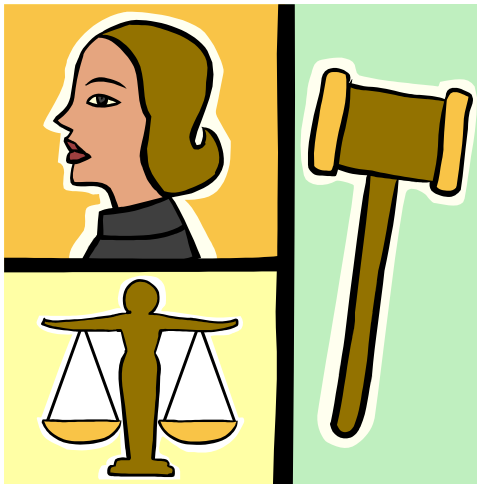**LAWRENCE TECHNOLOGICAL UNIVERSITY**

ROBOFEST 2015

Judging Guidelines
for Exhibition Competition

This PowerPoint file and related materials will be available at www.robofest.net → Get Involved → Exhibition, under "Judging" section.

This presentation is for all volunteers, coaches, mentors, site hosts, and team members

Updated March 3, 2015

Exhibition Judging Philosophy

- Maximize Students' STEM (Science, Technology, Engineering, and Math) learning
- Be as objective as possible
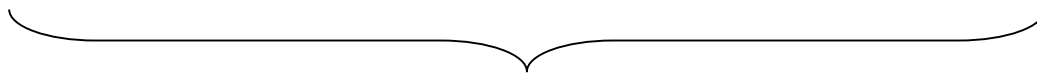
Judge Types and Roles

Chief Exhibition Judge

Exhibition Judges (at least 4 Judges*)

Silent Judges appointed by Chief Judge

About 20% of teams

WORLD ROBOFEST

Qualify for Regional and World Championships

(*) they cannot judge both Game and Exhibition

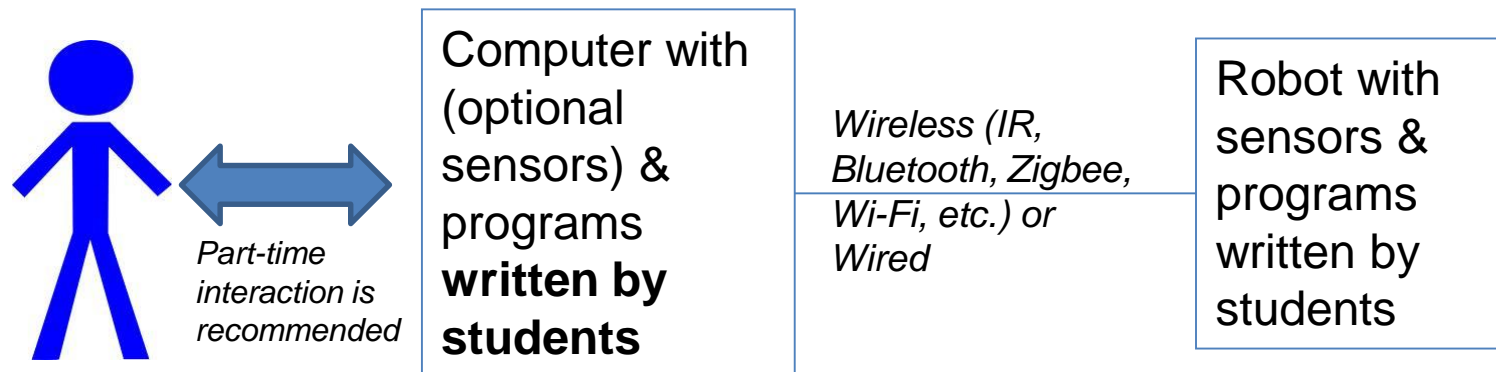# Rules for Exhibition Competition

- Complete freedom to show off any type of creative autonomous robotics project

- Must employ sensors

- "Human to Robot," "Computer to Robot," and/or "Robot to Robot" interactions encouraged (see the next slides)

- *Hardwired Remote Control (or Joystick) is not allowed. (If students program the controller as well as the robot, it is acceptable. See next slides)*

- Chief Judge's decision is final

- Evidence of learning/applying Math and Science concepts is the most important criteria (16%)

4

Examples of "Human to Robot" Interactions using Sensors

- Claps/Knocks – Sound Sensor

- Flash Light – Light Sensor

- Color Cards – Color Sensor or On-board camera

- Waving Hands – Sonar Sensor

- Gesture – On-board camera

- Etc.

Examples of "Computer to Robot" Interactions

- Computers [laptops, single board computers (SBC), smart phones, tablets, or other robot controllers such as EV3 brick] can be used to control robots, only if they (computers) are programmed by students

- The computers may have sensors (optional)

- The computers may have human interface to control robots. *Part-time, not full-time, control (supervised autonomy) is recommended*

Part-time interaction is recommended

| Computer with (optional sensors) & programs **written by students** |

Wireless (IR, Bluetooth, Zigbee, Wi-Fi, etc.) or Wired

| Robot with sensors & programs written by students |

Examples of
Robot to Robot Connection/Interactions

- IR communication (for example, Lego RCX)

- Tactile / Touch sensors

- Light/Color sensor; special color jersey

- RFID

- Bluetooth or ZigBee

- Wi-fi

- On-board camera – Robot gestures / visible signals

- Wired connection is also allowed

- Etc.

Rules for Exhibition Team Judging

- Official presentation when a group of Judges visits the team table: Teams will have maximum **4** minutes for their team introduction, robot presentation, and demonstration
- After that, judges will ask questions for maximum 1 minute
- Judges will revisit for interviews
- Teams are supposed to demonstrate the project whenever they have visitors, **silent Judges**, appointed by Chief Judge *may* visit team tables individually, as if they are spectators
- Michigan Championships and World Championship will have People's Choice award, decided by spectators

If a team is continuing a prior year's project…

- They must inform judges that this is a "continued" project
- They must add new feature(s), or significantly improve or change the system

Math & science theories and appropriate age level

- The application of math and science theories that is appropriate to the team members' age level is a strong plus for judging.

- Even though the use of advanced level is fine, it may **not** offer any advantages for the judging.

Roles of Exhibition Judges (1/2)

- *Before the competition date*:
  - Check the email from Chief Judge about team info on the web to Judges
  - Visit team web pages to get familiar with the project
  - Watch team videos
- *Before the Opening Ceremony*:
  - Attend Judges meeting
  - Visit each team table to be familiar with the exhibitions; prepare questions to ask.
- *During the official presentations*:
  - Write some brief notes/comments for each team and temporarily score the presentations using the rubric.
  - Ask questions right after the presentation

Roles of Exhibition Judges (2/2)

- Any time prior to one hour before submitting the scores to Chief Judge:
  - Visit team tables to interview teams
  - Read their posters and brochures
  - Ask for re-demonstrations, if needed
  - Inspect program code and robot(s)
  - Fill out judging rubric with official score of 1-5 for each judging category
- Submit your official scores to the Chief Judge
  - Preferably, enter the scores into the Google doc, if provided by the Site Host
- Attend Closing & Award Ceremonies

5: Strongly agree — excellent, advanced, exemplary, or amazing
4: Agree — good, accomplished, or proficient
3: Neutral — average, intermediate level, or acceptable
2: Somewhat disagree — attempted but needs work
1: Disagree — little attempted or needs lots of help

1 ~ 5

Judging Category	Sub Categories	Weight	Score*
1. Math & Science learning	This project truly applies the concepts of math & science.	8%	
	Students have sound and rigorous knowledge of the math & science concepts they applied.	8%	
2. Project idea and originality	The project idea was wow!	6%	
	I asked the team whether similar projects exist. The project itself is unique or has creative and original components. If project was entered in previous competition, it has significantly different/new features.	6%	
3. Project demo performance (robot)	The official public robot demo was free from problems and very impressive.	10%	
4. Project presentation (humans)	Project presentation was clear, well organized, and delivered effectively. Student attitude toward spectators was courteous. (Students reacted professionally when the robot did not perform as expected.)	8%	
	Information on the team poster, brochure was clear, well designed, and able to be understood even by robotic novices.	2%	
	The team provided information on the web such as a team website, blogs, OR YouTube videos.	2%	
5. Teamwork	Specific member roles were clearly introduced. Work division is done well and balanced. Each team member seems to know as much as the other team member. Teamwork and team spirit was evident. *If one member team, the score should be 1.*	8%	
6. Robot design	I inspected and tested the robot. The robot mechanical design was creative, effective, user-friendly, and sturdy.	7%	
	New, unique, innovative technologies/tools/parts/materials were introduced and used effectively.	3%	
7. Project size	The project is complex with multiple features/functions and components.	7%	
8. Practicality	The project shows practical & useful problem solving skills that have the potential to culminate in a useful robotics project. Students had entrepreneurial ideas and mindset as well.	7%	
9. Programming	I asked students who were involved in programming to explain parts of the programming code. They totally understood the code and seemed like they wrote the programs. Programs are well structured & commented.	8%	
10. Team independence	I believe the project was mostly designed, developed, and programmed by students, not by adult coaches, parents, or mentors.	10%	

100%

Judging Category:
(1) Math & Science Learning

- This project truly applies the concepts of math & science. (8%)
- Students have sound and rigorous knowledge of the math & science concepts they applied. (8%)

5: Strongly agree	excellent, advanced, exemplary, or amazing
4: Agree	good, accomplished, or proficient
3: Neutral	average, intermediate level, or acceptable
2: Somewhat disagree	attempted but needs work
1: Disagree	little attempted or needs lots of help

Judging Category:
(2) Project Idea and Originality

- The project idea was wow! (6%)

- I asked the team whether similar projects exist. The project itself is unique or has creative and original components. If project was entered in previous competition, it has *significantly* different/new features. (6%)

5: Strongly agree	excellent, advanced, exemplary, or amazing
4: Agree	good, accomplished, or proficient
3: Neutral	average, intermediate level, or acceptable
2: Somewhat disagree	attempted but needs work
1: Disagree	little attempted or needs lots of help

Judging Category:
(3) Project Demo Performance (robot)

- The official public robot demo was free from problems and very impressive. (10%)

5: Strongly agree	excellent, advanced, exemplary, or amazing
4: Agree	good, accomplished, or proficient
3: Neutral	average, intermediate level, or acceptable
2: Somewhat disagree	attempted but needs work
1: Disagree	little attempted or needs lots of help

Judging Category:

(4) Project Presentation (Humans)

- Project presentation was clear, well organized, and delivered effectively. Student attitude toward spectators was courteous. (Students reacted professionally when the robot did not perform as expected.) (8%)

- Information on the team poster, brochure was clear, well designed, and able to be understood even by robotic novices. (2%)

- The team provided information on the web such as a team website, blogs, OR YouTube video. (2%)

5: Strongly agree	excellent, advanced, exemplary, or amazing
4: Agree	good, accomplished, or proficient
3: Neutral	average, intermediate level, or acceptable
2: Somewhat disagree	attempted but needs work
1: Disagree	little attempted or needs lots of help

Judging Category:
(5) Teamwork

- Specific member roles were clearly introduced. Work division is done well and balanced. Each team member seems to know as much as the other team member. Teamwork and team spirit was evident. **If one member team, the score should be 1.** (8%)

5: Strongly agree	excellent, advanced, exemplary, or amazing
4: Agree	good, accomplished, or proficient
3: Neutral	average, intermediate level, or acceptable
2: Somewhat disagree	attempted but needs work
1: Disagree	little attempted or needs lots of help

Judging Category:
(6) Robot Design

- I inspected and tested the robot. The robot mechanical design was creative, effective, user-friendly, and sturdy. (7%)
- New, unique, innovative technologies/tools/parts/materials were introduced and used effectively. (3%)

5: Strongly agree	excellent, advanced, exemplary, or amazing
4: Agree	good, accomplished, or proficient
3: Neutral	average, intermediate level, or acceptable
2: Somewhat disagree	attempted but needs work
1: Disagree	little attempted or needs lots of help

(7) Project Size

- The project is complex with multiple features/functions and components. (7%)

5: Strongly agree	excellent, advanced, exemplary, or amazing
4: Agree	good, accomplished, or proficient
3: Neutral	average, intermediate level, or acceptable
2: Somewhat disagree	attempted but needs work
1: Disagree	little attempted or needs lots of help

(8) Practicality

- The project shows practical & useful problem solving skills that have the potential to culminate in a useful robotics project. Students had entrepreneurial ideas and mindset as well. (7%)

5: Strongly agree	excellent, advanced, exemplary, or amazing
4: Agree	good, accomplished, or proficient
3: Neutral	average, intermediate level, or acceptable
2: Somewhat disagree	attempted but needs work
1: Disagree	little attempted or needs lots of help

Judging Category:
(9) Programming

- I asked students who were involved in programming to explain parts of the programming code. They totally understood the code and seemed like they wrote the programs. Programs are well structured & commented. (8%)

5: Strongly agree   excellent, advanced, exemplary, or amazing

4: Agree   good, accomplished, or proficient

3: Neutral   average, intermediate level, or acceptable

2: Somewhat disagree attempted but needs work

1: Disagree   little attempted or needs lots of help

Judging Category:
(10) Team Independence

- I believe the project was mostly designed, developed, and programmed by students, not by adult coaches, parents, or mentors. (10%)

5: Strongly agree	excellent, advanced, exemplary, or amazing
4: Agree	good, accomplished, or proficient
3: Neutral	average, intermediate level, or acceptable
2: Somewhat disagree	attempted but needs work
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Possible problems of this suggested Judging method and how to solve the problem

- When a Judge is not a technical expert of a field, for example, program code inspection, ask other Judges about their opinions before you make final scores

- Give blank scores for no show teams

- Do not leave a score blank for teams that presented – discuss with other judges and give a number, 1 ~ 5. Please notify Chief Judge if you give a blank score for any reason for any category.

Responsibilities of
Chief Exhibition Judge before the Competition

- Get team information by visiting www.Robofest.net and visit "List of official teams" for your site under "Registration" button

- Contact Exhibition Judges by email with team info link such as website, blogs, and/or videos

- Recruit Silent Judges

- Remind Judges about Judges meeting before the Opening ceremony

- Get familiar with the Excel file or Google shared sheet to keep scores.

Responsibilities of
Chief Exhibition Judge on the Competition Day

- Before the opening ceremony
  - Call a Judges meeting
  - Explain Judging rules and procedures
- One hour before the award ceremony
  - Meet with each Exhibition Judge *(no group discussion needed!)*
  - Collect Judging rubric with **scores** from each judge
  - Check & resolve if any errors, personal bias, and/or blank scores
  - Find winners and breaking ties, if needed. (Do not need to discuss with other Judges to save time)
  - Write comments for each team on chief judge comment sheet
- During the closing ceremony
  - Announce award winners as well as teams qualified to advance (You may give this info to site host or Emcee)
  - For qualifying competitions, Chief Exhibition Judge *may* say some comments about teams.
- After the event, submit all the comments, sheets, and the Google doc or Excel file to the site host to return to Robofest office

Exhibition Judging Rubric

- A sample rubric can be found on the web:
  - http://www.robofest.net/index.php/current-competitions/exhibition
  - Note that Robofest will *not* post the rubrics from Judges
- Only final summary google doc/Excel file from Chief Judge and Chief Judge's comments will be posted
- Google doc is available for site hosts to use. If not used, chief judge must fill out summary Excel file. **Site host can decide how to best fill out google doc – the scorekeeper can input off paper forms from judges or the judges can enter in themselves.**

Example of Excel sheet for a Judge

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	Robofest Judging Form to Submit																	
2	Site Name:	Example																
3	Exhibition Division: Jr																	
4	Name:	Judge 1																
5		Math& Sci		Proj Idea		Demo	Presentation			Tmwk	Design		Size	Prctc	Prog	Indep		
6	Weight	8%	8%	6%	6%	10%	8%	2%	2%	8%	7%	3%	7%	7%	8%	10%		
7	Criteria #	1.1	1.2	2.1	2.2	3	4.1	4.2	4.3	5	6.1	6.2	7	8	9	10	w sum*	Rank
8	Team 1	3	3	3	3	3	4	4	2	3	4	4	3	3	2	3	3.1	6
9	Team 2	3	3	2	4	2	3	4	4	1	3	4	2	4	3	3	2.81	7
10	Team 3	3	3	5	4	3	4	4	2	4	4	4	2	3	4	3	3.45	4
11	Team 4	4	4	3	3	4	5	4	4	3	5	4	2	3	5	3	3.72	2
12	Team 5	3	3	3	3	3	4	4	4	3	4	4	4	3	4	3	3.37	5
13	Team 6	4	4	3	3	4	3	4	2	4	3	4	5	3	3	3	3.51	3
14	Team 7	3	4	4	5	5	4	5	4	4	4	4	4	3	4	3	3.93	1
15																		
16																		
17	Note to Judges: Enter between 1 ~ 5 for each item.																	
18				(*) Maximum weighted sum for each team should be 5														

http://www.robofest.net/2015/Exh15ScoreSheet_blank.xlsx
http://www.robofest.net/2015/Exh15ScoreSheet_example.xlsx

Example of final score sheet

	A	B	C	D	E	F	G	H	I	J	K
1	**Final Average Score**										
2	**Site Name:**	Example									
3	**Division:**	Jr									
4						*delete non-exist Judge columns, if any!!!*					
5		Judge1	Judge2	Judge3	Judge4	STD	Median	Avg	Rank	Trophy	Advance?
6	Team 1	3.1	3.03	3.08	3.11	0.0356	3.09	3.08	6		
7	Team 2	2.81	2.89	2.78	2.65	0.0998	2.795	2.7825	7		
8	Team 3	3.45	3.61	3.52	3.35	0.11	3.485	3.4825	4		
9	Team 4	3.72	3.94	3.79	4.06	0.1524	3.865	3.8775	2		yes
10	Team 5	3.37	3.35	3.31	3.47	0.0681	3.36	3.375	5		
11	Team 6	3.51	3.43	3.44	3.58	0.0698	3.475	3.49	3		
12	Team 7	3.93	4	4.03	4.01	0.0435	4.005	3.9925	1	1st	yes
13											
14				If STD is large and/or the difference between median and Avg is large,							
15				Chief Judge may need to analyze each entry for the team.							
16											
17	Chief Judge Initials:		cjc								

Final score and rank is calculated by Average

http://www.robofest.net/2015/Exh15ScoreSheet_blank.xlsx
http://www.robofest.net/2015/Exh15ScoreSheet_example.xlsx

Example of Judges' Comments - these will be posted online after competition. Handwriting is fine.

Judges' Comments

Team ID	Strength	Suggestions to improve
A	Excellent Science project	Eye contact during the demo
B	…	…
C	Very creative	Need more reliability
D		
E	Practical project	Employ math/science concepts

http://www.robofest.net/2015/ChiefJudgeCommentForm.doc
http://www.robofest.net/2015/ChiefJudgeCommentForm.pdf

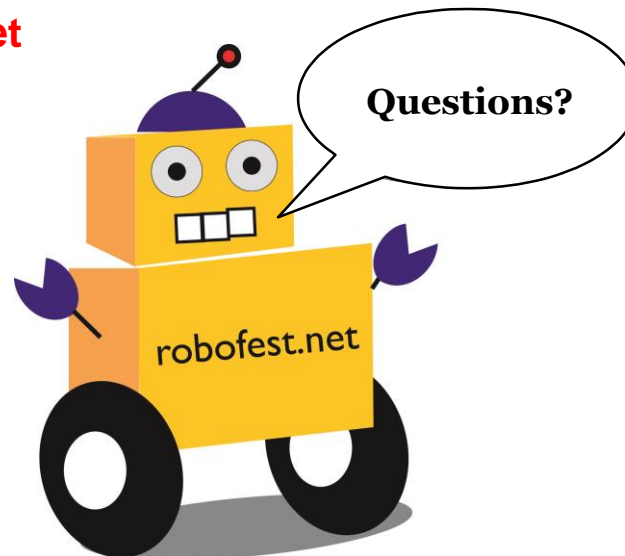# *New!* Exhibition Competition & WRO Open Category

- An Exhibition team can be an WRO USA Open Category, if the team meets the following criteria
  - Must use the WRO 2015 Theme: Natural Resource Exploration
  - NXT or EV3 controller should be a part of the project
  - WRO Age Rules
    - Elementary: up to 12 years old in 2015
    - Junior High: 13 to 15 years old in 2015
    - Senior High: 16 to 19 years in 2015
- Dr. CJ Chung, WRO USA Director will select and invite Exhibition teams to WRO **USA** Final

Little Robots, **Big Missions**

Exhibition Judging Materials at www.robofest.net → Get Involved → Exhibition

Questions?

robofest@LTU.edu