8th Annual Robofest® 2007 Rules

1-8-07 v1.1

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Attachments:

Forms (Links):

- **Consent, Release and Media Authorization Form:**
  http://www.robofest.net/2007/ConsentMediaReleaseForm.pdf

- **Age Division Waiver Request Form:**
  http://www.robofest.net/2007/ageWaiverForm.pdf *or*
  http://www.robofest.net/2007/ageWaiverForm.doc

- **Robofest Video Submission Form**
  http://www.robofest.net/2007/RobofestVideoSubForm.doc *or*
  http://www.robofest.net/2007/RobofestVideoSubForm.pdf

- **Digital Video Editing and Production Competition Submission Form**
  http://www.robofest.net/2007/videoEditingSubForm.doc *or*
  http://www.robofest.net/2007/videoEditingSubForm.pdf

Part 1 – Robofest 2007 General Rules

Robofest® is an annual competition to increase 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 Game & Exhibition competitions, which are the main events of Robofest. Robofest 2007 has other competition categories and the following Table 1 summarizes all the Robofest 2007 competition categories and Age Divisions:

Competition Categories	Age Divisions	Team Size	Platform	Unknown Problems	Oral exam*	Note
Game	Junior (5-9th) and Senior (9-12th)	Max. 7	Any	Yes	Yes	A team of students competes to accomplish robotics missions using two fully autonomous robots. This year's challenge is "Miner Rescue".
Exhibition	Junior (5-9th) and Senior (9-12th)	Max. 7	Any	No	Yes	Each team has complete freedom to show off any creative autonomous robotics project. Starting this year, entrepreneurship has beeb added as a part of judging criteria.
VEX Pentathlon	Senior (9-12th) recommended	Max. 7	VEX	Partly unknown like Tug of War	No	Teams compete in five field events using VEX robot only. Organizer is Cranbrook Schools in Michigan. Limited qualifying sites.
RoboSumo (*Pilot*)	Junior (5-9th)	Max. 7	Any	No	No	Limited qualifying sites. 30" ring, max weight 2.2 lb (1 kg)
	Senior (9-12th)	Max. 7	Any	No	No	Limited qualifying sites. 48" ring, max weight 4.4 lb (2 kg)
RoboFashionShow (*Pilot*)	Junior (4-9th)	Max. 7	Any	Dimension unknown	No	Limited qualifying sites.
Collegiate Challenge (*Pilot*)	Highschool	Max. 3	Vision based L2Bot platform provided by LTU	Dimension unknown	No	Mainly for college students; talented high school students who are interested in computer science may participate. This year's challenge is "Mini Urban Missions". Qualifying site only at Lawrence Tech on April 27, 2007. Registration fee $280 includes laptop robot platform, L2Bot.
	College					
	Professional					

(*) Answer a Question

Table 1. Robofest 2007 Competition Categories

Detailed rules about each Competition Category can be found in later parts. Special Video Editing & Production and Team Photo competitions are explained in section 10.

1. General Team Registration Rules

- Team registration is done on the web at http://www.robofest.net. The registration fee is $40 per team. Please note that no refunds will be given. There may be a $20 check-in fee at the qualifying competition site, which will be used solely by the qualifying competition organizer. All contest sites are open to the general public and admission is free.
- A team must have an adult "coach".
- A coach can have several teams, but each team can register at only one qualifying competition site. The Robofest registration system can accommodate only one competition site selection per coach ID.

Therefore, if a coach has other teams, and they wish to compete at different qualifying competition sites, the Coach must setup another coach ID and use that ID to register other teams for each different site.

- A coach can have different Age Division teams, but each team must select a single Age Division and a Competition Category
- Any organization, such as a school, home school, civic organization, club, etc. can form a team.

2. Registration process (Five Steps)

Step 1. **Coach Registration** will begin on the web at www.robofest.net in December 2006. The exact date and time will be announced through the Robofest mailing list. After the registration, a coach ID and password will be sent to the coach's email address in less than 2 minutes from admin@robofest.org. You must confirm the coach registration by clicking a link in the email confirmation sent to you; otherwise the coach registration has not been completed. If you do not receive the confirmation email, contact Lori Birman, LBirman@LTU.edu to resolve the problem. (This may be due to either the system/network has been down or you put the incorrect email address in the coach registration form.) Please also check your spam folder, before contacting us. Veteran Robofest (2003, 2004, 2005, or 2006) coaches can use their prior coach ID and password. If you forgot your password, click on "Forgot Password" link. If you forgot your ID, please contact Lori Birman, LBirman@LTU.edu. Your web browser must accept *cookies* to use the system.

Step 2. **Team Registration** will begin after the official Robofest 2007 rules are finalized and posted on the web in late December or early January. The exact date and time will be announced through the Robofest mailing list. Using the coach ID and password, the coach can now create teams *after selecting one qualifying site*. During this step, the coach must accept the Robofest 2007 Coach's Pledge as shown in Appendix 1. All the team member names, grades, and gender must be entered. Each team must provide at least one volunteer who will help with qualifying competition site setup or cleanup. The volunteer's name and email address needs to be entered. For exhibition teams, a short exhibition description must be entered in this step. It must include 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.

Step 3. **Registration Fee Payment**: After creating all 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 to LTU Robofest, 21000 West 10 Mile Rd., Southfield, MI 48075, USA. Make the check payable to LTU Robofest. Your team registration will be complete once LTU receives the check. The registration of a site will be closed when the number of teams who have completed Step 3 is equal to the max capacity for each division and competition category of the hosting site.

Step 4. **Team Photo Uploading**: Take a team photo and upload it to the coach web account. The requirements for the photos are: (1) standard "landscape" jpg file (width: height ratio must be 4:3) (2) size should be less than 350KB (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 a text). The team ID number is decided in the **Step 2** above. If no photo is uploaded before the update deadline, certificates for the team will not have team and robot photos. This step 4 must be done within 3 weeks after the team registration. There will be a special prize for Best Team Photo.

Step 5. **Robot Photo Uploading**: When the missions are completed or two weeks before your competition date, take a photo showing the team robots your students have constructed. Upload the photo using the coach web account. The robot photo requirements are the same as (1), (2), and (5) in step 4 listed above. At this step, coaches must be sure to update any information on the web. The update deadline will be 10 days before the competition date for each qualifying site. It is a hard deadline, as time is needed to print and ship all the participant certificates to each site.

3. Team Coaches

- The coach is responsible for registering, entering, and updating their team information. (This includes team data, uploading team and robot photographs by the update deadline to insure that the Robofest organizer can print the personalized certificate.) The team coach is responsible for facilitating and

overseeing team members. 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 click on a link in the confirmation email message.

- Any teacher, school administrator, parent, college student, professor, tech specialist, or scientist/engineer are eligible to be a coach. Coaches must be adults without any criminal record.
- A coach can register more than one team.
- Robofest 2007 has multiple qualifying competition sites. A coach must register team(s) for only one qualifying site.
- We recommend for coaches to recruit technical mentor(s), if necessary. The coach is responsible for entering on the web up to 5 volunteer names and their roles.
- 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.
- The coach is responsible for entering/updating the team data. Please note that personalized certificates will be printed based on the information and the photos on the website. The Robofest organizer will not reprint certificates for free due to incorrect information on the web. (Please see the last section about Reordering Certificates and Trophies)
- Robofest has been attracting lots of media attention. Coaches must collect Consent & Media Release Forms (PDF file) not only for team students but also for coach him/herself. These must be submitted to the hosting site during check-in.
- Another important role of the coach is to find sponsors for their team(s). Team sponsors are individuals, groups, company or other organizations that donate cash, products, or in-kind services to the team. The Robofest website will list up to four sponsors per team on the web. A Certificate of Appreciation will also be given to the sponsor on the day of the qualifying Robofest competition.
- Before and after Robofest, please contact newspapers, radio, and TV stations to recognize your teams' efforts and achievements. Let us know if your teams were introduced on any media.

4. Student Team Members

- Junior Division participants must be 5th-9th grade students in April 2007 (4th-9th grade for RoboFashionShow), and Senior Division participants must be 9th-12th grade students in April 2007. Any exceptions, the coach must submit "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 both construction of the robot body and computer programming and has 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. Either playing up or playing down requires approvals from other team members and their parents.
- It is recommended for each team to have technical mentors, but mentors should teach general concepts so that students can solve problems by themselves.
- It is highly recommended that a student participate on only one team.

5. Team Volunteers

The team cannot work without the help of various volunteers for jobs such as mentoring, financial sponsoring, transportation, constructing playing fields, taking pictures, or video taping, etc. The Robofest website will list up to five volunteers per team and a certificate of appreciation will be given to each team volunteer on the Robofest competition day. As mentioned before, each team must provide at least one volunteer for the setup or cleanup of the hosting site.

6. Common Sense Rules for Education

Construction of the robot body as well as all programming should be done by students only. 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 badges are allowed in the pit (team table) area after the unveiling of the unknown problem. No adults are allowed to be in the pit area after the unveiling. If a team coach must enter the area, they must receive permission from one of the judging proctors. Only coaches with badges will be allowed into the area with permission. It is strongly suggested, for security purposes, that the coach watch the team table area, especially when the team is competing. There will be judges/proctors in the competition area. If any adult wants to give help to his/her team for any reason, the adult must get permission from the judges/proctors.

7. Team's Responsibility on Robofest Day

- All the teams must observe the check-in time set by the host organizer for each site.
- Things to bring to Robofest venue
  - ❑ A laptop (or PC) computer for each team. (To solve the unknown part, each team must bring a computer. It is not recommended that any 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 Mindstorms RCX robot teams only: Cardboard box to cover your robot and IR tower
  - ❑ Extra batteries
  - ❑ Robot(s) and spare parts
  - ❑ Signed Consent & Media Release forms for team members and coach
  - ❑ $20 check-in fee, if your qualifying site charges a check-in fee.

- Teams must use the team table assigned by the organizer. Please do not change team tables. If you change, judges and the organizer *cannot* 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 to prevent interference from another RCX while downloading programs.
- See also attached "Typical Qualifying Robofest Competition Schedule"
- General Rules During the Robofest Competition:
  - ✓ No food or drink are allowed inside the contest area
  - ✓ Cameras with flash are not allowed inside the competition area
  - ✓ Do not make unnecessary noise which might disturb other teams in the pit area

8. Rules for Video Submission Site

Game, Exhibition, RoboParade, RoboSumo, and Vex Pentathlon teams must register on-line for the Video Submission site and pay the registration fee, if there is no qualifying site near the team or for special circumstances. The coach must submit the 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, April 13, 2007. The video itself can be made by adults and the following is the suggested video format:

- Start with the team and team member introduction, around 5 seconds for each member.
- Introduce features of the robots, around 5 seconds for each robot.
- Select one question from the list of sample questions attached, and answer within 45 seconds.
- Demonstrate the games or exhibitions; the video should not be edited, once the demo started.
- Rolling credit and/or acknowledgement (recommended).
- Acceptable video media: VHS, CD with a video file, Video CD, or DVD

9. Judging and Prizes

About 25% of the total number of teams at each qualifying site will win big trophies that will 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 framed certificate of achievement and medal during the award ceremony of the qualifying competition. All teams must stay for the closing ceremony.

10. Special Competitions for 2007

10.1 Team Video Editing and Production Competition
Teams will videotape and submit a digitally edited video journal of their team while it was preparing to compete at Robofest 2007. Maximum 15 minutes including rolling credits, acknowledgement, and software tools used. Submit DVD, CD with a video file, or VHS-tape to LTU Robofest, 21000 West 10 Mile Rd., Southfield, MI 48075, USA. It must include signed "Digital Video Editing and Production Competition Submission Form" attached. It must be postmarked by May 10th after the World Robofest Championship. No pre-registration is needed. There is no registration fee. Winners will be notified by email and Robofest eNewsletter.

Selection criteria will be how well the video presents the Robofest competition and the team's design solutions & performance. Additional criteria would be team spirit, unity, harmony, uniqueness, sound, narration, editing techniques, and among others. In addition, all the registered team student members should be shown in the video.

10.2 Team Photo Competition
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 presented on a big screen during the World Robofest before announcing the winners.

Selection criteria include showing team spirit, unity, harmony, and uniqueness. In addition, we are checking if all the registered team student members are in the photo. Please also be aware that the time of posting photo will be an important criterion for the selection. It will be deducted, if the team photo was uploaded long after the team was registered.

11. The World Robofest 2007 Championship

The Robofest 2007 Qualifying Competitions will take place at several regional and international locations. There is a video submission site for teams who are not close to a competition location as discussed in section 8. Top teams from each qualifying competition site will qualify to move on to compete in the World Robofest 2007 Championship at Lawrence Technological University on Saturday, April 28, 2007. The total number of teams advancing from each qualifying site will be dependent on the number of teams registered at the site.

Lawrence Technological University is planning to invite 30 game competition teams, 15 exhibition teams, 8 RoboSumo teams, 8 VEX teams, and 8 RoboFashionShow teams and some Collegiate Mini Urban Challenge Highschool teams for the World Robofest 2007 Championship on April 28.

Competition category rules found later in this document specify the details on how teams will be ranked during each 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 Worlds will be determined by Robofest Administration after registration closes.

Members of the top teams at the World Robofest Championship in Game, Exhibition, and VEX Pentathlon will receive $2,000 LTU annual renewable scholarships.

12. Reordering Certificates and Trophies

Robofest is pleased to announce a new systematic service: we have decided to provide certificate re-printing services with minimum charge. Also, winner teams can order multiple trophies with individual names on a fee basis.

Part 2 – Robofest 2007 Game Competition Rules

The Robofest competition is quite unique, because the shape and dimension of the playing field is unknown; the brightness of the competition area is also unknown. The condition of the playing field changes during competition, and some parts of the competition problem are unknown until the day of competition.

The name of the challenge for the 2007 competition is "Miner Rescue". Although Robofest allows up to 7 members, we recommend 4 or 5 members per team to better engage students. Both Junior and Senior game competitions use the same challenge theme, but Senior Division Mission is more difficult than that of Junior Division. We recommend a high-level programming language such as C or Java for the Senior Division teams.

Robofest teams do not compete in a predetermined order. For each round, whenever the team is ready to compete after solving the unknown problem, they line up with their official competition score sheet, which can be found in the team envelope given at the team check-in (no computers are allowed while waiting in line). As teams start their first round of game competition, they give a brief, oral, public presentation.

For game competition divisions, teams to advance to World Robofest are determined based on the following data:

Average two performance scores	70%*
The score from the unknown problem	20%
Team public presentation and answer a question	10%

* No final matches

Details about the game rules on the web at:
http://www.robofest.net/2007/minerRescue.pdf

Flash animations as well as streaming video for the game are available on the web at http://www.robofest.net

Part 3 – Robofest 2007 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. Wireless host computer control is also allowed. On the day of Robofest, each exhibition team will be given a table on which to demonstrate the robots. After the opening ceremony, exhibition teams have **4** minutes to explain and demonstrate their robotics project to the public on the stage using a microphone. They will also answer a question from the Official. Teams must bring all the necessary materials for the exhibition. For example, if the robot performs a dance to music, the team must bring a CD or audiocassette tape. The sound system in the hosting site will be available to play your audiotape or CD.

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

Public demonstration performance (reliability)	35%
Originality (creativity and imagination)	25%
Team public presentation and answer of question	10%
Source code and robot inspection	10%
Complexity and number of functions	5%
Usefulness / Practicality	5%
Entrepreneur ideas and mindset (*)	5%
New technologies used & other factors	5%

(*) New criterion added from 2007

Part 4 – Robofest 2007 VEX Pentathlon Rules

The objective of VEX Pentathlon is to design and program VEX robots that will work autonomously to sense and search for light and objects, navigate different paths, manipulate objects and pull loads.

VEX Pentathlon has the following 5 game categories.
- **Skeeball**: to launch from a distance balls into the buckets for points.
- **1600 Meter Dash**: Robot runs 4 laps counter-clockwise around an oval track
- **Tug of War**: This event would pit one robot against another in a tug of war.
- **Slam Dunk**: To deliver softballs into 24" goal
- **Bottle bowling**: The robot pushes pre-arranged bottles off of a field

Detailed rules can be downloaded from the web at
http://www.robofest.net/2007/vex5thlon.pdf

This competition is organized by Cranbrook Schools, Michigan
(http://schools.cranbrook.edu)

Part 5 – (Pilot Competition) RoboSumo Rules

There will be Junior and Senior Divisions. Detailed rules can be found at

http://techclubs.org or directly at

http://www.techclubs.org/activities/robots/contests/sumo_rules_small_big.php

Part 6 – (Pilot Competition) RoboFashionShow Rules

Robotics in education creates an innovative and simulating classroom environment, in which students have fun, are excited, and are motivated to learn math, science, and technology.

In this competition, a team of robots will use the whole stage to show off their costume, walk (driving), and performing dancing motions to music.

The RoboFashionShow category has been created in order to attract younger students into autonomous robotics.

Detailed rules can be downloaded from the web at
http://www.robofest.net/2007/RoboFashionShow.pdf

Part 7 – (Pilot Competition) Collegiate –"Mini Urban Challenge" using Vision Robots

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

Robofest is inspired by the ambitious DARPA challenge and we are simulating a small indoor competition environment solely based on an onboard vision system.

There will be highschool, college, and professional divisions. Detailed rules can be downloaded from the web at

http://www.robofest.net/2007/miniUrbanMissions.pdf

Robofest 2007 Coach's Pledge

As a Robofest coach, I have read and agree to abide by the Robofest 2007 rules (http://www.robofest.net/robofest07rules.pdf) as they exist now and as they may be set forth 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. I am responsible for reading the information and I will relay them to all the people affiliated with my team. If any changes in my email account, I will notify Robofest administrators as well as I will update my coach profile.

As a Robofest Coach, I understand that the young students come first. Robofest is about the students learning the 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 and building of the robot, problem solving and programming. Adults can help them find the answers, but cannot give them the answers or make the decisions in detail.
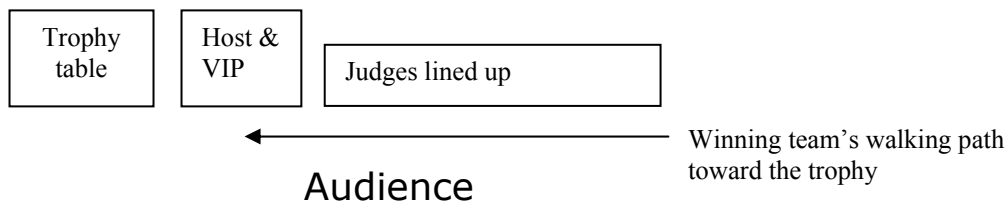
The acceptance of this code signifies my intent to uphold and maintain the Robofest spirit.

Appendix 2:

Typical Qualifying Robofest Competition Schedule
Last updated: 12-14-06

(Assumption: 20 game competition teams, 5 exhibition teams, and 2 official playing fields. There is no official lunch time, but concession stand can be open)

08:00 am	**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**
	National Anthem
	Opening Remarks
	Introduction of Judges
	Explanation of Robofest rules and unveiling of unknown problem
9:20am	**Official presentation and demonstration of exhibitions** (6 min x 5 = 30 min)
9:50am - Noon	Exhibition judges will visit exhibition team tables for interviews
9:50am – 11:20am	**First Round of Competition Begins**: First come first serve basis. Some teams will get extra points, if they solve the unknown problem early. Each team member must introduce her/his name, grade, and role using a microphone to Judges & the public for 5 seconds per member. Then they will have 10 seconds to introduce their robot design. Emcee will ask a question selected at random. The team needs to answer it within 45 seconds. Discussion time is included in the 45 seconds. Then the unknown problem will be tested in front of Judges. MC will assign a game track to the team. Estimated average match time will be nine minutes in length, which includes move-in, introduction, answer a question, test, game competition, and move-out. (10 x 9 min = 90 min).
11:20am	**Last call for First Round: teams who have not yet competed will be called. If they are not ready, they will lose the chance.**
11:25am	**Second Round of Competition Begins**: First come first serve basis. No presentations – the only exception will be teams who did not compete in the first round. (10 x 5min =50min) Each match will be five minutes in length, which includes move-in, game competition, and move-out.
12:15pm	**Last call for Second Round: teams who have not yet competed will be called. If they are not ready, they will lose the chance.**
12:20pm	**Recognition of Coaches, Teams, & Team Members:** Coaches and team volunteers are given a bag of framed certificates and medals (*) in advance. Ask the audience to give them applause. Students are called to come down and stand in front of their coach. Coaches present Medals (*) and Certificates in parallel. Ask students to face audience and sit down. Take a group photo with everyone. Music is recommended at this time.
12:35pm	**Awards and Closing Ceremony:** Judges should line up and congratulate winning teams. See figure below. Also, announce the teams to advance to World Robofest.
12:45pm	**Recognition of Volunteers** **Volunteer Group Photo / Cleanup**

Winning team's walking path toward the trophy

List of Sample Questions for the Answer of Question

For both Games and Exhibition teams

- What have you learned about robot programming?
- What have you learned about choosing the design for your robot?
- What is the purpose of working as a team? Give an example of your team working together.
- What programming language did you use? What are some features and advantages of this language?
- What sensors does your robot use? What is the purpose of each sensor?
- Describe your robot's gearing mechanisms and gear ratio. Why did you choose that ratio?
- What was the most difficult problem to solve? How did you solve or overcome it?
- Are you using any new technology that other teams might not be using?
- Are you using any creative ideas or strategies that other teams might not be using?
- Are you using any robot parts/components that other teams might not be using?
- Did you have any conflicts between team members in designing the robots? If so, describe a conflict and tell how your team resolved it.
- Explain the difference between remote- controlled robots and autonomous robots. Give examples of real-life applications of remote-controlled robots and autonomous robots.
- What problems can occur when robots do not have sensors?
- Why is friction needed? Why is friction bad? Give examples.
- What are some ways to improve the reliability of your robots? Give examples of methods that you used.
- Are there any tasks that your robot cannot do yet?
- How would you improve your robots if you had more time and resources?
- Explain what you would have done differently.
- How did you debug your program code?
- How did you make your programs more readable and understandable to others? Why is this necessary?
- What factors must be considered in building and programming a robot to climb down a steep ramp?
- What would you do if you want to make the robot go faster?
- What factors must be considered in building a robot to push heavy objects?
- Give an example of any science concept you applied in designing or programming your robot.
- Give an example of any math concept you applied in designing or programming your robot.
- What factors must be considered in building a robot to lift heavy objects?
- How did you trouble-shoot your robot?
- Who gave the most valuable technical help to your team and what was it?
- …

Game Competition team only

- Explain and demo how your robot detects the ball No. 1, 2, 3, or 4
- Explain and demo how your robot follows the black line.
- Explain and demo how your robot detects the aluminum foil tape on the floor.
- Explain and demo how your robot detects the edge of the board to avoid falling off.
- Explain and demo any unique features of your robot and programs.
- Strategies for two robots to cooperate together
- Strategies for two robots not to collide each other.
- …