RoboCupJunior CoSpace Rescue (Demo) SuperTeam Rules 2012

RoboCupJunior CoSpace Demonstrations Technical Committee 2012:
Shen Jiayao (Singapore), jyshen@sp.edu.sg
Martin Bader (Germany), martin_bader@gmx.de
Amy Eguchi (USA), amy_eguchi@bloomfield.edu

PREFACE

In CoSpace Rescue (Demo) SuperTeam competition, a SuperTeam has to develop a virtual competition arena and appropriate strategies for both real and virtual autonomous robots to navigate through the CoSpace and virtual space and collect objects. The robots need to avoid obstacles in the CoSpace field and traps in both the CoSpace and the virtual space fields.

Game process

A SuperTeam is composed of real and virtual robots. The real robot moves in the CoSpace field. It has to find objects, move them to the loading bay, and send a signal to the teammate virtual robot. The virtual robot has to find the objects in the loading bay, and move them to the collection box.

CoSpace and virtual fields

Before a game, SuperTeams are required to design a competition arena which is comprised of CoSpace and virtual space. Each SuperTeam provides virtual OR CoSpace for a SuperTeam game. In other words, one SuperTeam provides a virtual field and another SuperTeam provides a CoSpace, which will creates a tournament field for those two SuperTeams.

GENERAL RULES

CoSpace Rescue Rules (2012) apply with the following exceptions:

1. SUPERTEAM

1.1 CoSpace Rescue SuperTeam consists of two CoSpace Rescue teams from different countries chosen randomly by the CoSpace Committee.

2. ARENA

2.1 Layout

2.1.1 The arena for the CoSpace Rescue SuperTeam consists of two arenas – CoSpace arena and virtual arena. It can be seen only through a monitor since it's a co-existence of virtual and real worlds. (See appendix A)

2.1.2 The CoSpace arena is an avatar of a real arena.

2.1.3 The dimension of the real arena and the CoSpace arena is 180cm x 240 cm.

2.1.4 The dimension of the virtual arena is 360cm x 480 cm.

2.2 Design

2.2.1 There are real walls and real obstacles in the real arena.

2.2.2 There are virtual red/black objects, virtual traps and unloading bays (see section 2.3) in the CoSpace.

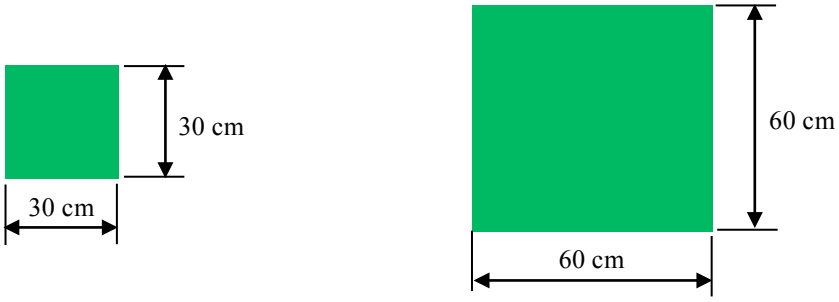
2.2.3 There are virtual obstacles, traps, red/black objects, and collection boxes in the virtual arena.

2.3 Unloading Bay

2.3.1 There are two sizes of unloading bay. The colour of the unloading bays is green.

2.3.2 The small unloading bay as shown in figure 1(a) is 30cm x 30cm. It is for the real robots to store objects collected in the CoSpace.

2.3.3 The big unloading bay as shown in figure 1(b) is 60cm x 90cm. It is the area where the virtual robots collect the virtual objects.



(a) (b)

Figure 1: Object Unloading Bay

3 ROBOT(S)

3.1 Teams are expected to use either original or loaned robots. Each SuperTeam controls one real robot and one virtual robot.

4 SUPERTEAM GAMES

4.1 Each SuperTeam designs both the CoSpace and the virtual space prior to SuperTeam games.

The details will be announced on-site.

4.2 A SuperTeam plays a game on the arena composed of their own design and the opponent team's design. For example, a virtual space should be the combination of the virtual space (designed by one SuperTeam) and the CoSpace (designed by its opponent SuperTeam).

4.3 During the SuperTeam game, two virtual robots and two real robots collect and transfer objects in the mixed reality environment.

4.4 The real robots move only in the real arena. The avatars of the real robots will be shown simultaneously in the CoSpace. The real robots need to avoid obstacles in the real arena and traps in the CoSpace while picking up red and black virtual objects. The collected objects need to be placed in the unloading bay.

4.5 The virtual robots move only in the virtual space. The virtual robots need to avoid traps while transporting red and black objects from the unloading bays to the object collection boxes.

5 SCORING

5.1 The score will be calculated based on

- the number of objects collected by the real robot;
- the successful unloading of the collected objects by the real robot to the bay;
- the number of objects collected by the virtual robot;
- the successful depository of the collected objects by the virtual robot to the object collection box.

5.2 Team will be given 100 scores at the beginning of each game.

5.3 Each red object is worth 10 scores and each black object is worth 20 scores.

5.4 Scores by the real robots:

5.4.1 A real robot must indicate that it has found an object by stopping and flashing a lamp for 3 seconds.

5.4.2 If a real robot falls into the virtual trap in the CoSpace, all objects collected that have not yet unloaded will disappear. Therefore, the scores awarded for those objects collected will be deducted.

5.4.3 The real robot needs to send the collected objects to any unloading bay. The score will be doubled upon successful unloading.

A real robot is considered to unload the objects successfully if it stops and flashes a lamp for 3 seconds when both colour sensors have detected the unloading bay.

5.4.4 A real robot cannot collect more than the maximum number of objects defined by the OC without unloading them to the bay. The maximum number will be announced on-site.

5.4.5 Real robots are penalized 10 scores for each lack of progress.

5.4.6 If a real robot got stuck after placing the collected object in the unloading bay, the robot will not be able to obtain the double points for unloading the objects.

5.5 Scores by the virtual robots:

5.5.1 A virtual robot must indicate that it has found an object by stopping and flashing a lamp for 3 seconds.

5.5.2 If a virtual robot falls into the trap, all objects collected that have not yet placed to the object collection box will disappear. Therefore, the scores awarded for those objects collected will be deducted.

5.5.3 The virtual robot needs to send the objects from the unloading bay to the object collection boxes. The score will be doubled upon successful placement of the objects to the object collection box.

5.5.4 A virtual robot cannot collect more than the maximum number of objects defined by the OC without placing them to the object collection box. The maximum number will be announced on-site.

5.5.5 Virtual robots are penalized 10 scores for each lack of progress.

5.5.6 If a virtual robot got stuck after placing the collected object in the collection box, the robot will not be able to obtain the double points for placing their objects in the collection box.

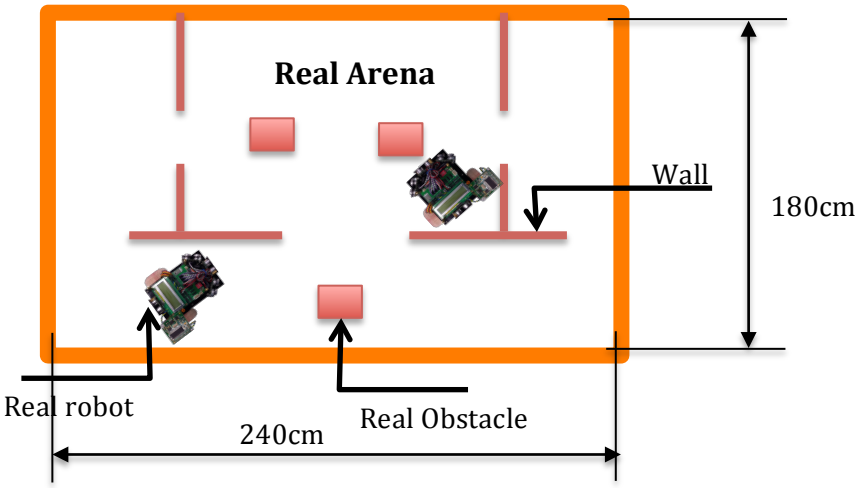
6 MENTOR ASSISTANCE

Mentors are to **ASSIST** the SuperTeam in translation and advising **ONLY**. **Mentors MAY NOT do the actual hands-on working including construction, programming, and/or take over the SuperTeam collaboration among students.** Cooperation and team facilitation between mentors is highly encouraged.

Inquiries regarding the rules may be sent to the CoSpace Technical Committee, Shen Jiayao (Singapore), at jyshen@sp.edu.sg .

Appendix A:

Real Arena:



Virtual Arena: