



Massachusetts Science  
+ Engineering Fair

**HIGH SCHOOL FAIR 2025**

POWERED BY 

## High School Award Winners

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### Sanofi Grand Award

**Nichelle Thinagar**

*Shrewsbury Senior  
High School*

*Creating a Soft Biomimetic Robotic Snake With an  
Anisotropically Frictional Skin Design for Rubble Search and  
Recovery*

### MathWorks First Place Award

**Jingxuan Zhou**

*Northfield Mount  
Hermon School*

*SkyProbe: A Thrust Vectoring UAV for Enhanced Inspection  
Performance Under Windy Conditions*

### First Place Awards

**Ram Sivaraman**

*Acton-Boxborough  
Regional High*

*HM-Detect: Murmur Detection and Classification  
Methodology Using A Novel C2-LSTM Architecture for Multi-  
Modal Signals*

**Benjamin Davis**

*Bishop Feehan High  
School*

*From Crude to Extrude: A Novel Approach to Combining  
Pultrusion and Extrusion Technologies into a Single Filament  
Production System to Recycle PET Bottle Waste and 3D  
Printing Purge Materials into Additive Manufacturing  
Filament*

<b>Adrita Samanta</b>	The Greater Commonwealth Virtual School	<i>Inference of Cell-Cell Communication to Understand the Molecular Mechanisms of Alzheimer's Disease</i>
<b>Dylan Striek, Anoushka Nair</b>	Hopkinton High	<i>A Translational Spectrophotometric Apparatus for Noninvasive Glucose Monitoring in Type II Diabetics</i>
<b>Vyshnavi Donthabhaktuni</b>	Massachusetts Academy of Math & Science	<i>Investigating the Neuroprotective Potential of T. Ammi Extract on Parkinson's Disease via Gut-Brain Axis Modulation</i>
<b>Qiaorui Zhang</b>	Newton North High	<i>Predicting Poverty in the US Based on Demographic and Socioeconomic Features</i>
<b>Agastya Sarmah</b>	Sharon High	<i>Demographic and Genetic Insights into ARID1A Mutations in Hepatocellular Carcinoma: Implications for Prognosis and Treatment</i>
<b>Ethan Yan</b>	Groton School	<i>Empowering Low-Resource Settings with RetinAI: An AI System with Wearable Headset and Retinal Imaging for Eye Tumor Home-Screening</i>
<b>Anvi Sarmah</b>	Sharon High	<i>Identification of Potential Genomic Biomarkers for the Personalized Treatment of Colorectal Cancer Utilizing Bioinformatics Approach</i>
<b>Yuze Cai, Rodolfo Wang</b>	Concord Academy	<i>ViSA: Virtual Swashplate Aircraft Design and Implementation of a Novel Control Surface-Less Fixed-Wing Aircraft</i>
<b>Avani Jain</b>	Massachusetts Academy of Math & Science	<i>Pathophysiological Disruption of the Endothelial Glycocalyx by Microplastic Contamination</i>
<b>Hayim Sims</b>	Maimonides School	<i>Photonic Nanoglass Stress Sensors</i>
<b>Finnegan Sommer, Olutayo Oyewusi</b>	Southeastern Regional Vocational Technical	<i>TheraBee</i>

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### Second Place Awards

<b>Deepika Bhardwaj, Yoyo Wu, Nandita Ganesh</b>	Acton-Boxborough Regional High	<i>Effects of Non-Nicotinic E-Liquid and Nicotinic E-Liquid Exposure and Ameliorating Properties of Hesperidin on Locomotion in C. elegans</i>
<b>Siddharth Gowtham</b>	Shrewsbury Senior High	<i>WATter Works</i>

<b>Zachary Medjamia</b>	Andover High	<i>Estimating Periodic Solutions within Pendulum-like Chaotic Dynamical Systems</i>
<b>Anushri Pal</b>	Acton-Boxborough Regional High	<i>Effect of Halogens and Stereochemistry of Hydantoin Derivatives on Antiviral Activities Against SARS-CoV-2 Variants: Atomistic Insight Through Computational Studies</i>
<b>Aryan Shah, Simrit Kukreja</b>	Hopkinton High	<i>Post-Transcriptional Regulation of Huntington's Disease: An Antisense Oligonucleotide Therapeutic Strategy for Inhibiting Mutant Exon 1 Expression</i>
<b>Jayaratna Deshamouni</b>	Shrewsbury Sr High	<i>Synergistic and Individual Optimization of Reproductive Health and Chronic Stress Resistance in <i>Caenorhabditis elegans</i> Using Resveratrol and Astaxanthin</i>
<b>Alex Kuriakose, Sanjay Iyer</b>	Sharon High	<i>Energy-Efficient Routing to Pick Up Heavy Objects</i>
<b>Emily King</b>	Athol High	<i>Algae-Pumpkin Bioplastic: A Sustainable Alternative to Conventional Plastics</i>
<b>Nina Capaldi, Emma Capaldi</b>	Phillips Academy	<i>An Automated Machine Vision Training Machine for Real-Time Sorting Applications</i>
<b>Niranjan Nair</b>	Massachusetts Academy of Math & Science	<i>Using Contrastive Activation Addition to Combat Societal Biases in Language Models</i>
<b>Pranay Kocheta</b>	Lexington High	<i>Pulse-Fi: A Low Cost Robust Machine Learning System for Accurate Cardiopulmonary Monitoring Using Channel State Information</i>
<b>Oleksandr Kaplenko</b>	Falmouth Academy	<i>The Creation of Mutant GJB2 Knockout <i>Xenopus</i> Utilizing CRISPR Cas9</i>
<b>Anika Jacob</b>	Littleton High School	<i>The Effects of Environmental Concentrations of Caffeine on the Neurobehavioral and Neurobiological Development of Zebrafish Embryos</i>
<b>Jianquan Zhao, Juns Ye</b>	Boston Latin School	<i>In Silico Usage of <i>Cordyceps Militaris</i> and its Effectiveness on NSCLC Cells</i>
<b>Shengzhen Wang</b>	St. Mark's School	<i>Detection of Black Ice in Autonomous Vehicles Using Inertial Measurement Based Binary Classification Neural Network</i>
<b>Shreya Jha</b>	Winchester High School	<i>Patient-Centered Radiology Reports Regarding Glioblastomas with Generative Artificial Intelligence</i>

<b>Richard Chen</b>	Andover High	<i>Determining the Crustal Structure of Central Antarctica Using Seismic Receiver Functions and Ambient Noise Cross-Correlation</i>
<b>Andrew Yu</b>	Boston Latin School	<i>Optimizing T-Cell-Mediated Cancer Killing: An Agent-Based Model</i>
<b>Michelle Chen, Elmeria Cheung, Anna Li</b>	North Quincy High	<i>Impact of Calcifying Macroalgae on the Mitigation of Ocean Acidification</i>
<b>Yifan Ding</b>	Boston Latin School	<i>A Self-Regulating Gene Therapy Vector for Rett Syndrome</i>
<b>Ariv Vaidya</b>	British International School Of Boston	<i>Novel Computational and Machine Learning Approaches Shed Light on Parkinsons Disease Heterogeneity and Subtypes</i>

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### Third Place Awards

<b>Alex Bace</b>	The Governor's Academy	<i>Protecting Native Forest Ecosystems: Using AI-Powered Drones for Identifying and Mapping Invasive Insect Populations</i>
<b>Adil Siddiqui</b>	Shrewsbury Senior High	<i>The Effect of Curcumin on Beta-Amyloid Plaques in the Brain.</i>
<b>Piyusha Majgaonkar, Miyu Hasegawa</b>	Hopkinton High	<i>The Effects of Terpene a Plant Compound on Reducing Lobaplatin-Induced Neurotoxicity</i>
<b>Xiaoke Yu</b>	Milton Academy	<i>Regenerative Shock Absorber with an Automatic Damping Adjustment System</i>
<b>Meena Lakshmanan</b>	Shrewsbury Senior High	<i>The Effects of Moringa Oleifera and Nigella sativa on Influenza A Virus</i>
<b>Varsha Alladi</b>	Massachusetts Academy of Math & Science	<i>Unraveling the Role of GABAergic Dysfunction in Catatonia: A GABAergic Investigation in Drosophila</i>
<b>Arjun Mohandass</b>	Shrewsbury Senior High	<i>Capturing Carbon Utilizing Portable Units</i>
<b>Ayanna Rohil</b>	Acton-Boxborough Regional High	<i>Investigating the effects of Novel-Transcription Regulator X in HEK293 Cells on Kidney Fibrosis</i>

<b>Hannah Cha</b>	St. Mark's School	<i>Effects of GABA Treatment on Locomotive Behavior Recovery in Sleep-Deprived Drosophila Melanogaster</i>
<b>Carey Huang</b>	St. Mark's School	<i>Evaluating the Effects of Noise Pollution on Cognitive Function in Drosophila Melanogaster</i>
<b>Srivibhu Piratla</b>	Sharon High	<i>Sweat Lactate Detection For Early Diagnosis Of Decompensated Heart Failure</i>
<b>Samyak Jain</b>	Andover High	<i>Entanglement Sudden Death in Interacting Quantum Circuits</i>
<b>Quinlan Kelly, Helena Brain, Vanessa Steinmeyer</b>	North Reading High	<i>Impact of Traffic Density and Precipitation on Conductivity in the Ipswich River (With Analysis Into Potential Effects on Local Organisms)</i>
<b>Pranav Addanki</b>	Canton High	<i>Molecular Profiling of Stem Cell-Derived Neurons: Evaluating Their Potential to Replace Huntington's Disease-Affected Neurons</i>
<b>Jacob Lee</b>	Berkshire School	<i>Mitigating Vibrations in High-Speed Helicopters: Model to Investigate an Electric Power Transmission System for a Vibratory Control Moment Gyroscope</i>
<b>Sophia Caramanica</b>	Massachusetts Academy of Math & Science	<i>Orthotic Hand Brace to Improve Range of Motion and Reduce Pain in Low-Functioning Children with Cerebral Palsy</i>
<b>Vladyslav Mishyn</b>	St. Mark's School	<i>DAL: Drone-Assisted Acoustic Localization System for Human Detection and Rescue in Disaster-Stricken Environments</i>
<b>Thantham Jittham</b>	CATS Academy Boston	<i>Ultrafast Pulsed Laser-Induced Degradation and Charge Carrier Dynamics in Multilayer Perovskite Photovoltaics via Cross-Sectional Multimodal Atomic Force Microscopy</i>
<b>Gavin Warnakulasooriya</b>	Franklin High	<i>Striking the Right Chord: How Musical Training Amplifies Emotional Reactivity, using Artificial Intelligence (AI)</i>
<b>Chenxi Hu</b>	Tabor Academy	<i>Power of Poop: Identification and Analysis of Gut Microbiome Biomarkers in Diarrhea</i>
<b>Wenna Mao</b>	Milton Academy	<i>Understanding GBM Relapse Mechanisms through scRNAseq Analysis and Experimental Validation of Functional Genes</i>
<b>Emma Toohey</b>	Bancroft School	<i>Creating Desiccation-Tolerant (DT) Koshihikari Rice Plants</i>

**Neal Tandon,  
Jason Xie**

Dover-Sherborn Regional  
High School

*STING Inhibits Migration and Invasion in Triple-Negative  
Breast Cancer Independently of Immune Cells*

**Vinay Murugan**

Chelmsford High

*Reframing Housing Advocacy: The Impact of Informative and  
Cautious-Based Advocacy On Affordable Housing Support.*

**Divi Bhaireddy**

St. Mark's School

*Ayurvedic Treatment as Oral Hygiene Alternatives for the  
Prevention of Dental Caries*

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## Honorable Mention

**Mahima Ganesan**

Amherst Regional High

*Unlocking the Grain: Comparative Analysis of Glucose Release  
in Healthy Grain Varieties*

**Emilia Graham**

Hopkinton High

*Understanding the Immunomodulatory Effects of Echinacea  
purpurea on Caenorhabditis elegans*

**Juhi Kundu**

Concord Academy

*Making Mobile Homes Amphibious: A Flood Avoidance  
System*

**Emily Carter**

Bristol-Plymouth  
Vocational Technical

*Bacteria behind the Beauty: What Lip Gloss Applicator Holds  
the Most Bacteria?*

**David Aubrey**

Falmouth Academy

*Biophysical Determinants of T-Cell Receptor Signaling in  
Danio rerio*

**Noah Proctor**

Massachusetts Academy  
of Math & Science

*Automatic Irrigation Using Soil and Weather Data*

**Shengtao Ding**

Worcester Academy

*Causal Discovery and Supervised Learning for Identifying  
Cancer Risk Factors*

**Eric Feng,  
Tanish Parida,  
Aatmaj Nagarkar**

Acton-Boxborough  
Regional High

*Iron Group Element Production in Type Ia Supernovae: A  
Machine Learning Approach to Nucleosynthesis Yields*

**Saketh  
Madhusudhan**

Massachusetts Academy  
of Math & Science

*Investigating the Role of HSF-1, SKN-1, and DAF-16 in  
Regulating Oxidative Stress Response in C. elegans*

<b>Sierra Kelch</b>	Wachusett Regional High	<i>A New Mechanism of Harmful Plastics: The Effect of G-15 on the Heart Rate of Daphnia magna Exposed to BPA or BPS</i>
<b>Qinghe Zhao</b>	Boston Latin School	<i>Effect of Post-Fire Smoke on Chlorophyll Concentration of Pines</i>
<b>Maverick Pil</b>	Falmouth Academy	<i>Benthic Microbial Fuel Cells: A Novel Power Source</i>
<b>Kathy Lin</b>	Buckingham Browne Nichols School	<i>AI-Driven Drone Surface Damage Detection for Wind Turbines</i>
<b>Guanbo Wang</b>	Boston Trinity Academy	<i>Interpreting Spatio-Temporal Brain Patterns in ADHD Using Transformer Models and Resting-State fMRI</i>
<b>Maria Mishechkina</b>	Massachusetts Academy of Math & Science	<i>Solar Powered Water Purification Device Utilizing Membrane Distillation Methods</i>
<b>Grace Qiu</b>	Massachusetts Academy of Math & Science	<i>The Impact Music Genres Play on the Behavioral Responses of Drosophila melanogaster</i>
<b>Marko Mano</b>	North Quincy High	<i>Harnessing Food Waste-Derived Hydrogels for Targeted Herbicide Delivery: A Novel, Sustainable Approach to Controlling Fallopia Japonica</i>
<b>Christopher Yoo</b>	Noble And Greenough School	<i>Modeling and Optimizing Firms' Competition and Collaboration Using Game Theory and Reinforcement Learning</i>
<b>Xintong Wu</b>	Dana Hall School	<i>CustomDancer: Customized Dance Recommendation by Text-Dance Retrieval</i>
<b>Rishabh Mathukiya, Ishan Kasam</b>	Franklin High	<i>AeroRain Generator: Small-Scale Synergistic Vertical-Axis Wind Turbine Utilizing Piezoelectricity for Increased Power Output</i>
<b>Aishwaryalakshmi Saravanan</b>	Sharon High	<i>Using Molecular Docking and Machine Learning to Design and Discover Novel Drugs for ER-alpha Targeted Breast Cancer Treatment</i>
<b>Venkat Surya Sai Kotur</b>	Sharon High	<i>SkinRAI: A Novel Approach to Leveraging AI and ML for Skin Cancer Detection by Mitigating Racial Bias</i>
<b>Dua Rafaqat</b>	North Quincy High	<i>Synergistic Effects of Plant Extracts and Silver Nanoparticles in Combatting Environmental Bacteria</i>

<b>Matthew Kellogg, Robert Ronan</b>	Falmouth Academy	<i>Examining the Forces that Drive a Crookes Radiometer</i>
<b>Austin Lin, Saayan Rao, Jaden Chen</b>	Westford Academy	<i>Personalized Workout Trainer: Hybrid AI and Classic Machine Learning Approach</i>
<b>Ashley Defilippo</b>	Weston High	<i>Fire and Smoke Detection Safety System Leveraging Computer Vision and Thermal Imaging</i>
<b>Shrinivasa Makaram</b>	Algonquin Regional High	<i>The Blind Timekeeper: The Synchronization of Coupled Oscillators</i>
<b>Anwita Wadekar</b>	Worcester Academy	<i>Understanding Social Determinants of Disabilities: A Machine Learning Approach</i>
<b>Vaagmi Shukla</b>	Hopkinton High	<i>Understanding Neurotoxicity: Drosophila Melanogaster as a Model for Memory Loss</i>
<b>Justin Romanelli, Brandon Guyott</b>	Westfield High School	<i>Optimizing an After-Market Prototype that Operates a Window Remotely</i>
<b>Madhav Warriar, Aarush Naik</b>	Hopkinton High	<i>The Impact of Hydroxyl Radicals on Drosophila Melanogaster using the Fenton Reaction to Mimic Oxidative Stress</i>
<b>Alex Ning</b>	Milton Academy	<i>Wearable Cardiovascular Disease Prediction Device Powered by a Convolutional Neural Network Based Transfer Learning Algorithm</i>
<b>Nikichi Tsuchida</b>	Winchester High School	<i>Sensitivity to Discovering Toponium from Simulated LHC Monte Carlo</i>
<b>Wilfredo Villanueva Erazo</b>	Pioneer Charter School Of Science	<i>Classification and Diagnosis of Helicobacter pylori Infections in Histopathological Images Using a Deep Learning Convolutional Neural Network: Phase One</i>
<b>Kaizar Rangwala</b>	Hopkinton High	<i>Scientific Machine Learning and Photodynamic Therapy for the Prevention, Anticipation and Mitigation of Toxic Algae Blooms</i>



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## Category Excellence Awards

### AMD Engineering Excellence Award

**Benjamin Davis**    Bishop Feehan High School    *From Crude to Extrude: A Novel Approach to Combining Pultrusion and Extrusion Technologies into a Single Filament Production System to Recycle PET Bottle Waste and 3D Printing Purge Materials into Additive Manufacturing Filament*

### MITRE Computer Science & Technology Excellence Award

**Ram Sivaraman**    Acton-Boxborough Regional High    *HM-Detect: Murmur Detection and Classification Methodology Using A Novel C2-LSTM Architecture for Multi-Modal Signals*

### Alnylam Bioscience Excellence Award

**Adrita Samanta**    The Greater Commonwealth Virtual School    *Inference of Cell-Cell Communication to Understand the Molecular Mechanisms of Alzheimer's Disease*

### MCTA Chemistry Excellence Award

**Hayim Sims**    Maimonides School    *Photonic Nanoglass Stress Sensors*

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## Special Awards

### Eversource Sustainability Award

**Rishabh Mathukiya, Ishan Kasam**    Franklin High    *AeroRain Generator: Small-Scale Synergistic Vertical-Axis Wind Turbine Utilizing Piezoelectricity for Increased Power Output*

## Massachusetts Life Science Center Trailblazer Award

**Wilfredo Villanueva  
Erazo**

Pioneer Charter School Of  
Science

*Classification and Diagnosis of Helicobacter  
pylori Infections in Histopathological Images  
Using a Deep Learning Convolutional Neural  
Network: Phase One*

## American Society of Microbiology, Northeast Branch Microbiology Award

**Vyshnavi  
Donthabhaktuni**

Massachusetts Academy  
of Math & Science

*Investigating the Neuroprotective Potential of T. Ammi  
Extract on Parkinson's Disease via Gut-Brain Axis Modulation*

## Regeneron Biomedical Science Award

**Dylan Striek,  
Anoushka Nair**

Hopkinton High

*A Translational Spectrophotometric Apparatus  
for Noninvasive Glucose Monitoring in Type II  
Diabetics*

## Wolf Greenfield Patent Award

**Sophia  
Caramanica**

Massachusetts Academy of  
Math & Science

*Orthotic Hand Brace to Improve Range of  
Motion and Reduce Pain in Low-Functioning  
Children with Cerebral Palsy*

## Shark Ninja G.R.I.T Award

**Ethan Okeke**

Athol High School

*Extraction Hive*

## Fish & Richardson G.R.I.T. Award

**Elisen Bonilla,  
Joseph Puopolo**

East Boston High School

*Soil Fertility in East Boston*

## American Society of Safety Professionals Award

**Ashley Defilippo**

Weston High

*Fire and Smoke Detection Safety System  
Leveraging Computer Vision and Thermal Imaging*

## Pauline J. LaMarche Memorial Award

**Madhav Warriar,  
Aarush Naik**

Hopkinton High

*The Impact of Hydroxyl Radicals on Drosophila  
Melanogaster using the Fenton Reaction to Mimic  
Oxidative Stress*

## Ben Eisenstadt Memorial Award

**Gavin  
Warnakulasooriya**

Franklin High

*Striking the Right Chord: How Musical Training  
Amplifies Emotional Reactivity, using Artificial  
Intelligence (AI)*

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## ISEF Delegates

*(listed alphabetically)*

<b>Benjamin Davis</b>	Bishop Feehan High School
<b>Jayaratna Deshamouri</b>	Shrewsbury High School
<b>Vyshnavi Donthabhaktuni</b>	Mass Academy of Math & Science
<b>Alex Hu</b>	Tabor Academy
<b>Adrita Samanta</b>	The Greater Commonwealth Virtual School
<b>Agastya Sarmah</b>	Sharon High School
<b>Aru Sharma</b>	North Attleboro High School
<b>Ram Sivaraman</b>	Acton-Boxborough Regional High School
<b>Dylan Striek &amp; Anoushka Nair</b>	Hopkinton High School
<b>Nichelle Thinagar</b>	Shrewsbury High School
<b>Tim Wang</b>	Deerfield Academy
<b>Ethan Yan</b>	Groton School
<b>Shutang Zhu &amp; Louis Chiu</b>	John D. O'Bryant School
<b>Qiaorui Zhang</b>	Newton North High School
<b>Jingxuan Zhou</b>	Northfield Mt. Hermon School

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## **Moderna Educator Excellence Award - High School Teacher**

**Valerie Finnerty**      Littleton High School

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### **Summer Program Scholarships**

#### **Wentworth Impact Lab**

**Charles He**, Milton Academy

**Nikichi Tsuchida**, Winchester High School

**Rodolfo Wang**, Concord Academy

**Siddarth Gowtham**, Shrewsbury Senior High School

**Vinay Murugan**, Chelmsford High School

**Wilfredo Villanueva Erazo**, Pioneer Charter School

### **Worcester Polytechnic Institute College Credit Jumpstart**

**Avani Jain**, Mass Academy of Math & Science

### **National Youth Science Camp**

**Jinxuan Zhou**, Northfield Mount Hermon

**Vyshnavi Donthabhaktuni**, Mass Academy of Math & Science

### **Harvard Summer School Secondary School Program**

**Vaagmi Shukla**, Hopkinton HS

### **Tuition Scholarships**

Current High School juniors will receive information this summer to apply for scholarship awards from these institutions.

*Merrimack College*

*UMass Amherst*

*UMass Boston*

*Wentworth Institute of Technology*

*Worcester Polytechnic Institute*