2024 Mercer Science and Engineering Fair Award List

Award: [Grand Prize](#)

Division: [Senior Division 2024](#)
Organization: [Mercer Science and Engineering Club](#)

Category: [Environmental Science and Engineering](#)
School: [Princeton International School of Mathematics and Science](#)
Project Title: [3D digital holographic microscopic water quality detection system](#)
Students: Tingwen Chen

Award: [First runner up](#)

Division: [Senior Division 2024](#)
Organization: [Mercer Science and Engineering Club](#)

Category: [Chemistry and Materials](#)
School: [Princeton High School](#)
Project Title: [Novel Quantum Materials for Low Power Electronics](#)
Students: Shloka Shriram

Award: [Second runner up](#)

Division: [Senior Division 2024](#)
Organization: [Mercer Science and Engineering Club](#)

Category: [Biochemistry, Biology and Medical](#)
School: [Lawrenceville School](#)
Project Title: [A Novel Interpretative Deep Neural Network with Grad-CAM's Heatmap for The Early Diagnosis of Alzheimer's Disease](#)
Students: Annabelle Yao

Award: Thermo Fisher Junior Innovators Challenge

Division: Junior Division 2024
Organization: Society for Science

Category: General Science (Junior)
School: Princeton Unified School Middle School (formally John Witherspoon)
Project Title: Understanding Plant Intelligence Using the Mimosa pudica
Students: Samhita Shriram

Category: General Science (Junior)
School: Princeton Montessori School
Project Title: Measuring Which Product Works Best to Keep Skin Moist
Students: Adhya Abi

Award: First Place

Division: Senior Division 2024
Organization: Mercer Science and Engineering Club

Category: Behavioral and Social Science
School: Hopewell Valley Central High
Project Title: The Influence of Social Settings on E-Cigarette and Alcohol Use
Students: Emily Fang

Category: Chemistry and Materials
School: Princeton High School
Project Title: Novel Quantum Materials for Low Power Electronics
Students: Shloka Shriram

Category: General Engineering
School: The Peddie School
Project Title: Multi-Terrain Adaptable Post Disaster Rescue navigation Vehicle
Students: Haolin Yu

Category: Plant Science
School: Princeton International School of Mathematics and Science
Project Title: Deciphering the Airborne Sounds of Plants Under Drought Stress
Students: David Hsu

Category: Software and Embedded Systems
School: Princeton International School of Mathematics and Science
Project Title: Multi-Unit Reconfigurable Robot
Students: Zirui Wang

Category: [Environmental Science and Engineering](#)
School: [Princeton International School of Mathematics and Science](#)
Project Title: [3D digital holographic microscopic water quality detection system](#)
Students: Tingwen Chen

Category: [Environmental Science and Engineering](#)
School: [The Peddie School](#)
Project Title: [EcoCast: Multi-Task Global Temperature Forecasting via Autoregressive Transformers](#)
Students: Yang Han

Category: [Biochemistry, Biology and Medical](#)
School: [West Windsor-Plainsboro High South](#)
Project Title: [Assessing Mutations In Beta-Globin Gene For Improved Protein Folding](#)
Students: Olivia Swarup

Category: [Biochemistry, Biology and Medical](#)
School: [Princeton High School](#)
Project Title: [Analysis of E. coli growth dynamics during Lambda(vir) phage infection reveals phage decay](#)
Students: Benjamin Gitai

Category: [Biochemistry, Biology and Medical](#)
School: [Lawrenceville School](#)
Project Title: [A Novel Interpretative Deep Neural Network with Grad-CAM's Heatmap for The Early Diagnosis of Alzheimer's Disease](#)
Students: Annabelle Yao

Award: [Superior Achievement (1)](#)

Division: [Junior Division 2024](#)
Organization: [Mercer Science and Engineering Club](#)

Category: [General Science (Junior)](#)
School: [Princeton Unified School Middle School (formally John Witherspoon)](#)
Project Title: [Understanding Plant Intelligence Using the Mimosa pudica](#)
Students: Samhita Shriram

Category: [General Science (Junior)](#)
School: [Princeton Montessori School](#)
Project Title: [Measuring Which Product Works Best to Keep Skin Moist](#)
Students: Adhya Abi

Award: Second Place

Division: Senior Division 2024
Organization: Mercer Science and Engineering Club

Category: Behavioral and Social Science
School: = Home School =
Project Title: OxySleep: An LSTM-based Machine Learning Approach to Sleep Apnea Detection using Blood Oxygen Data
Students: Krish Shah

Category: Chemistry and Materials
School: Princeton High School
Project Title: Predicting Compound Melting Temperatures from Computationally Derived Properties Using Machine Learning
Students: Amy Lin

Category: Animal Science
School: Princeton High School
Project Title: Investigating the Origins of Niche Shift in Bagheera kiplingi
Students: Shaochi Chuang

Category: Software and Embedded Systems
School: West Windsor-Plainsboro High South
Project Title: How and Why Large Language Models Rewrite Text: A Study in Media Bias Mitigation
Students: Neel Iyer

Category: Software and Embedded Systems
School: Princeton Day School
Project Title: Assessing ESG Compliance and Impact: A Zero-Shot Learning Approach to Analyzing Fortune 500 Companies' Sustainability Reports
Students: Armaan Agrawal

Category: Biochemistry, Biology and Medical
School: Princeton High School
Project Title: Antibiotic Interplay of the Keto Diet, High-Protein Diet, and the Green Mediterranean Diet on Gut Microbiota
Students: Akshaj Sama

Category: Biochemistry, Biology and Medical
School: The Peddie School
Project Title: Investigating the Pharmacological Effects on Action Potential Parameter Change by Simulated Spinal Cord Compression with Lumbricus Terrestris

Students: Aiden Kim

Category: [Biochemistry, Biology and Medical](#)
School: [Lawrenceville School](#)
Project Title: [Revolutionizing Asthma Treatment: A Breakthrough in LABA Design Enhances Both Selectivity and Efficacy](#)
Students: Sophia Liu

Award: [Outstanding Achievement (2)](#)

Division: [Junior Division 2024](#)
Organization: [Mercer Science and Engineering Club](#)

Category: [General Science (Junior)](#)
School: [Chapin School](#)
Project Title: [Seconds to Safety](#)
Students: Arjun Afiniwala

Category: [General Science (Junior)](#)
School: [Chapin School](#)
Project Title: [The Effect of home-made disinfectant solutions on strawberries freshness.](#)
Students: Ana Sofia Gutierrez-Gonzalez

Category: [General Science (Junior)](#)
School: [Princeton Day School](#)
Project Title: [Identifying the Severity of Knee Osteoarthritis Utilizing Machine Learning](#)
Students: Aayush Balaji

Category: [General Science (Junior)](#)
School: [Princeton Montessori School](#)
Project Title: [How Dogs (Both AI generated and real) can help train AI models to spot deepfakes.](#)
Students: Anamitra Abi

Category: [General Science (Junior)](#)
School: [Princeton Montessori School](#)
Project Title: [How does the level of solutes (salt) in water affect plant growth over twenty five days?](#)
Students: Beatrice Clarke

Category: [General Science (Junior)](#)
School: [Chapin School](#)
Project Title: [The Effect of Model Rocket Tube Length on Stability](#)
Students: Forrest Wang

Award: Third Place

Division: Senior Division 2024
Organization: Mercer Science and Engineering Club

Category: Behavioral and Social Science
School: Lawrenceville School
Project Title: The Diversity in College Admission: a study of Asian American applicants in Harvard Judicial Case
Students: Jin Sun

Category: Chemistry and Materials
School: Princeton International School of Mathematics and Science
Project Title: High Throughput Virtual Screening of Metal-Organic Frameworks for Hydrogen Storage
Students: Zhifei Liu

Category: Energy
School: Lawrenceville School
Project Title: Stretchable, Breathable Wearable Batteries using a Holey Design
Students: Christine Wu

Category: General Engineering
School: Princeton Day School
Project Title: Automated Farmland Contamination Monitoring Using Internet of Things
Students: Lizbeth He

Category: Software and Embedded Systems
School: Princeton High School
Project Title: Semi-Supervised Pulmonary Auscultation Analysis with Cross Pseudo Supervision
Students: Jieruei Chang

Category: Environmental Science and Engineering
School: West Windsor-Plainsboro High North
Project Title: The Effect of EV Battery Metals on River Microbial Systems
Students: Zeeshan Shariff

Category: Biochemistry, Biology and Medical
School: Princeton High School
Project Title: Combining Image similarity and Predictive AI Models to Decrease Subjectivity in Thyroid Nodule Diagnosis and Improve Malignancy Prediction
Students: Aishwarya Vedula

Category: Biochemistry, Biology and Medical
School: Lawrenceville School
Project Title: Navigating the Tumor Microenvironment: Identifying Novel Biomarkers in Non-Small Cell Lung Cancer Using Single-Cell Transcriptomics

Students: ZiXuan Xin

Category: Biochemistry, Biology and Medical
School: Lawrenceville School
Project Title: Pioneering Anti-Inflammatory Therapy: The Path to Precision Therapy with C3aR Peptide Libraries
Students: Megan Hsu

Award: Honorable Mention

Division: Senior Division 2024
Organization: Mercer Science and Engineering Club

Category: Plant Science
School: Robbinsville High School
Project Title: The Effects of Classical Music on the Growth of Vernalized Radish Plants
Students: Aishwarya Gadicherla

Category: Software and Embedded Systems
School: The Peddie School
Project Title: MetaDesigner: Advancing Artistic Typography through AI-Driven, User-Centric, and Multilingual WordArt Synthesis
Students: Kaibo Wang

Category: Software and Embedded Systems
School: = Home School =
Project Title: Machine Learning for HIV-ART Optimization
Students: Mariam El-Hadik

Category: Environmental Science and Engineering
School: Lawrenceville School
Project Title: Eco-friendly Remediation of PFOA Contamination using BTs-ZVI (Banana Peel, Tapioca - Zero Valent Iron)
Students: Emily Lee

Category: Biochemistry, Biology and Medical
School: Princeton High School

Project Title: [Polyunsaturated fatty acids (PUFAs) as Potential Anticarcinogenic Agents Against U937 Non-Hodgkin's Lymphoma Cancer Cells](#)
Students: Katie Qin

Category: [Biochemistry, Biology and Medical](#)
School: [Robbinsville High School](#)
Project Title: [The Efficacy of Various Food Preservation Methods Against the Growth of Escherichia Coli in a Controlled Environment](#)
Students: Akhilesh Chauhan

Category: [Biochemistry, Biology and Medical](#)
School: [Princeton International School of Mathematics and Science](#)
Project Title: [Investigating the Mechanisms of Microglia/Macrophage Activation in Mediating Inflammatory Responses following Distraction Spinal Cord Injury](#)
Students: Junrui Jonathan Hai

Award: [Honorable Mention (4)](#)

Division: [Junior Division 2024](#)
Organization: [Mercer Science and Engineering Club](#)

Category: [General Science (Junior)](#)
School: [Princeton Day School](#)
Project Title: [Classification of waste materials into biodegradable and nonbiodegradable using machine learning](#)
Students: Aarav Balaji

Category: [General Science (Junior)](#)
School: [Chapin School](#)
Project Title: [The Effect of Distance on the Light Intensity from Different Sources](#)
Students: Claire Liang

Category: [General Science (Junior)](#)
School: [Princeton Unified School Middle School (formally John Witherspoon)](#)
Project Title: [Does Social Media Negatively Affect Your Mental Health?](#)
Students: Fei-Fei Wang

Category: [General Science (Junior)](#)
School: [Princeton Unified School Middle School (formally John Witherspoon)](#)
Project Title: [How Do Chemicals in Processed Foods Affect Our Health?](#)
Students: Elena Shen

Category: [General Science (Junior)](#)
School: [Chapin School](#)

Project Title: [How Do Iron Pyrite Cubes Rust in Different Liquids?](#)
Students: Xingzhi Li

Category: [General Science (Junior)](#)
School: [Princeton Montessori School](#)
Project Title: [The Effect Of Temperature On The Bounce Of A Tennis Ball](#)
Students: Vishnu G

Category: [General Science (Junior)](#)
School: [Princeton Montessori School](#)
Project Title: [Comparison of Heat Storage in Water Bottle Brands](#)
Students: Jia M

Award: [Best Use of Photography](#)

Division: [Junior Division 2024](#)
Organization: [New Jersey Camera & One Hour Photo](#)

Category: [General Science (Junior)](#)
School: [Princeton Montessori School](#)
Project Title: [How Dogs (Both AI generated and real) can help train AI models to spot deepfakes.](#)
Students: Anamitra Abi

Award: [Biomedical Science Award](#)

Division: [Senior Division 2024](#)
Organization: [Regeneron Pharmaceuticals](#)

Category: [Biochemistry, Biology and Medical](#)
School: [Lawrenceville School](#)
Project Title: [A Novel Interpretative Deep Neural Network with Grad-CAM's Heatmap for The Early Diagnosis of Alzheimer's Disease](#)
Students: Annabelle Yao

Award: [Air Force Research Laboratory Award](#)

Division: [Senior Division 2024](#)
Organization: [US Air Force](#)

Category: Software and Embedded Systems
School: Princeton International School of Mathematics and Science
Project Title: Multi-Unit Reconfigurable Robot
Students: Zirui Wang

Category: Environmental Science and Engineering
School: Princeton International School of Mathematics and Science
Project Title: 3D digital holographic microscopic water quality detection system
Students: Tingwen Chen

Category: Biochemistry, Biology and Medical
School: Princeton High School
Project Title: Analysis of E. coli growth dynamics during Lambda(vir) phage infection reveals phage decay
Students: Benjamin Gitai

Category: Biochemistry, Biology and Medical
School: Lawrenceville School
Project Title: A Novel Interpretative Deep Neural Network with Grad-CAM's Heatmap for The Early Diagnosis of Alzheimer's Disease
Students: Annabelle Yao

Award: APA Outstanding Research

Division: Senior Division 2024
Organization: American Psychological Association

Category: Behavioral and Social Science
School: Lawrenceville School
Project Title: The Diversity in College Admission: a study of Asian American applicants in Harvard Judicial Case
Students: Jin Sun

Award: Association for Women Geoscientists Award

Division: Senior Division 2024
Organization: Association for Women Geoscientists

Category: Environmental Science and Engineering
School: Lawrenceville School
Project Title: Eco-friendly Remediation of PFOA Contamination using BTs-ZVI (Banana Peel, Tapioca - Zero Valent Iron)

Students: Emily Lee

Award: Environmental Protection Agency Award

Division: Senior Division 2024
Organization: Environmental Protection Agency

Category: Environmental Science and Engineering
School: West Windsor-Plainsboro High North
Project Title: The Effect of EV Battery Metals on River Microbial Systems
Students: Zeeshan Shariff

Award: NJ Water Environment Association (NJWEA)

Division: Senior Division 2024
Organization: NJ Water Environment Association

Category: Environmental Science and Engineering
School: Princeton International School of Mathematics and Science
Project Title: 3D digital holographic microscopic water quality detection system
Students: Tingwen Chen

Award: NASA Earth System Science Award

Division: Senior Division 2024
Organization: NASA

Category: Environmental Science and Engineering
School: The Peddie School
Project Title: EcoCast: Multi-Task Global Temperature Forecasting via Autoregressive Transformers
Students: Yang Han

Award: NOAA's "Taking the Pulse of the Planet" Award

Division: Senior Division 2024
Organization: NOAA

Category: Environmental Science and Engineering
School: The Peddie School
Project Title: EcoCast: Multi-Task Global Temperature Forecasting via Autoregressive Transformers
Students: Yang Han

Award: RICOH Sustainable Development Award

Division: Senior Division 2024
Organization: RICOH

Category: Environmental Science and Engineering
School: Princeton International School of Mathematics and Science
Project Title: 3D digital holographic microscopic water quality detection system
Students: Tingwen Chen

Award: USAID Science Champion Award

Division: Senior Division 2024
Organization: U.S. Agency for International Development

Category: Chemistry and Materials
School: Princeton International School of Mathematics and Science
Project Title: Predicting Crystal System of Cathode Materials in Lithium-Ion Batteries Using Machine Learning Models
Students: Tyler Fu

Award: YSEA Science Fair Award

Division: Senior Division 2024
Organization: Yale Science & Engineering Association

Category: Biochemistry, Biology and Medical
School: Lawrenceville School
Project Title: Revolutionizing Asthma Treatment: A Breakthrough in LABA Design Enhances Both Selectivity and Efficacy
Students: Sophia Liu