

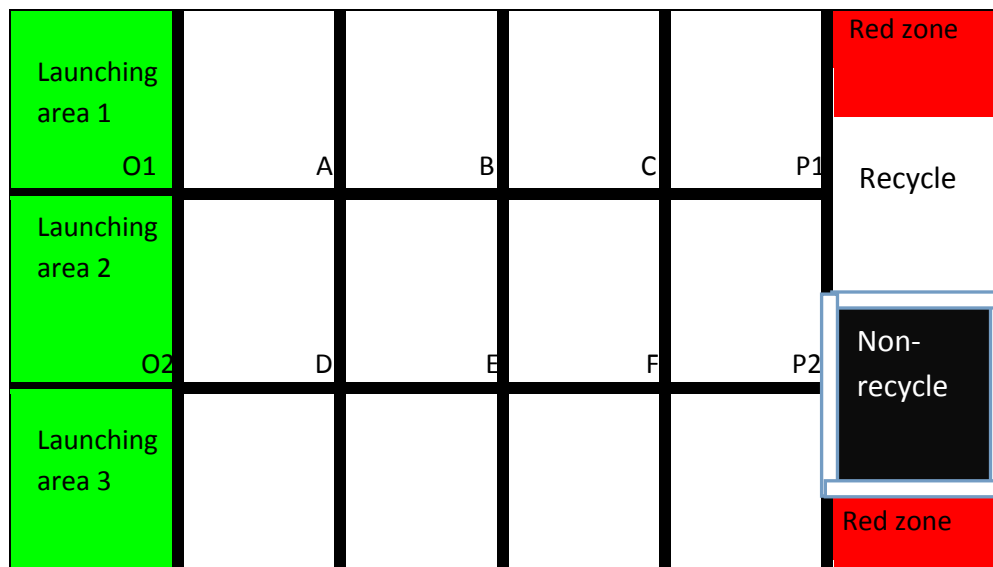
G-1

Smart Garbage Truck

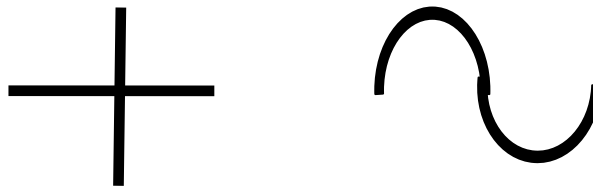
SCENE

In our daily life, garbage is everywhere. A empty beer can, banana peels, a piece of packing paper, are polluting our environment. A smart garbage truck will solve the problem for us. It will classify by the nature of the garbage. The truck will find and bury the organic ones and collect the recycles. As a result, we will have less contamination and renewable materials for our blue planet.

DESCRIPTION OF THE ARENA



- The surface is 180 cm in length and 120 cm in width.
- Each rectangular marked by the black line is 30 cm * 40 cm
- The black line is 15 mm in width
- There are 3 launching areas colored in green on the left side of the surface
- Recycle bin and Non-recycle bin locate on the right side of the surface



ROUTE TYPE 1 AND 2



GARBAGE: RECYCLE (left), NON RECYCLE (right)

- There are two types of route, straight lines and curves.
- Recycle garbage is represented by a white soda can whereas the non-recycle garbage is represented by a black soda can

DESCRIPTION OF THE ROBOT

Students can use any types of materials, but the robot need to meet the following criterions:

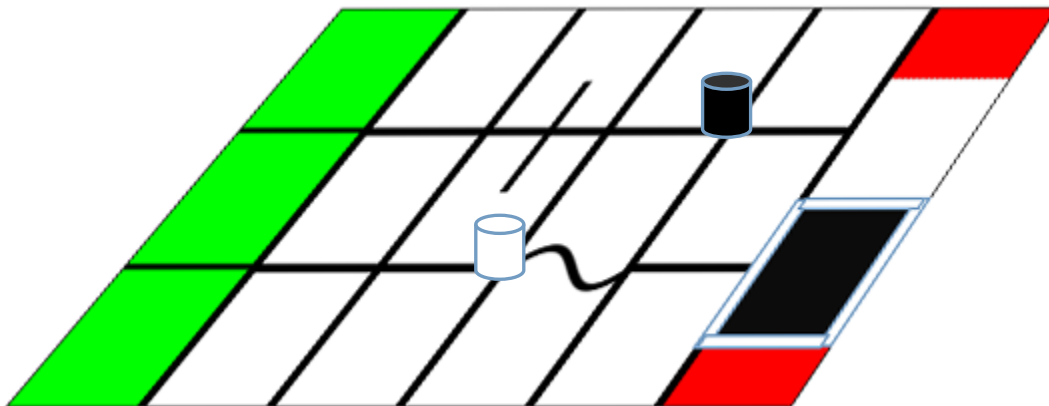
- Length * Width*Height must not exceed 25 cm * 25 cm * 25 cm
- Integrated sensor modulus cannot be used. Only individual sensors are allowed
- Programming need to be done on the spot before each round during the competition
- Robot cannot use auto line detecting modulus.

DESCRIPTION OF THE MISSION

- Robot need to follow the black line and find the garbage, identify the garbage and put the garbage to the corresponding bin.
- After put the garbage to the corresponding bins, robot need to return to its launching area.

DETAILED DESCRIPTION OF THE CHALLENGE

- Garbage will be randomly placed at point B, C, E or F by a referee prior to the beginning of the match.
- Two sections of the black lines among section AB, BC, DE and EF will be randomly replaced by the route type 1 and 2 (one type each) prior to the beginning of the match.



- Students have 2 hours and 30 minutes in total to build, program and practise.
- After launch, robots need to detect the black line as soon as possible.
- Time: 150 seconds maximum: total time used will be recorded for the situation of that two students have the same score. The one who uses less time will be the winner.
- two rounds
- The round ends in the following scenarios
 - Robot has been touched by student after launching
 - Robot is not following the black line after detected the black line
 - Exceeded the maximum time allowed

Challenge Step by Step
Randomly replaces two sections of black line using type 1 route once and type 2 route once
Randomly places garbage cans
Draw for launching area 1, 2 or 3
2h 30m: build, program and practise
Launch the robot
Robot is detecting black lines
Robot follows the black line and searching for garbage
Robot find the first garbage, identify its type and put it to the correspondent bin
Robot continues searching for the second garbage
Second garbage has been found. Robot put it to the correspondent bin
Robot returns to its launching area
Mission accomplished

Scoring	
	points
Structure design	max 10
Successful launching of the robot	10
Robot follows black line and cross the first cross section	20
Robot follows route type 1 or 2 (it is not necessary to follow both route types, but it's required to follow at least one route type during the challenge)	10
Robot picks up garbage	10 each
Robot put the garbage to a bin	10 each
Robot put the garbage to the correspondent bin	20 each
The garbage (can) is standing up in the bin	20 each
Robot returns to its launching area by following the black line (robot or its projection cannot touch the green launching area while returning)	15
Robot's part(s) left in the arena after each round	-5 each (max:-15)

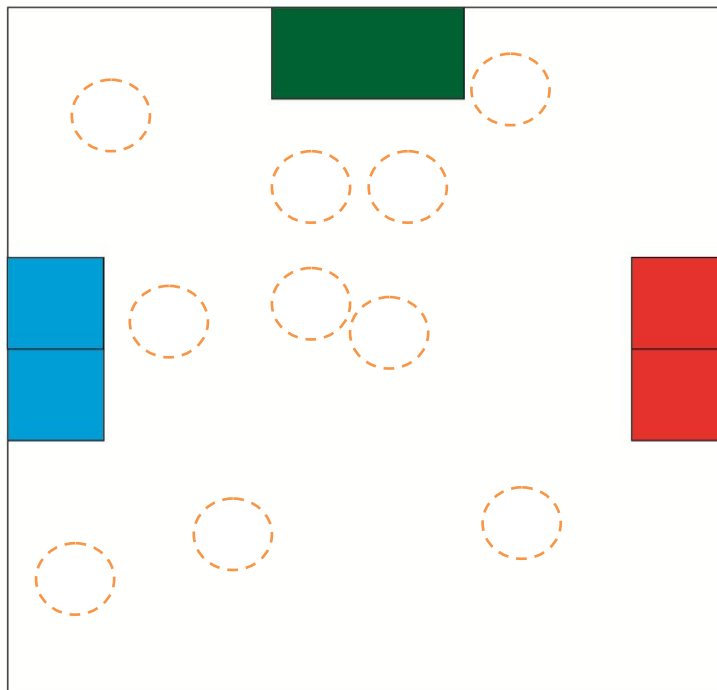
CATEGORY 2:

Troublemaker VS Cleaners

SCENE

A naughty boy is the troublemaker. He is playing beside apartment garbage bins. He wants to make fun and troubles of the cleaner by knocking over those garbage bins. Garbage is scattered everywhere. Now, the cleaner will have to collect the garbage back to the place, but he has very limited time because the garbage truck is coming closer.

DESCRIPTION OF THE ARENA



1、 The surface is 300 cm × 300 cm, or 12ft × 12ft. The area is fenced with board of 20 cm in height.

2: There are 4 zones in the arena. Each zone is marked by a different color.

- Green zone: 40cm ×80cm, is the garbage collection area. Cleaners need to move the

scattered garbage back to the green zone

- Red zone: 40cm ×80cm, is the launching area 1
- Blue zone: 40cm ×80cm, is the launching area 2
- White zone: 10 balloons will be placed randomly in this area by referees prior to each round.

DESCRIPTION OF THE MISSION

- The garbage bin is represented by 10 balloons. Each balloon contains 5 pieces of garbage which are represented by 2 by 2 pin LEGO bricks.
- The trouble maker needs to drive his robot and try to puncture all balloons. Meanwhile, the cleaner need to move the scattered garbage to the green zone.
- Two robots per team. One robot will be the troublemaker while another robot plays the role of the cleaner. The troublemaker will attempt to scatter more garbage for the cleaner from the other team. In the next round, team members of the same team switches roles.

DESCRIPTION OF THE ROBOT

One can use any types of robotics kit, but the robot must match the following criteria:

- Length * Width*Height must not exceed 40 cm * 40 cm * 40 cm
- No more than 4 motors in each robot
- Robots must be remote control, but allowed for autonomous parts for popping balloons or collecting garbage.
- Spike(s) (for popping balloons) cannot exceed the length of 2.5cm. The length of a spike is the length of a spike extending out of its holding device.

DETAILED DESCRIPTION OF THE CHALLENGE

- Prior to the start, team A's troublemaker and Team B's cleaner draw for the starting area: red zone or blue zone.
- Each round is 300 seconds for the troublemaker and 300 seconds for the cleaner. For the troublemaker, the clock will start once he leaves from the launching area. For the cleaner, he can leave the launching area once the troublemaker pops the first balloon, and his clock will start simultaneously.

- Physical contact is not allowed.
- The trouble maker needs to go back to his launching area once his time is up or he has popped all the balloons.
- The troublemaker's clock will be paused only in the following scenario:
 - The robot is tipped over or stops working by physical contact initiated by the cleaner.
- The cleaner's clock will be paused in the following scenario:
 - All the scattered garbage has been pushed to the green zone while the troublemaker is trying to pop the next balloon. The cleaner's clock will resume timing once the troublemaker pops a new balloon.
 - The robot is tipped over or stops working by physical contact initiated by the troublemaker
- The cleaner robot and troublemaker robot are allowed to be touched or moved for repairing by the correspondent player under the circumstances of the robot is tipped over or stops working by physical contact initiated by the opponent only.
- Two rounds with same opponent

Challenge step by step	
Troublemaker	Cleaner
Draw for launching area (Red or Blue)	
leaving the launching area, clock starts timing	waiting for the troublemaker to pop the first balloon
Has popped the first balloon, trying to pop the next	leaving the launching area, start cleaning; clock starts timing
popping balloons	cleaning the garbage by moving them to the green zone
popping balloons	All garbage in the arena has been moved to the green zone. cleaner is in idle mode. Cleaner's clock paused.*
has popped another balloons, new garbage released.	start cleaning again, cleaner's clock resumes timing
300 seconds is up or finishes popping all the balloons, the troublemaker is back to the launching area	continue cleaning

	time is up or finishing cleaning all the garbage left in the arena, cleaner is back to the launching area
counts number of garbage released	counts number of garbage left in the arena

*In the scenario of robot stop working or tipped over caused by opponent, one is allowed to repair or reposition by hands until the robot resume functional. Meanwhile, the clock will be paused.

SCORING

Troublemaker	
Scoring	
	Points
Successful release 1 piece of garbage inside the arena. If the garbage fly out of the arena, points won't be counted	2
Penalty	
Hit opponent intentionally	-10
Touch any robot during the game	-10
Cleaner	
Initial points:	100
Penalty	
Left 1 piece of garbage inside the arena when time is finished	-2
Hit opponent intentionally	-10
Touch any robot during the game or hit opponent intentionally	-10
Total score of each team	
Team score = troublemaker + cleaner	