

Guide to Soccer

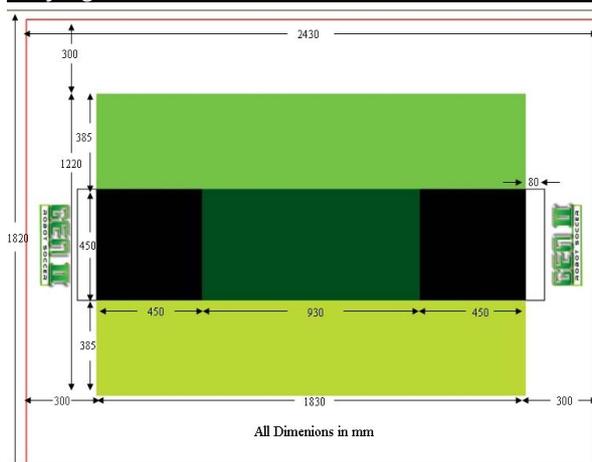
2010

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 playing field is 1220mm x 1830mm.

Floor: The floor of the playing field is a printed vinyl mat, placed flat and level on a carpet or felt base, either on a table or the floor.

Borders*: The playing field has a white border approximately 300mm wide. The borders along each side of the field are inclined; with the outside edges raised 10-15mm. The borders at the goal ends are not inclined.

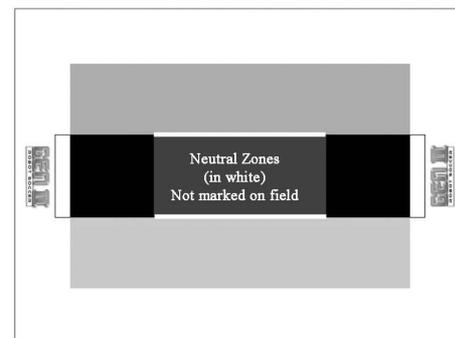
Walls: Matte black walls, 80mm high, are placed around the outside edge of the white borders.

The walls may be constructed of any material as they are not essential to game play.

Goals: The goals are 450mm wide, 140mm high and 80mm deep. The floor of the goals is white, and the back and top are sky blue. The outside of the goals including the top of the goals are matte black.

Penalty area: There is a black 'penalty area' directly in front of each goal.

Neutral zones: There are two neutral zones, as shown in the diagram below.



Ball: The official ball of the 2010 RCJA competition is an 8cm diameter **pulsed source** of infra-red emitting ball.

At the RCJT North Regional and RCJT State Finals an 8cm diameter **non-pulsed source of infra-red emitting ball will be used as per previous years.*

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 robots are designed to cope with slight imperfections (up to 5mm) on the surface and incline, as well as variations in lighting and magnetic conditions.

Event scheduling: RCJT North Regional*

Subject to the number of entries on the day, the schedule for the Soccer challenge at the RCJT North Regional will likely be a round robin, followed by a grand final.

Event scheduling: State Finals*

Friday (Preliminaries): At the State Finals, the preliminaries will be based on a 'Swiss tournament' format consisting of six rounds. Games in the first round will be based on a random draw and subsequent rounds will depend of the results of previous rounds.

Each team will play six games (unless there are forfeits or a team has a bye).

Prior to the start of each round, the games for that round will be displayed. Teams will need to refer to the displayed rosters to check the time and location of their next game.

Rankings are determined by points, with 3 points for a win, 1 for a draw, and 0 for a loss. If teams are equal on points, 'goals difference' is used, followed by 'goals scored'.

Saturday (The final eight): The top seven (7) teams from the preliminary rounds on Friday progress through to the finals on Saturday. If applicable, the Launceston Regional winner automatically qualifies for the finals, ranked 8th (unless they compete in the Preliminaries and finish in a better position).

The finals will follow a structure based on the final eight in Australian Rules Football (AFL), with the addition of play-offs for places 3 to 8.

All finals will consist of two 10-minute halves with a 5-minute break.

In the finals, if the scores are level at the end of full time, then additional 5-minute halves will be played (with sides alternating kick-off and ends) until a goal is scored. The team that scores the goal is the winner.

The Scrutineering, Interview and Record Keeping*

Scrutineering: Unlike previous years, scrutineering of all robots will now take place before the soccer competition begins on both the Friday and Saturday of the event. If your team's robots pass this scrutineering then you will be given a red dot to place on each robot which should not be removed at anytime during the competition. Additional scrutineering may take place before each match if required.

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.

Record Keeping: It is expected that all teams maintain records (photos, videos, circuit diagrams etc.) 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 record, 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. Robots may not be substituted during an event.

Captain: Before the start of each game, 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 expected to nominate at least one person who will act as a Referee for other games, if required. 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.

There is only one Soccer division in RoboCup Junior Tasmania. Teams should ensure that their robots are constructed ruggedly to prevent damage from other team's robots that may be heavier and bulkier. Competitors preparing for the Australian Open should be aware that the national event is run in three weight divisions: LEGO League (no more than 1kg), Lightweight (no more than 1kg), and Premier (not more than 2.5kg).

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

Type 2 (blue tooth) communication between robots is acceptable as long as it does not interfere with the performance of other robots.

Robots must have the ability to have their communication disabled at the request of the referee.

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).

All loose cables should be secured to the robot to prevent parts snagging during game play.

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 3cm.

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 3cm).

*If a robot has an electronic solenoid kicker, its voltage must **be limited to the OH&S Standard Safe Voltage of 70V.***

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 (*at least 45 cm from goal*). Its movement should be able to take some part of the robot outside the penalty area.

Hint: The goalie cannot respond sideways and followed by a forward movement.

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 rounds, 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 rounds, 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-off: The ball is positioned by the referee in the centre of the field. Robots must be placed on their side of the field, with the team kicking off placing their robots first. Robots cannot be moved by team members once they have been placed, but may be repositioned by the referee.

All robots not kicking off must have some part inside the penalty box.

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).

The robot kicking off must make a clear strike of the ball and it must roll clear of the robot by at least 5cm. A robot that does not have a kicker must visibly release the ball and not continue to push the ball.

Human intervention: Robots may not be moved by any humans unless directed by 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 ball must be free rolling to score a goal otherwise it will be deemed 'pushed' and the goal will not be counted. I.e. the scoring robot must make a visible effort to release or kick the ball. An exception to this is when the scoring robot first makes contact with the ball less than 15cm from the goal.

In the event of a pushed goal, the ball will be moved to the nearest available neutral zone. Play will not be stopped.

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.

Robots should be built in a manner that the cross bar prevents them from going behind the goal line.

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

Lack of progress*: A 'lack of progress' occurs when the ball is stuck between multiple robots and is unlikely to become free.

In the case of 'lack of progress':

- the ball is moved to the nearest unoccupied neutral zone
- stuck robots are freed using minimal movement by the referee or team captains (at the request of the referee).

Forcing*: If a robot is using greater power to 'force' the ball past an opposition robot, then the ball is moved to the nearest unoccupied neutral zone.

In this situation, if a goal is scored before the ball has been removed, the goal will be disallowed and the ball placed on the nearest unoccupied neutral zone.

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

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

- it does not move for a period of at least 15 seconds
- it does not respond to the ball
- it remains on the white border and shows no indication of returning to the playing area,
- 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 any 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.
- it continuously rams or attacks other robots in possession of the ball.
- it loses parts on the field during game play, such as wheels.

If a robot tips over after a collision with another robot, the robot may be righted, with the referee's permission and continue playing.

Damaged robots will be removed from play and must remain off the field **for 1 minute** or, in a preliminary round game, after a goal is scored by either team (whichever is sooner).

A damaged robot must be repaired and only then may be returned, with the referee's permission, to the area in front of the goal or the neutral zone 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.

Ball out of play: If the ball strikes the outer wall, it will be moved to the nearest neutral zone to the disadvantage of the last robot that touched it (i.e. the nearest neutral zone in the direction that the opposition are kicking).

If the ball is last touched by a defending robot and goes out over the end of the field, the ball will be placed at the neutral zone at the corner of the penalty area.

Interruption of game play*: Play may be stopped, with or without stopping the game clock, at the discretion of the referee. Robots must then be returned to the positions they occupied when play was stopped, and started simultaneously at the referee's command.

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: All teams are expected to play fair and clean games 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 expectation of RoboCup Junior that any technological and curricular developments should be shared with other participants after the event.

Resources and Acknowledgements

Soccer fields, walls and goals are available from Modern Teaching Aids (<http://www.teaching.com.au>).

Field construction hints are available at the Gen II Soccer site (<http://www.deakin.edu.au/scitech/eit/robocup/>).

Balls are available from Wiltronics (<http://www.wiltronics.com.au/>).

For the official rules and RCJT finals registration, please visit the RoboCup Junior Australia web site (www.robocupjunior.org.au).

RoboCup Junior Tasmania (www.roboticstasmania.com).

This Guide was prepared by Peter Wallhead and is based on the RCJA GEN II Soccer Rules 2010, last updated 23/06/10.