

# 84th Twin Cities Regional Science Fairs Awards

February 4-27, 2022

Students selected to compete at the 2022 Regeneron International Science and Engineering Fair (hybrid) in May, 2022. TCRSF will compete in-person and virtually in 2022.

## ISEF Finalist (St. Paul)

S-HS-EGSD-400	Maggie Banks	A Plant With Promise: Using Engineering Principles to Create an Eco-Friendly Manufacturing Process for a Biodegradable Piezoelectric Transducer
S-HS-ROBO-010	Alexander Moore,Ruth Mellin	One-way ASL translation: 3D printed robotic hand with integrated speech recognition

## ISEF 1st Alternate (St. Paul)

S-HS-ENMC-284	Will Sedo	Optimizing Waterflow in a Simulated River Environment
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## ISEF 2nd Alternate (St. Paul)

S-HS-EAEV-232	Linnea Cooley	Effect of Ethanol and Octocrylene on the Cell Growth and Chlorophyll-a Levels of <i>Cyclotella meneghiniana</i>
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## **ISEF Finalist (Twin Cities)**

T-HS-BMED-369	Karen Nakamura	The Electromyographic Evaluation of the Bilateral Muscle Asymmetry of the Latissimus Dorsi in Martial Arts and the Effect of Real-Time Biofeedback on Technique Improvement
T-HS-MCRO-335	Caroline Schlehuder	New Research, Old Medicine: Exploring Antibacterial Properties of Plants and Fungi Used in Indigenous Medicine
T-HS-EBED-419	Nickolas Zander	Automated Sorting Device Using Sensors and Motor Control
T-HS-CBIO-289	Srinath Hariharan	Tumor targeting: Utilizing spatial data science techniques to decode the enigmatic immune response with the goal of informing further efforts to develop immunotherapies for tumor treatment

## **ISEF 1st Alternate (Twin Cities)**

T-HS-ENEV-404	Coolsjes Singhvi	Modeling of Blood Glucose to Optimize Diet and Exercise for Type 2 Diabetes Management
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## **ISEF 2nd Alternate (Twin Cities)**

T-HS-ENEV-404	Ellen Guo	Novel Cellulose Carbon Fiber Based Biofilm for Airborne VOC Filtration
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## **ISEF 3rd Alternate (Twin Cities)**

T-HS-CHEM-332	Cady Pagel	Gluten-Free or Gluten Debris: Prolamin and Glutelin Levels in Oat Flours
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## **ISEF 4th Alternate (Twin Cities)**

T-HS-BMED-299	Rahul Balaji	Breaking News: There is more than one way to break the back! Characterizing and quantifying the effects of two models of the intervertebral disc for the purpose of successfully treating lower back pain
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## **ISEF Finalist (Western Suburbs)**

W-HS-ROBO-229	Krish Inba Rajashankar	Medical device recall prediction using MAUDE reports
W-HS-BMED-298	Elizabeth Levinshteyn	A Look Into the TINY Earth: Finding Antibiotic Producing Bacteria in Yellowstone Soil
W-HS-BMED-025	Ava Jaffe,Amrit Menon	Essential Protection: Using UV-sensitive yeast to evaluate essential oils as an alternative to sunscreen
W-HS-EBED-238	Shreshth Shrivastava	Wi-C.A.R.E: Wifi Computer-Assisted Remote Eldercare (Year 3)
W-HS-MATS-455	Jared Geppert	3D Printing Layer Angles

## **ISEF 1st Alternate (Western Suburbs)**

W-HS-ENEV-132	Ivars Emerson	A collapsible reusable cooler for eco-friendly sustainable shipping of cold medications
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## **ISEF 2nd Alternate (Western Suburbs)**

W-HS-PLNT-101	Tyler Clair,Quinn Hughes	Using Monte Carlo Simulation to Optimize Vitamin C Production in Brassica oleracea using Abiotic Plant Stress
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## **ISEF 3rd Alternate (Western Suburbs)**

W-HS-PLNT-085	Katriana Trinh	Effects of silica Nanoparticles to mitigate abiotic stress
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## **ISEF 4th Alternate (Western Suburbs)**

W-HS-PLNT-091	Maxwell Maveus	Sporophytic abortion rates under desiccation stress and the potential of sporophytic autonomy in the mosses Leucobryum glaucum and Bryum caespiticium
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## **ISEF 5th Alternate (Western Suburbs)**

W-HS-BMED-333	Noor Omar,Muminah Mohammed	Hidden Hunger
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## **3Mgives Sponsor Award**

W-HS-BMED- Elizabeth Levinshteyn A Look Into the TINY Earth: Finding Antibiotic  
298 Producing Bacteria in Yellowstone Soil

## **Ecolab Sponsor Award**

S-HS-EGSD- Maggie Banks A Plant With Promise: Using Engineering Principles  
400 to Create an Eco-Friendly Manufacturing Process  
for a Biodegradable Piezoelectric Transducer

## **DuPont Water Solutions Sponsor Award**

W-HS-ENMC- Trisha Samba,Amira Water You Risking? Developing a Novel Maze to  
035 Sinclair Assess the Effects of Thirst. on Risk-Taking  
Behavior in Mice

## **Northrop Grumman Sponsor Award**

W-HS-ROBO- Kevin Armstrong II Robotics for efficient household planting  
118

## **Office Depot Sponsor Award**

T-HS-ENEV- Anna Tran The Effect of Windmills Efficiency of Solar Panels  
148

## **Premier Bank Sponsor Award**

T-MS-MATH- Daniel Song  
137

Stock price movement prediction - a research based on multi-stage financial models and cross-period comparison

## **City of St. Paul Youth Fund Sponsor Award**

S-MS-ENMC- Lynne Hu  
188

What Effect Does Anti-Slip Material Have On Preventing Tools From Falling?

## **Mintahoe Catering and Events Sponsor Award**

T-MS-BMED- Callan Logan  
122

Music to Their Ears: Classical Music's Effect on Cognitive Test Performance for Those with Dementia

# 3M Film and Materials Science, Manufacturing Technology and Engineering (Film Group)

W-HS-ENEV-096	Kyla Fung	Sustainable Bioplastics: Seaweed and Hemp-based Alternatives to Fossil Fuel-based Plastics
S-HS-EGSD-400	Maggie Banks	A Plant With Promise: Using Engineering Principles to Create an Eco-Friendly Manufacturing Process for a Biodegradable Piezoelectric Transducer
S-HS-ENMC-284	Will Sedo	Optimizing Waterflow in a Simulated River Environment
S-HS-ROBO-010	Alexander Moore, Ruth Mellin	One-way ASL translation: 3D printed robotic hand with integrated speech recognition
T-MS-ANIM-215	Shreya Sekar	Turtle Tracks: Characterizing and quantifying the relationship between habitat, environmental, temporal, and climate data with turtle sightings

# 3M Film and Materials Science, Manufacturing Technology and Engineering (Materials Group)

W-MS-ANIM- 440	Ainsley Mick	Saddle Pad Science
W-MS-ROBO- 287	Saif Elkhateeb	Building an Edge and Light Detecting Robot
W-MS-CHEM- 375	Ava Kallunki	The Sweet Reward of Baking: How Flour Type Impacts the Density of a Cupcake
W-MS-EAEV- 355	Adeenah Fahim	Effect of different water types on plant growth at different stages
S-MS-EAEV- 044	Maggie Hughes	How does Ocean Acidification Affect Coral Bleaching?

## 3M Display Materials and Systems Division

W-HS-ENMC- 256	Billal Saidi	Engineering a Cost-Effective Ventilator
W-HS-ENMC- 036	Nathan Walsh	Everything you 'Kneed': Development of an adjustable, above-knee prosthetic capable of performing multiple activities.
W-MS-TMED- 288	Milan Darji	There's Not An App For That! A Novel Clinical Assessment Tool To Predict Heart Failure Patient Outcomes
W-MS-PHYS- 323	Amina Zahid	Hyperloop 2.0
S-MS-ENMC- 064	tetsu matsumoto	What Type of Winglet Creates the Most Lift?

## 3M Personal Safety Division

W-HS-BMED- 271	Ava Chen	A new potential antidepressant? The effects of L-tryptophan on serotonin levels, behavior, and alcohol aversion in <i>Faxonius virilis</i> model organisms
T-HS-BMED- 369	Karen Nakamura	The Electromyographic Evaluation of the Bilateral Muscle Asymmetry of the Latissimus Dorsi in Martial Arts and the Effect of Real-Time Biofeedback on Technique Improvement
T-HS-ENEV- 404	Ellen Guo	Novel Cellulose Carbon Fiber Based Biofilm for Airborne VOC Filtration
W-HS-BMED- 301	Zahraa Mansoor	The Link Between Hearing Loss and Alzheimer's Disease in Elderly Patients
S-MS-ENMC- 188	Lynne Hu	What Effect Does Anti-Slip Material Have On Preventing Tools From Falling?
W-MS-CHEM- 179	Indira Sivaraj	Sneaky Solutes: Can we trap them?
W-MS-TMED- 327	Hadley Gott	Best Mask



## 3M Young Inventor Recognition

T-HS-CHEM-332	Cady Pagel	Gluten-Free or Gluten Debris: Prolamin and Glutelin Levels in Oat Flours
T-HS-ENEV-013	Gabriel Cordova Gonzalez	Keeping Your Cool
W-HS-ENMC-083	Noah Anderson	Development of remotely operated underwater vehicle to aid in exploration and mapping of underwater cave systems
W-HS-ENBM-088	Zara Thomas	Different decellularization and demineralization methods for porcine bone tissue
W-MS-CHEM-248	Mardhav Shriram	Radical Rockets
W-MS-ENEV-441	Hannah Kocinski	Sailing Cars
W-MS-ENMC-156	Blake Curti	I Can't Hold It!
W-HS-BMED-333	Noor Omar, Muminah Mohammed	Hidden Hunger
W-MS-MATS-262	Katherine Zylstra	Humpty Dumpty had a Great Fall: The Effects of Packing Material on Shipping Products
W-HS-ENEV-132	Ivars Emerson	A collapsible reusable cooler for eco-friendly sustainable shipping of cold medications
W-HS-CELL-009	William Anderson	Using decellularized grapes to grow yeast
S-HS-MATS-203	Benjamin Chen	Recycled Plastic for Resilient Infrastructure
W-MS-ENEV-235	Tallulah Dogwill, Grace O'Brien	Reducing Carbon Emissions By Creating a Light Fixture that Relies On Solar energy from Indoors
W-HS-ENMC-308	Valerie Nelson	Effects of Chamber Shape on Movement of Accordion Soft Actuators and Implementation in Artificial Hands
T-HS-BMED-008	Ekbal Abdi, Eithne Onsinyo	Measuring Calories in Snack Foods

## **Inspiring Excellence Project**

W-MS-ROBO- 287	Saif Elkhateeb	Building an Edge and Light Detecting Robot
T-HS-ENEV- 013	Gabriel Cordova Gonzalez	Keeping Your Cool
S-HS-EGSD- 400	Maggie Banks	A Plant With Promise: Using Engineering Principles to Create an Eco-Friendly Manufacturing Process for a Biodegradable Piezoelectric Transducer
W-HS-ENMC- 256	Billal Saidi	Engineering a Cost-Effective Ventilator

## **Inspiring Excellence Teacher**

Hala Bazzi

Al-Amal School, Fridley

# United States Department of Agriculture Research Service

W-HS-PLNT-091	Maxwell Maveus	Sporophytic abortion rates under desiccation stress and the potential of sporophytic autonomy in the mosses <i>Leucobryum glaucum</i> and <i>Bryum caespitium</i>
T-HS-MCRO-335	Caroline Schlehuber	New Research, Old Medicine: Exploring Antibacterial Properties of Plants and Fungi Used in Indigenous Medicine
T-MS-PLNT-409	Ethan Finch	How Do Daily Temperatures Affect Sap Production in Maple Trees?
W-MS-PLNT-424	Josie Dederichs	Its Grow Time: The effect ribosomal bacteria has on plant growth rates

## Award for Science Potential

T-MS-PLNT-409	Ethan Finch	How Do Daily Temperatures Affect Sap Production in Maple Trees?
W-HS-BEHA-313	Ziyi (Rick) Qian	Defeating Dyslexia: A robust meta-analysis of the relationship between hearing and Dyslexia to achieve early diagnosis and treatment
T-MS-ENEV-446	John Liu	The Use of Controlled-releasing Technology to Reduce Salt Contamination in Minnesota Water
W-MS-ENEV-221	Shagun Shrivastava	100% Biodegradable Plastics!!! Is it true? ( Year 2 )
S-MS-MATS-068	Kathleen Dobie	How Hand Warmer Fillings Affect How Long They Retain Heat
W-HS-BMED-271	Ava Chen	A new potential antidepressant? The effects of L-tryptophan on serotonin levels, behavior, and alcohol aversion in <i>Faxonius virilis</i> model organisms

## American Chemical Society Runner Up

T-HS-CHEM- 332	Cady Pagel	Gluten-Free or Gluten Debris: Prolamin and Glutelin Levels in Oat Flours
S-HS-MATS- 203	Benjamin Chen	Recycled Plastic for Resilient Infrastructure
W-MS-CHEM- 437	Cohen Emmick	Picking the Pepper: The Effects of Ripeness on Vitamin C in Bell Peppers
T-MS-CHEM- 290	Olivia Hamann	How Clean is Clean?
W-MS-CHEM- 152	Makena Mbuba	Bubble Trouble: How potassium iodide affects the height, strength, and speed it takes foam to rise.

## American Chemical Society

W-HS-BCHM- 033	Romy Peterson	Don't Forget About Caspase-2: Analyzing the Binding Site Specificity of a Protein Linked to Alzheimer's Disease
W-MS-CHEM- 179	Indira Sivaraj	Sneaky Solutes: Can we trap them?

## MN Chapter of American Fisheries

W-HS-EAEV- 454	Breanna Vessels	Aquatic Plant Pollutants Effect
W-MS-EAEV- 355	Adeenah Fahim	Effect of different water types on plant growth at different stages

## **US Air Force (St. Paul)**

S-HS-ROBO-010 Alexander Moore, Ruth Mellin One-way ASL translation: 3D printed robotic hand with integrated speech recognition

## **US Air Force (Twin Cities)**

T-HS-EBED-419 Nickolas Zander Automated Sorting Device Using Sensors and Motor Control

## **US Air Force (Western Suburbs)**

W-MS-EGSD-443 Eric Suh Veggie Power

## Office of Naval Research

T-HS-ENEV-013	Gabriel Cordova Gonzalez	Keeping Your Cool
T-HS-BMED-369	Karen Nakamura	The Electromyographic Evaluation of the Bilateral Muscle Asymmetry of the Latissimus Dorsi in Martial Arts and the Effect of Real-Time Biofeedback on Technique Improvement
S-HS-MATS-203	Benjamin Chen	Recycled Plastic for Resilient Infrastructure
W-HS-ENMC-036	Nathan Walsh	Everything you 'Kneed': Development of an adjustable, above-knee prosthetic capable of performing multiple activities.
W-HS-MCRO-281	Rushil Khadilkar	Impact of Critical Parameters on Rhizopus Stolonifer Growth: Implications to Food Shelf Longevity and Economics
T-MS-BCHM-420	Mery Gomez	What Would the Bacteria Rhizobium Leguminosarum do to a Plant?
S-MS-MATS-068	Kathleen Dobie	How Hand Warmer Fillings Affect How Long They Retain Heat
W-MS-BCHM-351	MaKenzie Hochhalter	Drug solubility
W-MS-PHYS-338	Colton Hoffman	Grinding Gears
W-MS-ENBM-142	Alex Ebert	Getting a Grip! How Weight and Shape Affect the Time a D.I.Y. Prosthetic Hand can Hold it.

## Teacher Excellence

Kim Hoehne

Minnetonka HS

## ISEF Alumni Award - Timara Underbakke

W-MS-ENEV-221	Shagun Shrivastava	100% Biodegradable Plastics!!! Is it true? ( Year 2 )
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## **American Meteorological Society (St. Paul)**

S-MS-EAEV- Ellen Kovats  
041

How Does the Building Material Affect Urban Heating

## **American Meteorological Society (Western)**

W-HS-EAEV- Adelyn Diaz  
080

GIS mapping of traffic pollutant concentrations against socioeconomic and health data in Hennepin County

## **American Psychological Association (St. Paul)**

S-HS-BEHA- Kishori Patel  
202

The Effect of the Amount of Beef Food Source and Exposure Time on Calliphora vomitoria Pupation

## **American Psychological Association (Twin Cities)**

T-HS-BEHA- Braiden Moher  
316

Effects of Meditation on Memorization and Focus

T-MS-BEHA- Lalaine Acosta- Sanchez  
417

Can You Guess Handedness Based on Handwriting?

## **American Psychological Association (Western)**

W-MS-BEHA- Gabriella Olson  
321

The Nonexistent Word

W-MS-BEHA- Sanjana Kollipara  
293

Malleable Memory: Studying the role of false memory, demographics, and suggestion in witness testimony

## **ASM Materials Educational Foundation (St. Paul)**

S-MS-EAEV- Ellen Kovats  
041

How Does the Building Material Affect Urban Heating

## **ASM Materials Educational Foundation (Twin Cities)**

T-HS-ENEV- Ellen Guo  
404

Novel Cellulose Carbon Fiber Based Biofilm for Airborne VOC Filtration

T-MS-ENEV- John Liu  
446

The Use of Controlled-releasing Technology to Reduce Salt Contamination in Minnesota Water

## **ASM Materials Educational Foundation (Western)**

W-HS-MATS- Jared Geppert  
455

3D Printing Layer Angles

W-HS-MATS- Nick Carver  
077

The potential application of Nitinol's shape memory properties for use in internal muscle repair

## **Association of Women Geoscientists (St. Paul)**

S-MS-EAEV- Maggie Hughes  
044

How does Ocean Acidification Affect Coral Bleaching?

## **Association of Women Geoscientists (Twin Cities)**

T-HS-EAEV- Ahreum Ham  
184

Legacy contaminants: An extensive study of historic land use and contamination in the East Phillips neighborhood of Minneapolis to prioritize future monitoring and restoration efforts

## **Association of Women Geoscientists (Western)**

W-HS-EAEV- Breanna Vessels  
454

Aquatic Plant Pollutants Effect

## **DoD STEM Leadership Prize**

T-MS-ENEV- John Liu  
446

The Use of Controlled-releasing Technology to Reduce Salt Contamination in Minnesota Water



# GeniusOlympiad

T-HS-ENEV-013	Gabriel Cordova Gonzalez	Keeping Your Cool
S-HS-ENMC-284	Will Sedo	Optimizing Waterflow in a Simulated River Environment
T-HS-ENEV-404	Ellen Guo	Novel Cellulose Carbon Fiber Based Biofilm for Airborne VOC Filtration
W-HS-PLNT-101	Tyler Clair,Quinn Hughes	Using Monte Carlo Simulation to Optimize Vitamin C Production in Brassica oleracea using Abiotic Plant Stress
W-HS-ENEV-096	Kyla Fung	Sustainable Bioplastics: Seaweed and Hemp-based Alternatives to Fossil Fuel-based Plastics
T-HS-ENEV-148	Anna Tran	The Effect of Windmills Efficiency of Solar Panels

## **Lemelson Early Inventor Prize (St. Paul)**

S-MS-ENMC- Josie Lee  
066

Which Formula 1 Rear Wing Has the Lowest Level of Downforce.

## **Lemelson Early Inventor Prize (Twin Cities)**

T-MS-ENEV- John Liu  
446

The Use of Controlled-releasing Technology to Reduce Salt Contamination in Minnesota Water

## **Lemelson Early Inventor Prize (Western)**

W-MS-ENEV- Shagun Shrivastava  
221

100% Biodegradable Plastics!!! Is it true? ( Year 2 )

## **Mu Alpha Theta (St. Paul)**

S-HS-EGSD- Maggie Banks  
400

A Plant With Promise: Using Engineering Principles to Create an Eco-Friendly Manufacturing Process for a Biodegradable Piezoelectric Transducer

## **Mu Alpha Theta (Twin Cities)**

T-MS-MATH- Daniel Song  
137

Stock price movement prediction - a research based on multi-stage financial models and cross-period comparison

T-HS-CBIO- Coolsjes Singhvi  
208

Modeling of Blood Glucose to Optimize Diet and Exercise for Type 2 Diabetes Management

## **Mu Alpha Theta (Western)**

W-HS-MATH- Eric Chen  
259

Classification of Bone Surface Modifications with Graph-Based Semi-Supervised Learning

W-HS-MATH- April Wang  
117

Predicting COVID-19 Cass Through High-Dimensional Data Analysis

## **NASA Earth System Science Award (St. Paul)**

S-MS-EAEV- Maggie Hughes  
044

How does Ocean Acidification Affect Coral Bleaching?

## **NASA Earth System Science Award (Twin Cities)**

T-HS-EAEV- Sneha  
368 Sureshkumar, Sriram  
Sureshkumar

The Detrimental Impacts of a Tilling Based Agricultural System.

T-MS-MATS- Alexander Batham  
169

How Does Temperature Affect Quality?

## **NASA Earth System Science Award (Western)**

W-HS-EAEV- Roxy Neset  
296

Agriculture in the Big City: Studying the effectiveness of soil treatments on weed growth

W-MS-PLNT- Bradan  
307 Kavanaugh, Aidan  
Kavanaugh

Phosphorescence of the Sea

## **National Geographic Society That's Geography! Award (St. Paul)**

S-HS-EAEV- Linnea Cooley  
232

Effect of Ethanol and Octocrylene on the Cell Growth and Chlorophyll-a Levels of *Cyclotella meneghiniana*

## **National Geographic Society That's Geography! Award (Twin Cities)**

T-HS-ENEV- Ellen Guo  
404

Novel Cellulose Carbon Fiber Based Biofilm for Airborne VOC Filtration

## **National Geographic Society That's Geography! Award (Western Suburbs)**

W-HS-BMED- Elizabeth Levinshteyn  
298

A Look Into the TINY Earth: Finding Antibiotic Producing Bacteria in Yellowstone Soil

## **National Oceanic and Atmospheric Administration NOAA Taking the Pulse of the Planet (St. Paul)**

S-MS-EAEV- Maggie Hughes  
044

How does Ocean Acidification Affect Coral Bleaching?

## **National Oceanic and Atmospheric Administration NOAA Taking the Pulse of the Planet (Twin Cities)**

T-MS-ANIM- Shreya Sekar  
215

Turtle Tracks: Characterizing and quantifying the relationship between habitat, environmental, temporal, and climate data with turtle sightings

T-HS-EAEV- Ahreum Ham  
184

Legacy contaminants: An extensive study of historic land use and contamination in the East Phillips neighborhood of Minneapolis to prioritize future monitoring and restoration efforts

## **National Oceanic and Atmospheric Administration NOAA Taking the Pulse of the Planet (Western)**

W-HS-BMED- Elizabeth Levinshteyn  
298

A Look Into the TINY Earth: Finding Antibiotic Producing Bacteria in Yellowstone Soil

W-MS-EAEV- Sadie Hoekstra  
264

Tenebrio Molitor's Metamorphosis: The Effect of Temperature on Mealworms Metamorphosis

## **Ricoh Sustainable Development Award (St. Paul)**

S-HS-EGSD- Maggie Banks  
400

A Plant With Promise: Using Engineering Principles to Create an Eco-Friendly Manufacturing Process for a Biodegradable Piezoelectric Transducer

## **Ricoh Sustainable Development Award (Twin Cities)**

T-MS-MATS- Alexander Batham  
169

How Does Temperature Affect Quality?

T-MS-ENEV- John Liu  
446

The Use of Controlled-releasing Technology to Reduce Salt Contamination in Minnesota Water

## **Ricoh Sustainable Development Award (Western)**

W-HS-ENEV- Ivars Emerson  
132

A collapsible reusable cooler for eco-friendly sustainable shipping of cold medications

W-HS-ENEV- Kyla Fung  
096

Sustainable Bioplastics: Seaweed and Hemp-based Alternatives to Fossil Fuel-based Plastics

## **Society for In Vitro Biology (St. Paul)**

S-HS-ANIM- Nina Chafee  
200

The Effect of Adolescent Temperature Variation on Development and Adult Performance in *V. cardui*

## **Society for In Vitro Biology (Twin Cities)**

T-HS-CBIO- Coolsjes Singhvi  
208

Modeling of Blood Glucose to Optimize Diet and Exercise for Type 2 Diabetes Management

## **Society for In Vitro Biology (Western)**

W-HS-CBIO- Mohit Agarwal, Aedin Yu  
445

A two-part approach and implementation of early-stage skin cancer diagnosis using a novel dense convolutional neural network (CNN) architecture and affordable computing hardware

W-HS-BCHM- Romy Peterson  
033

Don't Forget About Caspase-2: Analyzing the Binding Site Specificity of a Protein Linked to Alzheimer's Disease

## **USAID - US Agency for International Development (St. Paul)**

S-MS-CHEM- Cece Hennis  
178

Which Vegetable Has the Highest Level of Chlorophyll

## **USAID - US Agency for International Development (Twin Cities)**

T-HS-EAEV- Sneha  
368 Sureshkumar, Sriram  
Sureshkumar

The Detrimental Impacts of a Tilling Based Agricultural System.

T-MS-PLNT- Ethan Finch  
409

How Do Daily Temperatures Affect Sap Production in Maple Trees?

## **USAID - US Agency for International Development (Western)**

W-HS-EAEV- Breanna Vessels  
454

Aquatic Plant Pollutants Effect

W-HS-EAEV- Roxy Neset  
296

Agriculture in the Big City: Studying the effectiveness of soil treatments on weed growth

## **US Metric Association (St. Paul)**

S-HS-MATS- Benjamin Chen  
203

Recycled Plastic for Resilient Infrastructure

## **US Metric Association (Twin Cities)**

T-MS-BCHM- Rebecca Cronin  
168

Candy Chromatography: Skittles vs M&Ms

## **US Metric Association (Western)**

W-HS-BMED- Elizabeth Levinshteyn  
298

A Look Into the TINY Earth: Finding Antibiotic  
Producing Bacteria in Yellowstone Soil

## **Yale Science and Engineering Association Inc. (Twin Cities)**

T-HS-BEHA- Emma Boys  
315

Gender Differences and the Stroop Effect

## **Yale Science and Engineering Association Inc. (Western Suburbs)**

W-HS-BMED- Srijani Datta  
444

Sepsis Survivor: Characterizing muscle stem cells  
using RNA sequencing from a murine surgical  
model of sepsis for the purpose of preventing  
sepsis-associated muscle wasting

## Stockholm Junior Water Prize (St. Paul)

S-HS-ENMC- 284	Will Sedo	Optimizing Waterflow in a Simulated River Environment
S-HS-EGSD- 400	Maggie Banks	A Plant With Promise: Using Engineering Principles to Create an Eco-Friendly Manufacturing Process for a Biodegradable Piezoelectric Transducer
S-HS-EAEV- 199	Cooper Danielson	The Effect of Varying Concentrations of Miracle-gro fertilizer on Composting Earthworm Ecosystems

## Stockholm Junior Water Prize (Twin Cities)

T-HS-BMED- 306	Scott Mikkelsen	Effect of Cooking Methods on Vitamin C Content
T-HS-EAEV- 184	Ahreum Ham	Legacy contaminants: An extensive study of historic land use and contamination in the East Phillips neighborhood of Minneapolis to prioritize future monitoring and restoration efforts
T-HS-BMED- 008	Ekbal Abdi,Eithne Onsinyo	Measuring Calories in Snack Foods
T-HS-BMED- 016	Juan Sanchez Uribe,Luis Ramirez Aranda	How Many Calories Are in those Snacks?
T-HS-BMED- 194	Nawal Warfa	Comparison of Fat Between Non-Organic and Organic Foods
T-HS-CBIO- 208	Coolsjes Singhvi	Modeling of Blood Glucose to Optimize Diet and Exercise for Type 2 Diabetes Management

## Stockholm Junior Water Prize (Western)

W-HS-EAEV- 082	Nicole Haraway	The impacts of chemicals found in plastics having Estrogenic Activity on the synthesization of vitellogenin protein in mussels
W-HS-EAEV- 454	Breanna Vessels	Aquatic Plant Pollutants Effect
W-HS-MCRO- 212	Scott Sorensen	Manipulating Dissolved Gas Content in Computer Simulations of Acoustic Cavitation
W-HS-EAEV- 296	Roxy Neset	Agriculture in the Big City: Studying the effectiveness of soil treatments on weed growth



## **Research Paper of Merit MS**

P-MS-ENVI-381      Shagun Shrivastava      100% Biodegradable Plastics!!! Is it true? (Year 2)

## **Research Papers MS Third Place**

P-MS-MHBE-292      Sanjana Kollipara      Malleable Memory: Studying the role of false memory, demographics, and suggestion in witness testimony

## **Research Papers MS Second Place**

P-MS-LIFE-260      Ethan Finch      How Do Daily Temperatures Affect Sap Production in Maple Trees?

## **Research Papers MS First Place**

P-MS-ENVI-435      Shreya Sekar      Turtle Tracks: Characterizing and quantifying the relationship between habitat, environmental, temporal, and climate data with turtle sightings

## Research Papers HS Advancing to JSHS

P-HS-MHBE-362	Ella Alexander,Aayush Goud	DBS Discovery: A multifaceted approach to Deep Brain Stimulation with new advances in neurosurgical testing equipment and synchronization of alpha and beta bands for postural instability in Parkinsonian patients
P-HS-MCCE-278	Stavya Arora	Overcoming Opioids: Analyzing, characterizing, and quantifying the sentiment of Reddit posts' tone and language prior to a relapse to allow for early intervention
P-HS-ENVI-401	Andrew Bai,Annie Bai	The extreme cold in the context of a warmer planet and a cooler solar cycle
P-HS-MHBE-396	Arul Banerjea	The Effect of Epileptic Activity on Brain Activity Related to Receiving Positive or Negative Feedback
P-HS-ENVI-399	Maggie Banks	A Plant With Promise: Using Engineering Principles to Create an Eco-Friendly Manufacturing Process for a Biodegradable Piezoelectric Transducer
P-HS-ENVI-075	Victoria Biggs	Type of Filter Media's Effect on Nitrates in Artificial Aquatic Systems
P-HS-MHBE-249	Spencer Burris-Brown	Assessing the Influence of Personality on Active and Passive Procrastination among Adolescents
P-HS-LIFE-159	Nina Chafee	The Effect of Adolescent Temperature Variation on Development and Adult Performance in <i>V. cardui</i>
P-HS-PCMS-204	Benjamin Chen	Recycled Plastics for Resilient Infrastructure
P-HS-MHBE-030	Chloe Chu	Learning Lizards Assessing the Impact of Human Socialization on Behaviors of <i>Varanus Acanthurus</i>
P-HS-ENVI-255	Linnea Cooley	Effect of Ethanol and Octocrylene on the Cell Growth and Chlorophyll-a Levels of <i>Cyclotella meneghiniana</i>
P-HS-LIFE-158	Cooper Danielson	The Effect of Varying Concentrations of Miracle-gro fertilizer on Composting Earthworm Ecosystems
P-HS-MHBE-371	Srijani Datta	Sepsis Survivor: Characterizing muscle stem cells using RNA sequencing from a murine surgical model of sepsis for the purpose of preventing sepsis-associated muscle wasting
P-HS-BIOM-081	Adelyn Diaz	Serotonin levels in <i>Procambarus clarkii</i> (Red Swamp Crayfish) and <i>Faxonius virilis</i> (Northern Crayfish) exposed to high ambient temperatures
P-HS-ENVI-097	Kyla Fung	Sustainable Bioplastics: Seaweed and Hemp-based Alternatives to Fossil Fuel-based Plastics
P-HS-ENVI-397	Ellen Guo	Novel Cellulose Carbon Fiber Based Biofilm for Airborne VOC Filtration
P-HS-ENVI-185	Ahreum Ham	Legacy contaminants: An extensive study of historic land use and contamination in the East Phillips neighborhood of Minneapolis to prioritize future monitoring and restoration efforts

P-HS-MCCE-285	Srinath Hariharan	Tumor targeting: Utilizing spatial data science techniques to decode the enigmatic immune response with the goal of informing further efforts to develop immunotherapies for tumor treatment
P-HS-LIFE-100	Tyler Clair,Quinn Hughes	Using Monte Carlo Simulation to Optimize Vitamin C Production in Brassica oleracea using Abiotic Plant Stress
P-HS-MHBE-024	Ava Jaffe,Amrit Menon	Essential Protection: Using UV-sensitive yeast to evaluate essential oils as an alternative to sunscreen
P-HS-LIFE-162	Per Johnson	The Effects of Temperature on Learning Complex Tasks in Red Harvester Ants
P-HS-BIOM-280	Rushil Khadilkar	Impact of Critical Parameters on Rhizopus Stolonifer Growth: Implications to Food Shelf Longevity and Economics
P-HS-MCCE-028	Akshay Krishna	Does Apple Really Watch Your Sleep? Modifying an algorithm to improve prediction of sleep stages from Apple Watch data
P-HS-MHBE-234	Isabel Lange	The Effect of Toothpaste on Stained Teeth
P-HS-PPAI-218	Gabriel Le	How Masks Affect Air Flow
P-HS-BIOM-297	Elizabeth Levinshteyn	A Look Into the TINY Earth: Finding Antibiotic Producing Bacteria in Yellowstone Soil
P-HS-MCCE-300	Leon Luo	Does ESG investing affect international capital flows? Evidence from statistical and machine learning methods
P-HS-MHBE-027	Sarah Feng,Sydney McDaniel	Finding Functionality: A Rasch Analysis of a Body Functionality Appreciation Scale
P-HS-ENGT-011	Alexander Moore,Ruth Mellin	One-way ASL translation: 3D printed robotic hand with integrated speech recognition
P-HS-PPAI-377	Sophie Meyers	Effect of Blades on Windmills
P-HS-MHBE-370	Karen Nakamura	The Electromyographic Evaluation of the Bilateral Muscle Asymmetry of the Latissimus Dorsi in Martial Arts and the Effect of Real-Time Biofeedback on Technique Improvement
P-HS-ENVI-295	Roxy Neset	Agriculture in the Big City: Studying the effectiveness of soil treatments on weed growth
P-HS-BIOM-166	Madeline Olsen	The Effects of Different Mouthwashes on Bacteria
P-HS-PCMS-344	Cady Pagel	Gluten-Free or Gluten Debris: Prolamin and Glutelin Levels in Oat Flours
P-HS-BIOM-334	Ella Passe	How Fluoride Impacts the Efficacy of Mouthwash on Streptococcus Salivarius Bacterial Colonies
P-HS-BIOM-031	Romy Peterson	Don't Forget About Caspase-2: Analyzing the Binding Site Specificity of a Protein Linked to Alzheimer's Disease
P-HS-MHBE-359	Ziyi (Rick) Qian	Defeating Dyslexia: A robust meta-analysis of the relationship between hearing and dyslexia to achieve early diagnosis and treatment

P-HS-ENGT-283	Will Sedo	Optimizing Waterflow in a Simulated River Environment
P-HS-LIFE-274	Abirami Rajasekaran, Harini Senthilkumar	Forage Frenzy: A multifactor analysis of manure application on forage nutritive value through sequential fiber methods
P-HS-MCCE-220	Shreshth Shrivastava	Wi-C.A.R.E: Wifi Computer-Assisted Remote Eldercare (Year 3)
P-HS-ENGT-039	Trisha Samba, Amira Sinclair	Water You Risking? Developing a Novel Maze to Assess the Effects of Thirst on Risk-Taking Behavior in Mice
P-HS-BIOM-430	Adhvaith Sridhar	Immune System Innovation: Ushering in a new era of immunology research by characterizing cell populations most impacted by normal microbial exposure for preclinical research and healthcare treatment development success
P-HS-PPAI-149	Matt Trussell	The Effects of Concrete Texture on Heat Absorption and Emission
P-HS-ENGT-034	Nathan Walsh	Everything you 'Kneed': Development of an adjustable, above-knee prosthetic capable of performing multiple activities.
P-HS-MCCE-367	PETER XU, Daniel Wang	Nimble Navigation: Designing and developing an interactive chatbot with natural language processing to assist visually-impaired users to maneuver in outdoor settings with assurance
P-HS-PCMS-038	Kendall White, Sarah Peterson	Knots or Not? Using electricity to study DNA entanglements in nanochannels

## **Research Papers HS Third Place**

P-HS-ENVI-  
397

Ellen Guo

Novel Cellulose Carbon Fiber Based Biofilm for  
Airborne VOC Filtration

## **Research Papers HS Second Place**

P-HS-MHBE-  
249

Spencer Burris-Brown

Assessing the Influence of Personality on Active and  
Passive Procrastination among Adolescents

## **Research Papers HS First Place**

P-HS-ENVI-  
097

Kyla Fung

Sustainable Bioplastics: Seaweed and Hemp-based  
Alternatives to Fossil Fuel-based Plastics

## Broadcom MASTERS (St. Paul)

S-MS-ENMC- 064	tetsu matsumoto	What Type of Winglet Creates the Most Lift?
S-MS-ENMC- 188	Lynne Hu	What Effect Does Anti-Slip Material Have On Preventing Tools From Falling?
S-MS-CHEM- 178	Cece Hennis	Which Vegetable Has the Highest Level of Chlorophyll
S-MS-BEHA- 175	Margaret Bergeron	Can people tell the difference between gluten-free and non-gluten-free foods?
S-MS-ENMC- 066	Josie Lee	Which Formula 1 Rear Wing Has the Lowest Level of Downforce.
S-MS-BEHA- 180	Jane Laurey	How Accurate are Eyewitnesses at Identifying a Suspect?

## Broadcom MASTERS (Twin Cities)

T-MS-ANIM-215	Shreya Sekar	Turtle Tracks: Characterizing and quantifying the relationship between habitat, environmental, temporal, and climate data with turtle sightings
T-MS-CBIO-209	Riddhi Singhvi	Development of Artificial Pancreas Model to Optimize Insulin Dosage
T-MS-CHEM-415	Crystal Salgado Quiroz	Frozen In Time!
T-MS-BEHA-411	Mason Leonard-Gorrill	Placebo Effect: Does It Work In Food
T-MS-ENEV-446	John Liu	The Use of Controlled-releasing Technology to Reduce Salt Contamination in Minnesota Water
T-MS-BCHM-420	Mery Gomez	What Would the Bacteria Rhizobium Leguminosarum do to a Plant?

# Broadcom MASTERS (Western)

W-MS-TMED- 288	Milan Darji	There's Not An App For That! A Novel Clinical Assessment Tool To Predict Heart Failure Patient Outcomes
W-MS-ROBO- 287	Saif Elkhateeb	Building an Edge and Light Detecting Robot
W-MS-EGSD- 345	Ayeza Moheet	Manufacturing and Testing Environmentally Friendly Packaging Materials
W-MS-PHYS- 323	Amina Zahid	Hyperloop 2.0
W-MS-EAEV- 264	Sadie Hoekstra	Tenebrio Moliter's Metamorphosis: The Effect of Temperature on Mealworms Metamorphosis
W-MS-CHEM- 179	Indira Sivaraj	Sneaky Solutes: Can we trap them?
W-MS-PLNT- 266	Sophie Ertel	Food For Fertilizer: You Can Use Composted Fertilizer To Enhance Plant Growth
W-MS-BEHA- 321	Gabriella Olson	The Nonexistent Word
W-MS-BCHM- 351	MaKenzie Hochhalter	Drug solubility
W-MS-BEHA- 293	Sanjana Kollipara	Malleable Memory: Studying the role of false memory, demographics, and suggestion in witness testimony
W-MS-BEHA- 317	Thomas Marsalek	Brownie Bonanza
W-MS-ENEV- 221	Shagun Shrivastava	100% Biodegradable Plastics!!! Is it true? ( Year 2 )
W-MS-ANIM- 440	Ainsley Mick	Saddle Pad Science
W-MS-BEHA- 205	Ade Stern	How Does Art Effect/Lower Levels of Stress in People Ages 10-16?
W-MS-PLNT- 282	Evelyn Danz, Iona Heddle, Hannah Grosser	Growing Micro-greens in Lunar Regolith
W-MS-CHEM- 437	Cohen Emmick	Picking the Pepper: The Effects of Ripeness on Vitamin C in Bell Peppers
W-MS-CHEM- 328	Julia Klein	Baking to a new height
W-MS-CHEM- 248	Mardhav Shriram	Radical Rockets
W-MS-CHEM- 322	Cristian Olson	The Secret to Creamy, Tasty Ice Cream: Stabilizers
W-MS-ENEV- 425	Sadie Vietzen	Making Paper New: The Impact of Different Ratios of Paper to Plastic on Recycled Paper
W-MS-ENEV- 272	Liban Abdi	Solar-Powered Water Desalination
W-MS-CHEM- 263	Emilyn Bosch	Fat Swap; The Effects Of Different Fats On The Temperature And Spread Of A Cookie
W-MS-PLNT- 312	Veda Rao	Organic or Not?



W-MS-CHEM- Makena Mbuba  
152

W-MS-PHYS- Scarlett Hough, Kiaya  
374 Mikrut

Bubble Trouble: How potassium iodide affects the  
height, strength, and speed it takes foam to rise.

Tea Bag Rockets

# State Science Fair MS

S-MS-BEHA-040	Mary Jensen	How Does Music With Different Tempos Affect Our Ability To Recall Information?
S-MS-BEHA-067	Amelia Seuntjens	The Effect of Screen Time on Overall Academic Performance
S-MS-BEHA-175	Margaret Bergeron	Can people tell the difference between gluten-free and non-gluten-free foods?
S-MS-BEHA-180	Jane Laurey	How Accurate are Eyewitnesses at Identifying a Suspect?
S-MS-CHEM-178	Cece Hennis	Which Vegetable Has the Highest Level of Chlorophyll
S-MS-EAEV-041	Ellen Kovats	How Does the Building Material Affect Urban Heating
S-MS-EAEV-044	Maggie Hughes	How does Ocean Acidification Affect Coral Bleaching?
S-MS-EGSD-046	Kayden Greeley	What Beverage Will Conduct The Most Amount of Electricity?
S-MS-ENMC-064	tetsu matsumoto	What Type of Winglet Creates the Most Lift?
S-MS-ENMC-066	Josie Lee	Which Formula 1 Rear Wing Has the Lowest Level of Downforce.
S-MS-ENMC-188	Lynne Hu	What Effect Does Anti-Slip Material Have On Preventing Tools From Falling?
S-MS-MATS-068	Kathleen Dobie	How Hand Warmer Fillings Affect How Long They Retain Heat
S-MS-MCRO-045	Bryn McSherry	What Time are the Desks and Chairs at School at their Dirtiest
T-MS-ANIM-215	Shreya Sekar	Turtle Tracks: Characterizing and quantifying the relationship between habitat, environmental, temporal, and climate data with turtle sightings
T-MS-ANIM-413	Isabella Blanco-Abundez	A Reply From Your Dog
T-MS-ANIM-416	Gabriel Carpio	What Are Cat`s Favorite Food?
T-MS-BCHM-168	Rebecca Cronin	Candy Chromatography: Skittles vs M&Ms
T-MS-BCHM-420	Mery Gomez	What Would the Bacteria Rhizobium Leguminosarum do to a Plant?
T-MS-BEHA-411	Mason Leonard-Gorrill	Placebo Effect: Does It Work In Food
T-MS-BEHA-414	Ellie Braun	Follow the Leader!
T-MS-BEHA-417	Lalaine Acosta- Sanchez	Can You Guess Handedness Based on Handwriting?
T-MS-CBIO-209	Riddhi Singhvi	Development of Artificial Pancreas Model to Optimize Insulin Dosage
T-MS-CHEM-290	Olivia Hamann	How Clean is Clean?

T-MS-CHEM-410	Christopher Martinez	Water Temperature vs Dirty Wool
T-MS-CHEM-415	Crystal Salgado Quiroz	Frozen In Time!
T-MS-ENEV-446	John Liu	The Use of Controlled-releasing Technology to Reduce Salt Contamination in Minnesota Water
T-MS-MATH-137	Daniel Song	Stock price movement prediction - a research based on multi-stage financial models and cross-period comparison
T-MS-MATS-169	Alexander Batham	How Does Temperature Affect Quality?
T-MS-PHYS-253	Brian Russell	Pass the Salt
T-MS-PHYS-270	Logan Kretz	How does temperature affect the strength of a magnet and its magnetic field
T-MS-PLNT-409	Ethan Finch	How Do Daily Temperatures Affect Sap Production in Maple Trees?
W-MS-ANIM-380	Ron Hustvedt	How Long a leech will survive with different water additives
W-MS-ANIM-440	Ainsley Mick	Saddle Pad Science
W-MS-BCHM-351	MaKenzie Hochhalter	Drug solubility
W-MS-BEHA-205	Ade Stern	How Does Art Effect/Lower Levels of Stress in People Ages 10-16?
W-MS-BEHA-293	Sanjana Kollipara	Malleable Memory: Studying the role of false memory, demographics, and suggestion in witness testimony
W-MS-BEHA-317	Thomas Marsalek	Brownie Bonanza
W-MS-BEHA-321	Gabriella Olson	The Nonexistent Word
W-MS-BMED-291	Zakaria Salaymeh	Which Beverage Causes The Most Tooth Decay To Tooth Enamel?
W-MS-CHEM-150	Edwin Lam	Corrosion Explosion
W-MS-CHEM-152	Makena Mbuba	Bubble Trouble: How potassium iodide affects the height, strength, and speed it takes foam to rise.
W-MS-CHEM-154	Milkahlyne Muriithi	Dessert Density
W-MS-CHEM-155	Maddisen Glover	Ready Set Grow!
W-MS-CHEM-173	Zabida Ahmed	Rose's are Red different colors too, but how to you find the Rf value? (Color of roses vs Rf value)
W-MS-CHEM-179	Indira Sivaraj	Sneaky Solutes: Can we trap them?
W-MS-CHEM-239	Katelyn Gregory, Hannah Arika	Flaming Hot Fuel
W-MS-CHEM-242	Shiaflyn Cooper	Balloons Go Kaboom; How Vinegar Impacts a Ballons Inflation Time

W-MS-CHEM- Mardhav Shriram 248	Radical Rockets
W-MS-CHEM- Emilyn Bosch 263	Fat Swap; The Effects Of Different Fats On The Temperature And Spread Of A Cookie
W-MS-CHEM- Cristian Olson 322	The Secret to Creamy, Tasty Ice Cream: Stabilizers
W-MS-CHEM- Mya Nelson 324	Ice, Ice, Baby
W-MS-CHEM- Julia Klein 328	Baking to a new height
W-MS-CHEM- Sema Asan 336	A CHANGE In Water
W-MS-CHEM- Hailey Flynn 337	Skittles VS H.2.O
W-MS-CHEM- Ava Kallunki 375	The Sweet Reward of Baking: How Flour Type Impacts the Density of a Cupcake
W-MS-CHEM- Kaitlyn Ziemer 427	The Impact of Gluten Free Flours on Vanilla Cupcakes
W-MS-CHEM- Cohen Emmick 437	Picking the Pepper: The Effects of Ripeness on Vitamin C in Bell Peppers
W-MS-CHEM- Carsten Bruin 439	When Will It Melt
W-MS-EAEV- Amelia Leither 151	What's Poppin'? How Temperature Affects Popping Mass
W-MS-EAEV- Avery Mros 252	Fertilizer Frenzy: How Fertilizer Amounts Effects Water Quality
W-MS-EAEV- Sadie Hoekstra 264	Tenebrio Moliter's Metamorphosis: The Effect of Temperature on Mealworms Metamorphosis
W-MS-EAEV- Adeenah Fahim 355	Effect of different water types on plant growth at different stages
W-MS-EGSD- Ayeza Moheet 345	Manufacturing and Testing Environmentally Friendly Packaging Materials
W-MS-EGSD- Eric Suh 443	Veggie Power
W-MS-ENBM- Alex Ebert 142	Getting a Grip! How Weight and Shape Affect the Time a D.I.Y. Prosthetic Hand can Hold it.
W-MS-ENEV- Shagun Shrivastava 221	100% Biodegradable Plastics!!! Is it true? ( Year 2 )
W-MS-ENEV- Liban Abdi 272	Solar-Powered Water Desalination
W-MS-ENEV- Sadie Vietzen 425	Making Paper New: The Impact of Different Ratios of Paper to Plastic on Recycled Paper
W-MS-ENMC- Molly Wesolowski 153	Pennies on a boat: Boat Wreck- Different Structured Tinfoil Boats and Maximum Pennies Supported
W-MS-ENMC- Blake Curti 156	I Can't Hold It!
W-MS-ENMC- Jack Bauer,Beck 376 Cleaveland	Aerial Ace
W-MS-MATS- Katherine Zylstra 262	Humpty Dumpty had a Great Fall: The Effects of Packing Material on Shipping Products

W-MS-PHYS- 223	Shayan Rahman	Cleats Beats: How Different Shoes Impact the Distance of a Ball
W-MS-PHYS- 323	Amina Zahid	Hyperloop 2.0
W-MS-PHYS- 338	Colton Hoffman	Grinding Gears
W-MS-PHYS- 374	Scarlett Hough, Kiaya Mikrut	Tea Bag Rockets
W-MS-PLNT- 266	Sophie Ertel	Food For Fertilizer: You Can Use Composted Fertilizer To Enhance Plant Growth
W-MS-PLNT- 282	Evelyn Danz, Iona Heddle, Hannah Grosser	Growing Micro-greens in Lunar Regolith
W-MS-PLNT- 307	Bradán Kavanaugh, Aidan Kavanaugh	Phosphorescence of the Sea
W-MS-PLNT- 312	Veda Rao	Organic or Not?
W-MS-PLNT- 424	Josie Dederichs	Its Grow Time: The effect ribosomal bacteria has on plant growth rates
W-MS-PLNT- 449	Daniel Beekman	The Relationship Between Beans and Gas: The Effects of CO <sub>2</sub> on Plant Growth
W-MS-ROBO- 287	Saif Elkhateeb	Building an Edge and Light Detecting Robot
W-MS-TMED- 288	Milan Darji	There's Not An App For That! A Novel Clinical Assessment Tool To Predict Heart Failure Patient Outcomes
W-MS-TMED- 327	Hadley Gott	Best Mask

## State Science Fair HS

S-HS-ANIM-200	Nina Chafee	The Effect of Adolescent Temperature Variation on Development and Adult Performance in <i>V. cardui</i>
S-HS-BEHA-201	Per Johnson	The Effects of Temperature on Learning Complex Tasks in Red Harvester Ants
S-HS-BEHA-202	Kishori Patel	The Effect of the Amount of Beef Food Source and Exposure Time on <i>Calliphora vomitoria</i> Pupation
S-HS-BEHA-250	Spencer Burris-Brown	Assessing the Influence of Personality on Active and Passive Procrastination among Adolescents
S-HS-EAEV-199	Cooper Danielson	The Effect of Varying Concentrations of Miracle-gro fertilizer on Composting Earthworm Ecosystems
S-HS-EAEV-232	Linnea Cooley	Effect of Ethanol and Octocrylene on the Cell Growth and Chlorophyll-a Levels of <i>Cyclotella meneghiniana</i>
S-HS-EGSD-400	Maggie Banks	A Plant With Promise: Using Engineering Principles to Create an Eco-Friendly Manufacturing Process for a Biodegradable Piezoelectric Transducer
S-HS-ENMC-284	Will Sedo	Optimizing Waterflow in a Simulated River Environment
S-HS-MATS-203	Benjamin Chen	Recycled Plastic for Resilient Infrastructure
S-HS-ROBO-010	Alexander Moore, Ruth Mellin	One-way ASL translation: 3D printed robotic hand with integrated speech recognition
T-HS-BEHA-315	Emma Boys	Gender Differences and the Stroop Effect
T-HS-BMED-008	Ekbal Abdi, Eithne Onsinoy	Measuring Calories in Snack Foods
T-HS-BMED-194	Nawal Warfa	Comparison of Fat Between Non-Organic and Organic Foods
T-HS-BMED-299	Rahul Balaji	Breaking News: There is more than one way to break the back! Characterizing and quantifying the effects of two models of the intervertebral disc for the purpose of successfully treating lower back pain
T-HS-BMED-369	Karen Nakamura	The Electromyographic Evaluation of the Bilateral Muscle Asymmetry of the Latissimus Dorsi in Martial Arts and the Effect of Real-Time Biofeedback on Technique Improvement
T-HS-CBIO-208	Coolsjes Singhvi	Modeling of Blood Glucose to Optimize Diet and Exercise for Type 2 Diabetes Management
T-HS-CBIO-289	Srinath Hariharan	Tumor targeting: Utilizing spatial data science techniques to decode the enigmatic immune response with the goal of informing further efforts to develop immunotherapies for tumor treatment
T-HS-CHEM-332	Cady Pagel	Gluten-Free or Gluten Debris: Prolamin and Glutelin Levels in Oat Flours
T-HS-EAEV-368	Sneha Sureshkumar, Sriram Sureshkumar	The Detrimental Impacts of a Tilling Based Agricultural System.
T-HS-EBED-419	Nickolas Zander	Automated Sorting Device Using Sensors and Motor Control

T-HS-ENEV-013	Gabriel Cordova Gonzalez	Keeping Your Cool
T-HS-ENEV-404	Ellen Guo	Novel Cellulose Carbon Fiber Based Biofilm for Airborne VOC Filtration
T-HS-MCRO-139	Sigrid Davidson	Effect of Salinity Instabilities on Halobacterium Versus Escherichia coli
T-HS-MCRO-335	Caroline Schlehuder	New Research, Old Medicine: Exploring Antibacterial Properties of Plants and Fungi Used in Indigenous Medicine
W-HS-BCHM-033	Romy Peterson	Don't Forget About Caspase-2: Analyzing the Binding Site Specificity of a Protein Linked to Alzheimer's Disease
W-HS-BEHA-023	Sarah Feng, Sydney McDaniel	Finding Functionality: A Rasch Analysis of a Body Functionality Appreciation Scale
W-HS-BEHA-032	Chloe Chu	Learning Lizards Assessing the Impact of Human Socialization on Behaviors of Varanus Acanthurus
W-HS-BEHA-302	Leon Luo	Does ESG investing affect international capital flows? Evidence from statistical and machine learning methods
W-HS-BEHA-313	Ziyi (Rick) Qian	Defeating Dyslexia: A robust meta-analysis of the relationship between hearing and Dyslexia to achieve early diagnosis and treatment
W-HS-BMED-025	Ava Jaffe, Amrit Menon	Essential Protection: Using UV-sensitive yeast to evaluate essential oils as an alternative to sunscreen
W-HS-BMED-026	Ayres Warren, Mina Adabag	Piecing the Heart Together: Optimizing Procedures to Identify Cell Types in Murine Cardiac Tissue
W-HS-BMED-089	Isabelle Stroh	Using Artificial Intelligence to Detect and Localize Brain Tumors
W-HS-BMED-123	Julia Terrell	Efficacy of bacteriophage therapy on E. coli caused urinary tract infections during the perinatal period
W-HS-BMED-271	Ava Chen	A new potential antidepressant? The effects of L-tryptophan on serotonin levels, behavior, and alcohol aversion in Faxonius virilis model organisms
W-HS-BMED-298	Elizabeth Levinshteyn	A Look Into the TINY Earth: Finding Antibiotic Producing Bacteria in Yellowstone Soil
W-HS-BMED-301	Zahraa Mansoor	The Link Between Hearing Loss and Alzheimer's Disease in Elderly Patients
W-HS-BMED-333	Noor Omar, Muminah Mohammed	Hidden Hunger
W-HS-BMED-363	Ella Alexander, Aayush Goud	DBS Discovery: A multifaceted approach to Deep Brain Stimulation with new advances in neurosurgical testing equipment and synchronization of alpha and beta bands for postural instability in Parkinsonian patients
W-HS-BMED-431	Adhvaith Sridhar	Immune System Innovation: Ushering in a new era of immunology research by characterizing cell populations most impacted by normal microbial exposure for preclinical research and healthcare treatment development success

W-HS-BMED-444	Srijani Datta	Sepsis Survivor: Characterizing muscle stem cells using RNA sequencing from a murine surgical model of sepsis for the purpose of preventing sepsis-associated muscle wasting
W-HS-CBIO-445	Mohit Agarwal,Aedin Yu	A two-part approach and implementation of early-stage skin cancer diagnosis using a novel dense convolutional neural network (CNN) architecture and affordable computing hardware
W-HS-CELL-009	William Anderson	Using decellularized grapes to grow yeast
W-HS-CELL-070	Jack Wherry	Prediction of anterior/posterior polarity in planaria through bioelectrical signals
W-HS-CELL-072	Claire Huang	Creating induced pluripotent stem cells by reprogramming CD34+ cells through episomal gene insertion
W-HS-CELL-125	Sana IKRAMUDDIN	Inhibition of Senescent Associated Phenotype Secretion using Lithocholic Acid in 3T3-L1 Preadipocyte cells
W-HS-CELL-230	Abby Hoekstra	Effects of sea cucumber glucocerebrosidase on amyloid-beta gene
W-HS-CELL-325	Alexandra Wagner	INS-1 Rattus norvegicus cells and gene expression in response to thapsigargin
W-HS-EAEV-069	Grace Kaung	Creating chitosan hydrogels to promote phytoplankton growth and accelerate carbon sequestration
W-HS-EAEV-082	Nicole Haraway	The impacts of chemicals found in plastics having Estrogenic Activity on the synthesization of vitellogenin protein in mussels
W-HS-EAEV-296	Roxy Neset	Agriculture in the Big City: Studying the effectiveness of soil treatments on weed growth
W-HS-EBED-109	Alia Peterson	Designing and building a technologically enhanced toy
W-HS-EBED-238	Shreshth Shrivastava	Wi-C.A.R.E: Wifi Computer-Assisted Remote Eldercare (Year 3)
W-HS-ENBM-088	Zara Thomas	Different decellularization and demineralization methods for porcine bone tissue
W-HS-ENEV-096	Kyla Fung	Sustainable Bioplastics: Seaweed and Hemp-based Alternatives to Fossil Fuel-based Plastics
W-HS-ENEV-132	Ivars Emerson	A collapsible reusable cooler for eco-friendly sustainable shipping of cold medications
W-HS-ENMC-035	Trisha Samba,Amira Sinclair	Water You Risking? Developing a Novel Maze to Assess the Effects of Thirst. on Risk-Taking Behavior in Mice
W-HS-ENMC-036	Nathan Walsh	Everything you 'Kneed': Development of an adjustable, above-knee prosthetic capable of performing multiple activities.
W-HS-ENMC-083	Noah Anderson	Development of remotely operated underwater vehicle to aid in exploration and mapping of underwater cave systems
W-HS-ENMC-256	Billal Saidi	Engineering a Cost-Effective Ventilator



W-HS-ENMC-308	Valerie Nelson	Effects of Chamber Shape on Movement of Accordion Soft Actuators and Implementation in Artificial Hands
W-HS-MATH-117	April Wang	Predicting COVID-19 Cass Through High-Dimensional Data Analysis
W-HS-MATS-037	Kendall White, Sarah Peterson	Knots or Not? Using electricity to study DNA entanglements in nanochannels
W-HS-MATS-071	Madison Andrews	Analysis of the fabrication and function of electrothermal materials for the construction of a portable and inexpensive incubator for E. coli for use in a field-rated detection method
W-HS-MATS-077	Nick Carver	The potential application of Nitinol's shape memory properties for use in internal muscle repair
W-HS-MATS-455	Jared Geppert	3D Printing Layer Angles
W-HS-MCRO-079	Calais Michaelsson	Resensitization of E. Coli to Tetracycline using Plant-Derived Efflux Pump Inhibitors
W-HS-MCRO-098	Ethan Chen	Examination of various essential oils on Candida albicans model organism growth as an indicator of anti-dandruff properties on Malassezia
W-HS-MCRO-115	Jackson Jaffe	Effects of far-UVC radiation (wavelength 222nm) on pathogens and mammalian cells
W-HS-MCRO-124	Lucas Edwards	The Impact of Flavonoids on P. fluorescens
W-HS-MCRO-135	Quinn Goergen	Finding Growth of Mycelia and Decomposition of Pesticides in Soil
W-HS-MCRO-212	Scott Sorensen	Manipulating Dissolved Gas Content in Computer Simulations of Acoustic Cavitation
W-HS-MCRO-245	Yousef Eldahshoury	Cyanobacteria Aid In Plant Growth In Martian Soil
W-HS-PLNT-085	Katriana Trinh	Effects of silica Nanoparticles to mitigate abiotic stress
W-HS-PLNT-091	Maxwell Maveus	Sporophytic abortion rates under desiccation stress and the potential of sporophytic autonomy in the mosses Leucobryum glaucum and Bryum caespiticium
W-HS-PLNT-101	Tyler Clair, Quinn Hughes	Using Monte Carlo Simulation to Optimize Vitamin C Production in Brassica oleracea using Abiotic Plant Stress
W-HS-PLNT-276	Abirami Rajasekaran, Harini Senthilkumar	Forage Frenzy: A multifactor analysis of manure application on forage nutritive value through sequential fiber methods
W-HS-ROBO-078	Tristan Green	The use of machine learning to identify leukemia cells in patients
W-HS-ROBO-095	Merlin Morton	Using Machine Learning to Improve the Accuracy of GPS by Reducing the Impact of Multipath and Other Sources of Error
W-HS-ROBO-130	Ross Volkov	Diagnosing Parkinson's disease with machine learning voice analysis
W-HS-ROBO-229	Krish Inba Rajashankar	Medical device recall prediction using MAUDE reports

W-HS-ROBO- 277	Stavya Arora	Overcoming Opioids: Analyzing, characterizing, and quantifying the sentiment of Reddit posts' tone and language prior to a relapse to allow for early intervention
W-HS-ROBO- 361	PETER XU, Daniel Wang	Nimble Navigation: Designing and developing an interactive chatbot with natural language processing to assist visually-impaired users to maneuver in outdoor settings with assurance
W-HS-SOFT- 042	Amrita Pal	Pollution and Prejudice: Building a computer-based algorithm to assess pollution exposure levels by Asian American subgroup
W-HS-SOFT- 225	Mahmoud Said	Controlling a computer cursor with basic webcam input
W-HS-SOFT- 247	Saloni Somia	Increasing Access to Epinephrine Injectors during Allergic Reactions through a Location Tracking Mobile Application.
W-HS-SOFT- 304	Kiefer Miskiw	Realtime 3D Collaboration

## Schools Participating in 2022

Al-Amal School	Lighthouse Secondary
Armstrong High School	Mahtomedi Middle School
Avail Academy (Blaine)	Mahtomedi Senior High
Avail Academy (Edina)	Maple Grove Senior High School
Blaine High School – Center for Engineering, Mathematics, and Science	Math and Science Academy
Blake School - Northrop Campus	Minnehaha Academy North Campus
Blessed Trinity Catholic School	Minnetonka East Middle School
Breck School	Minnetonka High School
Burnsville High School	Minnetonka Middle School West
Carondelet Catholic School	Mounds Park Academy
Central Middle School (Eden Prairie ISD 272)	Mounds View High School
Century Middle School (Lakeville)	Nativity of Our Lord
Chaska High School	New Life Academy
Chippewa Middle	Orono Senior High
Concordia Academy--Roseville	Prairie View Elementary School
Convent of the Visitation School	Salk Middle School
Craig Academy	Spring Lake Park High School
Eagle Ridge Middle School	St. Helena Catholic School
East Ridge High School	St. Paul Academy Summit School
Eastview Senior High	Stillwater Area High School
Eden Prairie Central Middle School	Stillwater Middle School
Eden Prairie High School	Transfiguration Catholic School
Highland Park Middle School	Wayzata High School
Lake Middle School	Wayzata West Middle School
	Woodbury High School

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