

2023 MSEF High School Award Winners

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For Scholarship and Summer Program Awards go to page 10
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Sanofi Grand Award

Sierra Kelch Wachusett Regional High *Sip Sustainably: The Rheology and Durability of Single-Use Environmentally Friendly Alternatives for Plastic Straws*

MathWorks First Place Award

Arielsie Li Phillips Academy *An Under-Actuated Fast-Running Bipedal Lizard Robot With Optimized Lateral Bending*

First Place Awards

Caden Ashmore Grafton High School *Control System for an Autonomous Sailboat*

Isha Nagireddy Shrewsbury Sr High *TalkToMe: An Application That Better Detects and Handles Suicidal Situations on Social Media Through ML*

Sophie Chiang St. Mark's School *Attenuating Social Isolation-Induced Sickness Behavior in *D. melanogaster* using Minocycline*

Ritika Roy Bishop Feehan High School *Using Machine Learning to Predict how a Nickel-Metal Hydride Battery Degrades*

**Disha Mudenur,
Dylan Striek,
Rylee Blair** Hopkinton High *The Electrolytic Extraction of Dawsonite from Ocean Water: Efficient Saltwater Mineral Recovery through Electrolysis*

Timucin Erbas Acton-Boxborough Regional High *Achieving Precision in Autonomous Rocket Landings with Convolutional Neural Networks and Model Predictive Control Algorithms*

Shuhan Luo	Worcester Academy	<i>A Hybrid Locomotion Delivery Drone with Route Planning Function</i>
Arin Nazarian	Wellesley Sr High	<i>Wren Reforestation Project</i>
Huiyi (Ari) Wen	Tabor Academy	<i>Efficient Fog Harvesting Interface with Bio-inspired Multilayer Micro Kirigami</i>
Krishna Patel	Ma Academy for Math and Science School	<i>The Effects of Varying Ground Surfaces on the Degree of Footstrike Hemolysis</i>

Second Place Awards

Mirudulaa Suginathan Yamini	Quincy High	<i>Exhibit of Invisible Radiation from Ionizing Particles through Condensation Nuclei</i>
Antonio Marzoratti, Arav Tyagi, James Hogan	Franklin High School	<i>Wheelchair Project: A Continuation</i>
Aryan Mago	Groton School	<i>Novel Wearable Volatile Organic Compound Detection and Mitigation via Cumulative Solvatochromism and Dietary Modification</i>
Anushri Pal	Acton-Boxborough Regional High	<i>Computational Screening and Designing of Potential SARS-CoV-2 Major Protease Inhibitors through Docking, Molecular Dynamics Simulations, and Multi-Parameter Optimization</i>
Haruki Ohara	Acton-Boxborough Regional High	<i>Bio-Physical Sensing of Feeding Pattern on Invertebrates and Application for Smart Recreational Fishing</i>
Anthony Lee	Milton Academy	<i>Two Novel Approaches to and Generalizations of the German Tank Problem</i>
Yuning Zhang	Newton Country Day School	<i>Attack and Defense: Gender Differences in Chess Strategy Preference and Correlation with Performance</i>
Kruthi Gundu	Shrewsbury Sr High	<i>The Effect of Heat Shock Proteins on Inflammation</i>

Jocelyn MacDonough	Wachusett Regional High	<i>The Effect of Magnesium on Sleep Deprivation in Drosophila melanogaster</i>
Hanna Matusik	Lexington High	<i>A Novel Pneumatically-Actuated Soft Robotic Hand With 3D Vision-Based Teleoperation</i>
Ekaavli Daga	Wachusett Regional High	<i>The Effectiveness of Algae in Desalination</i>
Leen Attia	Al-Noor Academy	<i>Habit Reversal Therapy For Compulsive Habits Using Machine Learning</i>
Lagnajeet Panigrahi	Shrewsbury Sr High	<i>Automating Brain Tumor Classification with the Use of Convolutional Neural Networks</i>
Andrew Yu, Yuxuan Zhang	Boston Latin School	<i>Epiphytic Lichens as Bioindicators of Ammonia Air Pollution</i>
Ragav Iyer	Ashland High	<i>Optimizing Exoplanet Discovery Via Machine Learning</i>
Rianna Santra	Ma Academy for Math and Science School	<i>Leveraging Differential Gene Expression Analysis and Agent-Based Modeling to Detect Biomarkers of Brain Cancer Subtypes</i>
Caroline Song	Boston Latin School	<i>Trace Detection of Thiabendazole on Produce Using Surface Enhanced Raman Spectroscopy</i>
Pranay Kocheta	Lexington High	<i>A Deep Learning Approach to Improve Early Detection of Cancer Using Multimodal Data</i>
Amal Nadaf	Shrewsbury Sr High	<i>HAWT or VAWT? Large or Small Scale?</i>
Verena Welch	Wachusett Regional High	<i>The Effects of Probiotics on Malnourished Fruit Flies</i>

Third Place Awards

Evan Zhang	Dover-Sherborn Regional High School	<i>Treating COVID-19 with Machine Learning</i>
Nevin Thinagar	Ma Academy for Math and Science School	<i>CubeSat-Based Millimetric Orbital Debris Detection</i>

Junu Lee	Lexington High School	<i>Mendelian Randomization Reveals Shared Genetic Landscape in Autism and Alzheimer's Disease</i>
Nagamitesh Nagamuralee	Lexington High School	<i>Low-Cost Educational Braille Display with Cognitive Learning Features</i>
Maya Sushkin	South High Community School	<i>Mobile Carbon Capture (MCC) to Green Hydrogen (GH)</i>
Daksh Dalal	Westborough High School	<i>Intelligent Waste Classification System</i>
Anika Jacob	Littleton High School	<i>A Study of the Effect of 1,3,7- Trimethylpurine-2,6-dione on the Growth and Development of Tenebrio molitor</i>
Camilla Royal	Foxborough Regional Charter School	<i>The Danger of a Solution: The Creation of a Bladderwrack Based Bioplastic. In Addition to an Analysis of Polyethylene Based Plastics and a Common Bioplastic (PBAT)</i>
Ben Rhodes-Kropf, Justin Chen	Milton Academy	<i>Revolutionizing Endangered Species Conservation: Employing Synthetic Satellite Data to Monitor and Protect Polar Bears</i>
Aniketh Mahesh	Shrewsbury Sr High School	<i>Using Raspberry Pi to Enhance Security for Packages and Mail</i>
Hyewon Suh	Noble And Greenough School	<i>Predictive Model for Graft Failure Due to Acute Rejection to Enhance the Success Rate of Pediatric Kidney Transplantation Outcomes</i>
Nikhita Varma	Wachusett Regional High School	<i>The Effect of Microplastics on The Stress Response of Daphnia magna</i>
Yiming Zhao	The Governor's Academy	<i>Measurement of Neuronal Firing in Intact Brains without Electrodes: Using Deconvolution to Extract Spikes from Two-Photon imaging data</i>

Srilakshmi Venkatesan	Hopkinton High School	<i>Utilizing Hypermagnesemia to Understand the Impact of Neuromuscular Blocking Agents on Caenorhabditis Elegans: A Safe Novel Automated Model for Paralytic Drug Testing</i>
Joseph Yu	Ma Academy for Math and Science School	<i>Using Immune Footprints in a Novel Deep Learning Model to Detect Human Diseases</i>
Yifan Ding	Boston Latin School	<i>Termite Intelligence: Can They Learn?</i>
Nathaniel Dziewietin	Wachusett Regional High School	<i>Agitating for Pond Health: Controlling Algae Growth Using A Surface-Level Underwater Impeller</i>
Anshika Shekhar	Ma Academy for Math and Science School	<i>The Effectiveness of a Standardized Mixture of Antioxidants as a Preventative Treatment for PTSD and its Symptoms in C. elegans</i>
Dan Khoi Nguyen, Owen Liao, Vina Le	Medford High School	<i>I Lost My Marbles: Does More Randomness Increase the Accuracy of Statistics-Based Measurements?</i>
Adrita Samanta	Greater Commonwealth Virtual School	<i>Computer Model for Eye Tracking without Subject Calibration</i>

Honorable Mention

Nikita Mullangi	Acton-Boxborough Regional High School	<i>ConvertO: Mitigating ABO Antigen Transfusion Incompatibility through Enzyme-Mediated Blood-Type Conversion</i>
Jaeyi Song	Cambridge Rindge and Latin school	<i>A Novel Detection Methodology with Topological Network Analysis and Clustering: A Twofold Approach to Glioblastoma Diagnosis</i>
Arianne Motakef	St. Mark's School	<i>Influence of Predator Stress on Courtship Behavior in Male Drosophila</i>
Jiayi Yu	St. Mark's School	<i>How Does the De Novo Lipogenesis (DNL) Pathway Control the Insulin Stimulation of Glucose Utilization in Adipocytes</i>

Xiaozheng Liu	Tabor Academy	<i>An All-Terrain Exploration Robot Based on Centipede's Structure and Motion</i>
Anna Du	Phillips Academy	<i>Developing an AI-Enhanced Protocol for Simulating Abiogenesis: Novel Nano-Structured Carbon Materials as a Templating Surface for Prebiotic Nucleic Acid Oligomer Formation</i>
HyeonKi (Ian) Lee	Northfield Mount Hermon School	<i>Development of Cost-Effective, Sustainable Microbial Fuel Cells for Purifying Manure Polluted River</i>
Barry Wang	Shrewsbury Sr High School	<i>Incorporating Graphite From Pencils as a Component of Lithium Batteries</i>
Linah Lasri, Rahil Kistas, Victoria Boguslavskaya	Pioneer Charter School of Science	<i>The Effects of Caffeine on Macrophage Phagocytosis of Streptococcus Pneumoniae 3</i>
Fiona Xu	The Governor's Academy	<i>Sleep Disturbances Interact with Rumination and Childhood Adversity as Longitudinal Predictors for Depression and Anxiety</i>
Sean Tao	Westwood High School	<i>Examining the Effects of Cutaneous Lupus Erythematosus on Behavior in a Murine Model</i>
Yuanbin Wang	Tabor Academy	<i>A Bionic Fish for Underwater Detection</i>
HuSang Lee	Newton South High School	<i>Synthesis of Cellulose-based Hydrogel from Food Waste and Its Biomedical Applications</i>
Yaniv Tausky	Wellesley Sr High School	<i>Measuring Genetic Diversity and Change in a Predator Prey Relationship</i>
Juliet Findlen	Hopkinton High School	<i>Chlorella Vulgaris: A Model for Photobioreactor Carbon Capture</i>
Yuze Cai	Concord Academy	<i>SpinTOL: A Novel VTOL Unmanned Aerial Vehicle</i>
Ansh Hiranandani, Rishab Nair	Westborough High School	<i>Drone Imaging to Assess Land Fertility Using AI Technology</i>

Eric Nie

Middlesex School

Gravitational Wave Detection and Pattern Recognition Based on Deep Neural Networks

Yun Cao

Dana Hall School

Mining Novel Glaucoma Drug Targets from Multiomic Analysis between Ocular Hypertension Dependent and Independent Pathways

Special Awards

National Grid Engineering Excellence Award

Caden Ashmore

Grafton High School

Control System for an Autonomous Sailboat

Ritika Roy

Bishop Feehan High School

Using Machine Learning to Predict how a Nickel-Metal Hydride Battery Degrades.

MITRE Engenuity Resilience through Innovation Award

Caroline Song

Boston Latin School

Trace Detection of Thiabendazole on Produce Using Surface Enhanced Raman Spectroscopy

Evan Zhang

Dover-Sherborn Regional High

Treating COVID-19 with Machine Learning

Eversource Sustainability Award

Maya Sushkin

South High Community

Mobile Carbon Capture (MCC) to Green Hydrogen (GH)

Fish and Richardson Patent Award

Jillian Mulvey

Newton Country Day School

Cleat-ciate: Cleats to Reduce Anterior Cruciate Ligament Injuries

Massachusetts Life Science Center Trailblazer Award

For innovation in life sciences

**Necalli Vela-Garcia,
Nithilan Sridharan,
Surya Raja-Amudhan**

Hopkinton High

PFAS Pollution and its Consequences on Daphnia Pulex: Implications for Environment and Human Health

ALKU Foundation

For impact on community or individual social-emotional well-being

Isha Nagireddy

Shrewsbury Sr High

TalkToMe: An Application That Better Detects and Handles Suicidal Situations on Social Media Through ML

Alnylam Award

For a project that shows innovation in diagnosis and/or treatment of genetic diseases

Jahnavi Bolleddula

Lexington High

A Novel Genetic Biomarker Screen for Early Detection of Cardiovascular Disease Risk across Different Ethnic Populations

3DEO Award

For a project that displays unique learning from an elegant use of common materials

Haruki Ohara

Acton-Boxborough Regional
High

Bio-Physical Sensing of Feeding Pattern on Invertebrates and Application for Smart Recreational Fishing

Massachusetts Chemistry & Technology Alliance (MCTA) Award

Anthony Kim

Tabor Academy

Prevention of Chlorine-Based Fog Caused by Calcium Chloride Snow Remover with Carbonate-forming Bacteria

Kenerson Cronin

Bancroft School

A Reusable Microplastic Extraction Mechanism Utilizing Ferrofluids In An Ocean Environment

Aryan Mago

Groton School

Novel Wearable Volatile Organic Compound Detection and Mitigation via Cumulative Solvatochromism and Dietary Modification

Anika Jacob	Littleton High School	<i>A Study of the Effect of 1,3,7- Trimethylpurine-2,6-dione on the Growth and Development of Tenebrio molitor</i>
Camilla Royal	Foxborough Regional Charter School	<i>The Danger of a Solution: The Creation of a Bladderwrack Based Bioplastic. In Addition to an Analysis of Polyethylene Based Plastics and a Common Bioplastic (PBAT)</i>
Sanjh Bonu	North Attleboro High School	<i>Do Natural Disinfectants Work Better than Chemical Disinfectants in Killing Bacteria?</i>
Anna Li	North Quincy High	<i>How the Amount of Sodium Carbonate Affect the Effectiveness of Bio-Detergent on Plant-based Stains</i>

Hologic Award

For a project that focuses on women's health and aligns with Hologic's dedication of improving the health and well-being of their patients

Esther Xu	Belmont High	<i>Early Diagnosis of Endometrial Cancers with Sialic Acid by Nano Detection</i>
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National Geographic Society: That's Geography! Cultivating Empathy for the Earth Award

Andrew Yu, Yuxuan Zhang	Boston Latin School	<i>Epiphytic Lichens as Bioindicators of Ammonia Air Pollution</i>
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Regeneron Biomedical Sciences Award

Joseph Yu	Mass Academy for Math and Science School	<i>Using Immune Footprints in a Novel Deep Learning Model to Detect Human Diseases</i>
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Microbiology Society Award

HuSang Lee	Newton South High	<i>Synthesis of Cellulose-based Hydrogel from Food Waste and Its Biomedical Applications</i>
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American Society of Safety Professionals

Anika Kale

Westborough High

Scald Shield: A Thermochromic Solution to Hot Water Hazard

Pauline J. LaMarche Award

For a project that displays excellence in design and implementation

Sophie Chiang

St. Mark's
School

Attenuating Social Isolation-Induced Sickness Behavior in D. melanogaster using Minocycline

**Disha Mudenur,
Dylan Striek,
Rylee Blair**

Hopkinton High

The Electrolytic Extraction of Dawsonite from Ocean Water: Efficient Saltwater Mineral Recovery through Electrolysis

Eisenstadt Award

For a project that combines appreciation for sound, music, and scientific pursuits

Yvangi Jacques

Brockton Public Library

Evaluating The Effect of Sound on the Abundance of Pollinator Insects

Scholarships and Summer Program Awards

Sierra Kelch

Harvard Summer Secondary School Program Scholarship

Ritika Roy

Harvard Summer Secondary School Program Scholarship

Caden Ashmore

Worcester Polytechnic Institute Scholarship

Huiyi Wen

Wentworth Impact Lab

Hanna Matusik

Northeastern University Scholarship

Junu Lee UMASS Amherst Scholarship

Manasa Josyula Wentworth Institute of Technology Scholarship

Tiffany Tran Merrimack College Scholarship

Erin Kim National Youth Science Camp Award

ISEF Delegates

Aryan Mago	Groton School
Nagamitesh Nagamuralee	Lexington HS
Huiyi Wen	Tabor Academy
Arielsie Li	Phillips Academy
Rylee Blair, Disha Mudenur, Dylan Striek	Hopkinton High
Caden Ashmore	Grafton High School
Hanna Matusik	Lexington High
Yaniv Taussky	Wellesley Sr High
Evan Zhang	Dover-Sherborn Regional High
Zachary Xin Chen	Boston Latin School
Nevin Thinager	MA Academy for Math and Science School
Elizabeth Hanechak	Pope Francis Preparatory School
Anshika Shekhar	MA Academy for Math and Science School
Molly Cullen	Bishop Feehan High School
Timucin Erbas	Acton Boxboro