SDP Rules 2017

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Introduction

SDP is designed to give students an experience of what it is like to work as part of a team producing a complex system with both hardware and software elements. It is intended to be a window into the kind of work done both in industry and academia on collaborative projects, and provides the opportunity to develop and improve project management and teamworking skills. **SDP is excellent CV material**.

The current task revolves around a game similar to football, with rules modelled on the RoboCup Small Size League[1]. Each group of students will build a single robot and its controlling software, then be paired up with another group to compete in 2v2 matches.

This document covers the main rules for the robot systems and the matches they will play, but if anything is unclear then message the teaching assistants (Kat / James) or Garry.

System Design

Each **Group** will build one robot, and groups will be paired up from the start of the course to form **Teams**. A match is played between two teams.

A robot **MUST** fit inside a box with dimensions **200(length)x180x180mm**. There should be no loose/trailing wires.

Maximum dimensions **MAY** be exceeded temporarily (eg. by an extending kicker) but if an extended part of the robot blocks the ball or another robot during play this will be a punishable offense. The intent is that defenders move intercept the ball, rather than expanding to fill the whole goal.

The ball is a standard Lego Mindstorms ball. It is a 52mm red sphere. Any red, yellow, or blue pieces of Lego used in construction **MUST NOT** be visible from above. Insulating tape or paper/card can be used to cover offending bricks.

Robots **MUST NOT** damage or interfere with other robots or the pitch.

The robot is to be fully autonomous.

You will be assigned a frequency/channel for your team to use with the provided RF sticks. You may use only this frequency to limit interference with other robots.

[1] http://robocupssl.cpe.ku.ac.th/rules:main

You **MUST** use only provided university equipment, e.g. DICE machine, or that bought with your group's budget, to run code for your robots.

Sensors **MUST** be mounted on your robot, with the exception of the overhead camera.

With the centre of the robot directly underneath the overhead camera, it **MUST NOT** obscure any more than 20% of the ball at any time.

Kickers should not be designed such that the ball will leave the ground when kicked.

Robots are uniquely identified during matches by a provided top plate. This will have 5 velcro fixings (4 corners and the centre). Each group will be issued with sticky backed velcro to make complementary fixings on the top of their robot.

Each Group should have a logo which clearly contains, or is displayed alongside, the Group number (eg. 1B) to identify the robot to spectators. This should be printed on a sheet of A4 paper to be placed on the pitch next to the robot before each match. Additionally, a copy of the logo should be hung from the top plate on either side of the robot.

Note: spot checks may be enacted by staff before any match, to ensure adherence to the above.

Pitches

There are two pitch rooms: A (3.D03) and B (3.D04).

The fields of play and equipment in each room are as similar as possible, but some variation between rooms should be expected and your designs should account for this.

Each room has an overhead camera feed, which your systems may use. It is also used to broadcast/live stream matches, but this should not influence image quality during matches.

Pitch rooms will be accessible for testing your systems, with the exception of match afternoons. Employ a fair usage policy: every group should be able to use the pitches.

Matches

Room allocations will be published in the tournament schedule, along with your team's colour (yellow or blue) and starting goal direction (subject to alterations).

During a match, only two members of each group are allowed in the pitch room: one designated as Operator and one as Handler:

- The **Operator** should be at the group's assigned computer commanding and monitoring the system.

- The **Handler** stands at their group's assigned corner of the pitch. They are responsible for removing any robot in that quarter and for placing their group's robot into that corner. Handlers are encouraged to take care with all robots.

Once all teams are logged in to their computers, they will have 2 minutes to set up before kick off.
A **Match** then consists of two **Halves**, each three minutes in length.
Half time is one minute in length. At half time, teams change direction but not colours.

Robots start in the corner their Handler is assigned to, facing in any direction.

The ball will start in the centre.

For a goal to be scored, the ball must clear the goal line completely.

A robot should not travel in possession of the ball. Practically, this means a robot should move no further than a robot length while pushing the ball. It should then kick the ball (at least a robot length) before moving towards it again.

Robots not in possession of the ball may attempt to take it, as long as they do not do so in a way that may damage the possessing robot.

Resolving Draws:
During the knockout stages of tournaments, the following steps will be followed until a deciding goal is scored:

1. The second half continues immediately into 1.5 minutes of extra time.
2. Teams switch halves and another 1.5 minutes of extra time are played.
3. The match ends and the win goes to the team that scored first.
4. If the result is 0-0 a coin flip decides the winner.

Milestones 1 and 2: each match will consist of a single half, played by two robots rather than four, in order to allow evaluation of group-level performance. For these matches, the 2 robots that are not playing (the team partners of those that are) will be positioned in their starting corners in case their presence is useful to the vision systems.

Referee

The Most Important Rule: The referee's word is Law.

Referees are tasked with regulating the behaviour of both the robots and the students during matches. Polite and professional behaviour is expected from everyone; a robot will be penalised for the actions of its controlling group if necessary.

Penalisation for infringement of the rules will take the form of temporary removal from the pitch for the offending robot. **Examples of common offenses can be found in the referee rules document.**

During a game, you **MUST** interact with your system **ONLY** under instruction by the referee. This includes the PC, as referees cannot be expected to tell the difference between clicking through windows and giving instructions to the robot.

Standard referee instructions and their corresponding actions are listed below.

Instruction	Action
Start Robot	Start the specified robot.
Stop Robot	Deactivate the specified robot. (no part of the robot should be able to move after this command).
Remove Robot	Take the specified robot off of the pitch.
Replace Robot	Place the specified robot in its starting position.
Reset Robot	Stop, Remove, then Replace the specified robot.
Start Match	Start all robots.
Reset Match	Stop all robots. Replace all robots. Wait for new Kickoff.
End Match	Stop all robots. Remove all robots.

Resets

Resets are done at the discretion of the referees when the course of the game is being impeded. This can be due to robots being inactive, caught on one another, or appearing stuck in a behaviour that won't go anywhere (eg. repeatedly trying to grab in the wrong direction for a ball). In many cases, simply resetting the ball to the centre of the pitch will suffice, but the referee may also decide to reset the offending robot(s) or, in rare cases, the whole match.

A team may request that their own robot is reset, but this should be done only to draw their attention to a fault rather than simply to move a robot back to its starting position.