COLORADO Science and Engineering Fair

For Colorado Students in grades 6 to 12
Hosted by the College of Natural Sciences Education & Outreach Center at Colorado State University Fort Collins, Colorado
APRIL 5 - 7, 2018

Artwork by: Angel Castillo, West Grand High School
Welcome to the 2018 Colorado Science & Engineering Fair

Congratulations to this year’s CSEF Finalists. The dedication displayed by each and every participant is commendable. Each of you is already a winner, having completed a self-directed scientific research project and earned the opportunity to represent your region at the state level. We are all here to celebrate your success and applaud your parents, teachers and mentors for their enthusiastic support. From start to finish, and at all levels of participation, the science and engineering fair experience is one not only of competition, but also of camaraderie, creativity and education. Well done Finalists!

I have been the CSEF Director for 19 years now and I must say that time flies when you are having fun meeting such wonderful young scientists.

The success of each year’s CSEF is directly dependent upon the support of public and private organizations, government agencies, school districts and universities, as well as the efforts of hundreds of committed volunteers. I want to say thank you to the members of the Board of Directors who oversee the nonprofit organization, the members of the Advisory Council who aid me in making sure everything runs smoothly; the judges; and hundreds of on-site volunteers who do the actual work during the CSEF.

I would also like to say thank you for the support given to me by my colleagues in the CNS Education & Outreach Center (EOC) at Colorado State University. CSEF has called the EOC home for the past 19 years and the EOC is proud to include the state science fair as one of its many outreach endeavors in the area of science and mathematics education.

Each year, the CSEF sends the top senior division projects to compete in the Intel International Science and Engineering Fair, being held this year in Pittsburgh, PA May 13 – 18, 2018. These students join the 20 or so other students who attend representing their regional science fair. I wish these students good luck and I know they will represent the state of Colorado well.

The top junior division projects are nominated to complete the application process for the Broadcom MASTERS competition. Each year, 300 semifinalists are chosen from the thousands who enter and from those, 30 finalists are awarded a trip to compete for up to $25,000 in scholarship funds. In 2017, Colorado had one finalist for the Broadcom MASTERS competition, Kathryn Kummel.

Colorado also had 3 12th grade students selected as Finalists for the Regeneron Science Talent Search and they got to travel to Washington, DC to vie for the top award of $250,000. Congratulations to Kyle Fridberg, Isani Singh and Abilash Prabhakaran on this great honor.

As usual, we aim to make each year’s CSEF better and better. We have recruited over 200 grand award judges to help us choose the 1st, 2nd, 3rd, 4th and honorable mention winners. And we have been working hard to expand our Special Award Organizations list and have approximately 80 companies, organizations, and individuals providing awards to students based on criteria they are interested in. And we have recently created a title sponsorship opportunity that we hope a generous organization will step forward and fill soon.

Thank you so much for attending and I look forward to many more years as the CSEF Director.

Sincerely,

Courtney Butler CSEF Executive Director
# 63rd Annual Colorado Science & Engineering Fair

**Thursday, April 5, 2018**

## Finalist Schedule

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 a.m. – 11:30 a.m.</td>
<td>SRC Interviews – <em>Interviews must be done BEFORE a project may be set up.</em>&lt;br&gt;Finalists MUST stay with their exhibit until Display &amp; Safety Inspection has been done and an Official Photo has been taken. Finalists must be out of the exhibit areas by 11:30 a.m.</td>
<td>Room 308/310</td>
</tr>
<tr>
<td>9:00 a.m. – 11:00 a.m.</td>
<td>Junior and Senior Division Finalist Check-In</td>
<td>Grand Ballroom Foyer</td>
</tr>
<tr>
<td>9:00 a.m. – 11:00 a.m.</td>
<td>Tour Ticket Pick-Up &amp; Sales</td>
<td>Room 322</td>
</tr>
<tr>
<td>1:30 p.m. – 5:00 p.m.</td>
<td>Judging – <em>Students must be at their exhibits for interviews.</em></td>
<td>Grand Ballroom</td>
</tr>
</tbody>
</table>

## Adult Schedule

1:30 p.m. – 2:15 p.m. | ISEF Rules Update & Discussion                                                          | Room 324      |
2:30 p.m. – 4:45 p.m.  | Professional Development for Teachers – Opportunities to Combine GLOBE and Science Fair Projects – Deanna TeBockhorst | Room 324      |

## Judging Schedule

9:15 a.m. – 9:45 a.m. | Grand Awards Judge Captains’ Briefing                                                   | LSC Theater   |
10:00 a.m. – 11:00 a.m. | Grand Awards Judges’ Briefing                                                           | LSC Theater   |
11:15 a.m. – 12:00 noon | Grand Awards Judges’ Luncheon                                                          | LSC Theater Lobby |
12:15 p.m. – 12:30 p.m. | Special Awards Judges’ Briefing                                                        | North Ballroom |
12:00 noon – 5:00 p.m. | Judging                                                                                  | Grand Ballroom |
11:30 – 12:30 p.m. | Grand Award Judges only may enter the exhibit area. Judges only in the exhibit area.    | Grand Ballroom |
12:30 – 1:30 p.m.      | Special Award Judges may enter the exhibit area. Judges only in the exhibit area.       | Grand Ballroom |
1:30 – 5:00 p.m.       | Students will be at their exhibits for interviews.                                      | Grand Ballroom |
5:30 p.m.              | Exhibit area is locked. Final judging continues.                                         | Grand Ballroom |

*Only Judging Captains and SRC Members are permitted in the exhibit area at this time.*

# Friday, April 6, 2018

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Room</th>
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<tbody>
<tr>
<td>10:30 a.m. – 5:00 p.m.</td>
<td>CSEF Finalist Exhibits Open to the Public and the Media</td>
<td>Grand Ballroom</td>
</tr>
<tr>
<td>9:00 a.m. – 10:00 a.m.</td>
<td>Guest Speaker – Dr. Janet McAllister&lt;br&gt;Center for Disease Control, Fort Collins, CO</td>
<td>LSC Theater</td>
</tr>
<tr>
<td>11:00 a.m. – 3:00 p.m.</td>
<td>Tours – <em>Registration is required.</em></td>
<td>Registration Booth</td>
</tr>
<tr>
<td>2:00 p.m.</td>
<td>Finalist Ballots for Student Choice and Poster Contest are due.</td>
<td>Registration Booth</td>
</tr>
<tr>
<td>6:00 p.m.</td>
<td>CSEF Awards Ceremony</td>
<td>Timberline Church</td>
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# Saturday, April 7, 2018

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<tr>
<td>9:00 a.m. – 11:00 a.m.</td>
<td>CSEF Finalist Exhibits Open to the Public and the Media&lt;br&gt;Finalists MUST be at their projects for interaction with the public.</td>
<td>Grand Ballroom</td>
</tr>
<tr>
<td>9:00 a.m. – 11:00 a.m.</td>
<td>Advisory Council &amp; Regional Fair Directors Meeting – <em>open to all</em></td>
<td>Room 322</td>
</tr>
<tr>
<td>11:00 a.m. – 12:00 noon</td>
<td>Pizza Party - Finalists, adult sponsors, &amp; family members are invited.&lt;br&gt;Finalists must be present to win door prizes!</td>
<td>Grand Ballroom Foyer</td>
</tr>
<tr>
<td>11:00 a.m. – 1:00 p.m.</td>
<td>Exhibit Dismantling - <em>Everything must be removed by 1:00 p.m.</em></td>
<td>Grand Ballroom</td>
</tr>
<tr>
<td>12:00 noon – 2:00 p.m.</td>
<td>Board of Directors Meeting – <em>open to all</em></td>
<td>Room 322</td>
</tr>
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</table>
2018 Colorado Science & Engineering Fair
Guest Speaker
Dr. Janet McAllister
Center for Disease Control, Fort Collins, CO
April 6, 2018
Colorado State University Theater

*Science Behind Integrated Mosquito Management: It’s Not Just Spraying*

Many people still think of mosquito control as just spraying from a truck. Actually, there is a lot of science behind how to best control mosquitos. Knowledge of mosquitos themselves, non-target organism impacts, pathogens, toxicity, chemistry, equipment engineering, water management, modeling, physics of very small droplets and more all lead to making mosquito control happen in a responsible way that protects both people and the environment. The need for multiple disciplines to come together as a team to tackle real life saving problems is what keeps me fascinated with mosquitos and their control. In this talk, I will present what a mosquito control response looked like in Miami, Florida during a Zika virus outbreak and how knowledge from different scientific disciplines helped in making decisions.

About Speaker:

Janet McAllister is a Board Certified Medical Entomologist. She received her undergraduate and master’s degrees from Louisiana State University. Her PhD in Entomology is from the University of Arkansas.

She currently works at the Centers for Disease Control in Fort Collins, CO where she is a research entomologist with the Division of Vector-Borne Infectious Diseases. Dr. McAllister conducts field and laboratory research on vector control and insecticide resistance in important vectors of arboviruses.

Current projects focus on evaluating how larvicide applications using trucks and aircraft effect populations of mosquitoes that use small containers in the urban environment. In addition, Dr. McAllister serves as the subject matter expert and point of contact for vector control after disasters, deploying to Texas and US Virgin Islands in response to Hurricanes Harvey and Maria. Dr. McAllister also served as vector control team leader for the CDC Zika virus response.

Dr. McAllister is active in the American Mosquito Control Association and Entomological Society of America. She has served as the President of the American Mosquito Control Association, West Central Mosquito and Vector Control Association, and Louisiana Mosquito Control Association.
## 2018 Colorado Science & Engineering Fair Tours

**Friday, April 6, 2018**

### Morning Tours

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>8A</td>
<td><strong>Electron Microscopy Demo</strong></td>
<td>Tour starts at 11:30 a.m.</td>
</tr>
<tr>
<td></td>
<td>Presented by Pat McCurdy</td>
<td></td>
</tr>
<tr>
<td>9A</td>
<td><strong>Star Lab</strong></td>
<td>Presentation starts at 11:00 a.m.</td>
</tr>
<tr>
<td></td>
<td>Presented by Timnath Elementary School students</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td><strong>CSU Museum of Arthropod Biodiversity</strong></td>
<td>Presentation starts at 11:00 a.m.</td>
</tr>
<tr>
<td></td>
<td>Presented by CSU’s Entomology Club</td>
<td></td>
</tr>
<tr>
<td>15A</td>
<td><strong>Secrets of the Marmot Science Exploration</strong></td>
<td>Activity begins at 11:00 a.m.</td>
</tr>
<tr>
<td></td>
<td>Presented by the CSU STEM Educator’s Club</td>
<td></td>
</tr>
<tr>
<td>17A</td>
<td><strong>Intro to Veterinary Medicine</strong></td>
<td>Tour starts at 11:00 a.m.</td>
</tr>
<tr>
<td></td>
<td>Presented by Dr. Bob Lee, Dept. of Biomedical Sciences</td>
<td></td>
</tr>
<tr>
<td>20A</td>
<td><strong>Journey Through Space and Time in 3D</strong></td>
<td>Presentation begins at 11:00 a.m.</td>
</tr>
<tr>
<td></td>
<td>Presented by Dr. Andrew Warnock, CNS Education &amp; Outreach Center</td>
<td></td>
</tr>
<tr>
<td>22A</td>
<td><strong>CSU Campus Tour</strong></td>
<td>Tour begins at 11:30 a.m.</td>
</tr>
<tr>
<td></td>
<td>Presented by CSU Student Ambassadors</td>
<td></td>
</tr>
<tr>
<td>28A</td>
<td><strong>Campus Sustainability Tour</strong></td>
<td>Tour begins at 11:00 a.m.</td>
</tr>
<tr>
<td></td>
<td>Presented by CSU Energy Institute</td>
<td></td>
</tr>
<tr>
<td>30A</td>
<td><strong>Tour of Walter Scott, Jr. College of Engineering</strong></td>
<td>Tour begins at 11:00 a.m.</td>
</tr>
<tr>
<td></td>
<td>Presented by Engineering Student Ambassadors</td>
<td></td>
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### Afternoon Tours

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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</thead>
<tbody>
<tr>
<td>1B</td>
<td><strong>CSU Anatomy/Physiology Lab – Senior Division</strong></td>
<td>Tour starts at 1:30 p.m.</td>
</tr>
<tr>
<td></td>
<td>Presented by Madison Driscoll &amp; Emily Li</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td><strong>The Last Flight of 746 (Forensic Science)</strong></td>
<td>Presentation starts at 12:30 p.m.</td>
</tr>
<tr>
<td></td>
<td>Presented by Dr. Bob Morrow, CSEF Alumni</td>
<td></td>
</tr>
<tr>
<td>8B</td>
<td><strong>Electron Microscopy Demo</strong></td>
<td>Presentation starts at 2:30 p.m.</td>
</tr>
<tr>
<td></td>
<td>Presented by Pat McCurdy</td>
<td></td>
</tr>
<tr>
<td>9B</td>
<td><strong>Star Lab</strong></td>
<td>Presentation starts at 12:45 p.m.</td>
</tr>
<tr>
<td></td>
<td>Presented by Timnath Elementary School students</td>
<td></td>
</tr>
<tr>
<td>9C</td>
<td><strong>Star Lab</strong></td>
<td>Presentation starts at 1:45 p.m.</td>
</tr>
<tr>
<td></td>
<td>Presented by Timnath Elementary School students</td>
<td></td>
</tr>
<tr>
<td>10A</td>
<td><strong>Powerhouse Tour – OFF CAMPUS</strong></td>
<td>Tour begins at 1:00 p.m.</td>
</tr>
<tr>
<td></td>
<td>Presented by CSU Powerhouse Energy Campus</td>
<td></td>
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<tr>
<td>10B</td>
<td><strong>Powerhouse Tour – OFF CAMPUS</strong></td>
<td>Tour begins at 2:00 p.m.</td>
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<tr>
<td></td>
<td>Presented by CSU Powerhouse Energy Campus</td>
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</tr>
<tr>
<td>15B</td>
<td><strong>Solar Cars Science Exploration</strong></td>
<td>Activity begins at 1:00 p.m.</td>
</tr>
<tr>
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<td>Presented by the CSU STEM Educator’s Club</td>
<td></td>
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<td><strong>Intro to Veterinary Medicine</strong></td>
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<td>Presented by Dr. Bob Lee, Dept. of Biomedical Sciences</td>
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</tr>
<tr>
<td>18</td>
<td><strong>Next-gen Nanomaterials Chemistry</strong></td>
<td>Tour begins at 1:00 p.m.</td>
</tr>
<tr>
<td></td>
<td>Presented by CSU Chemistry Club</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td><strong>Medical Mysteries</strong></td>
<td>Activity begins at 1:30 p.m.</td>
</tr>
<tr>
<td></td>
<td>Presented by CSU Senior Microbiology Students</td>
<td></td>
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The Colorado State Science Fair, Inc. is an independent, nonprofit organization. For this reason, CSSF, Inc. is totally dependent upon the generous donations of those private businesses, organizations, and individuals that provide support for the prize money, the ISEF trips, and other expenses. We thank you for encouraging Colorado's young scientists, engineers, and mathematicians through your generous support.

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Monica Engler

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Dr. Woody Moss
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Jennie Ridgley
Margaret Romero
Thomas Salmon & Kay Duncan
Joanne & Patrick San Nicholas
Paul Wright & Pamela Tyrrell*
Roberta Wright
The RedLion York

*In memory of former Grand Award Judge Fred Smigiel.

Pizza Party Door Prize Donors

The CSEF Pizza party will be held Saturday, April 7th starting at 11 a.m. outside the Grand Ballroom of the Lory Student Center.

Finalists MUST be present to win a door prize.

Colorado Geological Survey
Colorado State University – College of Natural Sciences
Colorado State University Bookstore
Durango/Silverton Narrow Gauge Railroad
Intermountain Natural History Association
Pueblo Zoo
Rio Grande Scenic Railroad
Texas Instruments
UCAR Center for Science Education
US Department of Commerce/NOAA
Wings Over the Rockies

Thank you to the many community members who use Goodsearch and AmazonSmile to raise money for CSEF with their internet searches and purchases.
Visit the CSEF web site to find out how you can help!
# 2018 Colorado Science & Engineering Fair

## Vital Statistics

- **378 Finalist Participants with 329 Exhibits from 13 Regional Science Fairs**
- **159 Senior Division Finalists with 128 Exhibits**
- **219 Junior Division Finalists with 201 Exhibits**

<table>
<thead>
<tr>
<th>Category</th>
<th>Projects</th>
<th>Junior</th>
<th>Senior</th>
<th>6</th>
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| TOTAL Exhibits                  | 329      | 201    | 128    | 35 | 72 | 94 | 33 | 32 | 37 | 26 |
| TOTAL Finalists                 | 378      | 219    | 159    | 37 | 77 | 105| 37 | 36 | 44 | 42 |

### Schools/Teachers:

112 schools from throughout the state were represented, and 191 teachers and adults sponsored the students’ projects. There were 49 high schools represented.

### Grand Award Judges:

Over 230 professional scientists and engineers volunteered to interview the Finalists for the grand awards.

### Special Awards:

At least 70 organizations, universities and individuals offered over 300 individual special awards and scholarships worth over $170,000 to the finalists, judged by more than 200 professionals from those organizations.
### 2018 Colorado Science & Engineering Fair

#### Alphabetical List of Finalists

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*Regional Science Fair Intel International Science & Engineering Fair Finalist.
2018 Colorado Science & Engineering Fair
Senior Division Finalists

# indicates the number of previous years the finalist has participated in the CSEF.

Animal Sciences

2-01-001  Tails a Wagging  
Gracean Hoesli - 9th grade - West Grand High School - Kremmling - Mr. Travis Hoesli

2-01-002  The Effects of Different Strengths of Magnets on Planarian  
Andie Caton - 12th grade - Limon Schools - Limon - Ms. Brandie Bellefeuille

2-01-003  Walk It Out  
# Kylie Kay Franklin - 12th grade - Campo Schools - Campo - Ms. Cheryl Taylor

2-01-004  Analysis of Demographic Variation Reflected by Colony Size in Cliff Swallows  
Olivia Fross - 11th grade - Fairview High School - Boulder - Dr. Paul Strode

2-01-005  Exploring Nutritional Variance in Rabbit Diets  
Devyn Wood - 12th grade - Roosevelt High School - Johnstown - Mr. Paul Kratz

2-01-006  Identifying Causes of Ectoparasite Presence on the American Pika (Ochotona princeps)  
Emma Perkins - 11th grade - Boulder High School - Boulder - Mr. Chris Ray

2-01-007  Mealworms . . . A Potential Solution to the Global Plastic Problem  
##### Alyssa Rawinski - 11th grade - Monte Vista High School - Monte Vista - Ms. Loree’ Harvey

2-01-008  Pack on the Protein  
### Sydnee Roth - 11th grade - Liberty School - Joes - Mrs. Linda Niccoli

2-01-009  Will They Survive?  
# Tristin Niccoli - 9th grade - Arickaree School - Anton - Mr. Donald Myers

2-01-301  The Effects of Substrate Architecture on L. vannamei  
Matthew Buckman - 10th grade - Sky View Academy - Highlands Ranch - Mr. Chris Buckman

Behavioral & Social Sciences

2-02-001  Does Music Affect the Speed of Tasks?  
Paige Carlson - 9th grade - The Vanguard School - Colorado Springs - Mrs. Cheryl Holling

2-02-002  Remember Me?  
Iliana Castillo - 9th grade - West Grand High School - Kremmling - Ms. Lori Birch

2-02-003  The Impact of Education on Student Athletes Regarding Concussions  
Aylin Kahraman - 10th grade - Cherry Creek High School - Greenwood Village - Dr. Keith Harrison

2-02-004  Virtual Illness: Can Virtual Reality Cause Motion Sickness?  
Andres Villas - 9th grade - Monte Vista High School - Monte Vista - Ms. Loree’ Harvey

2-02-005  The Role of Economic Variable in Election Outcomes: A Global Analysis  
Dylan Cantrell - 12th grade - Nederland Middle/Senior High School - Nederland - Mr. Alberto Real

2-02-006  Examining Whether Agency and Anthropomorphism Interact in an Environmental Risk Setting  
Theo Bayard de Volo - 12th grade - Monarch High School - Louisville - Mrs. Katharine Ellis

2-02-007  Altered Halter  
Laila Buchler - 12th grade - Centaurus High School - Lafayette - Mr. Nicholas Cady

2-02-008  Smelly First Impressions: Analyzing How the Application of a Scent Affects Perceptions of a Subject  
Hanaa Salman - 11th grade - Cherry Creek High School - Greenwood Village - Mr. Stephen Smith

2-02-009  How Do Various Types of Music Affect Sleeping Patterns in Teenagers?  
Riley Douglas - 9th grade - Animas High School - Durango - Ms. Tina Hott

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2018 Colorado Science & Engineering Fair
Senior Division Finalists

Chemistry & Biochemistry

2-03-001  CO2 Sequestration by Mineral Carbonation in Ambient Air: Wollastonite Ratio
Sarah Bian - 9th grade - Cherry Creek High School - Greenwood Village - Mr. Stephen Smith

2-03-002  The Chemiluminescence of Bleaches Induced by Luminol: A Study of Glows Over Periods Time
Jan Graden - 11th grade - Fairview High School - Boulder - Dr. Maria Lo

2-03-003  Denaturing Proteins
Mary Jefferson - 10th grade - Arickaree School - Anton - Mr. Donald Myers

2-03-004  How Magnesium Almost Lost World War Two: Environmental Effects on Magnesium
Logan Klein - 11th grade - Yuma High School - Yuma - Mrs. Amy Melby

2-03-005  Investigation of Transcription Factor Preferences of Bacterial Receptors
Rollin Leavitt - 12th grade - Animas High School - Durango - Mr. Steve Smith

2-03-006  Synthesis of Acetylene-Perfluorinatedpyridine Monomer and Click-Mediated Polymerization
Katelynn Salmon - 11th grade - Palmer Ridge High School - Monument - Mr. Thomas Salmon

2-03-007  Ferro-Solution: Can Iron Nanoparticles Help with Oil Spill Cleanup? Phase 2
Michael Santo Savala - 11th grade - Monte Vista High School - Monte Vista - Ms. Loree’ Harvey

2-03-008  Acidastic
Tyson Schneider - 10th grade - Arickaree School - Anton - Mr. Donald Myers

2-03-009  UV-Vis Analysis of Silver Nanoparticles Released from Odor Control Clothing, Part II
Max Warnock - 10th grade - Poudre Global Academy - Fort Collins - Dr. Andrew Warnock

2-03-010  Developing a Novel Inhibitor for Cdc14 in the Fungus Aspergillus niger
Stephanie Zhang - 12th grade - Fairview High School - Boulder - Dr. Mark Hall

Earth & Space Sciences

2-04-001  Parallax Part III: A Study on the Effect of Time Duration on a Stellar Parallax's Accuracy
Antonio Arant - 10th grade - Trinidad High School - Trinidad - Ms. Gina Festi-Gitano

2-04-002  Is It Hot in Here?
Raja Braford-Lefebvre - 9th grade - Silverton Schools - Silverton - Mr. Paul Joyce

2-04-003  Varies Crystals Responding To Environmental Audio Variables
Adrienne Jones - 12th grade - Trinidad High School - Trinidad - Mrs. Jessica Pepper

2-04-004  Global Storming? Is Climate Change Intensifying the Number and Duration of Tropical Storms and Hurricanes?
Matyson Jones - 9th grade - Monte Vista High School - Monte Vista - Ms. Loree’ Harvey

2-04-005  Shaken: A Statistical Analysis on Induced Seismicity
Rain Orsi - 10th grade - Rocky Mountain High School - Fort Collins - Dr. Rebecca Orsi

2-04-006  An Analysis of Compositional Characteristics of Two Distinct Fossil Butte Member Localities
Casey Shaw - 12th grade - Liberty School - Joes - Mrs. Linda Niccoli

2-04-007  Measuring Exoplanetary Radii Using Transit Photometry
Sarah Tang - 10th grade - Fairview High School - Boulder - Mr. William Waalkes

2-04-301  The Reduction of Perchlorate in Mars Regolith Using Hydrogen Gas to Produce Chloride and Water
Natalie Keller - 10th grade - Cherry Creek High School - Greenwood Village - Mr. Ethan Dusto
Melanie Gong - 10th grade - Cherry Creek High School - Greenwood Village - Mr. Ethan Dusto

2-04-302  Using 3D Drone-based Digital Models To Investigate the Fluvial Geomorphology of an Eroding Arroyo
Kathryn Kummel - 9th grade - Palmer High School - Colorado Springs - Dr. Miroslav Kummel
Michelle Kummel - 12th grade - Palmer High School - Colorado Springs - Dr. Miroslav Kummel
# 2018 Colorado Science & Engineering Fair
## Senior Division Finalists
### Energy

<table>
<thead>
<tr>
<th>Entry</th>
<th>Title</th>
<th>Grade</th>
<th>School</th>
<th>Advisor</th>
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<td>2-05-001</td>
<td>Design of a Novel Energy-Saving Radiative Cooling Bilayer Paint for Space Cooling</td>
<td>10th</td>
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<td>Dr. Xiaobo Yin</td>
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<td>2-05-002</td>
<td>Heating Up: Using Phase Change Materials as a Thermal Battery</td>
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<td>2-05-003</td>
<td>Efficiency of a Hydrogen/Oxygen Gas Generator</td>
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<td>Windmill Efficiency Part 3: Testing the Magnetic Flux of Magnetostrictive Solenoids to Optimize Oscillatory Energy Production</td>
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<td>Anaerobic Digestion of Food Waste Part 3: Comparing Different Conductors in the Production of Food Waste Generated Electricity</td>
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<td>2-06-001</td>
<td>The Reliability of Model Rocket Simulation Software</td>
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<td>Supporting the Future: Design and Creation of an Air-Evacuated Maglev Tunnel</td>
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<td>Stampede Arm II</td>
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<td>Parallel Plate Capacitor from the Ground Up</td>
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<td>Wildland Firefighter Defense System: Phase III</td>
<td>11th</td>
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<td>Photos of Synthetic Photosynthesis</td>
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<td>Leveraging Satellite Imagery to Map Road Surface Conditions</td>
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<td>Healing Air Pollution with Hydrogen</td>
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<td>Use of Monte Carlo Methods to Evaluate the Viability of Hydroelectric Dams</td>
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<td>A Novel Approach for Sensing Seismic Events: Applications of Graphene Nano Flake Powder Composites</td>
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<td>A Helping Hand: A Softer Side of Robots, Part II</td>
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<td>Suppression of Aeroelastic Instabilities in HR Wing Structures Using Principal Component Analysis</td>
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<td>2-06-016</td>
<td>Hit Me with Your Best Shot, Part 2</td>
<td>9th</td>
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### Engineering

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### Engineering cont.

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<th>Project Title</th>
<th>Student Name(s)</th>
<th>Grade</th>
<th>School</th>
<th>Advisor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synthesis and Characterization of a NiO-ZnO Semiconductor Junction for an Electromechanical Effect</td>
<td>Jenna Salvat</td>
<td>11th</td>
<td>Coronado High School</td>
<td>Mrs. Veronica Flores</td>
</tr>
<tr>
<td>Harvesting Water from Air with Solar Power for Underdeveloped Areas</td>
<td>Maximilian Shen</td>
<td>11th</td>
<td>Fairview High School</td>
<td>Mrs. Hongya Chen</td>
</tr>
</tbody>
</table>

### Environmental Sciences

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Student Name(s)</th>
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<th>Advisor(s)</th>
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</thead>
<tbody>
<tr>
<td>Understanding the Rio Grande Cutthroat Trout Resiliency in the Trinchera and Ute Creek Watersheds</td>
<td>Keaton Fischer</td>
<td>10th</td>
<td>Sierra Grande Jr/Sr High School</td>
<td>Mrs. Wendy Fischer</td>
</tr>
<tr>
<td>Coloring with Crops</td>
<td>Angel Castillo</td>
<td>10th</td>
<td>West Grand High School</td>
<td>Ms. Emmylou Harmon</td>
</tr>
<tr>
<td>The Evaluation of the Resuspension of Cyanobacterial Toxins into the Water Column in Eight Lakes</td>
<td>MaryAnn Ho</td>
<td>11th</td>
<td>Fairview High School</td>
<td>Dr. James McCutchan, Jr.</td>
</tr>
<tr>
<td>EcoGuardians</td>
<td>Khailaya Hughes</td>
<td>9th</td>
<td>West Grand High School</td>
<td>Ms. Lori Birch</td>
</tr>
<tr>
<td>To Add or Not To Add: Possible Relations Between Nitrogen Fixing Bacteria and Nitrogen Fertilizers</td>
<td>Tyson Lichty</td>
<td>11th</td>
<td>Liberty School</td>
<td>Mrs. Linda Niccoli</td>
</tr>
<tr>
<td>The Alamosa River Watershed: A Proving Ground for Natural Selection</td>
<td>Amber Michel</td>
<td>11th</td>
<td>Monte Vista High School</td>
<td>Ms. Loree’ Harvey</td>
</tr>
<tr>
<td>The Temperature Effect on a Physarum polycephalum’s Diet</td>
<td>Tyler Nelson</td>
<td>9th</td>
<td>The Vanguard School</td>
<td>Mrs. Cheryl Holling</td>
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<tr>
<td>Underwater Invaders</td>
<td>Jayden Edson</td>
<td>11th</td>
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<tr>
<td>Pioneering Mars’ Agriculture</td>
<td>Nizhoni Valdez</td>
<td>11th</td>
<td>Central High School</td>
<td>Mr. William Warren</td>
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<td>Assessing Goat Browsing as a Form of Wildfire Mitigation and Its Environmental Impacts</td>
<td>Delaney Yehle</td>
<td>11th</td>
<td>Rock Canyon High School</td>
<td>Mrs. Shawndra Fordham</td>
</tr>
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<td>Distinguishing Microbial Communities in Low Elevation Ponderosa Pine Forests After Prescribed and Natural Burns</td>
<td>Isabelle Rusk</td>
<td>11th</td>
<td>Fairview High School</td>
<td>Dr. Paul Strode</td>
</tr>
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<td>Roots for the Road</td>
<td>Emma Stone</td>
<td>9th</td>
<td>Brush High School</td>
<td>Mr. David Miner</td>
</tr>
<tr>
<td>The Effects of Ice Melts on Water pH</td>
<td>Robert Vanderschaaff</td>
<td>12th</td>
<td>Roosevelt High School</td>
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</tr>
</tbody>
</table>
2018 Colorado Science & Engineering Fair
Senior Division Finalists
Mathematics & Computer Sciences

2-08-001 Assimilating Time-Uncertain Measurements in Ensemble Kalman Filtering
# Elia Gorokhovsky - 11th grade - Fairview High School - Boulder - Dr. Jeffrey Anderson

2-08-002 Autonomous Anomaly Detection and Classification Using Neural Networks
# Siddarth Ijju - 10th grade - Cherry Creek High School - Greenwood Village - Dr. Keith Harrison

2-08-003 Characterization of Certain Non-Homogeneous Meta-Fibonacci Sequences
Austen Mazenko - 10th grade - Cherry Creek High School - Greenwood Village - Dr. Keith Harrison

2-08-004 Does Sample Size Affect Studies Done on Populations with Various Communities of Different Sizes?
Stephen McDonald - 11th grade - Central High School - Pueblo - Mr. William Warren

2-08-005 Small World Networks: I Know Someone You Know, But You Don't Know It and Neither Do I
### Sara Nehring - 9th grade - Monte Vista High School - Monte Vista - Ms. Loree’ Harvey

2-08-006 Learning To Player Hammurabi
Bill Ray - 12th grade - Peak to Peak Charter School - Lafayette - Mr. Robert Hettmansperger

Medicine & Health

2-09-001 Color War
Natali Shaw - 10th grade - Sacred Heart Academy - Burlington - Sister Mary Catherine

2-09-002 What Are Your Pulse and Oxygen Levels?
Daniela Acosta - 9th grade - Silverton Schools - Silverton - Mr. Paul Joyce

2-09-003 Bruxism: A Novel Diagnostic Approach
#### Edwin Bodoni - 11th grade - Cherry Creek High School - Greenwood Village - Dr. Keith Harrison

2-09-004 Knee Tension
#### Mindi Carr - 9th grade - Genoa-Hugo School - Hugo - Mrs. Marguerite Yowell

2-09-005 Flu Vaccine’s Accuracy
Gurleen Kaur - 10th grade - Alamosa High School - Alamosa - Mr. Matt Relyea

2-09-006 Determining the Role of Ferroptosis in Parthenolide and Its Analog Mediated Cell Death in AML
Spoorthy Reddy - 11th grade - Fairview High School - Boulder - Mrs. Jessica Ponder

2-09-007 The Effect of Ketoacidosis on the Breath: A Cost-Efficient Way to Monitor Ketones
#### Cody Robinson - 11th grade - Yuma High School - Yuma - Mrs. Amy Melby

2-09-008 Investigating the Developmental Requirements of Sex Chromosome Genes Affected in Turner Syndrome
#### Isani Singh - 12th grade - Cherry Creek High School - Greenwood Village - Mr. Stephen Smith

2-09-301 The Effects of Caffeine on Daphnia and H. Dujardin
Kaitlynn Alcorn - 12th grade - Limon Schools - Limon - Ms. Brandie Bellefeuille
Shalynn Hoffman - 12th grade - Limon Schools - Limon - Ms. Brandie Bellefeuille

2-09-302 Lactates Effects on Mitochondrial Phospholipids and Function
Hailey Chapman - 12th grade - Monarch High School - Louisville - Dr. Genevieve Sparagna
Valerie Warkins - 12th grade - Monarch High School - Louisville - Dr. Genevieve Sparagna

2-09-303 Characterization and In Vitro Differentiation of Myeloid Derived Suppressor Cells
Jayendra Chauhan - 10th grade - Rock Canyon High School - Lone Tree - Dr. Nicholas Pullen
Grace Nunnelee - 12th grade - Ridgeview Classical Schools - Fort Collins - Dr. Nicholas Pullen
2018 Colorado Science & Engineering Fair
Senior Division Finalists

Microbiology & Molecular Biology

2-10-001 Anthropogenic Induction of Antibiotic Resistance by Sulfamethoxazole
Isa Anderson - 10th grade - Denver North High School - Denver - Mrs. Munira Albuthi Lantz

2-10-002 Coliform Bacteria in Front Range Water
Owen Beute - 9th grade - The Vanguard School - Colorado Springs - Mrs. Kimberly Price

2-10-003 Identifying Downstream Targets of HCFC1: A Gene Linked To Severe Neurological Disease
Anand Chundi - 10th grade - SkyView Academy - Highlands Ranch - Mrs. Manjula Chundi

2-10-004 Investigating Capsicum frutescens as a Means of Treating Common Bacteria in Sinusitis
Brecken Dobbs - 9th grade - La Veta Schools - La Veta - Mrs. Pat Keeling

2-10-005 Optimizing the Ratios of Manuka Honey to Adhesive in an Antibacterial Surgical Adhesive
Peyton Leyendecker - 10th grade - SkyView Academy - Highlands Ranch - Mr. Kurt Leyendecker

2-10-006 Calcite Production in Cyanobacteria
Navami Manangi - 12th grade - Peak to Peak Charter School - Lafayette - Mr. Robert Hettmansperger

2-10-007 The Effect of Caffeine Versus Energy Drinks on the Heart Rates of Daphnia
Emma Palmer - 9th grade - The Vanguard School - Colorado Springs - Mrs. Cheryl Holling

2-10-008 Milk vs. Aerobic Bacteria
Courtney Ross - 11th grade - Yuma High School - Yuma - Mrs. Amy Melby

2-10-009 The Best Way To Disinfect Kitchen Sponges
Jessie Zimmermann - 9th grade - The Vanguard School - Colorado Springs - Mrs. Cheryl Holling

2-10-301 Novel Strategies for Detecting and Treating Podocyte Injury in Diabetic Nephropathy
Evelyn Bodoni - 10th grade - Cherry Creek High School - Greenwood Village - Dr. Keith Harrison
Nicole Hankovszky - 10th grade - Cherry Creek High School - Greenwood Village - Dr. Keith Harrison

Physics

2-11-001 In the Absence of Air Revisited
Eric Bauman - 9th grade - The Classical Academy - Colorado Springs - Mrs. Jennifer Smith

2-11-002 Totally Tubular: Calculating the End Correction to Find the Wavelength of a Wave in an Open Tube
Jasmine DeMeyer - 11th grade - Greeley West High School - Greeley - Mrs. Cyndi Stump

2-11-003 Voltage-Potential Profiles of Glow Discharges Using an Emissive Probe
Fionna Kopp - 12th grade - Boulder High School - Boulder - Dr. - Xu Wang

Molly Nehring - 10th grade - Monte Vista High School - Monte Vista - Ms. Loree’ Harvey

2-11-005 The Effects of Magnetism and Algae on Voltage on Tin Oxide Plates
Emma Schmit - 9th grade - SkyView Academy - Highlands Ranch - Ms. Nichole Schmit

2-11-006 Diurnal Variation and Duration of Meteors Usable for Radio Communications
Kyra Slovacek - 12th grade - Monarch High School - Louisville - Mr. Dave Andreatta

2-11-007 On the Comparison of Drone Propellers
Finn Bridgham - 9th grade - Animas High School - Durango - Ms. Tina Hott
Mason James - 9th grade - Animas High School - Durango - Ms. Tina Hott

2-11-008 Inductive Power Transfer
Cameron Eldridge - 12th grade - Roosevelt High School - Johnstown - Mr. Judson Doyle
Patrick James - 12th grade - Roosevelt High School - Johnstown - Mr. Judson Doyle
Tyler Woodbrey - 12th grade - Roosevelt High School - Johnstown - Mr. Judson Doyle

2-11-009 How Helicopter’s Wing Speeds Are Affected By Weight Offsets
Hauk Hubbard - 11th grade - Limon Schools - Limon - Ms. Brandie Bellefeuille
Braden Sandersfeld - 11th grade - Limon Schools - Limon - Ms. Brandie Bellefeuille

2-11-034 Analysis of Various Wing Structures for Hovering Capacity
Drake Ludgate - 11th grade - Brush High School - Brush - Mr. David Miner

Nathaniel Miner - 11th grade - Brush High School - Brush - Mr. David Miner
2018 Colorado Science & Engineering Fair
Senior Division Finalists

Physics

2-11-305 Orientation of Jumping Masses
Steven McConnell - 12th grade - Brush High School - Brush - Mr. David Miner
Jayden Markland - 12th grade - Brush High School - Brush - Mr. David Miner
Zabastian Medina - 12th grade - Brush High School - Brush - Mr. David Miner

2-11-306 CAN You Handle This?
## Olivia Odle - 9th grade - Brush High School - Brush - Mr. David Miner
## Brady Sanchez - 9th grade - Brush High School - Brush - Mr. David Miner

Plant Sciences

2-12-001 Heredity of Plant Albinism
Calyn Ashe - 10th grade - Hoehne Jr/Sr High School - Hoehne - Mr. Keith Berry

2-12-002 Fungicidal and Nutrient Application Impact on Wheat Germination
# Paige Beedy - 9th grade - Limon Schools - Limon - Ms. Brandie Bellefeuille

2-12-003 Effectiveness of Cereal Rye as a Cover Crop to Alfalfa
### Kit Bellefeuille - 11th grade - Limon Schools - Limon - Ms. Brandie Bellefeuille

2-12-004 Dirty Water . . . Dirty Food: The Effect of Environmental Pollutants on the Life of Garden Plants
# Emmalie Byrne - 9th grade - Colorado Virtual Academy - Vilas - Ms. Elaine Riegel

2-12-005 The Effect of Nutrient Availability on Plant Communities in the Alpine Tundra
# Vanessa Haggans - 11th grade - Fairview High School - Boulder - Dr. Timothy Seastedt

2-12-006 GMOs and Onions: A Molecular Controversy
Faris Jones - 9th grade - West Grand High School - Kremmling - Ms. Emmylou Harmon

2-12-007 Leaching of Nitrates in Different Soils
# Jaret Lichty - 9th grade - Liberty School - Joes - Mrs. Linda Niccoli

2-12-008 SALTY
Tyler Schneider - 10th grade - Arickaree School - Anton - Mr. Donald Myers

2-12-009 Covering the Cover Crop
## Colt Spencer - 10th grade - Mancos High School - Mancos - Mrs. Sara Spencer

2-12-010 The Effects of Electricity on Bean Seed Imbibition
# Chance Wiening - 10th grade - Trinidad High School - Trinidad - Mrs. Yvonne Wiening

2-12-301 Plant-Powered Homeostatic Habitat
Emily Soder - 12th grade - Centaurus High School - Lafayette - Mr. Nicholas Cady
Swami Velamala - 12th grade - Centaurus High School - Lafayette - Mr. Nicholas Cady

2-12-302 Assessing the Viability of Household Food Scraps as an Alternative To Traditional Fertilizer
Andrew Tokar - 11th grade - Cherry Creek High School - Greenwood Village - Mr. Stephen Smith
Maya Hegde - 11th grade - Cherry Creek High School - Greenwood Village - Mr. Stephen Smith
## 2018 Colorado Science & Engineering Fair Exhibit Hall

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<tr>
<th>Senior Division Projects</th>
<th>Junior Division Projects</th>
</tr>
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<tbody>
<tr>
<td>Grand Ballroom</td>
<td>Entrance</td>
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<tr>
<td>Lory Student Center</td>
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### Open to the Public
Friday 10:30 a.m. - 5 p.m.
Saturday 9 a.m. - 11 a.m.
2018 Colorado Science & Engineering Fair
Junior Division Finalists
# indicates the number of previous years the finalist has participated in the CSEF.

Animal Sciences

1-01-001 The Uses of Darkling Mealworms in Plastic Degradation
Natalie Aerni - 7th grade - Frontier Academy Secondary School - Greeley - Mrs. Nicole Howe

1-01-002 Beyond the Boots
Madison Cabot - 8th grade - Imagine Charter School - Firestone - Mrs. Karie Slade

1-01-003 Put One Paw in Front of the Other
Marley Eisman - 8th grade - Coal Creek Canyon K-8 School - Golden - Mrs. Tricia Logan

1-01-004 He? She? Is It a Matter of Degree?
# Lilly Figueroa - 7th grade - Mancos Middle School - Mancos - Mrs. Holly Figueroa

Arushi Munjal - 8th grade - Challenge School - Denver - Mr. John Wiley

1-01-006 Grooming’s Effect on a Horse’s Heart Rate
Jami Jo Quick - 8th grade - Springfield Jr/Sr High School - Springfield - Mrs. Bobbi Quick

1-01-007 I’m Sensing Bias: Does Poor Conformation in Quarter Horses Affect Certain Senses?
# Camille Rawinski - 8th grade - Monte Vista Middle School - Monte Vista - Ms. Loree’ Harvey

1-01-008 Man’s Best Friend
Jensen Renquist - 7th grade - Walsh Jr/Sr High School - Walsh - Mr. Tyler Hufford

1-01-009 Bite Me NOT!! The Effectiveness of Mosquito Repellent
Clay Robinson - 8th grade - Liberty School - Joes – Mrs. Linda Niccoli

1-01-010 Suffocating Shrimps?
Cash Walker - 7th grade – Orchard Mesa Middle School – Grand Junction – Mrs. Sandra Bavor

1-01-301 Animals and Sounds
# Alleson Schlosky - 8th grade - Pueblo Academy of Arts - Pueblo - Mrs. Kim Hopkins
# Jillian Evans - 8th grade - Pueblo Academy of Arts - Pueblo - Mrs. Kim Hopkins
2018 Colorado Science & Engineering Fair
Junior Division Finalists

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Behavioral & Social Sciences

1-02-001  Zen Testing
Chloe Bennett - 7th grade - The Classical Academy - Colorado Springs - Mrs. Candus Muir

1-02-002  Middle School in Middle Age
Anna Dery - 8th grade - Holy Family Catholic School - Grand Junction - Ms. Yolanda Pacheco

1-02-003  Do Different Types of Exercise Yield a Greater Prize?
Sophie Eschallier - 7th grade - Mancos Middle School - Mancos - Mrs. Elizabeth Eschallier

1-02-004  Bare Your Teeth!
Grace Farrell - 6th grade - Good Shepherd Catholic School - Denver - Ms. Annette Humphrey

1-02-005  Eyewitness Accuracy
Emilly Gonzalez - 8th grade - Pinnacle Charter School - Federal Heights - Dr. Maria McClure

1-02-006  Characters Who Are Shown Compassion
Kaenon Gossett - 8th grade - Genoa-Hugo School - Hugo - Mr. William Mallory

1-02-007  Back Up Dude
Josie Gundrey - 8th grade - St. Columba Catholic School - Durango - Ms. Shelley Gundrey

1-02-008  Stress Test
Chloe Haerr - 7th grade - The Classical Academy - Colorado Springs - Mrs. Candus Muir

1-02-009  A Ride to Remember
Hannah Helms - 7th grade - Miller Middle School - Durango - Dr. Elizabeth Helms

1-02-010  Which Child Safe Container Is the Most Child Safe?
Kasen Hicks - 7th grade - Frontier Academy Secondary School - Greeley - Mrs. Shelley Welch

1-02-011  Brainbow
Karsen Jorgensen - 7th grade - Good Shepherd Catholic School - Denver - Ms. Annette Humphrey

1-02-012  The Effect of Classical Music Tempo on Competitive Run Times
Kate Kaczmarek - 8th grade - The Classical Academy - Colorado Springs - Mrs. Candus Muir

1-02-013  How Does Social Media Affect the Grades of Students?
Lana Kitchen - 8th grade - Roncalli STEM Academy - Pueblo - Mrs. Krystal Reed

1-02-014  Can I Go To the Bathroom?
Marissa Martinez - 7th grade - Monte Vista Middle School - Monte Vista - Ms. Loraine Glidewell

1-02-015  Perfect Position!
Olivia Medina - 6th grade - Alta Vista Charter School - Lamar - Mrs. Marah Brase

1-02-016  Gender and Peer Pressure
Tarra Miller - 8th grade - Genoa-Hugo School - Hugo - Mr. William Mallory

1-02-017  Personality Inheritance
Olga Rokhlenko - 6th grade - Flagstaff Academy - Longmont - Mr. Michael Rokhlenko

1-02-018  Have You Been Persuaded?
Kaleigh Schanker - 8th grade - Turner Middle School - Berthoud - Mrs. Sandy Schanker

1-02-019  How Do Others Expressing Emotions Affect How You Feel?
Negha Sethuramalingam - 8th grade - Challenge School - Denver - Mr. Joseph King

1-02-020  The Power of Color
Bailey Short - 8th grade - Knowledge Quest Academy - Mililiki - Mrs. Megan Short

1-02-021  Musical Magic?
Molly Stanifer - 7th grade - Miller Middle School - Durango - Dr. Devon Daney

1-02-022  Cell Phones and Anxiety
Brakelle Westphal - 7th grade - Springfield Jr/Sr High School - Springfield - Mrs. Robyne Westphal

1-02-301  Brain Blank or Purely Productive
Timothy Cardenas - 7th grade - Rocky Ford Jr/Sr High School - Rocky Ford - Mrs. Melany Lucero

1-02-302  2+8≠10
Elizabeth Koenck - 8th grade - Challenge School - Denver - Mr. John Wiley
Aveline Hwang - 8th grade - Challenge School - Denver - Mr. John Wiley
2018 Colorado Science & Engineering Fair
Junior Division Finalists

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Chemistry & Biochemistry

1-03-001  Can Veggie Power Outlast the Energizer Bunny?
Jonathan Acosta-Soto - 7th grade - Fort Morgan
Middle School - Fort Morgan - Mrs. Rosalba Acosta

1-03-002  Magnetic Oil?
Parker Ford - 8th grade - Sargent Jr/Sr High
School - Monte Vista - Mrs. Terri Paulson

1-03-003  Black Snake
Emma Frey - 7th grade - Holly Schools - Holly -
Mrs. Jennifer King

1-03-004  Certified Cookie Monster Approved
Isabella Garcia - 7th grade - The Classical
Academy - Colorado Springs - Mrs. - Candus Muir

1-03-005  The Effect of Salt on the Rate of Ice Melting
Hailey Green - 6th grade - Stanley British Primary
School - Denver - Mr. Michael Rose

1-03-006  Analyzing the Effectiveness of Various Whiteboard Cleaners
Radhika Gupta - 7th grade - The Classical
Academy - Colorado Springs - Mrs. Candus Muir

1-03-007  Bones vs. Liquids
Hailey Harris - 7th grade - Primero Jr/Sr High
School - Weston - Ms. Josette Andrews

1-03-008  Potato Power
Adyn Jara - 6th grade - Holly Schools - Holly -
Mrs. Jennifer King

1-03-009  How Does Fabric Softener Affect the Flammability of Different Cloth?
Chris Larson - 8th grade - Primero Jr/Sr High
School - Weston - Ms. Josette Andrews

1-03-010  Lemon Volcano
Analise Minjarez - 6th grade - Roncalli STEM
Academy - Pueblo - Mrs. Krystal Reed

1-03-011  Life in the Fast Lane
Liv Moritz - 7th grade - Vail Mountain School –
Vail - Mr. Brett Falk

1-03-012  Detection of Chemical Contaminants in Water Using Carbon Nanotube Sensors
Gitanjali Rao - 7th grade - STEM School Highlands Ranch - Highlands Ranch - Dr. Selene Hernandez-Ruiz

1-03-013  Ions Can't Fly
Pearl Soundron - 8th grade - Classical
Conversations - Monument - Mr. Agnel Soundron

1-03-014  Which Method Makes the Softest Water?
Bailey Spotz - 7th grade - Fort Morgan Middle
School - Fort Morgan - Mr. Jack Spotz

1-03-015  Water U Drinkin' ?!
Madison Tajchman - 8th grade - Imagine Charter
School - Firestone - Mrs. Karie Slade

1-03-016  Fluorocarbon to Eco-Friendly
#
Levi Tichi - 8th grade - St. Columba Catholic
School - Durango - Mrs. Kerry Tichi

1-03-017  Over the Counter Medications vs. Herbal Remedies: Which Is More Potent?
Analisa Vega - 6th grade - Dolores Elementary
School - Dolores - Mr. Glenn Smith

1-03-018  Electrolysis of Salt Water Solutions
Ethan Wurman - 8th grade - Summit Charter
Middle School - Boulder - Mrs. Valerie Keeney

1-03-301  Hemp . . . A Hot Topic
Maddisun Ellithorpe - 8th grade - Sargent Jr/Sr High
School - Monte Vista - Mrs. Terri Paulson
Josh Sawyer - 8th grade - Sargent Jr/Sr High
School - Monte Vista - Mrs. Terri Paulson

1-03-302  Let’s Get Fired Up!
#
James Mars - 8th grade - Ignacio Middle School - Ignacio - Mr. Dusty Mars
Tyler Barnes - 8th grade - Ignacio Middle School - Ignacio - Mr. Dusty Mars

1-03-303  How Acid Affects the Rate of Corrosion
Michael Stone - 6th grade - The McClelland
School - Pueblo - Ms. Meredith Sparks
Tanner Hall - 6th grade - The McClelland School - Pueblo - Ms. Merideth Sparks

1-03-304  Different Concentrations of Vinegar Affecting the Staleness of Eggs
Veronica Wolf - 7th grade - Skinner Middle School - Denver - Mrs. Michon Schmidt
Preston Schmidt - 7th grade - Skinner Middle
School - Denver - Mrs. Michon Schmidt
# 2018 Colorado Science & Engineering Fair
## Junior Division Finalists

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## Earth & Space Science

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<tr>
<th>Project Title</th>
<th>Grade</th>
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<th>Advisor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-04-001 Starring Materials</td>
<td>6th</td>
<td>Liberty Middle School</td>
<td>Dr. Lorry Getz</td>
</tr>
<tr>
<td>1-04-002 Mission Filtration</td>
<td>8th</td>
<td>Pueblo Academy of Arts</td>
<td>Mrs. Pattyanne Cosentino</td>
</tr>
<tr>
<td>1-04-003 Plants vs. Water: A Battle of Soil Erosion</td>
<td>7th</td>
<td>Bayfield Middle School</td>
<td>Mr. Matthew Foutz</td>
</tr>
<tr>
<td>1-04-004 Surviving a Drought</td>
<td>8th</td>
<td>Monument Charter Academy</td>
<td>Mr. John Klapp</td>
</tr>
<tr>
<td>1-04-005 Flow or No, Will You Grow? Water Deficit of Quinoa</td>
<td>8th</td>
<td>Sargent Jr/Sr High School</td>
<td>Mrs. Terri Paulson</td>
</tr>
<tr>
<td>1-04-006 Sunspots</td>
<td>7th</td>
<td>Lamar Middle School</td>
<td>Ms. Robin Staker</td>
</tr>
<tr>
<td>1-04-007 Plant Growth in Varied Soil Type and Air Pressure</td>
<td>8th</td>
<td>Summit Charter Middle School</td>
<td>Mrs. Valerie Keeney</td>
</tr>
<tr>
<td>1-04-008 Structural Geology of the Fountain Formation in Lory State Park</td>
<td>8th</td>
<td>Fort Collins</td>
<td>Dr. Andrew Warnock</td>
</tr>
<tr>
<td>1-04-301 Mars Survival</td>
<td>7th</td>
<td>Roncalli STEM Academy</td>
<td>Mrs. Krystal Reed</td>
</tr>
<tr>
<td>1-05-001 The Battery of Baghdad</td>
<td>7th</td>
<td>Pagosa Springs Middle School</td>
<td>Mrs. Tiffany Candelaria</td>
</tr>
<tr>
<td>1-05-002 The Effect of Vane Pitch on Turbine Efficiency</td>
<td>6th</td>
<td>Grant Beacon</td>
<td>Mr. Noah Benedict</td>
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<tr>
<td>1-05-003 Burn Baby Burn: The Effect of Wood Type on Heat Produced in a Wood Burning Stove</td>
<td>6th</td>
<td>Branson School</td>
<td>Mrs. Jodi Doherty</td>
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<td>1-05-004 Influencing Electricity Output of MFCs Using Electron Acceptors</td>
<td>8th</td>
<td>Wiggins</td>
<td>Ms. Briana Simbeck</td>
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<td>1-05-005 3D Solar</td>
<td>7th</td>
<td>Imagine Charter School</td>
<td>Mrs. Karie Slade</td>
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<td>1-05-006 Solar Charging at Different Angles</td>
<td>6th</td>
<td>St. Columba</td>
<td>Mrs. Kathy Morozowich</td>
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<tr>
<td>1-05-007 Magnetic Energy</td>
<td>7th</td>
<td>Corwin International Magnet School</td>
<td>Mrs. C Kristin Wright</td>
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</tbody>
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## Energy

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Grade</th>
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<tbody>
<tr>
<td>1-05-008 Let It Shine: Altering the Wavelength of Bioluminescent Light to Power a Photovoltaic Cell</td>
<td>6th</td>
<td>Rocky Heights</td>
<td>Mr. Narayana Sainath</td>
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<tr>
<td>1-05-009 Help for Hurricane Victims: Creating Fresh Water Using Solar Power</td>
<td>6th</td>
<td>Webber Middle School</td>
<td>Mrs. Eva Petrecca</td>
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<tr>
<td>1-05-010 Energy Efficiency: The New Curve</td>
<td>7th</td>
<td>The Classical Academy</td>
<td>Mrs. Candus Muir</td>
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<td>1-05-011 Frightened Grasshopper Solar Energy</td>
<td>6th</td>
<td>Roncalli STEM Academy</td>
<td>Mrs. Krystal Reed</td>
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<tr>
<td>1-05-012 Maximizing Efficiency When Generating Clean Energy</td>
<td>7th</td>
<td>The Classical Academy</td>
<td>Mrs. Candus Muir</td>
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<td>1-05-013 Diesel Engine Economics</td>
<td>8th</td>
<td>Limon Schools</td>
<td>Ms. Brandie Bellefeuille</td>
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<tr>
<td>1-05-014 3D Solar</td>
<td>7th</td>
<td>Imagine Charter School</td>
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<td>1-05-015 Solar Charging at Different Angles</td>
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<td>1-05-016 Magnetic Energy</td>
<td>7th</td>
<td>Corwin International Magnet School</td>
<td>Mrs. C Kristin Wright</td>
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</table>
2018 Colorado Science & Engineering Fair
Junior Division Finalists

# indicates the number of previous years the finalist has participated in the CSEF.

Engineering

1-06-001  Wood Splitter
Trevor Paquin - 8th grade - Mancos Middle School - Mancos - Mr. Ron Paquin

1-06-002  How Big Is Too Big?
Braxton Dennison - 6th grade - Mancos Middle School - Mancos - Mr. Justin Ritter

1-06-003  It's All in the Movement
Austin Cantor - 7th grade - The Classical Academy - Colorado Springs - Mrs. Candus Muir

1-06-004  Smart Fabric- Microelectronic Properties of Textiles Coated with Carbon Nanotubes
Ellie Clark - 8th grade - St. Columba Catholic School - Durango - Dr. Matthew Clark

1-06-005  Robotic Exoskeleton
Nicholas Foster - 7th grade - The Classical Academy - Colorado Springs - Mrs. Candus Muir

1-06-006  Stirling Engines: Harnessing and Utilizing Heat Energy
Nicholas Huber - 8th grade - St. Columba Catholic School - Durango - Mr. Marc Huber

1-06-007  Don't Let Charging Up Run You Down: A Study on Portable Power
Miles Johnston - 8th grade - The Classical Academy - Colorado Springs - Mrs. Dawn Ehresman

1-06-008  Electronic Automated Product Dispensing
Tate Schrock - 8th grade - Arickaree School - Anton - Mr. Donald Myers

1-06-009  Magnificent Mounted Magnetic Bearings
Gabriel Wu - 8th grade - The Classical Academy - Colorado Springs - Mr. Chris Caruana

1-06-010  BioLine: The Biodegradable Fishing Line
Gregory Mackintosh - 8th grade - Good Shepherd Catholic School - Denver - Ms. Annette Humphrey

1-06-011  Self-Folding Origami
Nico Martinez - 7th grade - Pueblo Academy of Arts - Pueblo - Mrs. Mary Jose

1-06-012  Stop Horsing Around with My Hydration
Augustus Miller - 6th grade - Monte Vista Middle School - Monte Vista - Ms. Loraine Glidewell

1-06-013  Still Sitting?

1-06-014  What Roof Shape Is the Most Resistant To a Hurricane Force Wind Simulation?
Landry Peeples - 8th grade - Arickaree School - Anton - Mr. Donald Myers

1-06-015  Electricity from Heat
Elizabeth Petersen - 7th grade - Flagstaff Charter Academy - Longmont - Mr. Amy Petersen

1-06-016  Energy Down the Drain!
Norah Quirk - 7th grade - The Classical Academy - Colorado Springs - Mrs. Candus Muir

1-06-017  Maxime Lingura
Allison Rose - 8th grade - The Classical Academy - Colorado Springs - Mrs. Dawn Ehresman

1-06-018  SKHEAT
Kyleena Lathram - 7th grade - Vail Ski and Snowboard Academy - Minturn - Mr. Scott Hopkins

1-06-019  Tail Light
Gavin Livick - 6th grade - Dolores Elementary School - Dolores - Mr. Glenn Smith

1-06-020  Use It or Lose It: Using Human Waste in Adobe Construction
Anna Sundheim - 7th grade - St. John the Evangelist Catholic School - Loveland - Mr. Rick Gerkin

1-06-021  Enhancing Gecko Adhesive Technology Using Micro Filter Nano Moulding and Carbon Nano-tubes
Neil Sury - 7th grade - Challenge School - Denver - Mr. Govind Suryanarayan

1-06-022  The Effect of Sand/Gravel Ratio on the Strength of Concrete
Braden Wedel - 8th grade - Stratton Schools - Stratton - Ms. Deidra Shutte

1-06-023  What's the Deal with Two Wheels?
Chandler Wilburn - 7th grade - The Classical Academy - Colorado Springs - Mrs. Candus Muir

1-06-024  Propeller to the Air, Part 2
Justin Wright - 8th grade - Walsh Jr/Sr High School - Walsh - Mr. Tyler Hufford

1-06-025  Robotic Car Claw
Logan Wright - 7th grade - Arickaree School - Anton - Mr. Donald Myers

1-06-026  A Boat Built for Kicks: Using the Flutter Kick for Propulsion
Dylan Sellers - 8th grade - Walt Clark Middle School - Loveland - Mr. Ken Sellers
# 2018 Colorado Science & Engineering Fair
# Junior Division Finalists

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## Environmental Sciences

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Grade</th>
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<tbody>
<tr>
<td>Salty Studies</td>
<td>8th</td>
<td>Vail Mountain School</td>
<td>Brett Falk</td>
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<tr>
<td>Is CO2 Making Earth Greener?</td>
<td>7th</td>
<td>Crown Pointe Academy</td>
<td>Marcia Roe</td>
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<tr>
<td>What Eco Friendly Insulation Is the Best?</td>
<td>7th</td>
<td>Frontier Academy Secondary School</td>
<td>Shelley Welch</td>
</tr>
<tr>
<td>The pHoo Project: Testing Branson Soil</td>
<td>7th</td>
<td>Branson School</td>
<td>Jodi Doherty</td>
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<tr>
<td>Produced Gas Well Water: Can It Be Repurposed for Agricultural Use? Year 2</td>
<td>8th</td>
<td>Primero Jr/Sr High School</td>
<td>Josette Andrews</td>
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<tr>
<td>The Effect of Impermeable Surfaces on Soil Biodiversity</td>
<td>8th</td>
<td>Challenge School</td>
<td>John Wiley</td>
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<tr>
<td>A Bug’s Death: A Study of Diatomaceous Earth and Pesticides</td>
<td>7th</td>
<td>The Classical Academy</td>
<td>Candus Muir</td>
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<tr>
<td>Purifying the Arkansas</td>
<td>8th</td>
<td>Lamar Middle School</td>
<td>Robin Staker</td>
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<tr>
<td>The Effect of Salt on the Translucent Quality of Water</td>
<td>8th</td>
<td>Skinner Middle School</td>
<td>Heather Gregg</td>
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<tr>
<td>To Aerate or Not To Aerate. That Is the Question?</td>
<td>8th</td>
<td>The Classical Academy</td>
<td>John Wiley</td>
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<tr>
<td>I've Got the Power, Part 2</td>
<td>8th</td>
<td>Walsh Jr/Sr High School</td>
<td>Candus Muir</td>
</tr>
<tr>
<td>Well, Well, Well, What Do We Have Here?</td>
<td>7th</td>
<td>Monte Vista Middle School</td>
<td>Loraine Glidewell</td>
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<tr>
<td>Creating Hurricanes on Bubbles</td>
<td>7th</td>
<td>Pueblo Academy of Arts</td>
<td>Mary Jose</td>
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<tr>
<td>H2O on the Rocks</td>
<td>8th</td>
<td>St. Mary Catholic School</td>
<td>Amanda Zimmer</td>
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<td>Lawnmower for Plastic: Removing Plastic from Sand on Beaches</td>
<td>8th</td>
<td>Summit Charter Middle School</td>
<td>Peter Teasdale</td>
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<tr>
<td>Edible Water Bottle</td>
<td>7th</td>
<td>Pueblo Academy of Arts</td>
<td>Deborah Walters</td>
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### Mathematics & Computer Sciences

<table>
<thead>
<tr>
<th>#</th>
<th>Project Title</th>
<th>Grade</th>
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<th>Advisor</th>
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<tbody>
<tr>
<td>1-08-001</td>
<td><em>What Is Wrong with My WiFi Signal??</em></td>
<td>6th</td>
<td>St. Columba Catholic School - Durango</td>
<td>Mrs. Adrienne Aronson</td>
</tr>
<tr>
<td>1-08-002</td>
<td><em>It's a Flipping Machine</em></td>
<td>8th</td>
<td>Vail Ski and Snowboard Academy - Minturn</td>
<td>Mr. Scott Hopkins</td>
</tr>
<tr>
<td>1-08-003</td>
<td><em>NASA HUNCH: ISS Location App</em></td>
<td>8th</td>
<td>Challenge School - Denver</td>
<td>Mr. John Wiley</td>
</tr>
<tr>
<td>1-08-004</td>
<td><em>How CPU Specifications Affect Performance</em></td>
<td>8th</td>
<td>Summit Charter Middle School - Boulder</td>
<td>Mr. Peter Teasdale</td>
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<tr>
<td>1-08-005</td>
<td><em>Combating Pick Pockets of the Future</em></td>
<td>7th</td>
<td>Walt Clark Middle School - Loveland</td>
<td>Mrs. Debbie Hill</td>
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<tr>
<td>1-08-006</td>
<td><em>Drop Notice</em></td>
<td>8th</td>
<td>The Classical Academy - Colorado Springs</td>
<td>Mrs. Dawn Ehresman</td>
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<tr>
<td>1-08-007</td>
<td><em>Fruity Controller</em></td>
<td>6th</td>
<td>Silverton Schools - Silvertown</td>
<td>Mr. Paul Joyce</td>
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<td>1-08-008</td>
<td><em>Raspberry Pi Cluster</em></td>
<td>7th</td>
<td>Merino Jr/Sr High School - Merino</td>
<td>Mr. Robert Newton</td>
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<td>1-08-009</td>
<td><em>Cracking Computers</em></td>
<td>8th</td>
<td>Challenge School - Denver</td>
<td>Mrs. Susan Smith</td>
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<td>1-08-010</td>
<td><em>Using Artificial Intelligence and Raspberry Pi to Monitor and Conserve Household Water Usage</em></td>
<td>8th</td>
<td>Challenge School - Denver</td>
<td>Ms. Yashodha Sriram</td>
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<td>1-08-011</td>
<td><em>A Novel Approach To Authorship Attribution Using Word Vectors and Stylistic Features</em></td>
<td>8th</td>
<td>Summit Charter School</td>
<td>Mr. Peter Teasdale</td>
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<tr>
<td>1-08-012</td>
<td><em>Postal Pods</em></td>
<td>8th</td>
<td>The Classical Academy - Colorado Springs</td>
<td>Mr. Daniel Wilson</td>
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### Medicine & Health

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<th>Project Title</th>
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<tr>
<td>1-09-001</td>
<td><em>Now You See Me . . . Now You Don't</em></td>
<td>7th</td>
<td>Dove Creek Middle School - Dove Creek</td>
<td>Mrs. Brandy Barnett</td>
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<tr>
<td>1-09-002</td>
<td><em>Coffee Buzz, Part 2</em></td>
<td>8th</td>
<td>Walsh Jr/Sr High School - Walsh</td>
<td>Mr. Tyler Hufford</td>
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<tr>
<td>1-09-003</td>
<td><em>Sleep Tight, But Not with Blue Light</em></td>
<td>7th</td>
<td>The Classical Academy - Colorado Springs</td>
<td>Mrs. Candus Muir</td>
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<tr>
<td>1-09-004</td>
<td><em>Can We Prevent Concussions in Sports and Chronic Traumatic Encephalopathy in Later Life?</em></td>
<td>8th</td>
<td>Walt Clark Middle School - Loveland</td>
<td>Mr. Michael Clingan</td>
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<td>1-09-005</td>
<td><em>Warmth without the Womb</em></td>
<td>6th</td>
<td>Monument Chart Academy - Monument</td>
<td>Mrs. Kris Goodman</td>
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<td>1-09-006</td>
<td><em>Cool Mints or Mint Cools?</em></td>
<td>7th</td>
<td>Sacred Heart Academy - Burlington</td>
<td>Sister Mary Catherine</td>
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<td>1-09-007</td>
<td><em>Homeopathics: Do They Have Antibiotic Properties?</em></td>
<td>7th</td>
<td>St. Columba Catholic School - Durango</td>
<td>Mrs. Tobia Green</td>
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<td>1-09-008</td>
<td><em>Mind the Gape: The Effect of Tension on the Gaping of Sutures</em></td>
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<td>Mr. John Wiley</td>
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<td>1-09-009</td>
<td><em>The Effects of Social Media and Smartphone Use on Physiological and Psychological Health</em></td>
<td>8th</td>
<td>St. Columba Catholic School - Durango</td>
<td>Mrs. Etoile Hening</td>
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<td>1-09-010</td>
<td><em>Ultrasound Therapy and Its Ability to Diminish Pain</em></td>
<td>6th</td>
<td>La Veta Schools - La Veta</td>
<td>Mrs. Pat Keeling</td>
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<td>1-09-011</td>
<td><em>Sleep Architecture in a Teenager</em></td>
<td>7th</td>
<td>STEM School Highlands Ranch - Highlands Ranch</td>
<td>Dr. Vipin Malik</td>
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<td>1-09-012</td>
<td><em>Autoimmune Disease</em></td>
<td>6th</td>
<td>Heaton Middle School - Pueblo</td>
<td>Mrs. Carmen Romero</td>
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<td>1-09-013</td>
<td><em>Back Off Bacteria</em></td>
<td>8th</td>
<td>The Classical Academy - Colorado Springs</td>
<td>Mrs. Candus Muir</td>
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<td>1-09-014</td>
<td><em>Inherited Fingerprint Patterns</em></td>
<td>7th</td>
<td>Pioneer Christian School - Rocky Ford</td>
<td>Mr. Briania Havens</td>
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</table>
2018 Colorado Science & Engineering Fair
Junior Division Finalists
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**Medicine & Health cont.**

1-09-015 *Peroxidase Reaction Rate*
- **Cora Schrock** - 7th grade - Arickaree School - Anton - Mr. Donald Myers

1-09-016 *Finding Treatment for Developed Antibiotic Resistance E. coli Using Amoxicillin and Coliphasge T4*
- **Elizabeth Tayane** - 8th grade - Most Precious Blood Catholic School - Denver - Mrs. Lucy Charlton

1-09-017 *How Flatworms Are Affected by Magnetic Fields*
- **Nathanial Vercammen** - 6th grade - Flagstaff Charter Academy - Longmont - Mrs. Sarah Vercammen

1-09-018 *Battling Bacteria: Testing the Effectiveness of Natural Remedies on Streptococcus*
- **Natalia Wright** - 8th grade - The Classical Academy - Colorado Springs - Mrs. Candus Muir

1-09-019 *How Fresh Is That Egg?*
- **Parker Steckel** - 7th grade - Eaton Middle School - Eaton - Mrs. Becky Steckel

1-09-020 *Worm Food*
- **Vianney Escobedo Herrera** - 8th grade - Pinnacle Charter School - Federal Heights - Dr. Maria McClure

1-09-301 *Medical Cushioning Using Slime*
- **Maya Monks** - 8th grade - Stanley British Primary School - Denver - Mr. Michael Rose

1-09-302 *Are Soft Drinks Really Hard?*
- **Eli Weisensee** - 8th grade - Limon Schools - Limon - Ms. Brandie Bellefeuille
- **Ky Bandy** - 8th grade - Limon Schools - Limon - Ms. Brandie Bellefeuille

**Microbiology & Molecular Biology**

1-10-001 *Bacteria Growth on Different Type of Floor Material*
- **Mariah Addai-Opoku** - 6th grade - North Middle School - Aurora - Mrs. Loretta Erickson

1-10-002 *Persistent & Resistant*
- **Ellinor Davenport** - 7th grade - Miller Middle School - Durango - Mrs. Barbara Wynne

1-10-003 *Bacterial Growth Rates vs. Magnetic Field Strength*
- **Aydin Gocemen** - 8th grade - Peak to Peak Charter School - Lafayette - Mr. Brandon Nelson

1-10-004 *Antibiotic Resistance: The World's Most Dangerous Threat To Effective Healthcare*
- **Gracey Hening** - 6th grade - St. Columba Catholic School - Durango - Mrs. Etoile Hening

1-10-005 *Synergistic Antibiotics with Phage K and Prophylactic Nanosilver: Manipulating Resistance*
- **Esha Sury** - 8th grade - Challenge School - Denver - Dr. Alexander Horswill

1-10-006 *Mold Massacre*
- **Faith Roberts** - 7th grade - The Classical Academy - Colorado Springs - Mrs. Candus Muir

1-10-007 *Do the Growing Conditions of Tomatoes Influence pH and Potential Bacterial Colonization?*
- **Kennedy Frank** - 8th grade - Liberty School - Joes - Mrs. Linda Niccoli

1-10-008 *Best Thing Since Sliced Bread!*
- **Lucian Grinnan** - 8th grade - Sacred Heart Academy - Burlington - Sister Mary Catherine

1-10-009 *Algistic Effects of Retail Barley Products on the Cyanobacteria, Anabaena, in Freshwater*
- **W. Hall Matthews** - 8th grade - Homeschool - Bellvue - Mrs. Timalynn Matthews

1-10-301 *What Doorknob Is the Dirtiest?*
- **Kristen Frasco** - 8th grade - Fort Morgan Middle School - Fort Morgan - Dr. Rena Frasco

1-10-302 *Blooming Algae*
- **Aryan Gandhi** - 7th grade - Aspen Ridge Prep School - Erie - Mrs. Liz Walls
- **Peyton Streu** - 7th grade - Aspen Ridge Prep School - Erie - Mrs. Liz Walls
2018 Colorado Science & Engineering Fair
Junior Division Finalists

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**Physics**

**1-11-001**  
*Tin Foil Strength*  
**Novalee Ah Yo** - 6th grade - Heaton Middle School - Pueblo - Mrs. Carmen Romero

**1-11-002**  
*Redesigning Ventilation to Minimize Airborne Pathogen Transmission in Multiple-Bed Hospital Wards*  
**Matthew Anderson** - 8th grade - Challenge School - Denver - Mrs. Ali Anderson

**1-11-003**  
*Veggie Tales*  
**Kooper Grinstead** - 8th grade - Rocky Ford Jr/Sr High School - Rocky Ford - Mrs. Melany Lucero

**1-11-004**  
*Quantum Entanglement of Photons via Spontaneous Parametric Down Conversion in a KD*P Crystal*  
**Zachary Isley** - 8th grade - Turner Middle School - Berthoud - Mr. Kenneth Isley

**1-11-005**  
*Rocketology: Lift Off*  
**LilyRae Martinez** - 6th grade - Heaton Middle School - Pueblo - Mr. Jacob McIntyre

**1-11-006**  
*Up Up and Away*  
**Kjersti Moritz** - 7th grade - Vail Mountain School - Vail - Mr. Brett Falk

**1-11-007**  
*The Science Behind Tsunami: Study the Effect of Water Depth on Wave Velocity*  
**Hoa (Jenny) Nguyen** - 6th grade - Heaton Middle School - Pueblo - Mrs. Carmen Romero

**1-11-008**  
*Shotgun Spread*  
**Cael Nordyke** - 6th grade - Holly Schools – Holly - Mrs. Jennifer King

**1-11-009**  
*Turn on the Octane*  
**Zack Rankin** - 6th grade - Alta Vista Charter School - Lamar - Mr. Bill Becker

**1-11-010**  
*Antibubbles and Surface Tension*  
**Caleb Siegling** - 7th grade - Fort Morgan Middle School - Fort Morgan - Mrs. Juanita Siegling

**1-11-011**  
*Your Rubbish - My Joules*  
**Zakery Snider** - 8th grade - The Classical Academy - Colorado Springs - Mrs. Candus Muir

**1-11-012**  
*Ready, Aim, Fire!*  
**Joshua Snyder** - 7th grade - The Classical Academy - Colorado Springs - Mrs. Candus Muir

**1-11-013**  
*Refraction Action*  
**Kiersten Super-Hill** - 8th grade - Notre Dame Parish School - Denver - Ms. Rebecca Mock

**1-11-014**  
*Magnetic Linear Acceleration*  
**Nathan Woo** - 7th grade - Turner Middle School - Berthoud - Ms. Sarah Woo

**1-11-015**  
*Electromagnetic Pulses (EMPs): Solar Flares, Radioactive Winds, and the End To Our Digital World!*  
**Nathaniel Ellis** - 6th grade - Escalante Middle School - Durango - Mr. Michael Ellis

**1-11-016**  
*Field of Dreams*  
**Connor Provencher** - 8th grade - Vail Mountain School - Vail - Mr. Brett Falk

**1-11-017**  
*Testing Electrical Conductivity*  
**Reginald Huff** - 6th grade - Heaton Middle School - Pueblo - Mr. Jacob McIntyre

**1-11-018**  
*Under Pressure*  
**James Tindle** - 6th grade - Boulder Country Day School - Boulder - Mr. Gregory Montoya

**1-11-019**  
*Why No WiFi*  
**Parker Stone** - 7th grade - Brush Middle School - Brush - Mr. Erik Stone

**1-11-020**  
**Zoe Wagner** - 6th grade - Boulder Country Day School - Boulder - Mr. Gregory Montoya

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2018 Colorado Science & Engineering Fair
Junior Division Finalists

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**Plant Sciences**

1-12-001  *Its Lit*
Victoria Arellano - 6th grade - Heaton Middle School - Pueblo - Mr. Jacob McIntyre

1-12-002  *Nature's Magnificent Medicine: Aloe Vera*
Blake Bowshot - 7th grade - The Classical Academy - Colorado Springs - Mrs. Candus Muir

1-12-003  *How Acidic Mine Drainage Affects Plant Growth*
Ainsley Crist - 8th grade - Peak to Peak Charter School - Lafayette - Mr. Brandon Nelson

1-12-004  *Roots of Steel: Nutrient absorption in soil versus hydroponic plants*
Christopher Custer - 8th grade - Challenge School - Denver - Mr. Joseph King

1-12-005  *Water Solution Effect on Hydroponically Grown Basil*
Alexander Dhupar - 7th grade - Frontier Academy Secondary School - Greeley - Mrs. Shelley Welch

1-12-006  *WiFi Radiation Affecting Plants Growth*
Noelle Edelmann - 8th grade - Vail Ski and Snowboard Academy – Minturn - Mr. Scott Hopkins

1-12-007  *All of a Spudden . . .*
Kamryn Holland - 8th grade - Sargent Jr/Sr High School - Monte Vista - Mrs. Terri Paulson

1-12-008  *To Pot or Not*
Chance Jurkiewicz - 8th grade - The Classical Academy - Colorado Springs - Mrs. Candus Muir

1-12-009  *Cornstalk Feed Value: Triple Stacked vs. Single Stacked*
Joslyn King - 8th grade - Arickaree School - Anton - Mr. Donald Myers

1-12-010  *To Grow or Not To Grow*
Payton Patrick - 7th grade - Pueblo Academy of Arts - Pueblo - Mrs. Deborah Walters

1-12-011  *Beneficial Blues & Roborant Reds - Anthocyanins in Action*
Lena Rohn - 8th grade - Homeschool - Classical Conversations Durango - Durango - Mrs. Nichole Rohn

1-12-012  *How Do Different Nutrients in Water Affect the Growth Rate of a Pea Plant?*
Chloe Rojas - 7th grade - Walt Clark Middle School - Loveland - Ms. Jennifer Rojas

1-12-013  *The Oleophilic Ability of Botanicals in Cleaning Oil from Water*
Sophie Scholl - 8th grade - Skinner Middle School - Denver - Mr. Christopher Martin

1-12-014  *There Goes the Algae*
Austin Thacker - 6th grade - Alta Vista Charter School - Lamar - Mrs. Robin Thacker

1-12-015  *The Night Time To Water?*
Clare Wiersma - 7th grade - The Classical Academy - Colorado Springs - Mrs. Candus Muir

1-12-301  *Alfalfa: Nitrogen Fixing Bacteria vs. Nitrogen Fertilizer*
#  Trista Marx - 8th grade - Limon Schools – Limon - Ms. Brandie Bellefeuille
Kylie Freeman - 8th grade - Limon Schools - Limon - Ms. Brandie Bellefeuille
<table>
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<tr>
<td>Alamosa High School</td>
<td>Matt Relyea</td>
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<td>Marguerite Yowell</td>
<td>Brandie Bellefeuille</td>
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<td>Miller Middle School</td>
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<td>Wendy Fischer</td>
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<td>Silverton Schools</td>
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<td>Loree’ Harvey</td>
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<td>Maria McClure</td>
<td>Notre Dame Parish School</td>
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<td>Rebecca Mock</td>
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<td>Trinidad High School</td>
<td>Kimberly Price</td>
<td>Orchard Mesa Middle School</td>
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<td>Vail Mountain School</td>
<td>Gina Fest-Gitano</td>
<td>Sandra Bavor</td>
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<td>Vail Ski and Snowboard Academy</td>
<td>Brett Falk</td>
<td>Pagosa Springs Middle School</td>
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<td>Tiffany Candelaria</td>
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<td>Peak to Peak Charter School</td>
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<td>Robert Hettmansperger</td>
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<td>Brandon Nelson</td>
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<td>Amy Melby</td>
<td>Pioneer Christian School</td>
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<td></td>
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<td>Mary Jose</td>
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<td>Deborah Walters</td>
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# 2018 Colorado Science & Engineering Fair

## Advisory Council

The CSEF Advisory Council includes all Regional Fair Directors, the CSSF, Inc. Board of Directors and many volunteers.

### Colorado State Science Fair, Inc.

#### Executive Committee

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
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<tbody>
<tr>
<td>President</td>
<td>Mrs. Dolly Morrow</td>
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<tr>
<td>Vice President</td>
<td>Mrs. Lucy Adams</td>
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<tr>
<td>Treasurer</td>
<td>Mr. Dan Kowal</td>
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<tr>
<td>Secretary</td>
<td>Mr. Ed Scholz</td>
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<tr>
<td>Past President</td>
<td>Mr. Brian Scriber</td>
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<tr>
<td>Executive Director</td>
<td>Ms. Courtney Butler</td>
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### Board of Directors Members

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<th>Company/Institution</th>
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<tbody>
<tr>
<td>Michael Bemski</td>
<td>National Renewable Energy Laboratory</td>
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<td>Mike Bemski</td>
<td>San Luis Valley Regional Science Fair</td>
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<tr>
<td>Gwyneth Glissmann</td>
<td>Dr. Russell Chadwick</td>
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<td>CableLabs</td>
<td>Optimal Schedule</td>
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<tr>
<td>Josh Redmore</td>
<td>Dr. Larry &amp; Carol Sveum</td>
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<td>Colorado Dental Association</td>
<td>US Department of Commerce/NOAA</td>
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<td>Dolly Morrow</td>
<td>Vaughn Web Works</td>
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<tr>
<td>Dr. Robert Morrow</td>
<td>Dr. Larry Sveum</td>
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<td>Colorado Engineering Council</td>
<td>Lucy Adams</td>
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<td>Sam Bartlett</td>
<td>Associate/Alternate Members</td>
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<tr>
<td>Colorado State University</td>
<td>Elemer Bernath – Historian</td>
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<tr>
<td>Dr. Andrew Warnock</td>
<td>Dr. Alfred Bedard – NOAA</td>
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<td>Dr. Jan Nerger</td>
<td>Doug Everett – SRC Chair</td>
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<td>Galvanic Engineering</td>
<td>Judy Prester – Dr. Larry Sveum</td>
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<td>Ryan Patterson</td>
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<td>Katlin Hornig</td>
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<td>IEEE Denver Section</td>
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<td>Santosh Veda</td>
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<tr>
<td>Jackie Adams</td>
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<td>Lockheed Martin</td>
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<td>Ed Scholz</td>
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### Past CSEF Directors

<table>
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<th>Year</th>
<th>Name</th>
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<tr>
<td>Courtney Butler</td>
<td>2000-present</td>
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*Director Emeritus for outstanding contribution to the CSEF and more than two years of service as CSEF Director.

### Participating Regional Science Fairs

<table>
<thead>
<tr>
<th>Region</th>
<th>Fair Name</th>
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<td>Arkansas Valley</td>
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<td>Warren McClure, Dol Nath Khanal, Wayne Beadles</td>
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<td>Boulder Valley</td>
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<td>Marlys Lietz, Jennifer Garfield</td>
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<td>Denver Metro</td>
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<td>Lin Browning, Molly Nepokrooff</td>
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<td>East Central Colorado</td>
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<td>William Mallory, Marguerite Yowell</td>
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<td>Lori Ball</td>
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<td>Darline Miner</td>
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<td>Sonya Shaw</td>
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<td>Pikes Peak</td>
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<td>Nancy Hampson, Carol Bach</td>
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<td>Sheila Weahkee</td>
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<td>San Luis Valley</td>
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<td>Lucy Adams, Taylor Rocha</td>
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<td>Valerie Reifschneider</td>
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<td>Morgan Lee Kempf, Lori Leyh</td>
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### At Large Advisory Council Members

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<tr>
<td>Loree’ Harvey</td>
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<td>Steve Iona</td>
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<td>Candus Muir</td>
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<td>Daniel Sandmeier</td>
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<td>Jim Sites</td>
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<td>Laura Ussery</td>
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<tr>
<td>Tracy Webb</td>
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2018 Colorado Science & Engineering Fair
Grand Awards Judges

S M Shafiul Alam, PhD
National Renewable Energy Laboratory

Scott Allen, BS
University of Colorado, Boulder

Tori Anderson, MS
Colorado State University (student)

Sara Andrews, MS, MBA
Mayo Clinic

Lauralee Arnold, BA
Denver Public Schools

Mark Azeltine, MS
University of Colorado, Denver

Don Barnes, BS
Good Samaritan Loveland Village

John Bartolotta, MS
University of Colorado, Boulder (student)

Kate Bates
Colorado State University (student)

Mike Battaglia, PhD
US Forest Service

Melanie Beale, BS
Colorado State University (student)

Jeanna Beard
Colorado State University (student)

*Christian Brown, BS
CO Gov. Office of Information Technology

Micah Brown
Colorado State University (student)

*Rebecca Buchholz, PhD
UCAR

Jennie Bukowski, MS
Colorado State University (student)

Suzanne Buntrock, MS, PE
US Bureau of Land Management; US Forest Service (retired)

**Leon Durivage, MS
Broadcom Limited

Nancy DuTear, PhD
Adrea Solutions, LLC

**Brian Ebel, BS, PE
US Bureau of Reclamation

*Megan Emmons, MS
Colorado State University (student)

**Christian Brown, BS
CO Gov. Office of Information Technology

Micah Brown
Colorado State University (student)

*Rebecca Buchholz, PhD
UCAR

Jennie Bukowski, MS
Colorado State University (student)

Suzanne Buntrock, MS, PE
US Bureau of Land Management; US Forest Service (retired)

Anthony Burg, AS
Burg Associates

Shannon Campbell, PhD
A Votre Sante Communications

Shaun Case, MPH, APHA, USAHA
Colorado State University

Kevin Cash, PhD
Colorado School of Mines

Casey Casias, MS, EIT
Gebau, Inc.

Michael Cheeseman, BS
Colorado State University (student)

Ming Chen, PhD
National Center for Atmospheric Research

**Charlotte Cialek, BS
Colorado State University (student)

Neely Clapp, PhD

^Scot Colburn, MS
UCAR

Shelley Coldiron, PhD
W.O.L.F. Sanctuary

Myles Crane, MS
MwC Colorado Consulting

Kathryn Cronise, MS
Colorado State University (student)

*Mark Crowder, PhD
Ball Aerospace & Technologies Corp.

Jenna Crowell, BS
Colorado State University

Benjamin Curtis, DVM
Colorado State University (student)

Kathryn Dalzell
Colorado State University (student)

Hugh Davidson, MS
University of Colorado, Boulder (student)

**Joshua De La Cruz, MS
University of Colorado, Boulder (student)

Christopher Dean, BS
Colorado State University (student)

Daniel Dean, BS
Colorado State University (student)

Jane Dianich, MAT

Matthew Dilsaver, BS
Colorado State University (student)

Amanda Doherty, BS, GIS Certificate
Colorado State University (student)

Jasmine Donkoh, BS
Colorado State University (student)

Chandler Drachslin
Colorado State University (student)

Nicholas Dummer, BS, EIT
CO Dept. of Public Health & Environment

**Leon Durivage, MS
Broadcom Limited

Nancy DuTear, PhD
Adrea Solutions, LLC

**Brian Ebel, BS, PE
US Bureau of Reclamation

*Susan Eccles, BS, MBA
Cigna

Kathleen Eddy, BS
Colorado State University (student)

Steve Eddy, BS

**Bridget Eklund, BS
Colorado State University (student)

Bob Elsheimer, MS
Broadcom Limited

*Caitlin Erickson, BA
Colorado State University (student)

Emily Everett, BA
CO Dept. of Public Health & Environment

Jessie Filer, MS
Colorado State University (student)

**Mike Fleischmann, BS
NetApp, Inc.

Darcy Fletcher, BS
Colorado State University (student)

*Karl Ford, PhD
US Bureau of Land Management (retired)

Sandra Forston, MS
Treatment & Evaluation Services

Jason Fraser, MS
Lockheed Martin

**John Gaebler, MS
University of Colorado, Boulder (student)

*Suzanne Gallagher, PhD
Colorado State University

Benjamin Gaubert, PhD
National Center for Atmospheric Research

*Brian Geiss, PhD
Colorado State University

Claudia Gentry-Weeks, PhD, CBSP
Colorado State University

Suzanne Gallagher, PhD
Colorado State University

**Suzanne Gallagher, PhD
Colorado State University

*John Gaebler, MS
University of Colorado, Boulder (student)

*John Gaebler, MS
University of Colorado, Boulder (student)

Suzanne Gallagher, PhD
Colorado State University

Benjamin Gaubert, PhD
National Center for Atmospheric Research

*Brian Geiss, PhD
Colorado State University

Claudia Gentry-Weeks, PhD, CBSP
Colorado State University
2018 Colorado Science & Engineering Fair
Grand Awards Judges

Johannes Gessler, PhD, PE
Colorado State University (retired)

**Stefan Gessler, BS
**

**Nicholas Geyer, MS
Colorado State University

Simone Gibauf
Colorado State University (student)

Paul Goldan, PhD
US Department of Commerce/NOAA (retired)

Marc Gonzalez, MS
Sunlight Photonics

**Carolina Gonzalez-Berrios, MS
Colorado State University (student)

**Raina Gough, PhD

James Graham, DVM
Banfield Pet Hospital

**Rebecca Greben, BS
CO Dept. of Labor & Employment (retired)

^Melinda Gross, BA
Comcast

*Jim Gunderson, PhD
Gunderfish, LLC

Laura Hantzis, MS
Colorado State University

Gaurav Harshe, BS
Colorado State University (student)

*Luke Hartje, MS
Colorado State University (student)

Kelly Hassell, MS
Colorado State University (student)

^Jessica Haugen Frenkel, BS
Colorado State University (student)

Garrett Heck, BS
Colorado State University (student)

Arsineh Hecobian, PhD
Colorado State University

Aytron Hendrix
Colorado State University (student)

Dennis Henry, M.Ed.
CO Gov. Office of Information Technology

Lisa Herickhoff, PhD, MBA
Membrane Protective Technologies, Inc.

Stephen Hibbs, MS

Steve Hiebert, BS, CFS

Matthew Hoch
Colorado State University (student)

Gregory Holman, MS
US Department of Agriculture

**Tim Holt, MS, Dip.Ed.
University of Southern Queensland

Debra Horensky, MD
Colorado State University

Emily Hudson-Arus, MS
Colorado State University

Zacharia Hussain
Colorado State University (student)

Mohammad Nurul Islam, PhD
Colorado State University

Kristen Jackson, BS
Colorado State University (student)

Kaysie Jennings, MS
Colorado State University (student)

Ashley Jones, BS
CO Dept. of Public Health & Environment

Richard Juday, PhD
NASA Johnson Space Center (retired)

Gary Julian, BS, PE

Krithika Kalyanasundaram, PhD
Seagate Technology

Chryistine Kelley, BS
CO Dept. of Public Health & Environment

Courtland Kelly, BA
Colorado State University (student)

Kristyn Kelly, MS
TOLMAR, Inc.

Beth Kelsic, MS, PE
Ball Aerospace & Technologies Corp.

**Patrick Keys, PhD
Colorado State University

Alex Kislukhin, PhD

Rachel Konda-Sundheim, MD
Loveland Youth Clinic

Ian Koss, MS

Louise Koss, MS

David Krenek, MS, PE

*William Kucharski, BS
Oracle Corporation

Andrew Kumler, MS
National Renewable Energy Laboratory

Isabelle Kunz, BS
Colorado State University (student)

Peter Laird, BS
Salesforce

Jennifer Lee, BS
Colorado State University (student)

Jeff Leget, MA, MBA
CableLabs

Coral Levi
Banfield Pet Hospital

Yang Li, MS
University of Colorado, Boulder (student)

James Ling, PhD

Youjian Liu, PhD
University of Colorado, Boulder

Byron Lopez, BS
Colorado State University (student)

Jeffrey Ma, MS
Colorado State University (student)

**Payal Maharaj, PhD
Centers for Disease Control & Prevention

Kenneth Mahrer, PhD

**Mike Mangala, MS
Colorado State University (student)

Andrew Mann, BS
Colorado State University (student)

Kristen Marra, PhD
US Geological Survey

Jonathan Martin, PhD

*Will Masters, ME
Comcast

Pablo Maurin, BS
Cardinal Peak

Grant McKercher, MS
CO Dept. of Public Health & Environment

*Nichole McMahon, MS
Colorado State University (student)

Dylan Menamara
Colorado State University (student)

Jim McNamee, PhD

*Trevor McQuain, MA, LPC
University of Colorado Health

Aimee Merkel, PhD
Colorado State University

Clark Mikkelsen, PhD

Othmane Mikou, BS, MBA
CO Gov. Office of Information Technology

^David Miller, BS
University of Colorado, Boulder (student)

Peter Modreski, PhD
US Geological Survey

Lily Moloney, BS
Colorado State University (student)

*Bill Moninger, PhD
US Department of Commerce/NOAA; CRES

Dominique Montano, BS
Colorado State University (student)

Julie Moreno, PhD
Colorado State University

Woody Moss, DO
Northern Colorado Anesthesia Professionals

**Annika Muchlbradt, BS
University of Colorado, Boulder (student)
2018 Colorado Science & Engineering Fair
Grand Awards Judges

Kurt Muenchow, BS
US Forest Service
James Neely, MS, PE
NPC, Inc.
Bella Neufeld, BS
Colorado State University (student)
Thang Nghiem, BS
CO Dept. of Public Health & Environment
Barry Noakes, BS
Lockheed Martin
Marc Oddo, MS
Agrium
Christine Olver, DVM, PhD
Colorado State University
Iuliana Oprea, PhD
Colorado State University
Don Ostwald, DVM, Dipl. ABVP
Ethos Veterinary Health
John Patterson, MS, MLS (ASCP)
Leprino Foods Company
Stephen Pearce, PhD
Colorado State University
Erika Peirce, BS
Colorado State University (student)
Randi Perlis, MS
CO Dept. of Public Health & Environment
Josh Pettit, MS
University of Colorado, Boulder (student)
Claudia Phelps Spencer, BS
CO Dept. of Public Health & Environment
Courtney Pierce, BS
Colorado State University (student)
David Pinter, BS
Patrick Pravorne, BS
Ground Engineering
Kristen Pudenz, PhD
Lockheed Martin
Kristen Purcell, BS
Colorado State University (student)
Mark Raleigh, PhD, PE
University of Colorado, Boulder; CRES
Kristen Rasmussen, PhD
Colorado State University
F. Andrew Ray, PhD
Colorado State University
Star Ray, AS, CVT
Colorado State University (student)
Josh Redmore, BS
CableLabs
Kailee Reed, BS
Colorado State University (student)
Richard Rew, BS, EIT/FE
Stephen Riley, BS
James Rivers, Jr., MS, PMD
Lockheed Martin (retired)
Tom Roberts, MS
US Bureau of Land Management (retired)
Matthew Rogers, PhD
Colorado State University
Barbara Rose, BS, MT (ASCP)
Colorado State University
Corey Rosenberg, PhD
Colorado State University
Rhea Kay Rowe, BS
Colorado State University (student)
Claudia Rueckert, PhD
Colorado State University
Daniel Sandmeier, BS
Valhalla Engineering Group, LLC
Yugandhar Sarkale, MS
Colorado State University (student)
Shashank Satyanarayana, BS
Colorado State University (student)
William Schoepnner, BA
CO Gov. Office of Information Technology
Michel Schuh, BS, PE
US Bureau of Reclamation (retired)
Rebecca Schwantes, PhD
National Center for Atmospheric Research
Vanessa Selwyn, MA
Colorado State University (student)
Parag Shah, PhD
University of Colorado, Boulder
Joel Sharbrough, PhD
Colorado State University
Rodney Simpson, PhD
Colorado State University
Shailendra Singh, MD
University of Colorado, Denver
Rachel Sobke, BS
Stolle Machinery
Scott Sorensen
Colorado State University (student)
Ramazan Spencer, BS, EIT
CO Dept. of Public Health & Environment
Sarah Stephany, BS
Medtronic
Catherine Stewart, PhD
US Department of Agriculture
Tom Stuve, MS
Envisagent Systems, Inc.
Eric Suchman, PhD
Colorado State University
Douglas Thamm, DVM
Colorado State University
Olivia Todd, BS
Colorado State University (student)
Chandrakanth Venigalla, BS
University of Colorado, Boulder (student)
Maxine Verbit, AAS
Crothall Health Services at Cheyenne Regional Medical Center
Leena Vilonen, BS
Colorado State University (student)
Xuezhen Wang, PhD
Broadcom Limited
David Warren, BS
Ryan Webb, PhD, EIT
University of Colorado, Boulder
Sarah Webb, MS
Tracy Webb, DVM, PhD
Colorado State University
Cole Weinland
Colorado State University (student)
Bill Williams, MS
Sere Williams, BS
Colorado State University (student)
Eric Wolf, MS
NetApp, Inc.
Carrie Womack, PhD
US Department of Commerce/NOAA; CIRES
Susan Yonemura, PhD
Terumo BCT
RedLion York, BS
Broadcom Limited
Muhammad Usman Zaheer, DVM
Colorado State University (student)
Karl Zeller, PhD, CCM
KsubZ, LLC & Rickards & Company, LLC

*CSEF Alumni
*Judging Team Captains
**Judging Team Assistant Captains
Organizations
Air & Waste Management Association
American Association of University Women
American Chemical Society
American Industrial Hygiene Association
American Institute of Aeronautics & Astronautics
American Institute of Chemical Engineers
American Institute of Professional Geologists
American Meteorological Society
American Statistical Association
American Vacuum Society
ASM International
Biomedical Engineering Society, CSU Chapter
Biophysical Society
Colorado Association of Meat Processors
Colorado Association of Science Teachers
Colorado Biology Teachers' Association
Colorado BioScience Institute
Colorado Chemistry Teachers' Association
Colorado Dental Association
Colorado Division of Reclamation, Mining & Safety
Colorado Environmental Health Association
Colorado Foundation for Agriculture
Colorado Geographic Alliance
Colorado Medical Society
Colorado Mineral Society
Colorado Mycological Society
Colorado Native Plant Society
Colorado Scientific Society
Colorado State University
College of Agricultural Sciences
Department of Biochemistry & Molecular Biology
Department of Chemistry
Department of Horticulture & Landscape Architecture
Energy Institute
Colorado Veterinary Medical Association
Colorado's Touchstone Energy Cooperatives
Colorado-Wyoming Society of American Foresters
Comstock Family
Consumer Energy Education Foundation
Dairy Tech, Inc.
Fort Collins Conservation District
Frank Armbruster Foundation
Geological Society of America
Gromko Family
Human Factors and Ergonomics Society
Institute of Electrical & Electronics Engineers
Koppa Research, LLC
Little Shop of Physics
Lockheed Martin
National Centers for Environmental Information
National Defense Industrial Association
National Renewable Energy Laboratory
Platte River Power Authority
Rocky Mountain Association of Geologists
Rocky Mountain Water Environment Association
SACNAS, CSU Chapter
Science Toy Magic, LLC
Society for Mining, Metallurgy and Exploration
Society of Manufacturing Engineers
Society of Women Engineers
Soil & Water Conservation Society
SPIE, the international society for optics and photonics
The Inventors' Roundtable
Trout Unlimited
United States Air Force
United States Department of Commerce
United States Geological Survey
United States Navy & Marine Corps
University of Colorado, Denver
Van Gorp Family
Vaughan Web Works
Wilkins Family
Wojtaszek Family
Women in Physics, CSU Chapter
Zonta Club of Boulder County

Scholarships
Adams State University
Colorado College
Colorado School of Mines
Colorado State University, Fort Collins
Colorado State University, Pueblo
University of Colorado, Boulder
Ryan Patterson Scholarship

Teacher Awards
Lockheed Martin
SparkFun Electronics
The following list of people deserves our most sincere thanks for volunteering their time to do a variety of jobs during the CSEF. When you see a person wearing a green “Volunteer” name badge, please take a moment to thank them for their efforts. The Colorado Science and Engineering Fair would not be possible without their dedication. An * indicates these are CSEF Alumni who are volunteering this year.

<table>
<thead>
<tr>
<th>Volunteers</th>
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<tbody>
<tr>
<td>Lucy Adams</td>
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<tr>
<td>Jaclyn Adkins</td>
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<tr>
<td>Andrew Allsup</td>
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<td>Josette Andrews</td>
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<td>Lori Ball</td>
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<td>Candice Batholomew Brown</td>
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<td>Sam Bartlett</td>
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<td>Mike Bemski</td>
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<td>Nancy Bennett</td>
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<td>Elemer Bernath</td>
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<td>Lynn Bloomfield</td>
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<td>Nikkie Brandborg</td>
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<td>John Butler</td>
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<td>Lorry Everett</td>
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<td>Gwyneth Glissmann*</td>
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<td>Tobia Green</td>
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<td>Lindsey Hamilton</td>
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<td>Nancy Hampson</td>
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<td>Emmylou Harmon</td>
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<td>Samantha Harsh</td>
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Thank You!!
This year’s CSEF Award Ceremony will be held at Timberline Church in Fort Collins, CO starting at 6 p.m. The address to use with GPS units is 2908 South Timberline Road Fort Collins, CO 80525. Please note that large vehicles should use the East side parking lot for dropping off passengers and parking. Attendees can use either side of the building to enter and the ceremony will be held in the South Auditorium.

**Directions from Colorado State University Campus:**
Head South on either College Avenue or Shields Street. Turn East (left) onto Drake Road. Take Drake to Timberline Road. Turn South (right) onto Timberline Road. Turn East (left) onto Custer Drive (first light). Take the first right (Illinois Drive) into the church parking lot.

**Directions from I-25:**
Take Harmony Road (exit 265) – turn West into town. Turn North (right) onto Timberline Road. Timberline Church will be past Horsetooth Road, but before Drake Road on the right hand side of the road. There are two entrances into the church parking lot prior to reaching Custer Drive.