

ROBOFEST 2021 ~ 2022 Annual Report

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(Figure 1) Robofest Online World Championship 2022 participants and major sponsors

1. Analysis of Robofest Team Participation Data

Robofest® is Lawrence Technological University's world-wide robotics program for students in 4th - 12th grade and college. Student teams design, construct, and program their autonomous robots to compete for trophies in a variety of competitions. Robofest's mission is: to generate excitement & interest among young people for Science, Technology, Engineering, and Mathematics (STEM) and Computer Science, to develop essential skills such as teamwork, creative thinking, communication and problem solving, and to prepare them to excel in higher education and technological careers.

During the 2021-2022 academic year, many in-person local events, online events and video submission events were held by local hosts and the Robofest staff. The Robofest World Championship events were conducted online through the zoom platform for the third consecutive year due to the COVID-19 pandemic. A total of **1,674** students in **516** teams participated from 13 countries/territories: Canada, Colombia, Ecuador, Egypt, Ghana, Hong Kong, Macau, Mexico, Romania, Saudi Arabia, South Korea, Taiwan, and USA. In the USA, students represented 7 States: Illinois, Florida, Ohio, Pennsylvania, Minnesota, Michigan, and Texas. There were **550** site volunteers registered as judges, online local judges, proctors, check-in, setup/cleanup crew, etc. Table 1 shows the total number of officially registered coaches, teams, students and volunteers for each site.

Site ID in Robofest registration system	Coaches	Teams	Participants	Volunteers	Format
Alexandria_TechnoFuture_Egypt	26	29	129	100	In-Person
Alexandria_TechnoFuture_Egypt_Parade	37	49	246		In-Person
Canton_Gallimore_MI	12	12	48	20	In-Person
Clearwater_FL	4	26	64	23	In-Person
Cloquet_MN	1	5	15	1	In-Person
Detroit_JeffersonDouglassAcademy_MI	1	7	20	4	In-Person
International_Video_Qualifier	2	1	4	3	Video Sub
Napoleon_NCS_MI	4	17	45	11	In-Person
Napoleon_NCS_MI_BottleSumo	1	5	12	10	In-Person
Novi_AccelerateKID_MI	6	7	23	19	In-Person
PlantCity_AdvantageAcademy_FL	4	18	50	7	In-Person
Pretoria_SouthAfrica	1	41	177	5	In-Person
Southfield_LTU_MI	6	7	15	7	In-Person
Southfield_LTU_MI_BottleSumo	3	9	19	5	In-Person
USA_Video_Qualifier	16	19	46	4	Video Sub
Warmup_LTU_MI	3	5	18	12	In-Person
Warren_WWCS_MI	4	9	28	12	In-Person
Wolfville_Acadia_Canada	17	26	86	7	Video Sub
In-Person and Online Qualifiers (A)	148	292	1045	250	

WS_GAME_EV3_Scratch	7	8	19	2	In-Person
WS_GAME_VEXIQ_RobotMesh	1	9	16	2	In-Person
WS_GAME_VexIQ_VEXcode	5	5	11	2	In-Person
SummerCamp_BottleSumo_VEXIQ_Aug11	2	9	21	3	In-Person
SummerCamp_RoboParade_EV3_Aug9	2	7	16	3	In-Person
Workshops and Camps (B)	17	38	83	12	

ROWC_BSTT_Jr	14	26	65	40	Online WC
ROWC_BSTT_Sr	25	35	86	52	Online WC
ROWC_Exhibition_Jr	6	6	24	8	Online WC
ROWC_Exhibition_Sr	6	7	18	8	Online WC
ROWC_Game_Jr	21	24	79	53	Online WC
ROWC_Game_Sr	34	38	115	66	Online WC
ROWC_RoboArts	4	4	19	7	Online WC
ROWC_RoboMed	5	5	15	7	Online WC
ROWC_RoboParade	17	18	54	8	Online WC
ROWC_UMC_Jr	7	8	26	22	Online WC
ROWC_UMC_Sr	13	15	45	17	Online WC
ROWC (C)	152	186	546	288	
Grand Total (A) + (B) + (C)	317	516	1674	550	

(Table 1) Number of Registered Participants at Robofest 2021-2022 Official Competition Sites

Events that were hosted by countries that utilized their own registration systems for their regional competitions reported an additional **145** teams that are in addition to the official number registered.

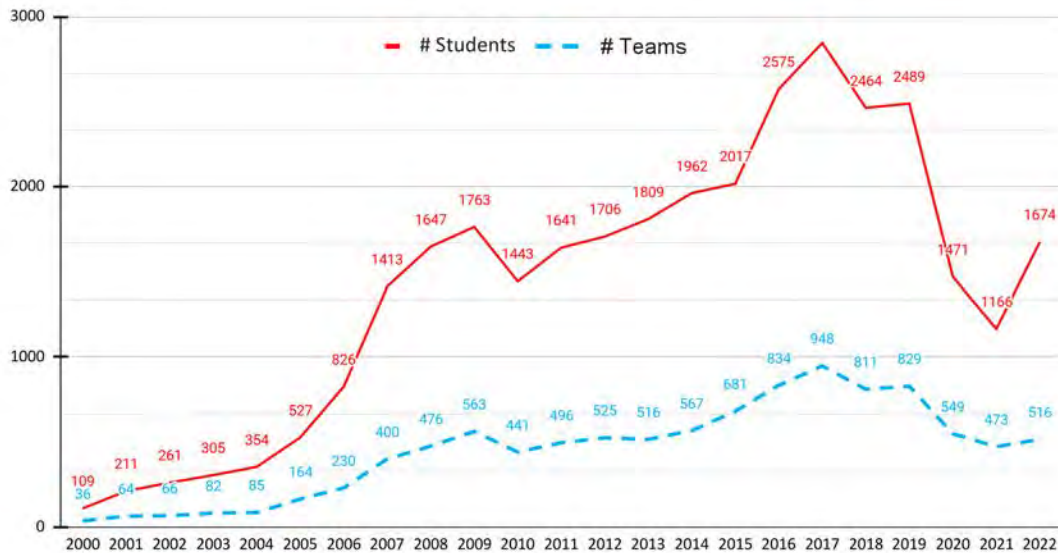
International "Option 3" competitions	Teams
Robofest LATAM	52
Korea RECA	16
Ghana	50
Romania	21
Hong Kong/Macau	27
Kingdom of Saudi Arabia	11
Korea FUNERS	2
Taiwan	9
Total - International Option 3	145

(Table 2) Number of Registered Teams at Robofest 2021-2022 Option 3 Competition Sites

The average Robofest team size in 2022 was 3.2 participants, which has increased from earlier pandemic levels of 2.7 in 2020 and 2.5 in 2021. This is the highest team size average since 2014. At Robofest, we believe this small team size is good for effective learning, because each student has more opportunities to contribute to the team's objectives.

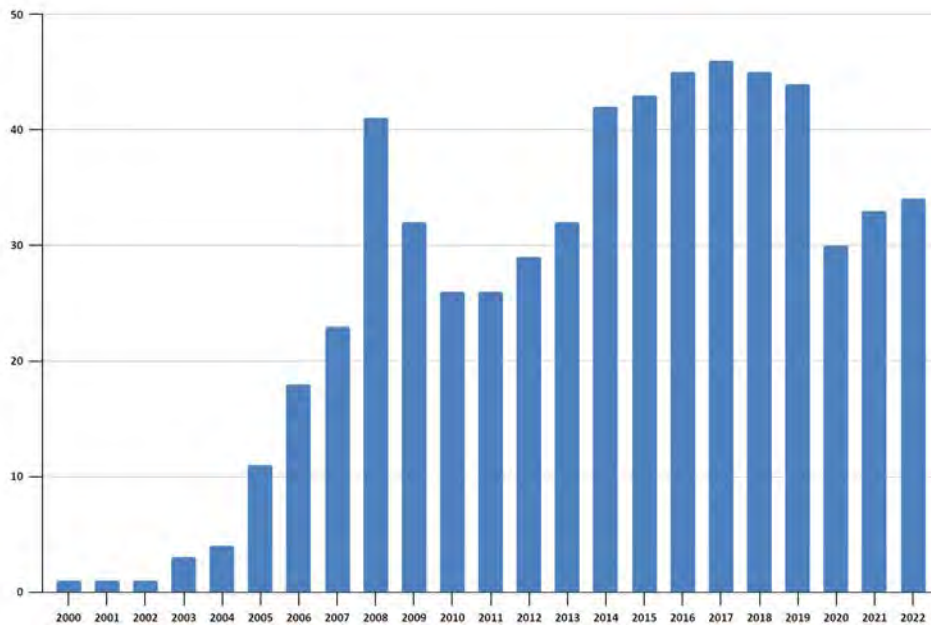
Figure 2 shows the number of students and teams participating since 2000. The ongoing COVID-19 pandemic prevented some domestic and international sites from hosting any competitions in 2022. The number of teams is the highest since the start of the shutdowns in early 2020.

The cumulative number of registered students in our registration database since 2000 has reached **32,679**.



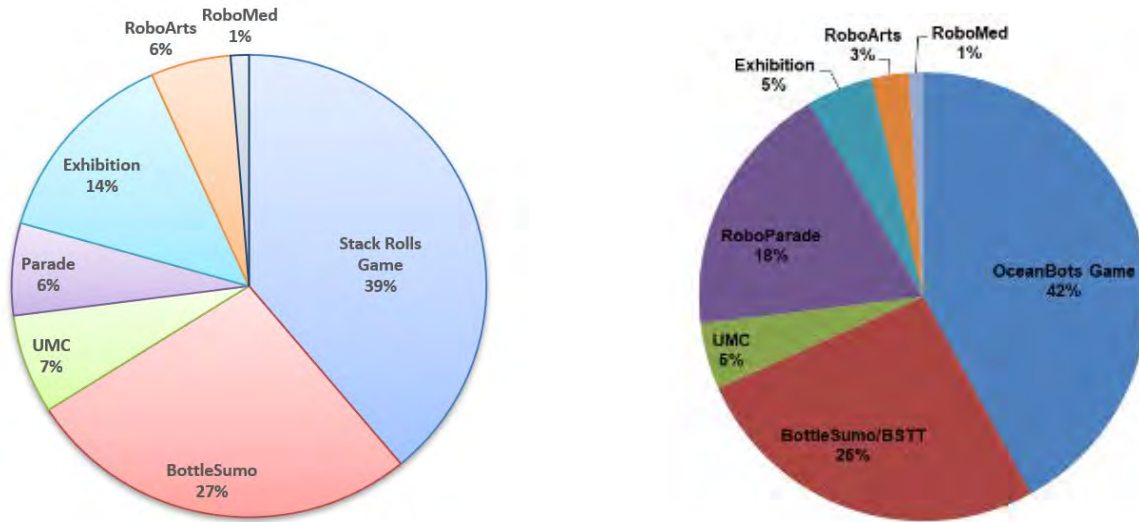
(Figure 2) Number of Robofest student participants and teams since 2000

The total number of Robofest competition site locations listed in Table 1 was 34 in the 2021-2022 season. On average, 49 students and 15 teams participated per competition site that Robofest managed. Figure 3 shows the history of the number of official competition sites since the inception of Robofest.



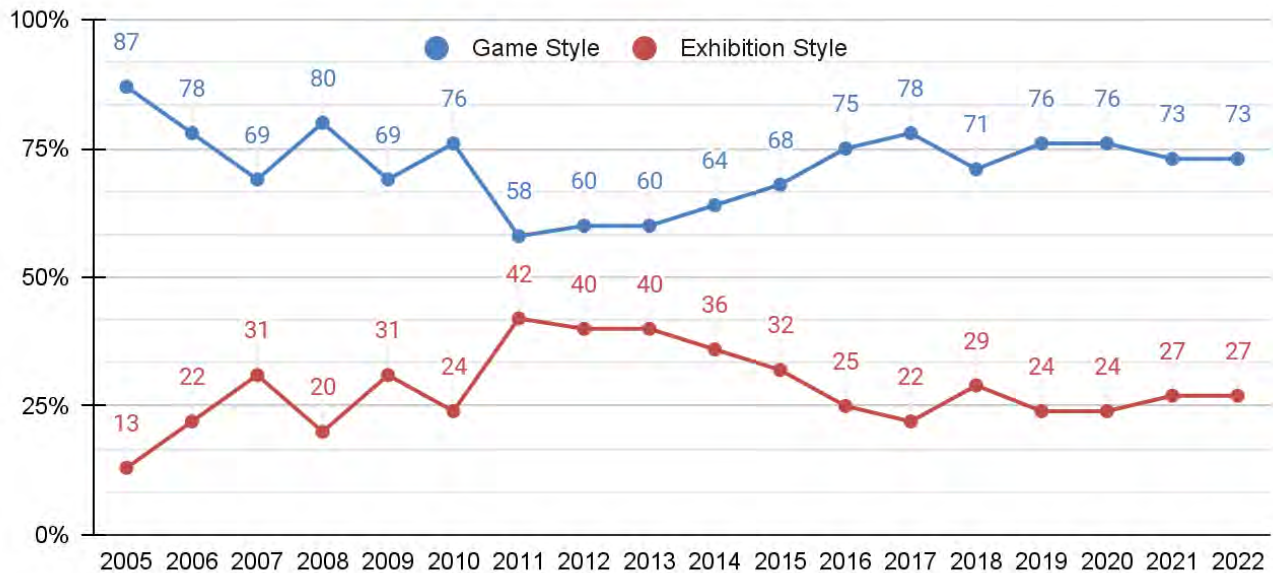
(Figure 3) Number of official Robofest competition site locations since 2000

Robofest offers a variety of categories in which to compete. 42% of teams participated in the OceanBots Game. The second most popular category was BottleSumo/BottleSumo Time Trial with 26%, then RoboParade with 18% of teams. This increase in RoboParade is due to the return of this open category to the World Championship through video submission, where in 2020 and 2021, the category was canceled for the World Championship and only offered at local events. Pie charts in Figure 4 show percentages of teams by competition category for 2021 and 2022.



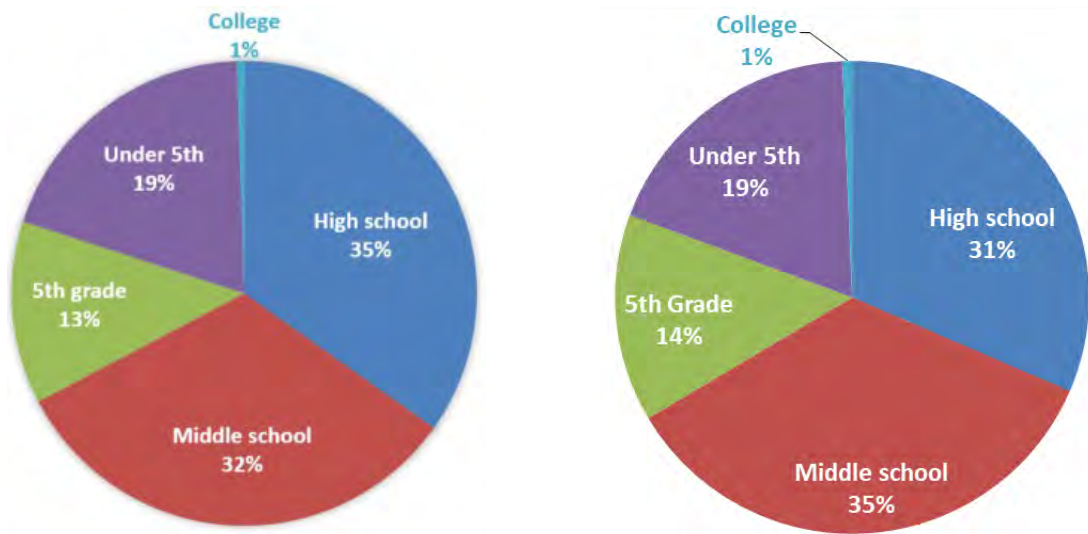
(Figure 4) Percentages of Teams per Robofest Competition Category in 2021 (left) and 2022 (right)

Robofest competitions can be generalized into two categories: (1) Game style that uses fixed rules including Game, BottleSumo, BottleSumo Time Trials, and Vision Centric Challenge (not hosted in 2021 or 2022), and Unknown Mission Challenge and (2) Exhibition style that has no or a few fixed rules including Exhibition, RoboParade, RoboArts, and RoboMed. Figure 5 shows the trend of number of teams between Game Style and Exhibition Style since 2005. The percentage of Game Style to Exhibition Style teams remained steady from 2021 to 2022.

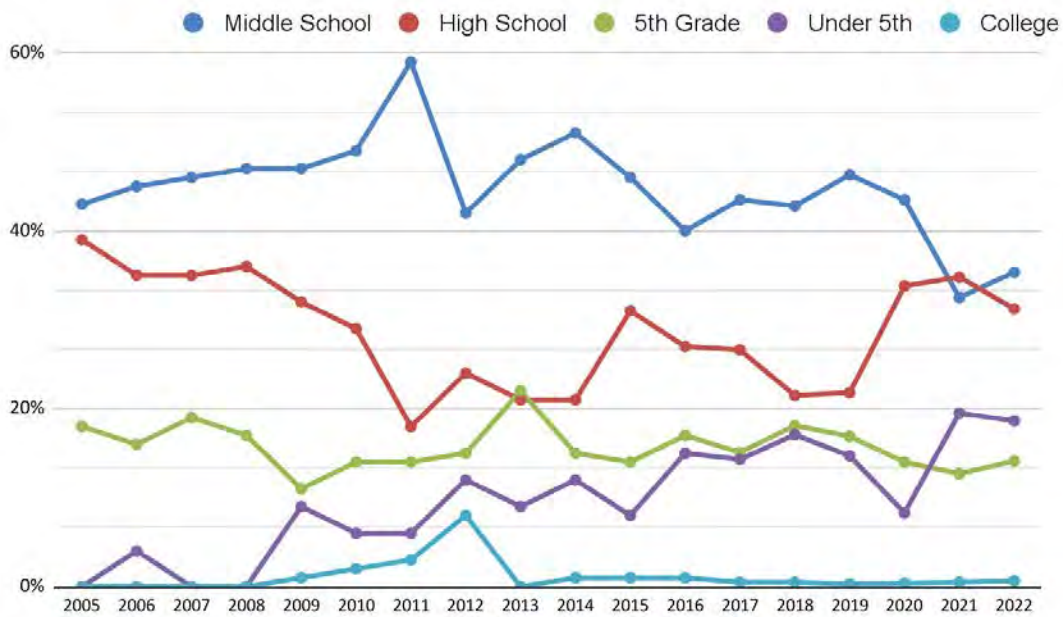


(Figure 5) Percentages of Robofest Game style teams and Exhibition style teams since 2005

The charts in Figure 6 show student participation by academic level for 2021 and 2022. For the 2022 season, 35% of the students were middle school aged (6th through 8th grade) and 31% of the students were high school aged (9th through 12th grade). Figure 7 shows the trend of each age group since 2005.

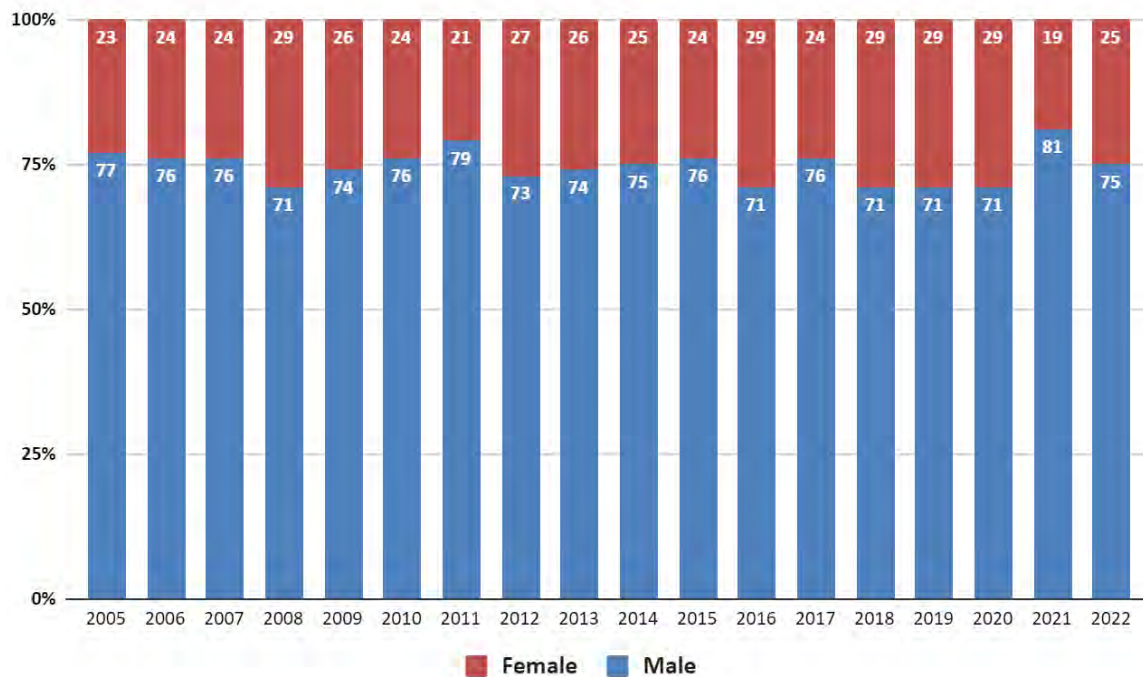


(Figure 6) Percentage of Robofest student participation by age group in 2021 (left) and 2022 (right)



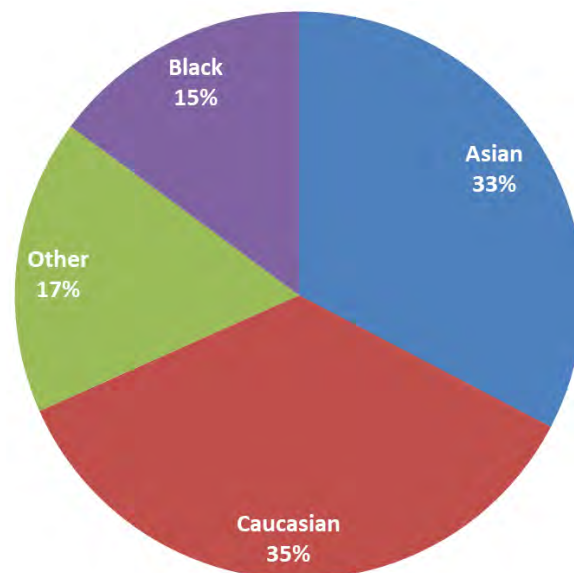
(Figure 7) Percentages of Robofest participants by age group since 2005

Gender ratios (75% male and 25% female) are trending back to pre-pandemic level as shown in Figure 8. Note that the gender data is taken directly from our registration database therefore some international students' data is excluded.

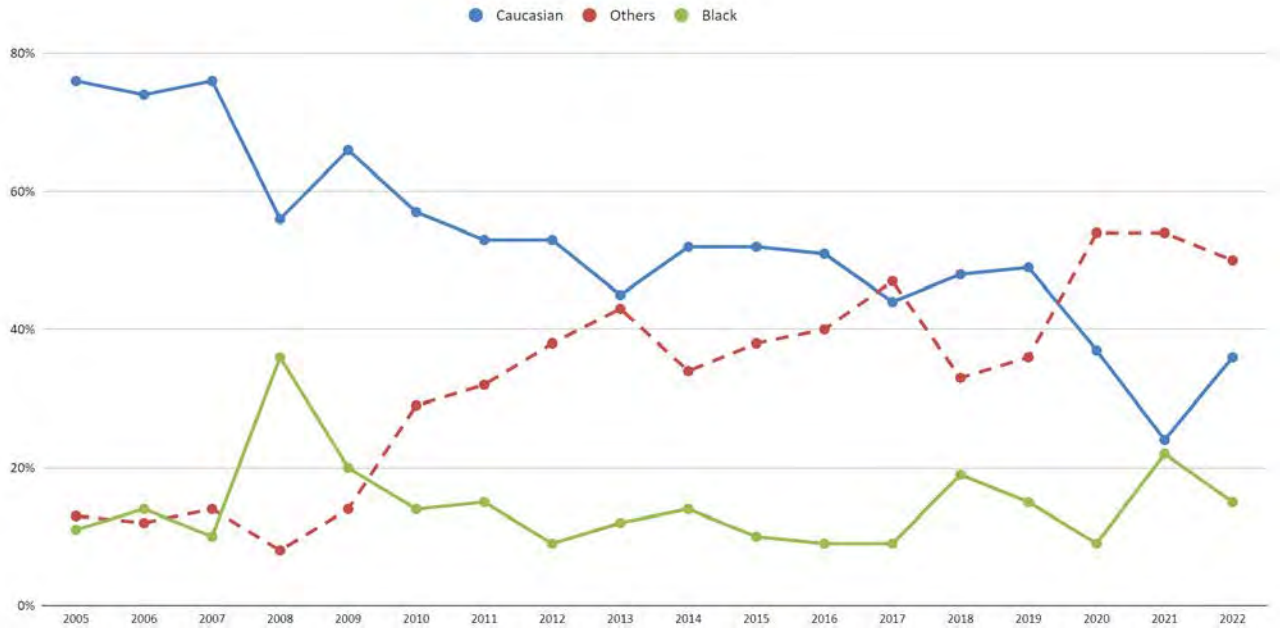


(Figure 8) Ratios of Robofest students by gender since 2005

In 2018, we introduced a new optional field on the registration system to identify ethnicity when a coach registers team members online. Because the field is not required on the online form, a majority of coaches did not provide the students’ ethnicity information. The following data is from only 479 (30%) of total participants registered in the system. In 2022, 15% of Robofest participants that responded were African/Black as shown in Figure 9. Figure 10 shows the changes since 2005. Asian, Indian-Asian, Indian-AN (Alaskan Native), Pacific Islander, Pacific-Asian, and other ethnicity classes are grouped into “Other” to show the data in the same categorical format as previous years.

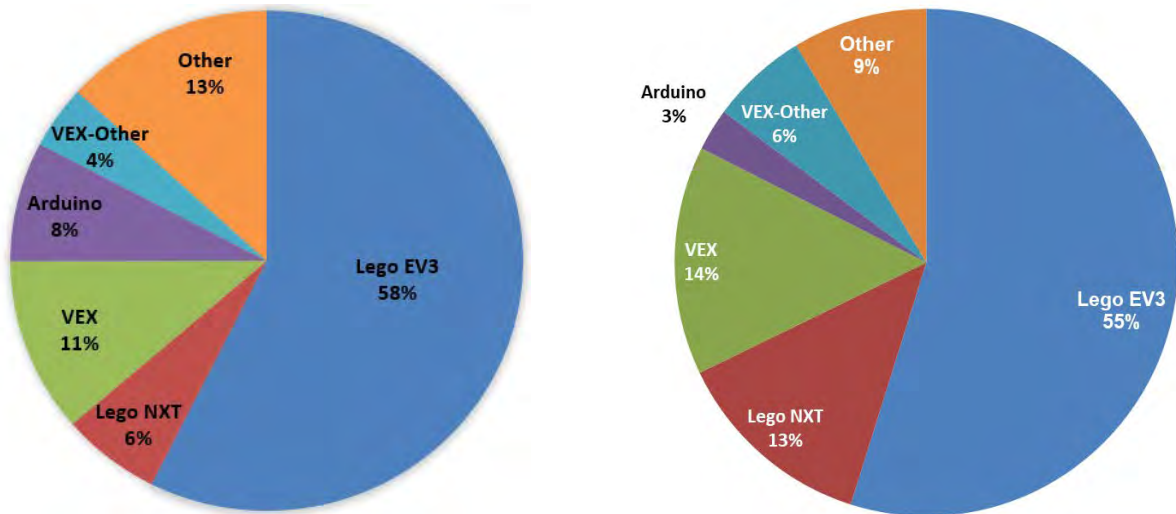


(Figure 9) Percentage of Robofest Student Participation by Ethnicity Data in 2022



(Figure 10) Robofest Ethnicity Data since 2005 (The surge of African American in 2008 was due to a targeted grant)

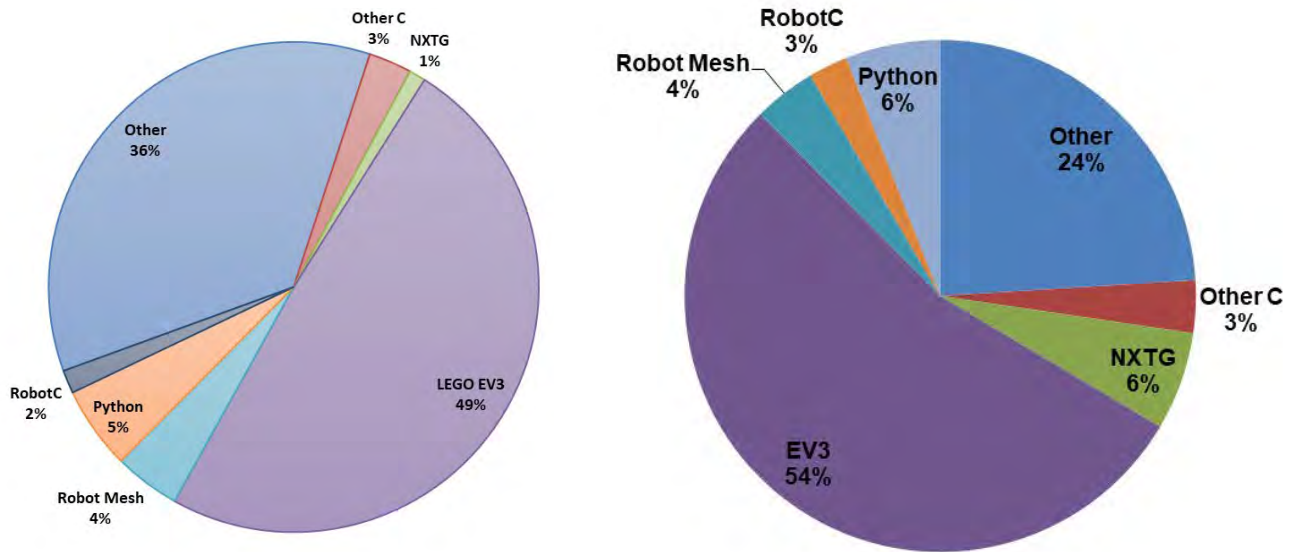
Robofest is completely open and allows the use of *any* robotics platform, which is one of its unique features. Figure 11 shows the data on robotics kits used by teams in 2021 and 2022. In 2022, the majority of the teams (55+13=68%) are still using LEGO products. 2nd generation Lego NXT kits are still being used (13%). The use of VEX platforms increased from 11% in 2021 to 14% in 2022. The use of Arduino decreased to 3%. Other kits also decreased from 13% to 9%.



(Figure 11) Percentages of robotics kits used by teams in 2021 (left) and 2022 (right)

Robofest remains focused on getting student participants to learn STEM through computer programming/coding and testing. Allowing students to use whichever programming language they prefer is one of the unique features of Robofest. Figure 12 shows the data on programming languages used by teams in 2021 and 2022. Student teams continue to use advanced and varied forms of programming languages. “Other C” in the figure includes Arduino C (Sketch). RobotC became popular for high school teams when Carnegie Mellon Robotics Academy provided free licenses for Robofest teams beginning in 2009. All C-style languages together totaled 6%. Scratch-like Robot

Mesh for VEX IQs was used by 4% of teams. “Other” includes Java, Scratch, VEX Code and other languages. Robofest provides opportunities to learn professional programming languages and helps prepare our students for future professional career paths. Robofest students continue to show advanced technical skills and improvements in their STEM and Computer Science abilities. This is possible because of the many dedicated coaches and technical mentors associated with Robofest.



(Figure 12) Percentages of programming languages used in 2021 (left) and 2022 (right)

2. Workshops and Online eAcademy

We hosted 3 official and 1 unofficial proprietary technical workshops. Table 3 shows one instructor and the classes during the 2021-2022 season. Total number of workshop attendees was 65. The Lawrence Tech Help Desk provided laptops for the workshops. Most of the workshop materials were posted on the web for on-site and online participants. Additional training materials for using Lego EV3 Scratch and VEXcode for RoboParade were made available on the website.

Date	Workshop Topic	# Attendees	# LTU Student assistants	Lead Instructor
Sat Jan 22	VEX IQ with Robot Mesh for Game	16	2	Elmer Santos
Sat Jan 22	Lego EV3 with Scratch for Game	19	2	Elmer Santos
Sat Mar 12	Vex IQ with VEXcode for Game	11	2	Elmer Santos
Wed Apr 6	Vex IQ with VEXcode for BottleSumo Unofficial (Not included in official totals)	19	0	Elmer Santos

(Table 3) 2021-2022 Workshops

3. Plans for 2023

We are planning to host as many in-person events as possible and hope to increase the total number of events in the USA and internationally, knowing that we may need to adjust as the season

progresses. We have plans to host the 2023 World Championship events on LTU Campus on May 11-13, 2023. Final schedule and any changes will be announced at the Robofest Kickoff Meetings and on the Robofest Website.

We also instituted a new quota for the number of teams advancing to the World Championship events from each site. Each international director will be allowed to select 1 team per category/age division to compete in the World Championship events with the option to expand if space allows.

4. Revenue/Expense Summary

Financial results for the modified 2021-2022 academic year (Oct. 24, 2021 ~ Aug. 7, 2022) due to COVID-19 pandemic situation are as follows: **\$56,881.43** in cash revenue including the transferred balance from 2020-2021 year. Net expense was **\$18,732.57** and **\$38,148.86** is transferred to the next year. LTU College of Arts and Sciences supported **\$66,222.22** to pay full-time, part-time staff, and student assistant hourly wages. The total program direct cost was **\$84,954.79**. Tables 4~6 show the summary of cash revenue and expenditure.

Transfer from 2020-2021	\$11,380.81
Individual donors	\$1,200.62
Corporate/Org. Cash Sponsorship (<i>In-kind donations not included.</i>)	\$3,500.00
Team registration fees & other income	\$40,800.00
Total net cash income without transfer from last year	\$45,500.62
Total revenue including transfer from last year	\$56,881.43

(Table 4) 2021-2022 Cash Revenue

Workshop instructor, PT faculty, faculty summer, and AWS admin hours.	\$912.50
Student assistants' wage	\$703.24
Buying out faculty release time	\$4028.00
Trophies, individual trophies, and plaques	\$5,476.00
Qualifier and Championship Medals	\$4,411.90
Supplies (Amazon web services, Cloudflare, playing fields, office supplies, signs, workshop food, USPS postage, UPS, etc.)	\$2,810.19
Give away & merchandise items	\$0.00
Table & chair rental for World Championship	\$0.00
Poster & Banner printing; Office copier & printing	\$390.74
T-shirts for Judges, volunteers, and teams	\$0.00
Robofest staff travel; Team & Judge travel support	\$0.00
Out of State workshop support; Sponsored site support	\$0.00
World Championship food	\$0.00
Net direct expenses	\$18,732.57

(Table 5) 2021-2022 Robofest Account Expense Summary

Staff (full-time and part-time) wage support from College of Arts & Sciences	\$63,469.85
Student assistant wage support from College of Arts & Sciences	\$2,752.37
Total LTU Cash Support	\$66,222.22

(Table 6) LTU Direct Support Expense Summary in 2021-2022

Note that Table 5 does not include LTU's indirect overhead cost. Table 7 shows cost per student data history since 2016.

	2016	2017	2018	2019	2020	2021	2022
Direct cost	\$168,784	\$146,085	\$141,908	\$155,482	\$115,177	\$66,623	\$84,955
# Stu. Served	2,575	2,846	2,464	2,489	1,471	1,166	1,674
Cost / Student	\$65.55	\$51.33	\$57.59	\$62.47	\$78.30	\$57.14	\$50.75

(Table 7) Cost per student data since 2016

5. Recognition & Acknowledgement



(Figure 13) IEEE Sponsored Medals

Each participant of a Robofest Online World Championship competition event received a medal sponsored by IEEE SEM (Southeastern Michigan Section); see Figure 13.

List of Winning Teams with participant names can be accessed at:

https://www.robofest.net/images/2122/2022_Winners.pdf

Table 8 summarizes Robofest Online World Championship (ROWC) with web links for award winners, highlight video, judge bios/lists, and program of each competition category.

We would like to thank all the Robofest Online World Championship UMC, Exhibition, RoboArts, RoboMed, RoboParade, BottleSumo Time Trial, and Game Judges. Their information can be found in the Table 8 “Event Judges” column.

Category / Division	Award Winners	Highlight Video	Event Judges	Event Program
Sr UMC	UMC	Sr UMC	Sr UMC	Sr UMC Program
Jr UMC	UMC	Jr UMC	Jr UMC	Jr UMC Program
Sr. BottleSumo Time Trial	BSTT	Sr BSTT	Sr BSTT	Sr BSTT Program
Jr. BottleSumo Time Trial	BSTT	Jr BSTT	Jr BSTT	Jr BSTT Program
Sr. Exhibition	Exhibition	Sr Exhibition	Sr Exhibition	Sr Exhibition Program
Jr. Exhibition	Exhibition	Jr Exhibition	Jr Exhibition	Jr Exhibition Program
RoboArts	RoboArts	RoboArts	RoboArts	Video Submission
RoboMed	RoboMed	RoboMed	RoboMed	Video Submission
RoboParade	RoboParade	RoboParade	RoboParade	Video Submission
Sr. Game: OceanBots	Oceanbots	Sr Oceanbots	Sr Oceanbots	Sr Oceanbots Program
Jr. Game: OceanBots	Oceanbots	Jr Oceanbots	Jr Oceanbots	Jr Oceanbots Program

(Table 8) Robofest Online World Championship (ROWC) 2022 Summary Table with Links

Robofest was again very fortunate this year to have 5 corporate/foundation Bronze or higher sponsors and 12 Friends level sponsors as shown in Figure 14. Without their support, Robofest & ROWC 2022

would not have been possible. Sponsor logos were shown on programs for warm up, qualifying, and ROWC competitions as well as all the highlight videos. A list of all the 2022 sponsors can be found at <https://www.robofest.net/index.php/2022-sponsors>

Sponsors



Friends of Robofest

VPN Clients	Qi Wireless Charging	Michelle Butkovich	CJ and Min Chung
Dennis Howie	Nathaniel Johnson	Robin G. Leclerc	Rebecca Maracle
Shannan and Patrick Palonis	Emery and Linda Pence	Julie Vulaj	

(Figure 14) Official Robofest Sponsors for 2021-2022

During the Robofest Online World Championship award ceremony on May 21, 2022, Robofest recognized the following coaches with an Anniversary award:

- Paul Weaver, Palm Harbor, FL (Coach ID 1752): 10 years
- Adam Draa, Napoleon, MI (Coach ID 2964): 5 years
- Lei Chen, Troy, MI (Coach ID 2652): 5 years
- Pam Sparks, Roseville, MI (Coach ID 3004): 5 years

We deeply thank them all for their dedication and hard work for STEM education through robotics in their communities.

Robofest cannot reach our students without volunteer site hosts. We would like to applaud all the work done by our great site host organizers in Table 9. Without their leadership, dedication and sacrifice, the Robofest 2020-2021 season would not have been possible. Table 10 lists National Directors who organized competitions in their countries and/or sent teams to ROWC.

Site Name in Robofest Management System	Site Host Organizer Name(s)
Alexandria_TechnoFuture_Egypt	Farid Hussien / Ayman El Kabbany
Alexandria_TechnoFuture_Egypt_Parade	Farid Hussien / Ayman El Kabbany
Canton_Gallimore_MI	Cara Wegrzyn
Clearwater_FL	Emma Alaba
Cloquet, MN	Cameron Lindner

Detroit_JeffersonDouglassAcademy_MI	Monica Thompson
Napoleon_NCS_MI	Adam Draa
Napoleon_NCS_MI_BottleSumo	Adam Draa
Novi_AccelerateKID_MI	Q Do
PlantCity_AdvantageAcademy_FL	Gavin Coleman
Warren_WWCS_MI	Becky Branch
Wolfville_Acadia_Canada	Dilkeerat Dhillon

(Table 9) Site Host Organizers using Robofest Management System

Country	National Director
Ghana	Dr. Yaw Okraku-Yirenkyi, GRAF
Hong Kong	Justin Chan, RIHK
Macau	Yau Ka Chun, RIHK
Mexico / Latin America	Dr. Ramiro Marrero, CENIPAD
South Korea	Stephen Seungdong Baek, RECA
South Korea	Yijun Nam, FUNERS
Saudi Arabia	Manal Nagash, BenaEDU
Romania	Marinela Buruiana, Sophia Science
Taiwan	Jason ChienTai Lo

(Table 10) National Directors who organized competitions not using RMS and/or sent teams to ROWC

The ROWC event dates are listed on the 2022 Robofest poster along with all the US and International Site Hosts shown in Figure 15.

23rd ANNUAL WORLD ROBOFEST



2022 ROBOFEST ONLINE WORLD CHAMPIONSHIPS // // // // //



ROWC EVENTS // // // // //

All events are from 8AM - Noon EDT

- | | | |
|---|-------------------------------|--|
| Sr. Unknown Mission Challenge, FRI 4/8 | Sr. Exhibition, FRI 4/29 | Jr. and Sr. RoboArts, Sr. and College RoboMed and RoboParade (Video Submission), FRI 5/6 |
| Jr. Unknown Mission Challenge, SAT 4/9 | Jr. Exhibition, SAT 4/30 | ROWC Award Ceremony, SAT 5/21 |
| Sr. BottleSumo Time Trial Classic and Unlimited, FRI 4/22 | Sr. Game: OceanBots, FRI 5/13 | |
| Jr. BottleSumo Time Trial, SAT 4/23 | Jr. Game: OceanBots, SAT 5/14 | |

www.robofest.net



U.S. QUALIFYING LOCATIONS //

- Accelerate Kid, Novi, MI
- Advantage Academy, Plant City, FL
- Clearwater Main Library, Organized by Computer Learning Center, Clearwater, FL
- Cloquet Robotics, Cloquet, MN
- Gallimore Elementary, Canton, MI
- LTU Robofest World Headquarters, Southfield, MI
- Napoleon Community Schools, Napoleon, MI
- South Early College, Organized by Houston Urban STEM, Houston, TX
- USA Video Qualifiers
- Warren Woods Christian School, Warren, MI

INTERNATIONAL EVENTS AND PARTNERS //

- Acadia University, Nova Scotia, Canada
- Alexandria Center for the Arts, Egypt, Organized by Techno Future Egypt
- FUNERS Co. Ltd., South Korea
- Ghana Robotics Academy Foundation, Ghana
- International Language and Robotics Institute, Taiwan
- International Video Qualifiers
- King Abdulaziz University, Saudi Arabia
- RoboFun, United Kingdom
- Robot Institute of Hong Kong Limited, Hong Kong and Macau
- RECA, South Korea
- Robofest Latin America, Mexico Organized by CENIPAD
- Sophia Science, Romania
- STEAM Center, Jordan
- Waterkloof High School, South Africa

2022 SPONSORS // // // // //

GOLD SPONSOR



SILVER SPONSOR



BRONZE SPONSORS



PARTNERS AND FRIENDS

- | | | |
|--------------------|-----------------------------|-----------------------------|
| Michelle Butkovich | Nathaniel Johnson | Q1 Wireless Charging |
| CJ and Min Chung | Robin G. Leclerc | State Champs Sports Network |
| Dennis Howie | Rebecca Maxalec | VPN Clients |
| IEOM Society | Shannan and Patrick Palonis | Julie Vulaj |



College of Arts and Sciences, Department of Mathematics and Computer Science, 21000 West Ten Mile Road, Southfield, MI 48075-1058, www.ltu.edu
Lawrence Technological University

Detailed information on registration competition categories, rules, and prizes can be found at www.robofest.net. For more information, contact 248.204.3568 or robofest@ltu.edu



PHOTOS OF 2021 ROBOFEST ONLINE WORLD CHAMPIONSHIP PARTICIPANTS

(Figure 15) Robofest 2022 Official Poster

The Robofest office staff consists of Shannan Palonis, Full-time Coordinator, Elmer Santos, Assistant Director, and Pam Sparks, Coordinator. We also had 5 Student Assistants: Anthony Shevenock (Computer Engineering), Scottie Rapp (Electrical Engineering), Robert Newberry (Game Design), Nicholas Sparks (Media Communications), and Harika Velagapudi (Masters of Computer Science).

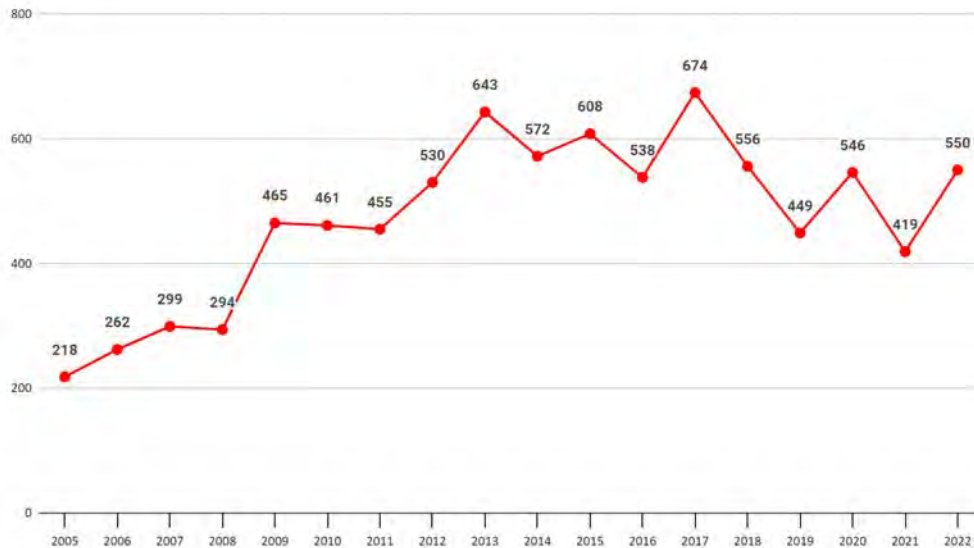
LTU Administrators, Staff and Faculty who *directly* supported Robofest this year include:

- Dr. Srinivas Kambhampati, Dean of College of Arts and Sciences: budget support, video remarks for Robofest Online World Championship, and presentation of Special Awards at the live ROWC Award Ceremony
- Dr. Patrick Nelson, MCS Department Chair: budget support for FT position
- Dr. Yawen Li, Department Chair of Biomedical Engineering: served as a Judge and helped recruit Judges for the RoboMed competition
- Marilyn Wiseman, MCS Department Administrative Assistant: purchasing & reimbursement requests, employment related paperwork, and many more.
- Tracy Kash, CoAS Dean's Office Administrative Assistant: assisted Marilyn and managed the College of Arts & Sciences budget account for Robofest.
- Matt Roush, Managing Editor University News Bureau, Director of Media Relations: Master of Ceremonies at the live ROWC Award Ceremony and press releases
- Renee Tambeau, Interim Vice President; Director of University Communications and Academic Editor: poster design
- Sofia Lulgjuraj, Art Director: poster design
- Gonca Eren, Helpdesk Operations Supervisor: laptop services
- Linda Ridella, Helpdesk Technician: laptop services
- Norman Plant, Manager, Instructional and Graphics Support: video and media production
- Thomas "Sam" Vukonich, Assistant Director of Media Services: audio/video support
- Scott Lehman, Media Production Coordinator at eLearning Services: technical support for Zoom Webinars, video production of opening & closing remarks

Other individuals we would like to thank for their support:

- Prof. Gordon Stein, PhD candidate at Vanderbilt University: maintenance of Tomcat & Joomla web server systems
- Steven Kryskalla: supports the Robofest Management System (RMS)
- David Reeves: developed the online match timer used for all the In-Person and Online events <https://robofest-timer.daveeddigs.repl.co/>

There were 550 site & location volunteers registered this year and we deeply thank all of them. See Figure 16 for the number of registered site volunteers since 2005. Lists of all the ROWC Judges and short bios of Exhibition Style ROWC Judges can be accessed in the Table 8 "Event Judges" column.



(Figure 16) Number of yearly registered Robofest site volunteers since 2005

In summary, we believe 2021-2022 Robofest has achieved its primary missions: inspiring students into STEM fields and supporting them even in this third year of the Coronavirus pandemic. We are proud that Robofest has been continuously inexpensive since its inception in 2000, while providing proven quality STEM education environments for students. Once again, we deeply thank everyone who has hosted, sponsored, supported, volunteered, worked, participated and learned in the 23rd Robofest for the 2021-2022 year. If you find any errors or have comments on this report, please let me know (ccartwig@ltu.edu). We are looking forward to seeing you during the 24th annual Robofest season in 2023.

Respectfully,
September 6, 2022

Christopher Cartwright, Ph.D.
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