

# CoSpace Grand Prix Challenge Rules 2017

CoSpace Technical Committee

## **1. About These Rules**

This document contains the official rules for the 2017 CoSpace Grand Prix Challenge (“the Challenge”) to be conducted at the RoboCup Singapore Open 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 racecourse. 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.**

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.

### **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 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](mailto:competition@cospacerobot.org)

## **2. Team Categories**

The challenge is divided into Primary and Secondary categories.

### **2.1. Primary category.**

For the Primary category, all races will be conducted entirely with virtual robots on a virtual race course. No real robots will be used. Primary participants must be aged between 7 and 12 years old as of 1 February 2017.

### **2.2. Secondary category.**

For the Secondary category, the Time Trial will be conducted with virtual robots only, whereas the Challenge Race will be conducted with virtual and real robots and environments. Secondary participants must be aged between 13 and 19 years old as of 1 February 2017.

### **3. Programming**

Teams must develop their own robot control programs. Teams which acquire their programs from some other source may be subject to censure and/or sanctions from the CoSpace Technical 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.

#### **3.2. Real robots to be standardized.**

The physical robots used for the Secondary Challenge Race 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, namely the Time Trials and the Challenge Races, 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**

Each team will be participating in two races during RoboCup SG Open 2017: the Time Trial and the Challenge Race. Teams may not participate in the Challenge Race unless they attend the Time Trial.

#### **4.1. Time Trial.**

The Time Trial will be conducted on the first day of the event. For the Primary category, this race will be identical to the Challenge Race. For the Secondary category, the Time Trial will be conducted entirely with virtual robots; the real robots will not race during the Time Trial.

## **4.2. Results of the Time Trial.**

The results of the Time Trial will not directly affect teams' final competition standings. However, they will be used to determine the order of the various teams in the Challenge.

## **4.3. Challenge Race.**

The Challenge Race will be conducted on the second day of the event. For the Secondary category, the Challenge Race 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.

## **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.**

Both virtual as well as real runs will begin at the signal of the referee. In the case of virtual races, the referee will either start the run from the race management system, or signal an assistant to do so. In the case of the Secondary Challenge Race, an appointed team member will place the robot at the starting line, and release it upon the referee's signal.

## **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. Recovery and reset of real robots.**

If a real robot is determined to have become stuck or gone out of bounds, either by its owning team or by the referee, then the owning team must reset it by physically moving it to a point

on the course to be determined by the referee. Notwithstanding the above, any given real robot may only be reset a maximum of 3 times per race (NOT per run). If, after all three resets are used, the robot becomes stuck, goes out of bounds, or is reset a fourth time, the run will be terminated and the final legal position of the robot will be recorded on the course. The referee's decision regarding the robot's position will be final.

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

### **5.6. Teleportation.**

In the Secondary category races, when the real robot reaches the designated finish line of the course, the race management system will automatically flag off the virtual robot. Teams are required to program their physical robot to stop when it reaches the finish line. Failure to do so will incur a 10-second time penalty.

### **5.7. 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 Secondary Challenge Race, the referees will make every reasonable effort to provide a replacement robot.

Secondary teams are encouraged to ensure that their robots' batteries are charged before each practice run and especially before the Challenge Race.

### **5.8. 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.

### **5.9. 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.

#### **5.9.1. 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).

#### **5.9.2. 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.

### **5.9.3. 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 in the Time Trials will not be ranked; their position in the Challenge Race order will instead be determined by the referee. Tier 3 teams in the Primary Challenge Race will be considered “DNF” (Did Not Finish). Tier 3 teams in the Secondary Challenge Race will be ranked depending on the position on the physical course that their respective robots have reached.

### **5.9.4. 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.

## **6. Sportsmanship**

The RoboCup SG Open is 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.

### **6.1. 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 barred from future competitions.

### **6.2. 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!