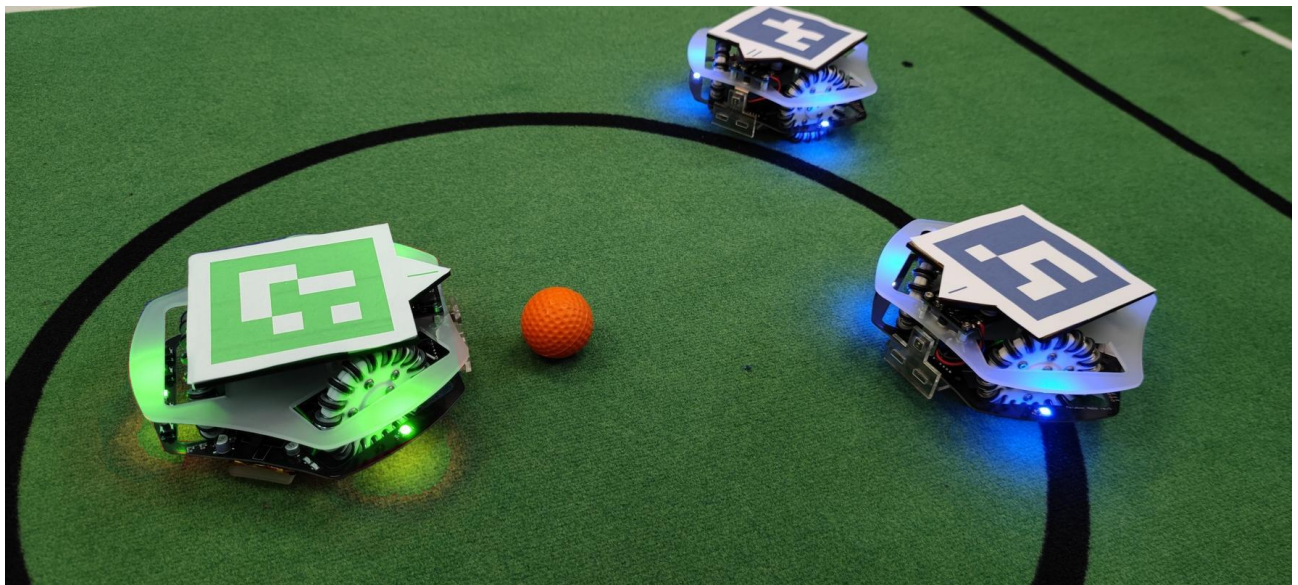


SSL-Jr Rules

with the

Robot Soccer Kit



<https://robot-soccer-kit.github.io/>

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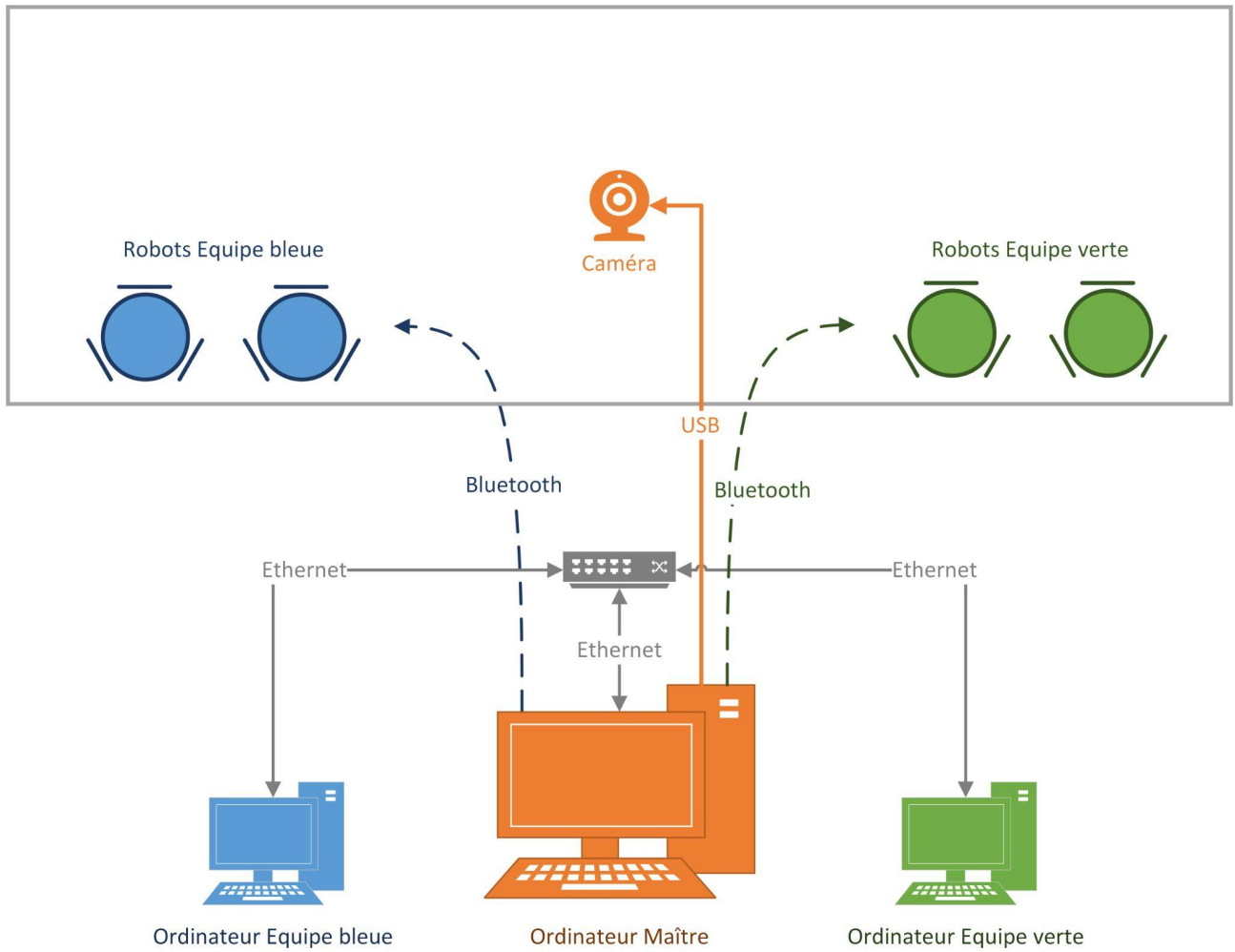
A. General presentation

This experimental league aims to promote robotic soccer with a focus on programming and match strategy. The participants are completely free from any material realization, be it design, manufacture or maintenance before and during the competition.

The robots, the field and the computer system are provided by the organizers and are identical for each match.

Technically, the principle is similar to the adult Robocup Soccer SSL league, the robots are controlled by programs developed by each team. Unlike the Robocup Soccer Jr league, these programs are not embedded but run on a "player" computer which communicates the movement information to the "master" computer which itself controls the robots through a bluetooth link.

These player programs obtain the game parameters (position of the robots on the field, of the ball, orders from the referee) via a wired network connection established with the central computer. It is on this central computer that the referee intervenes in order to trigger the different phases of the match: penalties, stoppages, time-outs

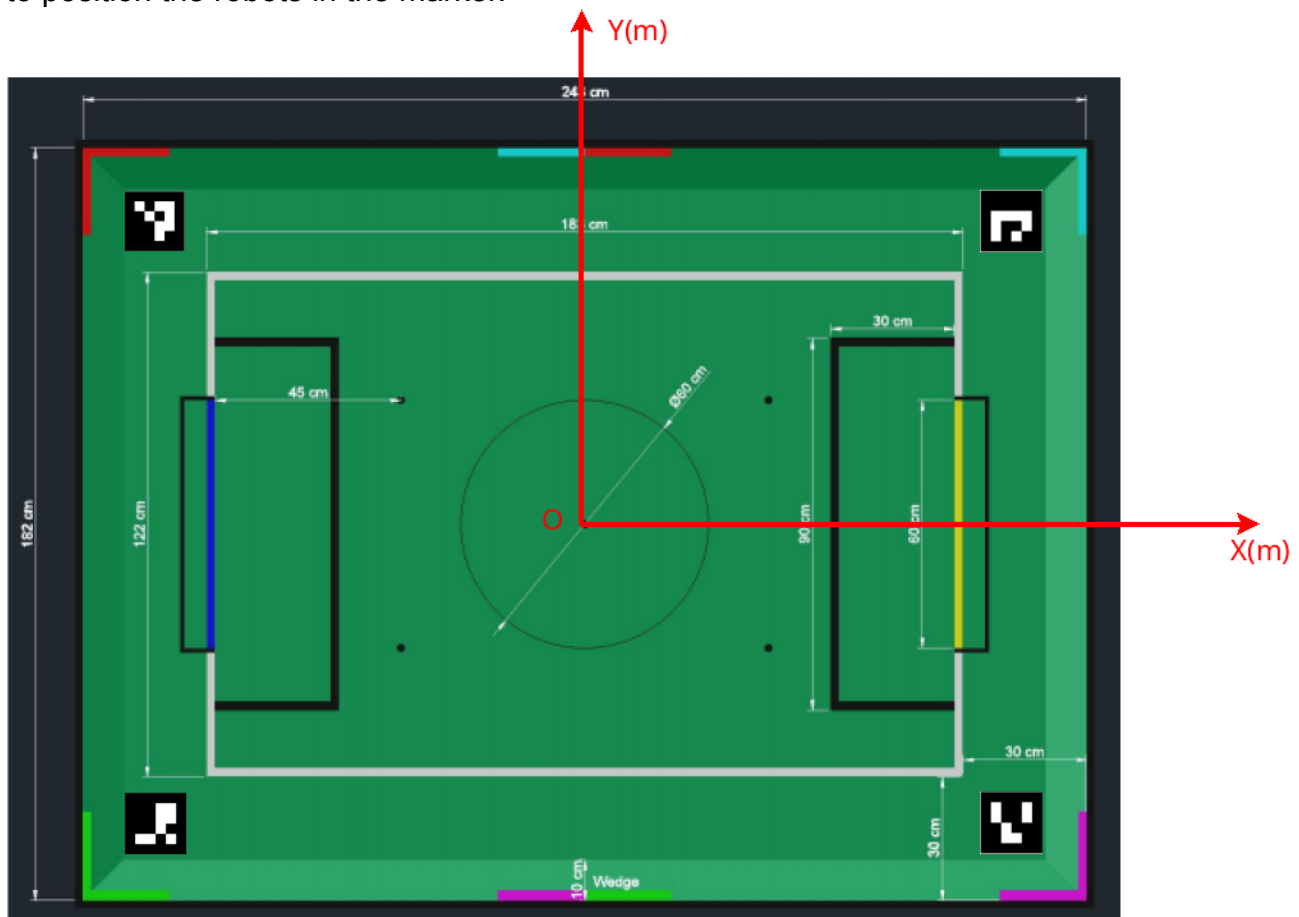


B. Playground

B.1. Field

The playing surface is made of felt (fine carpet) so that there is enough friction to make the ball's trajectory more controllable.

Each corner of the field is marked with a marker that will be used by the master computer to position the robots in the marker.



More informations about the markers : <https://robot-soccer-kit.github.io/>

B.2. Camera portal

The camera gantry is made of 50mm PVC water drainage tubes, which allow the camera to be placed above the playing area in order to detect the positions of the robots and the ball relative to the field marker.

The uprights and the crossbar are made of two 1m tubes, the feet of the tubes are made of a T-junction assembling two 50cm tubes at the end of which there is a 90° elbow on each side.

ATTENTION: some bends and T-joints have angles different from 90° and can distort the gantry.



B.3. Camera

The camera can be a USB camera. It works with OpenCV and its field of view must cover the whole field. We recommend the "Spedal MF920Pro, 1080p" with an angle of view of 120°.



C. Ball

The foam ball is orange in colour and has a diameter of ...

You can find it on the internet ...

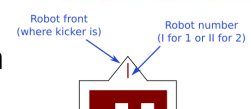


D. Playing robots

The two teams are made up of two robots each. They are identified by the camera using markers placed on them, the layout of which is shown opposite:

The colour of the pattern may change during the next evolutions.

These robots are equipped with three holonomic wheels that allow them to move in all directions. They are provided by the organizers and will all be strictly identical.



More informations : <https://robot-soccer-kit.github.io/coordinates-field-markers>

E. Player and master computers

The material is provided by the organisers

E.1. Master computer

This computer has a specific program for managing the Robot Soccer Kit game. It is connected by USB to the supervision camera and thanks to it, it can know at any time the positions of the robot players and the ball relative to the field marker.

It is connected by bluetooth to the robots and can send them the following commands:

- shooting,
- relative and absolute movements,
- stop play,
- to safety,
- join a pre-registered position (edge of the field, start of the game, etc.).

E.2. Players computers

The two player computers are connected to the master computer via an ethernet link. This bi-directional communication will provide the following features:

E.2.a Player computer → master communication

- Request to move the team's robots.
 - Eg : `c.blue2.goto((0,0,0))`
- Request the coordinates of the locations of the robots of both teams.
 - Eg : `print(c.green1.position[0])`
- Ask for the coordinates of the ball.
 - Eg : `print(c.ball[0],c.ball[1])`

E.2.b Communication master computer → player computers

- Sending of ball and player details on request
- Sending of specific orders for the course of the match (fouls, stoppage of play, start of play, end of play etc.)

F. Refereeing

It is desirable that at least two referees are assigned to each match. This referee communicates directly with the master computer and gives it orders for the different phases of the match: start and end of the game, stoppage of play, penalties etc.

G. Preparation area (Team stand)

Restrictions to be put in place in the preparation area

H. Playing area

The boundaries of the playing area are defined by the referees and/or organisers by means of virtual or real borders. It is shown and explained at the beginning of the match and must contain at least

- The pitch,
- The camera gantry,
- The camera,
- The ball,
- The player robots,
- The player and master computers.

Only the players, the referee(s) and the organisers are allowed to enter the playing area during a game.

No individual other than those listed above is permitted to:

- Be present in the playing area,
- Touch the computers or robots,
- Assist the players in any way after the game has started,
- Influence or interfere with the refereeing.

If any of the above four points occur, the referee will take the necessary action by excluding the individual from the audience or by sanctioning the assisted team.

I. Course of the competition / Gameplay

I.1. Game organisation.

Each team has two robots controlled by the computers. Apart from time-outs or reconfiguration due to a hardware problem, access to these computers is not allowed. The match is divided into two rounds. The duration of a set is 10 minutes and the half-time between the two games lasts 3 minutes.

The phases of the game follow each other automatically. The clock is started at the beginning of the match and does not stop until the end of the match, unless the referee requests it. It is the referee who acts on the game controller to stop the game. The referee may then integrate the time-outs if he wishes.

The duration of a time-out is 3 minutes per team (not divisible). The time-out can only be taken before a throw-in.

Teams must be present on the field 10 minutes before their games start. Teams that are late at the start of the game may, in the opinion of the referee, be penalised by one goal for every 30 seconds that have elapsed.

Depending on the competition and its specific rules, when the difference in points between the two teams reaches a certain differential, the referee may decide to end the game, regardless of the progress of the clock.

I.2. Pre-match, kick-off, half-time

Before the match, each team will be assigned a colour.

At the start of the match, the robots are positioned along an axis from one cage to the other, one in the defence zone and the other in the attacking zone. When the ball is put in its place, the refereeing software will count down and allow the players' programs to take control of the robots and make them move. The game then begins.

At half-time, the referee will come and swap the covers with the markers (and the team colour) so that the robots and the location on the field are swapped for the sake of fairness.

I.3. Human interferences

During the game, no interference from teams (e.g. touching a robot) is allowed, unless explicitly authorised by a referee. Teams violating this rule may be disqualified from the game.

The referee or his assistant may help the robots to unblock if the ball is not played next to them and the situation has been created by a normal interaction between the robots (by the programming of the robot itself). In this case, the referee or his assistant may pull the robots just enough to allow them to move freely again.

I.4. Scoring points

A point is scored when the ball intersects the cage area segment. Goals scored by attacking or defending robots have the same result; they give a point to the team on the opposite field. After a goal, the game is restarted with a kick-off by the team that did not concede the point.

I.5. Timeout

Each team has a non splittable 3 minutes timeout for the whole game. During the time-out, team members can make changes to their program or load a different version.

I.6. Goalkeeper

Only one defending robot may be in the penalty area at a time. Attacking robots are not allowed to enter this area.

I.7. Lack of progress (dead game)

"lack of progress" (dead game) occurs when there is no progress in the game for a reasonable period of time and when the situation is not likely to change. A typical dead game situation is when the ball is stuck between robots, when there is no change in the position of the ball or the robots.

After an audible (loud) countdown, a referee will announce "Lack of progress" and move the ball to the nearest unoccupied neutral point. If this does not resolve the lack of progress, the referee may move the ball to another neutral point.

Note: The count is usually 3 (It will be announced by the referee at the start of the game).

I.8. Offside (Out of bounds, off the field)

I. 10-1. Robot out of play

Si tout ou partie d'un robot sort des bordures externes du terrain, il sera nommé hors-limite. L'ordinateur maître reprendra alors la main sur le robot pour le ramener automatiquement sur le terrain.

L'arbitre annonce "Out of reach" (Hors d'atteinte) et bouge la balle au point neutre inoccupé le plus proche lorsque l'une de ces conditions se produit :

I. 10-2. The ball goes out of play area

The game controller stops the robots. There are several "neutral" points around the field for restarts. The referee places the ball on the point closest to where the ball went out, the game controller then triggers the restart of the game.

I.9. Damaged robots

If a robot is damaged during the match, then it may be replaced by a new working robot provided by the organiser.

Only the referee can determine whether a robot is damaged or not. A robot may only be removed from the field or put back into play with the referee's permission.

Furthermore, if one of the two damaged robots has been damaged because of an infraction by the opposing team, a penalty will be given.

I.10. Game interruption

Theoretically, a match will not be stopped.

A referee may stop the game when there is a situation in or around the game that the referee wishes to discuss with another official of the tournament, or, if the system is not working properly and a replacement is needed.

When a referee has suspended play, the game controller stops all robots. The referee may decide to resume play from the situation where it was stopped or to resume it with a kick-off.