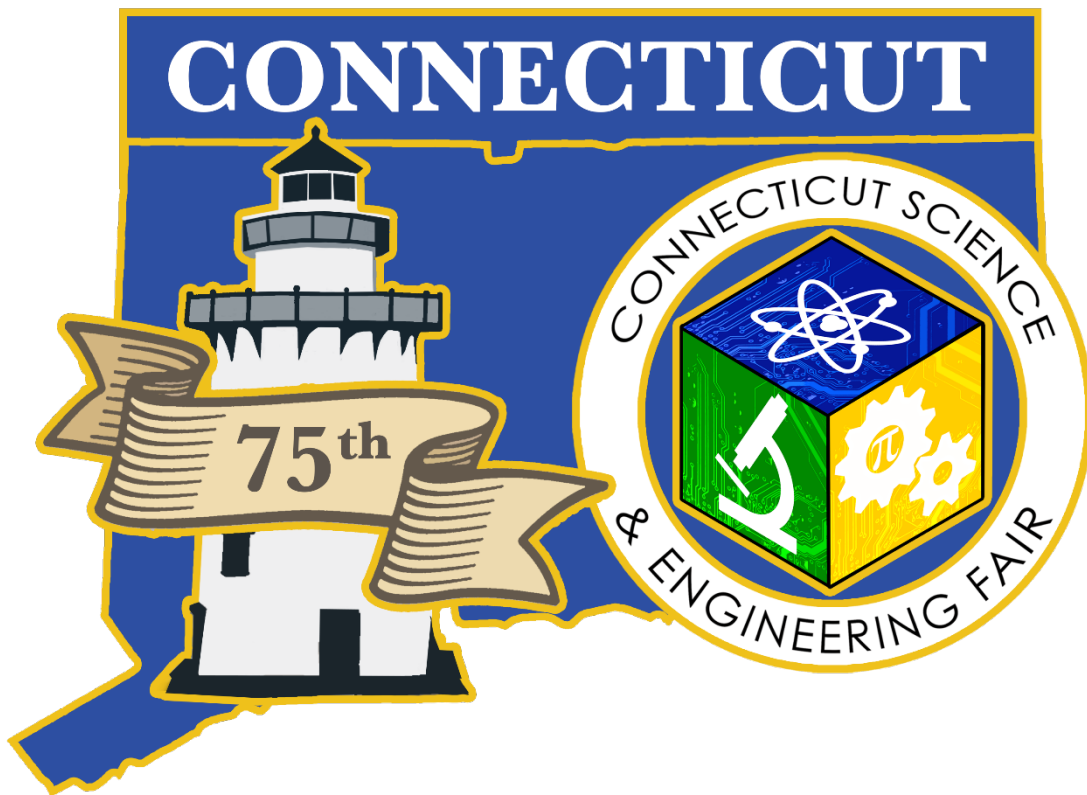# 75th Anniversary
Connecticut Science and Engineering Fair
2023 Fair Report

The CSEF was held as a virtual fair on March 6-March 18, 2023

Table of Contents

2023 CSEF Fair Summary

The 2023 fair was the 75th anniversary fair and was held virtually for the preliminary judging allowing every student to present their project to our judges. Although the finalist judging was planned to be in person at Quinnipiac University, it was also held virtually due to poor weather conditions. This situation presented some technical challenges and quick turnaround times but was held successfully with very few issues. The awards ceremony was held successfully in person at Quinnipiac University on March 18th. 436 students participated in the fair with 345 projects presented. The students represented 66 different towns or cities. There were over 263 volunteer judges from both industry and academia who participated. Awards were given to over 215 students worth over $20,000 from contributing sponsors. A number of students proceeded on to further national and international science competitions including seven who went on to the prestigious Regeneron International Science and Engineering Fair (ISEF) held in Los Angeles, CA. These representatives received 1 grand award at the event and 8 special awards. In addition to the fair, a 75th anniversary celebration was held to honor present and past fair participants and many of the dedicated volunteers, board members, officers, and other contributors to the CSEF's success over the years.

Links to Student Awards

Student Awards by Town:

https://ctsciencefair.org/media/2023RegFairWinners_SchTownV2.pdf

Student Awards by Fair Category:

https://ctsciencefair.org/media/2023RegFairWinners_CategoryV2.pdf

Student Special Awards by Granting Organization:

https://ctsciencefair.org/media/2023SponAwardsV2.pdf

Top Winners Advancing to International Competitions

Regeneron ISEF

CSEF Life Sciences

1.) Knockdown of the essential 23S rRNA methyltransferase, rv3579c, increases the susceptibility of Mycobacterium tuberculosis to macrolides

Yuriy Sandmeier   **King School**   **Stamford**

2.) Cell type-specific expression of the molecular players in mouse prefrontal cortex during cocaine addiction

Eric Teng   **Kent School**   **Kent**

CSEF Physical Sciences

1.) ParkBD: A Novel Multi-Modal Deep Learning Framework for Biomarker Identification and Drug Repurposing in Parkinson's Disease

Shriya Jonnalagadda   **Brookfield High School**   **Brookfield**

Diya Girish Kumar

2.) Development of Eco-Navigation System for Reducing Greenhouse Gas Emissions of Ships using Wind-Assisted Flettner Rotors

Thomas Ewald   **Brunswick School**   **Greenwich**

CSEF Alexion Biotechnology

A Self-Stabilizing Haptic Accessibility Mouse for Parkinson's Disease Sufferers

Jingyuan Zhang   **Choate Rosemary Hall**   **Wallingford**

CSEF Urban School Challenge

Non-Invasive Pre-screening Approach for Early Detection of The Human Papillomavirus (HPV) to Aid in Cervical Cancer Prevention in Underrepresented Demographics

Ana-Lois Davis   **Academy for Aerospace and Engineering**   **Windsor**

CSEF Engineering

Concurrent Removal of Rising Soluble Ocean Carbon Dioxide and Oil-in-Water Contaminants via Multi-Functional Remediation Framework

Naomi Park   **Greenwich High School**   **Greenwich**

Genius Olympiad

GENIUS Olympiad Competition for 1st Place HS Environmental Project

Multi Temporal Analysis of Beaver Activity in Connecticut Forests Using Aerial Imagery

Hiruni Witharana   **E. O. Smith High School**   **Storrs**

GENIUS Olympiad Competition for1st Place HS Future Sustainability

Development of an Efficient and Easily-Applicable Low-Energy Process for the Degradation of PFAS

Zara Haque   **Greenwich High School**   **Greenwich**

GENIUS Olympiad Competition for HS Environmental, Energy, Ecology, or Biodiversity Project

Synthesis and Investigation of Metal Organic Frameworks for the Purpose of Atmospheric Water Harvesting

Caitlin Tice   **Greenwich High School**   **Greenwich**

GENIUS Olympiad Competition for HS Environmental, Energy, Ecology, or Biodiversity Project

Potential Impact of Heavy Rain Events on Coastal Bacterial Populations: Modeling Human Impact in Close Proximity to Wastewater Treatment Facilities

Cora FitzGerald   **Sound School**   **New Haven**

Britney Xochipitecatl Cuahtepitzi

GENIUS Olympiad Competition for 1st Place Technical High School

Urban Hub Revitalization Project

Ashley Ramos   **Platt Technical High School**   **Milford**

Bruno Valdivia

Katelyn Zayas

Regeneron ISEF Representatives

Knockdown of the essential 23S rRNA methyltransferase, rv3579c, increases the susceptibility of Mycobacterium tuberculosis to macrolides

Yuriy Sandmeier   **King School**   **Stamford**

Awards: 3rd Place Grand Award in Microbiology ($1,000)

Abstract:

According to CDC, in 2018, roughly 1.7 billion people were infected with Mycobacterium tuberculosis (Mtb). The long treatment times of Mtb infections (6-12 months) hampers the recovery of patients and makes treatment unsustainable. To treat tuberculosis (TB) infections, there has been interest in using macrolides, a family of drugs that includes clarithromycin and azithromycin (Z-pack), due to the fact that they are exceedingly safe and well-tolerated by most individuals. However, Mtb possesses intrinsic resistance to macrolides, generally rendering macrolide drugs ineffective at treating TB infections. Thus, we aimed to determine whether there were additional factors responsible for this phenotype. A CRISPR interference (CRISPRi) screen performed in our lab identified rv3579c, a predicted 23S rRNA methyltransferase, to be a novel macrolide-resistance factor in Mtb. Using homology-based methods, we ascertained that rv3579c was closely related to the rlmB family of methyltransferases found in E. coli. We then demonstrated the essentiality of rv3579c in M. smegmatis (a non-lethal model of Mtb) and later showed that, with genetic knockdown of rv3579c, Mtb becomes more susceptible to clarithromycin, thereby highlighting a mechanism that could potentially facilitate successful treatment and elimination of TB in affected individuals. With these pivotal findings, we have laid the groundwork for further research to determine whether or not rv3579c can be targeted by chemical compounds to both inhibit Mtb growth and render the bacteria sensitive to macrolides. In the future, we aspire to use our findings to prevent the deaths and hospitalizations of countless millions of people.

Cell type-specific expression of the molecular players in mouse prefrontal cortex during cocaine addiction

Eric Teng   **Kent School**   **Kent**

Abstract:

Cocaine addiction is an issue that affects more than 5 million people in America per year. Although there has been much research into the genes and chemicals responsible for cocaine addiction, there are many specific questions left unanswered. Our experiment attempts to further previous research into certain molecular players. We follow up with their use of single-cell RNA sequencing on the prefrontal cortex cells of mice undergoing cocaine intravenous self-administration. Data from 12 samples from both saline and cocaine treated mice which are found on the Gene Expression Omnibus public database were retrieved. Using the Seurat function of RStudio, the data was merged into objects, normalized, clustered, and labeled into one of eight cell types. What resulted was a detailed UMAP plot displaying the clusters, their gene expression level, expression frequency, and their cell type. With this plot, we were able to determine the specific cell types that express the genes encoding the preestablished mo lecular players (ΔFosB, MeCP2, and BDNF). When the analysis was expanded to a cell-type specific level, it was discovered some of these genes were selectively expressed in excitatory neurons and non-neuronal cells. Going further into the analysis, we determined the 6 genes with the most varied gene expression over the 3 stages of cocaine addiction for each of the 8 cell types. Overall, our computational analysis of publicly available transcriptome datasets from the mouse addiction model provides new insights into the molecular basis of cocaine addiction.

ParkBD: A Novel Multi-Modal Deep Learning Framework for Biomarker Identification and Drug Repurposing in Parkinson's Disease

Shriya Jonnalagadda **Brookfield High School** **Brookfield**

Diya Girish Kumar

Abstract:

Parkinson's Disease (PD) is the second most prevalent progressive neurodegenerative disorder. The development of new therapeutic approaches requires a better understanding of the underlying mechanisms of PD and the identification of new biomarkers that can aid in disease monitoring and the development of targeted therapies. Blood-based biomarkers hold promise for PD prognosis, but their identification and use in disease prediction remain challenging due to its complexity and heterogeneity. To address this challenge, we present ParkBD, a comprehensive deep learning framework that integrates clinical and blood-based biomarker data to provide a reliable and accurate prediction of PD severity over time. The framework includes a biomarker discovery module that identifies ten correlated blood-based biomarkers with PD using differential protein analysis and linear regression with ten-fold cross-validation. It also has a severity prediction module that utilizes a modified XGBoost classification algorithm with clinical and biomarker data to predict MDS-UPDRS values over time. We evaluated the performance of ParkBD on a dataset of PD patients and healthy controls and compared it to existing methods. Our results show that ParkBD outperforms similar methods for PD severity prediction, with an accuracy of 90%. We also identified a set of novel blood-based biomarkers that are highly correlated with PD and utilized existing machine learning models to rank effective drug compounds. ParkBD is a promising tool for the development of therapeutic approaches for PD and the implementation of disease management strategies that can help maintain function, delay disease progression, and improve the quality of life. Student Name(s): S. Jonnalagadda, D. Girish Kumar Abstract: 254 Word Count 1. As a part of this research project, the student directly handled, manipulated, or interacted with (check all that apply): human subjects potentially hazardous biological agents vertebrate animals controlled substances 2. Student independently performed all procedures as outlined in this abstract. 3. This project was conducted at a Registered Research Institution. 4. Is this project a continuation? 5. My display board includes photographs/visual depictions of humans (other than myself or my family): x x x x Yes No Yes No Yes No Yes No Technical Disciplines Selected by the Student (Listed in order of relevance to the project) CBIO

Development of Eco-Navigation System for Reducing Greenhouse Gas Emissions of Ships using Wind-Assisted Flettner Rotors

Thomas Ewald   **Brunswick School**   **Greenwich**

Abstract:

Wind-assisted shipping has the potential to become a cleaner and more energy efficient alternative to traditional shipping by reducing greenhouse gas emissions while generating fuel savings to ship operators. Ship engines lose up to 70% of fossil fuel energy as heat and other losses, leaving only 30% for propulsion. By contrast, Flettner rotors and sails deliver 100% of harnessed wind-power to the hull of the ship, equivalent to effective power generated by an engine. Optimizing a route to maximize propulsion from wind-power presents two challenges: (1) it requires modeling complex aerodynamic and hydrodynamic forces and (2) the major shipping companies prioritize time to destination rather than efficiency and reduction of emissions because of economics. To solve this problem, I created Eco-Navigator, novel software that uses NOAA weather forecasts to predict wind-optimized routes for cargo ships with Flettner rotors and provide ship owners with a practical tool for calculating the economic value of fuel and emissions reduction. Eco-Navigator uses Dijkstra's algorithm to select the path that minimizes total work (physics definition) based on the voyage and ship specifications. The code determines total work by calculating the forces acting on the ship and rotors and optimizing the spin of the Flettner rotors using gradient descent. Eco-Navigator's simulations predicted an average of 30.8% fuel and CO_2 emissions savings per trip. The potential impact of Eco-Navigator is the reduction of emissions leading to improvements in human health, protection of ocean ecosystems and property, fuel savings, and consideration and uptake of wind-assisted technology.

A Self-Stabilizing Haptic Accessibility Mouse for Parkinson's Disease Sufferers

Jingyuan Zhang   **Choate Rosemary Hall**   **Wallingford**

Awards: Special awards, 2nd place Serving Society Through Science Award and 4th place Association for Computing Machinery Award **($500 each)**

Abstract:

Haptic technology, which delivers a sense of touch, has gained significant popularity in the electronics and entertainment industries for providing immersive virtual experiences. However, its potential as an accessibility accommodation for medical disabilities remains largely untapped. This project proposes a novel application of haptic technology for Parkinson's Disease patients by developing a low-cost accessibility mouse that provides guiding forces for users to navigate electronic devices. The gadget addresses the limitations of current accommodations by providing direct friction and applied forces, overcoming tremors, stiffness, and coordination issues that make it challenging to control electronic devices. The design incorporates optical flow movement testing, Hall effect sensors, and route planning algorithms to improve accuracy and efficiency. A framework was developed to compare the stability of the gadget under spasms, leading to the development of the final product. The final gadget significantly improved cursor navigation accuracy and efficiency by up to 81%, compared to current accommodations. This research demonstrates the potential of haptic technology as an innovative accommodation for individuals with Parkinson's Disease, offering a new avenue for individuals with movement disorders to access electronic devices and improve their quality of life. Overall, this project highlights the promise of haptic technology as a practical, cost-effective, and accessible solution for medical disability accommodations. Further research is warranted to explore the full range of applications of haptic technology in healthcare and other fields.

Non-Invasive Pre-screening Approach for Early Detection of The Human Papillomavirus (HPV) to Aid in Cervical Cancer Prevention in Underrepresented Demographics

Ana-Lois Davis   **Academy for Aerospace and Engineering**   **Windsor**

Abstract:

This study addresses the concern that cervical cancer is the 4th leading cause of death for
women in the U.S. Due to COVID-19, the pap-
smear screening rates to detect the Humanpapillomavirus (HPV) decreased by 80% according to the CDC
. The number of minority
women not having access to HPV screenings is a burgeoning crisis. This study found alternative, non-
invasive and easily accessible pre-screening methods for HPV detection to
decrease the growing mortality rate of women developing cervical cancer. It was hypothesized
that if the swabbing of a menstrual pad containing a human blood sample can be examined for
irregular cells, then HPV can be detected through a woman's menstrual cycle by the means of a non-
invasive pre-screening test.
To confirm validity of the approach, interviews were held with a licensed Pathologist and a
presentation was then given by the student-researcher promoting cervical cancer awareness.
Two public questionnaires showed 66.7% of women responded they don't schedule annual pap-
smear examinations. A simulated-experiment was conducted using vinegar infused pads
to detect HPV+cells in menstrual cycle simulated-blood using 3D-printed cervixes.
An extension to further test this study is to use human menstrual blood samples. A prototype HPV pre-
screening menstrual cotton pad that is capable of being affordable for all women to
have access too for earlier detection of HPV strains and preventing cervical cancer from
manifesting using vinegar-pad test strips will be constructed. More research investigating HPV-
detection technologies for women in foreign countries will also be collected where
healthcare access for women is limited.

Concurrent Removal of Rising Soluble Ocean Carbon Dioxide and Oil-in-Water Contaminants via Multi-Functional Remediation Framework

Naomi Park   **Greenwich High School**   **Greenwich**

Awards: 4th place Grand Award in Environmental Engineering, Special awards: Patrick Hurd Sustainability Award, and the US Environmental Protection Agency Award to attend the EPA's National Design EXPO

Abstract:

The oceans absorb nearly a third of airborne CO2 emissions, while concurrently, 1.3 million gallons of crude oil are spilled into oceans every year. Both issues continue to detrimentally affect marine biodiversity, and the future of human health. This research provides a highly efficient/practical method for the concurrent removal of CO2 and soluble oil-in-water contaminants through the creation of a Multi-Functional Remediation Framework (MF-RF) utilizing hypercross-linked polymers (HCPs), synthesized from Styrofoam. First, styrofoam HCPs were synthesized through a one-pot Friedel–Crafts reaction according to Dong et al. HCPs alone remediated 88% of the 1.7g/L-soluble-benzene in seawater (via measure of benzene's fluorescence). Regarding CO2 95% of the contaminant was removed, or 3.12E-5M [CO2]=[H+] (via pH measure). For the MF-RF, HCP-sponges were constructed on 8x1.3x0.7cm of melamine, with PTFE adhesion, and 450mg HCP for pollutant removal/capture. Air-tight modeling of the sponge benzene/CO2 remediation were subsequently constructed. HCP-sponges remediated 92% of the 1.7g/L-benzene contaminant, and 95% of CO2 (3.12E-5M[CO2]=[H+]). Realistic concurrent oceanic experiments with a 0.1pH difference and maximum solubility of benzene highlight 92% remediation of oil, with only 12.6min needed to reach suitable oceanic pH. High-load concurrent removal experiments with 100x more CO2 demonstrate 71% remediation of oil and 85% remediation of CO2. Via recycle/reuse studies, the MF-RF may be reapplied in contaminated water until its capacity is reached (5.99g oil/HCP-sponge and 3700ppmCO2/HCP-sponge). Stability studies demonstrate prolonged MF-RF integrity, as a marine-safe, easy-to-use oil and CO2- remediation tool, which is simply lowered into contaminated water, left until saturated, and then lifted out for contaminant recovery/recycling.

Accompanying Team for Regeneron ISEF

Dr. Frank LaBanca

CSEF Fair Director

Principal, ACES at Chase

Ms Ann Frattelone

CSEF Board Member

Mr. and Mrs. Bramante

Greenwich High School

University Scholarship Winners

Quinnipiac University Scholarships

Mitigating the Threat of Microplastics in Drinking Water: The Potential of Coconut Fiber and Activated Coconut Charcoal as Sustainable Filtration Materials

Rhea Doshi   **8ᵗʰ Grade**   **Farmington**

A Self-Stabilizing Haptic Accessibility Mouse for Parkinson's Disease Sufferers

Jingyuan Zhang   **10ᵗʰ Grade**   **Wallingford**

University of Hartford Scholarships

Classify Liver cancer using Uncertainty-aware CNN

Qiwu Jiang   **The Loomis Chaffee School**   **Windsor**

Award: Excellence in Science or Math ($28,000)

Non-Invasive Pre-screening Approach for Early Detection of The Human Papillomavirus (HPV) to Aid in Cervical Cancer Prevention in Underrepresented Demographics

Ana-Lois Davis   **Academy for Aerospace and Engineering**   **Windsor**

Award: Excellence in Science or Math ($28,000)

Thermacork Shelters

Meranyelis Negron-Figueroa   **A.I. Prince Technical High School**   **Hartford**

Award: Excellence in Engineering or Technology ($28,000)

Producing Electricity with Water

Davis Walker   **The Morgan School**   **Clinton**

Award: Excellence in Engineering or Technology ($28,000)

The University of New Haven Scholarships

Optimizing Reinforcement Learning Using Dynamic Environment Manipulation to More Efficiently Train Autonomous Navigation AI

Aarav Patel   **Amity Regional High School**   **Woodbridge**

Award: 4 year scholarship ($96,000)

University Scholarships Cont.

League of Legends Esports AI: Training a Machine Learning Model in a Dynamic Gameplay Environment from Professional Human Experience

Mashnoov Chowdhury   Bethel High School   Bethel

Award: 4 year scholarship ($96,000)

Developing a Machine-Learning Based Algorithm to Identify and Predict Alzheimer's Disease from Clinical Notes

Haseeb Chaudhry   **Amity Regional High School**   **Woodbridge**

Award: 4 year scholarship ($96,000)

Predicting Solar Storms and Coronal Mass Ejections (CMEs) using novel Attention based Deep Learning algorithms.

Pragyan Yadav   **South Windsor High School**   **South Windsor**

Award: 4 year scholarship ($96,000)

Winning Projects of Regular Categories

Award	CSEF Life Sciences					CSEF Physical Sciences				
	LT	L7	L8	LS	LST	PT	P7	P8	PS	PST
1	1023	2020	2518	3007	3502	4025	5022	5502	6047	6510
2	1018	2016	2520	3104	3521	4028	5029	5540	6090	6530
3	1006	2019	2524	3107	3505	4005	5027	5523	6091	6511
4		2024	2508	3061			5025	5553	6036	
5		2007	2511	3077			5014	5531	6024	
M	1001	2011	2529	3020	3503	4009	5003	5509	6001	6521
M	1002	2014	2531	3021	3507	4012	5005	5510	6013	
M	1003		2532	3030	3518	4007	5006	5517	6048	
M	1021			3052	3522	4008		5526	6058	
M				3053		4022		5539	6064	
M				3070					6073	
M				3106					6089	
M									6092	
M									6097	
M										
M										

Winning Projects of Special Categories

Awd	Computer Science		Mathematics		Applied Tech		Engineering		Future Sustain.	
	Middle	High	Middle	High	Middle	High	Middle	High	Middle	High
1	5553	6052	5553	6052	5523	6005	5025	3007	5025	6074
2	5519	3028	5503	6529	5540	6012	5011	3030	2528	6047
3	5531	6068		3022	5514	6002	5526	6530	2515	3024
M	5006	6004		6068	4005	6021	1022	3052	1006	3021
M	5514	6005			5006	6024	2007	3053	1023	3032
M	5517	6024			5025	6042	2531	3058	2023	3053
M		6048			5519	6058	4007	6036	2503	6017
M		6083			5531	6064	4025	6048	4004	6036
M						6077	4028	6064	5010	6073
M						6079	5003	6077	5524	6089
M						6089	5517	6079		
M						6092		6090		
M								6506		
M								6510		
M								6511		
M										
M										
M										
M										
M										
M										
M										

Winning Projects of Special Categories Cont.

Awd	Energy Middle	Energy High	Petit Foundation Middle	Petit Foundation High	Envir Science Middle	Envir Science High				
1	5025	6510	5509	3101	2528	3007				
2	5517	6001	2019	6063	2508	3070				
3	5524	6002	5518	6506	5509	3104				
M	2518	6026	1002	3007	2503	3021				
M	4007	6053	4025	3061	2529	3024				
M	5008	6090	5523	6001	2530	3027				
M	5012	6092	5530	6017	5504	3032				
M	5024	6096		6040	5516	3049				
M	5506	6504		6089		3076				
M		6508				3503				
M						6029				
M						6032				
M										
M										
M										

Awd	Biotechnology 7th	Biotechnology 8th	Biotechnology 9 - 12th	Urban School Middle	Urban School High				
1	1023	5502	3030	5509	6521				
2	2008	2518	3106	2531	3052				
3	5003	4028	3088	5027	6074				
4	5012	5523	3053	2008	6530				
5	2019	2528	3052	5540	3070				
M	2003	2511	3040	2020	3020				
M	2007	2529	3058	2024	3054				
M	2024	2530	3090	2512	6004				
M	5008	4025	3093	2523	6058				
M	5028	5517	3110	4028	6063				
M									
M									
M									
M									
M									

UTC Middle	UTC High	CSTA Middle	CASE High	QU Middle	QU High				
5025	6005	2518	3007		3070				
	6047	5502	6047		6089				
	6048		6521						
	6058								
	6083								
	6090								
	6530								

Student/Project Statistics

Projects

Project Category	JrTm	7th	8th	Sr	SrTm	Total	%
Life Sciences	15	30	35	101	44	225	48%
Physical Sciences	28	38	54	92	27	239	52%
Total	43	68	89	193	71	464	
Percent	9%	15%	19%	42%	15%	100%	

Project Grade	7	8	9	10	11	12	Total
Life Sciences	39	41	14	28	45	58	225
Physical Sciences	51	69	16	23	39	41	239
Total	90	110	30	51	84	99	464
Percent	19%	24%	6%	11%	18%	21%	100%

Project Gender	7	8	9	10	11	12	Total
Male	46	42	11	24	48	45	216
Female	44	68	19	27	36	54	248
Not Given	0	0	0	0	0	0	0
Total	90	110	30	51	84	99	464

Students

Student Category	JrTm	7th	8th	Sr	SrTm	Total	%
Life Sciences	31	30	35	101	98	295	49%
Physical Sciences	63	38	54	92	61	308	51%
Total	94	68	89	193	159	603	
Percent	16%	11%	15%	32%	26%	100%	

Student Grade	7	8	9	10	11	12	Total
Life Sciences	49	47	18	41	65	75	295
Physical Sciences	68	87	20	28	55	50	308
Total	117	134	38	69	120	125	603
Percent	19%	22%	6%	11%	20%	21%	100%

Student Gender	7	8	9	10	11	12	Total
Male	62	52	15	35	68	52	284
Female	55	82	23	34	52	73	319
Not Given	0	0	0	0	0	0	0
Total	117	134	38	69	120	125	603

Student Registration by Gender and Race/Ethnicity

Student Participation by Gender

Other 2 (0.4%)

Not Reported 7 (1.4%)

Transgender 1 (0.19%)

Male 213 (41%)

Female 294 (57%)

American Indian 8 (2%)

Hawaiian 2 (0.4%)

Other 27 (5%)

Multi-Racial 26 (5%)

Not Reported...

Black 28 (5%)

Caucasian 236 (46%)

Asian 151 (29%)

Student Participation by Race/Ethnicity

Student Registration by Gender and Race/Ethnicity Cont.

Registered Student Ethnicity

Prefer Not to Report
49 (9%)

Hispanic/Latino59
(11%)

Other
141 (27%)

Non-Hispanic/Latino
267 (52%)
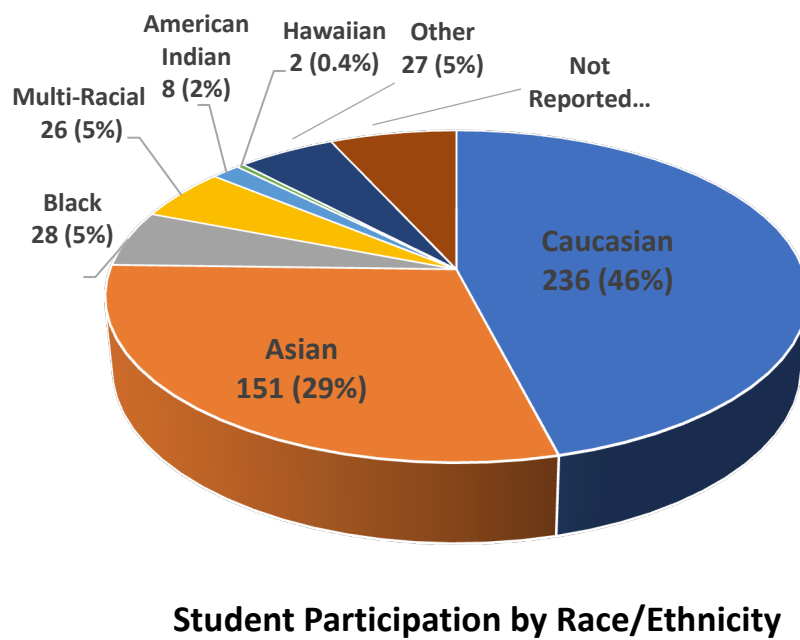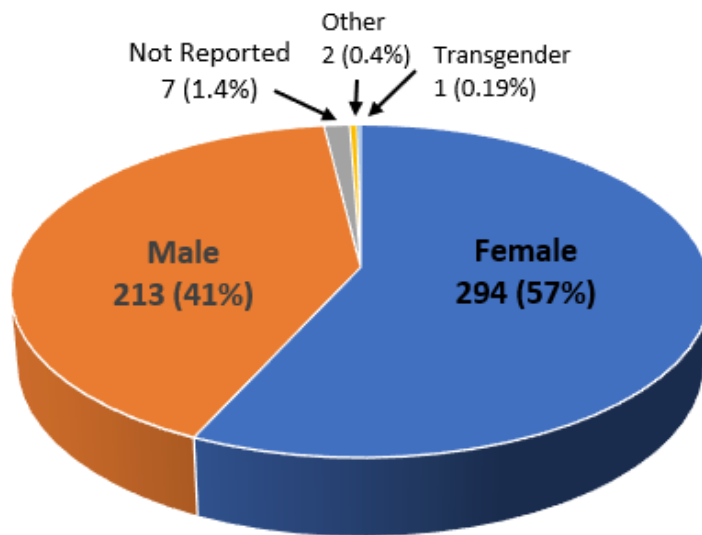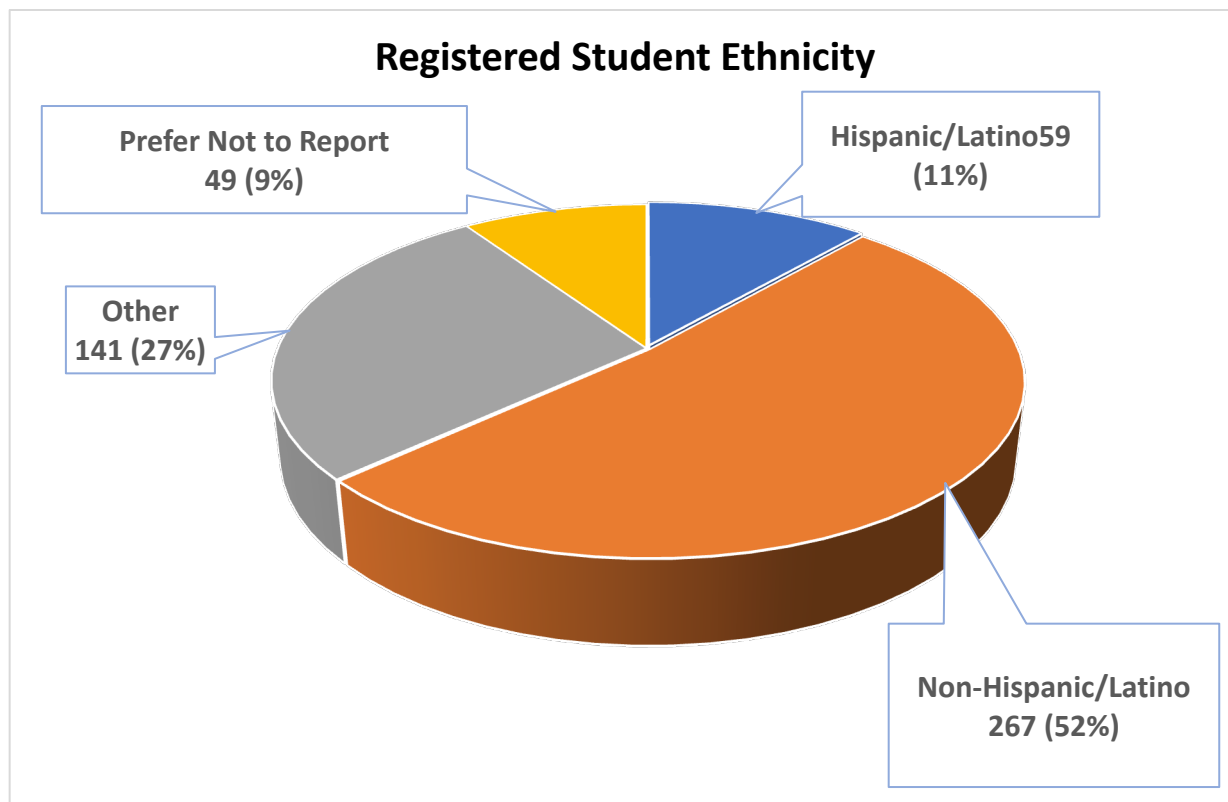
Student/Projects Statistics Cont.

Summary

Category	Students Jr	Students Sr	Students Total	Student Gender Male	Student Gender Fem	Student Gender Total	Schools Jr	Schools Sr
Life Sciences	96	199	295	104	191	295		
Physical Sciences	155	153	308	180	128	308		
Total	251	352	603	284	319	603		
Percent	42%	58%		47%	53%			

Category	Projects Jr	Projects Sr	Projects Total	Individual Projects Jr	Individual Projects Sr	Individual Projects Total	Team Projects Jr	Team Projects Sr	Team Projects Total
Life Sciences	80	145	225	65	101	166	15	44	59
Physical Sciences	120	119	239	92	92	184	28	27	55
Total	200	264	464	157	193	350	43	71	114
Percent	43%	57%		45%	55%		38%	62%	

Awards

Projects --> Category	Regular Awards Jr	Regular Awards Sr	Regular Awards Total	Special Awards Jr	Special Awards Sr	Special Awards Total	All Awards Jr	All Awards Sr	All Awards Total
Life Sciences	40	35	75	19	30	49	45	45	90
Physical Sciences	41	47	88	36	47	83	55	64	119
Total	81	82	163	55	77	132	100	109	209
Percent	50%	50%		42%	58%		48%	52%	

Honors

Category	Hon	Projects Jr	Projects Sr	Projects Total	Projects %	Students Jr	Students Sr	Students Total	Students %
Life Sciences	1	22	17	39		29	21	50	
Physical Sciences		28	18	46		36	23	59	
Sub Total		50	35	85	18%	65	44	109	18%
Life Sciences	2	32	65	97		37	90	127	
Physical Sciences		37	53	90		45	67	112	
Sub Total		69	118	187	40%	82	157	239	40%
Life Sciences	3	26	63	89		30	88	118	
Physical Sciences		55	48	103		74	63	137	
Sub Total		81	111	192	41%	104	151	255	42%
Total				465				603	

Historical Information on CSEF Fair Location and Project Information

Year	Location	# Projects	# Students	# Schools	# Towns
1984	University of Connecticut, Stores	540	634		
1985	Quinnipiac College, Hamden	544	619		
1986	Quinnipiac College, Hamden	478	552	121	
1987	Connecticut College, New London	441	487		
1988	Connecticut College, New London	587	671	124	
1989	Trinity College, Hartford	627	740	138	75
1990	Trinity College, Hartford	642	746	142	85
1991	Quinnipiac College, Hamden	617	743	138	82
1992	Quinnipiac College, Hamden	403	465	130	81
1993	U.S. Coast Guard Academy, New London	393	461	119	78
1994	U.S. Coast Guard Academy, New London	435	511	123	72
1995	University of Connecticut, Stores	421	513	121	70
1996	Connecticut College, New London	430	527	116	77
1997	Connecticut College, New London	410	491	119	75
1998	Quinnipiac College, Hamden	435	527	110	64
1999	Quinnipiac College, Hamden	419	525	102	65
2000	Quinnipiac College, Hamden	416	533	93	61
2001	Quinnipiac University, Hamden	430	543	118	65
2002	Quinnipiac University, Hamden	463	583	124	64
2003	Quinnipiac University, Hamden	482	613	114	68
2004	Quinnipiac University, Hamden	421	536	121	70
2005	Quinnipiac University, Hamden	407	501	103	63
2006	Quinnipiac University, Hamden	415	538	105	66
2007	Quinnipiac University, Hamden	407	498	103	65
2008	Quinnipiac University, Hamden	374	450	101	64
2009	Quinnipiac University, Hamden	409	498	114	68
2010	Quinnipiac University, Hamden	395	476	114	66
2011	Quinnipiac University, Hamden	442	526	122	66
2012	Quinnipiac University, Hamden	446	568	120	61
2013	Quinnipiac University, Hamden	448	557	113	61
2014	Quinnipiac University, Hamden	545	648	121	64
2015	Quinnipiac University, Hamden	514	628	127	66
2016	Quinnipiac University, Hamden	517	648	125	66
2017	Quinnipiac University, Hamden	513	632	116	63
2018	Quinnipiac University, Hamden	464	603	109	58
2019	Quinnipiac University, Hamden	411	578	103	53
2020	Virtual Fair	452	578	115	63
2021	Virtual Fair	NA	NA	NA	NA
2022	Virtual Fair	306	383	90	46
2023	Virtual Fair	345	436	105	66

Graphical Information on Student Projects

Historical School and Project Information
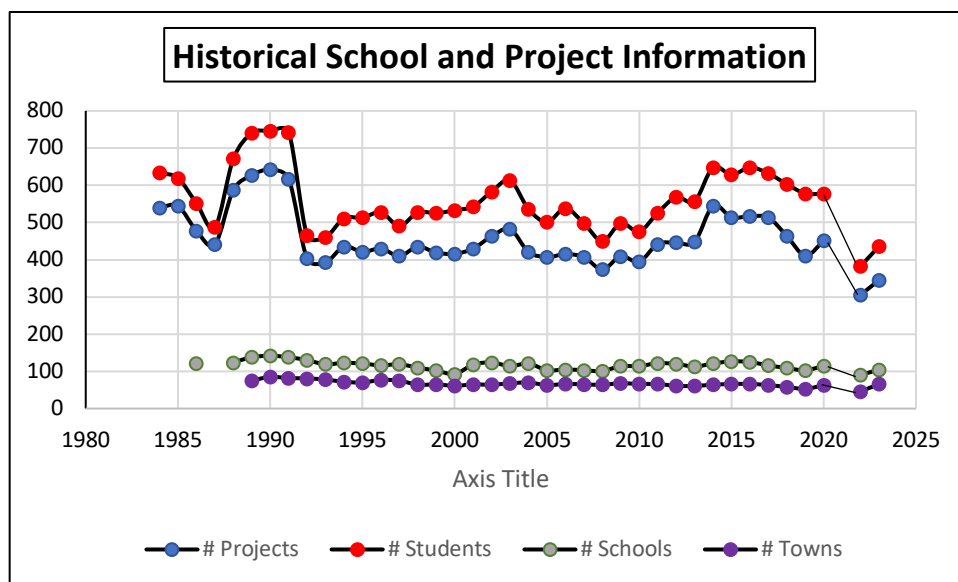
1988- Junior Individuals (LJ, PJ) were separated into L7, L8, and P7, P8 to reduce size of categories for judging process

1991- Senior Teams (LST, PST) were added to the fair categories

1992- Maximum reservations for middle school was changed from 6 to 3 projects per school

1993- Maximum reservations for middle school was changed to 4 projects per school at request of teachers

2014- Maximum reservations for middle school was changed to 6 projects and high schools to 15 projects

2016- Maximum reservations for middle school was changed to 10 projects and high schools to 15 projects

Outcome for Submitted Projects
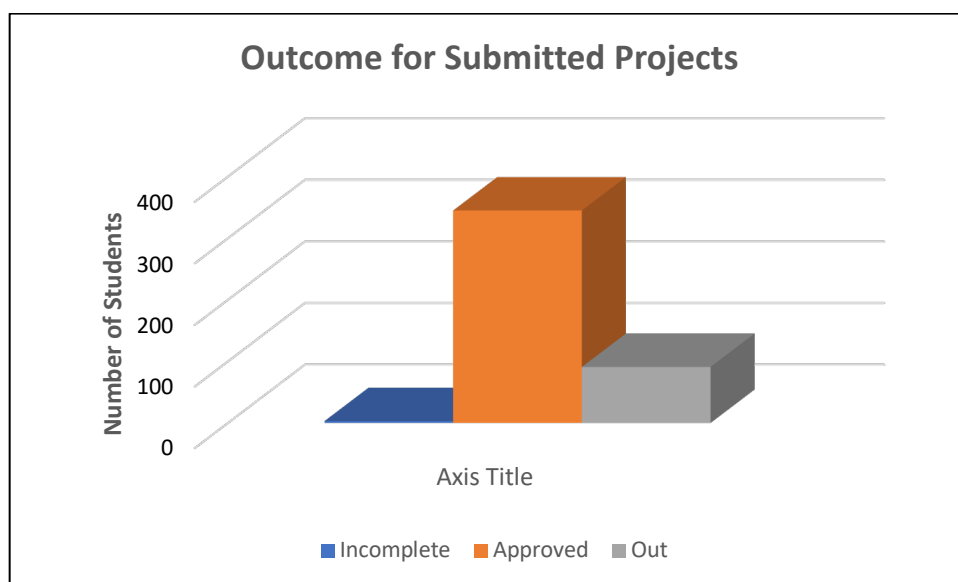
Project Category Totals by Year

Year	LT	L7	LJ	L8	LS	LST	PT	P7	PJ	P8	PS	PST	Total
1984	58	-	137	-	74	--	36	-	162	-	73	--	540
1985	41	-	155	-	68	--	34	-	175	-	71	--	544
1986	36	-	125	-	60	--	38	-	152	-	67	--	478
1987	26	-	136	-	63	--	20	-	157	-	39	--	441
1988	37	70		89	47	--	47	94		144	59	--	587
1989	56	76		93	64	--	57	91		121	69	--	627
1990	63	105		89	83	--	41	78		102	81	--	642
1991	56	80		87	75	6	56	67		110	74	6	617
1992	32	35		60	79	7	23	45		60	62	0	403
1993	37	53		58	47	4	23	45		74	49	3	393
1994	31	40		70	64	14	25	49		88	51	3	435
1995	34	46		57	60	11	37	53		68	50	5	421
1996	40	42		64	53	14	37	44		76	54	6	430
1997	35	51		49	60	11	32	41		80	49	2	410
1998	35	58		61	56	15	30	58		54	58	10	435
1999	40	46		39	63	18	39	49		63	58	4	419
2000	46	46		44	62	11	43	42		59	50	13	416
2001	36	47		56	78	7	54	38		56	45	13	430
2002	43	44		63	74	27	36	47		59	58	12	463
2003	39	54		57	59	32	42	44		78	64	13	482
2004	32	40		44	67	16	42	38		65	58	19	421
2005	21	35		48	54	24	35	51		72	56	11	407
2006	22	25		46	48	29	33	47		76	63	26	415
2007	20	38		28	66	16	38	48		65	76	12	407
2008	19	38		46	59	29	14	47		51	61	10	374
2009	24	40		35	83	18	27	53		44	69	16	409
2010	19	30		36	75	16	23	52		61	65	18	395
2011	22	31		42	85	11	25	60		62	86	18	442
2012	27	34		43	92	20	34	44		54	74	24	446
2013	20	31		38	89	14	44	53		58	86	15	448
2014	17	45		43	144	17	29	55		65	109	21	545
2015	25	41		43	118	25	31	62		64	91	14	514
2016	32	63		53	105	22	38	39		68	71	26	517
2017	17	34		37	132	36	27	38		71	97	24	513
2018	15	30		35	101	44	28	38		54	92	27	464
2022	16	16		13	102	25	14	11		23	77	9	385
2023	15	30		35	101	44	28	38		54	92	27	464

School and Town/City Statistics

Town	School	Reserved			In Fair				Type	Path	UC
Project Type , 1= Middle School, 2=High or Middle School		MS Total	HS Total	Spaces Tot.	Projects	Students	MS	HS			
Ansonia	Emmett O'Brien Technical High School	0	3	3	3	3		3	2		Y
Avon	Farmington Valley Academy Montessori	2	0	2	1	2	1		1		
Avon	Talcott Mountain Academy	6	0	6	8	8	8		1		
Avon	Avon High School	0	1	1	1	1		1	2		
Avon	Avon Old Farms School	0	1	1					2		
Bethel	Bethel Middle School	2	0	2	1	1	1		1		
Bethel	Bethel High School	0	9	9	8	8		8	2		
Bloomfield	Circle of Excellence (Virtual School Conn. Students)	1	0	1	1	1	1		1		
Bozrah	Fields Memorial School	2	0	2	2	2	2		1		
Bridgeport	Park City Prep Charter School	10	0	10					1		Y
Bridgeport	Bridgeport Public Schools	10	15	25	22	35	9	19	2	BP	Y
Bridgeport	Bridgeport Regional Aquaculture Science and Tech Cntr.	0	6	6	6	6		6	2	BP	Y
Bridgeport	Bullard-Havens Technical High School	0	3	3	3	3		3	2	BP	Y
Brookfield	Brookfield High School	0	4	4	2	4		2	2		
Cheshire	Dodd Middle School	2	0	2					1		
Cheshire	St. Bridget School	2	0	2	2	2	2		1		
Cheshire	Cheshire High School	0	6	6	5	5		5	1		
Clinton	The Morgan School	0	1	1	1	1		1	2		
Danbury	St. Gregory the Great School	8	0	8	8	8	8		1		
Danbury	Westside Middle School Academy	10	0	10	9	25	9		1		Y
Danbury	Henry Abbott Technical High School	0	3	3	0	0	0	0	2	GS	Y
Danielson	H.H. Ellis Technical High School	0	3	3	0	0		0	2	GS	
Darien	Darien High School	0	10	10	5	5		5	2		
Enfield	Chiaravalle Academy	10	0	10	9	22	9		1		
Fairfield	Fairfield College Preparatory School	0	3	3	1	1		1	2		
Farmington	Miss Porter's School	0	1	1	1	1		1	2		
Fishers Island	Fishers Island School	0	1	1	1	1		1	2		
Glastonbury	Glastonbury High School	0	15	15	6	6		6	2	GP	
Greenwich	Central Middle School	7	0	7	3	3	3		1		
Greenwich	Greenwich Catholic School	4	0	4	2	2	2		1		
Greenwich	Western Middle School	3	0	3	4	4	4		1		
Greenwich	Brunswick School	0	15	15	14	24		14	2		
Greenwich	Greenwich Country Day School	0	11	11	10	10		10	2		
Greenwich	Greenwich High School	0	15	15	17	17		17	2		
Greenwich	Sacred Heart Greenwich	0	15	15	5	7		5	2		
Groton	Ella T. Grasso Technical High School	0	3	3	0	0		0	2	GS	Y
Guilford	Guilford High School	0	4	4	5	5		5	2		
Hamden	Eli Whitney Technical High School	0	3	3	0	0		0	2		Y
Hamden	Hamden Hall Country Day School	8	12	20	19	21	9	12	2		
Hamden	Sacred Heart Academy	0	8	8	7	7		7	2		
Hartford	Environmental Sciences Magnet School at Mary Hooker	3	0	3	1	1		1	1		Y
Hartford	Renzulli Academy	2	0	2	2	4	1		1		Y
Hartford	A.I. Prince Technical High School	0	3	3	3	5		3	2	GS	Y
Kent	Kent School	0	4	4	2	2		2	2		
Litchfield	Wamogo Reg High School	0	1	1	1	1		1	2		
Lakeville	The Hotchkiss School	0	2	2	2	2		2	2		
Manchester	Saint James School	3	0	3	3	4	3		1		
Manchester	Howell Cheney Technical High School	0	3	3	0	0		0	2		Y
Manchester	Manchester High School	0	4	4	4	4		4	2		Y

Town	School	Reserved			In Fair				Type	Path	UC
Project Type , 1= Middle School, 2=High or Middle School		MS Total	HS Total	Spaces Tot.	Projects	Students	MS	HS			
Meriden	H.C. Wilcox Technical High School	0	3	3	2	6		2	2		Y
Middletown	Vinal Technical High School	0	3	3	0	0		0	2		Y
Middletown	Xavier High School	0	1	1	1	1		1	2		
Milford	Platt Technical High School	0	3	3	2	5		2	2	GS	
New Britain	E.C. Goodwin Technical High School	0	3	3	0	0		0	2	GS	Y
New Haven	Sound School	0	6	6	5	9		5	2		Y
New Haven	Engineering and Science University Magnet School	0		10	9	20		9			
New Milford	Canterbury School	0	1	1	1	`1		1	2		
Newtown	Hughes Homeschool	1	0	1					1		
Norwich	Norwich Free Academy	0	1	1	0	0		0	2		Y
Norwich	Norwich Technical High School	0	7	7	7	16		7	2	GS	Y
Pawcatuck	St. Michael School	6	0	6	6	6	6		1		
Pomfret	Pomfret School	0	6	6	3	3		3	2		
Riverside	Eastern Middle School	10	0	10	0	0	0		1		
Redding	CT STEM Foundation	0	7	7	3	3		3	2	CS	
Redding	Joel Barlow High School	0	4	4	1	2		1	2		
Ridgefield	Ridgefield High School	0	15	15	15	16		15	2		
Rocky Hill	Rocky Hill High School	0	2	2	2	4		2	2		
Sandy Hook	Newtown High School	0	11	11					2		
Shelton	Shelton Intermediate School	3	0	3	4	5	4		1		
Shelton	Shelton High School	0	3	3	0	0		0	2		
Simsbury	Westminster School	0	11	11	3	5		3	2		
South Windsor	South Windsor High School	0	2	2	3	4		3	2		
Southington	Southington High School	0	1	1	1	1		1	2		
Stamford	Bi-Cultural Hebrew Academy	3	0	3	2	2	2		1		
Stamford	J.M. Wright Technical High School	0	3	3	0	0		0	2		Y
Stamford	King School	0	8	8	7	7		7	2		
Stamford	Westhill High School	0	1	1	1	1		1	2		Y
Stratford	Saint Mark School	4	0	4	3	6	3		1		
Storrs	E.O. Smith High School	0	2	2	1	1		1	2		
Suffield	Suffield Academy	0	1	1	1	1		1	2		
Suffield	Suffield High School	2	4	6	2	3		2	2		
Suffield	Suffield Middle School	*	*	*	1	2	1				
Trumbull	Christian Heritage School	3	3	6	4	4		4	2		
Trumbull	Trumbull High School	0	4	4	4	4		4	2		
Torrington	Oliver Wolcott Technical High School	0	3	3	0	0		0	2		Y
Wallingford	Choate Rosemary Hall	0	8	8	10	10		10	2		
Washington	The Frederick Gunn School	0	1	1	1	1		1	2		
Waterbury	ACES at Chase	10	0	10	10	12	10		1		
Waterbury	W.F. Kaynor Technical High School	0	3	3					2		Y
Watertown	Taft School	0	1	1	1	1		1	2		
West Hartford	Renbrook School	*	*	*	1	1	1		1		
West Haven	Engineering and Science University Magnet School	4	6	10	0	0		0	2		Y
Westbrook	Westbrook High School	0	1	1	1	1		1	2		
Westport	Greens Farms Academy	3	6	9	5	6		5	2		
Westport	Staples High School	0	5	5	1	1		1	2		
Weston	Weston Public Schools	1	0	1	0	0		0	1		
Wilton	Middlebrook School	7	0	7	7	7	7		1		
Wilton	Wilton High School	0	1	1	1	1		1	2		
Windham	Windham Technical High School	0	3	3	0	0		0	2		Y
Windsor	Academy of Aerospace and Engineering	0	15	15	8	9		8	2		Y
Windsor	Madina Academy	0	4	4	2	2		2	2		
Windsor	The Loomis Chaffee School	0	6	6	5	5		5	2		
Woodbridge	Amity Regional High School	0	15	15	15	15		15	2		
Woodstock	The Woodstock Academy	0	2	2	0	0		0	2		
	Totals =	152	384	546	372	483	106	273			27

Returning Student Milestone Presentations at CSEF

4 Year Students (2)	School	Town	Grade	Honors
Jason Li	Guilford High School	Guilford	11	3
Gabriella Spata	Sound School	New Haven	12	3
3 Year Students (13)				
Suticha Srinivasan	Cheshire High School	Cheshire	9	2
Ann Song	Choate Rosemary Hll	Wallingford	10	1
Anthony Sharonov	Amity Regional High School	Woodbridge	12	2
Ronak Ramesh	Academy of Aerospace and Engineering	Windsor	11	1
Michael Neiss	Guilford High School	Guilford	12	2
Zara Haque	Greenwich High School	Greenwich	10	2
Emma Conway	Suffield High School	Suffield	11	3
Snigtha Mohanraj	Ergineering and Science University	New Haven	10	2
Shirya Jonnalagadda	Brookfield High School	Brookfield	11	1
Tazneem Zoghol	Medina Acedemy	Windsor	10	1
Anna-Lois Davis	Academy of Aerospace and Engineering	Windsor	11	1
Iana Campbell	Bridgeport Central High School	Bridgeport	10	3
Anchal Bahel	CT STEM Fair	Redding	12	2

Summary of Judging Statistics

Judges Affiliation Numbers

Judges' Affiliate	# Judges		Judges' Affiliate	# Judges
Advanced Educational Resources	2		IBM	2
AIAA	1		Jackson Laboratory	20
Alexion	23		Kaman and ASSP	1
Applied Technology	1		Leonardo DRS	1
Astronomical Society of Greater Hartford	2		Lockheed Martin	1
Avangrid	1		MTU Aero Engines	1
Boehringer Ingelheim	14		Nutmeg IFT	2
Bristol Myers Squibb (retired)	1		Otis Elevator	7
Capitol Region Education Council	1		Pfizer	4
Central Connecticut State University	1		Pratt & Whitney	2
Coastal Safety, LLC	1		Project Oceanology	1
Collins Aerospace	1		Quantori	1
Columbia University	1		Quinnipiac University	6
Conn. Science & Engineering Fair	5		Raytheon Technologies Res Center	2
Connecticut Architecture Foundation	1		Navel Under Sea Warfare Center (retired)	1
Connecticut Children's Medical Center	1		Seagen Inc.	1
Connecticut College	2		SENEME	1
Connecticut Science Center	1		Sikorsky Aircraft	2
Connecticut Section IEEE	1		Wooster School	1
CT Early College Experience	1		Sustainable Ecovations	1
CT Institute of Food Technologists	1		Talcott Mtn Science Ctr	2
CT Technical Education and Career System	1		Travelers	2
CT Valley ASSP	1		Turnstone Biologics, Inc.	1
CT Valley ISA	1		University of Connecticut	8
CTECS	1		Unilever	1
David Hill and Company, LLC	1		United Technologies (ret.)	1
Demos R Us	1		University of Hartford	4
Department Head Ella T Grasso THS / BET	1		University of Illinois	1
Dept. of Navy (NUWC-NPT)	1		University of Massachusetts	1
Earth Forward Group	4		University of New Haven	1
East Hartford Rotary Club	1		UTRC (retired)	1
Ensign-Bickford Aerospace & Defense	1		Vanderbilt Chemicals LLC	1
Eversource	3		Vista IT Solutions	1
Fairfield University	1		Wallingford Dept of Public Utlilities	1
Flightware	1		WCSU METEROLOGY// CTWEATHER CENTER	1
Goodwin university	1		Yale New Haven Health	1
			Yale University	4

## Total Number of Judges = 263

Judges not listing affiliate = 72

Number of Judges by Registration Category

Registration Catagory	# Judges
Alternative/Renewable Energy	2
Alumni & Friends Awards	7
Applied Technology	5
Biotechnology	33
Computational Sciences and Bioinformatics	5
Computer Science	11
Engineering	23
Environmental	9
Future Sustainability	7
Life Sciences	55
Mathematics	4
Physical Sciences	21
Special Awards - Connecticut	41
Special Awards - National	7
Sustainable Resources	2
Technical High Schools	6
University/College Scholarships	5
Urban School Challenge	7
Women in Science and Engineering (Petit)	8
Zoom Meeting Moderator for Virtual Judging	4

Total Registered Judges = 262

Experience of Judges by Number of Years
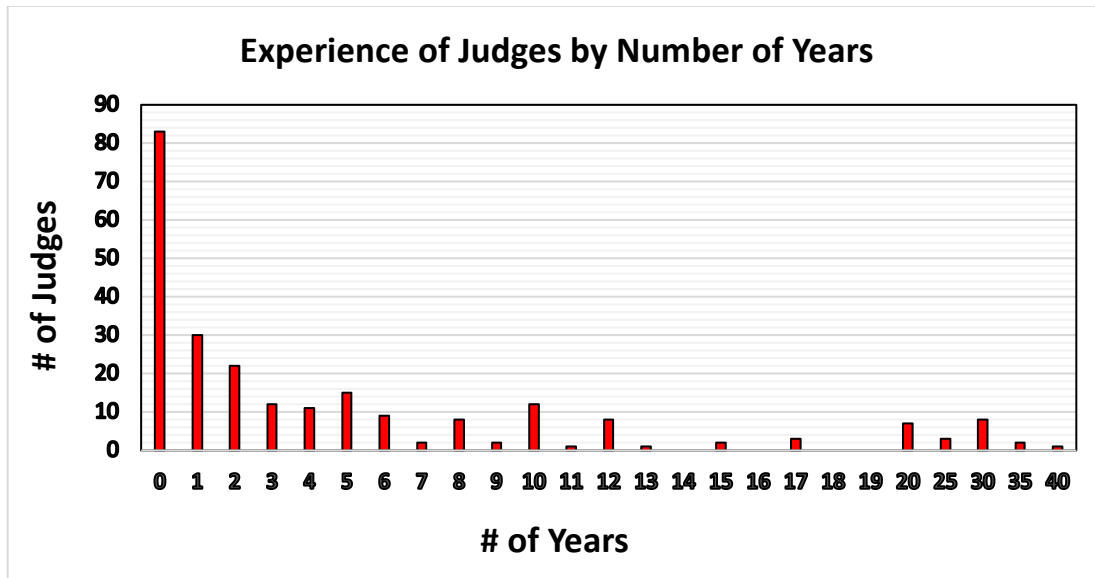
This graph shows the experience of judges by how many years they have judged the CSEF

CONNECTICUT

SCIENCE &

ENGINEERING

—FAIR—

Next years 76th CSEF will be a hybrid fair with both virtual presentation and judging for all students on March 4-16 with finalist judging and awards ceremony at Quinnipiac University in Hamden, CT