

System Design Project 2013 — Football Rules

John Butler, Garry Ellard, Philip Wadler

29th March 2013

1 Historical Interest Only

As used in 2013, *not* what will be used in 2014!

2 Dimensions

The Pitch is 8ft by 4ft pitch and surrounding black wall is 1ft high.

The goals sizes will be: width = 60cm and height = 18cm.

The ball is a red golf ball.

The robot dimensions should be within in the following sizes: length = 20cm, width = 18cm and height = 18cm.

The football “strips” for the robots are blue and yellow “T” shapes with a black circle above them on a green background plate.

Because of the size of the strip plate we are refining the rules for robot dimensions as follows: Sensors and reasonable support for sensors may protrude up to 1cm beyond the given dimensions, on front, back, and each side. Up to 1cm may be used at the top to provide additional support for the top plate, provided that the plate is secure enough to withstand collisions with the walls and crossbar.

The orientation of the “T” on the “strip” on the robot should be that it points forwards. That is that the bottom of the “T” is to the front of the robot and the top of the “T” is to the back. The robot should be constructed in such a manner that when the strip plate is added to it it does not obscure the ball from the camera.

3 Match Times

Each half is three minutes, with one minute between halves. In the event of a draw two further one and a half minute golden goal periods will be played.

4 Robot Construction

Any red, yellow or blue pieces of Lego used in construction should not be visible from above. (Insulating tape and paper/card can be used to cover up the offending bricks).

Any red Lego used should not be visible from any of the sides (ie by the opposition robot, should they be using any form of colour sensors). No use of the red plastic ball from the Lego kit as part of the robot.

If the light sensor is used with the red LED, it must be designed so that there is no leakage of light that confuses the opponent. A sensor pointing down and close to the pitch surface should be ok.

Your robot should have some kind of flat top or frame or fixing points for the strip to be stuck onto. No blutack or glue should be used on the robots to hold them together (if you can't brace it up solidly with Lego then you are not using it right).

No cutting, drilling, painting of Lego on the robots The robot kits should be returned to us at the end of the project in the same condition we handed them out in.

Loose and/or trailing cables will need to be coiled and tied up.

No flame throwers, catapults, crossbows.

If a robot falls apart during play, the referee may choose to award the game to the opposing team. For group table calculation this would be recorded as a 3-0 win to the opposing team with 3 points also being awarded to them.

5 Robot Control and Programming

You may program your Mindstorms robots using any system you wish. Lejos was popular last year but other software options are available.

6 Pre-Match

The tournament draws will be made a week in advance with a rep from each group present as the "groups are drawn from a hat". A poster or two will be put up in the labs with the match line ups and times on it. As well as being posted on the forum and emailed out to you.

Be aware that you may be required to play earlier than expected due to unforeseen withdrawals.

The strips for this year are going to be blue and yellow Lego "T" shapes with the black circles on the green Lego base boards that can be found on the pitch. They will be allocated just before kick off.

A coin toss will be made and a member from each participating group will then decide which of the two colours they will be wearing and, which direction they will be attacking. Please note that you switch attacking direction but not strip colours at half-time and continue to switch directions for the two golden goal periods. Each team will then have 1 minute to prepare for kick off. Which means you will have to be ready to attach the allocated strip to the top of your robot very quickly and input the direction information. Robots must be designed so that the T emblem can be easily attached between games. Bluetack should not be required. The T emblem should be secure, and not fall off in normal play or when the robot collides with a wall or its opponent.

As part of the advertising/product branding/presentation side of things in this project each group is expected to have a team name and logo. This team name or logo should be presented as a big, bold colour A4 print and placed on the pitch just prior to each match starting. (To help the video viewers identify who is playing and the video editor to correctly edit and tag each match.)

7 Start of Play

You will be allowed a minute between coin toss decisions being made and kick off to get your robot on the pitch and ready to play.

The initial position for the ball is in the centre of the field.

The initial position for each robot is facing forward, centred, with its back against its own goal line. The plate must be clearly seen by the camera with the back of the plates just in screen shot and no more.

If a robot cannot be placed on the field at the start of play the team may forfeit the match. For group table calculation this would be recorded as a 3-0 win to the opposing team with 3 points also being awarded to them. Please also note that you may be required to play earlier than expected due to unforeseen withdrawals.

The robots will be checked prior to the matches to make sure that they fit in with the rules on sizes and pass the swipe test for ball trapping/covering purposes and also that any colours that may conflict with any of the Vision Systems are covered up or removed.

8 Rules of Play

Each half is three minutes, with one minute between halves. If a team is not ready to play on time, they may default. Be aware that you may be required to play earlier than expected due to unforeseen withdrawals.

One team member will be allowed to act a coach/physio and be allowed to reposition/restart the robot as and when the referee allows

The initial position for the ball is in the centre of the field.

The initial position for each robot is centred on the goal line, with its back against its own goal. With the back of the plate when viewed by the camera to be in line with the goalline.

As it is 1-a-side football, you may dribble the length of the field as long as the ball is not shielded from the opposing robot, in such a manner as they have no hope of attempting to tackle your robot, we will use the swipe test to check this. As in can the ball be swiped away from your robot or not. We will allow dribbling for distances longer than 500mm as specified by Robocup. The 80/20 rule as mentioned in the Robocup rules will be applicable; (only 20/lifting or carrying the ball. No deliberate covering of the ball from above or obscuring it from the camera. No chipping/flicking/kicking the ball above the surrounding wall No attempting to fire the ball with such power that it will damage the opposition robot.

Robot collisions will occur and when the robots bump into each other play will be allowed to continue. We will however enforce the rule that if one robot rams another, then a penalty kick may be awarded against the robot doing the ramming. If both robots ram each other violently or repeatedly then they and the ball will be returned to their initial positions. If either robot is stuck for 10 seconds, it may be returned to its initial position. If the ball is dead for 10 seconds (against the wall where it is impossible to kick, or not visible to the camera), it will be returned to its initial position.

One group member only to interact with robot when allowed to do so by the referee during the match. You will be required to identify yourself to the referee before the match. Any other member of your group handling the robot during the course of the match without the referees prior consent will result in a penalty being awarded against you. To avoid confusing the vision systems we would like to request that those of you handling the robots don't wear the same colours as the strips or the ball.

Apart from the required interaction with the robot at kick-off/match restarts and penalties. There should be no communication/interaction with the robot after the match has begun.

Running repairs to robots during the match must be carried out off the pitch. If a robot falls apart during play, the referee may choose to award

the game to the opposing team. For group table purposes 3 points will be awarded to the opposing team and either a 3-0 for goal difference or the actual result at time of stoppage, whichever is greater in their favour.

Each match will have a referee and a may have a panel of three judges. Their decisions will be based on these rules and the events of the matches. In the event of dispute the referees decision is final. (There however may be time allowed afterwards for post-match analysis and discussion)

9 Watching The Matches

All observers to stay behind the black lines on the floor that surround the pitch, so as not to confuse the participating teams vision systems. You will also be able to watch the matches on the projectors in each room as well as from the web feed.

10 Penalties

During play, a penalty will be awarded if a robot is touched without first obtaining permission from the referee or if a robot repeatedly or deliberately rams another or at the judgement of the referee or panel. The positioning for a penalty kick is that the defending robot is placed first, then the robot taking the kick is placed. In all other cases, the only place a robot may be moved to is its initial position. The robot taking the penalty will then have up to 30 seconds to do so. If the penalty is awarded with less than 30 seconds of match time to play, the 30 seconds will still be allowed for the penalty to be taken. It will however be the last action of that time period. The defending robot may move along the goal line or rotate or try to kick the ball back, but only after the attacking robot has been placed and the timekeeper has announced the start of the 30 second penalty clock. The defending robot cannot however move off the goal line towards the ball.

11 Match Winners

In the event of a draw the match shall go into two one and a half minute golden goal periods. The first team to score wins the match. If it is still a no-score draw then we go to penalty's (one each). Each game will have a panel of three judges. If the game is tied after one penalty kick for each side, the judges may decide either: (a) to toss a coin to determine the winner; (b) to award the game to the robot that they believe was technically superior;

or (c) to allow up to two more additional penalty kicks for each side (if the game remains tied, the panel then decides between options (a) and (b)). As an incentive to do well in the friendlies, the two finalists will get preferential seeding for the next tournament, with the remaining four groups being drawn randomly against them.

12 Tournament Structure

Each tournament will consist of eight knockout matches. Each week's top four teams, will go into a seeded pot and the other four teams will be in the unseeded pot for the draw for the next tournament. The rest of the days tournament is a straight knockout tournament.

13 Recordings

The matches will be streamed live to the web and also recorded. The full tournament recording will be available from kick-off time. The edited match recordings will be made available to you to use for further simulation work from Thursday morning onwards.

14 Unsporting Behaviour

"Unsporting Behaviour" is frowned upon and may result in the offending teams being penalised depending on the severity of the infraction this may vary from penalty kicks being awarded against them up to and including exclusion from the tournament. Some examples of unsporting behaviour include:- The use of anything that may disrupt a robot's capability to use its sensors effectively, in particular the use of magnets to disrupt compass sensors. The sending of direct commands via bluetooth to the robot during the match is not permitted. Once the whistle has blown for the match to start the robot is supposed to be autonomous. It is not a remote-control robot competition.

15 Updates

These rules may be amended or added to as the project progresses so please check back here and the forum:- <https://www.forums.ed.ac.uk/viewforum.php?f=641> for updates.