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Joel Stein

Patrick & Shannan Palonis

(Figure 1) Robofest Online World Championship 2023 participants and 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, Arts, and Mathematics (STEAM), AI 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 2023-2023 academic year, US Site Hosts, International Partners and the Robofest staff held in-person and Video Submission events. The Robofest World Championship events returned to Lawrence Technological University for the first time since 2019 due to the COVID-19 pandemic. A total of 22 countries/territories scheduled or participated in events during the season including Canada, Colombia, Ecuador, Egypt, Ghana, Hong Kong, India, Jordan, Macau, Maldives, Mexico, Nigeria, Romania, Saudi Arabia, Sierra Leone, South Africa, South Korea, Sri Lanka, Taiwan, United Arab Emirates, United States of America and Uzbekistan. In the USA, students represented 6 States: Alabama, Florida, Minnesota, Michigan, Ohio, and Texas.

A total of **1,666** students in **593** teams participated in events and workshops that utilized the Robofest Registration Management System. There were **387** site volunteers registered as 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 Management System (RMS)	Coaches	Teams	Participants	Volunteers
Alexandria_Egypt (World Champ Only)	2	2	10	4
Bellevue_Cornerstone_FL	3	22	87	10
Bengalore_India	3	42	51	20
Canton_Gallimore_MI	15	13	49	22
ClintonTwp_MISD_MI	5	9	21	8
Cloquet_MN	2	9	19	4
Detroit_Emerson_MI	1	3	6	3
Detroit_JeffersonDouglassAcademy_MI	1	5	15	3
Detroit_UPSM_MI	2	27	36	4
Freetown_SierraLeone	2	5	20	4
Houston_UrbanSTEM_TX	14	16	56	6
MI_Invitational_JR_APR22	4	6	17	4
MI_Invitational_Sr	2	2	3	4
Novi_AccelerateKID_MI	3	4	15	12
PlantCity_AdvantageAcademy_FL	5	18	59	9
Pretoria_SouthAfrica	5	39	140	14
Saline_WCS_MI	7	21	57	16
StPeteBeach_CommunityCenter_FL	3	14	38	22
TaoyuanCity_Taiwan	36	90	206	63
Troy_TrinityRomanian_MI	5	6	22	16
Video_Qualifier_International	2	3	10	3
Video_Qualifier_USA	15	19	56	3

Warmup_LTU	7	8	27	18
Wolfville_Acadia_Canada	17	33	123	21
In-Person Qualifiers (A)	161	416	1143	293

WS_AI_Exh_Scratch_Feb25	3	6	11	3
WS_GAME_VexIQ_VEXcode_Feb25	2	2	6	3
WS_GAME_VEXIQ_VEXCode_Jan14	2	3	7	3
Workshops and Camps (B)	7	11	29	9

World_Champ_Exhibition	12	13	41	9
World_Champ_Game	39	50	163	29
World_Champ_JrBottleSumo_Group1	9	11	24	7
World_Champ_JrBottleSumo_Group2	8	12	31	6
World_Champ_RoboArts	9	9	29	4
World_Champ_RoboMed	8	8	23	4
World_Champ_RoboParade	9	11	38	11
World_Champ_SrBottleSumo	20	27	72	9
World_Champ_UMC	15	25	78	6
World Championship (C)	129	166	499	85

Grand Total (A) + (B) + (C)	298	593	1666	387
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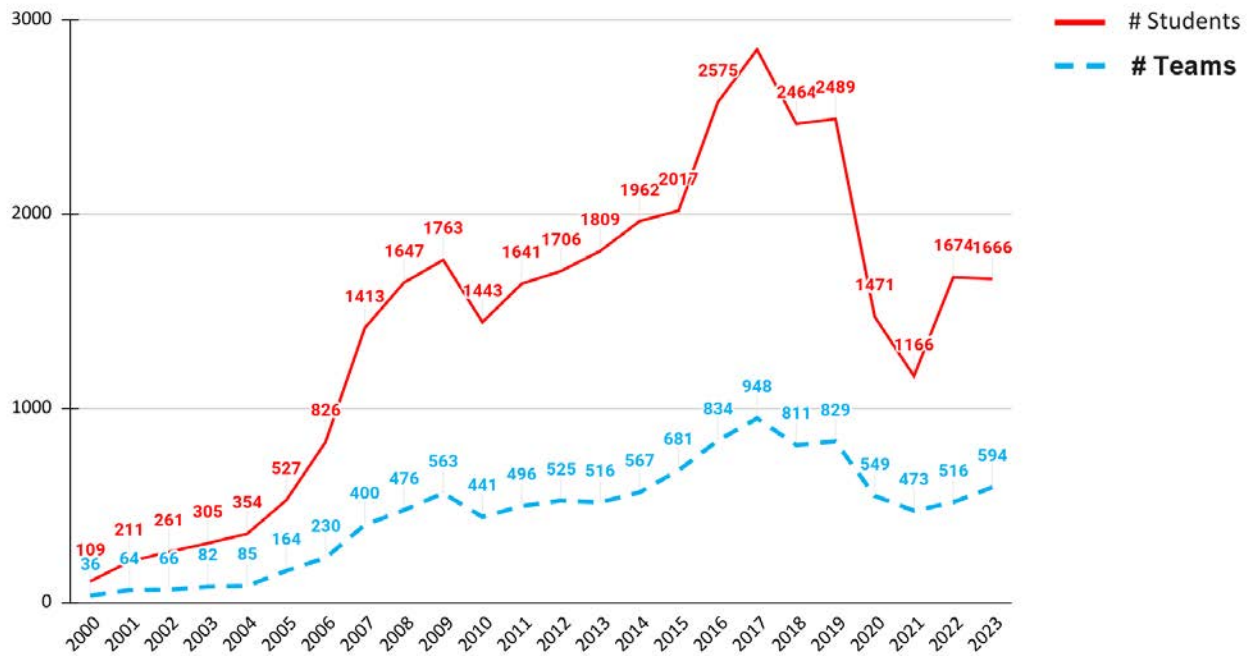
(Table 1) Number of Registered Participants at Robofest 2022-2023 Official Competition Sites

Events that were hosted by international partners in countries that utilized their own registration systems for their regional competitions reported an additional **795** teams that are in addition to the official number registered in RMS.

International "Option 3" competitions	Teams
Robofest LATAM (Latin America)	53
Ghana	120
Hong Kong/Macau	490
Egypt	96
Korea FUNERS	6
Total - International Option 3	795

(Table 2) Number of Registered Teams at Robofest 2022-2023 Option 3 Competition Sites

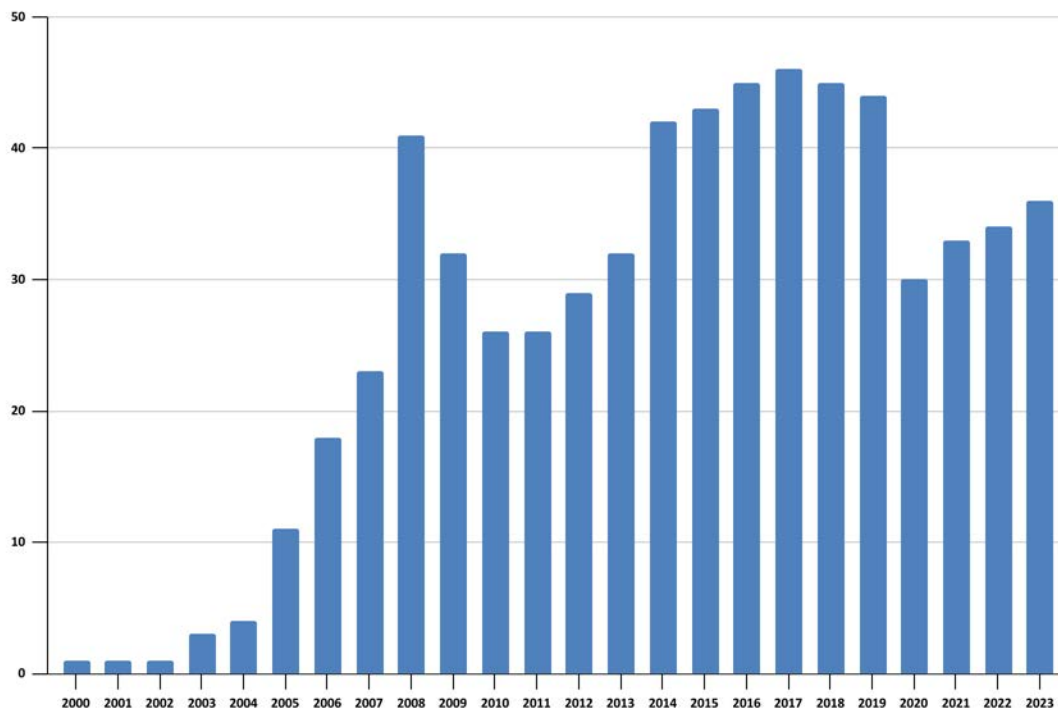
The number of teams decreased from 2022 to 2023. Some International sites that were historically Option 1 or 2 in RMS transferred to Option 3 for the 2023 season. The 3-year COVID-19 pandemic reduced the overall number of teams and we are working hard to return to pre-pandemic registration numbers. Figure 2 shows the number of students and teams participating since 2000. The cumulative number of registered students in our registration database since 2000 has reached **34,345**.



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

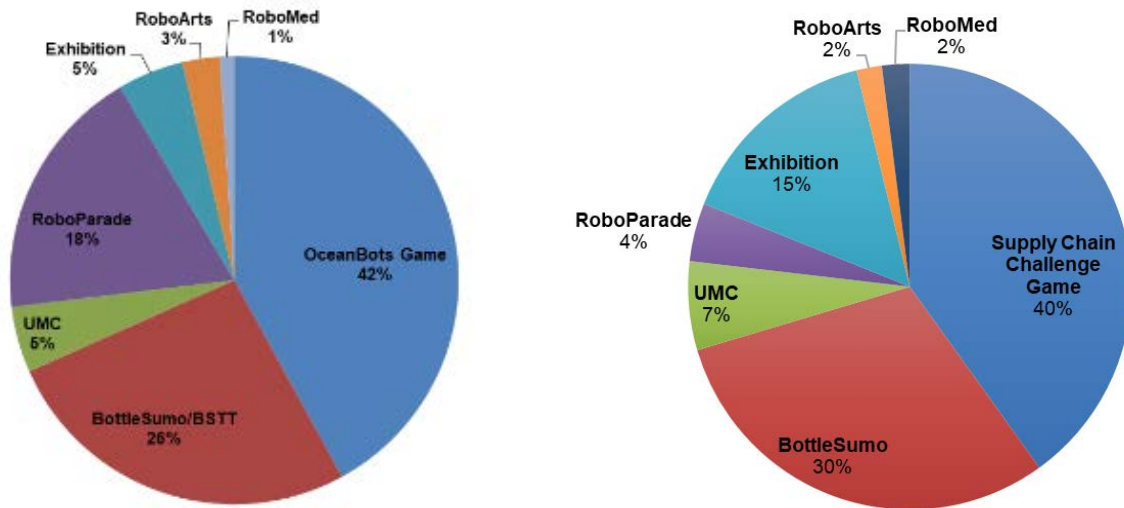
The average Robofest team size in 2023 was **2.8** participants, which was a decrease from 2022, but higher than earlier pandemic levels of 2.7 in 2020 and 2.5 in 2021. At Robofest, we believe this small team size is good for effective learning, because each student has more opportunities to contribute to the team's objectives.

The total number of Robofest competition site locations for the 2022-2023 season listed in Table 1 was **36**. On average, **46** students and **15** teams participated per competition site in RMS. Figure 3 shows the history of the number of official competition sites since the inception of Robofest.



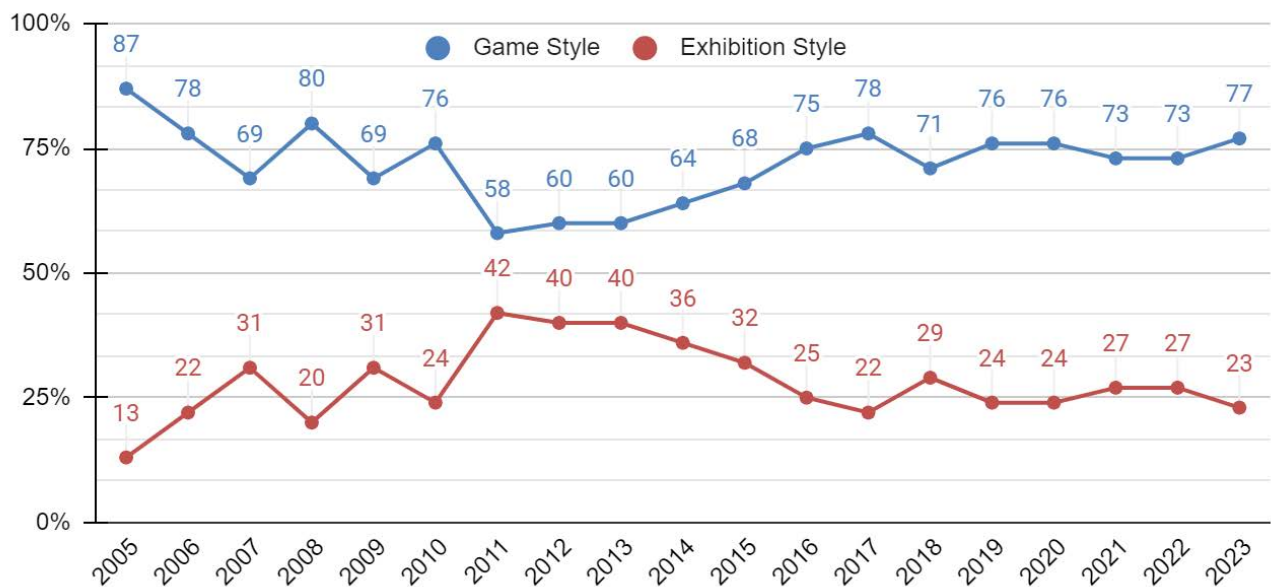
(Figure 3) Number of official Robofest competition site locations since 2000

Robofest offers a variety of categories in which to compete. In 2023, 40% of teams participated in the Game category “Supply Chain Challenge.” The second most popular category was BottleSumo with 30%, then Exhibition with 15% of teams. Charts in Figure 4 show percentages of teams by competition category for 2022 and 2023.



(Figure 4) Percentages of Teams per Robofest Competition Category in 2022 (left) and 2023 (right)

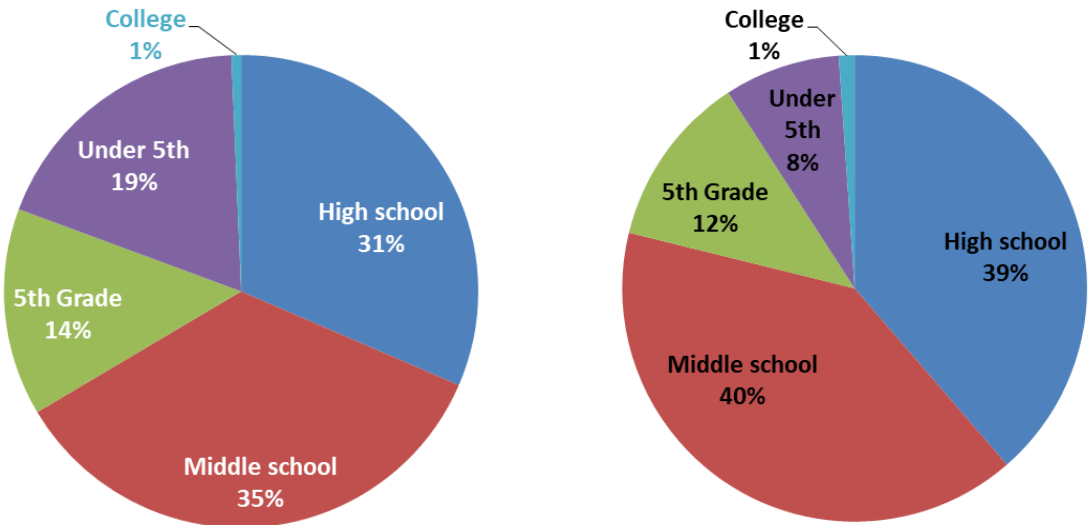
Robofest competitions can be generalized into two categories: (1) Game style that uses fixed rules including Game, BottleSumo, Unknown Mission Challenge, and Vision Centric Challenge (not hosted since 2020), and (2) Exhibition style that has no or a few fixed rules including Exhibition, RoboParade, RoboArts, and RoboMed. Figure 5 shows the trend of number of teams between Game Style and Exhibition Style since 2005. The percentage of Game Style teams increased from 2022 to 2023.



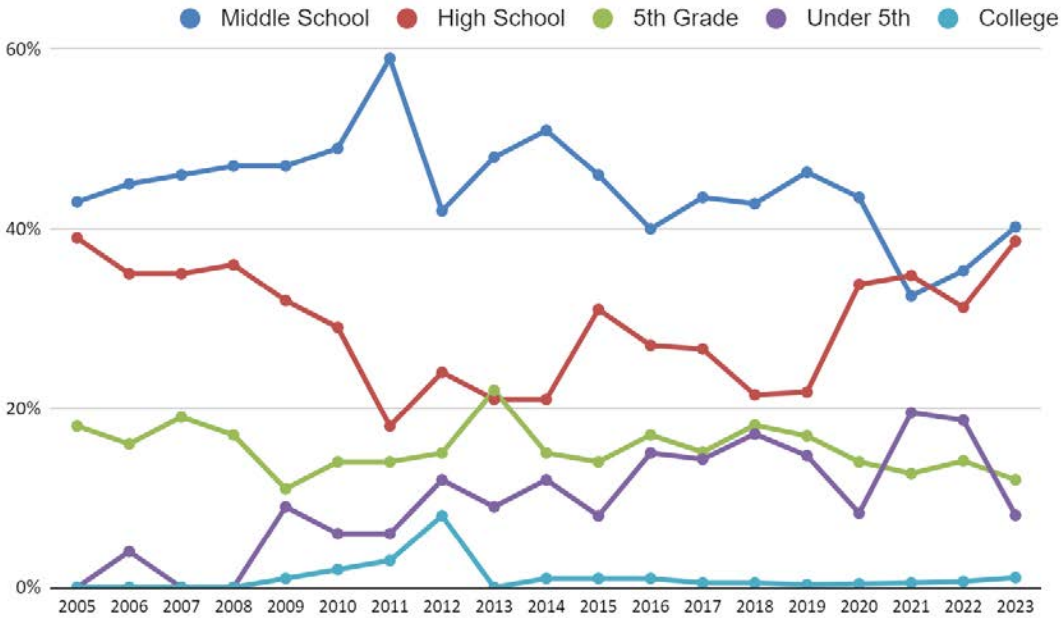
(Figure 5) Percentages of Robofest Game style teams and Exhibition style teams since 2005

The charts in Figure 6 show student participation by academic level for 2022 and 2023. For the 2023 season, 40% of the students were middle school aged (6th through 8th grade) and 39% of the students

were high school aged (9th through 12th grade). The percentage of high school students has reached the highest level since 2005. Increasing participation of High School students is currently a focus of Robofest. Figure 7 shows the trend of each age group since 2005. Note that the grade level data is taken directly from our registration database and therefore Option 3 international student data is excluded.

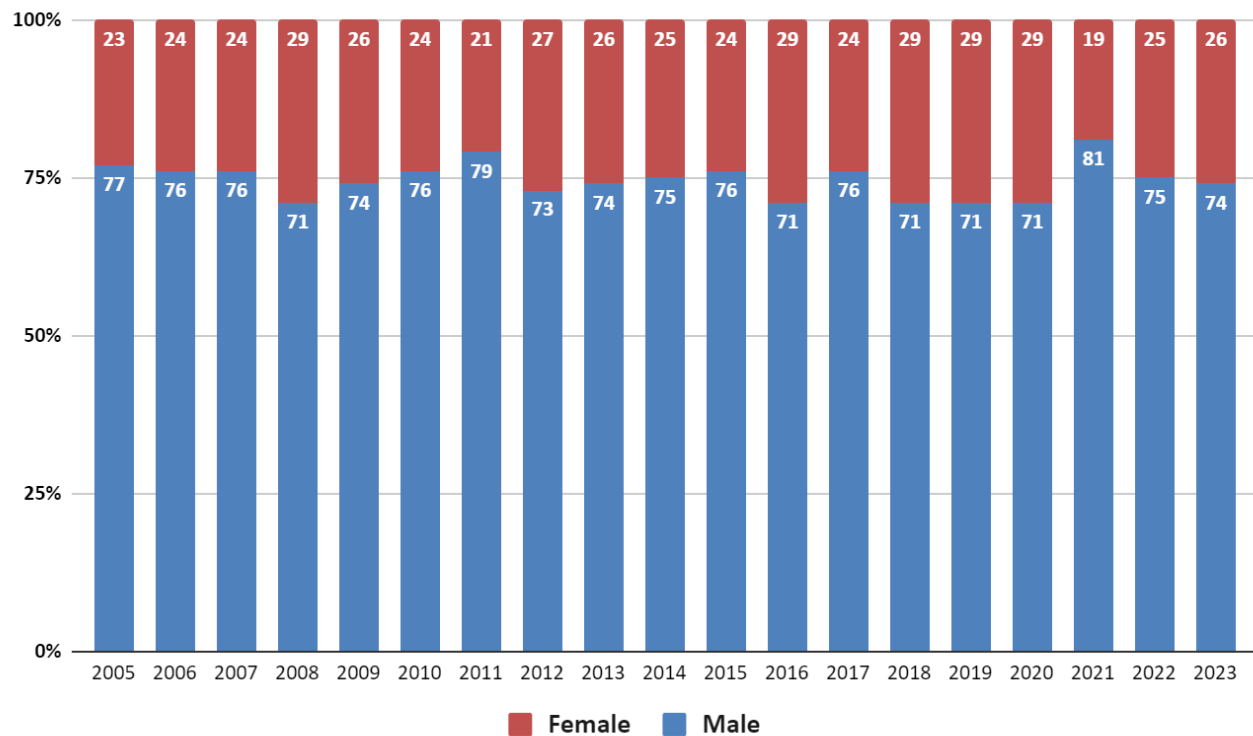


(Figure 6) Percentage of Robofest student participation per age group in 2022 (left) and 2023 (right)



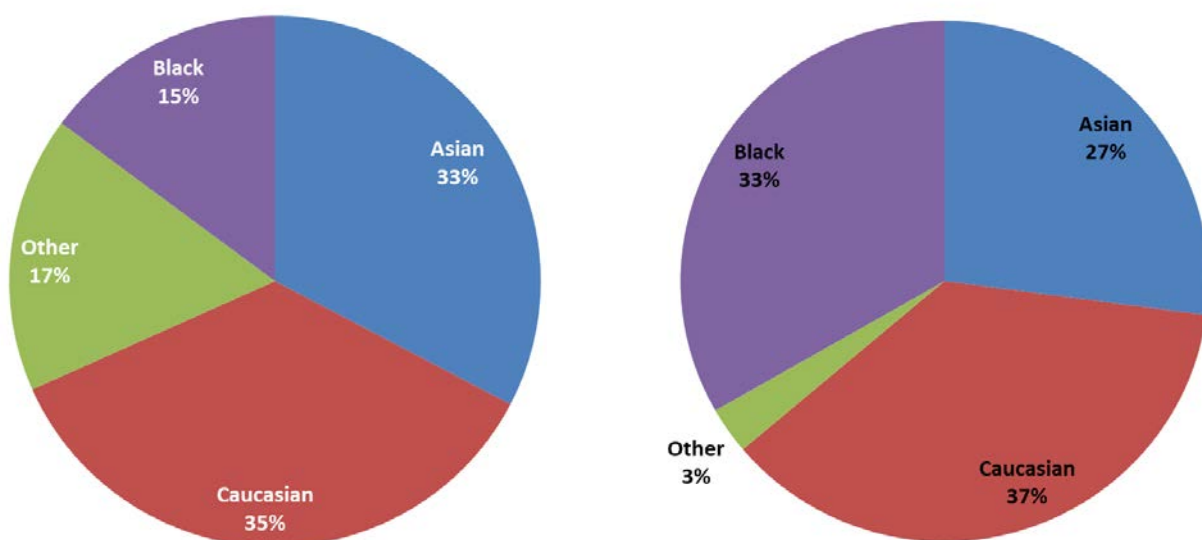
(Figure 7) Percentages of Robofest participants by age group since 2005

Gender ratios (74% male and 26% female) have adjusted slightly since last year, as shown in Figure 8. Note that the gender data is taken directly from our registration database and therefore some international student data is excluded.

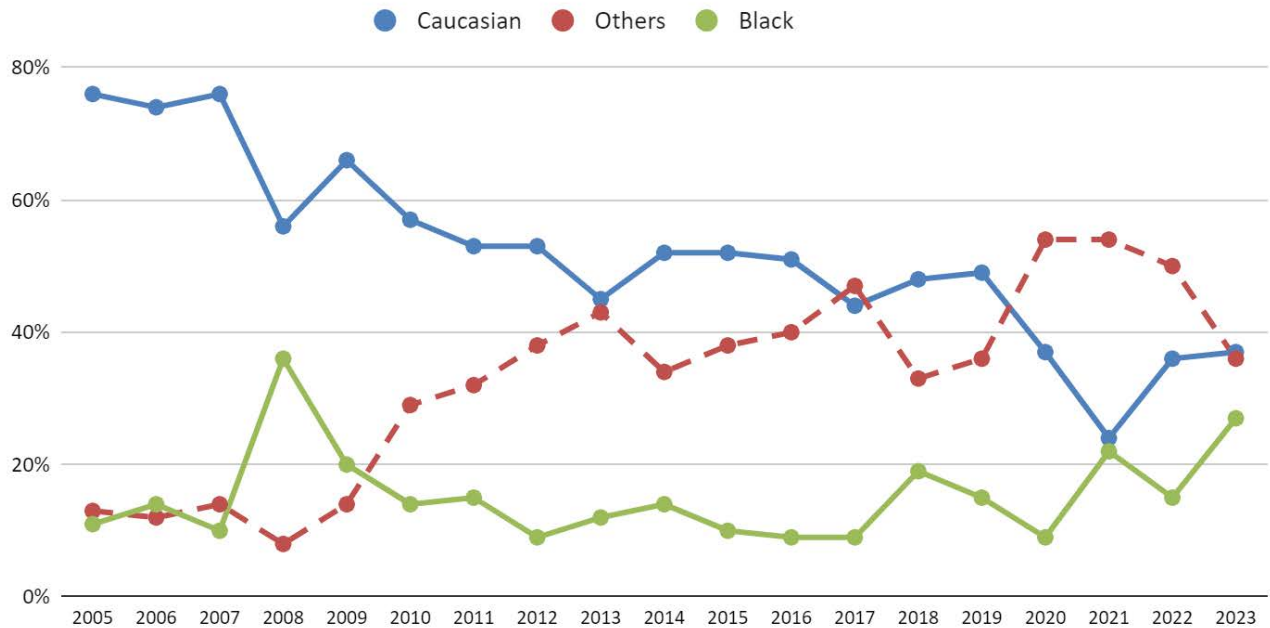


(Figure 8) Ratios of Robofest students by gender since 2005

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 517 (34%) of total participants registered in the system. In 2023, 33% 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.

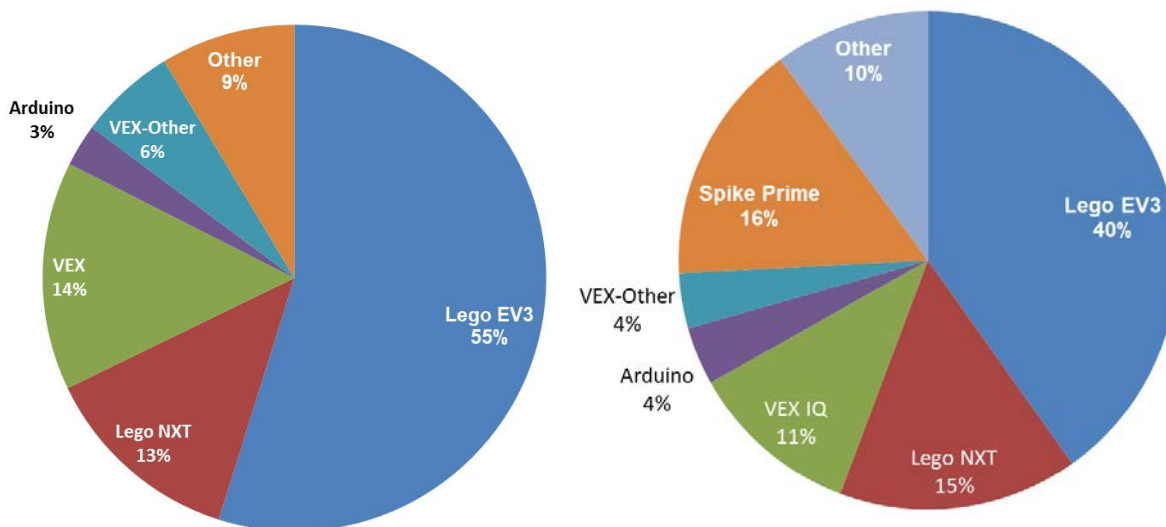


(Figure 9) Percentage of Robofest Student Participation by Ethnicity Data in 2022 (left) and 2023 (right)



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

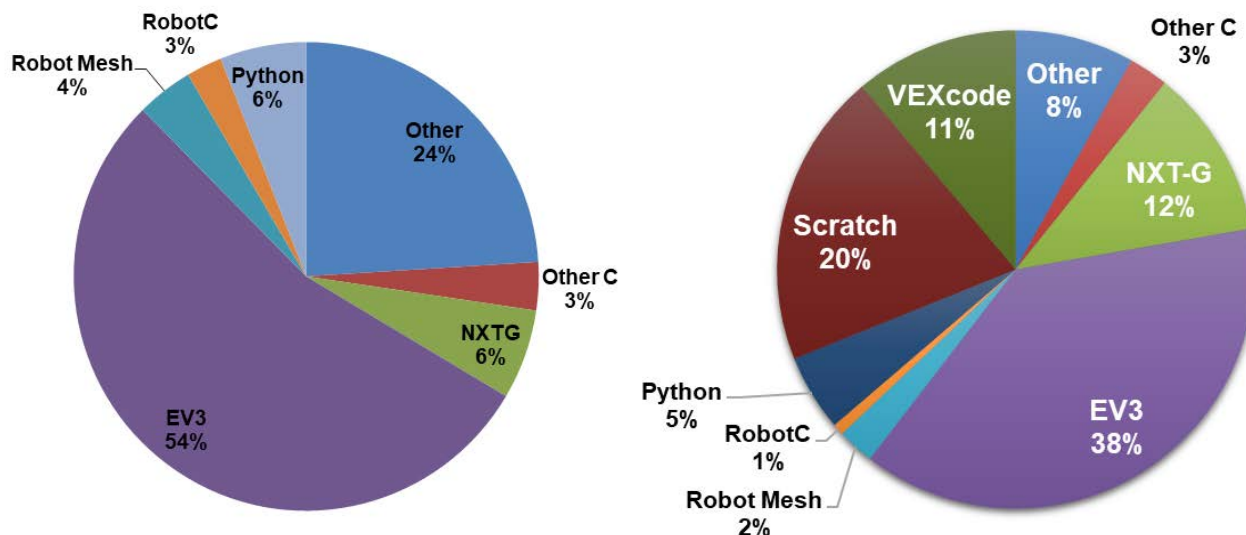
One of the unique features of Robofest is that it is completely open and allows the use of *any* robotics platform. Figure 11 shows the data on robotics kits used by teams in 2022 and 2023. In 2023, we added LEGO Spike Prime/Robot Inventor to the options, separating it from LEGO or Other. The majority of the teams (71%) are using LEGO products including the EV3 (40%) Spike Prime/Robot Inventor (16%) and 2nd generation LEGO NXT (15%). The use of VEX platforms decreased from 20% in 2022 to 15% in 2023. The use of Arduino increased from 3% to 4%. Other kits also increased from 9% to 10%.



(Figure 11) Percentages of robotics kits used by teams in 2022 (left) and 2023 (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 2022 and 2023. In 2023, student teams continue to use advanced and varied forms of programming languages. EV3 is still the most popular (38%). Scratch (20%) and VEXcode (11%) were added to the list of options in 2023 (previously “Other”). “Other C” in the figure includes Arduino C (Sketch). All C-style languages together totaled 4%. “Other” includes Java, 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 2022 (left) and 2023 (right)

2. Workshops and Outreach

Workshops:

Robofest hosted 3 official technical workshops during . Table 3 shows one instructor and the classes during the 2022-2023 season. Total number of workshop attendees was 24 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. The AI/Machine Learning workshop was new in 2023.

Date	Workshop Topic	# Attendees	# LTU Student assistants	Lead Instructor
Sat Jan 24	VEX IQ with VEXcode for Game	7	2	Elmer Santos
Sat Feb 25	AI/Machine Learning with Spike Prime / Robot Inventor for Exhibition	11	2	CJ Chung
Sat Mar 12	VEX IQ with VEXcode for Game	6	2	Elmer Santos

(Table 3) 2022-2023 Workshops

Robofest Outreach Initiatives:

Robotics Competition Education Forum, August 10th, 2022:

Shannan Palonis represented Robofest at the inaugural "Robotics Education and Outreach Forum" for robotics competition leaders in Minneapolis, MN. Coordinated by The Institute of Competition Sciences and hosted by the National Center for Autonomous Technologies in partnership with RoboNation and MATE Inspiration for Innovation. Its overarching goal is to increase communication and collaboration amongst robotics program practitioners.

The group discussed topics including the role of robotics competitions workforce development, promoting a centralized database of robotic competitions, creating a standard system of Micro-credentials/digital badges, and coordination for increased funding opportunities. Travel grant support was provided by NCAT.

The Alliance met again on May 9, 2023, but Robofest was unable to attend due to the Robofest World Championship events on May 11-13.

Marburger STEM Center Extreme STEAM Saturday, October 8, 2022:

Elmer Santos conducted an "Introduction to Autonomous Robots" workshop as part of the Extreme STEAM Saturday series for High School students. 8 Students attended the session, which included basic programming and troubleshooting of autonomous robots.

Robotics Competitions Insider Webinar, October 12, 2022:

Chris Cartwright and Shannan Palonis participated in a "Robotics Competition Insider" webinar hosted by the Institute of Competition Sciences. The event, including Robofest, MATE, RoboNation and REC was an invigorating discussion with four leaders of the top robotics competitions about how to do well in robotics competitions and participants can use the programs to the best effect for future college and career opportunities. There was a panel discussion and a Q&A session.

Marburger STEM Center "STEM Day with Wayne Westland Schools", November 9, 2022:

Elmer Santos, Shannan Palonis and 2 student assistants participated in the Wayne Westland Community Schools STEM Day, where 200 middle school students from the district were introduced to LEGO EV3 Robot Scorpion Robots and learned about the Robofest program. The district has plans to host teams and in the 2024 season

Michigan Science Teachers Association Conference, March 3, 2023:

Pam Sparks and Shannan Palonis presented a breakout session at the 2023 Michigan Science Teachers Association conference in Lansing, MI. 15 teachers participated in the session titled: Autonomous Robotics Education Through Competition. During the session, the teachers were introduced to the Robofest competition methodology and how the competition enhances STEAM Learning in the classroom and afterschool programs.

Pen Pal Program:

A Pen Pal program, coordinated by Advisory Board member Gavin Coleman, was initiated during the 2023 Robofest season. Teams were paired based on the event that they were signed up for. Priority was given to pair teams from different countries so that they could have a better understanding of different cultures and be able to collaborate with ideas. Students communicated via email mostly due to the time changes. There was a great rapport between most of the teams and those that participated enjoyed the experience.

RoboZone Podcast:

State Champs and Yellow Flag Productions, Lawrence Technological University's Marketing partner, hosts a "RoboZone" podcast. Previously dedicated to FIRST Robotics competitions, they began to include Robofest when the partnership began. On January 24, 2023 Chris Cartwright, Shannan Palonis participated in the podcast to announce the upcoming season. On June 12, 2023, Shannan Palonis and Coach Erik Rosvold participated to wrap up the season and announce upcoming opportunities for High School students. RoboZone also highlighted Robofest competition footage on their weekly updates throughout the season on their YouTube channel.

<https://www.youtube.com/@RoboZoneTV>

MITech TV Podcast, October 31, 2022:

Shannan Palonis participated in the MITech TV Podcast with Matt Roush and Mike Brennan to discuss the Robofest program kickoff and return to in-person competition for the 2023 season.

<https://www.dbusiness.com/tech-mobility-news/lawrence-techs-robofest-returns-in-person-for-2023-season/>

3. Plans for 2024

We are planning to host as many in-person events as possible and hope to increase the total number of events in the USA. Lawrence Technological University is proud of providing a quality education to students. Robofest will assist LTU with its recruiting efforts with the goal of attracting more students to LTU. Robofest has been approved by the State of Michigan as a 99h grant provider for 2023, which will reduce costs to "Michigan" teams that can get a grant. We are planning Teacher/Coach workshops in coordination with the MISD (Macomb Intermediate School District) as well as other school districts. Team pre-registration will be available earlier (October 1-31) for the 99h grant. We believe that these additions will contribute to an increase in participation. We are implementing quality improvements, including establishing a Technical Committee for each competition category and introducing more AI, math, and physics into the competitions. We are planning more events in the fall semester, such as Saturday workshops and competitions.

We have plans to host the 2024 World Championship events on LTU Campus on May 9-11, 2024. Final schedule and any changes will be announced at the Robofest Kickoff Meetings and on the Robofest Website.

4. Revenue/Expense Summary

Financial results for the 2022-2023 academic year (Aug. 8, 2022 ~ July 29, 2023) are as follows: **\$74,308.24** in cash revenue including the transferred balance from 2021-2022 year. Net expense was **\$59,145.52** and **\$15,162.72** is transferred to the next year. LTU College of Arts and Sciences supported **\$64,721.12** to pay full-time and part-time staff wages. Tables 4~6 show the summary of cash revenue and expenditure.

Transfer from 2021-2022	\$38,148.86
Individual donors	\$860.88
Corporate/Org. Cash Sponsorship (<i>In-kind donations not included.</i>)	\$6,300.00
Team registration fees & other income	\$28,988.50
Total net cash income without transfer from last year	\$36,159.38
Total revenue including transfer from last year	\$74,308.24

(Table 4) 2022-2023 Cash Revenue

Webserver, RMS admin hours.	\$570.00
Six student assistants' wage	\$6,708.75
Buying out faculty release time	\$4,300.00
Workshop instruction hours; Faculty summer hours	\$0
Trophies and plaques	\$4,673.50
Qualifier and World Championship Medals	\$4,055.98
Other Supplies (Amazon web services - Webserver, Cloudflare, playing field materials, office supplies, signs, workshop food, etc.)	\$6,559.15
Give away & merchandise items; Lapel pins	\$15,549.28
Table & chair rental for World Championship	\$2,714.50
Poster & Banner printing; Office copier & printing; J234 wall sign	\$2,101.00
2023 T-shirts	\$1,590.25
Robofest staff travel; Judge travel support	\$2,892.72
World Championship food	\$5,134.02
Net Direct Expenses (E1)	\$59,145.52

(Table 5) 2022-2023 Robofest Account Expense Summary

Staff (full-time and part-time) wage support from College of Arts & Sciences	\$64,721.12
Student assistant wage support from College of Arts & Sciences	\$0
Total LTU Cash Support (E2)	\$64,721.12

(Table 6) LTU Direct Support Expense Summary in 2022-2023

Note that Table 5 does not include LTU's indirect overhead cost such as space, electricity, heating and A/C, water, etc. The total direct program cost (**E1+E2**) was \$123,866.64. Table 7 shows cost per student data history since 2017.

	2017	2018	2019	2020	2021	2022	2023
Direct cost	\$146,085	\$141,908	\$155,482	\$115,177	\$66,623	\$84,955	\$123,867
# Stu. Served	2,846	2,464	2,489	1,471	1,166	1,674	1,666
Cost / Student	\$51.33	\$57.59	\$62.47	\$78.30	\$57.14	\$50.75	\$74.35

(Table 7) Cost per student data since 2017

5. Recognition & Acknowledgement



(Figure 13) IEEE Sponsored Medals

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

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

https://www.robofest.net/images/2223/WC_Winners_with_Names_Open.pdf

and

https://www.robofest.net/images/2223/WC_Winners_with_Names_Main.pdf

Table 8 summarizes Robofest World Championship categories, program/agenda and judge bios (exhibition style events). We would like to thank all the Robofest World Championship UMC, Exhibition, RoboArts, RoboMed, RoboParade, BottleSumo, and Game Judges.

Category / Division	Day / Date	Program/Agenda	Judge Bios
Jr BottleSumo (Group 1)	Thursday 5/11	Jr BottleSumo Gp 1 Program	
Jr BottleSumo (Group 2)	Friday 5/12	Jr BottleSumo Gp 2 Program	
RoboMed	Friday 5/12	RoboMed Program	RoboMed Judges
Unknown Mission Challenge (UMC)	Friday 5/12	UMC Program	
Sr BottleSumo Classic and Unlimited	Friday 5/12	Sr BottleSumo Program	
RoboParade	Friday 5/12	RoboParade Program	RoboParade Judges
RoboArts	Saturday 5/13	SATURDAY Program	RoboArts Judges
Exhibition	Saturday 5/13		Exhibition Judges
Game Finals	Saturday 5/13		

Robofest was fortunate this year to have 6 corporate/foundation Bronze or higher sponsors, 5 Friends level sponsors, and 4 World Championship event sponsors as shown in Figure 14. Sponsor logos were shown on programs for warm up, qualifying, and WC competitions as well as all the highlight videos.



(Figure 14) Official Robofest Sponsors for 2022-2023

Robofest recognized the following coaches with an Anniversary award:

- Brian Kincheloe, Troy, MI (Coach ID 1080): 15 years
- Srinivas Bommedi, Novi, MI (Coach ID 2109): 10 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 2022-2023 season would not have been possible. Table 10 lists National Directors who organized competitions in their countries and/or sent teams to Robofest World Championship.

Site Name in Robofest Management System	Site Host Organizer Name(s)
Alexandria_TechnoFuture_Egypt	Farid Hussien / Ayman El Kabbany
Bellevue_Cornerstone_FL	Joe Moseley
Bangalore_India	I.A Khan, Novatech Robo
Canton_Gallimore_MI	Cara Wegrzyn
ClintonTwp_MISD_MI	Mark Muzzin
Cloquet, MN	Cameron Lindner
Detroit_Emerson_MI	Kunjan Vyas

Detroit_JeffersonDouglassAcademy_MI	Monica Thompson
Detroit_UPSM_MI	Pamela Sparks
Freetown_SierraLeone	Kalidu Bundu
Houston_UrbanSTEM	Dr. Monique Thompson
Napoleon_NCS_MI_BottleSumo	Adam Draa
Novi_AccelerateKID_MI	Jelani Stowers
PlantCity_AdvantageAcademy_FL	Gavin Coleman
Pretoria_SouthAfrica	Jaco vanWyk
Saline_WCA_MI	Betty Recker
StPeteBeach_CommunityCenter_FL	Emma Alaba
TaoyuanCity_Taiwan	Jason ChienTai Lo
Troy_TrinityRomanian_MI	Maria Rosvold
Wolfville_Acadia_Canada	Jenna Watson-Findley

(Table 9) Site Host Organizers using Robofest Management System

Country	National Director
Ghana	Dr. Yaw Okraku-Yirenkyi, GRAF
Hong Kong	Justin Chan, RIHK
Jordan	Farah Hourani, STEAM Center
Macau	Yau Ka Chun, RIHK
Mexico / Latin America	Dr. Ramiro Marrero, CENIPAD
South Korea	Yijun Nam, FUNERS
Saudi Arabia	Manal Nagash, BenaaEDU
United Arab Emirates	I.A Khan, Novatech Robo

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

All the US and International Site Hosts are listed on the 2023 Robofest poster shown in Figure 15.



(Figure 15) Robofest 2023 Official Poster

The Robofest office staff consists of Elmer Santos, Assistant Director, Shannan Palonis, Full-time Coordinator, and Pam Sparks, Part Time Coordinator. We also had 6 LTU Student Assistants for the full year: Anthony Shevenock (Computer Engineering), Scottie Rapp (Electrical Engineering), Robert Newberry (Game Design), Nicholas Sparks (Media Communications), Giovanni DeRose (Mechanical Engineering) and Stephen Arnold (Computer Science). CJ Chung, Advisory Board Chair, volunteered for many aspects of Robofest administration including teaching AI & Lego Robotics workshop and assessment.

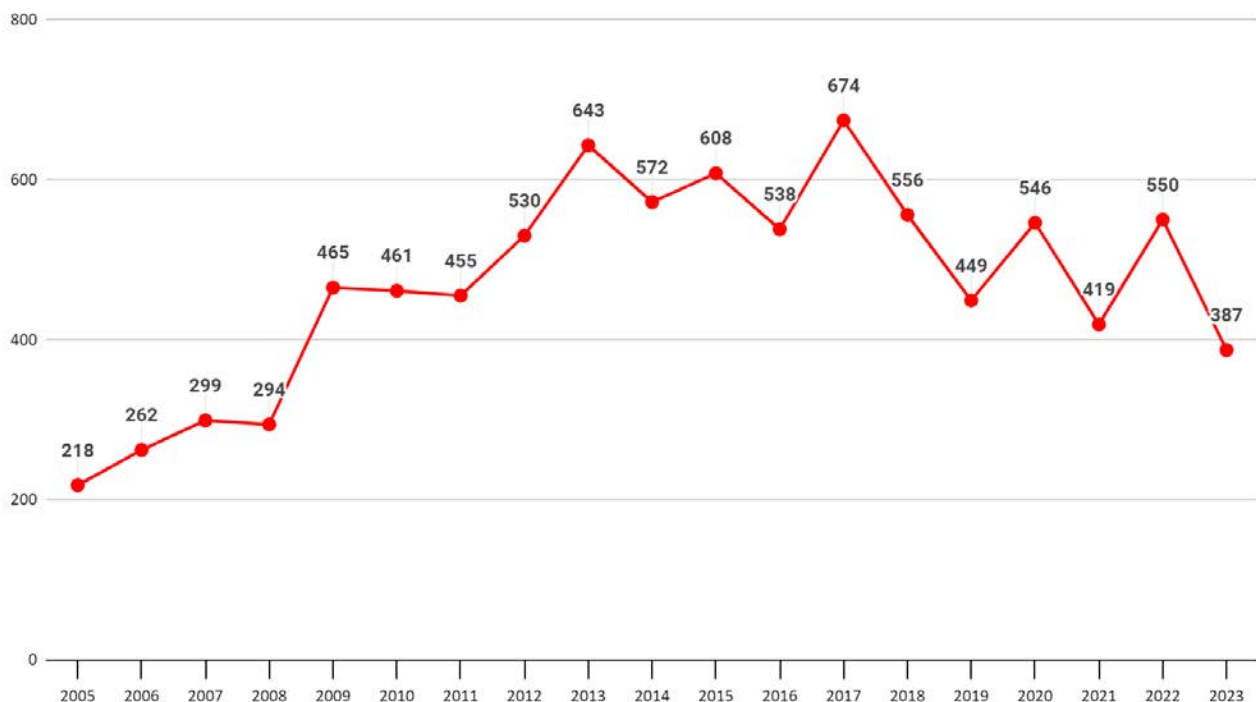
LTU Administrators, Staff and Faculty who *directly* supported Robofest this year include:

- Dr. Patrick Nelson, Interim Dean of College of Arts and Sciences: budget support AND 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
- Glen Bauer, Associate Dean of College of Arts and Sciences: Closing Remarks and presentation of Special Awards at the live Robofest World Championship Award Ceremony
- Dr. Sibrina Collins, Executive Director of STEM Education, Associate Professor of Practice in Chemistry, College of Arts and Sciences: Opening Remarks at Robofest World Championship
- Dr. Choongbae Park, Assistant Professor, Mechanical, Robotics, and Industrial Engineering: Jr Exhibition Judge
- Dr. Paula Lauren, Assistant Professor, Math & Computer Science: RoboParade Judge
- Dr. Eric Martinson, Associate Professor, Math & Computer Science: Exhibition Judge
- Marilyn Wiseman, MCS Department Administrative Assistant: purchasing & reimbursement requests, employment related paperwork, People's Choice Award Judge Coordinator, and much more.
- Cheri Frost, CoAS Dean's Office Administrative Assistant: assisted Marilyn and managed the College of Arts & Sciences budget account for Robofest.
- Olivia Thompson-Tinsley, Biomedical Engineering Administrative Assistant: Retail Sales Coordinator at World Championship
- Lyubov Kagan, Business Services: Retail Sales and Credit Card Services
- Kathy Juchartz, Financial Aid Counselor: People's Choice Award Judge Coordinator
- Matt Roush, Managing Editor media services for Lawrence Technological University, Yellow Flag Productions: press releases and media support (MITech Podcast)
- Gonca Eren, Helpdesk Services Operations Supervisor: laptop services
- Linda Ridella, Helpdesk Services Technician: laptop services
- Alexis Swint, Helpdesk Services Technician: laptop services
- Shannell Douglas, Admissions: Information Table at Field House for World Championship
- Norman Plant, Manager, Instructional and Graphics Support: video and media production
- Thomas "Sam" Vukonich, Assistant Director of Media Services: audio/video support
- Anthony Persinger, Media Production Coordinator at eLearning Services: media production
- Lorne Plant, Yellow Flag Productions: Marketing Support
- Matt Mandriano, Yellow Flag Productions: Poster design
- Denver Rochon, Yellow Flag Productions: video and media production
- John Snow, Yellow Flag Productions: video and media production
- Mathew Maracle, Assistant Director Campus Facilities: World Championship setup, cleanup and coordination of venues
- Derek Thornton, Event Manager Campus Facilities: All Campus event setup, cleanup and coordination of venues

Other individuals we would like to thank for their continued 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 events
<https://robofest-timer.daveeddigs.repl.co/>
- Katherine Bis: Cranbrook Education Community, Former Robofest Coordinator: World Championship Event Coordination, UMC Judge, Exhibition and morale support
- Chris Parker: Owner of TechRoots, Former Robofest Coordinator: World Championship Event Coordination, Jr BottleSumo Chairperson, and morale support
- Emma Alaba, Advisory Board Member, Florida Robofest Director, Owner of Computer Learning Center: World Championship Exhibition Chairperson and World Championship Coordination
- David Carbery, Fanuc, Former Robofest Workshop Instructor: Sr BottleSumo Chairperson, RoboArts Chairperson

There were 387 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. Short bios of Exhibition Style World Championship Judges can be accessed in the Table 8 “Event Judges” column.



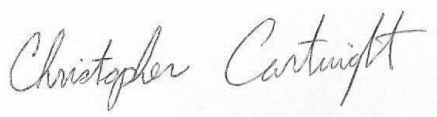
(Figure 16) Number of yearly registered Robofest site volunteers since 2005

In summary, we believe 2022-2023 Robofest has achieved its primary missions: inspiring students into STEM fields and supporting them even in these challenging times. We were happy to return to an in-person World Championship this year and hope that next year will be even better. 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 24th Robofest for the 2022-2023 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 25th annual Robofest season in 2024.

I have decided to step down from the Director of Robofest position. Prof. Elmer Santos who has been with Robofest since 2002 will be the next Director. I wish Elmer the best. I will assist Elmer as a member of an Executive Council that the Founder and previous Director Dr. CJ Chung is forming.

Respectfully,
August 15, 2023



Christopher Cartwright, Ph.D.
Associate Professor of Math and Director of Robofest
Lawrence Technological University
Math and Computer Science Department
21000 West 10 Mile Rd. Southfield, MI 48075, USA
www.LTU.edu ccartwig@LTU.edu

