

RoboCupJunior CoSpace Rescue Rules 2016

RoboCupJunior CoSpace Technical Committee 2016:

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This document contains the official rules for RoboCupJunior CoSpace Rescue 2016, and is released by the RoboCupJunior CoSpace Technical Committee. The rules contained in this document have priority over any translations. Differences between the RoboCupJunior CoSpace Rescue 2015 rules and the RoboCupJunior CoSpace Rescue 2016 rules are highlighted in red.

PREFACE

In CoSpace Rescue, teams have to develop and program appropriate strategies for both real and virtual autonomous robots to navigate through the real and virtual worlds to collect objects while competing with another team's robot that is searching and collecting objects in the same real and virtual worlds.

The CoSpace Rescue Simulator is the only official platform for the sub-league. It can be downloaded at <http://www.cospacerobot.org>. **This simulator allows programs to be developed using a graphical programming interface or C language.** Please refer to CoSpace Rescue Simulator help or CoSpaceRobot.org for details. You can also contact support@cospacerobot.org for assistance.

GENERAL RULES

(a) GAME DESCRIPTION

1.1 Game Process

- 1.1.1 A game lasts 8 minutes, with two teams competing in one game. A game consists of WORLD_1 and WORLD_2. A team has one robot in each WORLD as shown in figure 1.
 - ROBOT_1 can spend between 3-5 minutes in WORLD_1
 - ROBOT_2 will spend the remaining time in WORLD_2.
- 1.1.2 A team must program their ROBOT_1 and ROBOT_2 to navigate and collect objects in WORLD_1 and WORLD_2. A team must end the ROBOT_1 and activate the ROBOT_2 when transferring from WORLD_1 to WORLD_2 (refer section 1.3).
- 1.1.3 Only one robot can move at any one time. When ROBOT_1 moves in WORLD_1, ROBOT_2 must be in standby mode. When the ROBOT_2 is activated, ROBOT_1 stops until the end of the game.

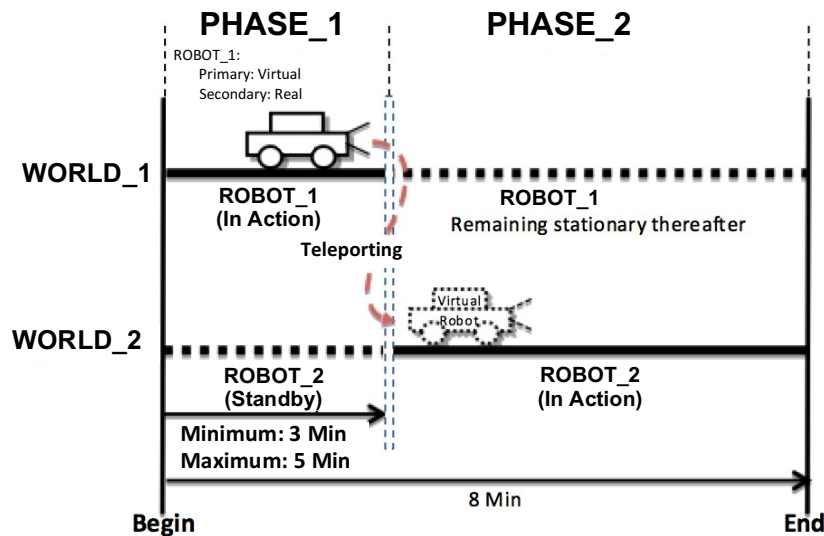


Figure 1: CoSpace Rescue Game Process

1.2 PHASE_1

- 1.2.1 A game begins with ROBOT_1 navigating in WORLD_1.
- 1.2.2 In the WORLD_1, ROBOT_1 searches for 3 types of objects, RED, GREEN, and BLACK objects. ROBOT_1 has to collect the objects and then deposit them in the collection box to receive points. It cannot collect more than 6 objects at any one time without depositing them in the collection box.
- 1.2.3 Bonus points will be awarded for every set of RED, GREEN and BLACK objects collected and deposited **successfully** in one single trip to the collection box (refer to section 4.5.4).

1.3 Teleportation

Teleportation means ending ROBOT_1's movement in WORLD_1 and activating the team's ROBOT_2 in WORLD_2.

- 1.3.1 A team needs to teleport their ROBOT_1 at any time after 3 minutes but before the first 5 minutes passed whilst ending the ROBOT_1's movement.
- 1.3.2 Teleportation within the first 3 minutes is invalid.
- 1.3.3 If a team fails to teleport by the end of the first 5 minutes, ROBOT_2 will be activated by the CoSpace server automatically (refer to section 4.5.5).

1.4 PHASE_2

- 1.4.1 In WORLD_2, ROBOT_2 searches for 5 types of objects, RED, GREEN, BLACK, SUPER and SUPER⁺ objects. ROBOT_2 has to collect the objects and deposit them in the collection box to receive points. It cannot collect more than 6 objects at any one time without depositing them in the collection box.
- 1.4.2 SUPER or SUPER⁺ objects will be created upon every set of RED, GREEN and BLACK objects collected and deposited **successfully** in one single trip to the deposition area (refer to section 2.12.1).

1.5 Competition Setup

- 1.5.1 Primary Category

In the primary category, the ROBOT_1 and ROBOT_2 are virtual robots. Both WORLD_1 and WORLD_2 are virtual worlds.

1.5.2 Secondary Category

In the secondary category, the ROBOT_1 is real and ROBOT_2 is virtual. WORLD_1 is real and WORLD_2 is virtual.

A team must **be able to** program both real and virtual robots and establish communication between them in order to teleport from WORLD_1 (real) to WORLD_2 (virtual). **The use of real robots is not compulsory for regional competitions.**

(b) **ARENA**

2.1 **Layout**

2.1.1 Primary Category:

Both WORLD_1 and WORLD_2 contain objects, obstacles, traps, markers, object collection boxes and special zones.

Appendix A shows the sample layout of WORLD_1 and WORLD_2 for the primary category.

2.1.2 Secondary Category:

Both WORLD_1 (real) and WORLD_2 (virtual) contain objects, obstacles, traps, markers, object collection boxes and special zones. The WORLD_2 also contains swamplands and signal block zones.

Appendix B shows the sample layout of WORLD_1 and WORLD_2 for the secondary category.

2.2 **Dimensions**

2.2.1 The dimensions of WORLD_1 are 180cm x 240cm. The dimensions of WORLD_2 are 270cm x 360cm.

2.3 **Floor**

2.3.1 Primary Category

The floor of both WORLD_1 and WORLD_2 is generally white.

2.3.2 Secondary Category

(a) WORLD_1 (Real World):

- The floor of WORLD_1 is generally white. The floor may be either smooth or textured. Appendix D shows the building instructions.
- The real world will be placed so that the floor is level.

(b) WORLD_2 (Virtual World):

- The virtual world is a 3D simulated environment (Refer to Appendix B). **The floor is not restricted to white or light colour. However, the contrast between the colour of the floor and that of the coloured objects, collection box, or special zones will be large enough for a robot to identify objects, special zones, etc.**

2.4 **Boundary**

2.4.1 Primary Category

WORLD_1 and WORLD_2 will be enclosed by a wall of height 20cm.

2.4.2 Secondary Category

- The outer edge of the WORLD_1 is covered by a 10cm wide yellow boundary (refer to Appendix B). The yellow boundary serves as warning area and it is used to prevent the real robot from moving out of the real arena.
- There will be no boundary for WORLD_2. Teams are required to keep the robot within the virtual arena based on the dimensions given. There will be an indication of the boundary for audience.

2.5 Markers

- 2.5.1 There may be some markers in the virtual/real worlds. The makers can be used to help the virtual/real robot for its localization, guidance, etc. The minimum size of the marker is 2cm x 2cm. The colour and shape of the marker is not fixed.

2.6 Obstacles

- 2.6.1 Obstacles found in real and virtual worlds can be of any size, any shape with the minimum dimensions of 10cm x 10cm.

2.7 Special Zones

- 2.7.1 Certain areas in the virtual/real world are designated as special zones. RED, GREEN and BLACK objects collected in these areas are worth double points. The special zone is blue in colour as shown in figure 2. The special zones have a minimum size of 30cm x 30cm. The shape of the special zone is not fixed.



Figure 2: Sample of Special Zones

2.8 Traps

- 2.8.1 Traps are surrounded by a yellow boundary as shown in figure 3. The minimum size of the trap is 10cm x 10cm. The traps can be any colour. The shape of traps is not fixed. If a robot goes over a trap it will lose any objects it is currently carrying.

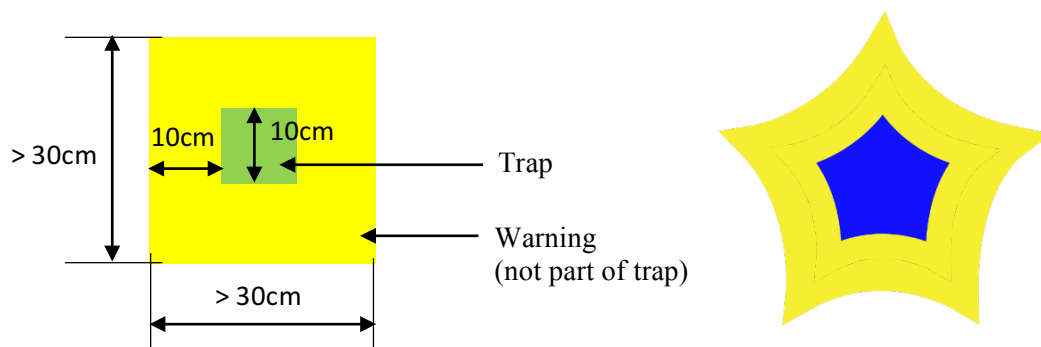


Figure 3: Sample of Traps

2.9 Swamplands (Secondary Category – WORLD_2 Only)

- 2.9.1 Certain areas in the WORLD_2 are designated as swamplands. The swampland is grey colour as shown in figure 4. The swampland can be any size bigger than 30cm x 30cm. The shape of the swamplands is not fixed.

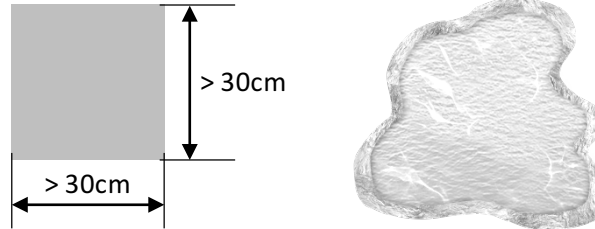


Figure 4: Sample of Swamplands

2.10 Signal Block Zone (Secondary Category – WORLD_2 Only)

- 2.10.1 While the robot is searching in the WORLD_2, the CoSpace Server will send the robot its own coordinates. When the robot enters a signal block zone, its coordinates information will be blocked, meaning teams will have ZERO information.

2.11 Objects

- 2.11.1 There are THREE Objects, RED, GREEN, and BLACK objects, located in random location throughout the course. The thickness of each object is less than 2mm. Each type of objects worth different value (refer to section 4.5.2).

2.11.2 Colour, size and shape of the objects

Colour, size and shape of the objects will be different between the primary and secondary age categories. Appendix C shows the details.

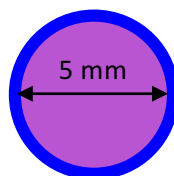
2.12 SUPER and SUPER⁺ Objects (Both Primary and Secondary Categories - WORLD_2 Only)

2.12.1 Creation of SUPER and SUPER⁺ objects

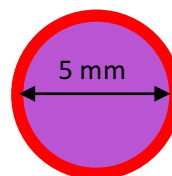
- ONE SUPER Object will be generated for every ONE set of RED, GREEN and BLACK objects collected and deposited **successfully** (with one single trip to the Collection Box, refer to section 2.13) in the WORLD_2.
- ONE SUPER⁺ Object will be generated for every TWO sets of RED, GREEN and BLACK objects collected and deposited **successfully** (with one single trip to the Collection Box) in the WORLD_2.
- The SUPER or SUPER⁺ objects can only be collected by the team that generated the objects. For example, the SUPRE or SUPRE+ objects generated by BLUE team can only be collected by the BLUE team.

2.12.2 Size, colour and shape of SUPER and SUPER⁺ objects

The SUPER and SUPER⁺ objects are about 5mm in diameter. They are circular in shape and purple in colour.



SUPER Object by Blue Team



SUPER Object by Red Team

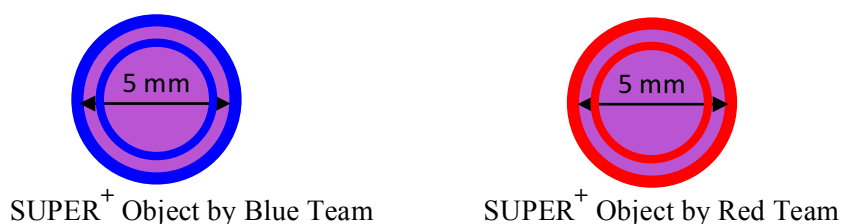


Figure 5: SUPER and SUPER⁺ objects

2.12.3 Placement of SUPER and SUPER⁺ objects

(a) Primary Category

The SUPER and SUPER⁺ objects will be placed on the lines 15 cm away from the wall (Refer to Appendix A). The line reference number (Line 1, 2, 3, or 4) will be sent to the respective team upon the SUPER and SUPER⁺ objects' creation.

(b) Secondary Category

The CoSpace server will send the coordinates (X, Y) of the SUPER or SUPER⁺ objects to the respective team upon SUPER or SUPER⁺ objects' creation. (See Figure 6)

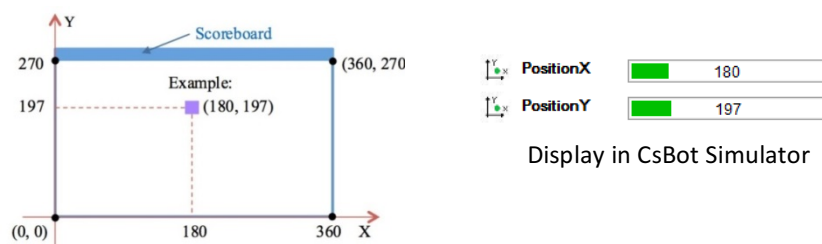


Figure 6: X & Y coordinate system for WORLD_2

2.13 Object Collection Boxes

2.13.1 Figure 7 shows the object collection box. The collection box is ORANGE in colour. The dimensions are less than 30cm x 30cm. The collection box can be any shape.



Figure 7: Sample of object collection boxes

2.14 Lighting

2.14.1 The lighting condition for the virtual/real worlds could be varied. Teams must be able to perform calibration in order to complete the mission.

2.14.2 For teams using real robot, please note that picture taking by spectators might create IR and visible light into the real world setup and to the real robots. Whilst efforts will be made to limit this, it is very difficult for organisers to strictly control factors outside of the real world.

Teams are strongly encouraged to program their real robots so that sudden changes (e.g. camera flash) do not cause major problems.

- 2.14.3 Every effort will be made by the organizers to place WORLD_1 (the real world) away from sources of magnetic fields such as under-floor wiring and metallic objects, however, sometimes this cannot be avoided.

(c) REAL ROBOTS (Secondary Category Only)

In RCJ2016, the organiser will provide the real robots (standard platform) for secondary teams during the international competition. ZigBee communication protocol is used in the CoSpace robot platform for establishing the real/virtual robot communication. Self-built robots are not allowed.

3.1 Control

- 3.1.1 Virtual/real robots must be controlled autonomously.
3.1.2 The use of a remote control to manually control virtual/real robots is not allowed.

3.2 Communication

- 3.2.1 Both ROBOT_1 and ROBOT_2 must be fully autonomous. The minimum duration of ROBOT_1 movement is 3 minutes and maximum duration is 5 minutes.
3.2.2 Teams need to setup the communication between ROBOT_1 and CoSpace server so that the team can teleport their robots from WORLD_1 to WORLD_2.
3.2.3 Teleportation within the first 3 minutes is invalid.
3.2.4 If a team fails to transport from ROBOT_1 to ROBOT_2 within the first 5 minutes, the CoSpace server will stop ROBOT_1 and activate ROBOT_2 automatically (refer to section 4.5.5).

(d) GAMEPLAY

4.1 Pre-setup

- 4.1.1 The layout of both WORLD_1 and WORLD_2 will be released to teams prior to the game.

4.2 Pre-round Practice (Secondary Category Only)

- 4.2.1 Wherever possible, teams will have an access to a practice field for calibration. Teams can calibrate their sensors ONLY before a game at the real field. Calibration is defined as the taking of sensor readings and modifying of the real robot's program to accommodate such sensor readings. Calibration can be done in as many locations as desired.

4.3 Humans

- 4.3.1 As the space around the competition fields is limited (and crowds can result in accidents to robots) teams should designate one member who will act as "captain" and be allowed to move the real robot, based on the stated rules and as directed by the referee.
4.3.2 The "captain" can move the real robot only when directed to by the referee.
4.3.3 Other team members (and any spectators) within the vicinity of the real world are to stand at least 150 cm (approximately 60 inches) away from the real world while their real robot is active, unless otherwise directed by the referee.

4.4 Game Procedure

- 4.4.1 A referee is an official who receives and uploads teams' programs as well as runs the games.
4.4.2 **At the end of each programming period:**

- (a) The chief judge will announce the time for the program submission.
- (b) Each team must submit their first AI strategy created during the programming period (AI 1) to the chief judge when the time is called.

4.4.3 Pre-Game Requirement

5 minutes before each game:

- (a) Real game (Secondary Category Only)

Teams should program and download the code to the real robot before the real game. It is team's responsibility to ensure that the correct program is downloaded to the correct robot.

- (c) Team captains must report to the referee at the respective game stations.
- (d) Teams are allowed to change the AI before each game (ONLY ONCE) and submit the revised version to the referee. The referee will continue to use the previous AI if there is no revised AI submitted.

3 minutes before each game:

If a team has not arrived at the game station 3 minutes after the scheduled game time, the team will forfeit the game. The opponent will gain 500 points and be declared as the winner.

4.4.4 Pre-match Meeting

Each team will be assigned a team colour (BLUE or RED). During the pre-match meeting, the referee will toss a coin. The result determines the teams' colour.

4.4.5 Start of Play

- (a) The referee will upload the programs to the CoSpace server, place the team's robot in the starting point in the virtual world and start the virtual game.
- (b) It is the team captain's responsibility to ensure the correct program is uploaded.
- (c) Team captains must be present during the full length of the game.

4.5 Scoring

4.5.1 A team will be given 100 points at the beginning of each game.

4.5.2 Collecting objects

A team will gain points by collecting the objects.

To indicate that a robot has collected an object, it must stop and flash the LED for 3 seconds when any one of the colour sensor has detected the object.

Object Type	Points in Real World (Secondary only)		Points in Virtual World	
	Regular Zone	Special Zone	Regular Zone	Special Zone
RED	20	40	10	20
GREEN	30	60	15	30
BLACK	40	80	20	40
SUPER	NA	NA	90	90
SUPER ⁺	NA	NA	180	180

- (a) A real/virtual robot cannot collect more than 6 objects at any one time without placing them in the collection box.
- (b) Objects in the real world will NOT disappear after it is collected. It is team's responsibility to program their robot such that it moves away from the same real object and search for others. Collecting the same objects consecutively will not be counted.
- (c) Objects in the virtual world will disappear after they are collected.

4.5.3 Depositing objects

When a robot deposits objects successfully, the points of the objects deposited will be doubled.

- (a) Robot in the collection box: A robot is only considered to be in the collection box when both colour sensors detect the collection box (both colour sensors are inside of the collection box).
- (b) Robot's successful object deposit: A robot must
 - stop inside the collection box;
 - turn on the LED for 3 seconds (with a steady light) to indicate the depositing process;
 - exit the collection box autonomously after depositing objects (both colour sensors are out of the collection box).

4.5.4 Bonus points (only for WORLD_1)

- (a) For every ONE set of RED, GREEN and BLACK objects collected and deposited **successfully** (in one single trip to the collection box) in WORLD_1, 90 bonus points will be rewarded. **There will be no SUPER objects generated in WORLD_1.**
- (b) For every TWO sets of RED, GREEN and BLACK objects collected and deposited **successfully** (in one single trip to the collection box) in WORLD_1, 180 bonus points will be rewarded. **There will be no SUPER⁺ objects generated in WORLD_1.**

4.5.5 Communication and Teleportation

- (a) For successful teleportation, teams will be given 100 bonus points. **Teams can choose a location in WORLD_2 that the robot will be teleported to.**
- (b) **Even when the teleportation was unsuccessful, the robot will be placed in WORLD_2 by the CoSpace server at the end of the first 5 minutes of a game. No bonus will be given. Teams cannot choose the location in WORLD_2 that the robot will be teleported to.**

4.5.6 Falling Into a Trap

If a virtual/real robot falls into a trap (refer to section 2.8), all objects that have been collected but not yet placed in the object collection box (refer to section 2.13) will disappear. Therefore, the points awarded for those objects collected will be deducted.

A virtual/real robot is considered to be in the trap if any one of the robot's colour sensor has detected the trap.

4.5.7 Falling Into a Swampland (Secondary Category - WORLD_2 Only)

If a robot falls into a swampland (refer to section 2.9), the robot's speed will be reduced by 80% by the CoSpace server.

A virtual/real robot is considered to be in a swampland if any one of the colour sensor has detected the swampland.

4.5.8 Falling Into a Signal Block Zone (Secondary Category - WORLD_2 Only)

A virtual/real robot is considered to be in a signal block zone if the centre of the robot is within the zone. The centre coordinates is provided to teams by the CoSpace server.

4.5.9 Out Of Boundary (Secondary Category - WORLD_2 Only)

A virtual/real robot is considered out of boundary if the centre of the robot is outside the WORLD_2.

4.5.10 Game Points

After each match, following GAME POINTS will be given accordingly.

Game	GAME POINTS
Win	3
Draw	1
Loss	0

4.6 Human Interference

4.6.1 Except for a lack of progress, human interference (e.g. re-locate a real/virtual robot to any reset point) during the game is not allowed unless permitted by the referee. A violating team can be disqualified from the game.

4.6.2 In any case, only the team captain is allowed to communicate with the referee.

4.7 Lack of Progress

4.7.1 Lack of progress occurs when there is no progress in a game play for 10 seconds and the situation is not likely to change. A typical lack of progress situation is when a real/virtual robot is stuck. The referee will call “lack of progress” and will move the robot to a different location but close to where it was located.

4.7.2 A team may decide to stop a round early if the lack of progress cannot be resolved. In this case, the team captain must indicate to the referee the team's desire to terminate the game. The team will be awarded all points achieved.

4.8 Penalty

4.8.1 It is compulsory for teams to specify the team name in virtual games. Teams will be given a **verbal warning** if they failed to do so for the first time. **The team will be disqualified for the current game** if the team fails to add the team name for the second time.

4.8.2 If a virtual/real robot is hit/attacked by another virtual/real robot, the attacking robot will be separated from the attacked robot and repositioned at the same location with different orientation (if there is collision), and be frozen for 10 seconds. There will be no point deduction.

4.8.3 If two virtual/real robots bump into each other, both robots will be separated from each other and repositioned at the same location with different orientation (if there is collision). Both robots will be frozen for 10 seconds. There will be no point deduction.

4.8.4 For the Secondary Category, if a real robot moves out of boundary, the robot will be placed inside the competition arena and then be frozen for 10 sec. There will be no point deduction.

4.8.5 If a robot repeats its action (looping – one type of “lack of progress”), the team captain can request to relocate the robot to a different location but close from where it was. However, the robot will be frozen for 10 seconds after relocation. **The team can only call relocation up to 3 times in each game. The referee will keep track of the number of relocations requested.**

4.9 Interruption of Game

- 4.9.1 In principle, a game will not be stopped during gameplay.
- 4.9.2 The referee can end a game when all objects have been collected by the robots.
- 4.9.3 The referee can stop a game when the game coordinator/referee needs to discuss an issue/problem with the OC/TC. The game will be called “time-out” in this case.
- 4.9.4 Teams are not allowed to quit a game 5 minutes after the game started.

(e) CONFLICT RESOLUTION

5.1 Referee

- 5.1.1 During a gameplay, the referee’s decisions are final.

5.2 Rule Clarification

- 5.2.1 Rule clarification may be made by the members of the RoboCupJunior CoSpace Technical Committee.

5.3 Special Circumstances

- 5.3.1 Specific modifications to the rules to accommodate special circumstances, such as unforeseen problems and/or capabilities of a team's robot, may be agreed upon at the time of the tournament when majority of the contestants agree with the proposed modifications.

(f) DOCUMENTATION

6.1 Learning Journal

Each team must bring a learning journal or any form of documentation describing the information about the team, their preparation efforts in programming and how they prepared for RoboCupJunior. The learning journal must be presented during the interview, and may be called upon to help establish the authenticity of a team’s performance.

6.2 Poster

Teams will be given some public space to display their poster. The size of the poster should be no larger than A1 (60 x 84 cm). The poster should be brought along to the technical interview. After the interview the poster should be displayed in the location indicated. The aim of the poster is to explain the technology used in the robots. It should include:

- Team name;
- Team members' names and (perhaps) a picture of the team members;
- Team's country and location within country;
- Team's school and district;
- Development of the searching and placement strategies.
- Any interesting or unusual features of their programs;
- What the team hopes to achieve in robotics.

(g) JUDGING AND AWARD

7.1 Interview

- 7.1.1 It is compulsory for all teams to attend the technical interview.
- 7.1.2 Teams are required to present the learning journal or posters for the interview. Teams may take the interview score sheet for reference while preparing their interview.
- 7.1.3 Interviews will take place in English, if teams require a translator they should inform the local organizing committee by e-mail prior to the event to allow translators to be organized.

7.1.4 Teams may be asked to have second interview if judges consider it is necessary.

7.2 **Technical Challenge** (Note: Rule 7.2 applies specifically for the World Championship)

7.2.1 It is compulsory for teams to take part in the Technical Challenge. The task will be released on site. During the challenge, teams will not be allowed to consult mentors or other students who are not participating in the technical challenge.

7.2.2 Primary age group:

All team members are required to work as a team to take part in the Technical Challenge.

7.2.3 Secondary age group:

50% or more of team members are required to attend the Technical Challenge. i.e. minimum 2 members are required for a team of 4. Minimum 3 members are required for a team of 5. Each member will work on the task independently. The average score will be considered as the team result.

7.3 **Best Strategy Challenge**

7.3.1 The Best **Strategy** Challenge is not compulsory for every participant. Only participants aiming for the Best **Strategy** Award are required to sit in the Challenge.

7.3.2 Participants can only take part in the challenge as individual candidate.

7.4 **Winner**

7.4.1 Round Robin

- The winner of the round robin is determined based on Technical Challenge results (30%) and total GAME POINTS (refer to section 4.5.10) from round robin games (70%).
- If two teams gained the same result, the winner will be decided based on the technical challenge result. If the technical challenge results are still the same, the winner will be decided based on the total round robin points. If the total round robin points are still the same, the team with the higher points in WORLD_2 will be the winner.

7.4.2 Quarter-Finals, Semi-finals and Final

- The winner of the quarter-finals, semi-finals and final will be decided solely based on the quarter- /semi- /final game result.
- If match is drawn, teams will be going for re-match.

7.4.3 Best **Strategy** Award

▪ Primary Category:

The winner will solely depends on the Best **Strategy** Challenge Result

▪ Secondary Category:

The winner will be determined based on the combination of 30% of Technical Challenge Result (**individual score**) and 70% of the Best **Strategy** Challenge result.

7.4.4 **Best Novice Team Award**

- The winning team must consists of all new members from a new team and a new school.
- The team must be one of the top 4 teams in its age group.

7.5 **Awards**

Depending on the number of teams entering the competition, there will be awards for trophies and certificates.

7.5.1 Trophy

- RoboCupJunior CoSpace Rescue winning teams
- Best Presentation Award

7.5.2 Certificate

- RoboCupJunior CoSpace Rescue Technical Challenge winning teams.
- Best **Strategy** Award
- **Best Novice Team Award**

(h) CODE OF CONDUCT

8.1 Fair Play

8.1.1 Humans that cause a deliberate interference with real robots or damage to the real world setup will be disqualified.

8.1.2 It is expected that the aim of all teams is to participate fairly.

8.2 Behaviour

8.2.1 If one team copies a program from another team, both teams will be disqualified.

8.2.2 Teams will be disqualified for deliberately trying to lose the game or tie with the opponent team.

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

8.2.4 Participants are not to enter setup areas of other leagues or other teams, unless expressly invited to do so by team members.

8.2.5 Participants who misbehave may be asked to leave the building and risk being disqualified from the tournament.

8.2.6 These rules will be enforced at the discretion of the referees, officials, tournament organizers and local law enforcement authorities.

8.2.7 Mentors (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 programming of students' robots. Mentor interference with robots or referee decisions will result in a warning in the first instance. If this reoccurs, the team will risk being disqualified.

8.3 Sharing

8.3.1 Teams and students are encouraged to share their programming and strategies to the participants. A certificate of appreciation will be presented to the presenters.

8.3.2 Any developments may be published on the RoboCupJunior website after the event.

8.3.3 This furthers the mission of RoboCupJunior as an educational initiative.

8.4 Spirit

8.4.1 It is expected that all participants (students and mentors alike) will respect the RoboCupJunior mission.

8.4.2 The referees and officials will act within the spirit of the event.

8.4.3 It is not whether you win or lose, but how much you learn that counts!

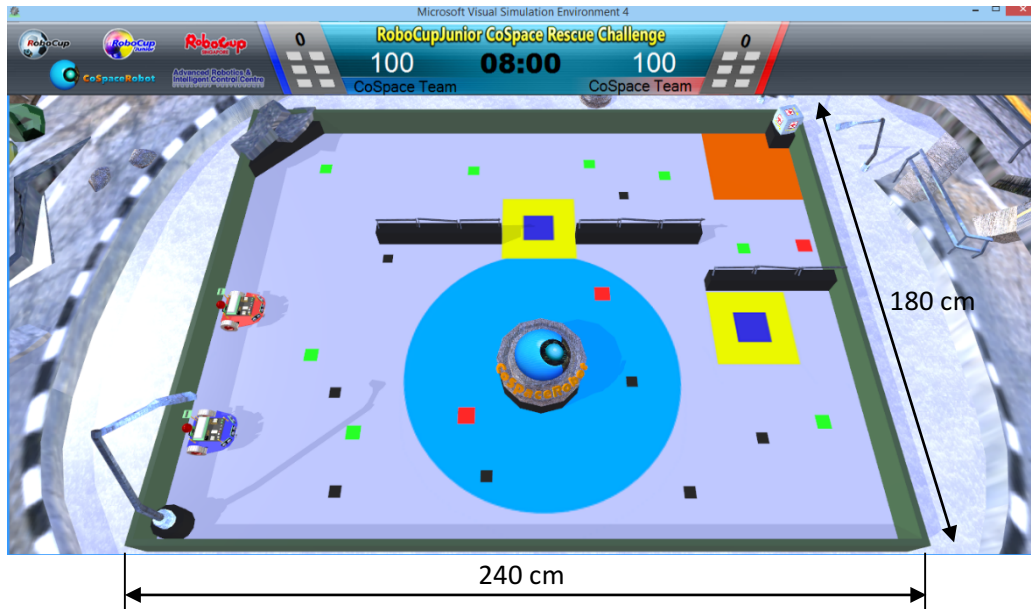
Queries regarding these rules or their interpretation may be sent to the CoSpace Technical Committee, Shen Jiayao (Singapore), at jyshen@sp.edu.sg.



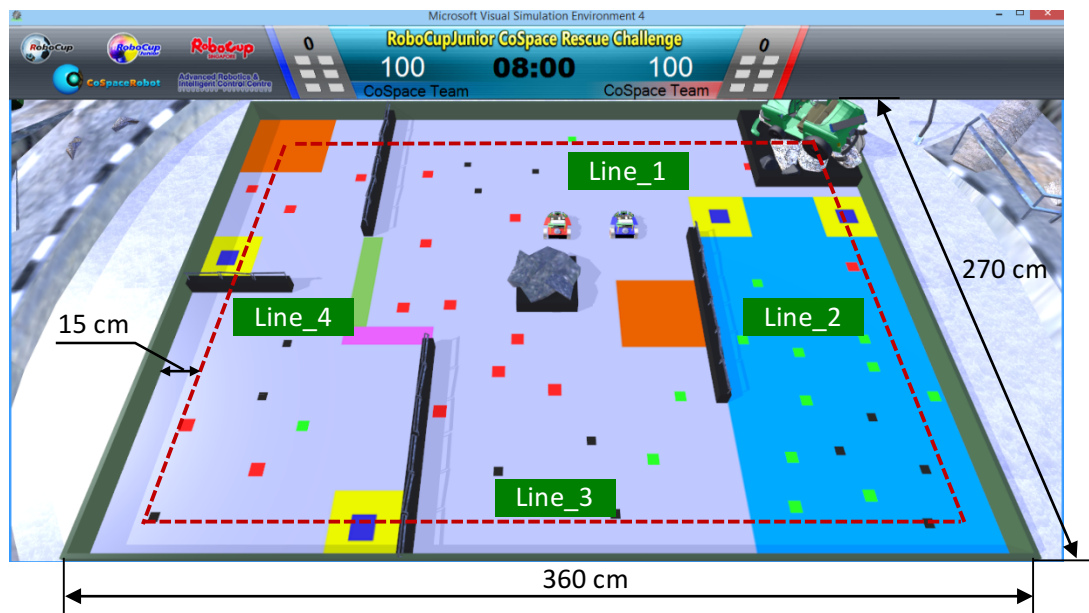
About CoSpace Rescue Simulator: www.CoSpaceRobot.org

Appendix A: Primary Category Competition Setup

WORLD_1 (Virtual):



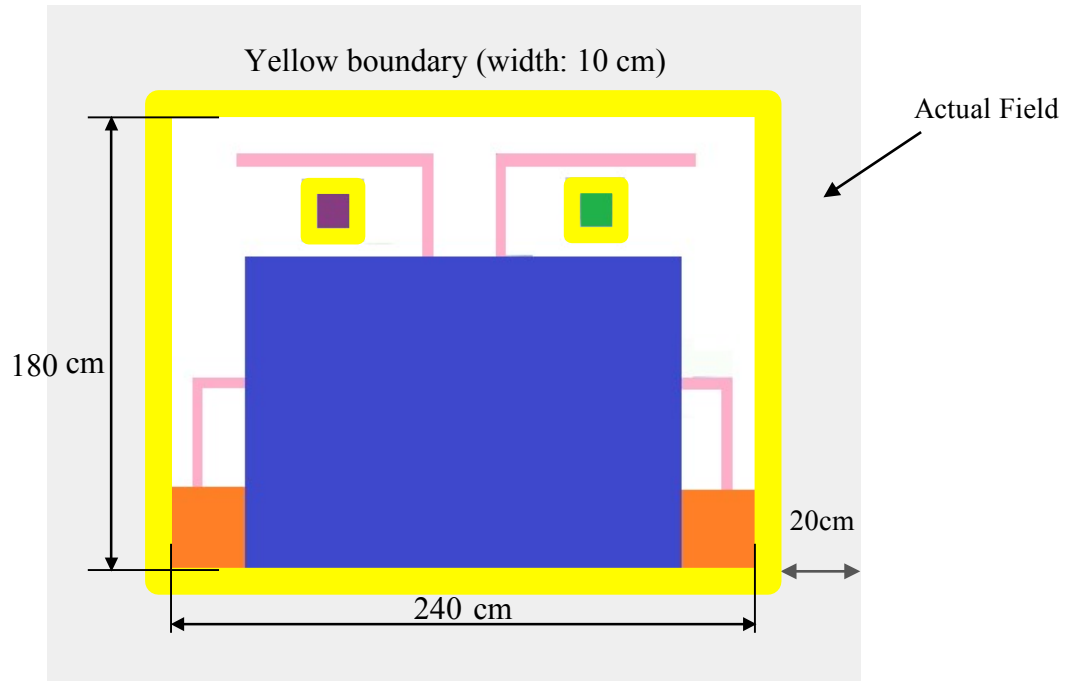
WORLD_2 (Virtual):



- The SUPER and SUPER⁺ objects will be placed 15cm away from the wall (indicated by the dash-lines in the diagram; however, the dash-line will not be shown in the WORLD_2) upon generation.

Appendix B: Secondary Category Competition Setup

WORLD_1 (Real):



- The location (X& Y coordinates) of any objects including real robot, real objects, special zones, traps, marker, collection boxes, and obstacles will not be disclosed to teams.

WORLD_2 (Virtual)

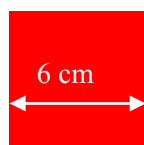


- The coordinates of virtual robots, special zones, collection boxes, traps, signal block zones will be provided to teams.
- The coordinates of SUPER and SUPER⁺ objects will be sent to team that generates the objects.

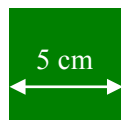
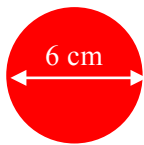
Appendix C: List of objects

Primary Category:

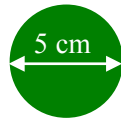
The colours, shape, and size of objects are fixed. They are square or round shape in general.



RED



GREEN

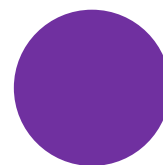
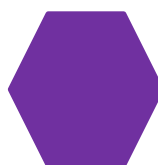
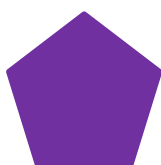


BLACK

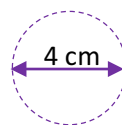
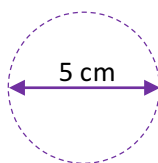
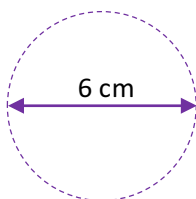


Secondary Category

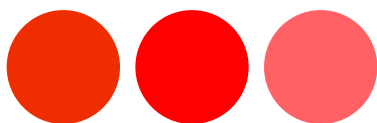
- The shape: The shape of the objects will be any one of the following. There might be different shapes of objects in a map.



- The size: the inscribed circle for the 3 types object are:



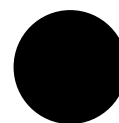
- The colour: the colour of the objects will be in the RED/GREEN categories or BLACK.



RED



GREEN



BLACK

Appendix D: Real Arena Suggested Building Instruction

The following is the suggested instruction for building the real arena for CoSpace Rescue Secondary category. This instructions are applicable only for the World Championship organisers.

1. Cut a piece of 240cm x 300cm plywood or fibreboard (about 1.5cm thickness is adequate). The surface of the board may be either smooth or textured. You may also join a few small ones together. Please make sure the joint is smooth. It should not affect the real robot movement.
2. Lay the board on the floor. The floor should be level.
3. Paint the surface with white colour.
4. Paste the yellow warning boundary on the board.
5. A simple frame should be added at the edge to prevent the robot from falling if the arena is not placed on floor.

