

2019 Open Platform Challenge

SMART SORTING



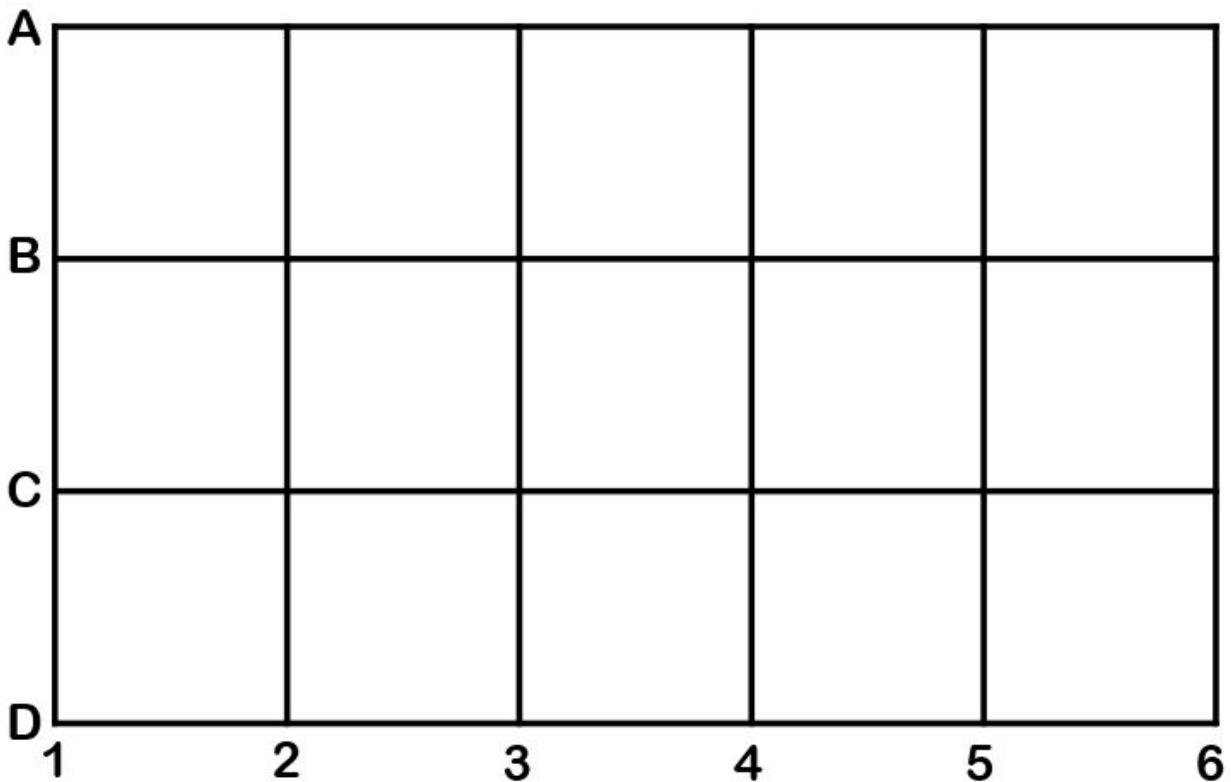
INTRODUCTION

In our daily life, we use a lot of material that should be recycled or disposed of correctly. While we find solutions to reduce the amount of material we use, a smart sorting robot will help us to classify the discarded material to the appropriate bins.



GAMEFIELD

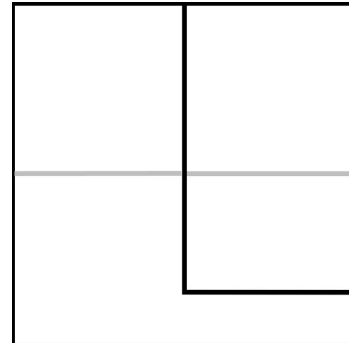
The gamefield for this challenge is simple and easy to set up for teachers. The dimensions are described below.



The gamefield is composed of 15 squares of 35 cm X 35 cm surrounded by black lines measuring 2 cm.

In order to clearly describe the arena, the lines are marked with a letter or a number. The competition mat will not have these indications.

A separate 72 cm X 72 cm (equivalent to 4 squares) section with 2 perpendicular lines forming an L will be added to the playing surface.



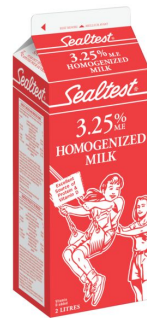
GAME ELEMENTS

Material to recycle

There are 3 types of material that must be picked up and sorted : cardboard, metal and electronic waste.

Cardboard

A milk carton represents the cardboard material. Its approximate dimensions are 10 X 10 X 24 centimeters. Dimensions may vary +/- 1 centimeter. It stands up on the surface. The carton is empty to ensure the robot is able to lift it.



Metal



A food aluminium can represents the metal material. Its diameter is 7.5 centimeters and its height is 11 centimeters. Dimensions may vary +/- 1 centimeter. The can is empty to ensure the robot is able to lift it.

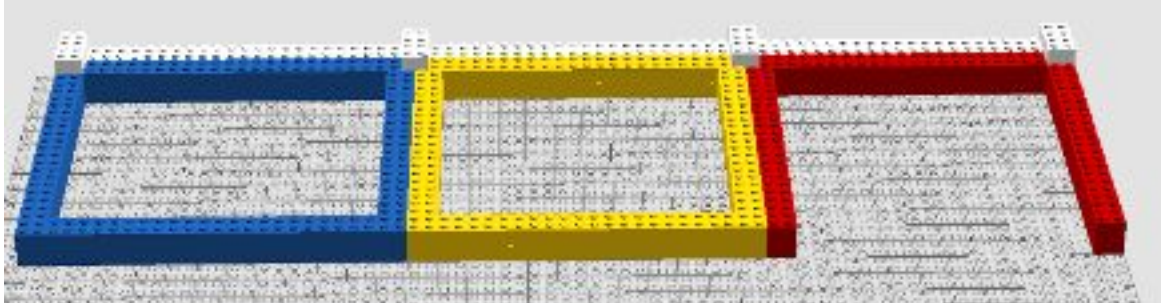
Electronic device

An old cell phone represents the electronic material. It is flat on the surface. The robot does not need to lift the device, it should push it in the right area.



Recycle bins

Recycle bins are made from LEGO walls. Cardboard and metal have to be lifted and placed into the bins (blue and yellow). Electronics bin (red) has no facing wall so the material can be pushed in the bin.



DESCRIPTION OF THE ROBOT

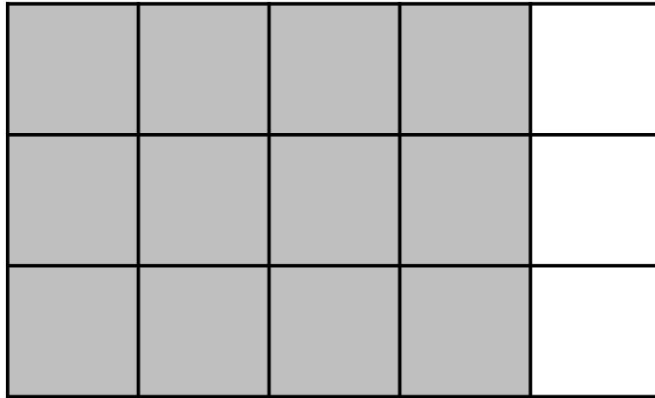
Your team may use any type of material, but the robot needs to meet the following criteria :

- Dimensions cannot not exceed **25 X 25 X 25 centimeters** at start. Once it leaves the starting area, the robot can deploy but not beyond 35 X 35 X 35 centimeters
- Integrated sensor modules cannot be used. Only individual sensors are allowed.
- Robot cannot use auto line detecting modules.

DESCRIPTION OF THE MISSION

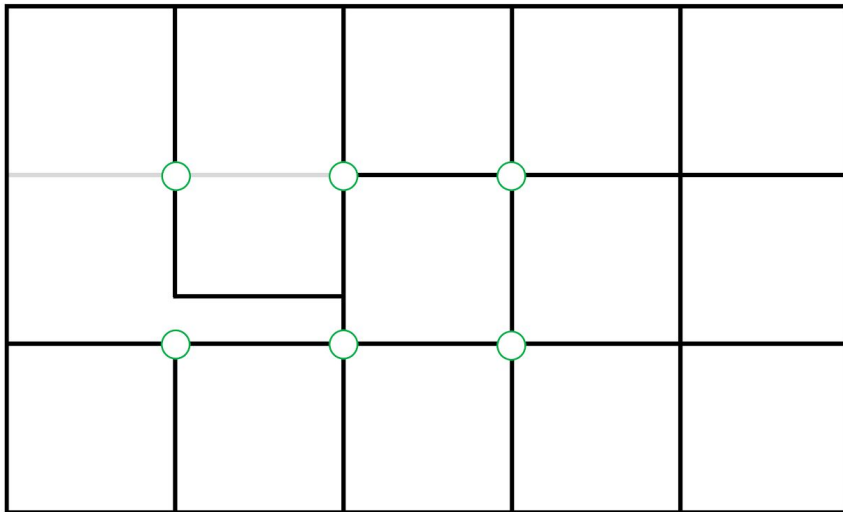
Starting area

The starting area will be randomly selected from one of the 12 grey squares, but will avoid the “L” shaped section. A sign will be marked on the selected square prior to the start.



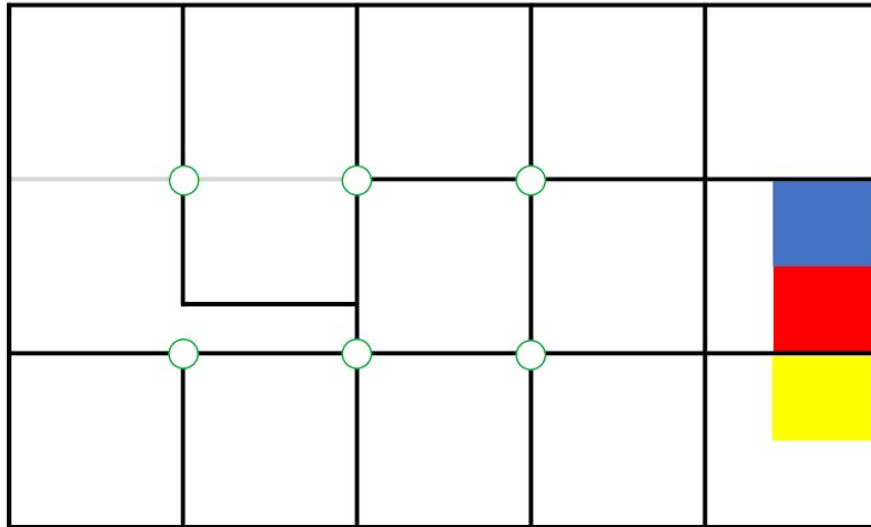
Route

Prior to the start, the location of the “L” section center will be randomly selected from points B2, B3, B4, C2, C3 or C4. After the location draw, referees will randomly place the “L” shape opening orientation towards up, down, left or right direction.



Location of the bins

Three types of bins are placed on the mat as follows. RED indicates electronics; YELLOW indicates metal and BLUE indicates cardboard.



Location of the material to recycle

Only 1 of the 3 objects (metal can) has a confirmed location, which is on the corner of the L-shape line. Other 2 types of material are randomly placed at any black line cross points.

PROCEDURE OF DRAWS

1. Location of "L" shaped section
2. "L" shape section opening orientation
3. Location of starting area
4. Location of each type of material

DETAILED DESCRIPTION

CHALLENGE STEP BY STEP
Judges proceed to the draw of the game elements, and announce the configuration for the competition day.
Teams have 1 hour to program and practice with the configuration.
The round begins. Each team comes to the competition table one after the other. The team places its robot in the starting area.
At the signal from the judge, the team starts the robot
The robot looks for each material, identifies its type and place it into the corresponding bin.
The robot returns to its starting area.

The round ends in the following scenarios :

- Robot has been touched by competitors after the start
- Maximum allowed time has been reached (2 minutes)
- Robot has stopped by itself completely or partly in the starting area

SCORING

Task	Max score
Robot moves material from their initial location (6 points)	18
Robot places material in its corresponding bin (20 points)	60
Robot completely returns inside the starting area (after earning points for material)	12
→ Robot partially returns inside the starting area (after earning points for material)	8
TOTAL	90

Final score is the best of two rounds.

“In the bin” means that the material touches the area inside the bin.

To earn points for returning inside the starting area, the robot needs to have stopped by itself.