RoboCup Junior Australia

Simple Simon Soccer Rules 2023

Last Modified: 20 February 2023

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Code of Conduct

Spirit

It is expected that all participants, students and mentors, will respect the aims and ideals of RoboCup Junior as set out in our mission statement. In turn, the volunteers, referees and officials will act within the spirit of the event to ensure the competition is competitive, fair and most importantly, fun. "It is not whether you win or lose, but how much you learn that counts."

Sharing

It is the overall desire of RoboCup Junior competitions that any technological and curricular developments will be shared with other participants after the competition. Any developments including new technology and software examples, may be published on the RoboCup Junior website after the event, furthering the mission of RoboCup Junior as an educational initiative. Participants are strongly encouraged to ask questions of their fellow competitors to foster a culture of curiosity and exploration in the fields of science and technology.

Local Variations

These rules will be in use for the Australian National Championships for the titled year. State and Regional competitions may implement minor variations with respect to age groups, divisions and judging. These variations will be communicated to the participants through email and/or on their relevant website prior to the state or regional competition.

Notes/Advice vs. Rules
This document includes notes/advice to the competitors and mentors, plus rules that are firm. This has been done to remove ambiguity. There is a notation to indicate whether the content of this document is to be read as a note/advice or as a rule. Notes/advice appear in green.
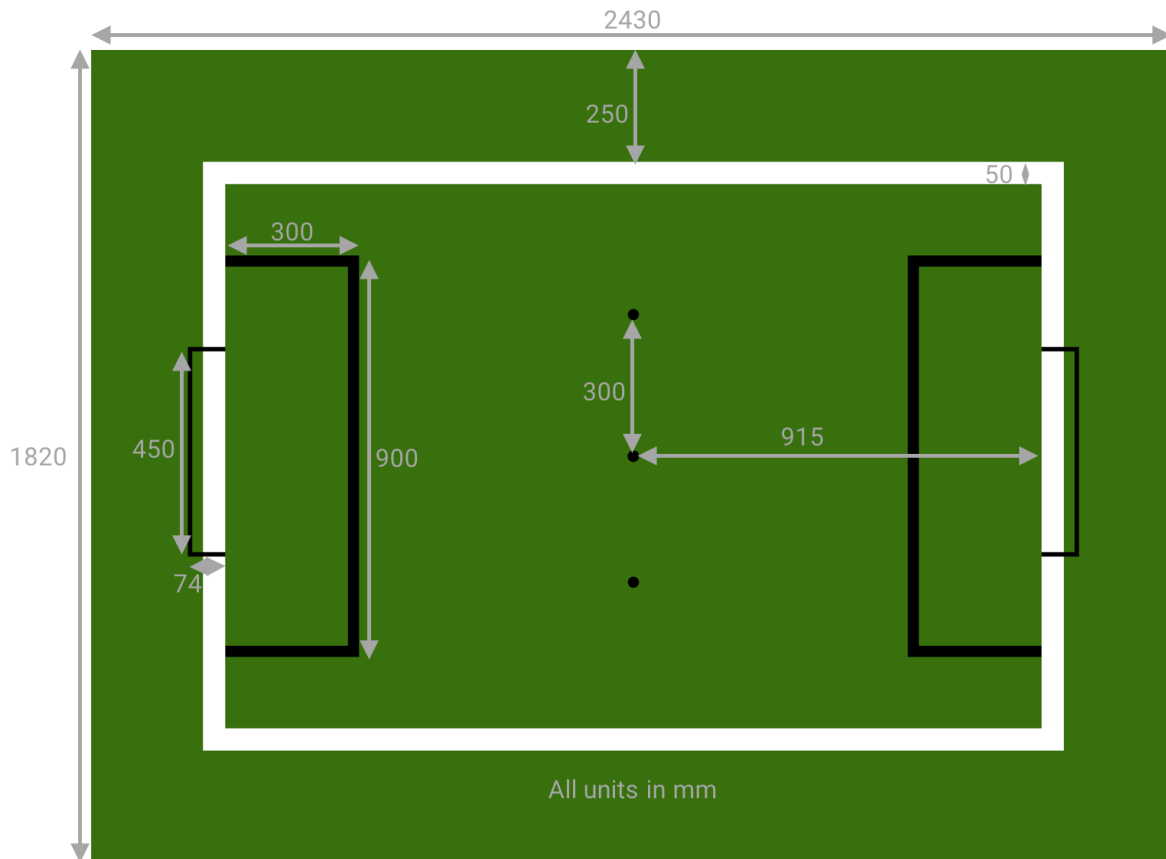
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1   Playing Field

1.1   Floor

1.1.1   The field has 50mm thick white lines 250mm from the walls on every side, which form the border of the out area (exclusive of the white lines). The floor is green or charcoal coloured carpet with neutral points and penalty boxes marked with 25mm thick black lines, as shown above.

1.1.2   The field should be placed so that it is flat and level. The out areas of the field may be either flat or inclined by raising the outside of the field by 10mm (the incline should allow the ball to roll from the top of the incline to the centre of the playing area).

1.1.3   The field can be either a carpet base (preferred for State and National events) or the printed Gen2 vinyl field if carpet isn't available. The recommended carpet is 3 - 5mm thick green outdoor carpet.

1.1.4   The field may be placed on a wooden or plastic table or on the floor.

1.1.5   All dimensions of the field have a tolerance of +/- 5%.

Note: While all efforts will be made to construct the fields precisely, robots should be designed to allow for this tolerance.

1.2 Walls

1.2.1 Matte black walls are placed all around the field, including behind the goals.

1.2.2 Wall heights are at least 100mm high above the playing field.

1.3 Goals

1.3.1 The internal width of each goal is 450mm.

1.3.2 The internal depth of each goal is 74mm.

1.3.3 Each goal will have a crossbar 140mm above the playing surface. The depth of the crossbar is a maximum of 20mm to avoid covering the top of the goal.

1.3.4 The back and sides of one of the goal's interior, as well as the crossbar, is painted matte similar to CMYK cyan. The back and sides of the interior of the other goal, as well as the crossbar, is painted matte similar to CMYK yellow. The external sides of the goals are painted matte black.

1.3.5 The surface within the goal area is flat and level (horizontal).

1.3.6 The sidewalls of the goals extend to the end wall to prevent the ball from rolling behind the goals.

1.4 Neutral Points

1.4.1 There are two neutral points, as shown on the field diagram in section 1.1.

1.4.2 A neutral point is also designated in the middle of the field. This is only used for starting games and placing the ball after multiple calls of lack of progress, or if all other neutral points are occupied.

1.5 Lighting and Magnetic Conditions

1.5.1 Teams 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, as these vary from venue to venue.

Note: At the Australian Open, all fields will be raised off the floor by at least 450mm to minimise magnetic interference.

2 Ball

2.1 Specification

2.1.1 A ball that meets the RoboCup Junior Australia Soccer Ball Specification (available on the RCJA soccer web page) shall be used. The Simple Simon League will use the **infrared ball**. The ball will be used in a pulsed and stepped-waveform mode - the Elekit RCJ-05 ball will be operated in MODE A (pulsed).

2.1.2 If the infrared ball has a **fast-flashing LED** (indicating low battery power) the batteries or the ball shall be replaced prior to the start of the game or at the earliest stoppage in play. Match timing shall be paused while the issue is rectified.

2.2 Ball Suppliers

2.2.1 The official infrared balls for all RCJA tournaments will be the Elekit RCJ-05 soccer ball available from Modern Teaching Aids.

Note: The older, dark-grey coloured infrared ball previously sold by HiTechnic is also acceptable.

2.2.2 A passive orange ball that suits the requirements set out in the Ball Specification document (see Rule 2.1.1.) will be used for the Open League.

3 Robots

3.1 Dimensions

3.1.1   The robot, as it will be positioned in gameplay, must fit inside an upright 220mm diameter cylinder.

3.1.2   The robot height must be less than 220mm.

3.1.3   For each league, the weight of each robot must be less than 1.0kg.

3.1.4   While being inspected, each robot must be positioned as it will be in gameplay and at its maximum size, i.e., anything that protrudes from the robot must be fully extended. If a robot has a moving part that extends in two directions, it will need to be inspected with this part operating. The robot must be able to operate **without touching the measuring cylinder**.

Note: It is recommended to design your robot to a smaller size, such as 210mm, to allow for tolerances.

3.1.5   Voltage of robots batteries will be limited to the rechargeable LEGO battery.

3.1.6   **Omni wheels of any type are not permitted.**

3.2 Control

3.2.1   Robots must be controlled autonomously.

3.2.2   Robots must be able to be started manually.

3.2.3   The use of remote control of any kind is not allowed.

3.2.4   Robots must be able to drive in all directions.

3.2.5   Communication between robots is acceptable if it does not interfere with the performance of other robots, is not detectable outside the venue and complies with local regulations regarding frequency use and safety.

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

3.3 Marking/Colouring

3.3.1   Competitors must mark or decorate their robots to identify them as belonging to the same team. These must not influence gameplay and will not be considered in the height restrictions.

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

Advice: Lightweight and Open, avoid having cyan, yellow, or orange visible on the outside of the robot as it may interfere with other robots if they are using cameras.

3.4 Team Structure

3.4.1   All teams shall consist of no more than two (2) robots. **Any substitution of extra robots during a tournament is forbidden, and disqualification will result. Teams cannot enter the competition venue with more than two constructed robots.**

3.5 Construction

3.5.1 Aftermarket pulsed IR light sensors are the only non-LEGO parts that can be used in robot construction. All other parts used in the robot construction must be strictly LEGO-brand pieces, motors and sensors. **Compass sensors or gyro sensors** *(built in or as an add on)* **are not permitted**

Note: NO other building materials can be used, including glue, tape, screws, etc.

3.5.2 Tris10, HiTechnic IR and IR Seeker Sensor for LEGO Education SPIKE Prime & EV3sensors are allowed. (IR Seeker Sensor for LEGO Education SPIKE Prime & EV3sensors are available from MTA)

3.5.3 LEGO pieces cannot be modified in any way.

3.5.4 Robots must have a handle for referees to easily pick them up. The handle will not be included in above height measurements.

3.5.5 Cable ties or tape may be used to secure wires but must not be part of robot construction.

3.6 Ball Capturing Zones and Movement

3.6.1 Ball Capturing Zones are defined as any internal space created when a straight edge is placed on the protruding points of a robot.

3.6.2 The ball cannot penetrate the Ball Capturing Zone by more than 30mm.

3.6.3 A robot cannot "hold" a ball.

Note: Holding a ball means taking full control of the ball by removing all of its degrees of freedom. For example, this would mean fixing a ball to the robot's body, surrounding a ball using the robot's body to prevent access by others, encircling the ball or somehow trapping the ball with any part of the robot's body. If a ball stops rolling while a robot is moving or a ball does not rebound when rolled into a robot, it is a good indication that the ball is trapped.

3.6.4 The ball cannot be held underneath a robot, i.e. no part of a robot can protrude over more 30mm of the ball's projected diameter.

3.6.5 Dribblers: The use of a rotating drum or wheel that imparts dynamic backspin on the ball to keep the ball on its surface, called a "dribbler", is not allowed.

3.7 Goalies

3.7.1 If a goalie is used, it cannot limit its movement to a single direction on the field. It must be programmed to move in all directions.

3.7.2 The goalie must respond to the ball in a forward direction in an attempt to intercept the ball ahead of the goal. If required, its movement should be able to take some part of the robot outside of the penalty box (300mm from the goal).

Note: The goalie cannot respond sideways, followed by a forward movement.

3.7.3 Failure to respond to the ball with a forward movement down the field will result in the robot being classified as "Damaged." (Section 4.7)

4 Game Play

4.1 Pre-game setup

4.1.1 Organisers will provide access to the competition area for calibration and testing prior to the competition and according to a schedule that will be made available at the start of the event.

4.1.2 Organisers will make every effort to allow at least 5 minutes of setup time before each game.

4.1.3 This time is also for teams to express any concerns about the legality of opposing robots.

4.2 Length of Game

4.2.1 The game will consist of two 5-minute halves. Some competitions may choose to run 10-minute halves at the discretion of the tournament organising committee.

4.2.2 There will be no break in between the halves.

4.2.3 The game clock will run for the duration of the game (typically two 5-minute halves), without stopping (except as noted in Referee's Timeout in section 4.9.4).

4.2.4 Teams can be penalised one goal per minute at the referee's discretion if they are late.

4.2.5 If a team does not report within 5 minutes of the scheduled game time, they will forfeit the game and the winning team awarded a 10-0 score line.

4.2.6 A game will end when there is a goal difference of 10 goals. The losing team may elect to continue playing, but the recorded score (10 goal difference) will not change.

4.2.7 Teams may elect to end a game early; however, they will forfeit the game and the winning team awarded a 10-0 score line.

4.3 Start of Game

4.3.1 At the start of the first half of the game, the referee will toss a coin and the team first mentioned in the draw shall call the coin while it is in the air.

4.3.2 The winner of the toss can choose either (a) which end to kick to, or (b) to kick off first.

4.3.3   The loser of the toss will decide the other option.

4.3.4   The team not kicking off in the first half of the game will kick off to begin the second half.

4.4   Kick-Offs

4.4.1   Each half of the game begins with a kick-off.

4.4.2   All robots must be located on their defensive side of the field.

4.4.3   Robots must not be running.

4.4.4   The ball is positioned by the referee in the centre of the field.

4.4.5   The team kicking off places their robots on the field first. Robots cannot be moved once they have been placed.

4.4.6   All robots on the team not kicking off must have some part of the robot in the penalty box.

4.4.7   On the referee's command, all robots will be started immediately by human team members.

4.4.8   The robot kicking off must make a clear strike of the ball and it must roll clear of the robot by at least 50mm or the robot must start at least 50mm from the ball. An illegal kick off will result in the opposing team being granted the kick off.

4.4.9   Any robots that are started before the referee's command will be treated as damaged.

4.5   Scoring

4.5.1   A goal is scored when the ball strikes the back wall of the goal. The referee will announce the goal.

4.5.2   A penalty goal will be awarded if a ball deemed to be traveling into the goal strikes a defensive robot that has some part of it over the goal line and in the "in goal" area.

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

4.5.3   After a goal is scored, a kick-off will occur. The non-scoring team will be awarded the ball.

4.5.4   "Own goals" will be treated as a goal to the opposition.

4.6   Lack of Progress

4.6.1   This occurs if the ball is stuck between multiple robots ("forcing" situation) for a reasonable amount of time and has no chance of being freed or if no robot has any chance of locating the ball in a reasonable amount of time.

4.6.2   The referee will call "Lack of Progress" immediately when a robot is using greater power to "force" the ball past the opposition. If a referee is slow to remove the ball and a goal is scored as a direct result of a robot "forcing" the ball through, the goal will be disallowed, and the ball placed on the nearest neutral point.

4.6.3   In the case of Lack of Progress, the ball will first be moved to the nearest neutral point. If this occurs again, the ball will be moved to the centre of the field.

4.6.4   When Lack of Progress is called, any stuck robots will be freed using minimal movement by the referee or team captains at the request of the referee. Stuck robots should not be moved at any other time.

4.7 Damaged Robots

4.7.1   If a robot does not respond to the ball, it will be deemed damaged by the referee.

4.7.2   If a single robot remains in the goal area for longer than 20 seconds, or is stuck against walls or goals, and shows no indication of returning to the playing area, it will be deemed damaged by the referee.

Advice: A small reverse command in a program will usually free a stuck robot.

4.7.3   The referee or a team member (**with the referee's permission following a player request**) may remove a damaged robot(s) from the field. **"Damaged" robots can be removed at the team's discretion. If a robot is in a situation where it is about to kick an own goal, it can be removed.**

4.7.4   A damaged robot must remain off the field for at least thirty seconds (or one minute if ten-minute halves) or until a goal is scored.

4.7.5   A damaged robot must be repaired and may be returned with the referee's permission to the field. It will be placed on an unoccupied corner of the penalty box on the robot's defending side that does not advantage the robot, e.g., facing the ball.

Note: Alternatively, the referee may instruct the team to place the robot on a neutral point if the penalty box is fully occupied, or to avoid a multiple defence situation. Goalies may be returned to the area in front of the goal without advantaging the robot, e.g., facing the ball.

4.7.6.   Play will continue during removal, repair and replacement. Note that the referee may choose to interrupt play if robot damage occurred because of a collision with another opposition robot.

4.7.7   If a robot turns over, it will be treated as a damaged robot and removed. The exception to this rule is if the robot is tipped over after a collision with an opposition robot, it can be righted by the referee and continue playing.

4.8 Ball Out of Play

4.8.1   A ball is considered out of play if it strikes the wall behind either goal.

4.8.2   After a ball is considered out of play, it will be moved to the nearest neutral point.

4.9 Interruption of Game Play

4.9.1   The situations listed in sections 4.6 - 4.8 may cause play to be interrupted, usually resulting in the movement of the ball to the nearest neutral point while play is allowed to continue.

4.9.2   Play may also be stopped by the referee, but the game clock is not stopped, unless at the discretion of the referee. All robots must be stopped immediately and restarted from their penalty box.

4.9.3   After a stoppage in play, play will resume on the referee's command and all robots will start simultaneously.

4.9.4   A referee may call "Referee's Timeout" for field repair, situations, such as in section 4.7.7 or 4.11.3, or if the tournament referee is called for rule clarification. The referee can elect to stop the match clock if the stoppage is lengthy.

4.10 Multiple Defence

4.10.1   Multiple Defence occurs if more than one robot from the defending side enters the penalty area, takes up a defensive position and substantially affects the game.

4.10.2   For a "Multiple Defence", the robot having the least influence on play is moved to the centre of field. In the case where a goalie is involved, the other player will be moved.

4.11 Fouls

4.11.1   If a robot utilises a device or an action which continuously attacks or charges a robot not in possession of the ball, the referee will call "Foul!". The robot will be deemed damaged.

4.11.2   If the robot continues to foul, it will be permanently removed from the game, a yellow warning sticker will be placed on the robot/s and the referee will record the infringement on the scorecard.

4.11.3   If a robot is damaged by a foul, the referee will stop the game and stop the clock for up to 2 minutes while repairs are made. (See Referee's Timeout section 4.9.4)

4.11.4   If a robot is removed from two games for "fouling", it will be disqualified from the tournament.

4.12 Free Kicks, Penalty Kicks and Offside

4.12.1   There are no free kicks, penalty kicks or offside rules.

4.13 Humans

4.13.1   In general, movement of robots by humans is not acceptable.

4.13.2   Humans can only move robots at the instruction of the referee.

4.13.3   Before the start of each match, teams should designate one human who will act as "Captain", and be allowed to place, remove and replace robots during the game, based on the stated rules and as directed by the referee.

4.13.4   Other team members may start one robot, but after this, they are not allowed within the vicinity of the playing field. They are to remain more than one metre from the field while the ball is in play, unless otherwise directed by the referee.

4.13.5   If requested, team members starting the robots must be able to cover up any cyan, yellow, or orange on their person or equipment that interferes with the sensors of the other team's robots (see also: section 3.3.2).

4.14 Selections For Finals

14.1   During Round Robin play, teams will be allocated three points for a win, one point for a tie and 0 points for a loss.

14.2   Teams will be ranked on the following criteria:
- Points scored
- Goals scored
- Goal difference

4.15 Tied Games

4.15.1   In the event of a tie at full time during a non-finals game, the tied score will be recorded.

4.15.2   In the event of a tie at full time during a finals game, the following procedure will be followed:

- Game play will not be stopped or interrupted.
- The game will continue as "golden goal". As soon as a goal is scored, the game will end.
- If after five minutes, no additional goal has been scored, then only one robot from each team will be allowed on the field. Any team with two robots on the field must pick one robot to be taken off the field, then "golden goal" gameplay will continue. The robot chosen to be removed from the field is not allowed back on the field for the remainder of the game.
- If after an additional five minutes, no team has scored a golden goal, the team who is ranked higher in the seeding will be considered to have won the game.

5   Conflict Resolution

5.1   Referee
5.1.1   **During game play, the referee's decisions are final.** Any argument with a referee's decision will result in a yellow warning card. If argument continues, the referee will give a red card resulting in immediate forfeit of the game.

5.1.2   If team captains are satisfied with the result of a game, they are to sign the score sheet at the conclusion of game play.

5.1.3   Any protest after the game should only be if the scoring is believed to be incorrect, or if a game result is in doubt. After signing the score sheet, no protests can be lodged.

5.2   Rule clarification
5.2.1   Rule clarification may be made by members of the RoboCup Junior Australia Technical Committee.

5.2.2   If a rule clarification is needed, the referee should stop the game immediately, call referee's timeout (Section 4.9.4), stop the clock and confirm the ruling before continuing with the game.

5.3   Special Circumstances
5.3.1   Specific modifications to the rules to allow for special circumstances, such as unforeseen problems and/or capabilities of a team's robots, may be agreed to at the time of the tournament, provided a majority of the contestants agree.

6   Inspection

6.1   Scrutineering
6.1.1   All robots will be examined by a panel of referees before the start of each day of the tournament to ensure that the robots meet all constraints described in section 3.

6.1.2   **It is the responsibility of teams to have their robots re-inspected if their robots have been modified at any time during the tournament.** This also includes damage or changes during game play. Any team that is deemed to have an illegal robot following a game, will forfeit that game.

6.1.3   Any violations of the inspection rules will prevent that robot from competing until modifications are made.

6.1.4   Modifications must be made within the time schedule of the tournament and teams must not delay game play while making modifications.

6.1.5   The inspection may include, but is not limited to, checking the size, weight, ball capture zone depth, maximum voltage, and kicker strength (using the "Kicker Power Measuring Device") of each robot.

6.2   Robot Construction

6.2.0   Construction and programming of robots has to be performed exclusively by the competitors.

6.2.1   Competitors will be interviewed to explain the operation of their robots in order to verify that the construction and the programming of the robot is their own work.

6.2.2   Competitors will be asked questions about their preparation efforts, and they may be requested to answer surveys and participate in recorded interviews for research purposes.

6.2.3   Commercial kits may be used but must be substantially modified by the competitors.

6.2.4   Proof of a full understanding of the program must be shown.

6.2.5   It is expected that tournament organisers will conduct verification interviews prior to the finals of all events.

6.2.6   If there is excessive mentor assistance or the work on the robots is not substantially original work by the competitors, then the team will be disqualified from the tournament.

7   Code of Conduct

7.1   Fair Play

7.1.1   Robots that cause deliberate interference and repeated damage to structurally sound robots during normal game play will be disqualified (see section 4.11).

7.1.2   Robots that cause damage to the field or the ball during normal game play will be disqualified from the tournament (see section 3.8).

7.1.3   Humans that cause deliberate interference with any robots or damage to the field or the ball will be disqualified from the tournament. *It is recommended that teams avoid clothing which uses the colours cyan, yellow and orange in case these interfere with the operation of robots seeking a passive ball.*

7.1.4   It is expected that the aim of all teams is to play a fair and clean game of robot soccer. It is expected that all robots will be built with sections 3.8 and 4.11 in mind.

Note: If robots are built to the upper limits of power and weight, they must anticipate the possibility of damaging other robots or the ball. Officially endorsed RoboCup Junior Australia balls have been tested for robustness and are not damaged in normal RoboCup Junior Australia game play.

7.2   Behaviour

7.2.1   All movement and behaviour are to be of a subdued nature within the tournament venue.

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

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

7.2.4   These rules will be enforced at the discretion of the referees, officials, conference organisers and local law enforcement authorities.

7.3   Mentors

7.3.1   Mentors (teachers, parents, chaperones, and other adult team-members) are not allowed in the competitor's work area.

7.3.2   Sufficient seating will be supplied for mentors to remain in a supervisory capacity around the competitor's work area.

7.3.3   Mentors are not to repair robots or be involved in the programming of robots. Robots or computers should not need to leave the competitor's work area during the day's game play.

7.3.4   Mentor interference with robots or referee decisions will result in a yellow card warning in the first instance. If this reoccurs, a red card will be awarded, and the mentor will be asked to leave the venue.

7.4   Definition of a Team

7.4.1   Teams may consist of two to four students.

7.5   Sharing

7.5.1   An understanding that has been a part of world RoboCup Competitions is that any technological and curricular developments should be shared with other participants after the competition.

7.5.2   Any developments may be published on the RoboCup Junior Australia website after the event.

7.5.3   This furthers the mission of RoboCup Junior Australia as an educational initiative.

7.5.4   Teams are encouraged to publish footage of highlights on YouTube and social media, tagging "RoboCup Junior Australia Soccer" or its social media pages. Prizes may be awarded for the best clips at the discretion of the tournament organisers.

7.6   Spirit

7.6.1   It is expected that all participants, competitors, and mentors alike, will respect the RoboCup Junior Australia mission.

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

7.6.3   **It is not whether you win or lose, but how much you learn that counts.**