

SOURCEBOTS

UNIVERSITY OF  
**Southampton**

ELECTRONICS AND COMPUTER SCIENCE  
FACULTY OF ENGINEERING AND PHYSICAL SCIENCES  
UNIVERSITY OF SOUTHAMPTON



THE SMALLPEICE TRUST

## **TIN CAN RALLY: RULES**

AUGUST 2018

COMPUTING, ELECTRONICS, AND ROBOTICS

# 1 Game Rules

1. The game, called *Tin Can Rally*, is played in the arena defined in Specification 1. The objective is to race around a track, picking up tin cans along the way.
2. 6 points are awarded each time a robot crosses a track boundary in the anticlockwise direction.
3. Robots can pick up tin cans which are in the track. Each time a robot crosses a track boundary and is awarded track boundary points, it is awarded 4 bonus points for each tin can it is carrying.
4. At the end of every lap – defined as every sixth forward zone crossing – a robot is awarded an additional 4 points above the points it normally gets for the crossing.
5. At the end of a match, each robot is awarded 2 additional points for each tin can it is carrying.
6. A robot is deemed to have passed a track boundary when the back of the robot passes the line.
7. In the centre of the arena is a special *super can*. The super can behaves in all regards the same as a normal tin can, except that if a robot is carrying the super can at the end of the match, the opponent robot's points are halved.
8. Cases of a robot passing backwards over a line are offset against future crossings forward of a line. That is, if a robot crosses two track boundaries backwards, it will need to cross two track boundaries forwards before it can gain any more track boundary points.
9. Participating teams must present their robots to match officials before the start of matches, as regulated by the match officials. Non-compliant teams may be disallowed from participating.
10. There will be 2 robots in each match.
11. SourceBots may have any number of match officials within the arena, including during the course of matches.
12. At the start of each match, robots must be entirely within their starting zones.
13. At the start of each match, teams will be permitted to lean into the arena and start their robots.
14. Each match lasts 120 seconds.
15. Teams may be disqualified from one or all matches by match officials, for non-compliance with regulations, lateness to the match, or any other reason at the discretion of the judge. Teams disqualified before the start time of a match will not be permitted to enter a robot.

## 2 Regulations

1. The Judge's decision is final.
2. All robots must be safe.
  - (a) This is defined considering safety concerns including, but not limited to:
    - i. sharp edges;
    - ii. the effects of impact at speed;
    - iii. fire risks from the battery (see Regulation 9).
  - (b) No robots will be permitted to compete without passing a safety and compliance inspection.
  - (c) SourceBots staff may reinspect your robot and invalidate previous inspections at any time.
3. Any assistance from SourceBots staff is provided without guarantees.
4. Competitors are expected to behave within the spirit of good sportsmanship.
5. Competitors must take reasonable measures to avoid their robot damaging the arena, or anything within it, including other robots. This is a non-contact sport.
6. Competitors are not permitted in the arena during the competition, except to lean in to start robots or where directed by match officials.
7. All robots must be fully autonomous once started. No remote control systems are permitted.
8. At the start of each match, all competing robots must fit within a cube with edges of length 500 mm. Expansion beyond this limit during the course of a match is permitted.
9. The Lithium-Polymer battery is the most dangerous part of the electronics kit and must be treated accordingly. Whenever a robot is in operation its battery must be:
  - (a) securely held in place;
  - (b) adequately protected from damage even in the presence of damage to the rest of the robot;
  - (c) connected only to the main input of the power board.
10. A robot's main power switch must be easily accessible and on the top of the robot whenever the robot is powered.
11. All electronics on a robot must be:
  - (a) securely held in place;
  - (b) easily removable.
12. A robot must not have any devices designed to make sound, other than where provided directly by SourceBots.

## 3 Specifications

### 3.1 Arena

1. The arena floor is an 8 m × 8.1 m rectangle. The tolerance of these two dimensions is  $\pm 250$  mm.
2. The floor of the arena is carpeted.
3. The layout of the arena is given in Figure 1. This figure is to scale.
4. The outer walls of the arena are at least 600 mm high, and the interior surface is white plastic-coated hardboard.
5. The outer track of the arena is 1.5 m wide along the 8 m edges, and 1.55 m wide along the 8.1 m edges.
6. The central reservation is surrounded by walls, which are 358 mm high.
7. The starting location of the robots is given in Figure 1. Teams are allowed to place their robot anywhere such that the entire robot is within 1 m of the starting point, which will be indicated on the floor of the arena. The starting zones are along the shorter (8 m) walls of the arena.
8. There is a short-cut through the central reservation, as specified in Figure 1. It is 1.34 m wide.
9. Within the short-cut there are fixed obstacles. These have a square cross-section, with the area touching the floor being a square with edges of length 200 mm. Their height is deliberately left unspecified here. Their layout is given in Figure 1.
10. In the centre of the arena is a pedestal holding the super can. The pedestal is 358 mm high, and is a square with sides of length 200 mm, rotated at  $45^\circ$  to the arena.
11. The track boundaries are visually delineated on the floor of the arena by metal tape. The actual boundary is on the trailing edge of the tape – that is, a robot has passed the boundary when the back of the robot is past the tape.

### 3.2 Tin Cans

1. The tin cans are standard 400g steel tin cans, of height 108 mm ( $\pm 5$  mm), and diameter 75 mm ( $\pm 5$  mm).
2. The initial layout of tin cans in the arena is given in Figure 1.
3. The tin cans are ferromagnetic.

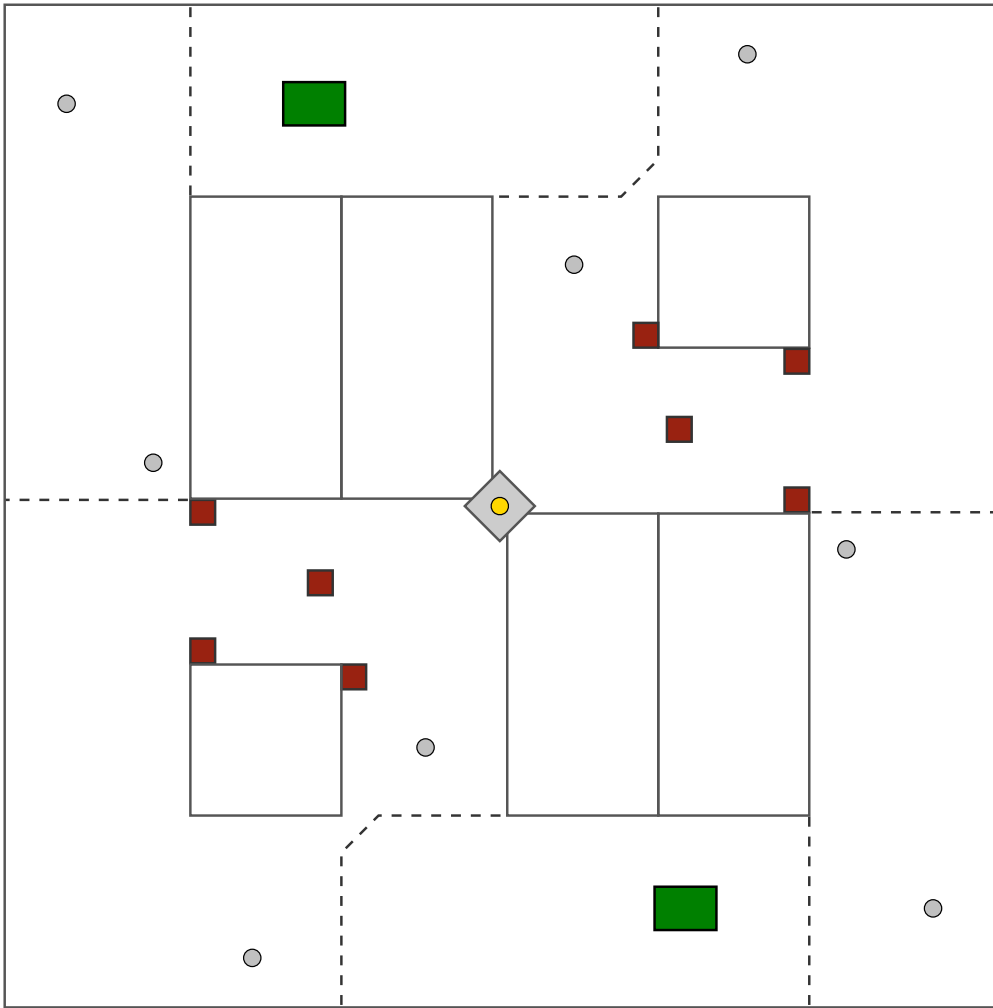


Figure 1: Layout zones and cans in the arena.