Minibots Michaelmas 2021 Rulebook

0th Revision
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1. Game Rules

1. The game, called Seven Block Pickup, will be played in the arena defined in section 3.1. The objective of this game is to collect as many tokens as possible, whilst preventing your opponents from collecting tokens!
2. Before a match begins, participating teams must place their robot in the starting zone that they are assigned. The robot must be placed such that it is entirely within this starting zone, with no parts overhanging its boundary.
3. A match lasts 180 seconds.
4. There will be 2 robots in a match.
5. Robots will be started by teams leaning into the arena to press the start button on their robot when instructed to do so.
6. A match may be terminated prematurely if all teams participating in that match state to the match officials that they are happy for the game to end.
7. At the end of a match, each team's game points will be calculated. These are used to rank teams before competition league points are awarded. Game points will be awarded to each team as follows:
    a. +10 points for each token which is within that team's allocated zone. A token is in a zone if any part of that token is touching the arena floor within the scoring zone.
    b. -5 points deducted for each collision with another robot.
    c. +20 points awarded for being able to produce a graph of the location of the tokens after the run.
8. At the end of a game, league points will be awarded as follows. The team that wins will be awarded 3 points towards the competition league. The team that loses will be awarded 0 points. In the event of a draw, both teams will be awarded 1 point.
9. Once the league has completed, a knockout competition will begin. The positions of the teams in the league will seed the positions of teams in the knockout matches. The top teams from the league advance to the knockout. The number of teams progressing to the knockout will be announced before the start of the league matches. In the event of tied league positions, the team with the greatest cumulative game points in the league will go through. Each match in the knockout competition involves 2 teams. The team that come 1st in each knockout match will continue to the next round of the knockout. In the event of a tie in a knockout match, the team that ranked highest in the league will go through. If there is a tie in the final, then a rematch will be played. The number of league and knockout matches will be announced on the morning of the competition.

2. Regulations

1. All robots must be safe. It must not be possible to directly or indirectly injure oneself on the robot (for example on sharp edges and fast moving parts). The robot must also not intentionally damage other robots or the arena.
2. The decisions of CuR committee members are final.
3. All kit deployed by CuR remains the property of CuR. All electronic kits must be returned to CuR after the competition.
4. Robots should be able to fit within a cube with 300mm internal sides. During the run, the robot may extend beyond this size.
5. All wires connected to the robot's ground (0V line) must be black. Black wires should not be used for anything else. It is strongly recommended that all wiring is neat and easily removable, as this will reduce the time required to debug problems on robots.
6. All electronics must be securely fixed to the robot and should also be easily removable.
7. The robot's power switch must be on the outside top of the robot and easily accessible at all times – including throughout the game. This is for everyone's safety, especially your robot's.
8. Only the power board may be connected directly to the battery.

9. The lithium-ion polymer batteries provided in the kit must be shielded from mechanical and thermal harm. This includes mechanical protection from accidental impact with other robots.
10. If teams wish to use batteries other than the lithium-ion polymer batteries provided, then they must seek approval from CuR through the CuR Minibots Slack Channel first. Additionally, if teams wish to add systems powered by separate batteries then they must seek approval through the same channel first.
11. The robot must be fully autonomous. Not remote control (i.e. no input from the team is needed after hitting the reset button on the robot).
12. The robot may be changed and updated between games.
13. Members of the CuR committee may not offer any advice to teams at the competition.

3. Specifications

3.1. Arena

1. The match arena floor, overall, is an 1.5m x 3m rectangle, as shown in figure 1. The tolerance of these two dimensions is ±0.05m.
2. The floor of the arena will be made of unpainted MDF board. It will be made of multiple sheets. And, there may be slight gaps and height differences between these sheets.
3. Black electrical tape in the centre of the arena will mark the path between the two scoring zones. The tape will be 19mm wide ± 1mm.
4. There will be no area walls.
5. Each robot will be assigned a short side at the start of every match to indicate its starting position. Short side starting positions are 350 ±20mm square and will be marked by 19mm ±1mm wide blue electrical tape as shown in figure 1.

3.2. Scoring Zones

1. There are two zones in the arena, both half way along the short sides of the arena. The arrangement and dimensions of these zones can be seen in figure 1.
2. The boundary of the scoring zones will be marked by 19mm ± 1mm wide blue electrical tape. The tape will be placed along the inside of the edge of the zone, making it part of the zone for scoring purposes.

3.3. Tokens

1. Tokens are 31.8x31.8x19.2mm cuboids made from four red lego bricks. The bricks will be placed in an upwards orientation.
2. There will be 7 tokens in the arena. The positions of three of the tokens are specified (as shown in figure 1), the other four tokens will be randomly positioned in the arena.
3. Each token will be placed at least 100mm from each other.

4. Awards

1. Main Competition Award
   The team that is placed highest at the end of the competition will be allowed to keep their robot. Further, each member of the team will be given an edible prize.
2. Committee Award
   The Committee Award will be given to the team that displays the most extraordinary ingenuity in the design of their robot. It will not be awarded for complexity of design, rather the implementation of a simple and elegant solution to a problem.
3. First Robot Movement
   There will be an award for the team with the first robot movement. This requires a video of the robot moving 2 metres, pausing for 2 seconds, turning 180◦ (±20◦), returning to its starting position (±0.5m), and come to a halt without interference being posted in the CuR Minibots Slack Channel. An edible prize will be posted to the team that is successful.

5. Clarifications

Requests for rule clarifications may be made on the CuR Minibots Slack Channel, and this document will be updated if deemed necessary. Requests received within one week of the competition are unlikely to be processed.

Appendices

A. Return of Kit

Each team is responsible for ensuring that they return these items from their kit.

A.1. Items to be Returned

Item	Quantity
18l Really Useful Box	1
Power Board	1
Brain Board (Odroid U3)	1
Motor Board	2
Servo Board	1
Ruggeduino	1
Screw Shield	2
USB Hub	2
USB A to USB B lead	3
USB A to USB Micro-B lead	5
Lithium Polymer Battery	2
Battery Charger (IMAX B6 or HobbyKing E4)	1
Charger Power Supply and Mains Cable	1
Battery charging bag	1
7.5mm Green Camcon plugs	10
5mm Green Camcon plugs	7
3.81mm Green Camcon plug	1
ODROID Power Cable	1
Screwdriver	1

A.2. When and How to Return Kit

The kit should be returned at the competition. If you wish to keep the kit beyond the competition, then this must be arranged with us, before the 1st of December 2021, via email to js2515@cam.ac.uk .

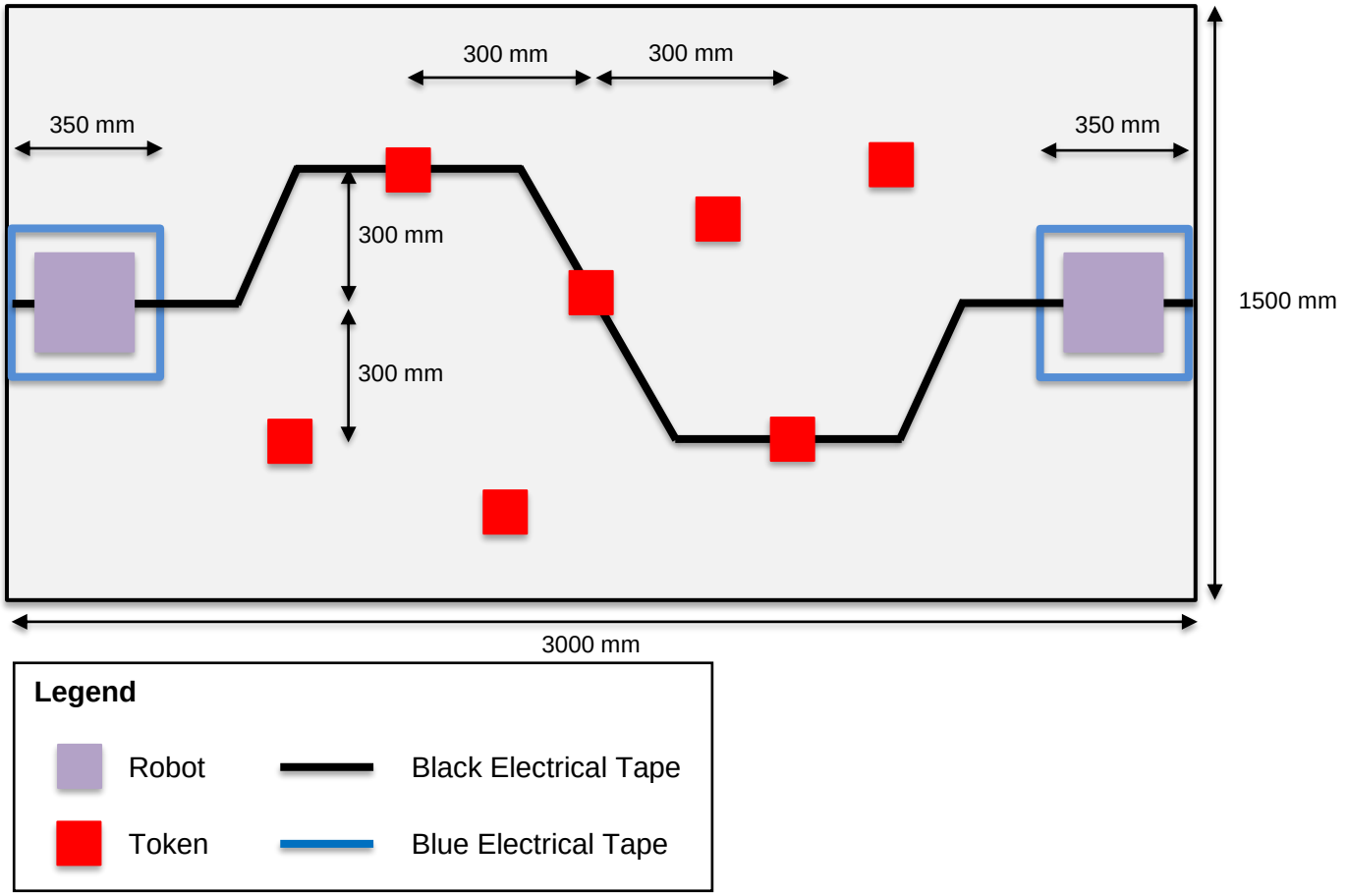

Figure 1: A bird's-eye view of the arena. All dimensions are in millimetres.