



Colorado Science and Engineering Fair

Contact Information:

Courtney Butler
CSEF Director
csef@colostate.edu
(970) 491 - 7716

2021 Colorado Science and Engineering Fair Award Winners

Virtually (April 8, 2021) – This year’s Colorado Science and Engineering Fair (CSEF) was held virtually on April 8, 2021. 263 projects were on display from students in grades 6 through 12 in zFairs (<https://co-csef.zfairs.com>).

This year’s Grand Awards Ceremony was held via Zoom and will be available on the CSEF website soon. Attached is the list of winners.

Five Senior Division CSEF Finalists will be participating in the Virtual Regeneron International Science & Engineering Fair in May. They are:

1st Place: Siddharth Bharthulwar from Fairview High School

2nd Place: Emily Zhang from Cherry Creek High School

3rd Place: Elizabeth Sundheim from Berthoud High School

4th Place: Matthew Anderson from Cherry Creek High School

5th Place: Reese Titensor from Rock Canyon High School

The CSEF also presented the Lockheed Martin Teacher of the Year Award to Emmylou Harmon from West Grand High School in Kremmling.

Special thanks goes to all of the contributors and sponsors of the 2021 CSEF for their financial and in-kind support of Colorado’s future scientists. This year’s top sponsors (\$2,500 or more) included.

- Broadcom Foundation
- Colorado State University
- Affiliate Fair Emergency COVID-19 Transition Fund (Regeneron ISEF)
- Verizon Foundation
- Lockheed Martin
- US Department of Commerce/NOAA
- Society of Petroleum Engineers, Denver Section

For a complete list of all of the 2021 CSEF participants, sponsors, Colorado’s Regeneron ISEF delegates and other CSEF details, please visit the CSEF website at www.csef.colostate.edu.

The Colorado Science and Engineering Fair (CSEF) is an independent, nonprofit corporation. Thanks to the support of generous corporations, foundations, government agencies, and donors who believe in the importance of science education, the CSEF has served Colorado and its students for 66 years.

2021 Colorado Science and Engineering Fair Grand Awards Press Release

Junior Division Best of CSEF Project

First Place

Naomi Kruse 7th grade
Knock Out! Bacterial Microflora as a Defense
Against Tobacco Mosaic Virus in Phaseolus
 Schullandheim Colorado Springs

Second Place

Rohan Mysore 8th grade
Structural Safety Monitor
 Flagstaff Charter Academy Longmont

Third Place

Kelly Yang 8th grade
ABA-lanced Response: The Effect of External
Abscisic Acid on Plant Stress Conditions
 Summit Middle Charter School Boulder

Senior Division Best of CSEF Project

First Place

Siddharth Bharthulwar 12th grade
XRCT-Net: Development of a Novel Sparse-View
Deep Learning Framework for Safer, Cheaper,
and More Accessible CT Imaging
 Fairview High School Boulder

Second Place

Emily Zhang 11th grade
Fusing LiDAR and Camera Data for Advanced
Context Recognition in Autonomous Navigation
Sensory Systems Through Multidimensional Deep
Neural Network Architectures
 Cherry Creek High School Greenwood Village

Third Place

Elizabeth Sundheim 12th grade
Mapping Extent of Neutral Hydrogen Cloud Near
Sagittarius A at 1420 MHz*
 Berthoud High School Berthoud

Fourth Place

Matthew Anderson 11th grade
Early Diagnosis of Parkinsonism Via a
Smartphone Application
 Cherry Creek High School Greenwood Village

Fifth Place

Reese Titensor 12th grade
Effects of Cannabidiol Exposure on Cortisol Levels
in Danio rerio Embryos with Heat Induced Stress
 Rock Canyon High School Highlands Ranch

Junior Division Animal Sciences

First Place

Dorothy Berger 6th grade
Pet Stress Management with Music
 Webber Middle School Fort Collins

Second Place

Luci Bruchez 8th grade
What Color Is Most Appealing to Horses?
 West Grand Middle School Kremmling

Third Place

Aleigha Sanchez 7th grade
Searching for the Earthworms Home
 Sierra Grande School Blanca

Honorable Mention

Raeya Schrock 8th grade
Infrared Thermography to Enhance Livestock
Health
 Arickaree School Anton

Senior Division Animal Sciences

First Place

Reese Titensor 12th grade
Effects of Cannabidiol Exposure on Cortisol Levels
in Danio rerio Embryos with Heat Induced Stress
 Rock Canyon High School Highlands Ranch

Second Place

Marissa Martinez 10th grade
Traveling Trout: Viability of Trout Eggs Along the
Mainstream of the Geothermally Altered Alamosa
River Watershed
 Monte Vista High School Monte Vista

Third Place

Margaret Mattson 12th grade
Compartmentalization in Lepidopteran
Development: Anterior Posterior Boundary
Location and Interaction in Genus Morpho
 Fairview High School Boulder

Honorable Mention

Lilly Figueroa 10th grade
Investigation on High Twinning Rate in Cattle
Using Sanger Sequencing
 Mancos High School Mancos

Honorable Mention

Alex Ramsey 10th grade
*Determining If Common Waste Products, Coupled
 with a Simple Base, Provide Stable Nutritional
 Value for Mealworms*
 SkyView Academy Highlands Ranch

Junior Division
 Behavioral & Social Sciences

First Place

Mahi Mehta 8th grade
 Shriya Sriram 8th grade
*Testing the Effect of Age and Gender on Body
 Image Perception*
 Challenge School Denver

Second Place

Nora May 6th grade
*Collective and Swarm Intelligence: Are Many
 People Really Smarter Than a Few?*
 St. Columba Catholic School Durango

Third Place

Phoebe Donovan 7th grade
 Lola Green 7th grade
*The Cover Up: The Relationship Between Face
 Masks and the Perception of Facial Cues*
 Friends Middle School Boulder

Honorable Mention

Rachel Tilton 7th grade
Psychology of Covid-19 Vaccine
 Casey Middle School Boulder

Honorable Mention

Aysia Mathews 7th grade
Teen Mental Health
 Mancos Middle School Mancos

Senior Division
 Behavioral & Social Sciences

First Place

Siena Negrón 9th grade
Political Bias Assessment
 SkyView Academy Highlands Ranch

Second Place

Emaan Khan 11th grade
*Classifying Hate Speech Using Machine Learning
 Algorithms*
 Centaurus High School Lafayette

Third Place

Fatima Duran 11th grade
*Binaural Beats and Their Influence on Task
 Productivity*
 Yuma High School Yuma

Honorable Mention

Gus Miller 9th grade
*iPhone or MyPhone: Analyzing How Personality
 Traits Influence Application Organization.*
 Monte Vista High School Monte Vista

Junior Division
 Chemistry & Biochemistry

First Place

Chloe Sebek 8th grade
*The Effect of Essential Oil on Ascorbic Acid Decay
 in Citrus Juice*
 Sacred Heart of Jesus Catholic School Boulder

Second Place

Tenzing Matt 6th grade
Preventing Rust
 St. Columba Catholic School Durango

Third Place

Emma Sewell 8th grade
Proteolytic Enzyme Power
 Sargent Junior High School Monte Vista

Honorable Mention

Angelina Wang 8th grade
*Identification and Characterization of the Natural
 Sweetener: Brazzein*
 Summit Middle Charter School Boulder

Honorable Mention

Izzy Adochio 7th grade
Popped Perfection
 Vail Mountain School Vail

Senior Division
 Chemistry & Biochemistry

First Place

Stephen Chen 11th grade
*Illuminating the Folding Dynamics of
 Bacteriorhodopsin: A Model Membrane Protein*
 Fairview High School Boulder

Second Place

Arjun Batra 12th grade
*Implementation of a Copper Catalyst for Methane
 Hydrate Formation*
 Cherry Creek High School Greenwood Village

Third Place

Maria Alder 12th grade
 Riley Carpenter 12th grade
*Water Desalination: Crystallization of CaCO₃ Out
 of Saline Solution onto Plastic Polymers*
 Monarch High School Louisville

Honorable Mention

Emma Peters 12th grade
Change in Onset Potential of CO₂ Electroreduction Using Gold
 Broomfield High School Broomfield

Honorable Mention

Kevin Collins 12th grade
 Sydney George 12th grade
Investigating the Impact of ALS-Associated Point Mutations on ErbB4's Proteolysis
 Evergreen High School Evergreen

Junior Division
 Earth & Space Sciences

First Place

Ronan Curnyn 8th grade
How the Size of Earthquakes Affects the Size of Tsunamis
 Vail Mountain School Vail

Second Place

Berkley Ulibarri 6th grade
Earth's Layers Under Pressure
 St. John the Evangelist Catholic School Loveland

Third Place

Gurman Goraya 7th grade
Stellar Endgame
 Challenger Middle School Colorado Springs

Senior Division
 Earth & Space Sciences

First Place

Maddie Fox 12th grade
 Annalie Haralson 12th grade
 Laura Egaas 12th grade
Hidden Signals in Paleoclimate Records: Investigating the Importance of the Sun for Earth's Climate
 Monarch High School Louisville

Second Place

Ibrahim Mohammed 12th grade
Understanding Wildfires for Better Prevention Using an Image Classification Neural Network
 Cherry Creek High School Greenwood Village

Third Place

Maria Silver 12th grade
Quantifying Precipitation Undercatch in a Citizen Scientist Weather Observation Network
 Broomfield High School Broomfield

Honorable Mention

Abigail Ross 10th grade
Detecting Flares (Part 3)
 Lamar High School Lamar

Junior Division
 Energy

First Place

Shrey Rohilla 8th grade
Battle of the Blades
 The Classical Academy Colorado Springs

Second Place

Peyton Rhodes 8th grade
What's On Your Roof?
 Firestone Charter Academy Firestone

Third Place

Hailey Mazzotta 8th grade
Wind Today, Green Tomorrow
 Firestone Charter Academy Firestone

Honorable Mention

Cooper Thielemier 7th grade
Energy from Energy
 Goodnight School Pueblo

Senior Division
 Energy

First Place

Julia Warnock 11th grade
Experimenting with the Radiative Cooling Effect to Generate Electricity from the Night Sky
 Poudre Global Academy Fort Collins

Second Place

Chandler Slowik 12th grade
Micro Hydroelectric Generator
 Golden High School Golden

Third Place

Nikhila Narayana 11th grade
Catching the Sun: Harnessing Stokes Shift to Increase Solar Cell Efficiency
 Rock Canyon High School Highlands Ranch

Honorable Mention

Chinmay Jayanty 11th grade
Synthesizing Renewable Energy from Water Using Sunlight
 Sargent High School Monte Vista

Honorable Mention

Bryan Williams 9th grade
Charging into the Future of Transportation: An In-Depth Comparison of Electric and Combustion Vehicles
 Hoehne Schools Hoehne

Junior Division
Engineering

First Place

Rohan Mysore 8th grade
Structural Safety Monitor
Flagstaff Charter Academy Longmont

Second Place

Stefan Zehnacker 8th grade
Watch It Wash!
Good Shepherd Catholic School Denver

Third Place

Benjamin Sundheim 8th grade
*And the Band Played On: Masks and Instrument
Sound Quality*
St John the Evangelist Catholic School Loveland

Honorable Mention

Liam Bois 6th grade
Not So Silent Sonar
St. Joseph Catholic School Fort Collins

Honorable Mention

Ersel Serdar 7th grade
*Dust Begone: Using Arduinos to Clean Mars Rover
Solar Panels*
Challenge School Denver

Senior Division
Engineering

First Place

Siddharth Bharthulwar 12th grade
*XRCT-Net: Development of a Novel Sparse-View
Deep Learning Framework for Safer, Cheaper,
and More Accessible CT Imaging*
Fairview High School Boulder

Second Place

Tyler Burt 12th grade
*A Novel Mask Insert to Reduce Habitual Particle
Transmission*
Wheat Ridge High School Wheat Ridge

Third Place

Rithvik Ijju 9th grade
*A Human-Machine Interface That Helps
Quadriplegic Patients Communicate by
Translating Eye Blinks into Morse Code*
Cherry Creek High School Greenwood Village

Honorable Mention

Tate Schrock 11th grade
Autonomous Surveillance UAV
Arickaree School Anton

Honorable Mention

Ayan Vaishnav 9th grade
*Designing and Evaluating the Performance of
Novel Airfoil Innovations Using SOLIDWORKS*
Cherry Creek High School Greenwood Village

Junior Division
Environmental Sciences

First Place

Naomi Kruse 7th grade
*Knock Out! Bacterial Microflora as a Defense
Against Tobacco Mosaic Virus in Phaseolus*
Schullandheim Colorado Springs

Second Place

Alexander Zhang 8th grade
Carbon Capture: Refining the Process
Summit Middle Charter School Boulder

Third Place

Shrreya Sethuramalingam 8th grade
*Chlorophyta and Lemnoideae Components
Impacting the Contaminants of H2O*
Challenge School Denver

Senior Division
Environmental Sciences

First Place

Sean Brooks 11th grade
*Separating Microplastics from Beach Sand Using
a Fluidized Air Bed*
Pine Creek High School Colorado Springs

Second Place

Gitanjali Rao 10th grade
*Detection of C. parvum Transposons in Potable
Water Using Genetically Engineered Bioelectric
Sensors*
STEM School Highlands Ranch

Third Place

Maya Hunter 12th grade
*COVID-19 Shutdowns and Air Quality: A
Demographic Analysis*
Cherry Creek High School Greenwood Village

Honorable Mention

Camille Rawinski 11th grade
*Analyzing the Effects of Spruce Beetles on Aquatic
Ecosystems through Macroinvertebrate and Water
Quality Sampling in Conejos County, Colorado*
Monte Vista High School Monte Vista

Junior Division
Mathematics & Computer Sciences

First Place

Stella Laird 8th grade
Using Computer Vision Techniques to Count Jelly Beans
Southern Hills Middle School Boulder

Second Place

Tianyi Evans Gu 8th grade
Using Natural Language Processing to Analyze and Improve Communication Skills
Summit Middle Charter School Boulder

Third Place

Niram Nagafuji 6th grade
Akhil Ayalur 6th grade
Does Benford's Law Match COVID-19 Data?
The Logan School for Creative Learning Denver

Honorable Mention

Logan Futrell 6th grade
The Probabilities of Diabetes: A Mathematical Study of Diabetes and Its Factors
Monte Vista Middle School Monte Vista

Honorable Mention

Alejandra Pena 7th grade
User Experience: Do Emotions Matter?
St. John the Evangelist Catholic School Loveland

Senior Division
Mathematics & Computer Sciences

First Place

Emily Zhang 11th grade
Fusing LiDAR and Camera Data for Advanced Context Recognition in Autonomous Navigation Sensory Systems Through Multidimensional Deep Neural Network Architectures
Cherry Creek High School Greenwood Village

Second Place

Max Witwer 12th grade
Developing Computer Generated Glucose Transport One Inhibitor Lead Molecules for Oncological Metabolic Regulation
Caprock Academy Grand Junction

Third Place

Morgan Holien 11th grade
An Intuitive Approach to the Perimeter of an Ellipse
Monarch High School Louisville

Honorable Mention

Abbas Shaikh 11th grade
A Deep Learning Framework for Automated Brain Tumor Segmentation and Survival Prediction Using Multimodal MRI Scans
Cherry Creek High School Greenwood Village

Junior Division
Medicine & Health

First Place

Julian Kramer 8th grade
Don't UV Burning Me: A Comparative Study of Synthetic Versus Mineral Sunscreens
Good Shepherd Catholic School Denver

Second Place

Mila Vigil 8th grade
Brain Waves and Parkinson's Disease: An Early Detection?
Challenge School Denver

Third Place

Makayla Brown 8th grade
The Mightiest Mask?
Sargent Junior High School Monte Vista

Honorable Mention

Diya Mehta 6th grade
Study of the Efficiency of Different Face Masks in Preventing and Controlling Transmission of Communicable Diseases Like Covid-19
Flagstaff Charter Academy Longmont

Honorable Mention

Elizabeth Vossler 8th grade
Blink-183 – The Effect of Projected versus Reflected Light on Blinking Rate
Skinner Middle School Denver

Senior Division
Medicine & Health

First Place

Matthew Anderson 11th grade
Early Diagnosis of Parkinsonism Via a Smartphone Application
Cherry Creek High School Greenwood Village

Second Place

Cooper Hanley 12th grade
A Pharmacokinetic/Pharmacodynamic Analysis of CBD and THC
Monarch High School Louisville

Third Place

Aditi Avinash 9th grade
Breakdown of Gluten Proteins Using a Newly Identified Combination of Fruit Derived Enzymes to Alleviate Symptoms of Gluten Intolerance
Rock Canyon High School Highlands Ranch

Honorable Mention

Ria Jansun 12th grade
Designing an Internal Whiplipletree Mechanism in a Prosthetic Hand
Peak to Peak Charter School Lafayette

Honorable Mention

Ava Steger 10th grade
Connection ICU: A Novel Mobile Application to Prevent Delirium in the Intensive Care Unit
 Rocky Mountain High School Fort Collins

Junior Division
 Microbiology & Molecular Biology

First Place

Armaan Gill 8th grade
Transformations of E.coli with Plasmid DNA, Calcium Chloride, Ampicillin, and Arabinose Sugar
 Lamar Middle School Lamar

Second Place

Chloe Lubbers 6th grade
Bad Breath Bacteria
 Alta Vista Charter School Lamar

Third Place

Aubrey Holmes 7th grade
Antibiotic Post Mortem: Take Two
 Manzanola Jr/Sr High School Manzanola

Senior Division
 Microbiology & Molecular Biology

First Place

Tia Abraham 11th grade
Predictive Analysis of Transcription Factors to Directly Reprogram Human Cells
 Rock Canyon High School Highlands Ranch

Second Place

Madison Hoffman 12th grade
The Effects of Common Antibiotics on Escherichia Coli
 Limon Jr/Sr High School Limon

Third Place

Ashlyn Eisenman 9th grade
The Contaminated Classroom
 West Grand High School Kremmling

Junior Division
 Physics

First Place

Lily Sobers 6th grade
The Science of Spin: Mass and Inertia
 Bear Creek Elementary School Monument

Second Place

Ayush Vispute 6th grade
Stretch It!
 Mountain Ridge Middle School Colorado Springs

Third Place

Cooper Manganaro 6th grade
Friction: Does Material Matter
 St.Columba Catholic School Durango

Honorable Mention

Rut Trujillo-Abeyta 8th grade
How Is Water Attracted to Static Electricity?
 Justice & Heritage Academy Antonito

Senior Division
 Physics

First Place

Elizabeth Sundheim 12th grade
Mapping Extent of Neutral Hydrogen Cloud Near Sagittarius A at 1420 MHz*
 Berthoud High School Berthoud

Second Place

Kathryn Kummel 12th grade
Investigating Chaotic Convection Using a Lorenz Water Wheel and a Model of the Lorenz Attractors in R
 Palmer High School Colorado Springs

Third Place

Santiago Castillo 12th grade
Influence of Mars's Gravity and Seismicity on Mining Waste Dumps Facilities
 Cherry Creek High School Greenwood Village

Junior Division
 Plant Sciences

First Place

Kelly Yang 8th grade
ABA-lanced Response: The Effect of External Abscisic Acid on Plant Stress Conditions
 Summit Middle Charter School Boulder

Second Place

Kanshita Dam 8th grade
How Do Vibrations from Sound Waves Affect Plant Growth?
 Challenge School Denver

Third Place

Ellaree Rockey 8th grade
Nitrogen and Density Levels in Quinoa
 Sargent Junior High School Monte Vista

Honorable Mention

Riley Hunt 8th grade
How Does Caffeine Affect Plant Growth
 Wiggins Middle School Wiggins

Senior Division
Plant Sciences

First Place

Cora Becker 12th grade
Amanda Behmer 12th grade
*A Peek into Plastic Pollution: The Effect of
Irradiated PET Micro-plastic Leachate on Optical
Culture Density of Chlamydomonas reinhardtii*
Evergreen High School Evergreen

Second Place

Ashlyn Rockey 11th grade
*Screening Quinoa Germplasm For Downy Mildew
Resistance*
Sargent High School Monte Vista

Third Place

Carlos Ochoa-Marquez 10th grade
*Are Plants Airheads?: A Study of the Effect
Aeration Has on Solanum tuberosum and
Cucurbita pepo Plants*
Monte Vista High School Monte Vista