



Singapore National CoSpace & RoboMaker Challenges 2017

CoSpace Grand Prix Challenge - Official Rules

CoSpace Technical Committee

Revision 27/10/2017

1. About These Rules

This document contains the official rules for the 2017 CoSpace Grand Prix Challenge (“the Challenge”) to be conducted at the Singapore National CoSpace and RoboMaker Challenges 2017 (“the Event”), as prepared by the CoSpace Technical Committee. The rules contained in this document supersede any prior versions, and have priority over any translations.

1.1. Summary of challenge.

In the CoSpace Grand Prix Challenge, participating teams will program virtual and real robots to complete a race course. Only one robot will be racing at any given time. The team that reaches the finish line in the shortest possible time will be declared the winner.

1.2. Participants required to be familiar with rules and announcements.

All participants are required to read the rules in this document carefully, so as to understand the requirements and procedures for all aspects of the Grand Prix Challenge. In addition, all participants are required to pay attention to any public announcements, including schedules, meetings, and other information, made by the event organizers during, before or after the Event. Finally, it is the responsibility of all participating teams to familiarize themselves with the latest version of the rules, as posted on the official website, prior to the Event.

1.3. Conflicts or ambiguities in the rules.

Any conflicts or ambiguities in these rules may be resolved by the CoSpace Technical Committee and/or its appointed referees. The decisions of the committee and/or referees are final, and take priority over any interpretation of these rules. The committee may, at its discretion, release amendments to these rules at any time prior to or during the actual competition. Participating teams and their teachers are encouraged to approach committee personnel, or contact the organizing committee via e-mail, if they have any questions about the rules.

The address of the committee is: competition@cospacerobot.org

2. Teams and Categories

The challenge is divided into Primary and Secondary categories. Participants will register in teams of 2-4 students. Each participant may only be part of one team.

2.1. Primary participants.

Primary participants must be aged between 8 and 12 years old as of 1 July 2017.

2.2. Secondary participants.

Secondary participants must be aged between 13 and 19 years old as of 1 July 2017.

2.3. Categories.

The Primary category is limited to Primary teams only. Primary teams must consist of only Primary participants. Students currently enrolled in a Singapore secondary school at the level of Secondary One or above, regardless of age, are not permitted to be part of a Primary team.

The Secondary category is limited to Secondary and Mixed teams only. A Secondary team must consist of only Secondary participants. A Mixed team consists of both Primary and Secondary participants.

2.4. Team roles and team captain.

Each team member must have an identifiable role, such as strategy planning or programming.

At least one team member must take on the role of team captain. When a real robot is racing, only the captain of that robot's team is permitted to be within 150 cm of the real race course. All other participants must stay at least 150 cm away from the course, and may not touch or operate the robot.

3. Programming

Teams must develop their own robot control programs. Teams which acquire their programs from some other source, including their own teachers, parents or other adult mentors, may be subject to censure and/or sanctions from the CoSpace Technical Committee, potentially including (but not limited to) disqualification. Teams which allow another team to copy their programs may also be subject to censure and/or sanctions from the Committee, potentially including (but not limited to) disqualification.

3.1. Virtual robots must be programmed using CoSpace software.

For the virtual robots, teams are required to use the provided version of the CoSpace software to develop their robot programs.

Each virtual robot program must have the correct team name specified. Teams which repeatedly fail to specify the correct team name may be disqualified.

3.2. Real robots to be standardized.

The physical robots will be of a standard model. Modifications to the physical structure or electronics hardware of the robot will not be permitted.

3.3. Separate programs encouraged for real and virtual robots.

Teams are encouraged to develop appropriate strategies for both real and virtual robots. Real and virtual robots belonging to the same team do not need to use the same program; teams are encouraged to develop two different programs, one for the virtual and one for the real robot.

3.4. Restrictions on program development.

Before and after races, teams are allowed to freely modify their robot programs. However, before the start of each race, all teams participating in that race are required to submit their virtual robot programs and their physical robots, if any. For the duration of each race, participating teams are not allowed to make changes to their robot programs.

4. Event Races

For the SNCRC 2017, there will only be one event race for each category, namely the Challenge Race.

4.1. Challenge Race.

The Primary Challenge Race will be conducted on the first day of the event, whilst the Secondary Challenge Race will be conducted on the second day. Both races will be conducted with both real and virtual robots. The results of the Challenge Race will be used to determine the final competition rankings and, consequently, the recipients of the Grand Prix Challenge trophies.

5. Conduct of the Race

5.1. Teams to report in advance of race.

For each race, all participating teams are expected to report to the Grand Prix registration counter at least ten minutes before the race's start time as determined by the referees. A team that fails to show up for the race may be penalized or, in extreme cases, disqualified from competition.

Participating teams, when reporting, must bring two items: a thumbdrive containing their virtual robot program, and their real robot containing the real robot program.

5.2. Sequence of racing.

In each race, the participating teams will attempt the course in sequence. Only one team will be racing at any given time. Each team will be allowed 2 attempts, or runs, per race. The best time of those 2 runs will be taken.

5.3. Starting a run.

The race will begin at the signal of the referee. The team captain will place the robot at the starting line, and release it upon the referee's signal. The run will officially begin when the robot passes through the starting gate ("referee box").

5.4. Timing.

Main timing will be carried out automatically by the race management system. Backup timing will be conducted by the referee or an appointed assistant. If there is a discrepancy in the timing, the referee has the final say on whether to use the backup timing.

There is a maximum time limit per run of 8 minutes. If this time is reached before the robot finishes the course, the run will be terminated.

5.5. Shortcuts and virtual checkpoints.

In general, the real robot is not allowed to take shortcuts. In particular, red flags will be placed on the course to indicate areas where a shortcut appears possible but is in fact not permitted.

However, certain squares on the course may be marked with green flags. These will indicate that it is legal to take a shortcut on that square.

The robot is not capable of sensing and distinguishing the shortcut flags. They are purely for the participants' reference. Participants are expected to program their robots appropriately.

The virtual robot is allowed to take shortcuts, as long as the CoSpace software determines that it has passed through all the necessary checkpoints in the correct order. If it fails to do so, then the CoSpace software will not allow it to complete the race, regardless of whether it reaches the finish line or not.

For the SNCRC 2017 Grand Prix, the virtual checkpoints will not be displayed on the virtual world view. Accordingly, the robot does not need to perform any special actions when passing through a checkpoint.

5.6. Faults.

If the referee determines that a real robot has become stuck or gone out of bounds, then a "fault" will be declared. Upon declaration of a fault, the owning team must reset the robot by physically moving it to a point on the course to be determined by the referee. The referee's decision regarding the robot's position will be final. A 10-second penalty will be imposed for each square where the robot had a fault.

There is a limit of 9 faults per team. Upon incurring a 10th fault, the team's run will immediately be terminated and the final position of the robot will be recorded. A team that incurs 10 faults in their first run must forfeit their second run.

Any contact between a person or foreign object and the robot, regardless of whether the robot appeared to be moved, may be considered a fault, at the referee's discretion. Team members should therefore refrain from touching the robot unless they intend to reset its position.

5.7. Teleportation.

When the real robot reaches the designated finish line of the course by passing through the ending gate ("referee box"), the race management system will automatically flag off the virtual robot. At this point, teams will manually retrieve and stop their real robot. There will be no "overrun penalty" for this event.

5.8. Mechanical failure.

Teams are responsible for determining whether their robot is suffering from a mechanical failure. As such, if the robot breaks down during a run, it will be considered a failed run.

However, if a team reports a possible mechanical problem to the referees well in advance of the race, the referees will make every reasonable effort to provide a replacement robot.

Secondary teams are encouraged to ensure that their robots are supplied with fresh batteries before the Challenge Race.

5.9. Completing a run.

When the virtual robot reaches the finish line of the virtual course after having passed through all checkpoints, the run will be considered complete.

5.10. End of attempt.

Each run will end when one or more of the following conditions have been met:

- a) the robot successfully completes the run, or
- b) the virtual robot is declared to have gone off course or become stuck, or
- c) the participating team agrees to forfeit the run, or
- d) the real robot accumulates 10 faults, or
- e) 8 minutes elapse since the beginning of the run, or
- f) the real robot suffers a failure that cannot be immediately remedied.

In cases (a), (b), or (c), the run will be recorded as such; if it is their first run, the team is entitled to a second attempt. In cases (d) or (e), the run will be recorded as such, but the team will not be entitled to a second attempt even if it is their first attempt. In case (f), the referee may, at his/her sole discretion, declare the run null and void, allowing the team to retry again later.

At the end of a team's final attempt, the team captain will be asked to sign the race result sheet. The captain will have 1 minute to review the result and sign. By signing it, the captain accepts the final result on behalf of the entire team. If further clarification is desired, the team captain should write their comments in the result sheet and sign it.

6. Race Results and Team Ranking

After each race, the participating teams will be classified into three tiers, in order of their performance. They will then be ranked within each tier.

6.1. Tier 1.

A team will be classified Tier 1 if its virtual robot successfully completes the run. Tier 1 teams will be ranked depending on their completion time (after factoring any time penalties in).

6.2. Tier 2.

A team will be classified Tier 2 if its virtual robot completes at least one zone of the virtual course, but is unable to finish. Tier 2 teams will be ranked depending on the zone that their respective robots have reached. If multiple Tier 2 teams reach the same zone, they will be ranked depending on the time at which their robots reached that zone.

6.3. Tier 3.

A team will be classified Tier 3 if its virtual robot is unable to complete at least one zone of the course, either due to failing at the start, or because the real robot was unable to complete the physical course. Tier 3 teams will be ranked depending on the position on the physical course that their respective robots have reached.

6.4. Tie-breaker races.

In any given race, if two or more of the top four teams appear to be tied due to having exactly the same ranking, the referee may call for a tie-breaker race. The race may be physical, virtual, or both, at the referee's discretion. The results of the tie-breaker will only determine the relative ranking of the tied teams, and cannot cause them to overtake or fall behind teams which have already been ranked.

7. Conflict Resolution

7.1. The Referees.

The "referees" will be the event officials assigned to oversee and conduct the race. During the robot race, the referees' decisions are final.

7.2. Rule violations.

Any violation of these rules may cause the violating team to be penalized. Penalties may include disqualification from the event. Penalties will be issued at the discretion of the referee, officials, organizing committee or general chairs.

7.3. Special circumstances.

If any unforeseen circumstances occur during the event, including but not limited to robot malfunctions, the Organizing Committee may modify the rules to account for these circumstances. At their discretion, the Organizing Committee may invite affected teams to meet and discuss the rule changes. Any team which does not raise an objection during this meeting, including teams which are absent from the meeting for any reason, will be considered to have assented to the changes.

7.4. Complaint procedure.

Rule issues are not to be discussed during the race. Referee decisions are binding for the Grand Prix Challenge. A team may protest by executing the following complaint procedure. The procedure is also automatically invoked if a referee decides to abort the race for any reason, such as critical failures of the race management system, lighting failures, or widespread hardware malfunctions.

To initiate the complaint procedure, the team leader of the challenging team has to contact a member of the Technical Committee within 10 minutes after the respective race has ended. That member will then invoke a team leader conference in consultation with the Organizing Committee. In this conference, the following parties will participate: the referees of the race in question, Organising Committee members, and the Technical Committee (counselling). The situation shall be resolved by unanimous consent or by vote of the Organising Committee members. As with the procedure under "Special circumstances", any team which does not raise an objection during this meeting, including teams which are absent from the meeting for any reason, will be considered to have assented to the changes.

8. Sportsmanship

The Singapore National CoSpace and RoboMaker Challenges are founded on the core values of learning, good sportsmanship, and fair play. As such, the CoSpace Technical Committee takes any violations of these values very seriously.

8.1. Cheating.

Cheating is an extremely serious offence. Any attempt to cheat in any way - such as (but not limited to) tampering with the course, moving, touching or blocking one's own robot without calling a reset, moving, touching or blocking an opponent's robot, or tampering with race results or markers - will meet with severe sanctions from the CoSpace Technical Committee. In the most serious cases, teams may be disqualified or barred from future competitions.

8.2. Good behaviour.

Participants should bear in mind that they are representatives of their schools as well as of the event. As such, they should always be mindful of their behaviour. This includes, but is not limited to, the following:

8.2.1. Movement in the competition area.

Participants are not to enter the setup areas of other teams, including teams from other competition leagues, unless specifically invited or instructed to do so by those teams.

Participants are not to enter any official competition area, such as the race management booth, unless specifically invited or instructed to do so by referees or other event officials.

Participants should be mindful of other people and their robots when moving around the event venue.

8.2.2. Conduct of mentors.

Mentors, including teachers, parents, chaperones, translators, and other adult team members) are not allowed in the student work area. They are not allowed to be involved in the programming of students' robots. If any mentor interferes in any way with the conduct of the event, including the robots, the field or referee decisions, their team may be subject to sanctions up to and including disqualification.

8.3. Good sportsmanship.

Teams are strongly encouraged to be gracious in victory or defeat. After all, the most important thing is not whether you win or lose, but how much you learn!