

· 2019 ·

MAKEX

MakeX Robotics Competition

City Guardian

European Open 2019. - tasks



M01. Energy-saving Switch

Mission background:

The low-energy alarm is ringing in the city and robots need to switch on the energy-saving switch to reduce energy consumption.

Mission requirements:

The robot needs to move the yellow block A to the same area as yellow block B which means switch on the energy-saving switch. The team scores 60 points for successful moving, the full point is 60.

Scoring details:

The vertical projection of yellow block A in stationary state needs to be Completely In the same parallel area as yellow block B and stay for at least two seconds. If yellow block A is Partially In or Completely Out the area, this mission will not be scored.

The vertical projection of yellow block A and block B in stationary state needs to contact the white guideline to score points.

The vertical projection of yellow block B in stationary state need to be Completely in the initial position, otherwise the mission will not be scored.

The initial position of yellow block B will be determined randomly before each Single Match starts.

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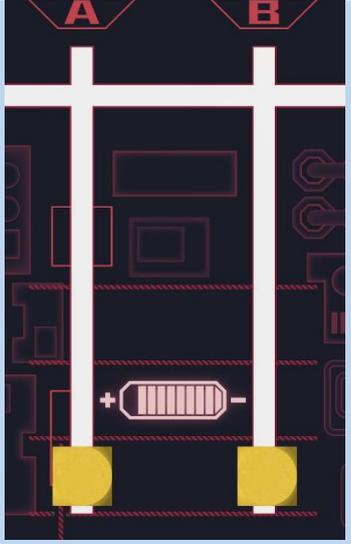
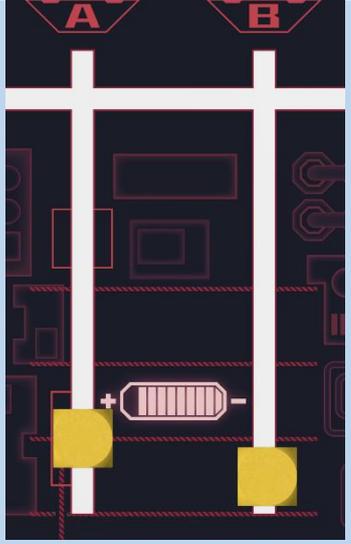
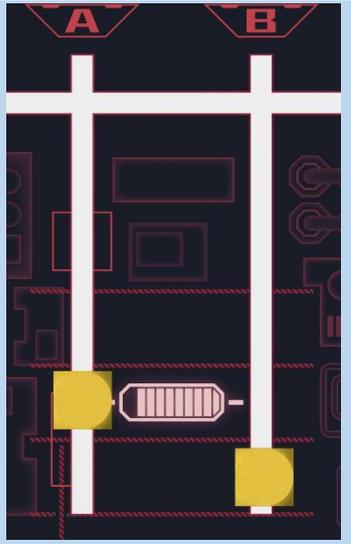
Status	Completely In	Partially In	Completely out
Figure			
Score or not	✓	✗	✗

Table 3.1 Scoring Details for Energy-saving Switch

MAKE X

M03. Aging Power Plant

Mission background:

There is an aging power plant with 3 generators in the city. Robots need to dismantle all 3 generators.

Mission requirements:

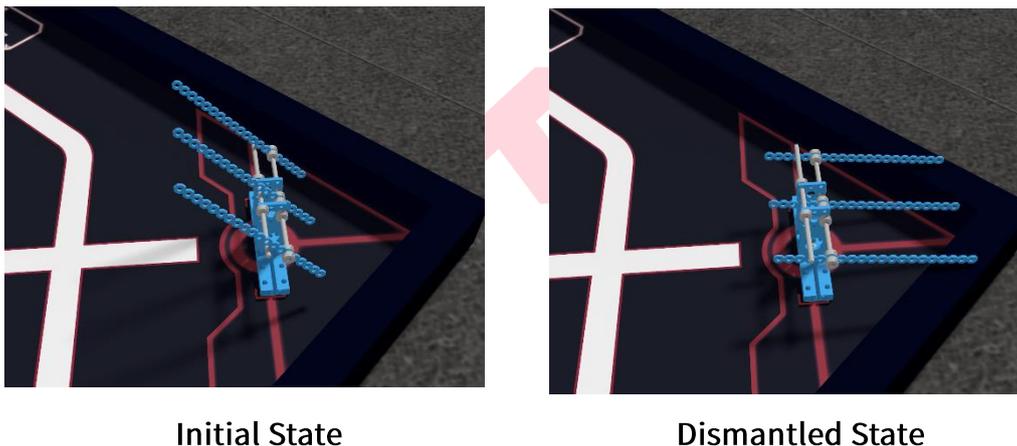
The robot needs to move the 3 generators to another direction representing successfully dismantling of the power plant. The team scores 20 points for each successful generator dismantling, the full point is 60.

Scoring details:

As long as each of the 3 generator reaches the dismantled state, it can be scored.

Scoring for the same generator will not be repeated.

If any object (except the table) traps the movement of any generator to the dismantled state, the mission is not fully completed, and no point will be scored for the trapped generator.



Initial State

Dismantled State

Fig 3.8 State of Aging Power Plant

M06. Obstacle Removal

Mission background:

After the rainstorm, an obstacle is on the road and affects urban traffic and normal life.

Mission requirements:

The robots need to move the obstacle away from the road. The team scores 50 points for successful moving, the full point is 50.

Scoring details:

If the vertical projection of the obstacle in Stationary State is Completely Out of the initial circle and stay for at least 2 seconds, the mission can be scored.

If the vertical projection of the obstacle in Stationary State is Partially In the initial circle, the mission cannot be scored.

Inclination or fall over of the obstacle does not affect the scoring.



Fig 3.12 Obstacle on Road

Status	Completely In	Partially In	Completely out
Figure			
Score or not			

Table 3.2 Scoring Details for Obstacle Removal (Direction of Removal is just for reference)

Automatic Alliance Missions

The robot needs to execute automatic programs and cooperate with their alliance team to complete these missions. After completing the missions, the team will score the Alliance Mission Points.

M07. Waste Sorting

Mission background:

There are 3 construction wastes in the city center. Robots need to classify and dispose these construction wastes.

Mission requirements:

The robot needs to distinguish the construction waste type by recognizing the correspondent color cards (red or blue). Then, robot needs to move the construction waste to the corresponding (red or blue) treatment areas according to the waste categories (red or blue) To identify the treatment areas, please refer to Fig 3.13. The alliance teams score 20 points for each successful sorting of construction waste, the full point is 60.

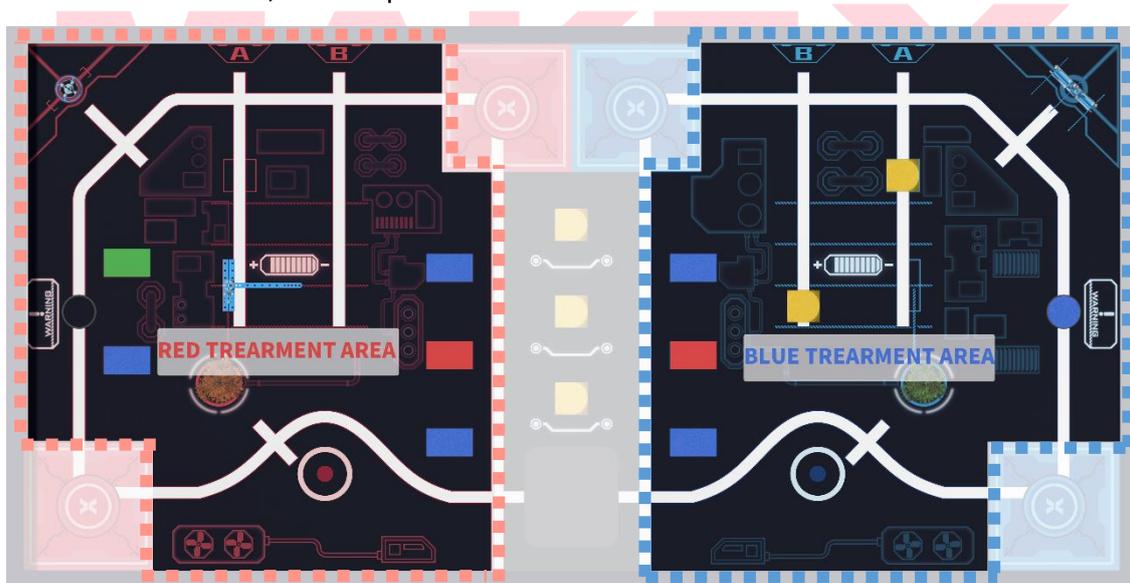


Fig 3.13 Details of Waste Treatment Area

Scoring details:

The red card represents that the corresponding construction waste needs to be processed at red treatment area. The blue card represents that the corresponding construction waste needs to be processed at blue treatment area.

The order of color cards will be determined randomly before a Single Match started.

The color cards will be pasted on the map.

If the vertical projection of the waste in stationary state is Completely In the correct treatment area and stays at least 2 seconds, the waste can be scored.

If the vertical projection of the waste in stationary state is Partially In or Completely In the Starting Area, the waste cannot be scored.

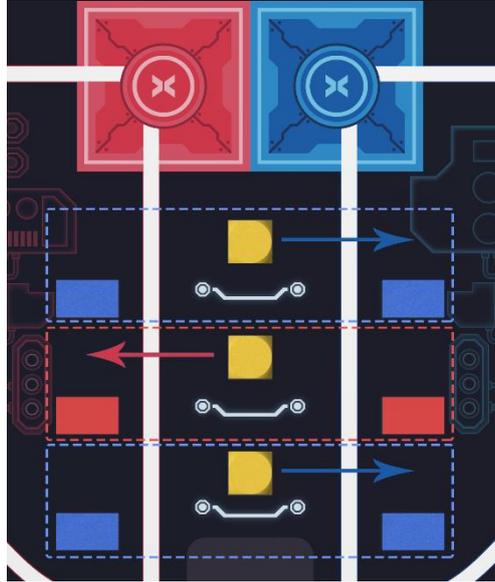


Fig 3.14 Correspondence between Color Card and Construction Waste

Status	Completely In	Partially In	Completely out
Figure			
Score or not	✓	✗	✗

Table 3.3 Scoring Details for Waste Sorting

M09. City Party

Mission background:

After hard working, the robots return to their base and hold a big party.

Mission requirements:

First, the robots from alliance team return to their own stage area. After that, one robot starts to play music, and the other robot starts to dance (repeated swing, rotation or forward-backward). The action of two robots must last for at least three seconds. The team scores 10 points for a successful party, the full point is 10.

Scoring details:

Only by returning from the non-starting area to the stage area, the robots can perform the party action. Robots Starting and performing directly in the Stage Area will not score.

After the vertical projection of the robot chassis is Partially In the stage area, the robot can perform the party action.

When the above scoring details are met, the referee will start timing when the two robots start party action together.



Fig 3.16 Stage Area

Manual Alliance Mission

The contestants need to manually control their robots in this stage and cooperate with the alliance team to complete this mission. After completing the mission, the team will score the Alliance Mission Points.

M10. Garbage Recycling

Mission background:

Garbage recycling plants at the city center are in trouble. The piled garbage in the city center need to be sorted and moved to the correct garbage stations. Robots from the alliance team need to work together to recycle garbage.

Mission requirements:

Robots from the alliance team need to move the circular garbage on the arena to the designated garbage station A. The alliance teams score 5 points for each successful placing of the circular garbage.

Robots from the alliance team need to move the spherical garbage on the arena to the designated garbage station B. The alliance teams score 5 points for each successful placing of the spherical garbage.

During the competition, the alliance teams' observer can stack the garbage which has been moved into station by robots to score extra points. The observer needs to take the spherical garbage from station B to station A and stack the garbages (shown in Fig 3.18) to save the space of the garbage station. The alliance scores extra 5 points for each successful garbage stack in station A.

Full point for this mission is 100.

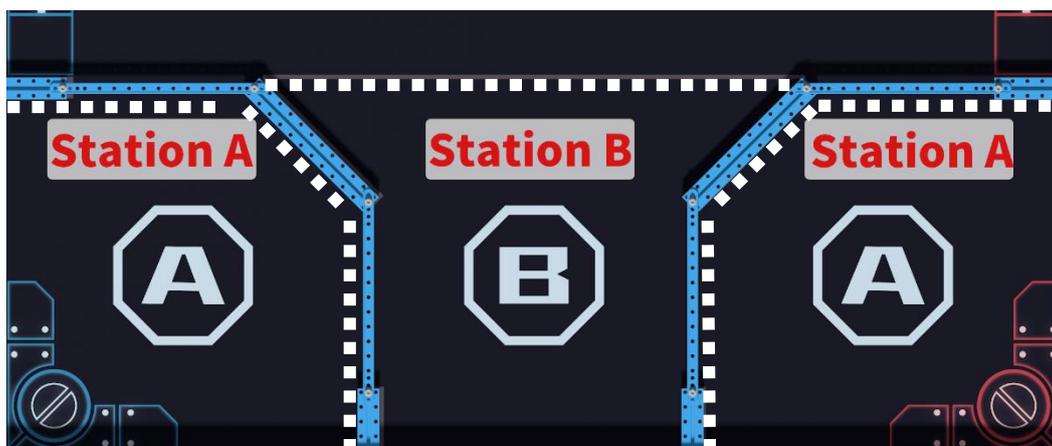


Fig 3.17 Garbage Stations (A&B)

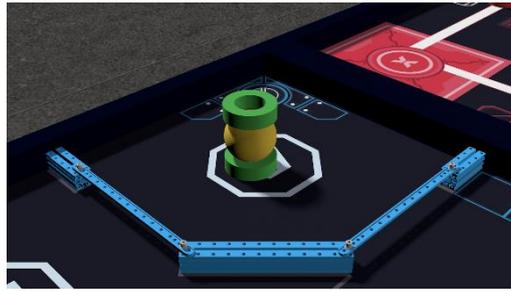


Fig 3.18 Garbage Stack (Color of garbage will not affect score)

Scoring details:

After the end of Manual Stage, the alliance can score if the garbage or garbage stack is Completely In the correct garbage station.

During the Manual Stage, the observer must only stack garbage inside the garbage station area A (shown in Fig 3.17). If the observer is against this detail, the team will receive a Violation with 20 points deduction.

During the stacking operation, the observer must not touch a prop that has contact with the robot. If the observer is against this detail the team will receive a Violation with 20 points deduction, but the prop can be scored for further operation.

During the stacking operation, the observer must not direct or indirect touch the garbage that is not Completely In garbage station. If the observer is against this detail, the team will receive a Violation with 20 points deduction, but the prop can be scored for further operation.

During the Manual Stage, if a garbage is moved Completely In a wrong garbage station by a robot, the robot operator will receive a Violation with 20 points deduction. The correspondent garbage can be scored if either Observer or robot moves it Completely In the correct garbage station, but the previous Violation will be kept.

During the manual stage, if the Observer takes the spherical garbage (moved Completely In station by robot) from Station B to Station A and makes a stack, the spherical garbage can be scored for either sorting process and stacking process. If the observer does not make a stack, the spherical garbage in Station A cannot be scored.

During the manual stage, if observer takes the circular garbage (moved Completely In station by robot) from Station A to Station B, the circular garbage cannot be scored.

Score for this mission = Sorting points for spherical & circular garbage + Stacking points. Violation deduction will be calculated in Single Match Points (Section 3.4).

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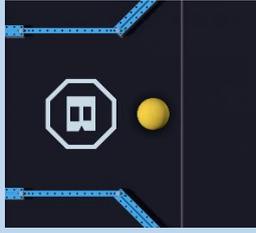
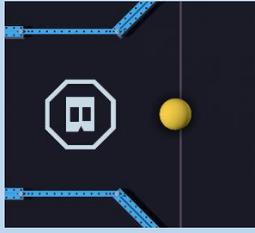
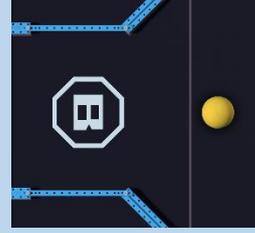
Status	Completely In	Partially In	Completely out
Figure			
score or not	✓	✗	✗

Table 3.6 Scoring Details for Spherical Garbage Recycling

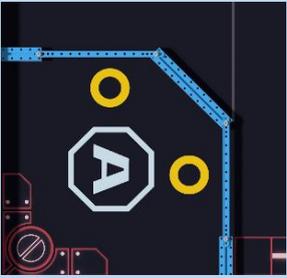
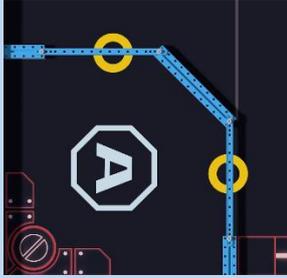
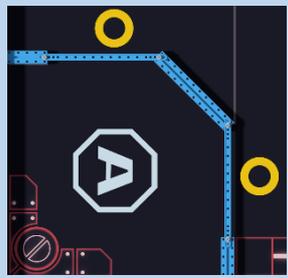
Status	Completely In	Partially In	Completely out
Figure			
Score or not	✓	✗	✗

Table 3.7 Scoring Details for Circular Garbage Recycling