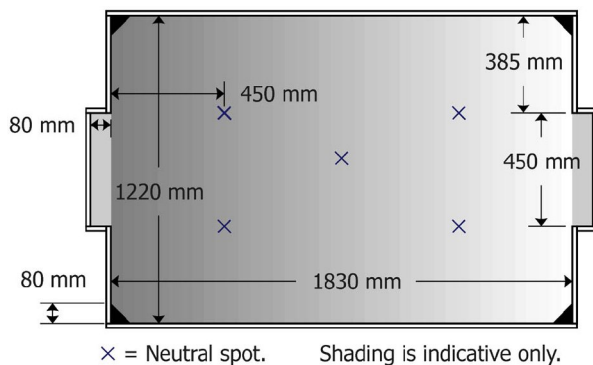


RoboCup Junior Australia (RCJA) Soccer involves teams of students designing, building and programming two robots to play soccer against two opposing robots.

This Guide is provided by Robotics Tasmania to help teams and referees prepare for the RoboCup Junior Tasmania (RCJT) Soccer competition. It summarises, but is not intended to replace, the official RCJA Soccer Rules (see www.robocupjunior.org.au for more details).

Note: An asterisk (*) indicates a modification of the national RCJA rules to suit the Tasmanian competition.

Playing Field



Size: The field is 1220mm x 1830mm. In each corner is a triangular prism, 80 mm long on the sides parallel to the walls.

A variation of 5% is allowable to accommodate local needs and construction methods.

Walls: The walls are 140mm high, painted matte black (except in the goals, see below).

Goals: The goals are 450mm wide and 80mm deep. The back, sides and floor of the goals are painted matte grey (75% matte white, 25% matte black).

Floor: The floor of the playing field is the Official RCJA Grey Scale, available from Educational Experience (www.edex.com.au).

The playing field should be placed so that it is flat and level, on a table or a floor.

It is recommended that robots are designed to cope with slight imperfections up to 3mm on the surface.

Neutral spots: There are five neutral spots, each marked by a small blue cross, one in the centre of the field and four adjacent to each corner, 450mm towards the middle of the field from each goal post.

Ball: The official ball of the competition, RCJA Roboball Mk2, is an 8cm-diameter infra-red emitting ball available from Educational Experience.

Lighting and magnetic conditions: Although organisers will aim to keep light levels consistent throughout the event and as low as possible, competitors must come prepared to calibrate their robots based on the lighting and magnetic conditions at the venue.

It is recommended that teams design their robots to cope with variations in lighting and magnetic conditions.

The Interview and Journals*

Interview: During the event, each team is required to attend a 10-minute interview to discuss their entry. Although one purpose of the interview is to verify that the team's work is substantially their own, it is also an opportunity for teams to share their work and to be recognised for their efforts. In assessing the quality of team entries, the interviewers are looking for evidence of *engineering* and *programming* skills, *independence* and *commitment*.

Note: Along with sportsmanship and quality of play, the interview contributes to whether or not a team is selected to represent Tasmania at the Australian Open.

Interview questionnaire: Prior to the event, teams will be required to complete an interview questionnaire that will be used as a starting point for the interview.

Journals: It is expected that all teams maintain journals of their competition preparation. As well as being good learning/assessment tools, they provide an excellent point of discussion in the interview.

If your team isn't already keeping a journal, start now!

The Team

Team members: Soccer teams consist of human team members (up to Grade 12 or 18 years old) and no more than two robots. Substitution of robots at any time during a tournament is strictly forbidden.

Captain: Before the start of each match, teams should designate one human who will act as 'Captain' and be allowed to start, place, remove and replace robots during the game as directed by the referee.

Referee*: Each team is required to nominate at least one person who will act as a Referee for other games. Games will be scheduled so that Referees will not miss out on any of their own team's games.

Competing in multiple events*: Although your team is welcome to register and compete in more than one event, please be aware that finals may run concurrently. Consequently, you must have enough robots and team members to cover all events.

For example, to enter both Rescue and Soccer, a team must have three robots and at least two human team members.

The Robots

Size: Each robot must fit inside an upright 22 cm diameter cylinder and be no more than 22 cm in height.

To satisfy these requirements, each robot must be upright and at its maximum size. i.e. anything that protrudes from the robot must be fully extended. If a moving part extends in more than one direction, the robot must be able to operate without touching the measuring cylinder.

Weight: The maximum robot weight is 2.5 kg.

Control: The robots must operate autonomously once started by the team captain. The use of remote control is not allowed.

Marking/colouring: Competitors are required to mark or decorate their robots to identify them as belonging to the same team.

Colours of robots and/or light transmitters must not interfere with the light sensor readings of other robots.

Construction: Any commercial robot kit or raw hardware may be used as long as the design and construction are substantially the original work of the student(s).

Ball capturing zones: Ball capturing zones are defined as any internal space created when a straight edge is placed against protruding points of a robot. The ball cannot penetrate a ball capturing zone by more than 2cm.

Dribbler: A 'dribbler' is any kind of rotating drum that imparts dynamic back spin on the ball to keep the ball against the robot. If a dribbler is used it

must comply with the previous rule (i.e. the ball cannot penetrate under the dribbler for more than 2cm).

Goalies: If a 'goalie' is used, it must be programmed to move in all directions and be able to respond to a ball that is down the field, in a forward direction. Its movement should be able to take some part of the robot past the neutral spots 45cm from the goal.

Game play

Pre-game setup*: Access for calibration and testing will be provided to the venue one hour before the start of the event.

Length of game*: In the preliminary round, games will consist of two 5-minute halves with a 5-minute break in between halves. All finals will consist of two 10-minute halves with a 5-minute break.

Start of game*: In the preliminary round, the first team ready to start with both robots on the field shall be given the choice of a) which end to kick to, or b) to kick off first. The second team will decide the other option.

In the second half, teams swap ends and the kick-off will be taken by the team that did not kick-off at the beginning of the game.

Teams will be penalised one goal per minute if they are late. If a team does not report within 5 minutes of the game start, it will forfeit the game and the score will be recorded 5-0.

Kick-offs: The ball is positioned by the referee in the centre of the field.

The team kicking off places their robots first, with one robot close to the ball. All robots not kicking off must be at least 30 cm away from the ball.

Robots must be placed on their side of the field, but not behind the goal line. Robots cannot be moved once they have been placed.

The referee may adjust the placement of the robots.

On the referee's command, all robots will be started by the team captains. A robot that starts before the referee's command will be deemed damaged and removed from play (see below).

Human intervention: In general, movement of robots by humans is not acceptable. Humans can only move robots at the instruction of the referee.

Ball movement: A robot cannot 'hold' a ball. Holding a ball means taking full control of the ball by removing all of its degrees of freedom. The only exception to this is the use of a 'dribbler' (see above).

Scoring: A goal is scored when the whole of the ball crosses the goal line and hits the back wall *unless it is 'pushed'* (see below). After a goal is scored, the non-scoring team will kick-off.

Pushed goals: The scoring robot must make a visible effort to release or kick the ball otherwise the goal will be deemed 'pushed' and the goal will not be counted. An exception to this is when the scoring robot first makes contact with the ball less than 15cm in from of the goal.

In the event of a pushed goal, play will be stopped and the ball will be moved to the nearest available neutral spot before play is resumed.

Penalty goals*: A penalty goal will be awarded if a ball deemed to be travelling towards the goal strikes a defending robot that has some part of it over the goal line and in the goal area.

Own goals: Own goals will be treated as a goal to the opposition, even if the ball is 'pushed'.

Interruption of game play: In addition to the interruptions listed below, play may be stopped, without stopping the game clock, at the discretion of the referee. After a stoppage, robots must be returned to the positions they occupied when play was stopped, and started simultaneously at the referee's command.

Lack of progress: This occurs if the ball is stuck, either between robots or between robot(s) and the wall, and is deemed by the referee to have no chance of being freed. It also occurs if the ball has not been touched by any robot for at least 20 seconds and it appears that no robots are likely to strike the ball.

In the case of 'lack of progress':

- the ball is moved to the nearest unoccupied neutral spot
- stuck robots are freed using minimal movement by the referee, and
- any robots sitting behind the goal line will be moved forward out of the goal area.

Multiple defence: If both robots from the defending side enter the region near the goal and substantially affect the game, the robot having the least influence on play is moved to the nearest neutral spot.

Damaged robots: A robot will be deemed 'damaged' if any of the following occur:

- it does not move for a period of at least 20 seconds
- it does not respond to the ball
- it continually returns to the area within the goals
- its movement is limited to a single direction
- it fails to respond to the ball with forward movement
- it starts before the referee's command (i.e. during a Kick-off)
- it damages the field or a ball, and/or
- it tips over of its own accord.

If a robot tips over after a collision with another robot, the robot can be righted by the referee and continue playing.

Damaged robots will be removed from play and must remain off the field for at least one minute.

A damaged robot may be returned, with the referee's permission, to the neutral spot that is closest to the position on the field from where the robot was removed and does not advantage that robot.

Fouls*: If a robot continuously attacks or charges a robot not in possession of the ball, the referee will call 'foul'. The offending robot will be removed from play and treated as a damaged robot (see above).

If a robot is damaged by an opposing robot, the referee will stop the game and the clock while repairs are made.

Code of conduct

The aim of RoboCup Junior is to create an entertaining and educational experience that will continue into the future. To achieve this we all must create a spirit of collaboration, and not just competition. It is hoped that all entrants respect this aim.

Fair play: It is expected that the aim of all teams is to play a fair and clean game of robot soccer.

Humans (and robots for that matter) that cause deliberate interference to other robots or damage to the field or the ball will be disqualified.

Behaviour: All movement and behaviour at the event is to be of a subdued nature. Competitors are not to enter setup areas of other teams unless expressly invited to do so.

Mentors: Mentors are not to repair robots or be involved in programming of students' robots.

Sharing: It is an understanding of world RoboCup competitions that any technological and curricular developments should be shared with other participants after the event.

Resources and acknowledgements

RoboCup Junior Tasmania
(www.robotas.idesigns.com.au).

For the official rules, please visit the RoboCup Junior web site (www.robocupjunior.org.au).

Roboballs and Grey Scales are available from Educational Experience (www.edex.com.au).

This Guide was prepared by Rob Torok and is based on the RoboCup Junior Australia Soccer Rules 2006, last updated 3/3/06 by Brian Thomas.