

# RoboCupJunior Soccer Rules 2021

## Soccer Technical Committee 2020 and 2021:

Georgia Gallant	USA
Javier E. Delgado Moreno	Mexico
Hikaru Sugiura	Japan
Marco Dankel	Germany
Felipe Nascimento Martins	Netherlands
Marek Šuppa	Slovakia (CHAIR)

## Soccer Technical Committee 2019:

Tairo Nomura	Japan
James Riley	Australia
Mikail S. Arani	Canada
Javier E. Delgado Moreno	Mexico
Felipe Nascimento Martins	Netherlands
Marek Šuppa	Slovakia (CHAIR)

These are the official SuperTeam Soccer rules for RoboCupJunior 2020. They are released by the RoboCupJunior Soccer Technical Committee. The English version of these rules has priority over any translations.

Teams are advised to check the RoboCupJunior Soccer site <https://junior.forum.robocup.org/> for OC (Organizational Committee) procedures and requirements for the international competition. Each team is responsible for verifying the latest version of the rules prior to competition. <sup>1</sup>



These are the Draft rules. Although they are still subject to change, the TC expects the changes to be minimal and at mostly cosmetic.

## Preface

In the RoboCupJunior Soccer challenge, teams of young engineers design, build, and program two fully autonomous mobile robots to compete against another team in matches. The robots must detect a ball and score into a color-coded goal on a special field that resembles a human soccer field.

To be successful, participants must demonstrate skill in programming, robotics, electronics and mechatronics. Teams are also expected to contribute to the advancement of the community as a whole by sharing their discoveries with other participants and by engaging in good sportsmanship, regardless of culture, age or result in the competition. **All are expected to compete, learn, have fun, and grow.**

RoboCupJunior Soccer consist of two sub-leagues: **Soccer Open** and **Soccer Lightweight**. These rules apply for both sub-leagues. There are two main differences between the two leagues.

**These rules are released together with the current regular game rules. Wherever a change is needed because of the difference with regular games, situation have been analyzed and are ruled here. For all other situations that do not change from the regular game rules, normally they have been only mentioned here as being the same regular game rule.**

- Deleted "The field is located 70 cm above the floor."
- Deleted "It has a cross-bar on top (to prevent robots from entering the goal and to allow checking if the ball scored)."
- Deleted "The cross-bar is exactly over the white line. The height of the cross-bar is 2 cm."

<sup>1</sup> The current version of these rules can be found at <https://robocupjuniortc.github.io/soccer-rules/master/rules.html> in HTML form and at <https://robocupjuniortc.github.io/soccer-rules/master/rules.pdf> in PDF form.

- Deleted "and the cross-bar"
- Deleted "A robot is considered inside the Penalty Area when it is completely inside."
- Added "It is recommended that the blue be of a brighter shade so that it is different enough from the black exterior."
- Changed "When the goal difference reaches 10 the game finishes regardless of the state of the game clock." to "The final game score will be trimmed so that there is at most 10 goal difference between the losing and the winning team."
- Changed "any other" to "an opposing"
- Changed "black" to "white"

## 1 GAMEPLAY

### 1.1 Game procedure and length of a game

- 1.1.1 RCJ Soccer SuperTeam games consist of two teams of robots playing soccer against each other. Each team has five autonomous robots. The game will consist of two halves. The duration of each half is 10-minutes. There will be a 5-minute break in between the halves.
- 1.1.2 The game clock will run for the duration of the halves without stopping (except if or when a referee wants to consult another official). The game clock will be run by a referee or a referee assistant.
- 1.1.3 SuperTeams are expected to be on the field 5 minutes before their game starts. Being at the inspection table does not count in favor of this time limit. Teams that are late for the start of the game can be penalized one goal **per 30 seconds** at the referee's discretion.
- 1.1.4 **The final game score will be trimmed so that there is at most 10 goal difference between the losing and the winning team.** <sup>2</sup>

### 1.2 Pre-match meeting

- 1.2.1 At the start of the first half of the game, a referee will toss a coin. The team mentioned first in the draw shall call the coin. The winner of the toss can choose either which end to kick towards, or to kick off first. The loser of the toss chooses the other option. After the first half, teams switch sides. The SuperTeam not kicking off in the first half of the game will kick off to begin the second half of the game.
- 1.2.2 During the pre-match meeting the referee or their assistant may check whether the robots are capable of playing (i.e., whether they are at least able to follow and react to the ball). If none of the robots is capable of playing, the game will not be played and zero goals will be awarded to both SuperTeams.

### 1.3 Kick-off

- 1.3.1 Each half of the game begins with a kick-off. All robots must be located on their own side of the field. All robots must be halted. The ball is positioned by a referee in the center of the field.
- 1.3.2 The team kicking off places their robots on the Big field first and the rest of the robots can be located anywhere on their side of the playing field, as long as they are at a maximum distance of 10 cm from any white line.

<sup>2</sup> In previous version this said "When the goal difference reaches 10 the game finishes regardless of the state of the game clock."

- 1.3.3 The SuperTeam not kicking off will now place their robots on the defensive end of the Big field.
- 1.3.4 Robots cannot be placed behind the goal line or out of bounds. Robots cannot be repositioned once they have been placed, except if the referee requests to adjust their placement to make sure that the robots are placed properly within the field positions.
- 1.3.5 On the referee's command (usually by whistle), all robots will be started immediately by members of the team they belong to. Any robots that are started early will be removed by the referee from the field and deemed damaged.
- 1.3.6 Before a kick-off, **all damaged or out-of-bounds robots** are allowed to return to the playing field immediately if they are *ready and fully functional*.
- 1.3.7 If no robots are present at a kick-off (because they have moved out-of-bounds Rule 1.9, **Out of bounds** or are damaged Rule 1.10, **Damaged robots**), the penalties are discarded and the match resumes with a Rule 1.3.A, **Neutral kick-off**.

### 1.3.A Neutral kick-off

- 1.3.A.1 A natural kick-off is the same as the one described in Rule 1.3, **Kick-off** with a small change: all robots need must be at least 30 cm away from the ball (outside of the center circle).

## 1.4 Human interference

- 1.4.1 Except for the kick-off, human interference from SuperTeam members (e.g. touching the robots) during the game is not allowed unless explicitly permitted by a referee. Violating SuperTeam / SuperTeam member(s) can be disqualified from the game.
- 1.4.2 The referee or a referee assistant can help robots get unstuck if the ball is not being disputed near them and if the situation was created from normal interaction between robots (i.e. it was not a design or programming flaw of the robot alone). The referee or a referee assistant will pull back the robots just enough for them to be able to move freely again.

## 1.5 Ball movement

- 1.5.1 **RoboCupJunior Soccer Rules** rule Rule 1.5, **Ball movement** applies.

## 1.6 Scoring

- 1.6.1 A goal is scored when the ball strikes or touches the back wall of the goal. Goals scored either by an attacking or defending robot have the same end result: they give one goal to the SuperTeam on the opposite side. After a goal, the game will be restarted with a kick-off from the SuperTeam who was scored against.
- 1.6.2 After the referee signals that a goal was scored, the referee will invite SuperTeam members to capture their robots or ask a referee to help capture them and get ready for kick-off.

## 1.7 Inside the Penalty Area

- 1.7.1 **RoboCupJunior Soccer Rules** rule Rule 1.7, **Inside the Penalty Area** applies.

## 1.8 Lack of progress

- 1.8.1 RoboCupJunior Soccer Rules rule Rule 1.8, Lack of progress applies.

## 1.9 Out of bounds

- 1.9.1 If a robot's entire body moves out beyond the white line of the Big field, it will be called for being out of bounds. When this situation arises, the robot is given a one-minute penalty, and the SuperTeam is asked to remove the robot from the Big field. There is no time stoppage for the game itself. The robot is allowed to return if a kick-off occurs before the penalty has elapsed.
- 1.9.2 The one-minute penalty starts when the robot is removed from play. Furthermore, any goal scored by the penalized SuperTeam while the penalized robot is on the Big field will not be granted. Out-of-bounds robots can be fixed if the SuperTeam needs to do so, as described in Rule 1.10, **Damaged robots**.
- 1.9.3 After the penalty time has passed, robot will be placed on the unoccupied neutral spot furthest from the ball, facing its own goal.
- 1.9.4 A referee can waive the penalty if the robot was accidentally pushed out of bounds by **an opposing** <sup>3</sup> robot. In such a case, the referee may have to slightly push the robot back onto the Big field.
- 1.9.5 The ball can leave and bounce back into the Big field. The referee calls **out of reach**, and will move the ball to the nearest unoccupied neutral spot when one of the following condition occurs:
1. the ball remains outside the Big field too long, after a visible and loud count <sup>4</sup>,
  2. any of the robots are unable to return it into the Big field (without their whole body leaving the Big field), or
  3. the referee determines that the ball will not come back into the Big field.

## 1.10 Damaged robots

- 1.10.1 If a robot is damaged, it has to be taken off the field and must be fixed before it can play again. Even if repaired, the robot must remain off the field for at least one minute or until the next kick-off is due.
- 1.10.2 Some examples of a damaged robot include:
- it does not respond to the ball, or is unable to move (it lost pieces, power, etc.).
  - it continually moves into the goal or out of the playing field.
  - it turns over on its own accord.
- 1.10.3 Computers and repair equipment are not permitted in the playing area during gameplay. Usually, a SuperTeam member will need to take the damaged robot to an "approved repair table" near the playing area. A referee may permit robot sensor calibration, computers and other tools in the playing area, only for the 5 minutes before the start of each half. Reprogramming of robots during the gameplay can only happen when they are out of game (i.e., damaged or out of bounds), or when explicitly allowed by the referee.

<sup>3</sup> In previous version this said "any other"

<sup>4</sup> usually a count of three, the length of the count could be decided by the OC before a competition as long as it's the same length within a sub-league

- 1.10.4 After a robot has been fixed, it will be placed on the unoccupied neutral spot furthest from the ball, facing its own goal. A robot can only be returned to the field if the damage has been repaired. If the referee notices that the robot was returned to the field with the same original problem, s/he may ask the robot to be removed, and proceed with the game as if the robot had not been returned.
- 1.10.5 **Only the referee decides whether a robot is damaged.** A robot can only be taken off or returned with the referee's permission.
- 1.10.6 If both robots from the same team are deemed damaged at kick-off, gameplay will be paused and the remaining team will be awarded 1 goal for each elapsed 30 seconds that their opponent's robots remain damaged. However, these rules only apply when none of the two robots from the same team were damaged as the result of the opponent team violating the rules.
- 1.10.7 Whenever a robot is removed from play, its motors must be turned off.

## 1.11 Interruption of Game

- 1.11.1 RoboCupJunior Soccer Rules rule Rule 1.11, Interruption of Game applies.

# 2 SUPERTeam

## 2.1 Regulations

- 2.1.1 A SuperTeam is a team of 3 or more regular teams with their corresponding robots, all from the same sub-league. Regular team is defined on RoboCupJunior Soccer Rules rules Rule 2.1, Regulations and Rule 3.1, Number of robots / substitution. Each regular team is required to provide at least one robot for each SuperTeam game.
- 2.1.2 Each SuperTeam must have a captain. The captain is the person responsible for communication with referees. The SuperTeam can replace its captain during gameplay. SuperTeam is allowed to have only the fewest possible members beside the field during game play: they will usually be the captain and one member from each individual team who has a robot as an active SuperTeam player (see Soccer Rules rule Rule 2.1, Regulations).

## 2.2 Violations

- 2.2.1 RoboCupJunior Soccer Rules rule Rule 2.2, Violations applies.

# 3 ROBOTS

## 3.1 Number of robots / substitution

- 3.1.1 The SuperTeam will have all the robots from their respective individual teams available to play. In the playing field, the SuperTeam is allowed to use a maximum of 5 robots simultaneously, and they are its active players. The rest of the robots constitute their reserve players. Since the playing field is big, it is suggested that the SuperTeam establish positions for the robots inside the playing field (goalkeeper, backs, midfielders, forwards, etc.), by adjusting robot's mechanics and programming.

- 3.1.2 The substitution of robots during the competition with other SuperTeam is forbidden. Robots will be issued a special code that will distinguish them from other SuperTeams. Each robot that belongs to a superteam will receive an ID identifying the robot as being a member of a team.
- 3.1.3 Example: Robot A-2: the referee would identify robot with sticker A-2 as robot number 2 belonging to team A. These IDs will be written on the Top Markers of robots (see [RoboCupJunior Soccer Rules](#) rule Rule [3.7, Top Markers](#)).
- 3.1.4 Each individual team is required to have at least one of its robots as an active player, with the exception of a sixth team in which case SuperTeam is required to have individual team rotation allowing with that to include all individual teams evenly. SuperTeam members can decide freely how to substitute robots between the current players and the reserve players during gameplay, but the captain is required to ask a referee for robot substitution authorization.
- 3.1.5 Substitutions are allowed only at every kick-off (see rule Rule [1.3, Kick-off](#)).

## 3.2 Interference

- 3.2.1 [RoboCupJunior Soccer Rules](#) rule Rule [3.2, Interference](#) applies.

## 3.3 Control

- 3.3.1 [RoboCupJunior Soccer Rules](#) rule Rule [3.3, Control](#) applies.

## 3.4 Communication

- 3.4.1 Robots are not allowed to use any kind of communication during game play unless the communication between two robots is via Bluetooth class 2 or class 3 <sup>5</sup> or via any other device that communicates using the 802.15.4 protocol (e.g., ZigBee and XBee).
- 3.4.2 Teams are responsible for their communication. The availability of frequencies cannot be guaranteed.

## 3.5 Agility

- 3.5.1 [RoboCupJunior Soccer Rules](#) rule Rule [3.5, Agility](#) applies.

## 3.6 Handle

- 3.6.1 [RoboCupJunior Soccer Rules](#) rule Rule [3.6, Handle](#) applies.

## 3.7 Top Markers

- 3.7.1 [RoboCupJunior Soccer Rules](#) rule Rule [3.7, Top Markers](#) applies.

## 3.8 Additional regulations of the sub-leagues

- 3.8.1 [RoboCupJunior Soccer Rules](#) rule Rule [3.8, Additional regulations of the sub-leagues](#) applies.

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<sup>5</sup> range shorter than 20 meters

### 3.9 Violations

- 3.9.1 Robots that do not abide by the specifications/regulations (see [?]) are not allowed to play, unless these rules specify otherwise.
- 3.9.2 If violations are detected during a running game the team is disqualified for that game.
- 3.9.3 If similar violations occur repeatedly, the SuperTeam can be disqualified from the tournament.

## 4 BIGFIELD

### 4.1 Kind of field

- 4.1.1 There is only one kind of field for all sub-leagues.

### 4.2 Dimensions of the field

- 4.2.1 The Big field is 540 cm by 340 cm. The Big field is marked by a white line that is part of the playing field. Around the playing field, beyond the white line, is an outer area of 30 cm width. Total dimensions of the Big field, including the outer area, are 600 cm by 400 cm. The playing area is divided in sides for each SuperTeam by a black line.
- 4.2.2 The floor near the exterior wall includes a wedge, which is an incline with a 10 cm base and 2 +/- 1 cm rise for allowing the ball to roll back into play when it leaves the playing field.
- 4.2.3 <sup>6</sup>

### 4.3 Walls

- 4.3.1 Walls are placed all around the Big field, including behind the goals and the out-area. The height of the walls is 22 cm. The walls are painted matte black.

### 4.4 Goals

- 4.4.1 The Big field has two goals, centered on each of the shorter sides of the playing field. The goal inner space is 60 cm width, 10 cm high and 74 mm deep, box shaped.
- 4.4.2 <sup>7</sup>
- 4.4.3 The goal "posts" are positioned over the white line marking the limits of the Big field. <sup>8</sup> The interior walls <sup>9</sup> of each goal are painted, one goal yellow, the other goal blue. The exterior (including the goal post and frame) are painted black.
- 4.4.4 **It is recommended that the blue be of a brighter shade so that it is different enough from the black exterior.**

<sup>6</sup> In previous version this said "The field is located 70 cm above the floor."

<sup>7</sup> In previous version this said "It has a cross-bar on top (to prevent robots from entering the goal and to allow checking if the ball scored)."

<sup>8</sup> In previous version this said "The cross-bar is exactly over the white line. The height of the cross-bar is 2 cm."

<sup>9</sup> In previous version this said "and the cross-bar"

## 4.5 Floor

- 4.5.1 The floor consists of dark green carpet on top of a hard level surface. All straight lines on the field should be painted and have a width of 20 mm.

## 4.6 Neutral spots

- 4.6.1 There are five neutral spots defined in the Big field. One is in the center of the Big field. The other four are located over the diagonals that go through the corners of the playing field, half the distance between the center of the field and each corner. The neutral spots can be drawn with a thin black marker. The neutral spots ought to be of circular shape measuring 1 cm in diameter.

## 4.7 Center circle

- 4.7.1 A center circle will be drawn on the Big field. It is 80 cm in diameter. It is a thin black marker line. It is there for Referees and SuperTeam members as guidance during kick-off.

## 4.8 Penalty areas

- 4.8.1 In front of each goal there is a 35 cm wide and 120 cm long penalty area.
- 4.8.2 The penalty areas are marked by a **white** <sup>10</sup> line of 20 mm width. The line is part of the area.
- 4.8.3 <sup>11</sup>

## 4.9 Lighting and Magnetic Conditions

- 4.9.1 RoboCupJunior Soccer Rules rule Rule 4.9, **Lighting and Magnetic Conditions** applies.

# 5 BALL

- 5.0.1 RoboCupJunior Soccer Rules rule Rule 5, **BALL** and its subsections apply.

# 6 CODE OF CONDUCT

- 6.0.1 RoboCupJunior Soccer Rules rule Rule 6, **CODE OF CONDUCT** and its subsections apply.

# 7 CONFLICT RESOLUTION

- 7.0.1 RoboCupJunior Soccer Rules rule Rule 7, **CONFLICT RESOLUTION** and its subsections apply.

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<sup>10</sup> In previous version this said "black"

<sup>11</sup> In previous version this said "A robot is considered inside the Penalty Area when it is completely inside."



The diagram shows a rectangular arena with a green interior and a red border. The arena is divided into four quadrants by a horizontal line (540 cm long) and a vertical line (340 cm long). A central circle with an 80 cm diameter is located at the intersection. Four black dots are positioned at the intersections of the lines with the arena walls. A blue rectangular block is at the top center, and a yellow rectangular block is at the bottom center. Dimensions for the blocks are 120 cm by 35 cm. The arena is surrounded by a red border with labels: 'wedge' at the top and bottom, and 'wall' on the left and right. The bottom right corner has dimensions of 20 cm and 10 cm.