



# RoboCupJunior Soccer - SuperTeams Rules 2018

## RoboCupJunior Soccer Technical Committee

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These are the official Soccer rules for RoboCupJunior 2018. They are released by the RoboCupJunior Soccer Technical Committee. The English version of these rules has priority over any translations. **Items in red represent significant rules changes introduced this year.**

Teams are advised to check the RoboCupJunior Soccer site <http://rcj.robocup.org/soccer.html> 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.

## 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.**

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.

## List of changes

Replaced (TC): SuperTeams that are latSS . . . . .	5
Added (TC): During the pre-match mSS . . . . .	5
Added (TC): Robots cannot be placed . . . . .	5
Replaced (TC): and not directly aiming tSS . . . . .	7
Added (TC): Alternatively, the refereSS . . . . .	7
Replaced (TC): an opposing . . . . .	7
Deleted (TC): , located inside the comSS . . . . .	7
Added (TC): Reprogramming of roboSS . . . . .	8
Replaced (TC): and not directly aiming tSS . . . . .	8



Added (TC): Alternatively, the refereeSS ...	8
Replaced (TC): If all robots from the same ...	8
Replaced (TC): All robots except for thSS ...	8
Added (TC): Only	8
Added (TC): If multiple defense happSS ...	8
Replaced (TC): If any robot needs to bSS ...	8
Deleted (TC): The carpet should be of a ...	11



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# 1 GAMEPLAY

## 1.1 Game procedure and length of a game

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.

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 (see Rule 7.1 for the description of a referee assistant).

SuperTeam are supposed to be at their big field 10 minutes before their game starts. To be at the inspection table does not count in favor of this time limit.

SuperTeams that are late for the start of the game can be penalized one goal per 30 seconds at the referee's discretion. In this (and any) situation, when the goal differential reaches 10 the game finishes regardless of the state of the game clock.<sup>1</sup>

## 1.2 Pre-match meeting

At the start of the first half of the game, a referee will toss a coin. The SuperTeam 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, SuperTeams 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.

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 (of any team) is capable of playing, the game will not be played and zero goals will be awarded to both teams.

## 1.3 Kick-off

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.

Each SuperTeam has to position one robot as a goalie (fully inside their penalty area), 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.

The SuperTeam kicking off places their robots on the big field first. Robots cannot be repositioned once they have been placed.

The SuperTeam not kicking off will now place their robots on the defensive end of the big field.

A referee may adjust the placement of the robots to make sure that the robots are placed properly within the big field positions.

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.

<sup>1</sup>In previous version of the rules this was "SuperTeams can be penalized one goal per each elapsed 30 seconds at the referee's discretion if they are late for the game start. In any situation, when the goal difference reaches 10, the game finishes regardless of the state of the game clock."



On the referee's command (usually by whistle), all robots will be started immediately by each captain. Any robots that are started early will be removed by the referee from the field and treated as a damaged robot.

## **1.4 Human interference**

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.

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**

RoboCupJunior Soccer Rules 2018 rule 1.5 applies.

## **1.6 Scoring**

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, game will be restarted with a kick-off from the SuperTeam who received the goal against. 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. 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.

## **1.7 Goalie**

The robot moving first into the penalty area on a SuperTeam's defending side completely (with every part of it) is designated as goalie until a part of it leaves the penalty area.

## **1.8 Pushing**

RoboCupJunior Soccer Rules 2018 rule 1.8 applies.

## **1.9 Lack of progress**

RoboCupJunior Soccer Rules 2018 rule 1.9 applies.

## 1.10 Out of bounds

If a robot's entire body moves out beyond the white line of the big field completely, 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 kickoff occurs before the penalty has elapsed.

The one-minute penalty starts when the robot is removed from play. Furthermore, any goal scored by the penalized team while the penalized robot is on the field will not be granted. Out-of-bounds robots can be fixed if the SuperTeam needs to do so, as described in 1.11.

After the penalty time has passed, robot will be placed on the unoccupied neutral spot nearest to where it has been taken off, **and not directly aiming towards the ball<sup>2</sup>. Alternatively, the referee may instruct the team to place the robot on the neutral spot on the side of the field currently farthest from the ball, oriented towards the closest wall.**

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 field.

The ball can leave and bounce back into the playing 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 playing field too long, after a visible and loud count, (usually a count of five, the length of the count can be decided by the OC before a competition as long as it is the same length within a sub-league)
2. any of the robots are unable to return it into the playing field (without their whole body leaving the playing field), or
3. the referee determines that the ball will not come back into the playing field.

## 1.11 Damaged robots

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 kickoff is due. If SuperTeam members cannot reach the damaged robot by themselves without stepping inside the field, they should ask a referee to hand over the damaged robot. If all robots have moved out of bounds, the penalties are discarded and the match resumes with a neutral kickoff.

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.

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.<sup>4</sup> 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**

<sup>2</sup>In previous version of the rules this was "orientated towards the nearest wall"

<sup>3</sup>In previous version of the rules this was "any other"

<sup>4</sup>In previous version of the rules this was ", located inside the competitors working area."

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.

After a robot has been fixed, it will be placed on the unoccupied neutral spot nearest to where it has been taken off, and not directly aiming towards the ball<sup>5</sup>. Alternatively, the referee may instruct the team to place the robot on the neutral spot on the side of the field currently farthest from the ball, orientated towards the nearest wall. 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.

**Only the referee decides whether a robot is damaged.** A robot can only be taken off or returned with the referee's permission.

If all robots from the same SuperTeam are deemed damaged at kickoff, gameplay will be paused and the remaining team will be awarded 1 goal for every 30 seconds that their opponent's robots remain damaged.<sup>6</sup>

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.

## 1.12 Multiple defense

Multiple defense occurs if more than one robot from the defending SuperTeam enters its penalty area with some part and substantially affects the game. All robots except for the one closest to<sup>7</sup> the ball will be moved to the nearest corner. The referee could take this action at any time when more than one robot lingers in their penalty area.

Only the referee can take this action at any time when both robots linger in their penalty area.

If multiple defense happens repeatedly in a short amount of time, the offending robot will be moved to an unoccupied neutral spot on the other side of the field, orientated towards the nearest wall. If any robot needs to be moved to an unoccupied neutral spot more than **three times** during its single uninterrupted time chunk on the field, it<sup>8</sup> will be deemed damaged<sup>9</sup>.

## 1.13 Interruption of Game

RoboCupJunior Soccer Rules 2018 rule 1.13 applies.

<sup>5</sup>In previous version of the rules this was "orientated towards the nearest wall"

<sup>6</sup>In previous version of the rules this was "If all robots from the same SuperTeam are deemed damaged during gameplay, the clock continues and the remaining SuperTeam gets one initial goal and rests while waiting for the opponent's return to play. The remaining SuperTeam will also get one additional goal for each minute the opponent's robots remain damaged. After five minutes of absence, the SuperTeam with no functional robots forfeits the game."

<sup>7</sup>In previous version of the rules this was "The robot farther from"

<sup>8</sup>In previous version of the rules this was "If multiple defense happens repeatedly, the robot"

<sup>9</sup>For the purpose of this rule a time chunk is defined as time between two events when the robot is taken off the field for some reason (e.g. at the end of the first half of the game, when it is deemed damaged or out of bounds).



## 2 SUPERTEAM

### 2.1 Regulations

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 2018 rules 2.1 and 3.1. Each regular team is required to provide at least one robot for each SuperTeam game.

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 2018 rule 2.1).

### 2.2 Violations

RoboCupJunior Soccer Rules 2018 rule 2.2 applies.

## 3 ROBOTS

### 3.1 Number of robots / substitution

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.

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.

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 2018 rule 3.7).

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. Substitutions are allowed only at every kick-off (see rule 5.3).

### 3.2 Interference

RoboCupJunior Soccer Rules 2018 rule 3.2 applies.

### **3.3 Control**

RoboCupJunior Soccer Rules 2018 rule 3.3 applies.

### **3.4 Communication**

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>10</sup> or via any other device that communicates using the 802.15.4 protocol (e.g., ZigBee and XBee). SuperTeams are responsible for their communication. The availability of frequencies cannot be guaranteed.

### **3.5 Agility**

RoboCupJunior Soccer Rules 2018 rule 3.5 applies.

### **3.6 Handle**

RoboCupJunior Soccer Rules 2018 rule 3.6 applies.

### **3.7 Top Markers**

RoboCupJunior Soccer Rules 2018 rule 3.7 applies.

### **3.8 Additional regulations of the sub-leagues**

RoboCupJunior Soccer Rules 2018 rule 3.8 applies.

### **3.9 Violations**

Robots that do not abide by the specifications/regulations are not allowed to play. If violations are detected during a running game, the SuperTeam is disqualified for that game. If similar violations occur repeatedly, the SuperTeam can be disqualified from the tournament.

## **4 BIGFIELD**

### **4.1 Kind of field**

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

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<sup>10</sup>range shorter than 20 meters

## 4.2 Dimensions of the field

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. The field is located 70 cm above the floor.

## 4.3 Walls

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. RoboCupJunior Soccer Rules 2017 rule 4.3 applies with regards to the landmarks placed on the walls.

## 4.4 Goals

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. It has a cross-bar on top (to prevent robots from entering the goal and to allow checking if the ball scored). The goal "posts" are positioned over the white line marking the limits of the big field. The cross-bar is exactly over the white line. The height of the cross-bar is 2 cm. The interior walls and the cross-bar of each goal are painted, one goal yellow, the other goal blue. The exterior (including the goal post and frame) are painted black.

## 4.5 Floor

The floor consists of green carpet on top of a hard surface. <sup>11</sup> All straight lines on the big field should be painted and have a width of 20 mm. It is recommended the floor near the exterior wall to have a wedge, which is an incline of 10 cm base and 2 cm rise for allowing the ball to roll back into play when it leaves the playing field.

## 4.6 Neutral spots

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

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.

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<sup>11</sup>In previous version of the rules this was "The carpet should be of a quality that will resist the wear and tear of spinning wheels."



## **4.8 Penalty areas**

In front of each goal there is a 35 cm wide and 120 cm long penalty area.

The penalty areas are marked by a black line of 20 mm width. The line is part of the area.

A robot is considered inside the Penalty Area when it is completely inside.

## **4.9 Lighting and Magnetic Conditions**

RoboCupJunior Soccer Rules 2018 rule 4.9 applies.

## **5 BALL**

RoboCupJunior Soccer Rules 2018 rules 5.1, 5.2 and 5.3 applies.

## **6 CODE OF CONDUCT**

All rules in RoboCupJunior Soccer Rules 2018 section 6 apply.

## **7 CONFLICT RESOLUTION**

All rules in RoboCupJunior Soccer Rules 2018 section 7 apply.

# BIG FIELD DIAGRAM

