

Statistics for 2021 Virtual TCRSF

2021 was the first virtual TCRSF. Although fair participation was much smaller than in normal years due to students having very little access to schools and labs, **the quality of the projects was so excellent that we were able to send over half our projects to state!** For the first time, TCRSF covered 9 Minnesota counties instead of the usual 4 counties.

At TCRSF, 249 students registered for projects & 130 for papers = 379 student registrations

TCRSF projects, 152 students presented 136 HS projects
97 students presented 94 middle school projects,
249 total students presented 230 total projects

TCRSF papers: 14 middle school students competed with 14 middle school papers and
116 high school students competed with 106 high school papers (10 2-person team papers)
130 total students competed with 120 total research papers

The Minnesota State Science and Engineering Fair and the tri-state North Central Regional Junior Science and Humanities Symposium were held virtually in 2021. National JSHS 2021 is also virtual.

Competing at state from TCRSF: (projects, not students; team project counts as one)

Middle school: 80/165 projects = 48.5% of middle school projects at state were from TCRSF

High School: 93/141 projects = 66.0% of high school projects at state were from TCRSF

(but TCRSF students won 55% of all state awards)

Total of 173 /306 total projects at state = 56.5% of all state projects were from TCRSF

Competing at Tri-State JSHS for high school papers: 43/106 HS papers = 41% of all HS papers to advance
TCRSF research papers won over 69% of all tri-state JSHS awards

Our TCRSF students competed extremely well at the Minnesota State Science and Engineering Fair. TCRSF students earned many awards at state. All 7 HS students (on 6 projects) sent to ISEF from state were from TCRSF. 12 HS students on 9 projects advanced to ISEF from TCRSF and another 7 HS students on 6 HS projects advanced to ISEF from state! That means 19 students from our 9-county metro area are finalists competing at the 2021 virtual International Science and Engineering Fair (ISEF).

20 students middle school students advanced from TCRSF (top 10% of each affiliation) and **3 more TCRSF students** advanced from the state science fair to compete in the **National Broadcom MASTERS** (grades 6-8) competition, with national winners announced in the fall. The national semifinalists will be announced Fall 2021.

At the Tri-state (MN, ND, & SD) North Central Regional Jr. Science & Humanities Symposium (JSHS, research paper competition), TCRSF students earned several awards, including **2nd.and 5th. place.**

Dominic Greco & Benjamin Kroul (Breck School), *Mighty MOFs: Using Novel Catalysts to Produce Components of Recyclable Plastics*

Won \$1500 scholarship (2nd place) at North Central Regional JSHS & participate in National JSHS

Atreyus Bhavsar (Blake School), *The Spread of Macroscopic Droplets from a Simulated Cough with and without the Use of Masks or Barriers*

Won 5th at North Central Regional JSHS to participate in National JSHS

4 additional TCRSF students won Honorable Mention awards at Tri-state JSHS and the 9 TCRSF students won the Minnesota Academy of Science Outstanding Achievement Awards including a certificate & \$50. 9 TCRSF students were recognized with the Minnesota Academy of Sciences Presidential Award – one research paper in each category was chosen for this award.

At ISEF (International Science and Engineering Fair – the best in the world!), TCRSF named 9 projects (12 students) to compete and 6 more of our projects (7 more students) were named to ISEF from state for a total of 19 TCRSF students as finalists at ISEF. ISEF was held as a virtual competition in 2021

ISEF Finalists 2021:

All finalists have won Wolfram Alpha Mathematica software for finalists (world's most powerful and all-encompassing computational software), finalist medal, and certificate – and the right to compete in the world's largest and most prestigious pre-collegiate scientific competition.

Johnny Yue & Sydney Peng (team), Mounds View HS, *Upsurge of the Glycolytic Pathway in Cancer: A Dynamic Network Analysis of Oncogenic Mutations in Phosphofructokinase-1*

Tarun Kota, Eastview Senior HS (Apple Valley), *Detection and Characterization of Astronomical Dwarfs using CatWISE*

Ellen Guo, Mounds View HS, Distinctive mutation profiles of SARS-CoV-2 spike protein in different geographic regions of the United States

Naci Konar-Steenberg, St. Paul Academy & Summit School, *Significant zero: the effect of personality questionnaires on identity-relevant choices*

Nikolas Liepins & Levi Mellin (team), St. Paul Academy & Summit School, *SPYGLASS: Eye-controlled camera glasses*

Austin Hunter, Minnetonka HS, *Analyzing the impact of drafting in cross country skiing with computational fluid dynamics*

Quentin Xander Hughes, Minnetonka HS, *An Active Role for Machine Learning in the Diagnosis of Cardiac Arrhythmias, Year 2*

Atreyus Bhavsar, Blake School – Northrop Campus (Minneapolis), *The Spread of Macroscopic Droplets from a Simulated Cough with and without the Use of Masks or Barriers*

Air Force Research Laboratory on behalf of the United States Air Force First Award of \$750, an engraved glass trophy and a medal

Simren Samba & Fiona Kinney (team), Breck School, *Fruit Fly Frenzy: Investigating the Development of Insecticide Resistance in *Drosophila melanogaster**

And Finalists additionally chosen at state (TCRSF students):

Shreshth Shrivastava, Eden Prairie HS, *WI-CARE: Wifi Computer-Assisted Remote Eldercare (Year 2)*

Kyla Fung, Minnetonka HS, *Pathway to a Sustainable Future: Economic and technical feasibility of hydrothermal carbonization (HTC) processing plants*

Award to attend NC State Engineering Summer Camp - week-long pre-selected summer camp, completing hands-on engineering challenges, exploring solutions, and sharing achievements along with other aspiring engineers.

Jack Hlavka, St. Paul Academy & Summit School, *Treatment of Acid Mine Drainage with *Desulfovibrio desulfuricans**

3rd Grand Award of \$1,000 ISEF

John Cardwell, Breck School, *Testing the Waters: Engineering an Innovative Method of Water Health Analysis Year II*

George Richards & William Sweeney (team), Breck School, *A.L.M.E. Assistive Lifting Machine for Elders: Engineering a solution to fall-recovery-related injuries in seniors and caregivers*

Peyton Crest, Minnetonka HS, *Investigating the effect of the severity of activity based anorexia in *Drosophila melanogaster* on the gut microbiome*