RoboCupJunior Soccer Simulation Rules

• Simulation Kick-Off Tournament in Jan 2021 •

Soccer Technical Committee 2020 and 2021:

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Soccer Tournament OC Jan 2021:

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These are the official Soccer Simulation rules for **the RoboCupJunior Simulation Kick-Off Tourmanet in Jan 2021**. They are released by the RoboCupJunior Soccer Technical Committee (TC). 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. [1]

Figure 1 Two teams of three robots in a simulated RoboCupJunior Soccer match.
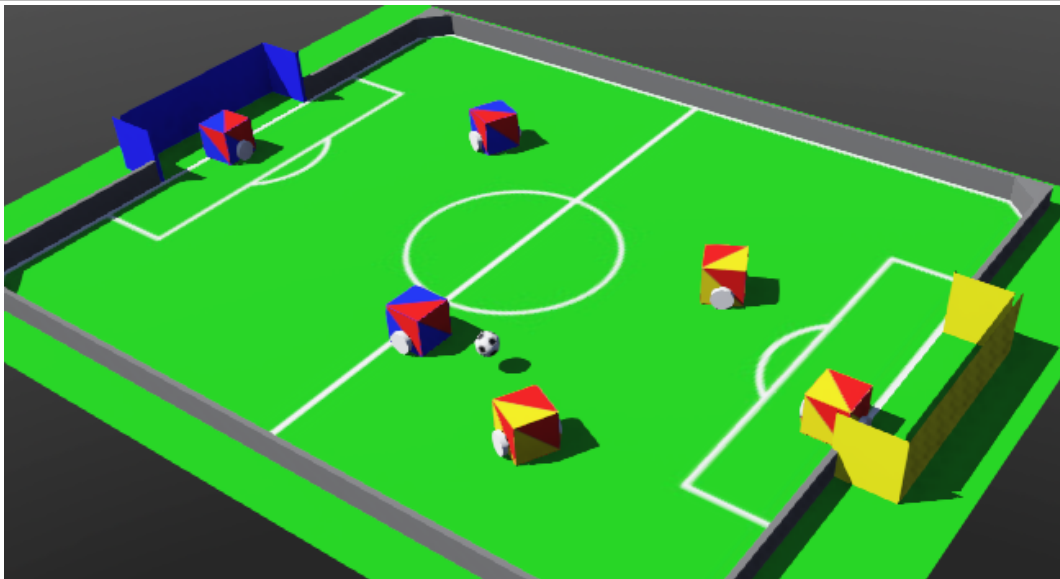
ℹ This is the first version of these rules. The TC may change some aspects prior or during the course of the tournament if evidence demands so.

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

Preface

In the RoboCupJunior Soccer Simulation challenge, teams of young engineers program three fully autonomous digital robots to compete against another team in simulated 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 special programming skills. 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.**

The RoboCupJunior Soccer Simulation League is a special addition to the existing RoboCupJunior Soccer Leagues. There is no need to meet in person for the RoboCupJunior Simulation challenge. The Soccer Simulation League was created solely for the 2021 season. There is no guarantee for continuing it throughout later seasons. However, depending on the results and feedback from the community, there might be future RoboCupJunior Soccer Simulation challenges.

Programming has to be performed exclusively by the students

Robots must be programmed exclusively by student members of the team. Mentors, teachers, parents or companies should not be involved in the software design, programming or debugging of robots. To avoid embarrassment and possible disqualification, it is extremely important that teams abide by all other competition's rules.

If in doubt, please consult with your Regional Representative before registering your team.

Changes in comparison with the 2021 physical RoboCupJunior Soccer Rules

The following changes were made by the Technical Committee to adapt the existing RoboCupJunior Soccer rules for this year's Simulation Challenge:

- Deleted "at least 30 cm away from the ball"

- Deleted "at least 30 cm away from the ball"

- Added "The game will be timed by an artificial referee program. The referee will make all the decisions during the game automatically, including the placement of the ball and of robots. There will be no discussion on decisions the artificial referee did."

- Added "Teams will send their code to the organization committee (OC) before the competition. The matches will then be conducted by the OC, which will run the code of the teams against each other. The matches will either be pre-recorded, or streamed live via an online streaming service."

- Added "On the artificial referee's command, all robots will be started immediately."

- Added "Except for starting or stopping the simulation, human interference during the simulated matches is not permitted, neither by teams nor by the OC. All decisions and actions are taken by the robots' programs and the artificial referee autonomously."

- Added "A robot cannot hold a ball."

- Added "No robots are supposed to be inside any penalty area for more than 15 seconds. After this time, they will be re-spawned on the furthest unoccupied neutral spot facing sideways. For this rule to apply, a robot must be inside the penalty area with its center of mass."

- Added "Sometimes robots in the simulation get stuck, will tip or fall over. The artificial referee will re-spawn any robots that do not move for 15 seconds onto the nearest unoccupied neutral spot facing sideways."

- Added "There is no rule such as "Out of Bounds"."

- Added "There is no rule about damaged robots."

- Added "two, three or four members"

- Added "The Teams will write a controller program to move the robots during the simulation. The program will be pre-written by the teams and used for the whole competition. Substitution of the program during the competition or during a match is not allowed."

- Added "Teams are not allowed to interfere with the simulation in any unofficial way. Teams may be penalized or disqualified by the OC for any attempt to influence or work-around the artificicial referee, other team's robots, or the simulation world's constraints."

- Added "The construction of the robots is pre-defined and part of the simulation world. The robots will have a cubic form, two motorized wheels and no kicker."

- Added "Robots may be programmed with a controller script. They may turn in any direction, as well as drive forward and backward anywhere on the field. There is a maximum speed defined by the simulation. There is no mandatory behaviour required for the programs."

- Added "The playing field will be provided by the OC as a digital Webots world, along with a small tutorial on how to place and move the robots during the game, as well as measure the robot and ball positions."

- Added "There are 7 neutral spots. They are defined in simulation units as follows:"

- Added "A team that does that may be disqualified from the tournament at the OC's discretion."

- Added "All the code must be shared with other participants and made open-source after the tournament."

- Added "Also, if you find any bugs within the simulation world or the artificial referee (except for the Webots logo), please let us know."

- Added "During a match, the artificial referee is a program in charge of making decisions with regards to the game and according to these rules."

- Changed "two autonomous robots" to "three autonomous robots"

- Changed "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." to "the artificial referee will choose the team kicking off at random, as well as the goal they will kick towards."

- Changed "a referee" to "the artificial referee"

- Changed "strikes or touches the back wall of the goal" to "crosses the goal line."

- Changed "After a visible and loud count" to "After no significant ball movement occurred for 10 seconds"

- Changed "robot(s)" to "program(s)"

- Changed "referees" to "OC"

- Changed "two robots" to "exactly three programs"

- Changed "robots" to "programs"

1 GAMEPLAY

1.1 Game procedure and length of a game

1.1.1 RCJ Soccer games consist of two teams of robots playing soccer against each other. Each team has **three autonomous robots** [2]. The game will consist of two halves. The duration of each half is 10 minutes.

1.1.2 **The game will be timed by an artificial referee program. The referee will make all the decisions during the game automatically, including the placement of the ball and of robots. There will be no discussion on decisions the artificial referee did.**

1.1.3 The final game score will be trimmed so that there is at most 10 goal difference between the losing and the winning team.

1.2 Pre-match programming

1.2.1 **Teams will send their code to the organization committee (OC) before the competition. The matches will then be conducted by the OC, which will run the code of the teams against each other. The matches will either be pre-recorded, or streamed live via an online streaming service.**

1.3 Pre-match meeting

1.3.1 At the start of the first half of the game, **the artificial referee will choose the team kicking off at random, as well as the goal they will kick towards.** [3] After the first half, teams switch sides. The team not kicking off in the first half of the game will kick off to begin the second half of the game.

1.4 Kick-off

1.4.1 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 **the artificial referee** [4] in the center of the field. All robots on the team not kicking off must be [5] outside of the center circle.

1.4.2 **On the artificial referee's command, all robots will be started immediately.**

1.4.A Neutral kick-off

1.4.A.1 A neutral kick-off is the same as the one described in Rule 1.4, Kick-off with a small change: all robots need must be [6] placed outside of the center circle.

1.5 Human interference

1.5.1 **Except for starting or stopping the simulation, human interference during the simulated matches is not permitted, neither by teams nor by the OC. All decisions and actions are taken by the robots' programs and the artificial referee autonomously.**

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[2] In previous version this said "two autonomous robots"

[3] In previous version this said "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."

[4] In previous version this said "a referee"

[5] In previous version this said "at least 30 cm away from the ball"

[6] In previous version this said "at least 30 cm away from the ball"

1.6 Ball movement

1.6.1 **A robot cannot hold a ball.**

1.7 Scoring

1.7.1 The artificial referee will consider a goal as being scored as soon as the ball **crosses the goal line.** [7]. Goals scored either by an attacking or defending robot have the same end result: they give one goal to the team on the opposite side. After a goal, the game will be restarted with a kick-off from the team who was scored against.

1.8 Inside the Penalty Area

1.8.1 **No robots are supposed to be inside any penalty area for more than 15 seconds. After this time, they will be re-spawned on the furthest unoccupied neutral spot facing sideways. For this rule to apply, a robot must be inside the penalty area with its center of mass.**

1.9 Lack of progress

1.9.1 Lack of progress occurs if there is no progress in the gameplay for a reasonable period of time and the situation is not likely to change. Typical lack of progress situations are when the ball is stuck between robots, when there is no change in ball and robot's positions, or when the ball is beyond detection or reach capability of all robots on the field.

1.9.2 **After no significant ball movement occurred for 10 seconds** [8], the artificial referee will call "lack of progress" and will move the ball to the nearest unoccupied neutral spot. If this does not solve the lack of progress, the referee can move the ball to a different neutral spot.

1.9.3 **Sometimes robots in the simulation get stuck, will tip or fall over. The artificial referee will re-spawn any robots that do not move for 15 seconds onto the nearest unoccupied neutral spot facing sideways.**

1.10 Out of bounds

1.10.1 **There is no rule such as "Out of Bounds".**

1.11 Damaged robots

1.11.1 **There is no rule about damaged robots.**

1.12 Interruption of Game

1.12.1 In principle, a game will not be stopped.

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[7] In previous version this said "strikes or touches the back wall of the goal"
[8] In previous version this said "After a visible and loud count"

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2 TEAM

2.1 Regulations

2.1.1 A team must have **two, three or four members** to form a RoboCupJunior team to participate in the International event. A team member(s) and/or **program(s)** [9] cannot be shared between teams.

2.1.2 Each team must have a **captain**. The captain is the person responsible for communication with **OC** [10]. The team captain should be in a position to answer all of the OC's requests and questions. The team can replace its captain during the competition.

2.2 Violations

2.2.1 Teams that do not abide by the rules are not allowed to participate.

3 ROBOTS

3.1 Number of robots / substitution

3.1.1 Each team must have **exactly three programs** [11] for the full tournament. The substitution of **programs** [12] during the competition within the team or with other teams is forbidden.

3.2 Control

3.2.1 **The Teams will write a controller program to move the robots during the simulation. The program will be pre-written by the teams and used for the whole competition. Substitution of the program during the competition or during a match is not allowed.**

3.3 Interference

3.3.1 **Teams are not allowed to interfere with the simulation in any unofficial way. Teams may be penalized or disqualified by the OC for any attempt to influence or work-around the artificicial referee, other team's robots, or the simulation world's constraints.**

3.4 Communication

3.4.1 Robots may communicate within each team in the scope of the simulation, as long as they abide by rule Rule 3.3, Interference.

3.4.2 Robots may not communicate with anything outside of the simulation world.

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[9] In previous version this said "robot(s)"
[10] In previous version this said "referees"
[11] In previous version this said "two robots"
[12] In previous version this said "robots"

3.5 Agility

3.5.1 **The construction of the robots is pre-defined and part of the simulation world. The robots will have a cubic form, two motorized wheels and no kicker.**

3.5.2 **Robots may be programmed with a controller script. They may turn in any direction, as well as drive forward and backward anywhere on the field. There is a maximum speed defined by the simulation. There is no mandatory behaviour required for the programs.**

4 FIELD

4.0.1 **The playing field will be provided by the OC as a digital Webots world, along with a small tutorial on how to place and move the robots during the game, as well as measure the robot and ball positions.**

4.1 Neutral Spots

4.1.1 **There are 7 neutral spots. They are defined in simulation units as follows:**

Nr.	Name	X-Coordinate	Z-Coordinate
1	Central Point	0.2	0
2	Blue Side	0.2	0
3	Blue Side	0.3	0.3
4	Blue Side	0.3	-0.3
5	Yellow Side	-0.2	0
6	Yellow Side	-0.3	0.3
7	Yellow Side	-0.3	-0.3

FIELD DIAGRAMS
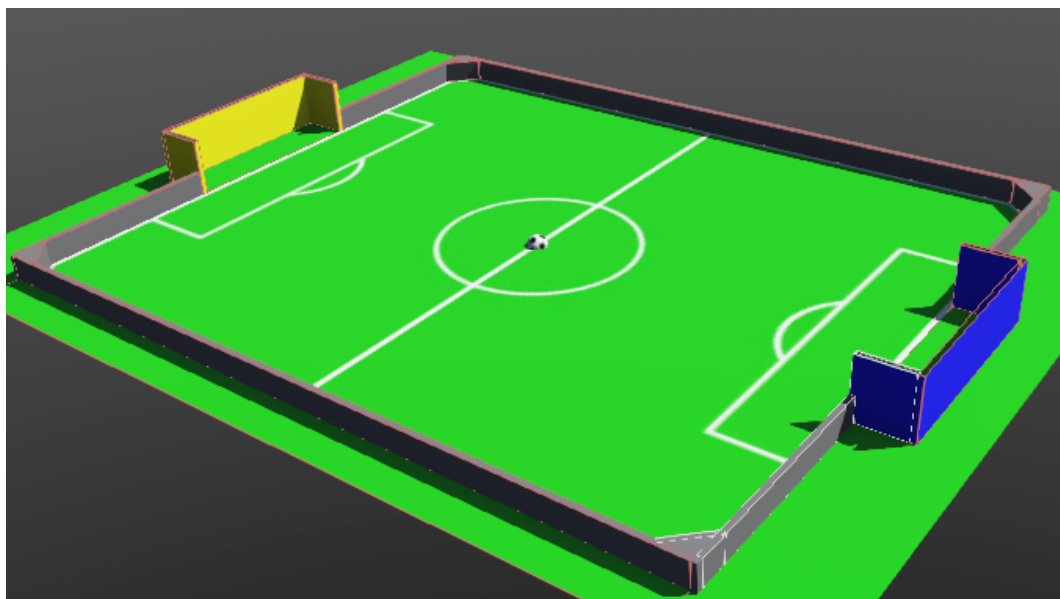
4.1.2

4.1.3

5   CODE OF CONDUCT

5.1   Fair Play

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

5.1.2   Programs are not allowed to cause interference with other robots or the referee during normal game play.

5.1.3   Programs are not allowed to cause interference to the field or to the ball during normal game play.

5.1.4   **A team that does that may be disqualified from the tournament at the OC's discretion.**

5.2   Behavior

5.2.1   All participants are expected to behave themselves. All behavior is to be of a subdued nature within the tournament.

5.3   Help

5.3.1   Mentors (teachers, parents, chaperones, and other adult team-members including translators) are not allowed to work on the teams' programs.

5.3.2   **Mentors must not touch, build or program any programs.**

5.4 Sharing

5.4.1 The understanding that any technological and curricular developments should be shared among the RoboCup and RoboCupJunior participants after the tournament has been a part of world RoboCup competitions.

5.4.2 **All the code must be shared with other participants and made open-source after the tournament.**

5.4.3 **Also, if you find any bugs within the simulation world or the artificial referee (except for the Webots logo), please let us know.**

5.5 Spirit

5.5.1 It is expected that all participants, students, mentors, and parents will respect the RoboCupJunior mission.

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

5.6 Violations / Disqualification

5.6.1 Teams that violate the code of conduct can be disqualified from the tournament. It is also possible to disqualify only single person or single program from further participation in the tournament.

5.6.2 In less severe cases of violations of the code of conduct, a team will be given a warning (a yellow card). In severe or repeated cases of violations of the code of conduct a team can be disqualified immediately without a warning by a red card.

6 CONFLICT RESOLUTION

6.1 Artificial Referee

6.1.1 **During a match, the artificial referee is a program in charge of making decisions with regards to the game and according to these rules.**

6.1.2 During gameplay, the decisions made by the artificial referee are final.

6.1.3 At the conclusion of the game, the result recorded is final.

6.2 Rule clarification

6.2.1 Rule clarification may be made by members of the RoboCupJunior Soccer Technical Committee and Organizing Committee, if necessary even during a tournament.

6.3 Rule modification

6.3.1 If special circumstances, such as unforeseen problems or capabilities of a robot occur, rules may be modified by the RoboCupJunior Soccer Organizing Committee Chair in conjunction with available Technical Committee and Organizing Committee members, if necessary even during a tournament.

6.4 Regulatory statutes

6.4.1 Each RoboCupJunior competition may have its own regulatory statutes to define the procedure of the tournament (for example the SuperTeam system, game modes, the inspection of programs, interviews, schedules, etc.). Regulatory statutes become a part of this rule.