# REGENERON

# SCIENCE
## TALENT SEARCH

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# REGENERON SCIENCE TALENT SEARCH
## 2023 SCHOLARS

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# 2023 SCHOLARS

The Regeneron Science Talent Search (Regeneron STS), a program of Society for Science, is the nation's most prestigious science and math competition for high school seniors. 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 Regeneron STS scholars and their schools are recognized. From that select pool of scholars, 40 student finalists are invited to participate in final judging, display their work to the public, meet with notable scientists and compete for awards, including the top award of $250,000.

# ALABAMA

**Auburn**      **Auburn High School**
Babu, Shivani, 17
Attenuation of Adipocyte Hypertrophy in a Palmitic Acid-Induced 3T3 Cell Model Through Lupeol Treatment

**Madison**      **Bob Jones High School**
Prabhakar, Ashwin, 17
A Low-Cost Portable and Modular Single-Shot Hyperspectral Imaging System for Characterization of Materials

# ARIZONA

**Gilbert**      **Perry High School**
Shunk, Joshua Logan, 18
Neuron-Specific Dropout: A Deterministic Regularization Technique To Prevent Neural Networks From Overfitting and Reduce Dependence on Large Training Samples

**Oro Valley**      **BASIS Oro Valley**
Kim, Matthew S., 17
Slowing Down Ice Melting From Thermal Radiation via Sustainable, Eco-Friendly Eggshells

# ARKANSAS

**Little Rock**      **Little Rock Central High School**
Iyer, Anu, 18
Systematic Parkinson Audio Recognition Construct (SPARC): A Novel Machine Learning Method To Detect Parkinson's Disease Using Voice in Three Seconds

# CALIFORNIA

**Aliso Viejo**      **Aliso Niguel High School**
Tiwari, Akshata, 17
Non-Invasive Stress Monitoring From Video for Semi-Autonomous Systems

**Arcadia**      **Arcadia High School**
Lu, Cindy, 17
Aberrant Human Gut Microbiome Composition in COVID-19 Disease: A Potential Target for Novel Adjuvant Therapy

     **Arcadia High School**
Peng, Ian, 17
Deactivation of SARS-CoV-2 Surrogates via ACE2-Functionalized Photothermal Absorbents Under Near-Infrared Laser Exposure

**Atherton**      **Menlo School**
Nesamoney, Sean, 17
Neurocognitive Dysfunction in Children and Adolescents With Mental Illness

**Cupertino**      **Cupertino High School**
Agrawal, Ashwika, 17
Hanu: A Low-Cost Computer-Aided Lung Auscultation Apparatus With Automated Diagnosis of Respiratory Illnesses

**Monta Vista High School**
**Sun, Christopher, 17**
Analyzing Multispectral Satellite Imagery of South American Wildfires Using Deep Learning

**Dublin**

**Dublin High School**
**Wu, Samuel Hong, 17**
A Novel Strategy for the Reversal of Tumor Cell Immortality

**Fullerton**

**Sunny Hills High School**
**Kiker, Thaddaeus, 18**
QPOML: Leveraging Machine Learning and Game Theory To Detect and Characterize Quasi-Periodic Oscillations in X-Ray Binaries

**La Jolla**

**Bishops School**
**Hou, James, 17**
Near Real-Time Seismic Human Fatality Information Retrieval From Social Media With Few-Shot Large-Language Models

**Bishops School**
**Xu, Shirley, 17**
A Heuristic Solution to the Closest String Problem Using Wave Function Collapse Techniques

**Los Angeles**

**Archer School for Girls**
**Ponrartana, Alyssa, 17**
The Effects of Bisphenol A (BPA) on Fragile X Syndrome (FXS) Phenotypes in Male and Female Wild-Type and dFMR1 Mutant *Drosophila melanogaster*

**Geffen Academy at UCLA**
**Deer, August, 18**
On Multi-Round Privacy in Federated Learning

**Los Gatos**

**Los Gatos High School**
**Cantu Valadez, Rodrigo, 17**
Investigating the Effects of Carbon-Based RF Aerogels on DSSCs With the Purpose of Increasing Cell Efficiency

**Morgan Hill**

**Oakwood School**
**Love, Maxwell, 17**
Nano-Encapsulation of a Low-Cost Antioxidant Enzyme Potentiates Effective Mitigation of Cigarette Smoking-Induced Oxidative Injury

**North Hollywood**

**North Hollywood High School**
**Cho, Hannah, 17**
Cortical Thicknesses of the Insula and Prefrontal Regions (Precentral Gyrus, Brodmann Area 6, and Caudal Middle Frontal Gyrus) Are Significantly Correlated With Social-Emotional Processing

**Palo Alto**

**Henry M. Gunn High School**
**Lee, Alan, 17**
Connectedness in Friends-and-Strangers Graphs of Spiders and Complements

**Palo Alto High School**
**Lee, Ryan, 18**
Mitochondrial Fission Regulates Structural Plasticity and Synapse Maintenance in Circadian Pacemaker Neurons

**Palo Alto High School**
**Wu, Vivian, 18**
Evaluating the Impact of the Varroacide Formic Acid on Honeybee Foraging Performance

**Pasadena**

**Polytechnic School**
**Hong, Elizabeth, 18**
Representing Space in Different Contexts: A Neural Network Model of the Hippocampus

**Polytechnic School**
**Soatto, Dario Gaitzi, 17**
The Minimum Wage as an Anchor: Effects on Determinations of Fairness

**Pleasanton**

**Amador Valley High School**
**Wang, Xina, 18**
*In silico* Screen and Benchtop 19F Nuclear Magnetic Resonance Spectroscopy-Enabled Kinetic and Mechanistic Studies of the Synthesis of Carmofur and Related 5-Fluorouracil Analogs

**Redwood City**

**Stanford University Online High School**
**Kim, Elane, 18**
Effects of Chemotherapy on the Taste Stem Cell Microenvironment

**Rolling Hills Estates**

**Palos Verdes Peninsula High School**
**Huang, William, 18**
Argus III: A Novel Image Optimization and Augmentation Framework To Enable an Improved Patient Experience for the Next Generation Epiretinal Prosthesis

**San Diego**

**Canyon Crest Academy**
**Krishnamurthy, Hari Hemanth, 17**
Asylum Indicator: Predictive Modeling of Asylum Adjudications in the USA and in the EU To Help Refugees

**Del Norte High School**
**Xu, Ellen, 17**
A Deep Convolutional Neural Network for Kawasaki Disease Diagnosis

**Del Norte High School**
**Zhang, Andrew Y., 17**
A Novel Blood-Based MicroRNA Diagnostic Model With High Accuracy for Multi-Cancer Early Detection

**Rancho Bernardo High School**
**Liu, Anna Lumin, 17**
A Selective Removal of Carboxylated Perfluoroalkyl Substances (PFAS) via Silver-Assisted Coagulation

**Torrey Pines High School**
**Liu, Derek, X., 16**
Arrangements of Simplices in Fine Mixed Subdivisions

**University City High School**
**Schremmer, Bella Rose Marie, 18**
Point Absorber Wave Energy Converter Devices Applied on Pre-Existing Marine Structures: An Economic and Sustainable Energy Solution

**Westview School**
**Nayak, Ayush, 18**
Development of InSb/Si Quantum Dots for Next-Generation Multivalued High-Transport Transistor Technology

**San Francisco**

**Lowell High School**
**Xu, Jeffrey, 17**
Characterizing Structure-Function Relationships in the CCR6/CCL20 Receptor-Ligand Pair

**Lycée Français de San Francisco**
**de Belloy, Madeleine, 17**
Computing the Mosaic Number of Reduced and Non-Reduced Projections of Knots

**Proof School**
**Cho, Aaron, 18**
A Random Forest Supervised Machine Learning Approach for Understanding and Mitigating Health Disparities Arising From the Social Determinants of Health

**San Jose**

**Evergreen Valley High School**
**Srivastava, Saurish, 18**
Scant Evidence for Domain-General Metacognition: A Meta-Analysis

**Evergreen Valley High School**
**Wei, Emmy, 18**
Solving Aliasing-Induced Problems in Convolutional Nonlinear Networks

**Nautilus Academy Homeschool**
**Panidapu, Apoorva, 18**
Short-Interval Sector Problems for CM Elliptic Curves

**Notre Dame High School**
**Yang, Anna, 18**
Smart Bee Colony Monitor: Internet of Things Device and Fusion Convolutional Neural Network for Queen Assessment

**Piedmont Hills High School**
**Li, Jessica, 17**
New Hardware Architectures for Digital Filters and Controllers

**The Harker School**
**Bhowmik, Rohan Tan, 18**
A Multi-Modal Wildfire Prediction and Early-Warning System Based on a Novel Machine Learning Framework

**The Harker School**
**Lan, Alexander, 17**
Designing and Implementing Novel Convolutional and Twin Neural Network Architectures To Decipher the Functional Impact of Noncoding Genetic Variants in Alzheimer's Disease

**The Harker School**
**Maniar, Krish, 18**
DANO (Digital Phenotypic Assessment in Neuro-Oncology): Guiding Treatment Interventions and Forecasting Recurrence for Glioblastoma Patients Using Smartphone-Extracted Mobility Metrics

**The Harker School**
**Ruan, Ashley, 18**
Development of Label-Free Antigen Test for Monkeypox

**The Harker School**
**Viradia, Deeya, 17**
Satellite Observations of $NO_2$ and Surface/Ground Measurements for Indian Cities

**The Harker School**
**Zhu, Sally, 17**
On the Smoothness and Regularity of the Chess Billiard Flow and the Poincaré Problem

**San Mateo**  **San Mateo High School**
**MacAvoy, Alexis Téa, 18**
Biochemical Design, *S. cerevisiae* Genetic Modification, and Lignocellulosic Fiber and Ethanol Yield Analysis of Novel Iceplant Bioethanol for Efficient Clean Energy Production

**San Ramon**  **Dougherty Valley High School**
**Peng, Fiona, 17**
Skewed EleGANce: Implications of CycleGANs Aggravating Biases on Facial Data

**Dougherty Valley High School**
**Yang, Grace, 17**
An Examination of Alzheimer's Disease Pathogenesis Using an APOE4 Stratified and Trajectory Inference-Based Approach

**Saratoga**  **Saratoga High School**
**Fung, Lisa, 17**
Data Fusion for Movement Analytics: Evaluating Mobility Patterns During Wildfire Season Using Coupled Matrix-Tensor Factorization

**Saratoga High Schooll**
**Liu, Bryant, 17**
Deep Learning for Meditation's Impact on Brain-Computer Interface Performance

**Yorba Linda**  **Yorba Linda High School**
**Yang, Tyler Benjamin, 17**
Integrity of Fecal Microbiome Biospecimen Diversity and Composition Across Various Practical Conditions

# COLORADO
**Highlands Ranch**  **STEM School Highlands Ranch**
**Rao, Gitanjali, 17**
A Novel Approach to Early Directional Diagnosis of Prescription Opioid Addiction

**Monte Vista**  **Monte Vista High School**
**Martinez, Marissa Lilianna, 18**
A Habitat Assessment Protocol To Determine Suitability for Southwestern Willow Flycatcher Occupancy in the Northern Rio Grande Watershed

# CONNECTICUT
**Greenwich**  **Convent of the Sacred Heart**
**Di Capua, Jennifer Carmen, 17**
Facilitating Healthcare Access for Latinx Immigrants Using a Novel Smartphone App, Salud por Todos

**Greenwich High School**
**Chang, Stephanie Yien, 17**
A Multi-Omics Approach to Host-Microbe Interactions in Inflammatory Bowel Disease and Targeted Cell-Type Discovery

**Greenwich High School**
**Fogarty, Angie, 17**
Rapid, Visual Detection of Illicit Substances in a Variety of Environments via Competitive, Amine-Responsive Fluorophores

**Greenwich High School**
**Gega, Isabella Angelina, 17**
Synthesis of Polysaccharide-Encapsulated Hydroxyapatite Nanocomposites To Stimulate Plant Growth and Promote Phosphorus Absorption

**Greenwich High School**
**Grover, Ambika, 17**
Design of a Novel, Dual-Functioning, Tissue Plasminogen Activator and Factor XI-Inhibiting Anticoagulant Therapeutic for Rapid Ischemic Stroke Treatment

**Greenwich High School**
**Gupta, Ronit, 17**
Design of a Rapid, Lateral Flow COPD Diagnostic via Detection of Cyto-Keratin 19 Biomarkers

**Stamford**

**King School**
**Krishnan, Gouri, 18**
Energy Loss From Wasted Plastic and Lighting Inefficiency Can Be Reduced Through a Combination of Environmentally Friendly Polymers Created From Biomass and Energy-Saving Electrochromic Windows

**King School**
**Persily, Ben, 17**
Utilizing and Optimizing Prime Editing To Target Endogenous Loci (*CFTR* and *SOX2*) and Ameliorate Genetic Disorders in Pluripotent Stem Cells

**Wallingford**

**Choate Rosemary Hall**
**Kim, Ryan Hwang, 18**
A Novel Affordable Artificial Intelligence of Things System for Real-Time Traffic Optimization and Emissions Reduction

**Choate Rosemary Hall**
**Yang, Ryan Yunrui, 18**
Aggregation in the Mirror Space (AIMS): A Low-Cost, Gossip-Based Distributed Machine Learning Framework

**Woodbridge**

**Amity Regional High School**
**Lu, Melinda Mengjia, 17**
*In vivo* Imaging of Structural Connectivity and Synaptic Density in Alzheimer's Disease

# FLORIDA

**Delray Beach**

**American Heritage School Boca-Delray**
**Balasubramanian, Sruthi, 18**
The Effect of Nicotinamide on the Il-6 Expression and Cell Count of Barrett's Esophagus-Expressing Cells

**American Heritage School Boca-Delray**
**Litman, Elon, 18**
Rational Protein Design by Higher Order Hallucination

**American Heritage School Boca-Delray**
**Wen, Nolan, 17**
Development and Characterization of a Novel Laponite-Enhanced Tannic Acid-Based Hydrogel

**Fort Myers**
**Canterbury School**
**Kendall, Lara Jean, 18**
Analyzing the Viability of Pure Mushroom-Derived Chitosan as an Alternative to Pure Crustacean-Derived Chitosan in Hemostatic Agents

**Gainesville**
**Buchholz High School**
**Gao, Angela Li, 17**
Iron-Modified Biochar Recovers Phosphorus From Wastewater as Fertilizer Through Column Filters and Flow Reactors

**Jacksonville**
**Paxon Senior High School**
**Biswas, Kristi, 18**
Associations of Genetic SNPs With AD, Neuropathology and Gene Expression Offers Novel Insight Into AD

**Oviedo**
**Oviedo High School**
**Nag, Ishika, 17**
Development of an Engineered Face Mask With Optimized Nanoparticle Layering for Filtration of Air Pollutants and Viral Pathogens

**Sebring**
**Sebring High School**
**Huang, Angela, 17**
FadA-Secreting *Fusobacterium nucleatum* as a Marker for Epithelial to Mesenchymal Transition in Colorectal Cancer

**Tallahassee**
**James S. Rickards High School**
**Sentil, Sruthi, 17**
Intelligent Vibroacoustic Monitoring and Interference for Insect Vector Threats Under Learnable Feature Extraction (VibroLEAF): The Case of *Diaphorina citrii*

**Tampa**
**Hillsborough High School**
**Patel, Shloke, 17**
Developing Novel Biologicals With Multiple Modes of Action (BM) To Combat the Early Blight Disease in Tomato *(Solanum lycopersicum)*, Potato *(Solanum tuberosum)* and Bell Pepper *(Capsicum annuum)*

**Viera**
**Viera High School**
**Natarajan, Lavanya, 17**
A Prescriptive IoT Solution To Detect and Mitigate Fugitive Methane Gas in Landfills via a Supervisory Control and Data Acquisition System

# GEORGIA

**Bogart**
**North Oconee High School**
**Li, Michelle, 18**
Exploration of Novel Capsule Depolymerases From Bacteriophage To Combat Antibiotic Resistance in *Klebsiella pneumoniae*

**Jonesboro**

**Elite Scholars Academy**
Pham, Amy, 17
An Eco-Friendly Method of Removing Immiscible Pollutants From Waterways Using Vitamin E and a Magnetic Suspension

**Lawrenceville**

**Gwinnett School of Mathematics**
Yu, Jean, 18
The Role of Ribosomal rRNA Modifications in Ribosome Biogenesis

**Marietta**

**George Walton Comprehensive High School**
Jiao, Catherine Kexuan, 18
The Implications of Smart Tip Nudging: A Data-Driven Behavioral Economic Study

**Peachtree City**

**McIntosh High School**
Sundar, Aadhav, 17
A Feasibility Study of Lightweight Polylactic Acid Fused Deposition Modeled Propeller Prototyping

# HAWAII

**Hilo**

**Waiakea High School**
Tao, Rachel, 17
Identifying the Molecular Mechanisms of a Safer Neuroblastoma Cure Using the Native Hawaiian 'Awapuhi *(Zingiber zerumbet)* Herb

# ILLINOIS

**Aurora**

**Illinois Mathematics and Science Academy**
Nyamwange, Elizabeth, 17
Social and Demographic Disparities in the Adherence of Chronic Hypertension Medication During Pregnancy

**Illinois Mathematics and Science Academy**
Shetty, Amogh, 18
Astrocytes Differentiated From Human Induced Pluripotent Stem Cells Robustly Express the Wnt/β-Catenin Pathway

**Illinois Mathematics and Science Academy**
Tuteja, Sachleen, 17
Investigating Shared Genetic Underpinnings in Autoimmune Diseases of Systemic Lupus Erythematosus, Scleroderma and Rheumatoid Arthritis by Implementing Polygenic Risk Scores on Cohorts Identified Using Electronic Health Record Data

**Chicago**

**The University of Chicago Laboratory High School**
Chen, Corona, 17
Understanding Incidental Microbial Communities Inside Ordinary Concrete Toward Decarbonization

**Oak Park**

**Oak Park and River Forest High School**
Dhillon, Nadya Jasmine, 18
The Effect of a Novel Biomedical Technique on Reprocessing of Duodenoscopes Using Silver Nitrate and Methylene Blue Irradiated With Red Light

**Winnetka**

**New Trier Township High School**
Oh, Madeline, 18
The Role of Natal Kicks in Forming Asymmetric Gravitational Wave Mergers

# IOWA

**West Des Moines**   **Valley High School**
Gu, Claire, 18
Using a Conditional Wasserstein Generative Adversarial Network To Design Meta-Atoms for All-Dielectric Metasurfaces

# KANSAS

**Overland Park**   **Blue Valley North High School**
Chen, Luke Wen-Tsu, 17
Design of a Highly Sensitive Circulating Tumor Cell Assay With Antibody-Functionalized Dendrimers for Urothelial Bladder Cancer

# KENTUCKY

**Bowling Green**   **The Carol Martin Gatton Academy of Mathematics and Science in Kentucky**
Laney, Hannah, 17
Synthesis of *4d*- and *5d*-Based Transition Metal Oxides

**Glasgow**   **Glasgow High School**
Bunch, Emma, 18
Clonal Hematopoiesis of Indeterminate Potential and Solid Tumors in Breast Cancer: An Analysis of Data in the NIH All of Us Research Program

**Lexington**   **Paul Laurence Dunbar High School**
Hariprasad, Varun, 17
Developing a Novel Autonomous Swarm-Based Beach Cleaning Robot

**Paul Laurence Dunbar High School**
Hu, Emily, 18
Structural Dynamic Simulation: Mathematical Modeling of Bridge Deformations Using Analytical Methods

**Louisville**   **duPont Manual Magnet High School**
Mo, Luke Zhang, 16
Susceptibility of Diabetics to Air Pollution: The Role of NLRP3 Inflammasome Activation in the Combined Effects of Ambient Fine Particulate Matter and High Glucose on Alveolar Macrophages

# LOUISIANA

**Shreveport**   **C. E. Byrd High School**
Miller, Chloe Jane, 18
Effects of SOD2 Mimetic (BMX-001) on Myocardial Ischemic-Reperfusion Injury

**Caddo Parish Magnet High School**
Minagar, Andrew Christopher, 18
Novel Imaging Approaches for the Quantification of Changes in Perivascular Space Volume and Morphology in Response to Transcranial Direct Current Stimulation

# MAINE

**Falmouth**   **Falmouth High School**
Wahlig, Patrick Michael, 17
Towards a System for Modeling the Impact of Ocean Acidification on Sea Scallops (*Placopecten magellanicus*) in Massachusetts Bay

# MARYLAND

**Baltimore**

**Baltimore Polytechnic Institute**
**Low, Holland, 17**
The Impacts of Modulating Reaction Time on Active Sensing in Weakly Electric Fish

**Baltimore Polytechnic Institute**
**Rehman, Kaif Ur, 17**
Analysis of Carbon Isotopic Values and Small Shelly Fossils of the Poleta Formation in the Lower Cambrian

**Ellicott City**

**Centennial High School**
**Xing, Emily, 17**
Analysis of Culturally-Exploitative Appeals on Chinese Cigarette Packs

**Mount Hebron High School**
**Shin, Yu, 18**
LRRK2 Phosphorylates Mitochondrial VDAC1 and Its Inhibitor, Olesoxime Alleviates LRRK2 G2018S-Mediated Dopaminergic Neurodegeneration *in vivo*

**Marriottsville**

**Marriotts Ridge High School**
**Yang, Alex, 18**
Global Premature Mortality by Dust and Pollution $PM_{2.5}$ Estimated From the MERRA-2 Aerosol Reanalysis

**Poolesville**

**Poolesville High School**
**Yuan, Andrew, 18**
Assigning Agents To Increase Network-Based Community Diversity

**Silver Spring**

**Montgomery Blair High School**
**Shan, Nathan, 18**
Built-In Injustice: Institutional Bias in Energy Infrastructure and Access

**Montgomery Blair High School**
**Wang, Joshua, 17**
AutoPower: Detecting IoT Malware With Power Measurements

**Montgomery Blair High School**
**Wu, Celine, 18**
Most Significant Factors Associated With Marijuana Use by U.S. High School Students During 1991 to 2019

# MASSACHUSETTS

**Acton**

**Acton-Boxborough Regional High School**
**Goel, Advay, 18**
The Geometry and Limits of Young Partition Flow Polytopes

**Andover**

**Phillips Academy**
**Huang, Michael, 18**
Effective Automated Stellar Substructure Detection Using the Supervised Neural Clustering Algorithm

**Phillips Academy**
**Wang, Claire, 18**
Correlating Spatial Massive Memory and Temporal Massive Memory

**Phillips Academy**
**Yu, Andrew, 17**
Quantum Complexity of Permutations

**Boston**

**Boston University Academy**
**Jin, Alexander, 18**
A SEIRD+V Model for the Effect of Vaccination and Social Distancing on SARS-CoV-2 Infection and Mortality

**Boston University Academy**
**Lu, Alvin, 17**
Dynamic Genome-Scale Metabolic Modelling Reveals Optimal SARS-CoV-2 Resource Partition Ratio

**Boston University Academy**
**Wang, Junyi, 17**
Study of Behaviors of Bilinear Forms Under Field Extensions

**Commonwealth School**
**He, Fenghuan (Linda), 17**
The Impact of Primordial Black Holes on Exoplanet Systems

**The Winsor School**
**Chan, Allison, 17**
Gut Microbial Metabolism of Putrescine Is Associated With Circulating GABA and Odds of Depression

**Dedham**

**Noble and Greenough School**
**Wang, Charles Han, 19**
Association Between Physical Activity and Sedentary Behavior With Depressive Symptoms Among U.S. High School Students

**Lexington**

**Lexington High School**
**Fan, Ho Tin (Alex), 17**
Amending and Continuing the Lonely Runner Spectrum Conjecture

**Lexington High School**
**Ram, Akhila, 18**
Unsupervised Representation Learning of GRACE Improves Groundwater Predictions

**Milton**

**Milton Academy**
**Yang, Anna, 18**
Improved Ethanol Tolerance and Production in Pyruvate Dehydrogenase Mutant of *Saccharomyces cerevisiae*

**Mount Hermon**

**Northfield Mount Hermon**
**Chang, Sheng-Chun (Angus), 17**
An "Artificial Leaf" That Can Generate Oxygen and Electricity

**West Roxbury**

**The Roxbury Latin School**
**Wang, Kevin Ro, 18**
Interpretability in the Wild: A Circuit for Indirect Object Identification in GPT-2 Small

**Worcester**

**Massachusetts Academy of Math & Science**
**Mazumder, Arul Rhik, 18**
An Adaptive Hybrid Quantum Algorithm for the Metric Traveling Salesman Problem

**Massachusetts Academy of Math & Science**
Suchenski Loustaunau, Diego Emilio, 17
*In silico* Design of Novel 2'FANA Oligonucleotides To Inhibit APOBEC3G

# MICHIGAN

**Bloomfield Hills**

**Cranbrook Kingswood School**
Feng, Austin, 17
Pattern of IRG1/*Acod1* Expression in the Tumor Microenvironment as Revealed by Single-Cell RNA Seq Analysis

**Cranbrook Kingswood School**
Hua, Michelle, 18
Novel Self-Supervised Deep Neural Networks for 3D Human Shape and Motion Reconstruction From a Monocular Video

**Saline**

**Saline High School**
Moudgal, Neel, 17
Using Unassigned NMR Chemical Shifts To Model RNA Secondary Structure

# MINNESOTA

**Maple Grove**

**Maple Grove Senior High School**
Arora, Stavya, 17
Overcoming Opioids: Analyzing, Characterizing and Quantifying the Sentiment of Reddit Posts' Tone and Language Prior to a Relapse To Allow for Early Intervention

**Plymouth**

**Wayzata High School**
Chen, Matthew, 18
Mod $p$ Homology of Unordered Configuration Spaces of Surfaces

**Wayzata High School**
Luo, Leon, 17
Does ESG Investing Affect International Capital Flows? Some Evidence From Statistical and Machine Learning Methods

**Woodbury**

**East Ridge High School**
Chen, Kenneth, 17
An Agent-Based Simulation of COVID-19 Transmission and Learning Loss in Schools: Evaluating Mitigation Strategies

# MISSOURI

**Chesterfield**

**Marquette High School**
Chen, Alex, 18
Aural Real-Time Position-Determining Model and Influencing Factors

# NEVADA

**Las Vegas**

**Edward Clark High School**
Zhang, Raymond Ming, 17
A Time-Dependent Method for Calculating Astronomical Spirals: Applications to Eccentric Planets in Protoplanetary Disks

# NEW JERSEY

**Fair Lawn**

**Fair Lawn High School**
**Jagadeesh, Aashika, 17**
FreeFeed: A Novel Deep Reinforcement Learning Approach for Achieving Multi-Sided Fairness in Recommendation Systems

**Hackensack**

**Bergen County Academies**
**Kim, Remington, 18**
OrphaDRGL: A Novel Graph Deep Learning-Based Drug Repositioning Approach for Orphan Diseases

**Bergen County Academies**
**Kim, Sungmin, 18**
A Novel Rotation-Aware Representation Learning for Gaze Estimation To Assist Disabled Individuals in Comfortably Communicating With the World Through Various Applications

**Bergen County Academies**
**Mittal, Amishi, 17**
Correlations Between Type 2 Diabetes and Alzheimer's Disease and Increasing A$\beta$ Degradation by Insulin-Degrading Enzyme via Zinc Chelation

**Bergen County Academies**
**Savelyev, Sonya, 18**
Paradoxical Role of TGF-$\beta$ in Epithelial and Mesenchymal Breast Cancer Cells

**Bergen County Academies**
**Shah, Divyash Viral, 17**
Effect of SCN9A Gene Therapy in Reversing Senescence in Astrocytes *in vitro* and Alzheimer's Disease Implications

**Bergen County Academies**
**Yu, Temmie, 18**
A Novel Biomarker of Psychological Stress: Salivary Cell-Free Mitochondrial DNA (cf-mtDNA)

**Lawrenceville**

**Lawrenceville School**
**Zhu, Allison Youwen, 17**
Risk Factors Associated With Youth Suicidality Before and During the COVID-19 Pandemic: Results From the National 2019 Youth Risk Behavior Survey and the 2021 Adolescent Behaviors and Experiences Survey

**Millburn**

**Millburn High School**
**Wang, Eric, 18**
Effects of Various Soil Microbiomes on Native and Invasive Plants

**Millburn High School**
**Winick, Jacob, 17**
Targeting Neoantigens Derived From the *ZRSR2* Mutation in Hematologic Malignancies

**Millburn High School**
**Xu, Andy, 17**
VAPOR: A Novel Approach to Power Forecasting in a Photovoltaic Microgrid

**Princeton**

**Princeton High School**
**Ma, Hanqi, 17**
"I's Dined With Ukraine": Empirical Analysis on Consumer Preference Change After Russo-Ukrainian War

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|---|---|
| **Skillman** | **<u>Montgomery High School</u>**<br>**Cao, George, 17**<br>The Indecomposable Summands of the Tensor Products of Monomial Modules<br>Over Finite 2-Groups |
| **Union City** | **<u>Jose Marti STEM Academy</u>**<br>**Marcelino, Naia Luz, 17**<br>The Effect of Toxic Stress on the Brain Development of Elementary School Children<br>in Union City, New Jersey |

## NEW YORK

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|---|---|
| **Armonk** | **<u>Byram Hills High School</u>**<br>**Das, Rohini Elora, 17**<br>"Let's Sleep On It": Employing the Brain App To Measure the Impact of Sleep<br>in Consolidating Prior Learning |
| | **<u>Byram Hills High School</u>**<br>**Matza, Remi Paige, 18**<br>Revealing the Retinal Vascular Changes Caused by Age-Related Macular Degeneration |
| | **<u>Byram Hills High School</u>**<br>**Milewicz, Samantha Maya, 17**<br>Selective Inhibition of Matrix Metalloproteinase-9 Attenuates Traumatic Brain Injury-<br>Mediated Blood-Brain Barrier Disruption in a Novel Dynamic *in vitro* Model |
| | **<u>Byram Hills High School</u>**<br>**Miller, Lindsay, 17**<br>Here Comes the Sun: The Impact of Chronotype and Seasonal Mood Variation<br>on Pupillary Light Response Across the Circadian Cycle |
| | **<u>Byram Hills High School</u>**<br>**Schaevitz, Samantha, 17**<br>Investigating the Use of Focused Ultrasound To Induce Blood-Brain Barrier Opening<br>and Increase Drug Delivery Into a Murine Model of Primary High Grade Glioma Tumors |
| **Bedford** | **<u>Fox Lane High School</u>**<br>**Feldman, Jacob Elias, 17**<br>The Geometry and Reactivity of a Novel Zirconium-Centered Coordination Complex<br>Supported by a *bis*-PN Ligand Framework |
| **Bellmore** | **<u>John F. Kennedy High School</u>**<br>**Bissoondial, Tyler Logan, 17**<br>An Omics Approach to Elucidating the Mechanism of Action for Hepatocellular Carcinoma<br>Development in Diet-Induced Murine Models of Nonalcoholic Steatohepatitis |
| | **<u>John F. Kennedy High School</u>**<br>**Feldman, Luke, 17**<br>Sulforaphane Mitigates the Phenotypic Expression of ALS in *Drosophila melanogaster*<br>via Upregulation of the Nrf2 Pathway |
| **Brentwood** | **<u>Brentwood High School – Sonderling Center</u>**<br>**Tariq, Minnahil, 17**<br>Evaluating the Invasive Macroalga, *Dasyshiphonia japonica*, on Long Island Coasts<br>and Assessing Its Effect on Carbon Sequestration, Nitrogen Loading and Climate Change |

**Briarcliff Manor**

**Briarcliff High School**
**Starr, Jason M., 17**
An Agent-Based Model of COVID-19 Social Determinants of Health for Equitable
Intervention Implementation

**Bronx**

**Bronx High School of Science**
**Kulahlioglu, Elif Camila, 17**
A New Mathematical Model for Forecasting Upcoming Zoonotic Pandemics and Math-
Driven Strategies Utilizing Spatial and Temporal Patterns of Migratory Canadian Geese
*(Branta canadensis)*

**Bronx High School of Science**
**Lee, Julianne, 17**
Moving Matter With Sound: Activating Dynamical Systems With Interfering Acoustic
Waves

**Bronx High School of Science**
**Liu, Xin Qi, 18**
New Computational Methadologies To Identitfy Classes of Near-Infrared Fluorescence
Dye for Early Diagnosis of Alzheimer's Diseases

**Bronx High School of Science**
**Morgan, Kiele, 17**
The Effect of NMDA Receptor Blockade on Neurogenesis and Neural Crest Development

**Bronx High School of Science**
**Pankevich, Vera, 17**
A New Montane Species of *Protium* From Ecuador and Peru

**Bronx High School of Science**
**Shaham, Roni, 18**
#HermanWho? Using Linguistic Analysis To Empirically Measure the Fifth Filter
of the Propaganda Model in 2022

**Brooklyn**

**Brooklyn Technical High School**
**Zheng, Eileen, 17**
Paired Mutational Analyses of RNA-Binding Proteins-Interactome and Overall Survival
in Cancer Patients

**Packer Collegiate Institute**
**Zuckerman, Liam, 17**
Infrared Nova Candidates From the WISE Space Telescope Help Constrain
the Global Nova Rate

**Chappaqua**

**Horace Greeley High School**
**Googel, Carly, 17**
The Connection Between Stress and a Person's Ability To Understand Their Own Mind
and the Minds of Others

**Horace Greeley High School**
**Lo, Elvin, 17**
An Empirical Evaluation of Zeroth-Order Optimization Methods on AI-Driven Molecule
Optimization

**Horace Greeley High School**
**Sun, Julia, 17**
Deregulated Aryl Hydrocarbon Receptor (AhR) and Malignant Transformation

**Horace Greeley High School**
**Yang, Amy, 17**
Image-Based Deep Learning on Air Quality Using A Nine-Layer Residual Neural Network

**Corning**　　**Corning-Painted Post High School**
**Lahiri, Nishant, 18**
Polyethyleneimine-Impregnated Adsorbents for a Novel Community-Based Carbon Capture and Sequestration System

**Cross River**　　**John Jay High School**
**Sandell, Cami, 18**
Can People Intentionally Wake Up From Sleep?

**Dix Hills**　　**Half Hollow Hills High School**
**Batheja, Samir, 18**
Association Between Sleep and Fatigue in Depression: Role of GABA and Glutamate

**Half Hollow Hills High School**
**Leshnower, Jacob, 17**
Music and Emotion: The Intervallic Fallacy of the Major-Minor Dichotomy

**East Amherst**　　**Williamsville East High School**
**Zhu, Sophie, 16**
Factorizations in Evaluation Monoids of Laurent Semirings

**Great Neck**　　**William A. Shine Great Neck South High School**
**Kagan, Dana, 17**
Employing CRISPR Cas9 Editing in Combination With DNA Polymerase To Correct the DELTA F508 Mutation of the Cystic Fibrosis Transmembrane Conductance Regulator Gene in HEK293T Cells

**William A. Shine Great Neck South High School**
**Saha, Amit, 18**
Deep Learning Accelerated Lattice-Boltzmann Simulations for Multiscale Modeling of Thrombosis

**William A. Shine Great Neck South High School**
**Sun, Amber, 17**
Neuroprotective Effects of Red Raspberry Extract and Broussoflavonol B in Alzheimer's Disease Models

**Harrison**　　**Harrison High School**
**Blackman, Ariella Maia, 18**
Developing a Model *in situ* Resource Utilization System for Oxygen-Sustaining Life Support and Launch Cost Reduction for Mars

**Harrison High School**
**Davidson, Lauren, 17**
The Effect of Copper Sulfate Concentration on Locomotor Ability and Lifespan of Alzheimer's Model *Drosophila melanogaster*

**Hastings on Hudson**　　**Hastings High School**
**Forrest, Lucca, 18**
A Quantitative Regression and Volatility Analysis of the Relationship Between Economics and Political Stability

**Hewlett**

**George W. Hewlett High School**
**Chavre, Hiral Milind, 18**
NMDA Receptor Mutation and KCC2 Inhibition Induce Changes in Brain Development
Associated With Neurodevelopmental Diseases

**George W. Hewlett High School**
**Cohen-Kashi, Ella, 17**
Does Nostalgia Affect Adolescent Behavior? An Investigation of Nostalgia
Among High School Students

**Jericho**

**Jericho Senior High School**
**Kim, Emily, 17**
The Dual Roles of Activated Carbon as an Adsorbent and Photocatalyst
for Azo Dye Removal

**Jericho Senior High School**
**Pahlavan, Natalia, 17**
Bidirectional 12-Lead Electrocardiogram and Electrogram Reconstruction Using
a Cycle Generative Adversarial Network

**Jericho Senior High School**
**Sakaria, Rhea, 17**
Identifying a Potent Wnt Compound To Enhance Stemness Post-Radiation Through
Activating the Canonical Wnt Signaling Pathway

**Jericho Senior High School**
**Trepeta, Nikhil, 17**
Decreased Levels of TSP-2 Results in Under-Activation of the Wnt/β-Catenin Pathway
and Alters Gene Expression in NIH-3T3 Cell Lines

**Jericho Senior High School**
**Zhu, Kevin, 18**
Recurrent Repeat Contractions and Micro-Changing Short Tandem Repeats:
Investigating Underrepresented Factors of Polymorphism in Human Cancers

**Lynbrook**

**Lynbrook High School**
**Krivitsky, Sean, 17**
Investigating Flavonoids as a Potential Therapeutic Against the Degenerative Effects
of Amyotrophic Lateral Sclerosis in *Drosophila melanogaster*

**Manhasset**

**Manhasset High School**
**Punzalan, Benjamin, 17**
Crosstalk Between Alzheimer's Disease and SARS-CoV-2 Infection is Mitigated
by Ginkgolides A and B in HTB-11 and U937 Cell Models

**Manhasset High School**
**Qian, Allen M., 17**
Artemisinin and Artesunate Mitigate Cytotoxic Effects Caused by Recombinant Spike
Protein of SARS-CoV-2

**Melville**

**Saint Anthony's High School**
**Margiano, Miah Christina, 18**
Potential Influence of LncRNAs in Tumor Regression: An Analysis of Prognostic LncRNAs
in Neuroblastoma

**New Hyde Park**

**Herricks High School**
**Lam, Ashley, 18**
Novel Zinc Oxide/Nanocellulose Composite as a Photocatalyst for Water Purification

**Herricks High School**
**Lee, Jeylin, 17**
Diabetic Ketoacidosis Amongst COVID-19 Infected Individuals: A Retrospective Study of Incidence, Characteristics, Outcomes and Risk Factors

**Herricks High School**
**Simrin, Dheyala, 17**
Characterizing Social Behaviors in Female Mice: A Novel Sex-Specific Model Using DeepLabCut and B-SOiD Unsupervised Machine Learning

**New York**

**Columbia Grammar & Preparatory School**
**Chen, Andrew, 17**
The Impact of COVID-19 on 3rd Through 8th Grade Student Achievement Across the Nation

**Columbia Grammar & Preparatory School**
**Luo, Joshua, 17**
Single-Molecule Investigation of the Interaction Between MeCP2 and Chromatin

**Stuyvesant High School**
**Zhang, Kathleen, 17**
Temporal Regression Method for Removing Hemodynamic Signal During Wide-Field Fluorescent Imaging of Epileptiform Activity

**Ossining**

**Ossining High School**
**Davis, Samara, 18**
Developing Environmental DNA Metabarcoding for the Detection of Elusive Vernal Pool-Breeding Amphibians

**Ossining High School**
**Gardner, Sarah, 17**
Co-Evolving Across Time: Black Holes as Regulators of Their Host Galaxy Properties

**Ossining High School**
**Goodwin, AriAnnah, 17**
Forecasting Visual Aura Characteristics: Perceived Stress Does Not Predict Temporal Aura Features in Adolescents

**Ossining High School**
**Jennings, Sarah Delia, 17**
Electron Transport Chain Acts as Potential Regulator of ER-Mitochondria Interactions

**Ossining High School**
**Lynch, Jesse, 17**
Aerobic Exercise Serves as an Effective and Immediate Treatment for Decreased Sound Tolerance in Adolescents

**Ossining High School**
**Robertazzi, Joseph Miguel, 18**
Migration and Magnetism: A Longitudinal Analysis Identifying the Relationship Between the South Atlantic Anomaly and Shifts in Migratory Bird Populations

**Pelham**

**Pelham Memorial High School**
**Brandler, Katie, 17**
The First Report of Marine Debris as a Dispersal Vector for Native and Introduced Species in the Temperate Northwest Atlantic Ocean

**Pelham Memorial High School**
**Sherbansky, Leah, 17**
Exploring the Relationship of SSTR2 Immunohistochemical and Textural Features to Neuroendocrine Tumor Grade

**Pelham Memorial High School**
**Van Praagh, Emma, 17**
Investigating Connections Between Sensorimotor Impairment and Resting-State Functional MRI of the Spinal Cord in Multiple Sclerosis

**Plainview**

**Plainview-Old Bethpage John F. Kennedy High School**
**Cowen, Skylar Rachel, 18**
Measuring the Effectiveness of Different Stimulus and Medium Types on Environmental Decision-Making

**Plainview-Old Bethpage John F. Kennedy High School**
**Hsu, Ethan, 18**
A Novel Application of Intracellular Anandamide Manipulation in *C. elegans* as a Model for a New Pharmacological Treatment for Autism Spectrum Disorder

**Port Washington**

**Paul D. Schreiber High School**
**Abell, Amelia, 17**
Analyzing the Interaction Between HRAS, STAT3 and LRPPRC in the Mitochondria

**Paul D. Schreiber High Schooll**
**Bandler, Sasha Beth, 18**
Behind the Mask: The Impact of Face Masks and Mask Mandates on Facial Emotion Recognition

**Paul D. Schreiber High School**
**Shaub, Bryson, 17**
Causal Effects of Self-Blame and Self-Efficacy Messages on Climate Change Intentions and Behaviors in the Context of Political Party Affiliation: A Randomized Controlled Trial

**Roslyn Heights**

**Roslyn High School**
**Yung, Maxx, 18**
μ-Opioids Endomorphin-1 and Endomorphin-2 Modulates Memory Processes in Alzheimer's and COVID-19 Cell Models

**Saint James**

**Smithtown High School**
**Zaher, Holy Mary, 17**
The Correlation Between Peroxisome Levels and Short-Term Memory Loss in a PINK1 -/- Rat Model of Parkinson's Disease

**Scarsdale**

**Scarsdale High School**
**DeDianous, Cindy, 17**
Alpha Retinal Ganglion Cell Dysfunction Precedes Vascular Dysfunction in a Mouse Model of Type 1 Diabetes

**Scarsdale High School**
**El Moselhy, Ali, 18**
Framework for Optimal Budget Allocation of HIV Intervention Policies

**Scarsdale High School**
**Kini, Sameer Ullal, 17**
Associations Between Pathophysiological Traits and Symptom Development in V30M and V122I Transthyretin Amyloidosis

**Scarsdale High School**
**Shi, Bryan, 17**
A Mutagenesis Study of the Parkinson's Protein α-Synuclein Reveals An Unexpected Link Between Membrane Association and Serine-129 Phosphorylation

**Scarsdale High School**
**Tepper, Jaden, 18**
Creating a Novel Device To Improve the Evacuation of Subdural Hematomas

**Scarsdale High School**
**Zlotnikov, Nicole Emma, 18**
*Asparagopsis taxiformis* Reduces Methane Emissions and Alters Microbiome Composition in Organic Grazing Sheep

**Stony Brook**

**The Stony Brook School**
**Nichitiu, Marc, 17**
Neutron Scattering Data Analysis To Support Feynman's Model of Superfluid Helium

**Syosset**

**Syosset High School**
**Guo, Sabrina, 17**
Differential Emergency Contraceptive Use Among Young Women in the United States From 2006 to 2019

**Syosset High School**
**Kam, Zachary David, 18**
Transformative Transactions: An Analysis of Factors Affecting ESG and Impact Investing Behaviors

**Syosset High School**
**Shah, Anika, 17**
Effects of Class-Conscious Admissions on College Campus Racial Diversity

**Syosset High School**
**Turakhia, Vivek, 18**
Aluminum Hydroxide-Induced Dopaminergic Neuron Degeneration and α-Synuclein Aggregation in the *Caenorhabditis elegans* Model of Parkinson's Disease

**Syosset High School**
**Wang, Alex, 17**
Spatially Multiplexed Gold Leaf Electrodes for Affordable Pathogenic Detection

**Syosset High School**
**Zhang, Tianyi (Tina), 17**
Consonant Correspondences in Sound Symbolic Words Across Indo-European Languages

**Syracuse**

**Christian Brothers Academy**
**Kodali, Sravan, 17**
Probing the Etiological Basis of Cancer and Neurological Disease: Epigenomic Signatures Associated With Spontaneous and Replication Stress-Induced Double Strand Breaks

**Tarrytown**  **Hackley School**
**Dheer, Vihaan, 18**
The Optimization of Flux Trajectories for the Adiabatic Controlled-Z Gate
on Split-Tunable Transmons

**Troy**  **Emma Willard School**
**Li, Jiahui (Stella), 18**
Bounding Vanishing at the Central Point of Cuspidal Newforms

**Valley Stream**  **Valley Stream South High School**
**Qadri, Ibrahim, 17**
The Ability of Vitamin E To Improve the Reproduction and Metabolic Respiration
of Nicotine-Induced *D. melanogaster*

**Westhampton Beach**  **Westhampton Beach High School**
**Schultz, Jack C., 17**
Alteration of Mineral and Elemental Composition in *Saccharina latissma*
Exposed to Elevated Levels of Carbon Dioxide

**Yorktown Heights**  **Yorktown High School**
**Bose, Raka, 17**
Using Artificial Intelligence for ICU Patient Triage

# NORTH CAROLINA

**Charlotte**  **Ardrey Kell High School**
**Gupta, Arya, 17**
Exploring the Relationship Between PolyCystic Ovary Syndrome and Its Five Related
Conditions: Insulin Resistance, Menstrual Malfunction, Hyperandrogenemia, Obesity
and Infertility

**Durham**  **North Carolina School of Science and Mathematics**
**Abdelbarr, Mariam, 18**
Investigation of Papain in the Eradication of *E. coli* Biofilms

**North Carolina School of Science and Mathematics**
**Adetunji, Kamisi, 17**
Modifying Naturally Sourced Flavonoids for Increased Antioxidant Capacity
and Antisickling Activity

**North Carolina School of Science and Mathematics**
**Chen, Angela, 17**
Developing Wildfire Risk and Burn Area Prediction Models Using Comprehensive
Environmental Variables for California With Machine Learning

**North Carolina School of Science and Mathematics**
**James, Linden Chi, 17**
Thyroid Hormone Treatment of Neurological Trauma Using the Model *Galleria mellonella*

**North Carolina School of Science and Mathematics**
**Khaire, Archita, 17**
A Semi-Supervised Approach To Rank Potential Causal Variants and Their Target Genes
in Microglia for Alzheimer's Disease

**North Carolina School of Science and Mathematics**
**Obi, Oziomachukwu Chidubem, 16**
Determining if a Combination of Treatments Ibudilast and Interleukin 4 Can Treat
or Prevent Multiple Sclerosis Using Model Organism *Lumbricus terrestris*

**North Carolina School of Science and Mathematics**
**Park, Minseok Eli, 18**
Predicting Aggression of NFL Coaches on Fourth Down

**North Carolina School of Science and Mathematics**
**Varadarajan, Keshav, 17**
Long-Term Hazardous Air Pollutant Estimates Across the United States

**North Carolina School of Science and Mathematics**
**Vatsavai, Adi, 17**
A Massive Spring Analogy to Josephson Junctions in an External Magnetic Field

**North Carolina School of Science and Mathematics**
**Xu, Ganning, 18**
Identifying Provocative Sentences From Fearful WhatsApp Messages

Raleigh
**William G. Enloe High School**
**Yan, Felicia, 18**
Modeling Sea Level Rise-Driven Coastal Forest Loss and the Aboveground Carbon Impacts With Remote Sensing and Machine Learning

# OHIO

Gates Mills
**Hawken School**
**Shone, Jasmine, 18**
Systematic Optimization of App Generation Few-Shot Learning for Large Language Models Trained on Code

Shaker Heights
**Hathaway Brown School**
**Fang, Hua, 17**
The Role of Voltage-Gated Calcium Channel CaV1.2 in Blood-Brain Barrier Damage and Neuroinflammation

# OREGON

Portland
**Jesuit High School**
**Ma, Alan Peijun, 18**
Smart Wildlife Sentinel (SWS): Preventing Wildlife-Vehicle Collisions and Monitoring Road Ecology With Embedded IoT Systems and Machine Learning

**Jesuit High School**
**Mamchik, Vladimir, 17**
Dynamic Extraocular Filtering: A Novel Method for Active Correction of Color Vision Deficiency, Validated With Steady-State Visual Evoked Potentials

**Jesuit High School**
**Mandera, Darsh Sandip, 18**
OncoPharML: A Machine-Learning Approach for Cancer Biomarkers Identification and Multi-Omics-Based Targeted Cancer-Drug Prediction

**Jesuit High School**
**Shrimali, Samyak, 18**
CareHAI: A Novel Automated Artificial Intelligence and Sensor-Based Multi-Modular System for Early Diagnosis and Prevention of Hospital-Acquired Infections

**Westview High School**
**Jain, Rishab Kumar, 18**
GlioMod: Spatiotemporal-Aware Glioblastoma Multiforme Tumor Growth Modeling
With Deep Encoder-Decoder Networks

# PENNSYLVANIA

**Bethlehem**

**Moravian Academy**
**Bell, Okezue Alexander, 16**
On Selecting Distance Metrics in $n$-Dimensional Normed Vector Spaces of Cells:
A Novel Criterion and Similarity Measure Towards Efficient and Accurate Omics Analysis

**Bryn Mawr**

**Baldwin School**
**Lin, Yuru, 18**
The Inhibitory Effect of the Combination of Berberine and Curcumin on Amyloid-Beta-
Induced Cell Apoptosis and Necrosis

**Doylestown**

**Central Bucks High School**
**Matich, Mason C., 17**
dataBASE DNA Data Storage

**Central Bucks High School**
**Xu, Lance Yunhao, 17**
The Correlation of Different Demographics to the Effects of Different Types of Framing
in Medical Contexts

**Murrysville**

**Franklin Regional Senior High School**
**Wang, Grace Li, 18**
Preparation and Characterization of Superabsorbent Beads via Super-Fast
Photopolymerization

**Newtown**

**George School**
**Wang, Yue, 18**
Investigation in U.S. Healthcare Referral System With Graph Neural Networks

**Pittsburgh**

**Fox Chapel Area High School**
**Seshan, Arvind, 18**
An Iterative Neural Network-Based Approach to Automated IFT-20 Sensory Neuron
Identification in *Caenorhabditis elegans*

**Taylor Allderdice High School**
**Levin, Daniel, 18**
Electroactive Bacterial Cellulose-Carbon Nanotube Composites Inhibit Growth
of Drug-Resistant *Staphylococcus aureus*

# SOUTH CAROLINA

**Columbia**

**Spring Valley High School**
**Han, Madison, 17**
The Phytoremediation of *Escherichia coli* in Contaminated Water by *Lemna minor*,
*Salvinia minima* and *Azolla caroliniana*

**North Charleston**

**Academic Magnet High School**
**Mei, Angela, 17**
MoJoint: A Motion Visualization and Kinematic Analysis Software for
Temporomandibular Joint

# TENNESSEE

**Brentwood**

**Brentwood High School**
**Wang, Jason Christopher, 18**
Differential Effects of Oncogenic Ras Isoforms on Epithelia

**Chattanooga**

**McCallie School**
**Yang, Benjamin Yue, 17**
Inflammatory Effect of Microplastics on Human Lung Cells

**Collierville**

**Collierville High School**
**Chen, Michael, 18**
The Regulation of Low-Level Backing on Supercell Intensity and Tornadogenesis Identified by Non-Hydrostatic Numerical Weather Prediction Model Analysis via Novel Hodograph Designs

**Knoxville**

**Farragut High School**
**Singh, Ridhima, 17**
Understanding the Sensitivity of Vegetation Growth to Climate Factors in Urban Areas and Its Variability Across Spatial Scales

# TEXAS

**Allen**

**Allen High School**
**Kutagula, Veda, 17**
Predicting Binge Drinking Risk Among Teenagers as Part of an Overall Mental Health Predictive Model Using Machine Learning Techniques

**Austin**

**Liberal Arts & Science Academy**
**Annem, Bhargav Raviseshachandra, 18**
Impact of Orbiting Satellites on Star Formation Rate Evolution and Metallicity Variations in Milky Way-Like Discs

**Liberal Arts & Science Academy**
**Elias, Nathan, 17**
A Novel Method for Automated Identification and Prediction of Invasive Species Using Deep Learning

**Westwood High School**
**Srireddy, Armaan, 18**
Developing a Wearable Triboelectric Nanogenerator To Sustainably Power Biosensors

**Coppell**

**Coppell High School**
**Khambete, Arnav, 17**
The Effects on Novel Drugs on EPH-EPHRIN Protein Interactions for the Inhibition of Chronic Pain

**Dallas**

**St. Mark's School of Texas**
**Song, Neil, 17**
SLGTformer: An Attention-Based Approach to Sign Language Recognition

**Friendswood**

**Friendswood High School**
**Venu, Ganesh, 18**
Cost-Effective Visual Aids for Retinitis Pigmentosa Patients

**Frisco**

**Rick Reedy High School**
**Shankar, Hari, 17**
PetalNet: A Novel Approach Towards Forecasting Plant Disease Epidemics Using Citizen Science and Machine Learning

**Plano**

**Plano East Senior High School**
**Bhat, Shriya P., 18**
Cloning and Mutagenesis of the *ampC* Gene Encoding for β–Lactamase in *Pseudomonas aeruginosa* To Identify Potential Allosteric Binding Sites

**Plano West Senior High School**
**Zhou, Brian, 17**
The Use of Social Media To Increase Vaccine Uptake: An Analysis of the Impact of the CDC's COVID-19 Vaccine Communication on Twitter

**San Antonio**

**BASIS San Antonio Shavano Campus**
**Guan, Hannah, 16**
Multi-Dimensional Interpretable Interaction Network (MDiiN) for Modeling Aging Health and Mortality

**Sugar Land**

**Harmony School of Innovation — Sugar Land**
**Arun, Aaditya Krishna, 18**
Determine the Deleterious Effect of Excess Fluoride on Reproductive Outcome and Development of Dip Bag-Based De-Fluoridation Solution

**William P. Clements High School**
**Wang, Rich, 17**
Ending States of a Special Variant of the Chip-Firing Algorithm

**The Woodlands**

**The Woodlands College Park High School**
**Pachipala, Siddhu, 18**
SuiSensor: A Novel, Low-Cost Machine Learning System for Real-Time Suicide Risk Identification and Treatment Optimization via Computational Linguistics

**The Woodlands College Park High School**
**Patel, Sohi, 17**
Programmable Matter: A Microscale, Self-Reconfigurable, Swarm Robotic System

# VIRGINIA

**Alexandria**

**Thomas Jefferson High School for Science and Technology**
**Arulandu, Alvan Caleb, 17**
Physics-Informed Neural Networks for Informed Infectious Disease Policy

**Thomas Jefferson High School for Science and Technology**
**Jain, Tanish, 17**
*In silico* Prediction of Drug Permeability Through an Inflamed Blood-Brain Barrier Using Molecular Feature Modeling

**Thomas Jefferson High School for Science and Technology**
**Tao, Lynn R., 18**
D-SCRIPT+C: Incorporating Protein Contact Maps in a Multiphase Deep Learning Model for Structurally Accurate Protein-Protein Interaction (PPI) Prediction

**Thomas Jefferson High School for Science and Technology**
**Vaddi, Suraj, 18**
Tar Print: Convolutional Remote Sensing Techniques To Quantify Urbanization and Study Water Quality Through Macroinvertebrate Assemblages

**Arlington**

**H-B Woodlawn**
**Westwater Brodsky, Julia, 17**
Characterization of Novel *Acinetobacter baumannii* Phages EAb3 and EAb7

**Washington-Liberty High School**
**Sharma, Ambica, 18**
Novel Aurora Kinase, EZH2 and BET Inhibitor Small Molecular Compound Combinations To Treat Glioblastoma Multiforme

**Fairfax**

**New School of Northern Virginia**
**Ocasio, Emily, 18**
Demographic Correlates of Humanizing Language in Media Coverage of Crime: Evidence From *The Boston Globe*, 1976-84

**Harrisonburg**

**Misterka Homeschool**
**Misterka, Max, 16**
A Generalization of *q*-Calculus Using Formal Group Laws

**McLean**

**McLean High School**
**Zhou, Ethan, 18**
Online Learning of Smooth Functions

# WASHINGTON

**Kenmore**

**Inglemoor Senior High School**
**Liao, Pinyu, 17**
Computational Design of Small-Molecule Inhibitors for the Activation of the Kid-Kis Toxin-Antitoxin System To Exploit Plasmid-Mediated Antibiotic Resistance

**Redmond**

**Tesla STEM High School**
**Kim, Evan, 17**
ScGAN: A Generative Adversarial Network To Predict Hypothetical Superconductors

**Tesla STEM High School**
**Krishnakumar, Harish, 17**
Analysis of Ring Galaxies Detected Using Deep Learning With Real and Simulated Data

**Seattle**

**The Lakeside School**
**Yu, Edward, 18**
Turán Problems for Mixed Graphs

# WEST VIRGINIA

**Charleston**

**George Washington High School**
**Patel, Jeeya Yogesh, 17**
Consequences of a *Dot-1.1* Deletion on Germ Cell Components in *Caenorhabditis elegans*

# WISCONSIN

**Hartford**

**Hartford Union High School**
**Kalluvila, Aryan Thomas, 17**
An Accurate Super-Resolution Approach to 64 mT Low-Field MRI via Domain Adaptation and Nested U-Net Architecture

**Shorewood**

**Shorewood High School**
**Hu, Alexis, 18**
CEO Regulatory Focus and Stock Buybacks: The Moderating Effect of CEO Tenure
and Restricted Stock Holdings

# CHINA

**Beijing**

**Tsinghua International School**
**Yin, Victor, 17**
Algorithms for Calculating the Lefschetz Number and Nielsen Number: Using Dehn Twists
in Fixed Point Theory

*Scholars are listed by their age as of the Regeneron STS 2023 Awards Gala in March 2023.*

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| Bose, Raka | 21 |
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| Cao, George | 14 |
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| Chavre, Hiral Milind | 17 |
| Chen, Alex | 12 |
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| Chen, Angela | 21 |
| Chen, Corona | 8 |
| Chen, Kenneth | 12 |
| Chen, Luke Wen-Tsu | 9 |
| Chen, Matthew | 12 |
| Chen, Michael | 24 |
| Cho, Aaron | 4 |
| Cho, Hannah | 2 |
| Cohen-Kashi, Ella | 17 |
| Cowen, Skylar Rachel | 19 |
| Das, Rohini Elora | 14 |
| Davidson, Lauren | 16 |
| Davis, Samara | 18 |
| de Belloy, Madeleine | 4 |
| DeDianous, Cindy | 19 |
| Deer, August | 2 |
| Dheer, Vihaan | 21 |
| Dhillon, Nadya Jasmine | 8 |
| Di Capua, Jennifer Carmen | 5 |
| El Moselhy, Ali | 19 |
| Elias, Nathan | 24 |
| Fan, Ho Tin (Alex) | 11 |
| Fang, Hua | 22 |
| Feldman, Jacob Elias | 14 |
| Feldman, Luke | 14 |
| Feng, Austin | 12 |
| Fogarty, Angie | 6 |
| Forrest, Lucca | 16 |
| Fung, Lisa | 5 |
| Gao, Angela Li | 7 |
| Gardner, Sarah | 18 |
| Gega, Isabella Angelina | 8 |
| Goel, Advay | 10 |
| Goodwin, AriAnnah | 18 |
| Googel, Carly | 15 |
| Grover, Ambika | 6 |
| Gu, Claire | 9 |
| Guan, Hannah | 25 |
| Guo, Sabrina | 20 |
| Gupta, Arya | 21 |
| Gupta, Ronit | 6 |
| Han, Madison | 23 |
| Hariprasad, Varun | 9 |
| He, Fenghuan (Linda) | 11 |
| Hong, Elizabeth | 3 |
| Hou, James | 2 |
| Hsu, Ethan | 19 |
| Hu, Alexis | 27 |
| Hu, Emily | 9 |
| Hua, Michelle | 12 |
| Huang, Angela | 7 |
| Huang, Michael | 10 |
| Huang, William | 3 |
| Iyer, Anu | 1 |
| Jagadeesh, Aashika | 13 |
| Jain, Rishab Kumar | 23 |
| Jain, Tanish | 25 |
| James, Linden Chi | 21 |
| Jennings, Sarah Delia | 18 |
| Jiao, Catherine Kexuan | 8 |
| Jin, Alexander | 11 |
| Kagan, Dana | 16 |
| Kalluvila, Aryan Thomas | 26 |
| Kam, Zachary David | 20 |
| Kendall, Lara Jean | 7 |
| Khaire, Archita | 21 |
| Khambete, Amav | 24 |
| Kiker, Thaddaeus | 2 |
| Kim, Elane | 3 |
| Kim, Emily | 17 |
| Kim, Evan | 26 |
| Kim, Matthew S. | 1 |
| Kim, Remington | 13 |
| Kim, Ryan Hwang | 6 |
| Kim, Sungmin | 13 |
| Kini, Sameer Ullal | 20 |
| Kodali, Sravan | 20 |
| Krishnakumar, Harish | 26 |
| Krishnamurthy, Hari Hemanth | 3 |
| Krishnan, Gouri | 6 |
| Krivitsky, Sean | 17 |
| Kulahlioglu, Elif Camila | 15 |
| Kutagula, Veda | 24 |
| Lahiri, Nishant | 16 |
| Lam, Ashley | 18 |
| Lan, Alexander | 4 |
| Laney, Hannah | 9 |
| Lee, Alan | 2 |
| Lee, Jeylin | 18 |
| Lee, Julianne | 15 |
| Lee, Ryan | 2 |
| Leshnower, Jacob | 16 |
| Levin, Daniel | 23 |
| Li, Jessica | 4 |
| Li, Jiahui (Stella) | 21 |
| Li, Michelle | 7 |
| Liao, Pinyu | 26 |
| Lin, Yuru | 23 |
| Litman, Elon | 7 |
| Liu, Anna Lumin | 3 |
| Liu, Bryant | 5 |
| Liu, Derek X | 3 |
| Liu, Xin Qi | 15 |
| Lo, Elvin | 15 |
| Love, Maxwell | 2 |
| Low, Holland | 10 |
| Lu, Alvin | 11 |
| Lu, Cindy | 1 |
| Lu, Melinda Mengjia | 6 |
| Luo, Joshua | 18 |
| Luo, Leon | 12 |
| Lynch, Jesse | 18 |
| Ma, Alan Peijun | 22 |
| Ma, Hanqi | 13 |
| MacAvoy, Alexis Téa | 5 |
| Mamchik, Vladimir | 22 |
| Mandera, Darsh Sandip | 22 |
| Maniar, Krish | 4 |
| Marcelino, Naia Luz | 14 |
| Margiano, Miah Christina | 17 |
| Martinez, Marissa Lilianna | 5 |
| Matich, Mason C. | 23 |
| Matza, Remi Paige | 14 |
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|---|---|---|---|---|---|
| Mei, Angela | 23 | Shah, Divyash Viral | 13 | Wang, Yue | 23 |
| Milewicz, Samantha Maya | 14 | Shaham, Roni | 15 | Wei, Emmy | 4 |
| Miller, Chloe Jane | 9 | Shan, Nathan | 10 | Wen, Nolan | 7 |
| Miller, Lindsay | 14 | Shankar, Hari | 25 | Westwater Brodsky, Julia | 26 |
| Minagar, Andrew Christopher | 9 | Sharma, Ambica | 26 | Winick, Jacob | 13 |
| Misterka, Max | 26 | Shaub, Bryson | 19 | Wu, Celine | 10 |
| Mittal, Amishi | 13 | Sherbansky, Leah | 19 | Wu, Samuel Hong | 2 |
| Mo, Luke Zhang | 9 | Shetty, Amogh | 8 | Wu, Vivian | 3 |
| Morgan, Kiele | 15 | Shi, Bryan | 30 | Xing, Emily | 10 |
| Moudgal, Neel | 12 | Shin, Yu | 10 | Xu, Andy | 13 |
| Nag, Ishika | 7 | Shone, Jasmine | 22 | Xu, Ellen | 3 |
| Natarajan, Lavanya | 7 | Shrimali, Samyak | 22 | Xu, Ganning | 22 |
| Nayak, Ayush | 4 | Shunk, Joshua Logan | 1 | Xu, Jeffrey | 4 |
| Nesamoney, Sean | 1 | Simrin, Dheyala | 18 | Xu, Lance Yunhao | 23 |
| Nichitiu, Marc | 20 | Singh, Ridhima | 24 | Xu, Shirley | 2 |
| Nyamwange, Elizabeth | 8 | Soatto, Dario Gaitzi | 3 | Yan, Felicia | 22 |
| Obi, Oziomachukwu Chidubem | 21 | Song, Neil | 24 | Yang, Alex | 10 |
| Ocasio, Emily | 26 | Srireddy, Armaan | 24 | Yang, Amy | 16 |
| Oh, Madeline | 8 | Srivastava, Saurish | 4 | Yang, Anna | 4 |
| Pachipala, Siddhu | 25 | Starr, Jason M. | 15 | Yang, Anna | 11 |
| Pahlavan, Natalia | 17 | Suchenski Loustaunau, Diego E. | 12 | Yang, Benjamin Yue | 24 |
| Panidapu, Apoorva | 4 | Sun, Amber | 16 | Yang, Grace | 5 |
| Pankevich, Vera | 15 | Sun, Christopher | 2 | Yang, Ryan Yunrui | 6 |
| Park, Minseok Eli | 22 | Sun, Julia | 15 | Yang, Tyler Benjamin | 5 |
| Patel, Jeeya Yogesh | 26 | Sundar, Aadhav | 8 | Yin, Victor | 27 |
| Patel, Shloke | 7 | Tao, Lynn R. | 25 | Yu, Andrew | 11 |
| Patel, Sohi | 25 | Tao, Rachel | 8 | Yu, Edward | 26 |
| Peng, Fiona | 5 | Tariq, Minnahil | 14 | Yu, Jean | 8 |
| Peng, Ian | 1 | Tepper, Jaden | 20 | Yu, Temmie | 13 |
| Persily, Ben | 6 | Tiwari, Akshata | 1 | Yuan, Andrew | 10 |
| Pham, Amy | 8 | Trepeta, Nikhil | 17 | Yung, Maxx | 19 |
| Ponrartana, Alyssa | 2 | Turakhia, Vivek | 20 | Zaher, Holy Mary | 19 |
| Prabhakar, Ashwin | 1 | Tuteja, Sachleen | 8 | Zhang, Andrew Y | 3 |
| Punzalan, Benjamin | 17 | Vaddi, Suraj | 25 | Zhang, Kathleen | 18 |
| Qadri, Ibrahim | 21 | Van Praagh, Emma | 19 | Zhang, Raymond Ming | 12 |
| Qian, Allen M | 17 | Varadarajan, Keshav | 22 | Zhang, Tianyi (Tina) | 20 |
| Ram, Akhila | 11 | Vatsavai, Adi | 22 | Zheng, Eileen | 15 |
| Rao, Gitanjali | 5 | Venu, Ganesh | 24 | Zhou, Brian | 25 |
| Rehman, Kaif Ur | 10 | Viradia, Deeya | 5 | Zhou, Ethan | 26 |
| Robertazzi, Joseph Miguel | 18 | Wahlig, Patrick Michael | 9 | Zhu, Allison Youwen | 13 |
| Ruan, Ashley | 5 | Wang, Alex | 20 | Zhu, Kevin | 17 |
| Saha, Amit | 16 | Wang, Charles Han | 11 | Zhu, Sally | 5 |
| Sakaria, Rhea | 17 | Wang, Claire | 10 | Zhu, Sophie | 16 |
| Sandell, Cami | 16 | Wang, Eric | 13 | Zlotnikov, Nicole Emma | 20 |
| Savelyev, Sonya | 13 | Wang, Grace Li | 23 | Zuckerman, Liam | 15 |
| Schaevitz, Samantha | 14 | Wang, Jason Christopher | 24 | | |
| Schremmer, Bella Rose Marie | 3 | Wang, Joshua | 10 | | |
| Schultz, Jack C. | 21 | Wang, Junyi | 11 | | |
| Sentil, Sruthi | 7 | Wang, Kevin Ro | 11 | | |
| Seshan, Arvind | 23 | Wang, Rich | 25 | | |
| Shah, Anika | 20 | Wang, Xina | 3 | | |

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