><u>Blue Valley Northwest High School</u></b>  <b>Ramanujan, Suruchi Archita, 17</b>            Effect of Bioenergetic Manipulation on SIRT1 Activation</p>
<b>LOUISIANA</b>	
Baton Rouge	<p><b><u>St. Joseph's Academy</u></b>  <b>Bush, Natalie Marie, 17</b>            Mitigation of Hypoxic Ecosystems Using Hemolymph Analysis of <i>Callinectes sapidus</i> and <i>Procambarus clarkii</i> in Relation to <i>Spartina</i> Grasses, Year 2</p>
Shreveport	<p><b><u>Loyola College Preparatory School</u></b>  <b>Kesten, Jacob Garrett, 18</b>            The Effects of Hypoxia and Reoxygenation on Gasotransmitter Signaling Pathways</p>
<b>MAINE</b>	
Bangor	<p><b><u>Bangor High School</u></b>  <b>Brown, Paige, 17</b>            Identifying and Remediating the Sources of Pollution in Impaired Bangor Streams</p>
Bethel	<p><b><u>Gould Academy</u></b>  <b>Maxim, Demetri, 18</b>            Directed Differentiation of Human Pluripotent Stem Cells into Mature Kidney Cells that Form Nephron Structures in Kidney Scaffolds</p>

## MARYLAND

### Baltimore

#### Baltimore Polytechnic Institute

**Le, Kathy, 17**

Activating Mutations in FGFR Leads to a Competitive Advantage in *Drosophila* Germline Stem Cells

### Gaithersburg

#### Quince Orchard High School

**Wakhare, Tanay Vijay, 17**

Sums Involving the Number of Distinct Prime Factors Function

### Greenbelt

#### Eleanor Roosevelt High School

**Rachakonda, Vinaichandra Sai, 17**

Autonomous Robot Bed Bathing

### Poolesville

#### Poolesville High School

**Dixit, Rohan, 18**

Increasing Safety and Accuracy in Automation Systems with Real-time Robot Monitoring

#### Poolesville High School

**Madan, Sanna, 17**

Computational Analysis of Driver Pathway Relationships Across Twelve Major Cancer Types

#### Poolesville High School

**Wang, Emily, 17**

An Enzyme-linked Immunosorbent Assay (ELISA) for Detecting and Differentiating Between H3N2v and Seasonal H3N2 Influenza Viruses

### Potomac

#### Winston Churchill High School

**Hu, Yidong, 17**

Simulation and Design of Spectral-spatial RF Pulses for Fat Suppression in fMRI

### Salisbury

#### James M. Bennett High School

**Li, Michael Yifan, 17**

Deciphering Neural Coding for Sensorimotor Decision-making

### Silver Spring

#### Montgomery Blair High School

**Chen, Eric S., 17**

Tumor Suppressor *BRCA1* Prohibits Replication Catastrophe in Response to Replicative Stress during Pregnancy

#### Montgomery Blair High School

**Fang, Noah Zhou, 18**

Searching for Dusty Clusters of Galaxies in a *Herschel* Catalog

#### Montgomery Blair High School

**Goldschlag, Yaelle, 17**

Top-K Inexact Query Matching in Graph Databases

#### Montgomery Blair High School

**Li, Amy, 17**

Incorporating Space Based Solar Power into a 5.8GHz Wireless Power Transmission Module

#### Montgomery Blair High School

**Lin, Raymond, 17**

T-reflection in Quantum Mechanics

**Montgomery Blair High School****Mong, Arnold, 17**

Exposing Non-classical Properties of the Greenberger-Horne-Zeilinger States in Perfect Correlation Cases

**Montgomery Blair High School****Morris, Brian P., 18**

Adapting the Poisson-influenced K-means Algorithm for a Larger User Base

**Montgomery Blair High School****Yu, Josephine Jessica, 17**

Lattice and Continuum Models of Solitons and Vortices in Bilayer Graphene

**Montgomery Blair High School****Yu, Rona, 18**

Whole Genome Sequencing Analysis of Childhood Disintegrative Disorder

**Towson****Towson High School****Nagib, Marc, 18**Characterization of the Enzymatic Interactions of MICAL<sub>1</sub>: A Monooxygenase Regulator of the F-actin Cytoskeleton**MASSACHUSETTS****Andover****Andover High School****Zhang, Victor Gongjie, 17**

Are Magnetically Active M Dwarf Stars Brighter Than Their Inactive Counterparts?

**Phillips Academy****Tang, Angela, 18**

Novel Thio-urethane Silanes Reduce Polymerization Stress in Light-cured Dental Composites

**Belmont****Belmont Hill School****Kim, Spencer, 18**

Non-invasive Detection of Breast Cancer on a Smartphone

**Boston****The Winsor School****Walsh, Michelle Lian, 18**Design, Fabrication, and *in vitro* Testing of a 3-dimensionally Printed, Biomimetic Patch for Repair of Tympanic Membrane Perforations**Grafton****Hudek Home School****Hudek, Katherine, 17**

Quacee: A New Quantum Programming Language

**Lexington****Lexington High School****Amirault, David, 18**

Better Bounds on the Rate of Non-witnesses of Lucas Pseudoprimes

**Sheffield****Berkshire School****Chakraborty, Shuvam, 18**

III-nitride High Electron Mobility Transistors as a Promising Thermoelectric Material

**Berkshire School****Tolvo, Josiah, 18**An *in vitro* Granuloma Infection Model as an Effective System for Screening Viral Infection in a Complex Matrix

**Worcester**

**Massachusetts Academy of Math and Science**

***Arivudainambi, Aishwarya, 17***

Effects of Curcumin and Piperine on Embryological Development in *Danio rerio*

**Massachusetts Academy of Math and Science**

***Dogar, Mariam, 17***

The Effects of Taurine on the Memory Retention of *D. dorocephala*

**Massachusetts Academy of Math and Science**

***Makaram, Yashaswini, 17***

The Phoney Lift: Using Accelerometers to Identify People

**Massachusetts Academy of Math and Science**

***Punjabi, Amol, 17***

ViaPocket: A New High-accuracy Druggability Predictor and Its Application to Intrinsically Disordered Proteins

**Massachusetts Academy of Math and Science**

***Saini, Sashrika, 17***

Linking GPCRs and Type II Diabetes: Novel ADORA2B Model Utilizing AR2A Multi-sequence Templates

**MICHIGAN**

**Ann Arbor**

**Father Gabriel Richard High School**

***D'Silva, Jeremy Philip, 17***

Modeling Spatial Transmission of Ebola in West Africa

**Skyline High School**

***Menon, Shreya, 18***

Antioxidants in Human Cancers: Differential Effects on Non-coding Intronic RNA Expression

**Beverly Hills**

**Detroit Country Day School**

***Vejalla, Anuush Krishna, 17***

Potential Role of Let-7d in Pericyte Differentiation: Determining a Pathway to Target Neural Stem Cells to Differentiate for the Alleviation of Neurodegenerative Diseases

**Bloomfield Hills**

**International Academy**

***Manga, Bogdan, 18***

Methods to Restore the Initial State of an Entangled Singlet Spin System After a Measurement with Applications in Quantum Cryptography

**Novi**

**Novi High School**

***Wan, Jeffrey, 18***

Entropically Driven Self-assembly of Cube Slices

**Port Huron**

**Port Huron Northern High School**

***Ahmed, Aishah Isabelle, 17***

Physiological and Behavioral Effects of a Neonicotinoid Insecticide and its Transformation Product on a Non-target Keystone Species

**Troy**

**Troy High School**

***Medarametla, Dhruv, 17***

Bounding Norms of Locally Random Matrices

**Troy High School*****Wu, David, 17***

Targeting PARP-1 to Overcome MAP Kinase (MAPK) Phosphatase-1-mediated Cisplatin Resistance in Ovarian Cancer Cells

**Troy High School*****Xu, Justin, 17***

Identifying the Pareto-optimal Solutions for Multi-point Distance Minimization Problem in Manhattan Space

**MINNESOTA**

Eden Prairie

**Eden Prairie High School*****Jons, Carolyn, 17***

Improved Efficiency of Seawater Steam Generation Using Carbon Nanoparticles

Plymouth

**Wayzata High School*****Weng, Jessica, 18***

Effect of APOBEC3B Gene on Tamoxifen and 5-Fluorouracil Resistance in Breast Cancer Cells (MCF-7L)

Rochester

**Mayo High School*****Banerjee, Neehar, 18***Trends in NO<sub>2</sub> and HCHO Over Central America Observed from the Ozone Monitoring Instrument

Stillwater

**Stillwater Senior High School*****Ylitalo, Max, 17***

Experimental Design Optimization of Surfactant Enhanced Waste Paper Hydrolysis

**MISSOURI**

Clayton

**Clayton High School*****Venkatesh, Omkar Gayathri, 18***

Changing the Ion Selectivity of the LGC-53 Receptor: A Prospective Tool for Studying Dopamine Networks

Columbia

**Rock Bridge High School*****Wang, Derek, 18***

Novel Treatment of Ischemia-reperfusion Damage

Kansas City

**Pembroke Hill School*****Li, Kevin H., 17***

Characterization of Lysosomal Trafficking and Distribution in Distal Axons: Establishing a Foundation for Studying Lysosomal Deficits in Major Neurodegenerative Diseases

Manchester

**Parkway South High School*****Zhang, Rachel, 17***

Statistics of Intersections of Curves on Surfaces

**NEBRASKA**

Lincoln

**Lincoln Southeast High School*****Burkey, Kyley, 17***

The Effects of Dietary Nitrate and Sulfate on Methane-producing Microbial Communities in Beef Cattle

**NEW HAMPSHIRE**

Concord

**St. Paul's School*****Wang, Ziheng, 18***

High Throughput Drug Design by a Novel Grid-based Computational Method

<b>Exeter</b>	<b><u>Phillips Exeter Academy</u></b> <b><i>Jagadeesan, Meena, 17</i></b> The Exchange Graphs of Weakly Separated Collections
<b>NEW JERSEY</b>	
<b>Hackensack</b>	<b><u>Academy for the Advancement of Science and Technology</u></b> <b><i>Cho, Min Sung, 17</i></b> Synthesis of Aluminosilicate Particles and Their Effect on Osteoblast Differentiation
	<b><u>Academy for the Advancement of Science and Technology</u></b> <b><i>Gleyzer, Rachel, 17</i></b> Altering Lentiviral Tropism: Design and Implications of a Targeted Drug-delivery System
	<b><u>Academy for the Advancement of Science and Technology</u></b> <b><i>Yang, David Kang Myung, 18</i></b> Role of APOBEC3 in the Diversity and Evolution of Herpes Simplex Virus 1
	<b><u>Academy for Medical Science Technology</u></b> <b><i>Han, Rachael, 18</i></b> Celecoxib Off Label: Novel Use as Adjuvant Therapy in Melanoma
<b>Millburn</b>	<b><u>Millburn High School</u></b> <b><i>Lee, Allen, 18</i></b> Analysis of lncRNA Expression in the Hippocampus Based on Single Nuclei RNA-sequencing
<b>NEW MEXICO</b>	
<b>Las Cruces</b>	<b><u>Las Cruces High School</u></b> <b><i>Park, Edward, 17</i></b> Bio-battery Utilizing Extracellular Charge Transfer of Exoelectrogenic Bacteria
<b>Los Alamos</b>	<b><u>Los Alamos High School</u></b> <b><i>Zhang, Jovan Yang, 18</i></b> Modeling Gas Production in Hydraulically Fractured Shale
<b>Montezuma</b>	<b><u>Armand Hammer United World College of the American West</u></b> <b><i>Ekim, Baris, 18</i></b> Ultrafast Protein Structure Search via Flat Divisive Clustering
<b>NEW YORK</b>	
<b>Accord</b>	<b><u>Rondout Valley High School</u></b> <b><i>Konz, Sean, 17</i></b> A Novel EEG-eye Tracking Based Computer Interface System
<b>Ardasley</b>	<b><u>Ardasley High School</u></b> <b><i>Lee, Philip, 18</i></b> Increased Capacity Needs and the Effects of CBTC Installation on the NYCTA's Subway System
<b>Armonk</b>	<b><u>Byram Hills High School</u></b> <b><i>Berenblum, Sela, 17</i></b> Understanding Emergency Contraceptive Mechanisms of Action: Computational Molecular Modeling of the Progesterone Receptor Against Progesterone Receptor Modulators

**Byram Hills High School****Chang, Kevin, 17**

Determining Resistance Mechanisms in Mantle Cell Lymphoma: The Search for Therapeutic Targets to Combat Acquired Resistance to Apoptosis

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