

11th Annual ROBOFEST[®] 2010 Rules

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This file may be revised or refined during the season. Check out www.robofest.net for the latest version.
Significant changes since v1.0 are in red.



10th Annual World Robofest Championship, May 9, 2009, Southfield, Michigan

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Forms:

- Consent, Release and Media Authorization Form:
<http://www.robofest.net/2010/ConsentReleaseForm.pdf>
- Age Division Waiver Request Form:
<http://admin.robofest.org/2010/ageWaiverForm.pdf> or
<http://admin.robofest.org/2010/ageWaiverForm.doc>
- Robofest Video Submission Form:
• <http://admin.robofest.org/2010/RobofestVideoSubForm.doc> or
• <http://admin.robofest.org/2010/RobofestVideoSubForm.pdf>

Part 1 – Robofest 2010 General Rules

Robofest® is an affordable annual robotics competition aimed at increasing young students’ interest, engagement, understanding and use of science, technology, engineering, and mathematics (STEM) through autonomous robotics. Robofest is an open competition, allowing teams to use any type of robotics platform and any programming language for the various competition categories shown in Table 1.

Competition Category**	Age Divisions	Team Size	Platform	Unknown Problems	Assessment	Reg. fee*	Note
Game - RoboPower	Junior (5-8 th) and Senior (9-12 th)	Max. 7 student	Any	Yes	Yes	\$50	Each team uses a fully autonomous robot to play this year’s game, RoboPower. See Part 2.
Exhibition	Junior (5-8 th) and Senior (9-12 th)	Max. 7	Any	No	Yes	\$50	Each team has complete freedom to show off any creative autonomous robotics project. See Part 3.
RoboFashion & Dance Show	Junior (4-8 th)	Max. 7	Any	No	Yes	\$50	Two robots are recommended. Limited qualifying sites. See Part 4.
Vision Centric Robot Challenge	Senior (9-12 th)	Max. 3	Vision based L2Bot	Partly unknown	Yes	\$50	For Talented high school and college students with an interest in computer science. See Part 5.
	College	2			No		

(*) No refunds will be given; some qualifying sites may charge \$20 ~ \$25 Check-in fee per team; International sites may use different fees; World Championship Check-in fee per team is \$40

(**) Special competition category for every team: Team Photo Contest – See Part 1, Section 10.

Table 1. Robofest 2010 Competition Categories

1 General Team Rules

A. Team Formation

- Any organization, such as a school, home school, civic organization, club, etc. can form a team.
- Team sizes range from one to seven members as noted in each specific competition category.
- Age divisions and grade levels for each competition category are also indicated above. Grade levels denote the grade the student is in as of April 2010.
- For any exceptions in a student’s age or grade, the coach must submit an “Age Division Waiver Request Form” to Robofest administration for approval. The general rule is that playing up is fine as long as the student has exceptional talent in construction of the robot *and* computer programming, and has the maturity to work with other team members. Playing down is discouraged in general. The reason to request playing down must be specified on the form. For either playing up or playing down, coaches should obtain consent from their entire team and their parents. See the attached Waiver Request [Form](#).
- A team that consists of both junior and senior students is not allowed.
- Though not recommended in general, a team member may join multiple teams if the team coach approves. For example, a student can join a game team and an exhibition team from the same school/organization.

B. Team Registration

- Teams are registered by a registered coach; a coach may have multiple teams at one qualifying site.
- Team registration is processed on the web at <http://www.robofest.net> See Part 1, Section 3 “Registration Process” for a detailed description of the registration steps.
- The registration deadline is 21 days (3 weeks) before the competition date at each site. If a competition category at a site does not have 5 teams or more, teams registered at the site may be moved to another site; or teams can enter via video submission. (See Part 1, Section 8.)
- There may be a \$20 ~ \$25 check-in fee at a qualifying competition site, which will be used solely by the qualifying competition host site. Each qualifying site web page under the check-in fee section specifies whether the site requires the check-in fee or not.
- All contest sites are open to the general public and admission is free.

2 Team Coach Rules

A. Coach Qualifications

1. Any teacher, school administrator, parent, college student, professor, tech specialist, or scientist/engineer is eligible to be a coach. Coaches must be adults without any criminal record.
2. The coach must have a valid email address and must check the email account periodically. Email is the primary and official communication method between the team and the Robofest organizer. If a coach's email address is changed, it is the coach's responsibility to update the Robofest registration system by logging into the coach's Robofest account and making the change. To confirm an email address change, the system will send the coach a confirmation email. The coach will need to confirm by clicking on a link in the confirmation email.

B. Coach Registration Responsibilities

1. The coach is responsible for registering the team and entering and updating team information by the update deadline. Note that team members' personalized certificates will be printed based on the information and photos the coach enters on the website. Robofest will not reprint certificates for free due to incorrect information on the web. Please see Part 1, Section 13, "Reordering Certificates and Trophies."
2. Robofest 2010 has multiple qualifying competition sites. A coach using a coach ID must register teams for only one qualifying site. It is allowed, however, for a coach to setup another coach ID for another qualifying site to register teams on a different date. See Part 1, Section 3 for complete information on the registration process.
3. Each coach must provide at least one volunteer for helping with either setup or cleanup at the hosting site. Each hosting site will send detailed information to the volunteers. See Part 1, Section 4 "Team Volunteers" for volunteer descriptions.
4. Team coaches must coordinate pre- and post-assessments to help Robofest administration gather data regarding students' learning of STEM subjects. See Part 1, Section 3, Steps 4 and 7 for details.

C. Coaching Teams

1. Coaches must not do direct work on their team's robot(s). They should teach and/or provide necessary training for the team to solve the challenge problems.
2. We recommend that coaches recruit technical mentors or assistant coaches if necessary. Coaches are encouraged to contact local IEEE chapters (Robofest medal sponsor), ACM chapters, engineers' societies, robotics clubs, colleges, or universities to find volunteer technical mentors. The coach is responsible for entering up to 5 volunteer names and their roles on the web.
3. Robofest provides some technical workshops at LTU and/or online. There may be books or online resources available as well, and some multimedia curriculum is available for purchase.
4. The team coach is responsible for facilitating, transporting, and overseeing team members for team meetings and at Robofest competitions.

D. Sponsorships/Media

1. Another important role of the coach is to find sponsors for their team(s). Team sponsors are individuals, groups, companies or other organizations that donate cash, products, or in-kind services to the team. The Robofest website will list up to four team sponsors per team on the web.
2. Robofest attracts lots of media attention. Coaches must collect [Consent & Release Forms \(PDF file\)](#) not only for students, but also for the coach him/herself and team volunteers. These must be submitted to the hosting site during check-in, preferably by a coach.
3. Before and after Robofest, please contact newspapers, radio, and TV stations to recognize your teams' efforts and achievements. Let Robofest administration (robofest@LTU.edu) know if your teams were introduced in any media outlets.

3 Registration Process –Seven Steps (See Figure 1 on next page for summary)

- Step 1. **Coach Registration** is currently open on the web at www.robofest.net . After the online registration form is submitted, a coach ID and password will immediately be sent to the coach by email from admin@robofest.org. **COACH REGISTRATION IS CONFIRMED BY CLICKING A LINK IN THE EMAIL CONFIRMATION SENT TO YOU; OTHERWISE THE COACH REGISTRATION WILL NOT BE COMPLETED.** If you do not receive the confirmation email, contact Robofest10@gmail.com or 248-204-3569 to resolve the problem. (System or network problems or an incorrect email address in the coach registration form may be the cause.) Please check your spam folder, before contacting us. Veteran Robofest (2003 ~ 2009) coaches can use their prior coach ID and password. If you forgot your password, click on the "Forgot Password" link. If you forgot your coach ID number, please contact Robofest10@gmail.com or 248-204-3569.
- Step 2. **Team Registration** will begin right after the Kick-Off Meeting in early December, 2009. Using the coach ID and password, the coach can create teams *after selecting one qualifying site*. During this step, the coach must accept the Robofest 2010 Coach's Pledge (Appendix 1). All the team member names, grades, and gender must be entered (student contact information is not made public). Each team must provide contact information for at least one volunteer who will help with the qualifying competition site setup or cleanup. Exhibition teams must enter a short project description in this step including the theme of the exhibition, functionalities of the robots, the number and types of sensors and motors used, and any other information that describes the exhibition. Please register early, since a competition division of a site will be closed when the number of teams registered is equal to the maximum capacity for the division.
- Step 3. **Registration Fee Payment:** After creating all of your teams, pay the registration fee online using a major credit card through PayPal. You will receive a payment confirmation email from PayPal, which can be used as a receipt. Or, you may choose the option to send a check payable to LTU Robofest to: **LTU Robofest, 21000 West 10 Mile Rd., Southfield, MI 48075, USA**. Make sure to **WRITE THE TEAM NUMBER(S) IN THE MEMO LINE OF THE CHECK AND INCLUDE A HARD COPY OF THE PAYMENT PAGE FROM THE WEB WHEN YOU MAIL THE CHECK**. Your team registration will be complete once LTU receives the check.
- Step 4. **Pre-Assessment:** Print the Consent & Release form and send it to students' parents. Get the signed forms from parents. An email with pre-assessment instructions will be sent to the coach. Also see Part 1, Section 6.
- Step 5. **Team Photo Uploading:** Take a team photo and upload it to the coach account on the web. The requirements for the photos are: (1) standard **landscape** "jpg" file (width: height ratio should be 4:3 or 16:9) (2) size should be less than 350KB – if not, the file will be automatically resized (3) must show all the team members listed (4) adult coach and volunteers may be in the picture (5) must show the identifiable team ID and team name (write down or print the number on a paper and hold it when taking the photo **or** edit the photo file to add text). The team ID number is decided in **Step 2** above. If no photo is uploaded before the deadline, certificates for the team will not have team and/or robot photos. The photo must be uploaded within **3** weeks after the team registration. There will be special prizes for Best Team Photos.
- Step 6. **Robot Photo Uploading & Final Update:** Take a photo showing your team robot(s). Upload the photo using the coach's web account two weeks before your qualifying competition date. The robot photo requirements are the same as in (1), (2), and (5) in **Step 5** listed above. At this step, coaches must be sure to update any team information on the web. The final update deadline will be **10** days before the competition date for each qualifying site. This is a hard deadline, as time is needed to print and ship all the participant certificates to each site.
- Step 7. **Post-Assessment:** This is to gauge learning over the time frame of the competition. After the qualifying competitions, an email with post-assessment instructions will be sent to the coach. Also see Part 1, Section 6.

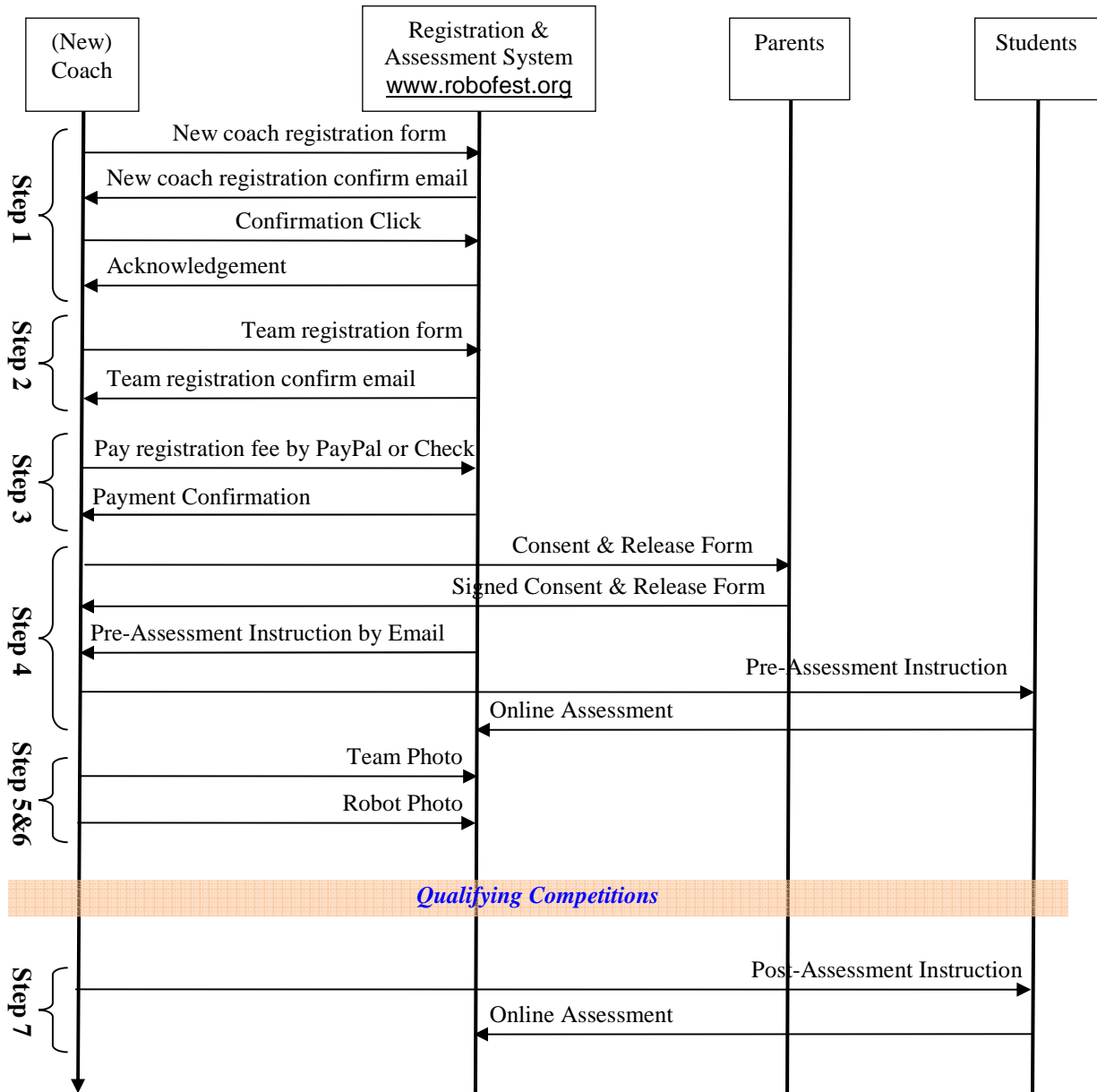


Figure 1. Team Registration & Assessment Process Summary

4 Team Volunteers

The team cannot work without the help of various volunteers for jobs such as mentoring, financial sponsoring, transportation, constructing playing fields, preparing food, taking pictures, or videotaping, etc. The Robofest website will list up to five volunteers per team and a certificate of appreciation may be given to each team volunteer on the Robofest qualifying competition day. As mentioned in Part 1, Sections 2 and 3, each team must provide at least one volunteer for the setup or cleanup of the hosting site. This will be a good opportunity for teams to preview the site and playing field setups.

5 Common Sense Rules for Education

Construction of the robot body as well as all programming for the student competition should be done solely by the students. Parents, teachers, mentors, or coaches may not directly assemble the robots or directly write the

program code for the team at any time during the preparation period or during the contest. Any direct participation is a violation of the rules. The offending team will become ineligible for any awards.

Only team members with name badges will be allowed in the pit (team table) area during the competition. No adults are allowed in the pit area. If a team coach must enter the area, they must receive permission from one of the judging proctors. It is strongly suggested, for security purposes, that the coach have assistants watch the team table area, especially when the team is competing. The use of cell phones by students in the pit area is prohibited. WI-FI in the pit area must be turned off.

6 Robofest Assessments

For the Robofest 2010 season, we will continue to assess the impact of autonomous robotics competitions in Science, Technology, Engineering, and Math (STEM) education. Competitions can drive students to work harder resulting in improving skills. We believe that students participating in robotics competitions will hone STEM skills and demonstrate skills they would not have gained outside of the competitions. To prove this we need measurable data to quantify the student's experiences. We can use this data to highlight successes and determine areas of improvement. The purpose of the assessment is to quantify and analyze students' improvements in STEM skills through autonomous robotics competitions that require computer programming as a major work. The result will also show how effective a robotics competition is at educating them. They will be assessed before and after the competition to see the level of improvement. Another group of students who did not participate in the competition will act as a control group and take the same pre- and post- assessments.

To accomplish this task, a set of web-based database tools has been developed at the Robofest.org site to allow for easy test creation, collecting data, and data analysis. This assessment research will be published in a journal on educational technologies. This assessment is 100% anonymous. To promote participation, Robofest is offering raffle prizes to participants.

7 Team's Responsibilities on Robofest Competition Day

- All teams must observe the check-in time set by the host organizer for each site.
- Things to bring to the Robofest venue
 - Robot(s) and spare parts
 - A laptop or other computer for each team (To solve unknown challenges or adjust to the lighting conditions each team must bring a computer. It is **not** recommended that teams share computers.)
 - *Only for exhibition teams*: poster boards to introduce the exhibition description and all the necessary materials for the exhibition
 - A power strip and power cable
 - *Lego RCX robot teams only*: Cardboard box to cover your robot and IR tower
 - Extra batteries
 - Signed Consent & Media Release forms for team members, coach, and team volunteers – *required*.
 - Check-in fee, if your qualifying site charges a check-in fee. Check out your site home page.
- Teams must use the team table assigned by the organizer. Please do not change team tables. If you change, judges and the organizer *will not be able* to find your team.
- Read the competition rules carefully.
- *Lego RCX robot teams only*: whenever new programs are downloaded, both your robot and the IR tower **MUST** be covered by a box. If not, you may damage other robots and/or your program may be corrupted. Do not forget to bring an IR opaque cardboard 'garage' to house your robots and IR tower.
- Also see attached "Typical Qualifying Robofest Competition Schedule", Appendix 2.
- General Rules During the Robofest Competition:
 - No food or drink is allowed inside the contest area.
 - Flash photography is not allowed inside the competition area
 - Do not make unnecessary noise which might disturb other teams in the pit area. Be respectful of all teams.

8 Rules for Video Submission Entry

If there is no qualifying site near the team location (or under special circumstances) the teams may register on-line for Video Submission. Video submission teams are required to pay the same registration fee. The coach must submit a signed [Robofest Video Submission Form](#) when sending the video to:

LTU Robofest
21000 West 10 Mile Rd.
Southfield, MI 48075, USA.

It must be postmarked by the deadline, Sat. April 10, 2010. The video can be made by adults. The following are the suggested video contents:

- Start with the team ID/name and team member introduction, around 5 seconds for each member.
- Introduce features of the robots, around 5 seconds for each robot.
- Demonstrate the game or exhibition. The video should not be edited once the demo has started. See RoboPower Game rules as well as the submission form for details about how to prepare the video.
- Rolling credit and/or acknowledgement (recommended).
- Acceptable video media: VHS, CD with a video file, Video CD, or DVD

Adults may help produce the video. If students were involved in the video production work, it should be acknowledged in the credits. Please also include hard copies of the source programs.

Regional Video submissions must be postmarked by April 17, 2010.

9 Judging and Prizes

About 20% of the total number of teams at each Qualifying Competition will win trophies to be presented during the award ceremony. Detailed judging rules are explained in each competition category later in this document. Every officially registered team member will receive a certificate of achievement and a medal during the award ceremony of the qualifying competition. All teams must stay for the closing ceremony.

10 Special Competition: Team Photo Contest

The best team photos will be selected from the uploaded official team photos. Every team is automatically entered once their team photos are uploaded. Selected team photos will be posted on the web and presented on a big screen during the World Robofest 2010 Championship before announcing the winners. Selection criteria includes: team spirit, unity, harmony and uniqueness. In addition, we are checking to see that all registered team student members are in the photo. Please be aware the promptness in posting the photo will be an important criterion in selection. A deduction will be made if the team photo was uploaded more than **3 weeks** after the team was registered.

11 Regional Robofest 2010 Championships

New for Robofest 2010, winning teams from numerous (U.S.) and international Qualifying Competition sites must compete in a Regional Championship to qualify for the World Robofest 2010 Championship. Video submissions as described in Section 8 will be allowed for teams who are not close to a Regional Championship location. **A Michigan Regional Robofest Championship will be held on April 24, 2010 at Lawrence Tech. There will be no check-in fee. All other teams competing at the Regional level must use Video Submission entries postmarked no later than April 17, 2010.**

12 The World Robofest 2010 Championship

Top teams from the Michigan Regional Championship site and Regional video submissions may advance to compete in the World Robofest Championship at Lawrence Technological University on Saturday, May 8, 2010. Teams must be present to compete at Worlds; video submissions will not be allowed. The team check-in fee will be \$40, tentatively.

Specific rules for each competition category detail how teams will be ranked during that specific competition. The total number of teams advancing from each qualifying site/competition category will be decided in proportion to the number of teams registered at the site. The exact number of teams qualifying for Regionals, and then Worlds, will be determined by the Robofest Administration after registration closes.

Team Members of the top Senior Division teams at the World Robofest Championship in Game, Exhibition, and Vision Centric Robot Challenge will receive \$2,000 LTU annual renewable scholarships as well as other prizes donated by Robofest 2010 sponsors.

13 Reordering Certificates and Trophies

Robofest is pleased to provide certificate re-printing services for a minimum charge. Also, winning teams can order multiple trophies or certificates of award with individual names on a fee basis.

Part 2 – Robofest 2010 Game Competition Rules

The name of the challenge for the 2010 competition is “RoboPower”. Although Robofest allows up to seven members, we recommend four or five members per team to better engage students. Game rules are on the web at: <http://admin.robofest.org/2010/roboPower.pdf> (These rules may be revised or refined during the season.) A streaming video of a practice game is available on the web at www.robofest.net.

Part 3 – Robofest 2010 Exhibition Competition Rules

The robotics exhibition is a great way for students to show off their imagination and creativity. Each team has complete freedom to create autonomous robotics projects such as robot pets, robot artists, dancing robots, storytelling with robots, robots for scientific experiments, and practical robotics applications. Teams are composed of one to seven members. In general, two students are recommended per robot. Computer controlled robots may be of any size and can use any material as long as it is safe for team members as well as spectators. Even though human controlled remotes are not allowed, *unlike the Game*, wireless host computer control is allowed. **Sensors must be employed to assure the robot is interacting autonomously with its environment. To promote power & energy related science projects, 20 free energy sensors will be available for high school students to use in their exhibition. A workshop on how to use this sensor is planned for early February. Please watch the website, www.robofest.net, for details.**

On the day of the Robofest competition, each exhibition team will be given a table on which to demonstrate the robots. After the opening ceremony, teams will have 4 minutes to explain and demonstrate their robotics project to the public possibly using a microphone. Judges will visit the team table to ask additional questions anytime before the final judging. “Silent Judges” will visit teams throughout the day to check presentation methods and attitude for spectators. These judges will not identify their roles.

Teams must bring all the necessary materials for the exhibition. For example, if the exhibition needs background music, the team must bring an iPod, CD or audiocassette tape. The sound system in the hosting site may not be available to play your music. Therefore, it is highly recommended to contact the site host in advance and/or bring a player, too. Teams are requested to bring poster boards to describe their projects. Hardcopies of programs to give to the judges are a plus, but not required. If the team has posted video clips on the web, show them to the judges.

We highly recommend each exhibition team publish a video clip on a video sharing site such as SchoolTube (www.SchoolTube.com). Judges will use this to preview the team projects and the team will get better scores for the presentation methods category. Teams should plan to show their video to the Judges in case they did not have an opportunity to view the video prior to the competition. The exhibition team coach can update the video information and the URL using his/her Robofest account.

Awards and advancing to World Robofest are determined based on the following data:

Public demonstration performance (reliability)	20%
Originality (creativity and imagination)	20%
Application of math and science concepts learned -- IMPORTANT	20%
Presentation methods and student attitude for spectators; Information on the team poster; Information on the Internet such as SchoolTube	10%
Source code and robot inspection	10%
Complexity and number of functions	5%
Usefulness / Practicality	5%
Entrepreneurial ideas and mindset	5%
New technologies used & other factors	5%

Teams are strongly encouraged to choose unique project topics, and may risk losing points for creativity or other categories by choosing to continue a prior year's project. Teams with continuing projects must:

- Add new features and/or significantly improve or change one or more features
- Detail revised or removed features in the project description text area of the registration form
- Inform judges that their project is a "continued" form of a previous project

Part 4 – RoboFashion & Dance Show Rules

Robotics in education creates an innovative and stimulating classroom environment in which students have fun, are excited, and are motivated to learn math, science, and technology. The RoboFashion & Dance Show category has been created in order to get students interested in math and science at a younger age.

In this competition, a team of robots will use **two 30" x 72" tables to create their performing stage arranged as they decide** (without walls) to show off their costumes, walk (drive), and perform dancing motions to music. **Teams must bring their stages to the competition site.** Detailed rules and judging rules can be downloaded from the web at <http://admin.robofest.org/2010/RoboFashionShow.pdf> (These rules may be revised or refined during the season.)

Part 5 – Vision Centric Robot Challenge Rules

The Defense Advanced Research Projects Agency (DARPA) is the central research and development organization for the US Department of Defense (DoD). They organized the famous DARPA Urban Challenge 2007 where Teams competed to build an autonomous vehicle able to complete a 60-mile long real-world urban course safely in less than 6 hours.

Robofest was inspired by the ambitious DARPA challenge and now offers the Vision Centric Robot Challenge using an onboard vision system to simulate the DARPA challenge. The contestants are to use a common robotic platform called L2Bot and implement a vision guidance software system to allow the robot to maneuver a given course. There are high school and college divisions. Detailed rules and supporting materials can be accessed through the web page <http://www.robofest.net/collegiate> . (These rules may be revised or refined during the season.)

Appendix 1:

Robofest 2010 Coach's Pledge

As a Robofest coach, I have read and agree to abide by the Robofest 2010 rules (<http://www.robofest.net/2010/robofest10rules.pdf>) as they exist now and as may be set forth or amended during the Robofest season.

As a coach, I am responsible for communicating and enforcing the Robofest rules to team members, team volunteers, and others affiliated with my team.

I understand that any rule updates, guidelines, additional information, and announcements will be communicated to me primarily via emails and web updates. I am responsible for reading the information and I will relay it to all the people affiliated with my team. If there are any changes in my email account, I will notify Robofest administrators as well as update my coach profile.

As a Robofest Coach, I understand that the students come first. Robofest is about students learning computer technologies, science, engineering, and mathematics. Everything my team does starts and ends with the principle: **the students do all of the work**. My team members will do the designing, building, and programming of the robot. Adults may help them find the answers, but cannot give them the answers or make the decisions in detail.

Acceptance of this pledge signifies my intent to uphold and maintain the Robofest spirit.

This will be signed when coaches register teams on-line.

Appendix 2:

Typical Qualifying Robofest Competition Schedule

(Assumption: eight Jr. Game, eight Sr. Game, and five Exhibition or Fashion Show teams; plus **three** official RoboPower playing fields. There is no official lunch time, but a food concession stand may be open.)

8:00am	Doors Open and Check-In begins. Find your team table after check-in. Practice fields & official playing fields open for practice. Setup exhibitions.
9:00am	Opening Ceremonies <ul style="list-style-type: none"> • National Anthem • Opening Remarks • Introduction of Judges • Explanation of Robofest rules
9:20 – 9:30am	Unveiling the Unknown Problem Tasks for the Game teams: 1) How the game begins, 2) The number of bottles to be used, 3) The exact locations of the bottles.
9:30 – 10:00am	Official presentation and demonstration of Exhibitions and RoboFashion and Dance Show. (6 min x 5 = 30 min) Game teams work on unknown problems.
10:00am – Noon	Exhibition and silent judges will visit exhibition team tables for interviews
10:00 – 10:42am	Round 1 Jr./Sr. Game competition begins on three RoboPower playing fields in parallel. Teams compete in a pre-determined order set by the site host. Two or three teams will be timed and judged at the same time. Each round will be 7 minutes on average in length, which includes: <ul style="list-style-type: none"> • Move-in (2 min), • Team introductions (2 min), • Play (2 min), and • Move-out (1 min). With 16 Game teams, there will be six Round 1 competitions for a time of 6 x 7 = 42 minutes; 10 minute break;
10:52 – 11:32am	Round 2 Game competition begins in reverse order or as determined by the site host for a second round as outlined above (minus team introductions)
11:32am – Noon	Break. Judges tabulate final scores.
Noon	<ul style="list-style-type: none"> • Recognition of Coaches, Teams, and Team Members: Coaches will award Medals and Certificates of Achievement to students • Take a group photo with everyone. Music is recommended at this time.
12:15pm	Awards and Closing Ceremony: Judges should line up and congratulate winning teams. See the illustration below. Also, announce the teams to advance to World Robofest.
12:25pm	Recognition of Volunteers Volunteer Group Photo / Cleanup

