Robot Soccer Chanllenge

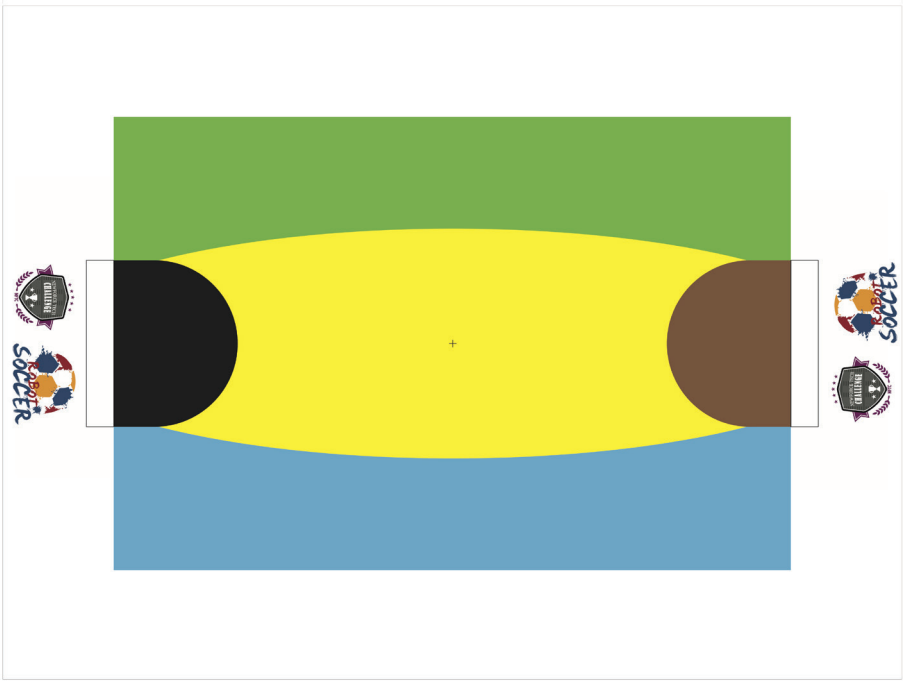
Elementary

Rules & Scoring

Remote Soccer

Version：20191106

Introduction



Content

A. Equipement

1. ROBOLAB or LEGO® Mindstorms™ NXT or LEGO® MINDSTORMS™ EV3 software must be used to control robots.
2. Official robotic football match field.

B. Game Field and Ball

1. Floor

1.1 The playing field is 2430mm (length) by 1820mm (width). Coloured sections are 1830mm (length) by 1220mm (width) and surrounded by a 300mm wide white border.

1.2 The floor of the playing field is covered with printed vinyl mat.

1.3 The central area of the playing field is placed so that it is flat and level.

1.4 The playing field must be placed on a wooden or plastic surface or on the ground.

Hint: Teams are advised to design robots to cope with imperfections up to 5mm on the field surface.

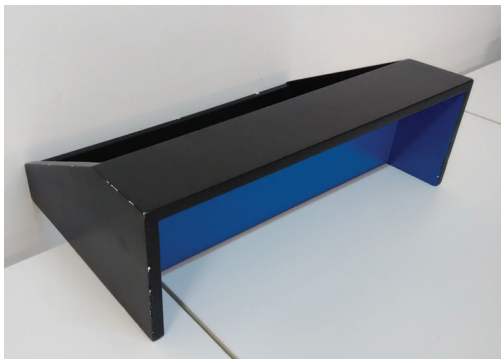
2. Walls

2.1 Walls are placed all around the field, including behind the goals

2.2 Walls are 7cm high. (measured from surface of playing field)

2.3 The walls are constructed with strong materials that can withstand the possible impacts during the game.

3. Goals



3.1 The width of each goal is 45cm.

3.2 The floor is white.

3.3 The depth of each goal is 7.4 cm.

3.4 Each goal will have a black cross bar 14cm above the playing surface.

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

3.6 The side walls of the goal extend to the end wall to prevent ball from rolling behind the goals.

4. Definition of Terms

4.1 'Center of Field' is defined as the black cross within the yellow region.

4.2 'Penalty box' is defined as the black and brown regions on the field. 'Own' s penalty box' is in one' s own half and 'enemy' s penalty box' is in enemy' s half.

5. Lighting and Magnetic Condition

5.1 Teams must come prepared to calibrate their robots based on lighting and magnetic conditions at the venue. Every effort will be made by organizers to keep light levels as low as possible and locate soccer fields away from magnetic fields such as floor wiring and metallic objects. However sometimes this cannot be avoided.

Hint: It is recommended that teams design their robot to cope with variations in lighting and magnetic conditions, as these vary from venue to venue.

6. Ball

6.1 A 3D printed ball with a diameter of 7.4cm shall be used.

6.2 The ball that is used will be hollow with a wall thickness of 2 mm and a weight of around 36g – 40g.

C. Robot

1. Specifications

1.1 Robots will be measured in upright position and with all parts fully extended.

1.2 The upright robot must fit inside an upright 22cm diameter cylinder and operate normally with out touching the measuring equipment.

1.3 The robot height must not exceed 22cm.

1.4 The robot weight (battery included) must not exceed 1500g.

1.5 While being inspected, each robot must be upright 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 operation. The robot must be able to operate without touching the measuring cylinder.

2. Construction

2.1 Robots are to be constructed using strictly LEGO® brand pieces.

2.2 Robot electronics (controllers, motors, sensors) must be from LEGO® MINDSTORMS™ Educations set or HiTechnic (HiTechnic NXT IRseeker V2 sensor or HiTechnic NXT compass sensor).

1. Each robot is limited to 1 controller (EV3, NXT or RCX).
2. Number of motors and sensors are not restricted.
3. remote communication must be based on EV3 Infrared sensor (part no. 45509) with EV3 Infrared beacon (part no. 45508).

2.3 LEGO® brand pieces that are used for construction may not be modified in any way.

2.4 No other building material can be used, including glue, tape, screws etc.

2.5 Robots must be programmed using LEGO® MINDSTORMS software. Other 3rd party programming software languages and tools may not be used.

2.6 Robots must have a handle for referees to easily pick them up. The handle will not be included in the above-mentioned height restrictions.

Hint: light wires as handles are recommended.

2.7 Avoid unnecessary extruding parts and keep wires organised. This is to prevent robots from being tangled up during competitions.

3. Control

3.1 Remote control restrictions:

1. Robot must only be controlled wirelessly
2. Robot must only be controlled using LEGO® MINDSTORMS software. Other 3rd party programming software tools may not be used.

3.2 Robots must be able to be started manually.

3.3 Robots controlled using EV3 Infrared sensor (part no. 45509) and EV3 Infrared beacon (part no. 45508) must be capable to adapt to all (1-4) remote communication channels and not interfere with other robots.

Hint: Teams may create a program for selecting remote communication channels or have 4 individual programs for each remote communication channel.

3.4 Robot must be able to move in all directions.

3.5 Bluetooth communication between robots is acceptable if it does not interfere with the perfor mance of robots of the opponent team. Robots must have the ability to have their communica tion turned off at the request of the referee.

4. Marking / Colouring

4.1 Competitors must mark or decorate their robot to identify them as belonging to the same team. These must not influence game play and will not be considered in the size restrictions.

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

5. Teams

5.1 Teams may select a maximum of 2 robots to compete. Any substitution of robots during a match is forbidden and violating teams will be disqualified, the competition result will be changed to "0:2" resulting with the opposing team winning.

6. Ball Capturing Zone and Movement

6.1 Ball capturing zones' are defined as any internal space created when a straight edge is place on the protruding points or a robot.

6.2 When the robot is dribbling;

1. The ball must maintain in motion
2. The ball must remain in contact with the ground
3. The ball cannot penetrate the 'ball capturing zone' by more than 3.7cm.

7. Goalies

7.1 Robots may only be powered by the official battery or individual lithium batters with a maximum voltage of 1.5V.

7.2 Judges may request teams to open the microcontroller for examination. If the battery is not as stated above, the team will have 1 minute to correct the problem. If the robot is not qualified in the time, the team may not participate in the match.

D. Game Play

1. Tournament structure and progression criteria

1.1 Explorer class will be separated in to 2 grades, A and B., each group will play and be ranked individually. Participating organisations / schools will be assigned to grade based on the follow ing criteria.

1.2 A-Grade:

1. The total average of all teams within the organisation in the previous year is within the top 80% of A-grade; or
2. The total average of all teams within the organisation in the previous year is within the top 20% of B-Grade.

1.3 B-Grade:

1. Unable to meet the above requirements; or
2. Did not participate in the previous year.

1.4 Participating organisations will be notified of the grade assignment after the organisers have received applications.

1.5 Both A and B grades will have independent awards but only teams from A-Grade will be qualified to participate in the international league.

2. Pregame Setup

2.1 Organizers 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.

2.2 Organizers will make every effort to allow at least 10 minutes of setup time before each game.

2.3 The ball will be checked for any damage by the referee before each half of the game is started.

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

3. Length of Time

3.1 The tournament is split into group stage and knockout rounds.

3.2 The game will consist of two 3-minute halves. The second half will begin as soon as teams change sides. Finals and semi-finals will consist of two 5-minute halves with a maximum of 2-minute breaks between the halves.

3.3 Timekeeping will be managed by the official competition timer.

3.4 If the team does not report within 2 minutes of the game start, it will forfeit the game and the winning team awarded 2 goals. Game will end with result of 2:0.

3.5 The game will end when there is a goal difference of 10 goals.

4. Start of Games

4.1 The team kicking off would be decided by a coin toss.

4.2 The winner of the toss can choose either (a)which end to kick to, or (b) to kick off first or not.

4.3 The loser of the toss will decide the other option

4.4 The team that picked which end to kick in the first half of the game will kick off to begin the second half.

5. Kick Off

5.1 Each half game must begin with a kick-off.

5.2 Both teams will place robots on field and start the program. Participants must then move away from match field and wait for referee to start the match.

5.3 Before the referee signals the start of the competition, all robots must not be moving. If robots fail to accomplish this, the robot will be removed for 1 minute.

Hint: Robot movement is not related to program state (running or not).

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

5.5 All robots not kicking off must have part of the robot touching their own penalty box.

5.6 After the referee' s countdown (3,2,1) to start match, the robot kicking off must make a clear strike of the ball within 2 seconds and it must roll clear from the robot for at least 5 cm before other robots can leave the penalty box. The referee will say "go" to signal that other robots may move and leave the penalty box.

5.7 If any robot is not moving within 5 seconds, the robot is considered as a 'damaged robot' (see D8 – Damaged Robot).

5.8 An illegal kick-off will result in the opposing side being granted the kick off.

6. Scoring

6.1 A goal is scored when:

1. the whole of the ball crosses the goal line. This coincides with the ball striking the back wall of the goal.
2. If the ball is in contact with a defensive robot which is partially within the "in goal" area, it would be treated as a scored goal.

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

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

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

7. Lack of Progress

7.1 Lack of progress' occurs if:

1. the ball is stuck between multiple robots 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.
2. Or if the referee deems a relevant circumstance.

7.2 the ball is considered stuck if:

1. ball is not rotating for over 5 seconds when outside penalty box; or
2. ball is not rotating for over 15 seconds when inside penalty box.

7.3 In case of 'lack of progress', referee will stop the timer, return the robots to their corresponding penalty boxes and remain stationary. The ball dribbler will not be required to be stopped. The referee will place the ball in the centre of the field and the game will continue after the referee signals to "go".

8. Damaged Robot

8.1 The referee will consider a robot damaged if:

1. If the robot remains stationary for over 5 seconds;
2. If the robot stays within its penalty box for over 5 seconds;
3. And the robot will be removed for repair for 1 minute.

8.2 Damaged robot removal process

1. The referee will remove the damaged robot from the playing field

8.3 Damaged robot re-entry:

1. When it has been removed for 1 minute; or
2. When a goal is scored.
3. With the referee's permission, the robot may be placed on the white region next to the team's goal to continue the game.

8.4 If the robot is tipped over after a collision with another robot, it can be righted by the referee and continue playing.

8.5 The time will not stop because of a Damaged robot and gameplay will continue.

9. Multiple Defence

9.1 Multiple Defence occurs when more than one robot from the defending side enters their own penalty area (including partially enter).

9.2 Multiple defence procedure:

1. If the ball is outside the team's penalty box, the referee will count down from 5 seconds and if the situation persists, the referee will remove the team's robot that is furthest from the goal for 1 minute.
2. If the ball is inside the team's penalty box, the referee will not count down and move the robot that the least influence on play to the centre of the field.

10. Humans

10.1 After the competition begins, all participants controlling the robot must stand behind their goal.

11. Fouls

11.1 The referee will deem a foul for the following circumstance (applies to both participants and robots):

1. Intentionally attacking opponent robots
2. Damaging the ball
3. Vandalizing the playing field
4. If participants contact the ball or robots without the permission of the referee
5. Inappropriate speech
6. Or any actions which the referee may believe is unacceptable.

11.2 Dealing with fouls

1. The referee will give teams a warning. When the referee gives a second warning, the team receives a “yellow card”. Robots that receive a yellow card will be removed from the field for 1 minute.
2. When teams receive 2 “yellow cards”, the team will immediately be disqualified, and all competition records will be changed to a loss of “0:2”.
3. The number of warnings will be recorded for each match and will be reset for each match. But the number of “yellow cards” will remain and counted for the whole duration of the competition.
4. For any special circumstances, all decision will be made by the head referee and finalised with no objections.

12. Others

12.1 There are no Free kicks.

12.2 There are no penalty kicks.

12.3 There are no offside rules.

12.4 No out of bounds rules.

E. Conflict Resolution

1. Referee

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 disqualification of the team.

1.2 If Team members are satisfied with the result of a game, they are to sign the score sheet at the conclusion of game play.

1.3 If a game result is in doubt, teams should clarify with the referee. Once score sheet has been signed, arguments would not be considered.

2. Rule Clarification

2.1 Rule clarification may be made by the organisers.

2.2 If a rule clarification is needed, the referee should pause the game immediately (See D7 – lack of progress) and resume after clarifying the rules.

3. Special Circumstances

3.1 Specific modifications to the rules to allow for special circumstances, such as unforeseen prob lems and/or capabilities of a team's robots, may be agreed to at the time of the tournament, provided most of the contestants agree and approved by the head referee.

F. Inspection

1. Scrutineering

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.

1.2 It is the responsibility of teams to have their robots re-inspected if their robots are not passed at scrutineering or have been modified at any time during the tournament.

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

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

1.5 If a robot fails to meet all specifications (even with modification), the robot will be disqualified for that game (but not the tournament).

G. Code of Conduct

1. Fair Play

1.1 It is expected that the aim of all teams is to play a fair and clean game of robot soccer. It is the team' s responsibility to familiarise and understand the rules before the competition.

2. Behavior

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

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

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

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

3. Mentors

3.1 Mentors (teachers, parents, chaperones and other adult team members) are not allowed in the student work area.

3.2 Enough seating will be supplied for Mentors to remain in a supervisory capacity around the student work area.

3.3 Mentors are not to repair robots or be involved in programming of student robots. Robots should not need to leave the student work area during the duration of the competition.

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 given, and the mentor will be asked to leave the venue.

H. Others

1. Teams should be familiar with competition terms and conditions as well as tournament rules.
2. When contradictions are seen in official documentation, the following will be the priority order: Final decision of Organiser > rules updates > rules