Robofest 2008 Official Report

Contents

Austin. TX 2008

1. Analysis of Robofest Registration Data

A total of 1,647 students, 560 teams from five countries (Canada, England, France, Korea, and the USA) participated in the 9th Annual Robofest student robotics competition. Robofest 2008 featured a warm-up competition, 40 qualifying competitions, and one World Championship. Robofest focuses on STEM (Science, Technology Engineering, and Mathematics) education and has grown rapidly since its inception in 2000, as shown in Figure 1.

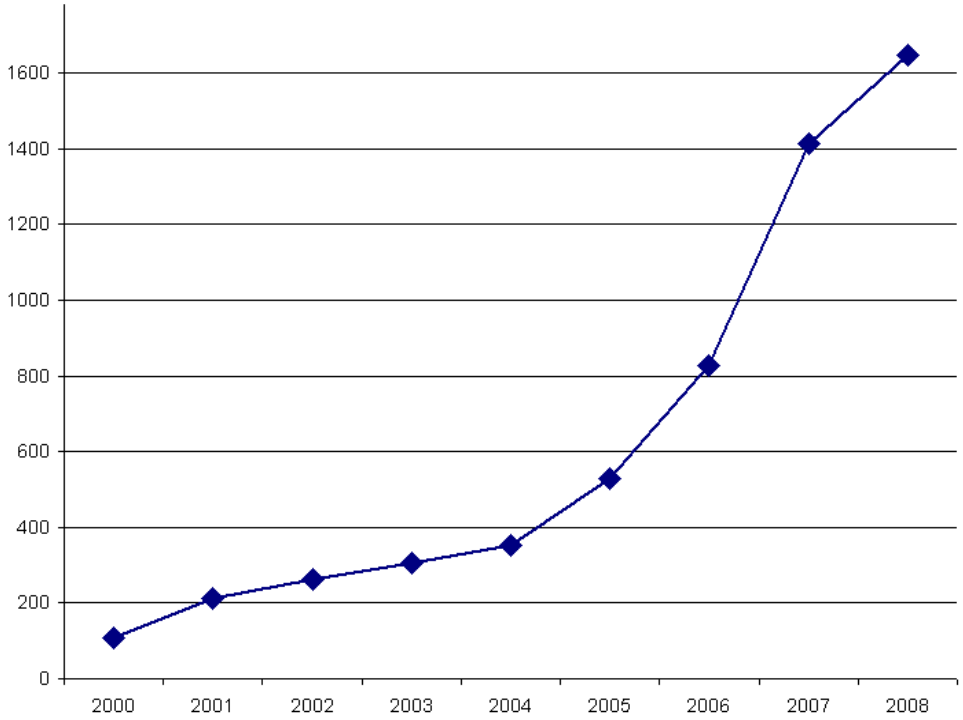

Figure 1. Number of Robofest Student Participants Since 2000

Robofest would not be possible without the help of many dedicated people. Table 1 shows the total number of officially registered people including teachers, mentors, students, coaches, judges, site sponsors, and site volunteers for the 2008 Season. Robofest 2008 had its largest number of participants ever, reaching over 3,600 people all together. The increase was possible due to the many new site hosts (see figure 2). (*) Note that the data numbers for the Asia-Pacific site in Korea are estimates based on the 2007 data. (**) A team from France participated via Video Submission.

Site/Event	Teams	Coaches	Players	Sponsors	Volunteers	Site Vol.	Total
Westland_MI	6	5	19	8	9	10	57
Winners_Korea	16	4	76	16	30		142
Asia-Pacific, Korea(*)	200	90	350				640
Aiea_HI	12	9	66	11	17		115
Kent_UK	15	2	33	17	11	8	86
Canton_MI	6	4	22	4	11	14	61
Monroe_WA	10	5	39	9	21	5	89
Video Submission(**)	5	2	16	5	5		33
Jemison_Detroit_MI	5	1	17	5	5	2	35
Clinton_twp_MI	13	7	52	11	21	8	112
Pentathlon_MI	6	6	20	5	6	4	47
DASA_Detroit_MI	4	1	8	4	4	5	26
Murphy_Detroit_MI	6	2	29	6	10	3	56
Cypress_TX	11	4	32	11	11	5	74
Merit_Detroit_MI	5	1	15	7	5	5	38
Aurora_CAN	10	1	62		10	8	91
Woodland_CA	5	4	18	4	5	8	44
UD_Jesuit_MI	12	5	44	9	18	12	100
Royal_Oak_MI	4	3	25		8	3	43
Northville_MI	10	10	37	8	15	20	100
Emerson_Detroit_MI	5	1	24	5	5	3	43
AAT_Detroit_MI	10	4	32	12	10	8	76
Edison_Detroit_MI	5	1	15	10	10	4	45
Community_Detroit_MI	4	1	5	2	4	3	19
YMCA_Detroit_MI	5	1	11	5	5	4	31
Marysville_MI	8	5	34	8	9	12	76
Kettering_Detroit_MI	5	1	13	6	5	4	34
Coaldale_CAN	10	4	24	1	10	8	57
Mini_Urban_MI	8	5	10	7	8	2	40
Grand_Rapids_MI	10	6	39	5	12	13	85
Houston_TX	4	4	25	2	8	8	51
Howell_MI	13	4	39	7	13	3	79
Bridge_Battle_MI	7	3	20	6	7	4	47
Burt_Detroit_MI	5	1	15	5	5	4	35
CIS_Detroit_MI	19	8	72	20	20	4	143
Flint_MI	12	9	44	9	16	8	98
Austin_TX	11	9	50	10	15	25	120
Neinas_Detroit_MI	5	1	14	5	5	4	34
Southfield_MI	14	9	57	14	29	30	153
Dossin_Detroit_MI	4	1	11		12	4	32
Ann_Arbor_MI	35	16	113	25	48	14	251
LTU_Warm Up						39	39
World_Championship						52	52
Total	**560**	**260**	**1647**	**304**	**478**	**380**	**3629**

Table 1. Total Number of Registered Participants for Each Robofest 2008 Competition Location

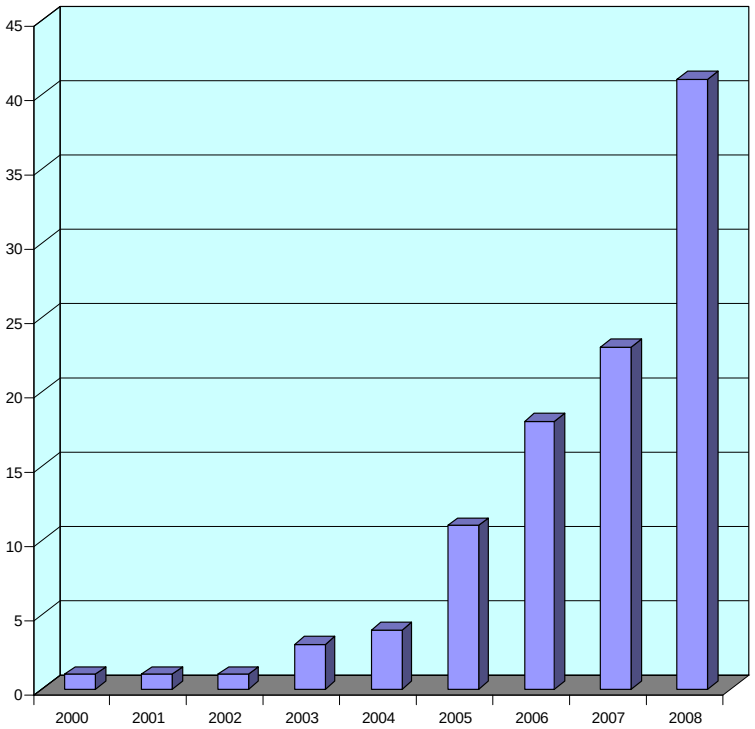

Figure 2. Number of qualifying sites

Unlike other years as shown in figure 3, the RoboSumo was the most popular category in 2008. 37% (26% Jr. Sumo + 11% Sr. Sumo) of Robofest teams participated in the RoboSumo games. Then 36% (24% Jr. Game + 12% Sr. Game) of Robofest Teams participated in the Game Competition, RoboSavers. RoboSumo appeared to be a good category to attract rookie teams. The VEX Bridge Battle was introduced as an associate program of Robofest this year. We thank Cranbrook Schools for organizing the event as well as the 3rd Annual Vex Pentathlon.

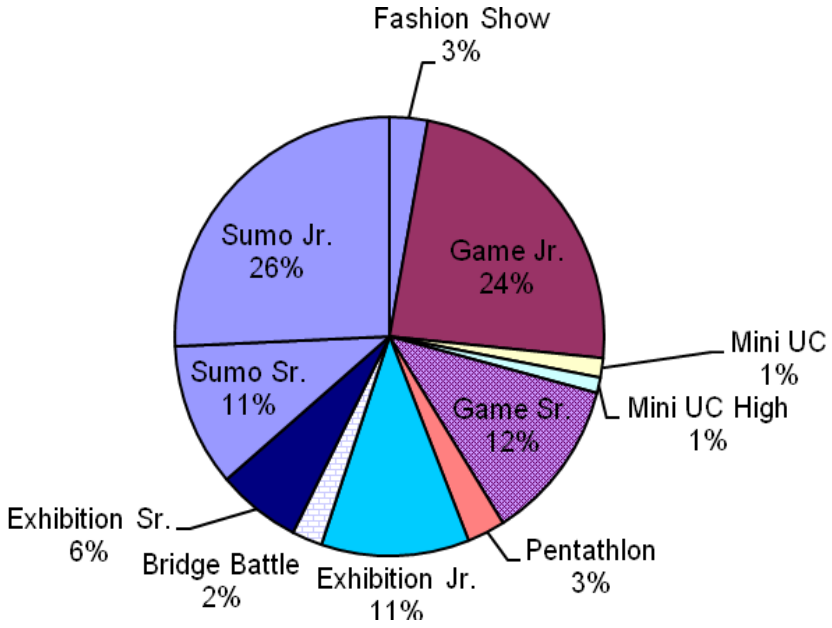

Figure 3. Percentages of Teams by Age Division and Competition Category

Robofest was popular for 6th through 8th grade students. 47% of the student participants were from middle schools as seen in figure 4. Furthermore, 17% of students were 5th grade level (down from 19% in 2008) while less than 1% participants below 5th grade requested an age waiver. The percentage of high school students increased by 1%. Please note that the data does not include Korean students.

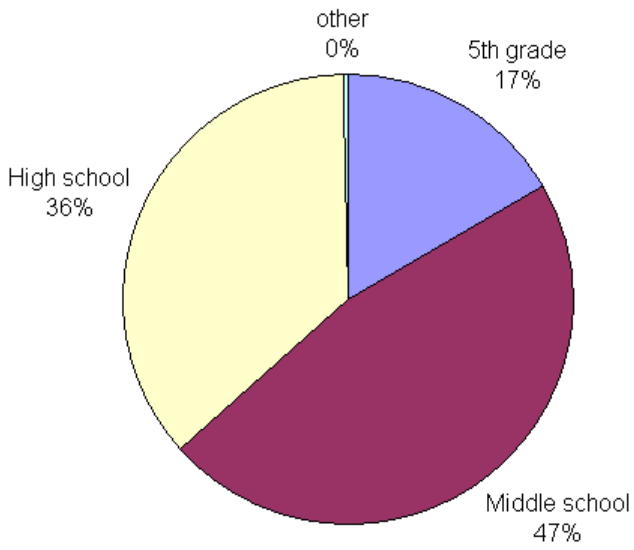

Figure 4. Student Participant School Grade

Figure 5 shows gender ratios of Robofest 2008 students. Robofest 2008 had the highest ratio of female students ever. In 2007, 24% were females. The data does not include the students participating at the Korean competition as they were using their own registration system and we were not able to get the data from them.

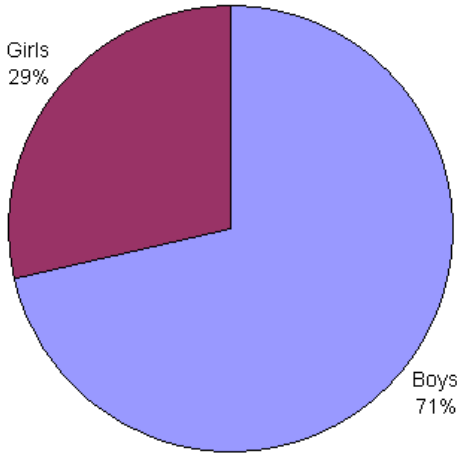

Figure 5 Gender Ratios of Robofest 2008 Students

Ethnic diversity is represented with nearly half (44%) of Robofest 2008 participants representing minority backgrounds. Specifically, 36% of Robofest 2008 students were African American, 8% were others as shown in figure 6. This larger increase was possible thanks to the dedicated generous fund from CFSEM (Community Foundation for Southeast Michigan) supporting schools in Detroit and Highland Park. Figure 7 shows the changes from 2005. Robofest continues to work hard to encourage students from underserved communities to participate in learning STEM areas. Figure 6 and 7 data exclude students from Korea, England, and France.

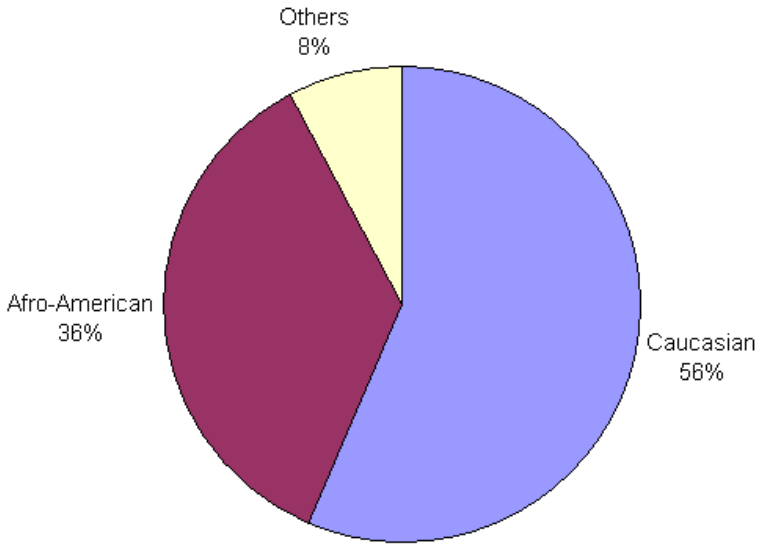

Figure 6 Robofest 2008 Student Participant Ethnicity Data

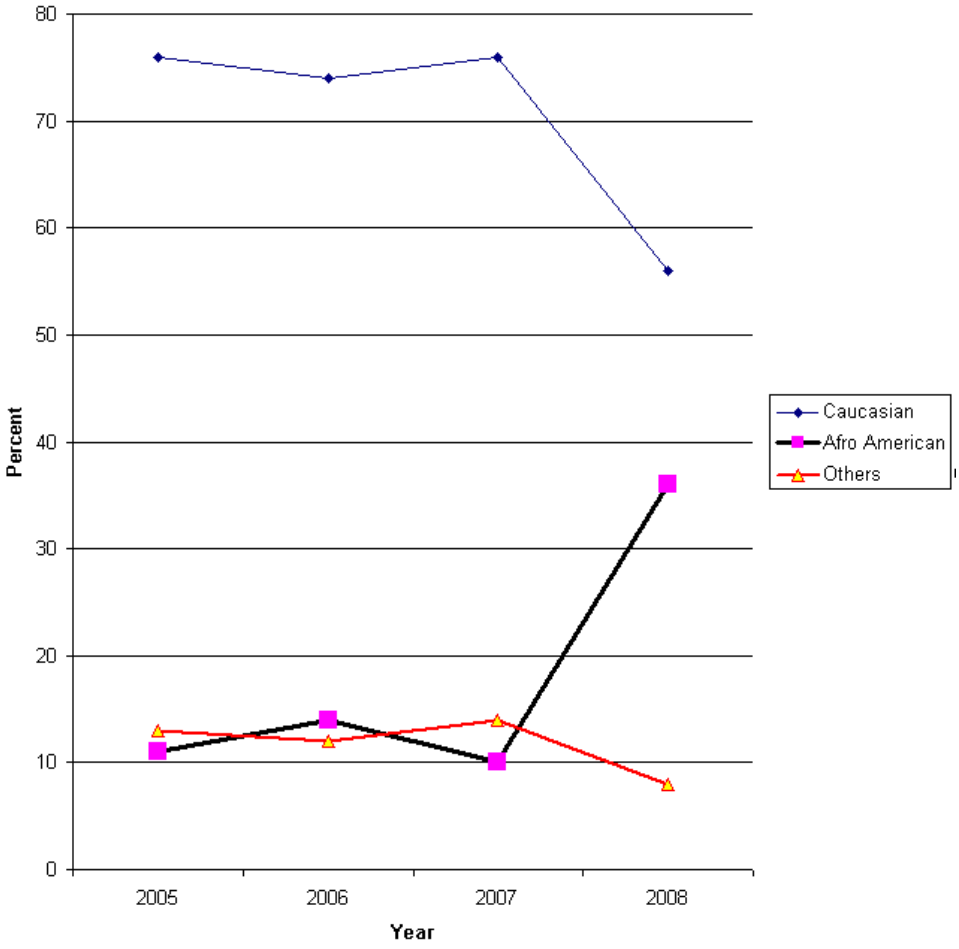

Figure 7 Robofest Ethnicity Data since 2005

Robofest allows the use of any robotics platform. Figure 8 shows the data on robotics kits used by teams in North America and teams at the World Robofest. We do not have detailed data on teams in Korea. More than half (51%) of robot kits were LEGO NXTs this season. UK teams introduced a new robot kit called BioLoid that can be transformed to humanoid robot. No team used HandyBoards this year.

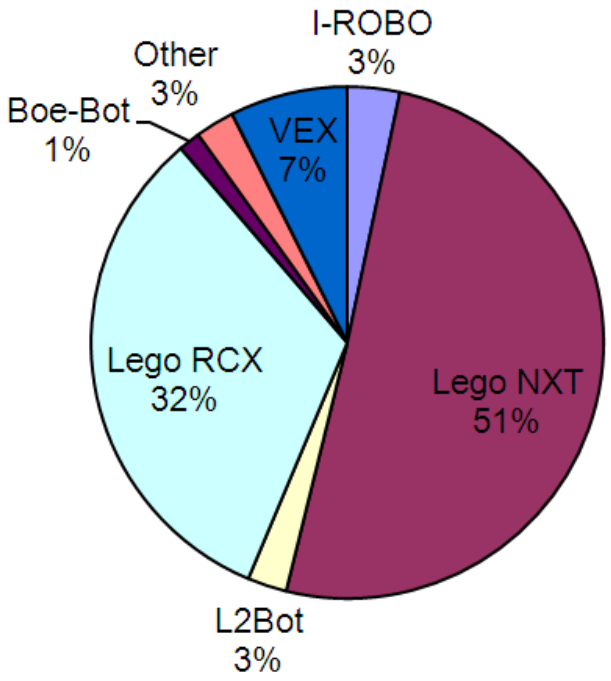

Figure 8 Robot Kits Used by teams

Robofest remains focused on student participants learning computer programming. The programming languages used in Robofest 2008 are graphed in Figure 9. Student teams continue to use advanced and varied forms of programming languages. Allowing students to use whatever programming language they prefer is one of many unique features of Robofest. Robofest provides opportunities to learn professional programming languages, and helps to prepare our students for future career paths.
Some of this year's game teams were using custom-made sensors for short range object detection. Robofest students continue to show high technical skills and advancements in their abilities. This is possible because of many dedicated coaches and mentors.

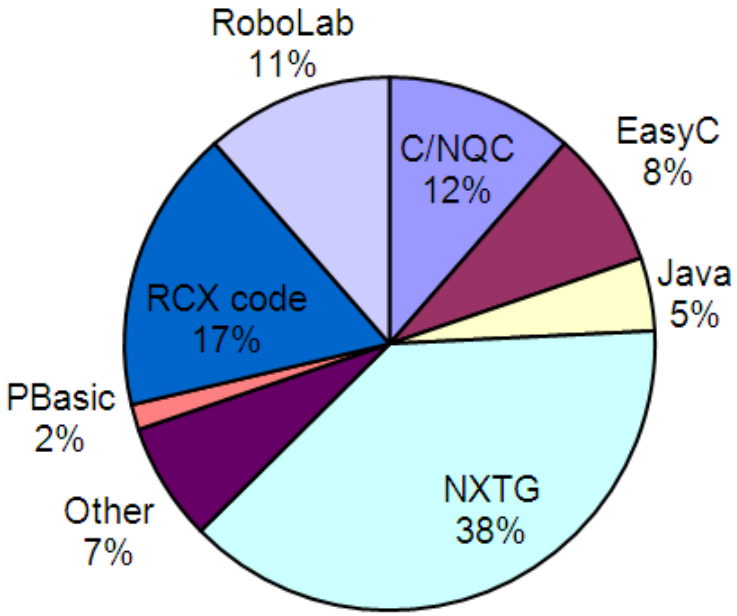

Figure 9 Programming languages used

How are Robofest teams formed? Figure 10 shows that most Robofest teams (37%) were learning and preparing for competition through after school programs. We found that a large portion of teams (17%) were from home schools.

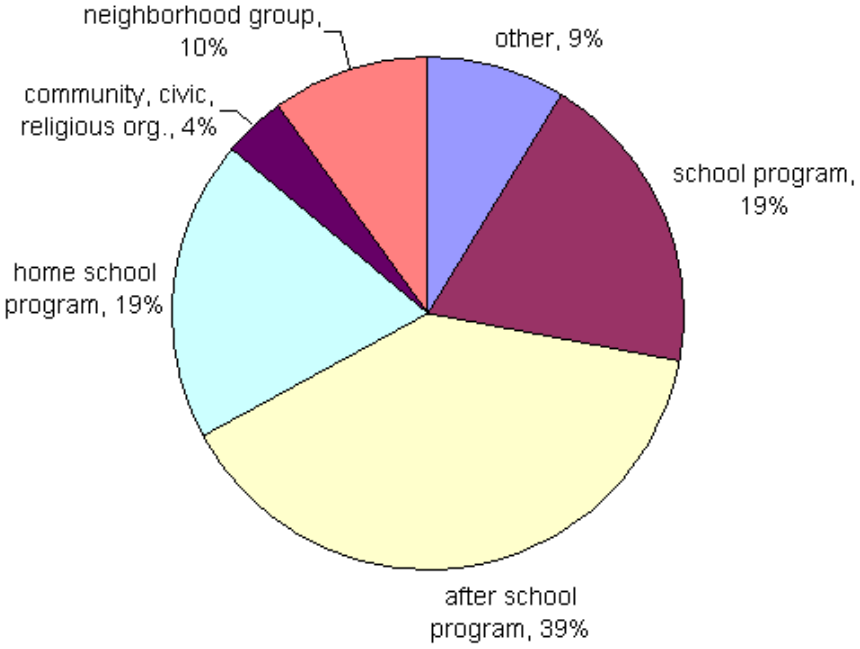

Figure 10. Team organization

2. Robofest 2008 Coach Survey Results

This section shows the results of the anonymous web survey conducted in summer 2008 after the world Robofest. 87 coaches (teachers or parents) participated in the survey.

Q: What area do you think is enhanced (or will be enhanced) through Robofest robotics for students?

other	5%
science/engineering	38%
computer technologies	31`%
math	4%
creativity	3%
teamwork / leadership	16%

Q: For whom do you think the Robofest program is designed for?

other / not sure	6%
Students who demonstrate exceptional talent	5%
Only for students who are interested in science and engineering area	26%
every student	60%

Q. How likely are you to participate in Robofest next year?

not sure yet	4%
not likely	3%
Somewhat likely	9%
Very likely	33%
extremely likely	49%

Figure 11 shows funding sources for teams. Parents are still the driving force behind Robofest teams. Robofest is always helping teams get grants and sponsorships. For example, team 668 got a sponsorship from AREVA NP Inc in WA through Lawrence Tech.

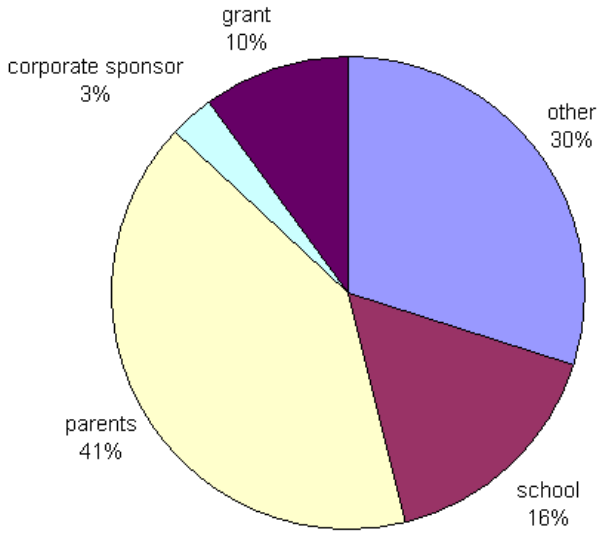

Figure 11. Team Funding Source

Instead of the "Answer a Question", we introduced written exams for Game and Exhibition teams. The results are shown in Figure 12. We feel we need more investigation on this issue and we are planning to introduce pre-test and post-test online instead of the written exams for all students in 2009.

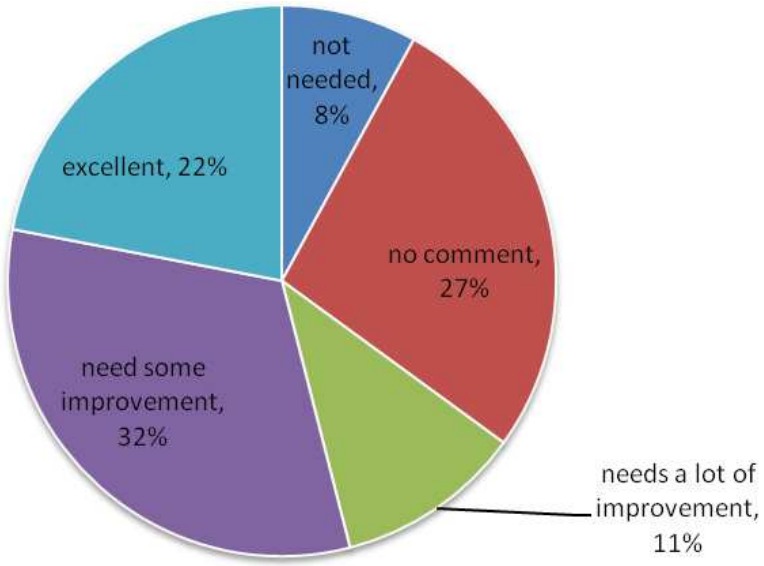

Figure 12. Written exam survey result

Figure 13 shows the overall satisfaction percentages this year. We realize again that it is not easy to satisfy everyone when organizaing a competition. We will, however, try hard to maximize the satisfaction rate for every team.

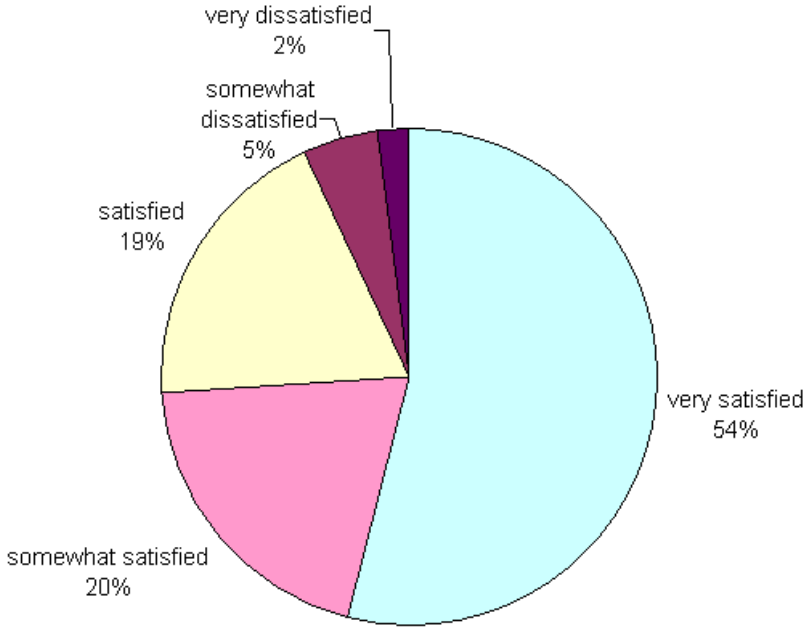

Figure 13. Overall Robofest Satisfaction

3. Areas That Need Improvement, Comments, and Plans

We have identified various facets of Robofest needing enhancement and improvement in the coming years. Additionally, we collected comments through the annoymous on-line survery. Some coaches and organizers emailed lists of suggestions. We apologize that some items summarized below were pre-existing problems from previous years. We are very sorry and will do our best. Please understand that some issues will take time to improve.

General Administration

Site Host Administration

The cost and complexity of supporting site hosts both in and outside of Michigan increased in 2008. On Saturday, April 12, there were 9 events concurrently. Amazingly we were able to ship and email supporting items out of states and support local sites with limited staff and volunteers. Efforts will be made to proactively schedule dates next year so that there is not as many events on one day. It is strongly suggested that sites out of Michgan paln for earlier dates, as time is needed to fund the expenses in coming to the World Championship. We plan to introduce a new online fundraising tool to assist teams with travel expenses to the World Championship. Some sites were too close to each other. Developing committees for each state to cordinate events is being considered. The hope is to alleviate scheduling conflicts outside of Michigan and to provide geographic distribution as well. The World Championship venue may be flexible starting in the 2010 season to share acess and further promote Robofest for future growth.

Categories/Age Divisions

The 2008 season had 11 competition categories/age divisions for Robofest, creating some confusion for novice teams. We plan to simplify competition categories. In addition, management of this many events created higher costs when few teams actually competed in a specific event. If there are fewer than five (5) teams registered for a specific category/age division of competition, cancellation of the division will be considered, with alternate site suggestions or video submission options for displaced teams. This decision should be made three weeks before the actual qualifying date.

Hotels and Lodging

Due to budgetary and administrative constraints at Lawrence Tech, we will be unable to provide one night hotel compensation for any teams competing in the 2009 World Robofest Championship.

Registration Fees and Checkin fees

According to the annoymous survey, 61% said the fee ($55 or $45 for Sumo) was reasonable. We decided to set $50 per team as the uniform fee for 2009. We are proud of our cost-effectiveness and efficient management to minimize cost.

Q. Rgistration fee ($45 for Sumo, $55 for others) was:

Too inexpensive	3%
moderate	58%
Too expensive	13%
No comment	24%

Budget

- Robofest Budget results for the 2008 season (July 1, 2007 ~ June 30, 2008, Lawrence Tech fiscal year) were as follows: $76,989.80 in revenue, $61,906.58 in expense which resulted in an overall gain of $15,083.22.
- The revenue does not include the salary for part-time Robofest coordinators, LTU student assistants, or office supplies and expenses.
- 4 part-time coordinators worked 1,409 hours from Sep 2007 ~ June 30, 2008.
- Balance carried over from previous year was negative $15,007. The current balance is positive $76.22 as of June 30, 2008. We are so glad to see the budget back in the black finally. This is due, in large part, to new funding sponsor CFSEM, platinum level sponsor Chrysler foundation, and gold level sponsor SolidWorks.
- Some Robofest teams did not pay registration fees. We decided not to pursue this, since hourly salary for Robofest staff members is greater than the moneis we could collect. However, we realize a more controlled registration process/tools for 2009 is necessary.
- We will post an Excel file for the revenue and expense from 08-09 year. Currently, all this information is in our internal database systems using three different accounts, making it hard to publish.

Communications

- Teams need ways to share, interact, and collaborate with other teams. We also need to provide a way for coaches to network or communicate with other coaches. Therfore, we are in the process of developing an online forum system or discussion board embedded in the Robofest coach account.
- We will be actively using Skype from now on. It is stronlgy encourgaed to have a free Skype account. We will also use web conferencing tools and webinars.
- Although there were Robofest articles in several publications, Robofest was not well publicized in major media outlets. This is a shame, as students were doing advanced competitions and their achievements should be well publicized. We hope to improve media coverage for 2009. Please send your teams' achievements to your local newspapers and TV stations!

Robofest Website

It was still not easy for new teams to find all the needed information on the web. We are fully aware that the current website is neither well structured nor well-organized. It is hard to navigate. Web pages are not consistent with design styles and color themes. There are some broken links. Some information is confusing and cluttered. We are planning major renovations, but we will improve partially by December. But we are proud of keeping almost all data/information/pictures of the 9 years of history. No other competition site provides that kind of information in detail over the years!

Online Registration Systems

- Still there are problems of operating the online registration system. For example, less pecentage of teams uploaded team pictures this year compared to 2006. (2006: 68%, 2007: 53%, 2008: 55%) We need to develp an automatic reminder function.
- There are inefficiences caused by the team registration system, mailing list system, and volunteer system not being integrated. For example, some coaches receive too many of the same emails generated from the systems, if the coach registered for multiple roles. System integration is not a simple job. We are targeting the integration of the five indepent database web application systems by 2010.
- The connection between our registration system and PayPal was not reliable. As a result, our database was not updated accordingly when the fee was paid. We had to manually check for maintaining the consistencies. This is a nontrivial technical problem, unless we change the credit card processing company. We are still working on finding better solutions.
- Some coaches did not like the mandatory volunteer field when a team is registered. Unfortunately, each site host did not use the info effectively either. We are considering removing the function.

Technical Support and Free Workshops

In addition to the 13 on-site workshops funded by CFSEM in Detroit, we provided nine hands-on free workshops in January and Feb, 2008 for teams at LTU. Most of the workshop files were posted on the web for free. However, there were concerns from non-Michigan teams who could not attend workshops in Michigan. We plan to charge small fees for the technical workshops from 2009. That is another reason we are reducing the registration fees from 2009. We encourage each site host to organize their own workshops. We learned that teachers needed to learn robotics too. We plan to develop multimedia online class materials, if our projects are funded. We will also introduce ways to borrow robots from LTU Robofest for minor fees.

Competition Rules

Same kind of Robot?

Some teams requested that all teams use the same kind of robot for fair Sumo competition. We fully understand the problem and we are amending the rules.

Rule Documentation and Finalization

The finalization of all the official rules was late (v1.12 on Mar 16). The clarification of the rules for the World Championship was not effectively delivered to the coaches. We will try earlier finalization, clear and better organization.

Written Test

Figure 12 shows that the written tests did not garner huge support. Students did not know that they would get math questions. Some short answer questions were very subjective; some coaches did not like the weights for questions. It was reported that some teams used cell phones to receive aid. Another oversight was not enough test copies prepared for the Championship for Game teams.

We have decided not to continue the current written test format. Instead we are working hard to introduce online assessment system as well as *perhaps* “answer a question”, We are trying to quantify how much stundents improved their STEM knowledge and skills through Robofest using a rigorous assessment methdology and web tools. Every student will do an anonymous online pre-test when they begin the Robofest season. After the season, they will do the post test on-line. There will be a control group to compare results. We would like to measure if they improved STEM skills through Robofest. The results will be summarized in our official report as well as some journal articles, if our paper is accepted. The data will be valuable to design future competition problems.

Game: RoboSavers

Removing Kleenex boxes was relatively easy, but bringing the balls back to the home was too difficult. There were no medium difficulty level tasks. Robot wireless communication was not required in the game due to the following reasons: (1) communication is not reliable and (2) some robots do not have the wireless communication capability. It is encouraged always for teams to exploit the wireless functions to solve the problems. We also plan to design a game to include integration with other teams, if possible. Like in the 2005 Robofest game, we plan to introduce a task such as opening a door to release your other robot for future games. If time permits, we would like to suggest an official practice round for every team like the Aurora Canada site did.

In 2006, nine teams at regional qualifier sites and eight teams at the World Championships were able to achieve perfect performance scores at least one time. In 2007, only one team during the qualifying rounds, and four teams during the championship were able to achive perfect scores. This year, two Jr. teams and one Sr. team got perfect scores at the qualifying; three Jr. teams, and three Sr. teams got perfect scores at the Championship. Congratulations, again, to Junior teams, team Lego Raiders and Devious Duo achieved marvelous records: two perfect runs at the Worlds.

RoboSumo

As you see in Figure 3, RoboSumo was the most popular competition category because: (1) the rules are simple, (2) it does not require two robots per team, (3) the playing field is simple, (4) our onsite workshops sponsored by CFSEM/DADA taught the sumo and we required the onsite schools to participate in the sumo competition. In 2009, we plan not to do the same Sumo, since 2008 teams are already ready to compete, which is not fair to rookie teams next year. Also another problem is the classical Sumo rule does not encourage the detection of the opponent. Actually the World Champion Sumo robot did not even have a sensor to detect the other robot. Another point we would like to mention is sportsmanship and friendship. We noticed only a few teams shook hands after the match, which shows the focus was competition only…

Exhibition

One of the key objectives of Robofest is to learn STEM subjects. We will add another judging category to see how the team applies math and science concepts in their project.

Many teams were very interested in knowing what the judges liked about their presentation and what they didn't like, so they could do a better job the next time. Therefore, we will require chief judge to submit written report on judging that includes comments for each team, the reason why a team was selected or not selected. The report will be posted on the web. Multiple groups of judges will visit team tables. Silent judges will also visit the tables. We will continue to encourage teams to post online videos of their robot projects and we will ask judges to preview those videos before coming to the competition site,

RoboFashion Show

This category did not gain as much popularity as expected. Integrations between robots and human players were not exhibited as we had hoped, We may consider combining this with exhibition category in 2009.

Mini Urban Challenge

No other robot competitions in the world are offering something like this for high school students. We plan to promote more participation in this category. There will be free workshops on L2Bots sponsored by a Robofest sponsor DENSO. The schedule will be announced through Robofest eNews soon. Please join eNews list at www.robofest.net, if you are interested in this opportunity.

Rules for Advancing from Qualifiers

This 2008 season we advanced more teams than ever to the World Robofest competition. This resulted in less complaints, but too many teams at the championship caused other problems such as space and longer event duration. In addition to the gym, we had to use other areas on campus. Next year, we plan to use the additional areas and provide more shuttle services between the two areas.

Competition Event Organization

Volunteer Organization

Volunteer recruitment must be started earlier. Some sites did not fully use the online volunteer system. At Worlds, the volunteer check-in line was too long. Some voluteers did not get T-shirts. If you were a site volunteer (not a voluteer for your competition team) and you did not get a T-shirt and a gift card, please let Jerri Ureel (jureel@LTU.edu) know. We had around 380 people registered on the web and we deeply thank all the site voluteers.

Hours of competitions

- The duration of the larger qualifying sites has always been an issue. We must work harder to fine tune the contest schedule to ensure finishing on time. We need to simplify competition procedures. The way the game rounds are conducted needs to be changed. For larger events, we plan to use two groups of

tables. One table is getting ready while the other is competiting. Rounds will move faster without as much down time.

- Due to the large number of prizes, the World championship award ceremony took too long. We will consider the use of Friday night time for some of the awards to reduce the World Championship closing ceremony time. Also, we may consider reducing the number of trophy winners as some teams suggested.
- For some spectators, it was too boring to stay from the early morning till the evening on a Saturday. We will plan to provide some informative events for parents and spectators and to shorten the closing ceremony.

Playing Fields, Tables :
For the first time plastic folding tables were sucessfully introduced for games. However, there were still some inconsistencies and variability in the playing field setup due to lighting, tape, and other factors. Especially, we must admit that the table no. 4 during the World Championship at LTU caused problems, since it was located directly under a bright gym light and the floor was very reflective. We have never used that location before in our 9 year history! Even though the rules clearly say the light condition is dynamic and unknown, we deeply apologize for teams who were assigned to table no. 4. Developing programs to adjust threshold values dynamically was not easy for most of the teams. We used to allow black boards under the tables to use in previous years, but it was simply a poor decision not to allow it this year. We are will definitely consider providing black poster-board, black paper, or dark tarp on the floor to prevent the reflection from a shiny floor in the future.

World Venue and Setup

- Robofest is growing and there are growing pains too. There were complaints due to the three different events in one gym area. The exhibition venue at the Worlds could not attract a lot of visitors, because the location was far from the main site. Some coaches who had both exhibition and game teams had trouble due to the separation. The shuttle service was not well organized. We will need to use the Management building in 2009, but we will provide better shuttle bus services.
- We know that the spectator viewing was difficult from upstairs in the gym. We needed a lot more chairs. We wish we could have a bigger gym floor area. At least for spectators, it would have been nice to project team numbers and team names currently with the assigned table numbers. – We can do that using a Tablet PC next year. In addition we should have a video projection system available to show robots in action on a screen.
- Sumo events were not well organized. Sumo tournament tree results were not visually shown to the teams or audience; teams were relying on only announcements, but the area was too noisy. Spectators upstairs did not know what was going on. We plan to have only one event at a time in a room next year, if possible.
- The pit area at the Worlds was too crowded. Because too many computers were connected to one outlet, the fuse was blown repeatedly.
- Even if Robofest does not allow adults in the pit area, there were still complaints that some adults were helping the students. We need more volunteers for the proctoring.

Judging and Game Scores
We used to show game scores on the screen in previous years, but it was our fault not to project the team scores on the screen this year at the World Championship. (During the lunch time, I had to run to the exhibition area. I forgot to ask to project the Excel file). We may consider asking a student from a team to sign the score sheet to make sure judges scored correctly. Some judges were not familiar with Robofest 2008 game rules. Head Judges need to be trained properly early on.

There was a judging dispute with Korean teams because they did not know how to decide the final ranking. We were using an average, but they thought it was a best score. Korean parents were very keen on the results because the competition awards could be a plus point for their children's college admission in their country.

4. Achievement and recognition

Data presented in previous sections show that we accomplished our intended objectives as listed below through Robofest 2008 season:

- To spark young students' interest in science, engineering and technology
- To promote imaginative, creative and innovative thinking and ideas
- To build a globally competitive engineering work force of the future

Figure 14. Some of world Robofest Championship Participants with trophies at Lawrence Technological University

For the fifth time since 2005, personalized individual trophies (see figure 15) were given to each student participant at the World Robofest Championships. This was possible due to our web-based registration system that included individual student team player names. We thank all the coaches who entered their student names correctly and uploaded team/robot photos. As far as we know, Robofest is the only competition who recognizes each student's efforts by providing a personalized certificates (see Figure 18) and World Championship trophy with student name engraved on a permanent metal plate. If your team member did not receive the persoanlized trophy at the World Robofest or framed certificate from the qualifying site, please let me (chung@LTU.edu) know.

Figure 15. Personalized Individual Trophiy at

Figure 16. Robofest Main Projection Screen during the World

Robofest was blessed this year to have 18 corporate/foundation and 7 individual sponsors. Without their support, Robofest 2008 would not have been possible. Figure 16 shows all the logos of the corporate/foundation sponsors and during the World Championship the logos were projected on a larger screen multiple times as you see in figure 17. The logos were also printed on all qualifying programs as well as the World Championship programs (see figure 18). If the sponsorship was decided before early February, the logo was printed on our official posters (see figure 19). More than 1,000 spectactors and 500 students came to the championship event held at Lawrence Tech in Michigan on April 26, 2008. A list of all the sponsors can be found at www.robofest.net.

Figure 17. Robofest sposnor logo file projected during the World Robofest Championship

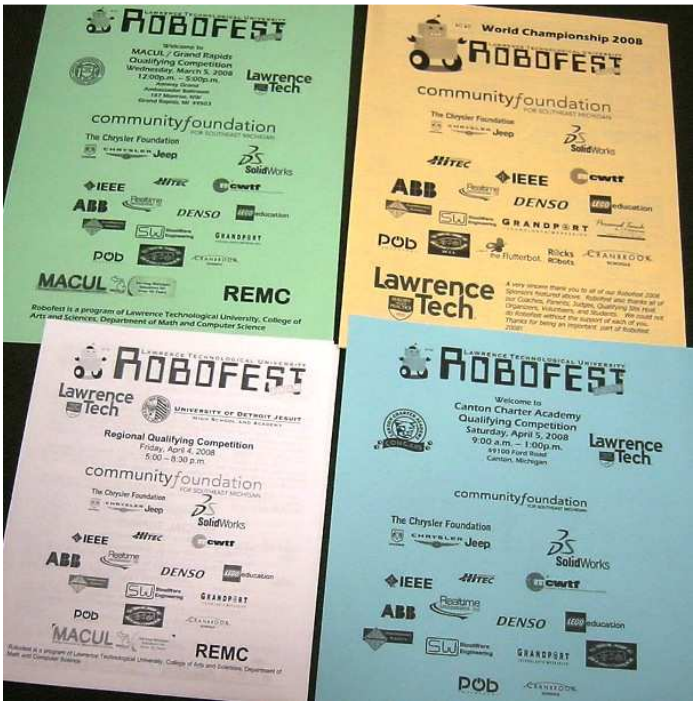

Figure 18. Some of Robofest Qualifying Programs and World Championship Program

Figure 19. Robofest 2008 Official Poster

Especially, we thank our funding partner CFSEM (Community Foundation for Southeast Michigan) and our platinum sponsor - Chrysler Foundation. Their logos were printed all the official certificates for students as shown in figure 20.

Figure 20. Framed Official Robofest Certificates with Funding and Platinum Sponsor logos

The CFSEM fund enabled us to deliver onsite robotics programming classes to 12 schools in the city of Detroit and Highland Park. Using the Chrysler foundation fund, we added another school in Detroit to the list. Here is the summary of the onsite hands-on classes:

- Number of Schools in Detroit or Highland Park that had on-site classes: 13 (see Figure 21)

- Number of students served: 219
- Number of teachers directly involved: 19
- Parents, administrators and others involved: 42
- Number of teams competing at qualifiers: 61
- Number of teams advancing to Worlds: 25
- Highest finish at Worlds: 3rd place, Sr. Division – Red Dragons, Digital Arts and Science Academy

Figure 21. Detroit Emerson Elementary School Site

Prof. Keith Bozin, Dr. Chung, Mr. Doug Czinder, Prof. Joe Engalan, Mr. Tom George, Mr. Kurt Meister, Prof. Jeff Sparling, and Mr. AJ Ureel delivered the classes on-site in Detroit and Highland Park.

Based on our 2008 sponsorship rules, we printed logos of CFSEM, Chrysler, and SolidWorks on our official Robofest T-shirts as shown in figure 22.

We thank IEEE Region 4 PACE and SEM (Southeastern Michigan Section) for their sponsorship for IEEE medals of achievement (see Figure 21) that were awarded all the registered participants of Robofest 2008 during the qualifying competitions.

We were very pleased to recognized five year coaches during the World Robofest. They include the following:

- Nathan Barhorst, 2004-2008
- Mary Cottrel, 2004-2008
- Elmer Santos, 2004-2008

Robofest part-time staff members in 2007-2008 year were Sally Mancini, Jerri Ureel, Jeff Sparling, and Susan Latos.

Robofest student assistants were Tiffany Platt, Steve Kryskalla, Andrew Scala, Joe Long, Ryan Matthews, Emily Trudell, Ashish Gollapalli, Rich Hellwig, and Shahed Ullah.

Robofest thanks Cranbrook Schools, Betsy Lamb, Elmer Santos, and others for their dedicated volunteer work for organizing and developing the VEX Pentathlon and VEX Bridge Battle.

Figure 22. IEEE medal of achievement and Robofest T-shirt

We are proud that Robofest is still low-cost, while providing high quality environment for STEM education. We deeply thank everyone who has hosted, sponsored, supported, volunteered for, and participated in Robofest for the 2008 season.

If you find any errors or have comments in this report, please let me know. Let's meet at the 10th annual Robofest 2009 sites. I would like to conclude this report with a quote by Helen Keller, which was in a video produced by a Robofest team, The Dawg Botz team who won the first place Jr Exhibition Award at the World Championship:

Only through experience of trial and suffering can the soul be strengthened, ambition inspired, and success achieved.

Respectfully,

CJ Chung,

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