

**MAKE X**

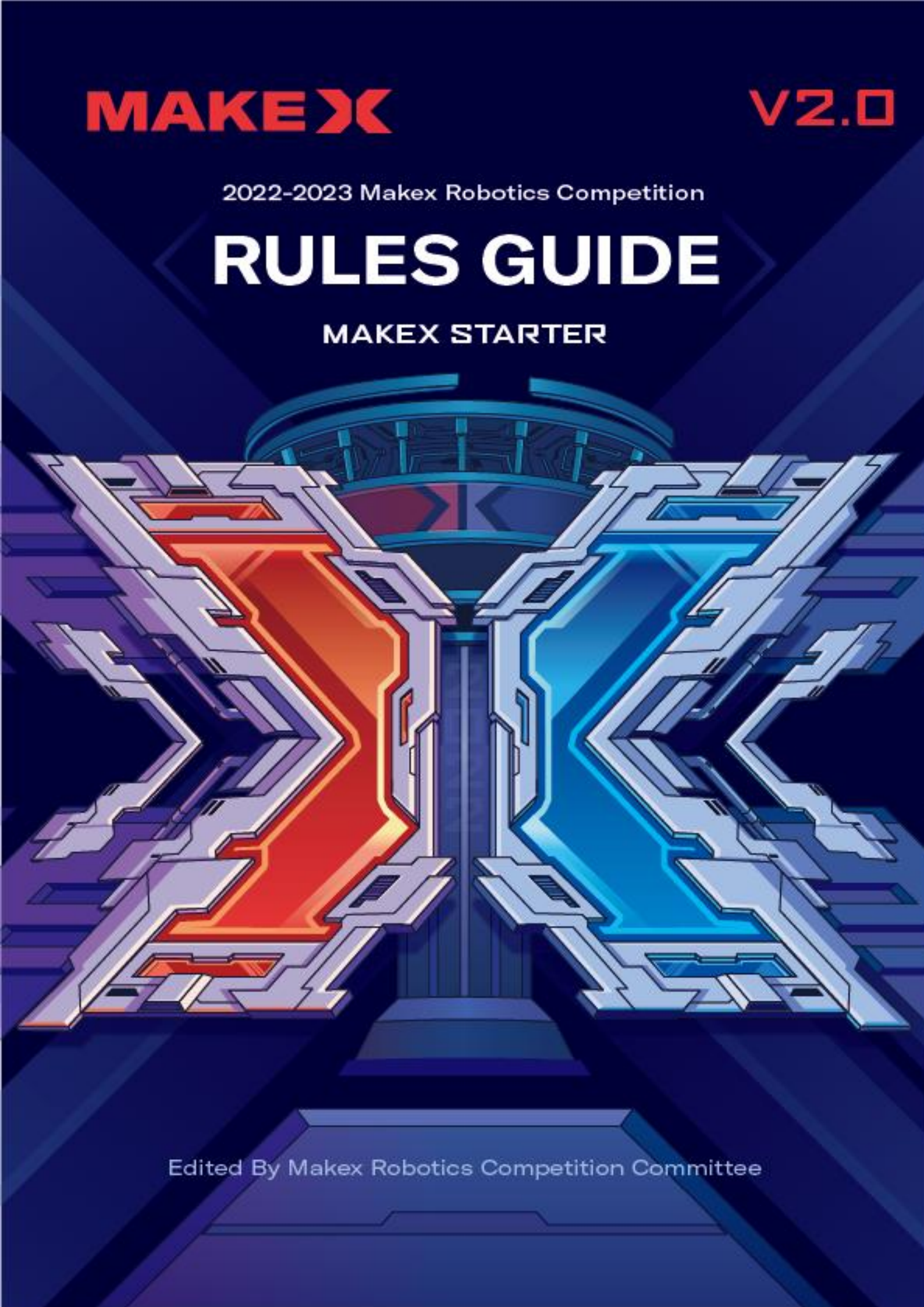
**V2.0**

2022-2023 Makex Robotics Competition

# **RULES GUIDE**

**MAKEX STARTER**

Edited By Makex Robotics Competition Committee





### Updates:

Date	Version	Modifications Record
2021.09	1.0	MakeX Starter Zero Carbon Rules Guide First Publish.
2023.01	2.0	2022-2023 MakeX Starter Zero Carbon Rules Guide Publish <ul style="list-style-type: none"><li>● 4.4 Missions Introduction and Scoring State Judgement</li><li>● 5.1 Robot General Requirement</li><li>● 6 Rules of Competition</li></ul>

# MAKE X



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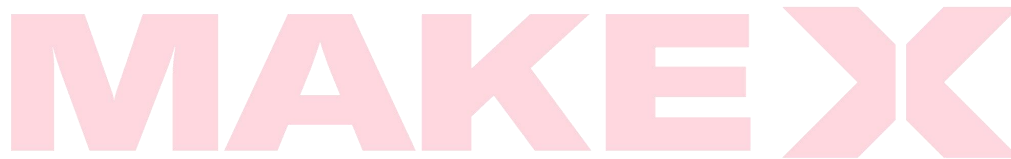
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# 1. Introduction

## 1.1 About MakeX

MakeX is an international robotics competition and education platform that promotes multidisciplinary learning within the fields of science and technology. It aims at building a world where STEAM education is highly appreciated and where young people are passionate about innovation by engaging them in exciting Robotics Competition, STEAM Carnival, Tech Event, Educational Conference etc.

As the core activity of MakeX, the namesake MakeX Robotics Competition provides exciting, challenging and high-level competitions in the spirit of creativity, teamwork, fun and sharing. It is committed to inspiring young people to learn Science (S), Technology (T), Engineering (E), Art (A) and Mathematics (M) and apply such knowledge in solving real-world problems.

## 1.2 MakeX Spirit

**Creativity:** we advocate curiousness and innovation, encouraging all contestants to create unique high-tech works with their talent, and challenge themselves for continuous progress!

**Teamwork:** we advocate solidarity and friendship, encouraging all contestants to develop a sense of responsibility and enterprising spirit, and sincerely working with their partners for win-win development !

**Fun:** we encourage contestants to build a positive, healthy mindset in the competition. Enjoy the journey and grow in the process.

**Sharing:** we encourage contestants to have an open mind as a maker and share their knowledge, responsibility, and joy with everyone, including their teammates and competitors.

MakeX spirit is the cultural cornerstone of the MakeX Robotics Competition. We hope to provide a platform for all contestants, mentors and industry experts to exchange ideas, study and grow up, and help young people acquire new skills during creation, learn to respect others in teamwork, gain an enjoyable life experience in



the competition, take delight in sharing with the society their knowledge and responsibility, and work hard to achieve their grand aspiration of changing the world and creating the future !

### 1.3 About MakeX Starter

MakeX Starter is a multi-mission competition program for teenagers aged from 6-13. The competition integrates the automatic stage and the manual stage, which greatly enhances fun and participation experience of the competition. The concept of multiple missions and the alliance cooperation design fully exercises the abilities of critical thinking and strategic planning of contestants, as well as improve the ability of communication and cooperation between alliance teams.

# MAKE X



## 2. Competition Application

### 2.1 Participation Requirements

**Participants:** The number of contestants is 1-2 for each team, with 1-2 mentor(s).

**Age:** Team members must be teenagers or children between the age of 6-13 (born between January 2, 2009 and December 31, 2017), the mentor must be at least 18 years old.

**Team Roles:** Everyone in the team can play their respective roles as operator, observer. The operator is responsible for operating the robot, and the observer is responsible for assisting the operator to complete the game.

**Identification Symbols:** Each team must have a team logo, team name, and team slogan. Teams are encouraged to use uniforms, flags, posters, badges, base decorations, etc. to show the team culture.

### 2.2 Registration and Application

Contestants and mentors that meet participation requirements can register on the designated competition web-page on MakeX official website ([www.makex.cc/en](http://www.makex.cc/en)). Each team should register with one registration form.

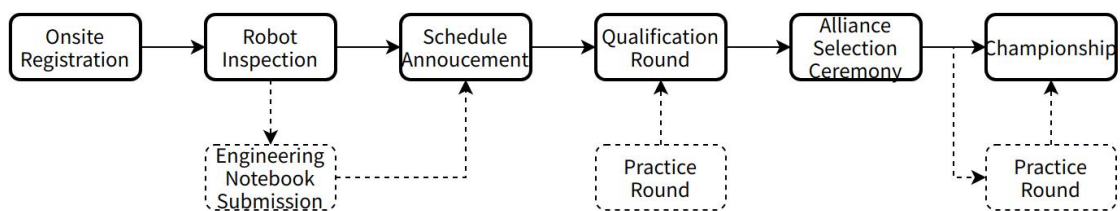
If participating team wants to change their members before competition, which leads to inconsistency with the registration information, they should inform MakeX Robotics Competition Committee in advance to finish re-registration.

For more details about the registration and application, please refer to [MakeX Registration & Competition Application Guide](#)

## 3. Competition Procedure

Participating teams shall pay close attention to related notices and Competition Guide published before each competition. If the rules have some updates in competition guide, the latest rules will be adopted for the competition. MakeX Competition Committee reserves the rights and final interpretation to amend competition rules and system based on actual situation of different competition.

The schedule for each competition is determined by actual situation, and generally includes following procedures.



\* Note: The solid line frame refers to necessary procedure of each match, while the dotted line frame refers to non-essential procedure. Please keep abreast of updates.

### Onsite Registration

When a team arrives at the venue, mentors and contestants should show ID cards or other valid certificates (e.g., passport) for onsite registration and to get the competition pack. It is necessary for mentors to inform team members about the fire exit, match schedule, arena, pits area, etc. Onsite registration and robot inspection will be closure once the match schedule is announced.

### Robot Inspection

The inspectors will strictly check the safety of robots on request. Teams can pre-check their robots in advance based on "**Appendix 3 MakeX Starter Robot Self-Check Form**". The robot and self-customized Team's Marker will be inspected before competition. If the inspection fails, the team needs to adjust their robots and check again until they pass the inspection. Those who fail to pass the inspection are not qualified for the competition.



## Schedule Announcement

The committee will announce the match schedule at least 30 minutes ahead of competition through online official website and onsite announcement. The schedule includes match-up chart, match session and specific time, red alliance and blue alliance, etc.

## Engineering Notebook Submission

MakeX Robotics Competition Committee encourages teams to write engineering notes, and excellent notebooks will be an important basis for team's award evaluation. The submission of paper engineering notebook and award setting based on pre-match notice and Competition Guide. Please refer to **Appendix 2 Engineering Notebook Guideline**.

## Practice Round

Teams who have finished their robot inspection can participate in practice round. The schedule will be announced at the entrance in form of notices, and teams are required to queue in line before entrance. Not all competitions have a practice round, which can be informed based on actual situation.

## Qualification Round

Normally, each team will participate in 4 matches during Qualification Round in a regular competition, during which alliances teammate will be allocated randomly. The number of qualification matches for teams to participate in may vary between different competitions, which is decided by the MakeX Committee according to the practical situation.

Teams will be ranked according to the total competition score of all single matches during Qualification Round.

If the total competition score of all single matches is the same in Qualification Round, teams with shorter total competition time of all single matches rank higher.

If the above conditions are all the same, two teams who rank the same will have an additional match (only for the automatic independent missions), until the winner is decided.

## Promotion proportion for each competition



In the 2022-2023 season, the promotion proportion for each competition is 50%. Take down even teams to advance.

Example: the actual participating teams are 129,  $129 \div 2 = 64.5$ , then take an even number of teams down and promote to 66 teams.

### **Alliance Selection Ceremony**

In alliance selection ceremony, promoted teams will select their alliance team in turn according to their ranking in qualification round. During this procedure, teams must abide by following rules:

When being chosen by other teams, promoted teams ranking top 50% can refuse for only once, and those teams ranking bottom 50% cannot refuse. If the team is refused by another team, they can continue to choose another team until the alliance is formed.

The promoted teams who are not present before the start of alliance selection are deemed as voluntarily giving up the right to choose alliance, and those who are not present before the end of the alliance selection are considered to be as voluntarily quitting the championship round. If the promoted teams quit amid the alliance selection ceremony, the promotion places will be given to the following teams according to the ranking in the qualification round.

### **Championship Round**

Normally, each alliance will participate in 1 match during Championship Round in a regular competition. The number of championship matches may be increased or decreased depending on the actual situation of different competition. Red and blue teams will be chosen by alliance teams. The alliance teams will be ranked according to the following rules.

1. The alliance with the higher score of the single match will rank higher.
2. If the score of the match is equal, the alliance with the shorter completion time ranks higher.
3. If the above conditions are the same, the alliance with the same ranking will complete an extra match (finish all the missions) until the winner is decided.

## 4.Competition Details

The theme of the 2022-2023 MakeX Starter is “Zero Carbon”.

Since the 18th century, the use of fossil fuels has brought a lot of convenience to people's life. However, the consumption of energy causes lots of global climate issues. Nowadays, more and more countries have participated in the response to global warming, and have put forward the goals and policies of the net zero-carbon plan, to join "Race to Net Zero" and achieve "carbon neutrality". For the common home of humanity, we will foster changes from the cities where we live together day and night, and zero-carbon cities are our answer to global warming.

### 4.1 Introduction

MakeX Starter is a multi-mission-based competition and requires blue and red teams forming an alliance to participate.

The competition lasts 4 minutes and is divided into automatic stage and manual stage. The teams in alliance can decide the time for each stage. Automatic missions must be finished in automatic stage and manual missions must be finished in manual stage, after switching from automatic stage to manual stage. The referee calculates the scoring for each stage according to the status of props at scoring period.



Fig4.1 Competition Arena Isometric View

## 4.2 Arena

MakeX Starter Arena consists of map and frame. Internal size of frame is 2317mm\*2317mm, external size of frame is 2347mm\*2347mm.

Map has two parts, Automatic Mission Area and Manual Mission Area, with sizes of 1151mm\*2317mm each. Starting area, marking area, recycling area, manual loading area and resource area are located on the map.

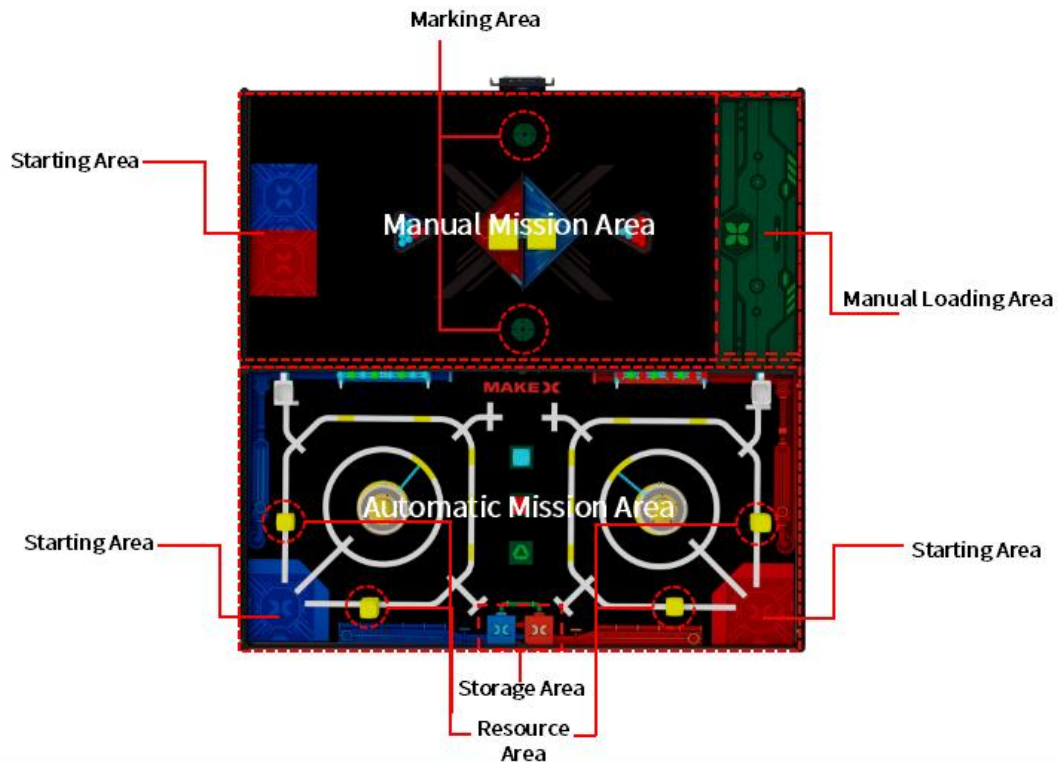
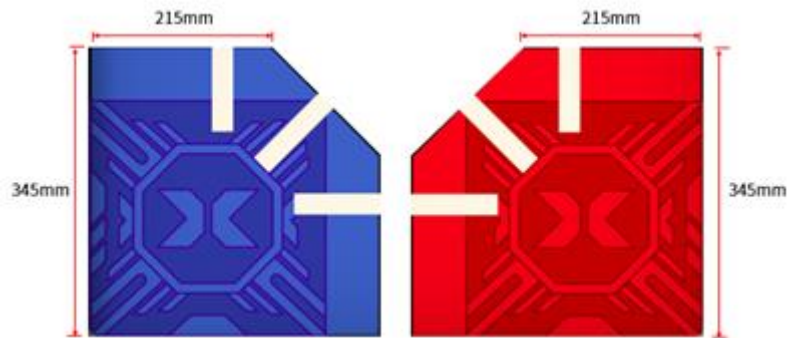


Fig 4.2-1 Areas on the Competition Arena

Areas in Detail:

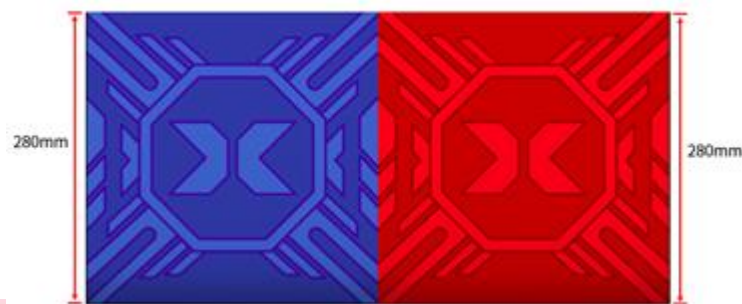
### Starting Area

Each alliance has one red and one blue starting area in automatic mission area. The shape of starting area in automatic mission area is irregular pentagon. Size of starting area is shown in fig 4.2-2



**Fig 4.2-2 Starting area in Automatic Mission Area**

Each alliance has one red and blue starting area in manual mission area. The shape is regular square with 280mm length. Size of starting area is shown in fig 4.2-3



**Fig 4.2-3 Starting area in Manual Mission Area**

**Manual Loading Area**

Green area shown below is Manual Loading Area.

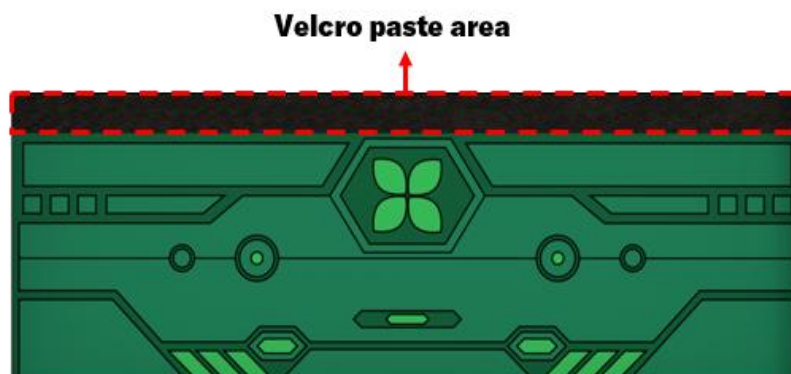
Size: 1151mm\*345mm

Location: On one side of the Manual Mission Area

Amount: 1

A slide of Velcro is pasted on the red dashed area in following figure.

Dimension: 1151mm (length) \*20mm (width) \*3mm (thickness)



**Fig 4.2-4 Manual Loading Area**



### Marking Area

Two circle shape areas shown in following Fig 4.2-5 are Marking Areas.

Size: Diameter 100mm Circle

Location: On both side of the Manual Mission Area's middle line

Amount: 1 for each red and blue teams

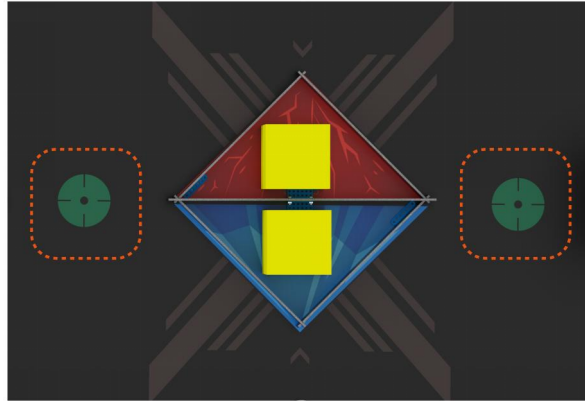


Fig. 4.2-5 Marking Area

### Recycling Area

Green square areas shown in Fig 4.2-6 are Recycling Area.

Size: 100mm\*100mm

Location: At the center of Automatic Mission Area

Amount: 3



Fig 4.2-6 Recycling Area

### Resource Area

Square areas with dash line are Resource Areas.

Size: 70mm\*70mm

Location: At both red and blue Independent Mission Area.

Amount: 2 for each red and blue teams.

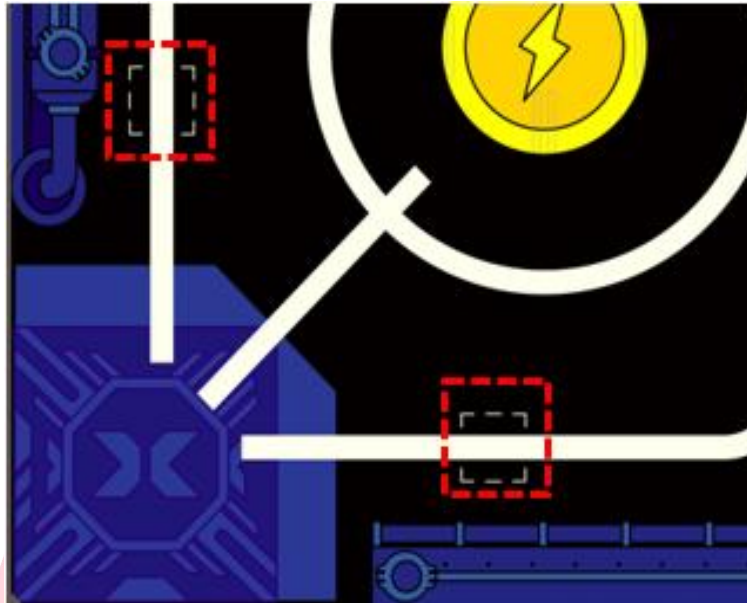


Fig 4.2-7 Resource Area

### Storage Area

The storage area are the places to place Renewable Resource Cube.

Size: 120mm\*120mm

Location: At the middle of Automatic Mission Area and close to the frame.

Amount: 1 for each red and blue teams.



Fig 4.2-8 Storage Area



### 4.3 List of Props

**Name:** Renewable Resource Cube

**Introduction:** 70mm Cube with round corner

**Size:** 70mm length

**Color and Material:** Yellow, EVA



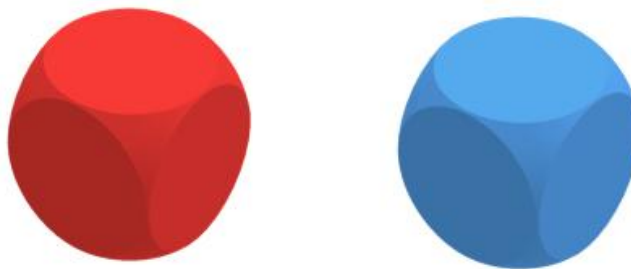
**Fig 4.3-1 Renewable Resource**

**Name:** Automatic Irrigation Device

**Introduction:** 70mm Cube with round corner

**Size:** 70mm length

**Color and Material:** Red and Blue, EVA



**Fig 4.3-2 Automatic Irrigation Device**

**Name:** Drought Tolerant Sapling, Cold Tolerant Sapling, Evergreen Sapling

**Introduction:** 32mm Diameter Sphere

**Size:** 32mm Diameter

**Color and Material:** Red - Drought Tolerant Sapling, Blue - Cold Tolerant Sapling,  
Green - Evergreen Sapling, EVA





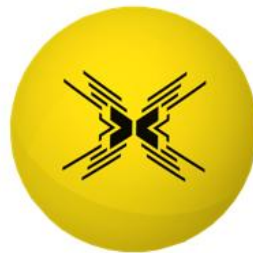
**Fig 4.3-3 Drought Tolerant Sapling, Cold Tolerant Sapling, Evergreen Sapling**

**Name:** Energy Storage

**Introduction:** 90mm Diameter Sphere

**Size:** 90mm Diameter

**Color and Material:** Yellow, PU



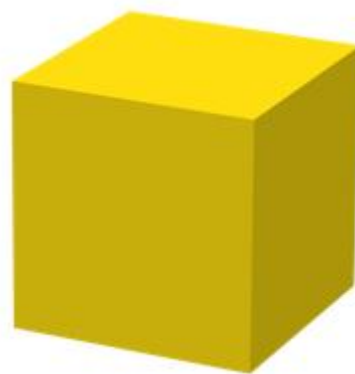
**Fig 4.3-4 Energy Storage**

**Name:** Manufacturing Station

**Introduction:** 120mm Length Cube

**Size:** 120mm Length

**Color and Material:** Yellow, EVA



**Fig 4.3-5 Manufacturing Station**

**Name:** Energy Storage Power Station

**Introduction:** Irregular Circular Shape Structure

**Size:** 215mm Diameter Disc, 140mm Long Metal Bar

**Color and Material:** Multi-color Acrylic Disk and Metal Frame



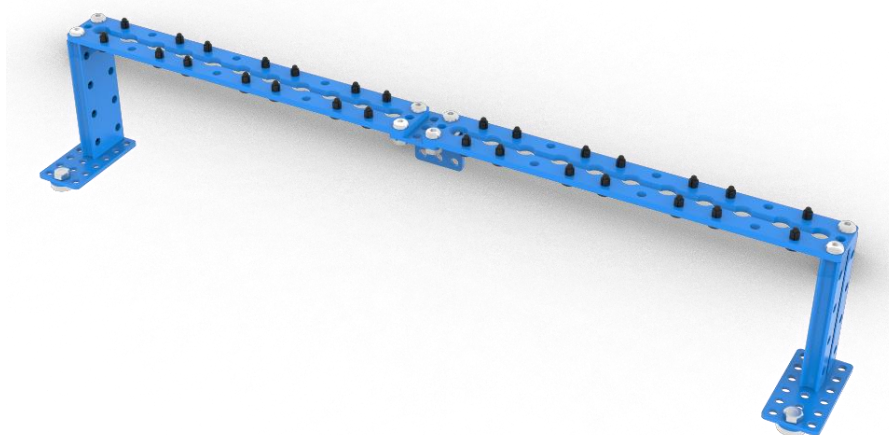
**Fig 4.3-6 Energy Storage Power Station**

**Name:** Seed Breeding Frame

**Introduction:** Frame-like Irregular Shape Structure

**Size:** Internal Long 376mm, Internal Height 70mm

**Color and Material:** Blue Metal, Black Plastic Pivot



**Fig 4.3-7 Seed Breeding Frame**

**Name:** Warehouse

**Introduction:** Blister Ball Rack with Metal Structure

**Size:** Internal Diameter of Ball Rack, 65mm\*65mm\*56mm(height), blue metal frame height 90mm



**Color and Material:** White plastic, blue metal



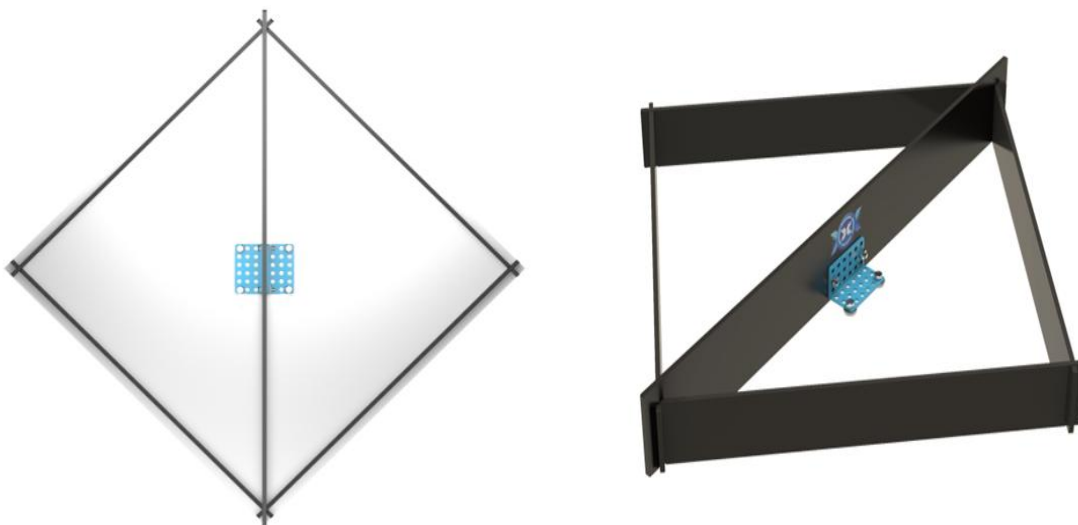
**Fig 4.3-8 Warehouse**

**Name:** Forest Farm Fence

**Introduction:** Black fence of forest farm edge

**Size:** Fence, 500mm(length)\*500mm(width)\*65mm (height), thickness of board 4mm

**Color and Material:** Black, Triamine



**Fig 4.3-9 Forest Farm Fence**

**Name:** Triangle-Pool Ball Rack

**Introduction:** Black triangle plate

**Size:** Internal length 116mm

**Color and Material:** Black, Acrylic



**Fig 4.3-10 Triangle-Pool Ball Rack**

**Name:** Team Marker

**Introduction:** Team self-made prop

**Size:** Height over 120mm, vertical projection of the prop should be within 100mm\*100mm square area

**Color and Material:** No limitation, detailed info in '5.2 Team Marker Requirements'

\*Note: All arena and props have reasonable deviation or error, please refer to 'MakeX Starter Zero Carbon Arena Construction Manual'. Contestant can request for replacement if props are available.

## 4.4 Missions Introduction and Scoring State Judgement

Competition missions include Independent Mission, Alliance Mission, and possible Mysterious Mission.

Independent Mission: M01-M04, independent mission scoring only for respective team.

Alliance Mission: M05-M08, alliance mission scoring for two alliance teams.

Mysterious Mission: The mysterious mission will be announced at the scene in large-scale competitions.

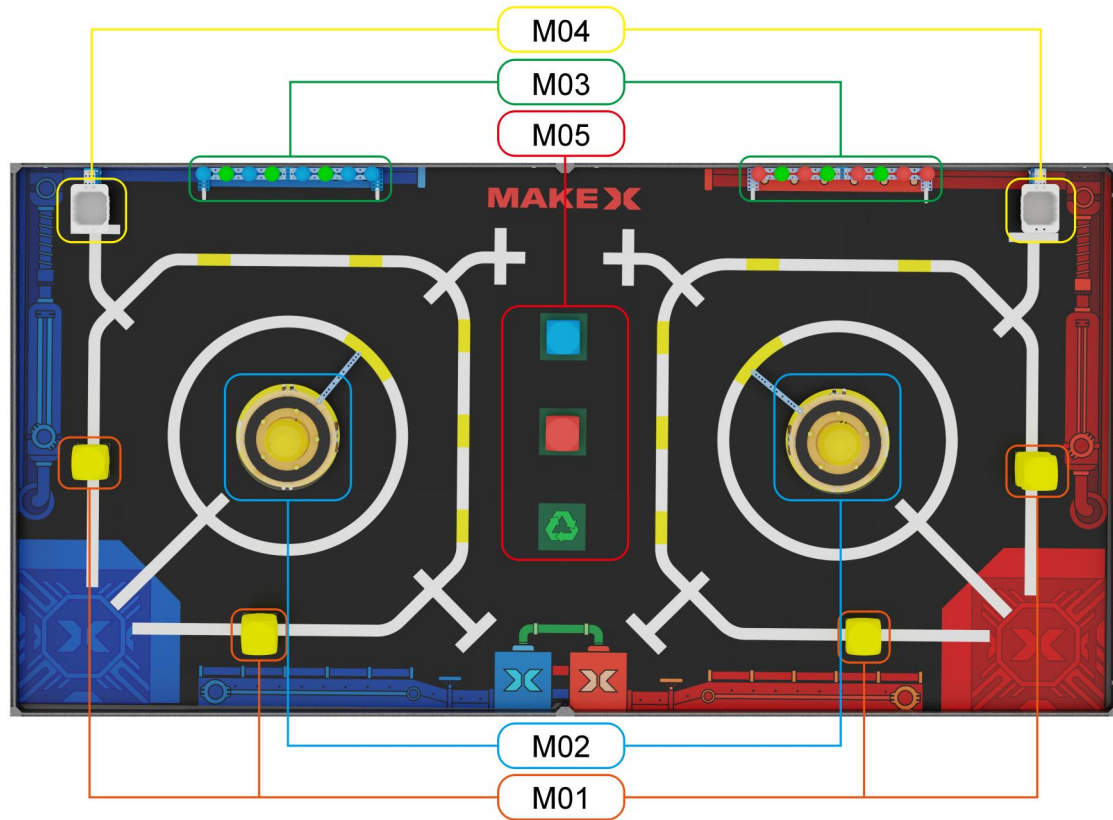


Fig 4.4-1 Mission in Automatic Mission Area

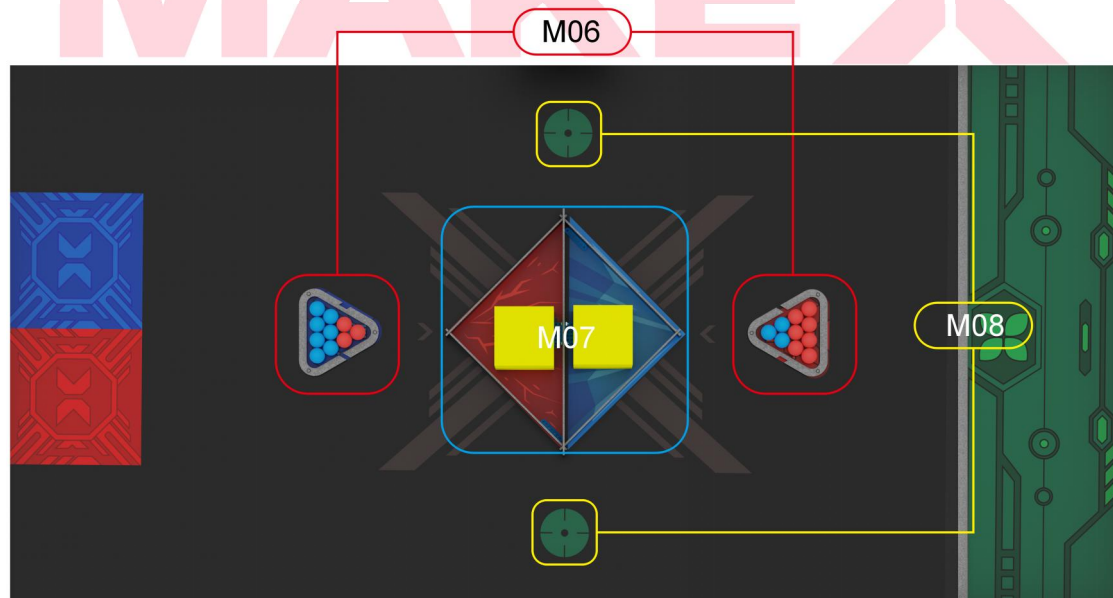


Fig 4.4-2 Mission in Manual Mission Area

In a single match, each team is required to complete 4 independent missions, 4 alliance missions:

Stage and period	Mission Type	Mission Name
Automatic Stage (x seconds, $0 < x \leq 240$ )	Independent Mission	M01 Placing Renewable Resources Cube
		M02 Power-On Energy Storage Power Station
		M03 Transplanting Sapling
		M04 Recycling Sapling
	Alliance Mission	M05 Transferring Automatic Irrigation Device
Manual Stage (240-x Seconds)	Alliance Mission	M06 Plants Research
		M07 Placing Automatic Irrigation Device
		M08 Recycling Marker

### M01 Placing Renewable Resources Cube

**Mission Type:** Independent Mission

**Mission Background:** As the earth’s resources become increasingly scarce, it is essential to achieve reuse of resources. Robot needs to take out these renewable resource cubes from the resource area and place them into the storage area to lay an important foundation for resource regeneration.

**Mission Target:** Robot is required to move the yellow cubes to the storage area.

**Starting Condition:** Each team has 3 yellow cubes which are not stuck on the map.

The position is determined by the prop cards before each match, following figure shows one possible option. The storage area is located in the middle of Automatic

Mission Area and close to the frame.

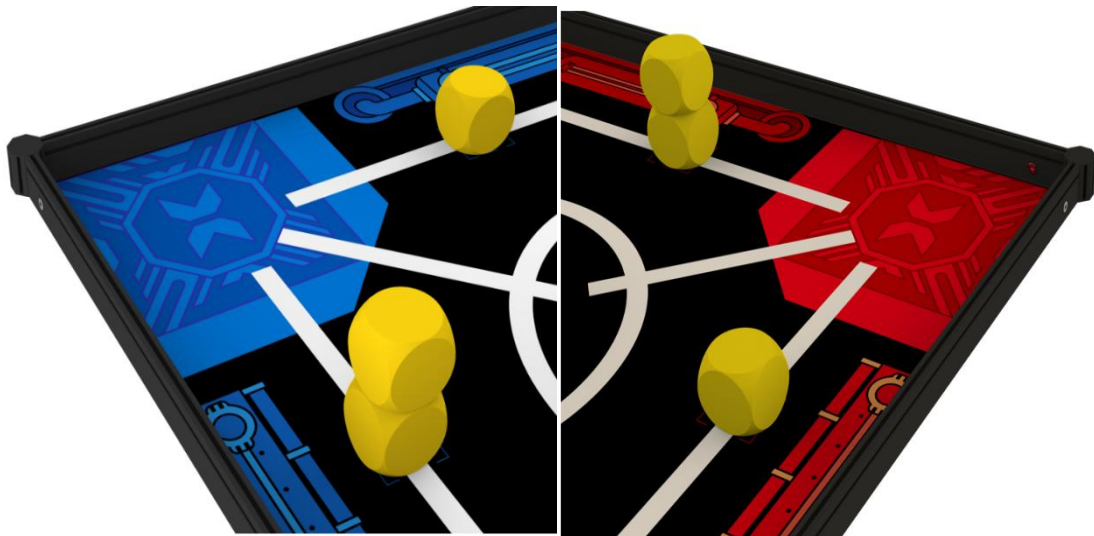


Fig 4.4-3 M01 Initial Location

**Mission Score:** Each successful removal of yellow cube from initial area to the storage area counts for 30 points.

**Scoring Judging:** At the scoring time after automatic stage, the vertical projection of yellow cube should at least partially locate in the corresponding storage area.

- a. At the scoring time, the yellow cube must be completely located in the arena.
- b. At the scoring time, the yellow cube must not contact robot directly.

To be notice, a and b must be fulfilled at the same time for scoring.

**Arena:** Referring to the area that include the map and the upper surface and internal edge of frame. Not include the external surface of frame, desktop, ground and other.



**Note:** “2” referred to 2 layers, “R” referred to cube for red team, “B” referred to cube for blue team.

Fig 4.4-4 M01 Scoring Judging Condition

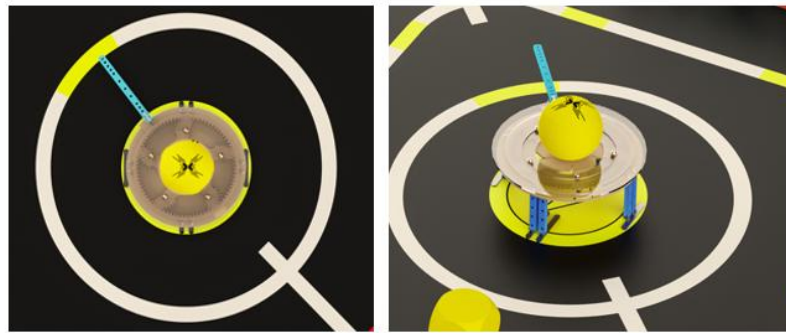
### M02 Power-On Energy Storage Power Station

**Mission Type:** Independent Mission

**Mission Background:** Smart manufacturing factory is producing an automatic irrigation device. Robot is required to turn on the storage power station, release the energy to support the production.

**Mission Target:** Robot pushes the blue metal bar and let the yellow ball drop to the yellow area below.

**Starting Condition:** Energy storage power station in the center of the gear in the closed state, the blue metal bar beside the disk device raised wooden shim (clockwise) on one side, and a raised wooden shim points to the middle of the yellow patrol line marker (logo), yellow ball in central energy storage power station, energy storage power station in the four blue metal stents paste on the map.



**Fig 4.4-8 M03 Location**

**Mission Score:** The yellow ball drops into the yellow area counts 50 points.

**Scoring Judging:** At the scoring time after automatic stage, the yellow ball is in contact with arena directly.

- a. At the scoring time, yellow ball has no direct contact with robot.
  - b. At the scoring time, yellow ball is completely inside the yellow area below.
- a and b must be fulfilled at the same time for scoring.

### M03 Transplanting Sapling

**Mission Type:** Independent Mission

**Mission Background:** Plant research center developed a series of new species of tree which can absorb carbon effectively, with cold tolerant sapling (blue ball), drought tolerant sapling (red ball) and evergreen sapling (green ball). Robot needs to go to the breeding frame and obtain appropriate new saplings.

**Mission Target:** Robot is required to remove the red or blue ball (representing sapling) from the frame to the arena.

**Starting Condition:** Each breeding frame has 8 balls (3 green balls and 5 red or blue balls). The sequence is determined by the prop card drawn before the competition.





The breeding frame is fixed on the map by magnet and pressed up against the frame.

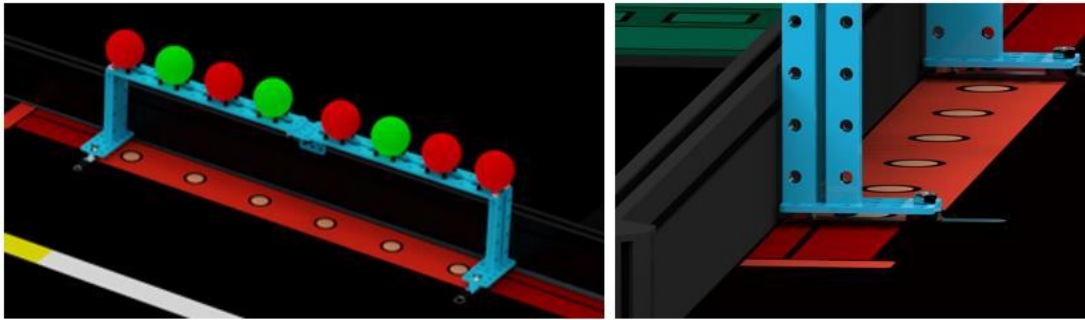


Fig 4.4-6 M03 Location

**Mission Score:** Each removal of red or blue ball, is worth 30 points.

**Scoring Judging:** At the scoring time after automatic stage, red or blue ball drops on the arena.

- a. At the scoring time, the red or blue ball is in contact with arena directly.
- b. At the scoring time, all the balls do not in contact the robot directly.

a and b must be fulfilled at the same time for scoring.

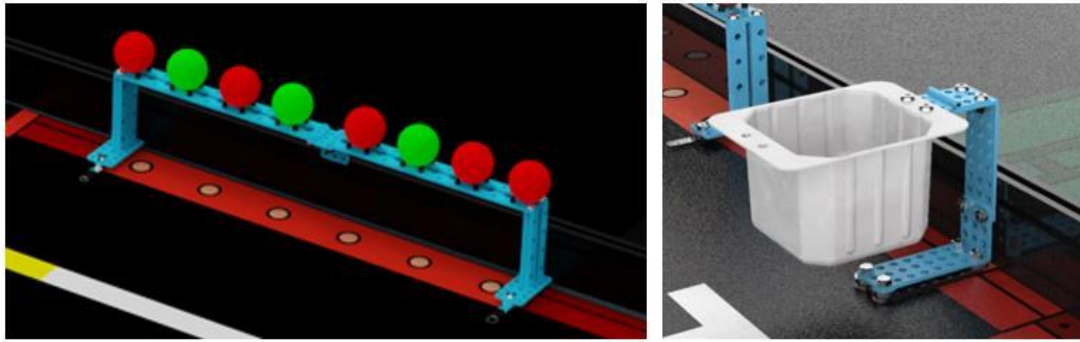
#### M04 Recycling Sapling

**Mission Type:** Independent Mission

**Mission Background:** Robot needs to go to the breeding frame and move the evergreen saplings (green ball) into the warehouse.

**Mission Target:** Robot is required to move the green ball (representing sapling) from the frame into the corresponding warehouse.

**Starting Condition:** Each breeding frame has 8 balls (3 green balls and 5 red or blue balls). The sequence is determined by the prop card drawn before the competition. The breeding frame is fixed on the map by magnet and pressed up against the frame. The warehouse is fixed on the arena by magnet. The blue metal part of the warehouse is partially attached to the frame.



**Fig 4.4-7 M04 Location**

**Mission Score:** Each successful removal green ball counts 50 points.

**Scoring Judging:** At the scoring time after automatic stage, the vertical projection of green ball has completely inside the blister basket of the warehouse.

- a. At the scoring time, the green ball is not in contact with robot directly.
- b. At the scoring time, the robot is not in contact with the blister basket of the warehouse directly.

a and b must be fulfilled at the same time for scoring.



**Fig 4.4-8 M04 Location**

### **M05 Transferring Automatic Irrigation Device**

**Mission Type:** Alliance Mission

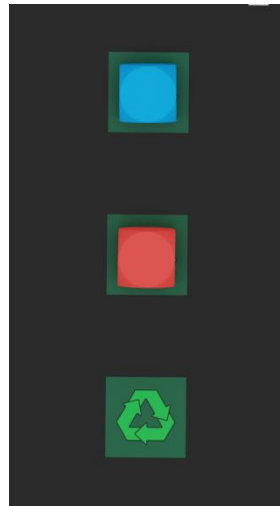
**Mission Background:** In order to achieve plants' automatic irrigation, the new generation of automatic irrigation devices is placed in the recycling area for reuse, the robot has to go to the recycling area, take out the device and place it wherever irrigation is needed.

**Mission Target:** Robot is requiring to move the red or blue cube (representing automatic irrigation device) completely out of the recycling area.

**Starting Condition:** In the middle of automatic mission area, 3 green square areas are



recycled areas, the red and blue cubes (representing automatic irrigation device) are completely placed inside these green squares, the location of the cube is determined by the prop card drawn before the competition. (One possible ways of the placement is as follows, the red and blue cubes may be stacked together, contestants are allowed to slightly adjust the placement of the cubes, just keep the vertical projection of the red/blue cube are completely inside the green squares)



**Fig 4.4-9 M05 Location**

**Mission Score:** Each successful removal of red or blue cube counts 30 points.

**Scoring Judging:** At the scoring time after automatic stage, the vertical projection of the red or blue cube is completely out of the initial area.

- a. At the scoring time, the red or blue cube is completely located in the arena.
  - b. At the scoring time, the red or blue cube is not in contact with robot.
- a and b must be fulfilled at the same time for scoring.

### M06 Plants Research

**Mission Type:** Alliance Mission

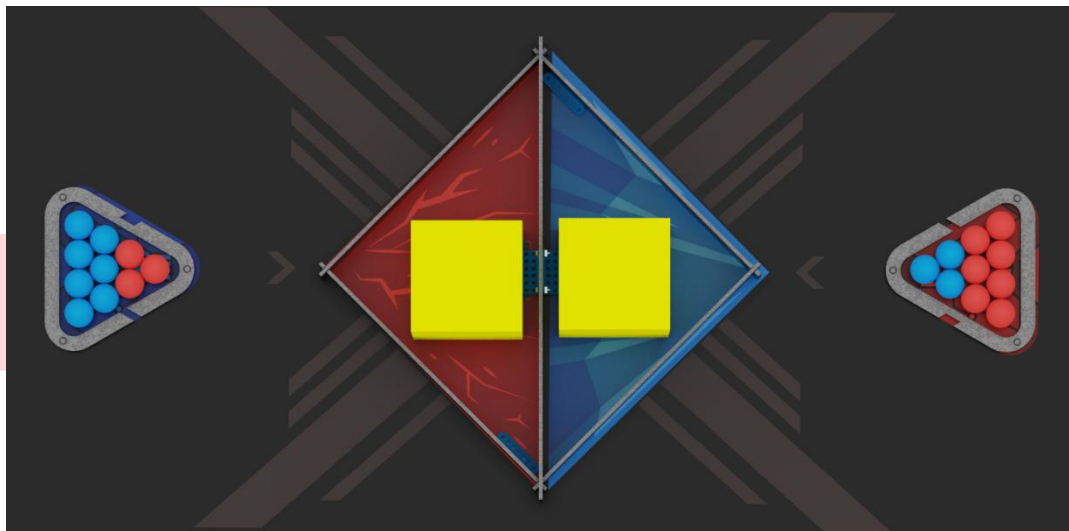
**Mission Background:** The new sapling needs to adapt to various climates; therefore, the plant research center sets up a tropical forest farm and frigid forest farm. The robot will be tasked with the cultivation of saplings and the study of new plant varieties with high carbon sequestration capacity that can adapt to different climates.

**Mission Target:** In the manual mission area, operator is required to remotely control



the robot to collect balls on the manual mission area and move them into corresponding forest area according to the color of the balls

**Starting Condition:** There are two Triangle-Pool Ball Rack on the manual mission area. Each triangle-pool ball rack has 10 red and blue balls as the initial balls for the mission. The triangle-pool ball rack that closed to the blue forest farm has 3 blue balls and 7 red balls, the triangle-pool ball rack that closed to the red forest farm has 3 red balls and 7 blue balls (the placement is shown as Fig 4.4-10). The rest balls are determined whether the teams have moved the props from automatic mission area to manual mission area during manual stage. The ball rack will be removed out of the arena by the referee or contestant before each match.



**Fig 4.4-10 M06 Location**

**Mission Score:** Each correctly sorted red or blue ball counts 10 points.

**Scoring Judging:** At the scoring time after manual stage, it is valid for scoring if the vertical projection of red or blue balls are completely in correct area and the forest farm fence.

- a. At the scoring time, the red or blue ball is not in contact with robot.
  - b. At the scoring time, if the ball is located on the upper surface of forest frame, the scoring will not be affected. As long as the vertical projection is inside the red or blue forest farm fence.
- a and b must be fulfilled at the same time for scoring.

**Manual Loading:** Observer can manually load the red or blue balls which are



completely inside the loading area during manual stage.

a. The vertical projection of robot and balls are completely in the manual loading area.

b. Observer can use hands to move the balls. Observer can touch and move the robot if its vertical projection is completely in the loading area.

### M07 Placing Automatic Irrigation Device

**Mission Type:** Alliance Mission

**Mission Background:** The plant research center has set up a manufacturing station to place the automatic irrigation device to make sure the new saplings grow up well.

**Mission Target:** Operator is required to control the robot to collect corresponding cubes and place them on the yellow cube on the corresponding forest farm.

**Starting Condition:** There is one yellow big cube with length 120mm placing inside each forest farm, the placement of the cubes is determined by the teams before each match, but please note that the side of the yellow cube have to be vertical to the central frame of the forest farm fence. Red and blue cubes are determined whether the teams have moved the props from automatic mission area to manual mission area during automatic stage.

**Mission Score:** Each successful placement of red or blue cube counts 30 points.

**Scoring Judging:** At the scoring time after manual mission stage, it is valid for scoring if the vertical projection of red or blue cubes are completely or partially on the yellow big cube in correct area.

- a. At the scoring time, the red or blue cube is not in contact with robot.
  - b. At the scoring time, if the lower surface of red or blue cube has directly contact with the upper surface of yellow big cube.
- a and b must be fulfilled at the same time for scoring.

**Note: Red and blue cube cannot manual loaded. Observer must not directly or indirectly contact the red and blue cube.**

### M08 Recycling Marker

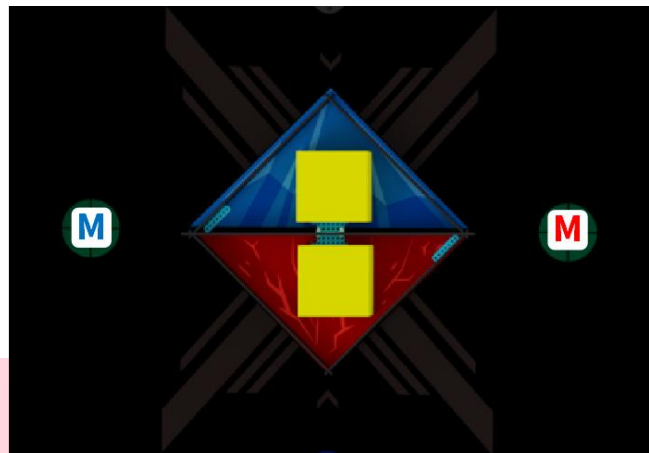
**Mission Type:** Alliance Mission

**Mission Background:** The marker can help researcher record the research data.

Robot is required to move the marker to the starting area from the marking area.

**Mission Target:** Move the marker that placing in the marking area to the starting area of manual mission area, each starting area can be placed with 1 marker at most.

**Starting Condition:** Before each match, the team should place their team marker on the marking areas located on the left and right sides of the forest farm. Each marking area can be placed with a maximum of 1 marker (the vertical projection of the marker should be completely inside the marking area). The team is required to prepare a self-made marker which comply with '5.2 Team's Marker Requirements'.



Note: "M" in red represent the red team marker, in blue represent the blue team marker.

Fig 4.4-11 M08 Location

**Mission Score:** Each successful placing counts 30 points.

**Scoring Judging:** At the scoring time after manual mission stage, the marker is completely in the starting area of the manual mission area.

a. At the scoring time, the marker should keep upright and has no contact with robot and blue-tooth controller.

b. At the scoring time, the marker is in contact with arena directly.

a and b must be fulfilled at the same time for scoring.

### Mysterious Mission

In different competitions, there may exist mysterious missions that different with existing mission(M01-M08); Details of mysterious mission may be published in the competition guide before the competition.

## 4.5 Scoring Explanation

Referee is counting the scores only in two scoring times, after automatic stage and after manual stage. During the match, referee is monitoring the process and record warning and violation.

### Independent Mission Score

Mission	Scoring Prop	Single Prop Score	Maximum Score
M01 Placing Renewable Resources Cube	Yellow Cube	30 points/each	90
M02 Power-On Energy Storage Power Station	Yellow big ball	50 points/each	50
M03 Transplanting Sapling	Red/Blue Ball	30 points/each	150
M04 Recycling Sapling	Green ball	50 points/each	150

### Alliance Mission Score

Mission	Scoring Prop	Single Prop Score	Maximum Score
M05 Transferring Automatic Irrigation Device	Red/Blue Cube	30 points/each	60
M06 Plants Research	Red, Blue Ball	10 points/area	300
M07 Placing Automatic Irrigation Device	Red, Blue cube	30 points/each	60
M08 Recycling Marker	Valid self-made prop	30 points/each	60

After single match, referee will confirm the scoring with team. Score contains three parts: independent mission, alliance mission and violation deduction. Single match score will be recorded for the ranking of qualification or championship.

### Qualification Match:

Single match scores: self-team independent mission scores + alliance mission scores – violation deduction

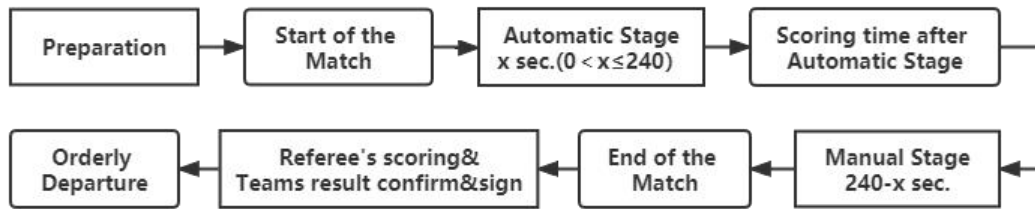
Maximum scores= 440+480-0=920

### Championship Match:

Single match scores: red team independent mission scores + blue team independent mission scores + alliance mission scores – violation deduction

Maximum scores =  $440+440+480-0=1360$

## 4.6 Single Match Flow



The single match lasts for 240 seconds. For any team, the match stages and switching time are as follows:

### Preparation

Before the single match, contestants should arrive to the competition area ahead of schedule, and make preparations under the guidance of referee.

- (1) Power on the robot and place it completely in the starting area in the automatic mission area. With Bluetooth controller powering on and placing in the starting area in the manual mission area. Place the team self-made marker in the marking area inside the manual mission area.
- (2) One representative will be appointed by their team to draw a prop card and then place the props of M01, M03, M04 and M05 accordingly;
- (3) Check the standard of arena and props placement.
- (4) Waiting for the referee's order.

### Automatic Stage

The automatic stage begins after referee's five-second counting down.

(1) After automatic stage starts, the robot completes the automatic missions in the automatic mission area by running the automatic program. During this period, the contestant can send restart request to the referee.

(2) After automatic stage starts, the alliance can apply for switching the stage from the automatic to the manual stage. Once the competition switches to the manual stage, robots are not allowed to go back to the automatic mission area. The alliance has only one chance to apply for a stage switch, in which the alliance both





agree to proceed to the Manual stage. The alliance shall apply for switching the stage to the manual mission area from referees and with the referees' permission, both teams of the alliance will switch to the manual stage together.

(3) The duration of this stage is 0 ~ 240 seconds, and the specific duration depends on the stage shifting application initiated by the alliance.

#### **Scoring time after automatic stage**

When the alliance applies stage switching and with the permission of the referee, the match will stop timing and enter the scoring time after the automatic stage. During this period, the alliance can't contact their robots, the robots have to maintain the state under the stage switching application until the referee has completed the scoring.

#### **Manual stage**

After the referee completed the scoring of automatic stage, the referee issues the "start" command, the manual stage begins:

(1) During the manual stage, the contestants shall stand according to the position requirements in "6.3 operation".

(2) Start and place the robot: the contestants shall completely place the robot in the starting area of the manual mission area to ensure that it is turned on and runs on the appropriate program. Operator can pick up the blue-tooth controller and control their robot the completed the manual mission.

(3) The contestants shall divide the missions of the observer and the operator, and stand in the designated station area to complete the relevant missions. For specific station requirements, please refer to the correct position of the contestants in "6.3 operation". In the manual control stage, the observer and operator can apply to the referee for transposition. For specific transposition requirements, please refer to the correct transposition of contestants in "6.3 operating".

(4) If the alliance applies to the referee to end the match before the match time, referee gives the instruction of "over" and stops the timing, the match will end ahead of schedule; Or when the 4 minutes run out, the referee will take the initiative to issue the command of "end of match".



During the whole competition, the contestants can repair and modify the robot according to the specifications, and the match time will not stop during this period. Except for safety issues, the contestants shall not apply to the referee for suspension of the match.

### **Referee's Scoring and Contestant's Results Confirmation and Sign**

The referee will count the scores after the competition. If there is no objection to the competition, the captains of both alliances must confirm the match's result. If there is any doubt about the result, the captain of the alliance may appeal to the referee without signing the score sheet.

After results confirmation, contestants shall actively assist the referee to restore the props, and leave the arena with their robots and Bluetooth controller in an orderly manner.

## **5. Technical Requirements**

### **5.1 Robot General Requirement**

The Robot General Requirements are prepared for better preparation for teams and ensures a fair and safe competition standard. We suggest team to programming and construct the robot under a fully comprehensive understanding of this guidebook. All robots must follow the Robot General Requirements strictly and any against of the requirement will be asked to rectify. The robot might be disqualified if seriously against the requirements.

#### **Robot Mechanical Requirements**

**T01.** Each team can use only one robot for inspection. After inspection, the team can only use the inspected robot for the match. The team should not replace the robot or use a robot which is not inspected.

**T02.** During single match, some parts can be replaced except for, mainboard, chassis, wheel or belt.

**T03.** During the single match, the size of robot should not exceed the size of: length

280mm, width 280mm, height 300mm. The diameter of the wheel (included the rubber tires) should not exceed 70mm.

- a. Size of robot is defined at the maximum extension state. Robot should be inspected when all movable structured is at extreme state (including the state after modification)
- b. When robot is at extreme state, any structure should not exceed the size of 280mm(width)\*280mm(length)\*300mm(height).

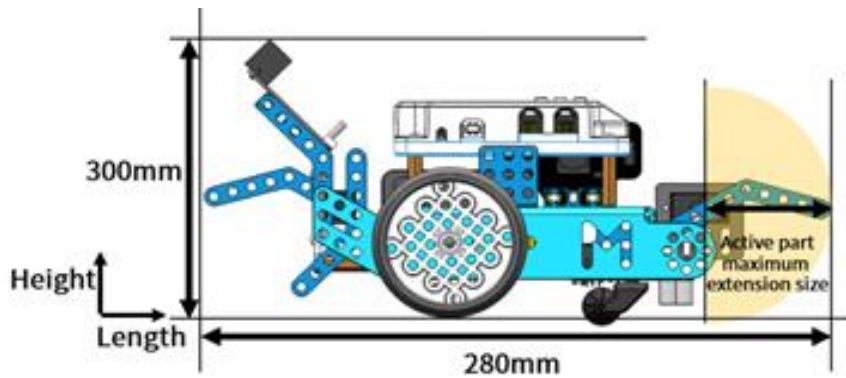


Figure 5.1-1 Maximum extension state (Side View)

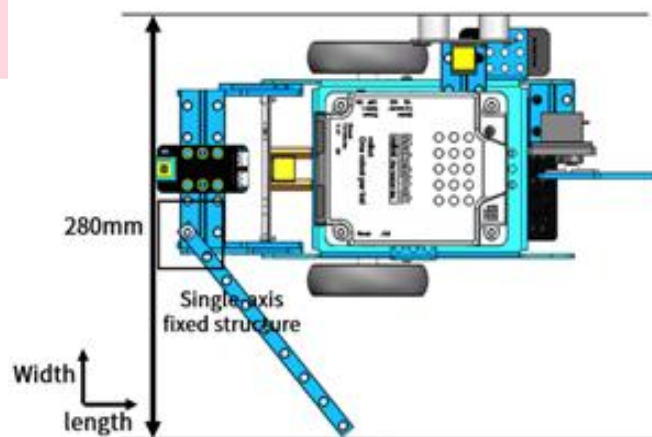
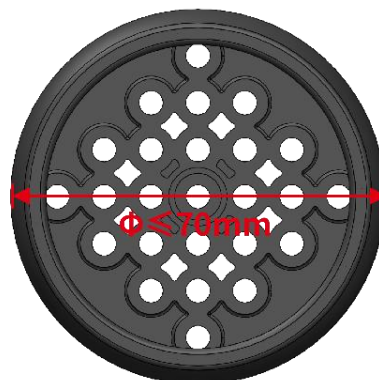


Figure 5.1-2 Maximum extension state (Top View)





**Figure 5.1-3 Wheel Size**

**T04.** During the whole competition, robot weight should not exceed 2.5kg at any time, including weight of battery and other modification parts but not team marker.

**T05.** Teams can use self-made mechanical parts by 3D printing or laser cutting. Teams must not use commercial structures with mature design, including but not limit to multi-DOF robotic arms or hands.

**Robot Electronic Requirements**

**T06.** To ensure the fairness of competition and prevent from team use high performance devices, team should use device which performance is under the following given specifications:

Device Type	Parts Name	Specs	Remark
Mainboard & Extension Board	ESP32-WROVER-B	Processor: Xtensa® 32-bit LX6 Dual-Core Communication Mode: Console Mainboard to Extension Board: Digital Signal: Smart Servo Input PWM: DC Motor Input	
Sensor	Vision Sensor	View angel: 65.0 degrees, Valid focus: 4.65 ±5% mm, Refresh rate: 60fps Working distance: best in 0.25-1.2m Power Source: 3.7v lithium battery or 5v mBuild Power module Power range: 0.9w-1.3w	Types and quantities are not limited. Robots are prohibited from using any sensors that can interfere with the sensory capabilities of other robots
	Ultrasonic Sensor	Voltage: DC 5v Working distance: 5-300cm Error: ±5%	
	Line Follower	Voltage: DC 5V Working height: 5mm-15mm	



Motor & Servo Motor	Encoder Motor	180 Optical Encoder Motor Voltage: 12V Zero Load RPM: 350±5% Gear Ratio: 39:6	Must not modify any motor or servo internal mechanical and electrical design. Maximum total amount 6.
	DC Motor	Dual-shaft TT motor Voltage: DC 6V Zero Load RPM: 200±10% Gear Ratio: 1:48	
		Highspeed TT motor Voltage: DC 6V Zero Load RPM: 312±10% Gear Ratio: 1:48	
	Smart Servo	MS-1.5A smart servo motor Voltage :4.8-6V DC Torque: 1.5kg/CM	
9g small servo Voltage: 4.8-6V DC Torque: 1.3 -1.7kg/cm			
Wireless Communication	Bluetooth Controller	Frequency:2402-2480MHz, Antenna Gain: 1.5dBi, Working Current 15mA	Must not connect with any device other than Official Bluetooth Controller. Including but not limited to manually trigger sensor.
	Bluetooth Module	Bluetooth Version: BT4.0 Frequency:2402-2480MHz, Antenna Gain: 1.5dBi, Power: ≤4dBm, Working Current: 15mA	
Battery	18650 Battery	18650 Lithium-ion batteries, Configuration: 3.7V 2500mAh Output: 5V 6A	Must not be modified. Team should be responsible for any accidents for the modification.

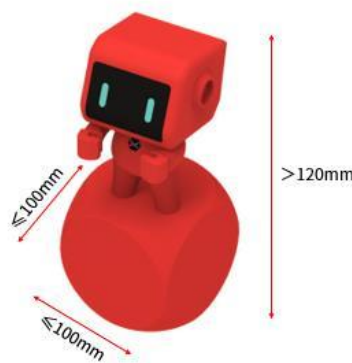
Robots should comply with technical requirements. Any violate will be disqualified from the competition and team must modify the robot until match the requirements.



## 5.2 Team's Marker Requirements

The requirements of Team's Marker are below:

**T07.** The self-made prop should be a 3D structure without material limit. It is suggested to be fabric with laser cutting machine or 3D printer. The height should be over 120mm and the vertical projection of the prop should within a 100mm\*100mm square area.



**Fig 5.2-1 Example of Team's Marker**

**T08.** The prop is aiming to show the spirit of the team. MakeX Robotic Competition Committee encourages teams to use personalized or designed patterns, letters, characters but must be in a positive manner, in overall, representing the team culture, theme or competition. The content must follow the local law or regulations and referee has the right to reject the prop during the inspection.

The team's marker must pass the inspection and pre-match check before bringing to the arena.



## 6. Rules of Competition

### 6.1 Penalties explanation

Explanations and categorization of rules are defined in following sections:

#### Warning

**E01.** The Referee gives the team an oral notice of the first violation and asked the team to stop the violation and obey the referee's instructions. During the warning, the competition will be timed normally.

**E02.** Every team in qualification round has and has only one chance to be warned. Alliance in a single match of championship round has and only has one chance to be warned. If a team or alliance are violating some rules and also being warned once before in this single match, the referee will be directly convicted of the violation.

#### Violation

**E03.** The referee immediately announced the violation to the team and deducted 20 points from the team as soon as it found a violation (the team had been warned once before in this single match). During the violation, the competition will be timed normally.

**E04.** During the competition, if any scoring advantages are obtained because of the violation behavior, the scoring advantages are invalid, and the scoring props will become an invalid prop.

#### Invalid Prop

**E05.** From the moment that have non-compliant contact with the mission prop and scoring prop, it will trigger the invalid prop and the referee will announce the props are invalid props. The invalid props will be removed from the arena by the referee and cannot continue to get points. The Referee has the right to determine whether the final state of the prop before invalid can be scored or not according to the contents of this Guide. At the scoring time, if the prop is contact with robot directly, the prop cannot be scored.



### Disqualify Single Match

E06. During the match, the team violated the rules, resulting in invalidate of the score of the match, but did not affect another match.

### Disqualify Entire Competition

E07. The team will lose the opportunity to continue to participate in the competition and the right to award.

## 6.2 Safety

### Robot Safety

R01. The team's design and construction for robot should follow the technical requirements.

R02. The robot's parts should be used safely under mentor's guidance.

R03. The robot should not behave any active behavior of parts separation (bouncing or shooting a parts).

R04. During the competition, the robot should not use any sticky material (including but not limited to double-side tape or glue).

R05. Referee has the right to reject a dangerous robot for competition. Referee has the right to withdraw a team from rest of the competition depending on the dangerous level of the robot.

### Team's Safety

R06. Under the guide of the mentor and after reading this guide, contestants can proceed to prepare for the competition and to design and construct their robot.

R07. In the preparation process, the team must follow the instructions of the mentor and should not perform any dangerous action without mentor's authorization.

R08. The Team should pay attention to safety when using dangerous tools (screwdrivers, sharp knives) and must use under the guide of their mentors.

R09. During the competition, teams should wear goggles; long hair should be tied up; teams are prohibited from wearing slippers into the competition arena.

R10. During the competition, Teams should not press the arena heavily or any behavior like damage the arena or props.



The referee has the right to reject the Teams that do not conform the safety rules to enter the competition arena. The Referee has the right to disqualify a team for entire competition according to the level of danger.

## 6.3 Operation

### Wrong Operation Position

**R11.** During the automatic stage, the contestants have to stand in the designated area. In the manual stage, an operator and an observer for each team are required to stand in the area shown in figure 6.3-1. If a team only has one contestant, the contestant can choose only one role. The contestant cannot act in two roles at same time. (eg. operator cannot use controller in observation area and control robot) The dimension of area may vary according to the actual size of the competition venue.

- Penalty for this behavior: Violation.

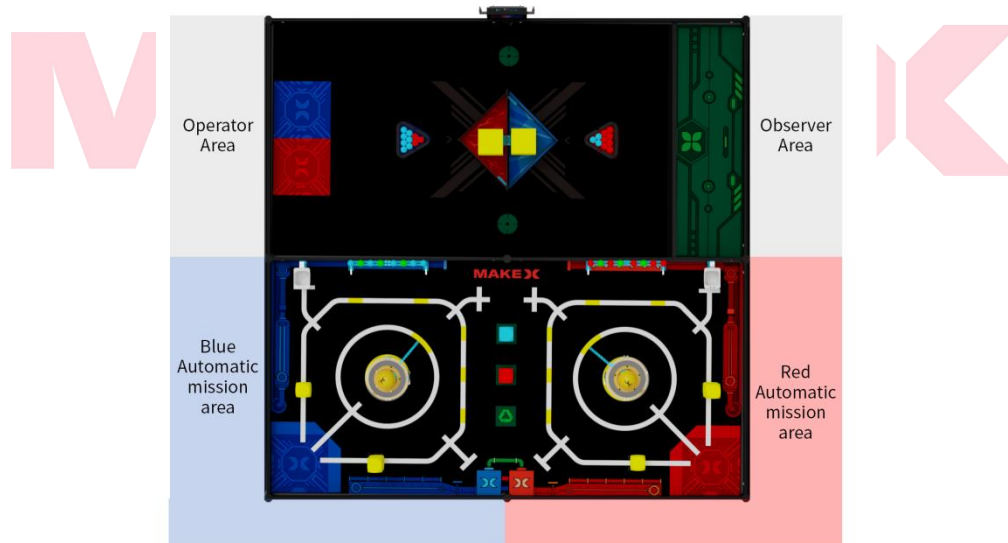


Fig 6.3-1 Contestant Operation Area

### Wrong Operation Position Switching

**R12.** In the manual stage, if the operator and the observer need to exchange their roles, they should apply to the referee and announce, “Red/Blue Team exchange role”. After the Referee responds, “Agree Red/Blue Team Exchange”, the current operation should be stopped, and the contestants go to the correspondent operation area to continue the competition. During the change of roles, the competition will be



timed normally. Contestant should not exchange the role without permission. Contestant should not exchange the role when operator is holding Bluetooth controller.

- Penalty for this behavior: Violation.

### **Robot Start in Advance**

**R13.** Contestants must start the Robot after the referee announces the start of the competition. If the robot is moved in advance, the robot is start in advance.

- Penalty for this behavior: Violation.

### **Robot Restart & Modification**

**R14.** During the competition, the contestants can restart and modify the robot at any time by applying to referee. With the referee's permission, the contestant can restart and modify their own robot. Operation can continue when referee approve, competition timing will not stop. If the Contestants choose to restart or modify their robot, the contestant of the Red/Blue Team should raise his hand to the Referee and announce, "Red/Blue Team requests Restart". After the Referee responds, "Agree Red/Blue Team Restart", the robot can be taken out by contestants for restart or modification. The team can't restart their robot with the referee's permission.

- Penalty for this behavior: Violation.

**R15.** Teams should not modify the robot in competition area other than starting area, manual loading area.

- Penalty for this behavior: Violation. Out of Area, on the floor is not competition area and not violate this rule.

**R16.** Robot should be completely in the starting area when start or restart during the whole competition.

- Penalty for this behavior: Violation.

### **Wireless Remote-Control Operation**

**R17.** Contestants are not allowed to bring electronic communication devices (cellphone, intercom, computer, or any other wireless remote devices) into the competing area.

- Penalty for this behavior: Warning. The team can be disqualified from single



match if serious.

**R18.** Contestant can only use Bluetooth controller in manual stage to control their own robot.

- Penalty for this behavior: The team can be disqualified from single match if serious.

#### **Non-compliance with programming tools**

**R19.** Contestants are not allowed to bring computers, Tablet PC or any other programming devices into the competing area.

- Penalty for this behavior: The team can be disqualified from single match if serious.

#### **Robot Enters Wrong Mission Area**

**R20.** In automatic stage, robot should not completely in manual mission area for any reasons. In manual stage, robot should not complete or partially in the automatic mission area for any reasons.

- **Penalty for this behavior: Violation.** Contestants should apply for restart to remove the robot immediately when it happens. The team can be disqualified for single match if serious offense.

**R21.** In automatic stage, robot should not completely in alliance team's independent mission area. Otherwise, the behavior will trigger the regulation of entering wrong mission area.

- **Penalty for this behavior: Violation.** Contestants should apply for restart to remove the robot immediately when it happens. The team can be disqualified from single match if serious.

#### **Violation Due to Contact with the Robot**

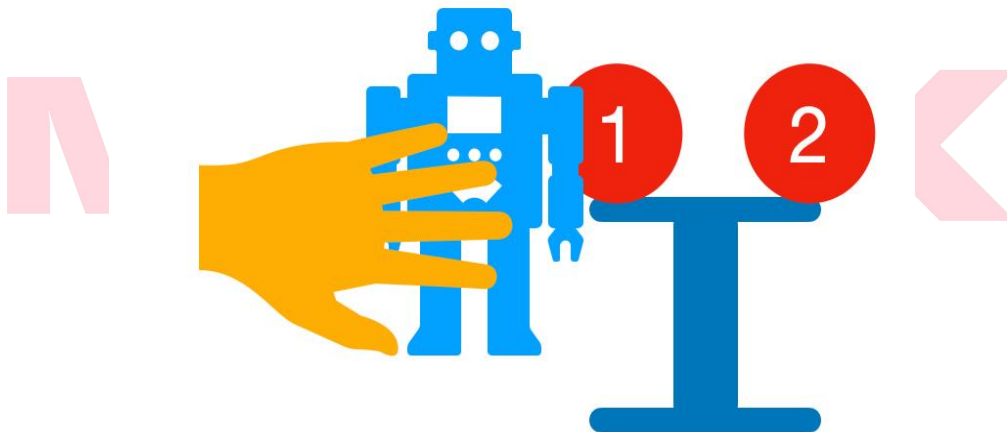
**R22.** During the competition, with the exception of obtaining restart permission from the referee, contestants are strictly prohibited from directly contacting Robots. Only observer can contact robot which is completely in loading area. Operator cannot contact robot without referee's permission of restart.

- Penalty for this behavior: Violation. The team can be disqualified from single match if serious.

### Violation Due to Contact with the Props

**R23.** During the competition, except for scoring props like balls that completely in the manual loading area during the manual stage, the contestants are strictly prohibited from directly contacting the props.

- Penalty for this behavior: Violation. The prop will be invalid and removed from arena by referee.
- Indirect contact: When contestant contact with robot, the robot and prop have physical contact. This situation is Indirect contact.
- E.g., Contestant touch robot as shown in the figure. The contestant is indirect contact with red ball 1 and red ball 2. The red ball 1 and red ball 2 are invalid and will be removed.



### Deliberately Damage Alliance Team Prop

**R24.** During the competition, any teams should not deliberately let alliance team's scoring prop invalid.

- Penalty for this behavior: The team can be disqualified from single match and the single match will be finished with the rest team.

### Deliberately pressing or hitting the Arena

**R25.** During the competition, contestant should not deliberately press or hitting the arena for scoring advantage or affect alliance team performance.

- Penalty for this behavior: Violation



### **Destroy arena elements on purpose**

**R26.** During the competition, contestants, robots are not allowed to destroy the arena elements on purpose.

- Penalty for this behavior: Violation

### **Props Enter Starting Area**

**R27.** If the robot moves any prop completely in or partially in the starting area and affecting the start or restart of Robot, the prop will not be taken out by any person during the competition. Any penalty relative to this corresponding prop will count as usual regardless whether it's located at Starting Area.

### **Scoring Props Leaving Arena Violation**

**R28.** In the whole process of single match, the vertical projection of scoring prop should not leave the arena. Otherwise, the prop is invalid and removed from the arena.

### **Referee Picks Robot**

**R29.** If the robot cannot be reached by the contestants, they can ask the referee for help. The responsibility for any kind of impact due to the referee's touch should be undertaken by the Team itself.

### **Can't Arrival the Arena on Time**

**R30.** Teams should arrive on time. Team that not show up in the competing area more than 5 minutes, will be treated as give up this match voluntarily. If the whole competition schedule delay, please refer to the actual notice.

- Penalty for this behavior: Disqualify the single match.

### **Violation Due to Mentoring**

**R31.** During the whole process of the competition, the team should not have any external mentoring.

- Penalty for this behavior: Warning for the first time, violation for the second time. The team can be disqualified from single match if serious.

### **Egregious Behaviors**

**R32.** It will be regarded as Egregious Behaviors if a Team or a person related with the team incurs into, but not limited to, any of the following circumstances. In case of



Egregious Behaviors happens, the referee has the right to disqualify entire competition.

- Impolite behaviors (abuse, bad words, unnecessary physical contact).
- Seriously affecting the competing area and the safety of the audiences. Interfering the process of competition.
- Seriously violating the spirit of competition (e.g., cheating).
- Repeated violations or ignoring the Referee's warning, violating blatantly.
- Malicious Complaints

### **Abnormal Situation**

**R33.** Including but not limited to following situation:

- Potential Safety Risk: The competition venue emerges problems that might affect the safety of competing areas, teams or Robot.
- Damage or missing of Arena elements and props: The arena and its elements and props are damaged or missing accidentally which leads to the competition not continuing.
- Re-competition: Referees have the right to discuss and determine if a Re-competition is necessary according to the specific situation.

### **The uncertainty of arena, props**

**R34.** Due to the uncertainty of manufacturing and processing, all arenas and props may exist minor error (dimension, weight, color and flatness, etc.). Teams should take these minor errors into consideration when constructing their robots to adapt different props and arenas. Contestants can apply to change the props before the competition if there are some adaptable props available. Robots should be able to adapt some unchangeable elements such as folded arena, light change, etc., The team should debug their robot to adapt these unchangeable elements.

### **Quitting competition due to sudden situation**

**R35.** After on-site registration, if the team cannot continue to participate in the competition due to some sudden situation, the team has to report to MakeX Committee and the competition schedule that is related to the team will proceed as normal.



## 7. Appeal and Arbitration

### 7.1 Results Confirmation

#### Results Confirmation

When a single match ends, after the referees finished the scoring, the captains of both teams need to confirm the results with the referees and then sign on the score sheet. Both teams shall not have any objection to the results of this single match after their signatures.

#### Dispute Settlement

If have any objection to the results and referee's explanation, they can reject to sign the score sheet. Instead, they need to write clearly about the situation on the remarks part of the score sheet.

### 7.2 Appeal Procedure and Valid Appeal Period

#### Appeal Procedure

Appeals should be lodged within the “valid appeal period” by the prescribed procedure and follow the civil participation spirit. The captain of the team needs to fill in the Appeal Form, then cooperates with the Arbitration Commission to investigate the actual situation. Both sides or the representative of the team will be required to arrive at the designated place if the Arbitration Commission requires. During the investigation, the captain of the appeal team must be present, and only captains or contestants of both teams can be present. The Arbitration Commission has the right to communicate with the appealing party alone, avoiding the mentor, the parents of the contestants, their relatives, or friends. The appellant should express facts clearly and objectively, not being over-emotionally.

#### Valid Appeal Period

Normally, the appeal should be lodged within 30 minutes after the end of the competition. Please check the Competition Guide for a specific effective appeal period before the competition. The appellant and the respondent must be present at



the designated place on time.

### **Appeal Response**

Not all the appeal will be accepted, the Arbitration Commission have the right to determine whether to accept the appeal or not according to the actual situation. Normally, the Arbitration Commission responds to the appeal after the end of the competition on the same day or before the start of the competition on the next day.

## **7.3 Invalid Appeal**

### **Overdue Appeal**

Appeals that are not lodged within the "valid appeal period" will be considered invalid and inadmissible. If the appellant fails to be present on time or leaves without any reason during the investigation, the appeal will be considered invalid. If the respondent fails to be present on time, the Arbitration Commission will directly determine the arbitration result and render it as a final result.

### **Appellants out of Stipulation**

The appellants must be the participating contestant and the appeal of another person is inadmissible. The Arbitration Committee will caution the offending team if parents, mentors, or other persons out of the stipulation participate in the arbitration process without the permission of the Arbitration Committee.

- Penalty for this behavior: Warning for the first time, a disqualification will be given for multiple invalid warnings.

### **Vague Appeal's Requests**

If the Arbitration Commission is unable to understand the appeal or conduct the normal investigation due to emotion factor of the appealing party, the offending party will receive a verbal warning.

- Penalty for this behavior: Warning for the first time, a disqualification will be given for multiple invalid warnings.

### **Uncivil Appeal**

Neither side shall make uncivil behavior nor offensive action and remarks.

- Penalty for this behavior: Warning for the first time, a disqualification will be



given for multiple invalid warnings.

## 7.4 Arbitration Procedure

### Arbitration Procedure

The Arbitration Commission consists of the head referee, the arbitration consultant, and the competition technical director. The Arbitration Commission is responsible for accepting the appeals and conducting arbitration investigations, to ensure the smooth progress of the competition and the fairness and justice of the competition results. The playback videos and photographs of any competition may be inaccurate due to the shooting angle, which is only used as reference but not arbitration evidence.

### Arbitration Results

The arbitration results can be divided into “maintaining the original result of the match” or “re-match”, and the two teams shall not appeal again. If the arbitration result is a "re-match", the two teams shall have a re-match according to the time and arena stipulated in the Appeal Form. If either team fails to reach the arena within 5 minutes after the beginning of the match, the team shall be deemed to quit the match.

### Additional Remarks

The Arbitration Commission determines the final arbitration result, and neither side shall dispute the result of the appeal anymore.



## 8. Statement

The official language for MakeX is Chinese. English or other language translations are prepared to facilitate the Team's preparation process. All documents translated to English are for reference only.

The MakeX Robots Competition Committee reserves the final interpretation of MakeX Robots Competition - Rules Guide for Zero Carbon.

### 8.1 Rules Explanation

In order to ensure a fair competition and high-quality competition experience, MakeX Robotics Competition Committee has the right to update and complement this Rules Guide regularly, issue and implement the latest version before the competition.

During the competition, all matters not stated in the Rules Guide shall be decided by the referee team.

This Rules Guide is the basis for refereeing, and the referee team has the right of adjudication during the competition.

### 8.2 Disclaimer

All Contestants in MakeX Robotics Competition should fully understand that safety is the most important issue for the sustainable development of MakeX Robotics Competition. To protect the rights and interests of all contestants and organizers, according to relevant laws and regulations, all contestants registered for the MakeX Robots Competition, should acknowledge and abide by the following safety provisions:

- (1) Contestants should take adequate safety precautions when constructing the robots, and all parts used for constructing the robots should be purchased from legal manufacturers.
- (2) Contestants should ensure that the structural design of the robots takes into account the convenience of the inspection and actively cooperate with the host

of the competition.

(3) When modifying and using the parts with potential safety hazards for the Robots, it must conform to the national laws, regulations and quality & safety standards. Those operations should be manufactured and operated by persons with relevant professional qualifications.

(4) During the competition, the teams should ensure that all the actions such as construction, testing and preparation will not do harm to their own team and other teams, referees, staff, audiences, equipment and arenas.

(5) In the process of construction and competition, if any action that may violate the national laws, regulations or standards occur, all consequences will be borne by the contestants themselves.

The competition kits and parts sold and provided by the supporter, Shenzhen Makeblock Co., Ltd., shall be used by the instructions. Shenzhen Makeblock Co., Ltd. and MakeX Robotics Competition Committee will not be responsible for any injury or loss of property caused by improper use.

### **8.3 Copyright Declaration**

Shenzhen Makeblock Co., Ltd. reserves the copyright of this Rules Guide. Without the written consent or authorization from Shenzhen Makeblock Co., Ltd, any entity or individual may not reproduce, including but not limited to any network media, electronic media or written media.

## Appendix 1. Awards and Annual Points

According to competition scale and team number, the competition will be classified into Points Race/Regional Competition, National Competition, International/Intercontinental Competition, and World Championship. Each team can voluntarily sign up for all kinds of Points Race all year round to accumulate the annual points. The accumulation of annual points is based on the Team Number. The plan of annual points for MakeX Starter is as follows:

Teams who participate in the single Points Race can obtain annual points = (total point in all qualification round + total score of the best single match in the championship round)\* competition type coefficient

Competition Level	Rank Coefficient
Points Race/Regional Competition	Sum of Scores*0.01
National Competition	Sum of Scores*0.02
International/Intercontinental Competition	Sum of Scores*0.03

Teams that have won the champion, runner-up, second runner-up and other awards can obtain additional annual points. For the details of award list, please refer to

### MakeX Awards Guide.

Category	Awards	Regional /Points Race	National	International/ Intercontinental
Starter	Champion	15	30	45
	Runner-up	10	20	30
	Second runner-up	5	10	15
	Innovative Design Award	-	5	10
	Engineering Notebook Award	-	5	10

Excellence Award	Outstanding Mentor Award	-	-	-
	Promotion Ambassador Award	-	5	10
	Technology Sharing Award	-	5	10
	MakeX Spirit Award	-	-	10

Take a 4+1 point race as an example (4 rounds in Qualification, 1 round in Championship), if team X10000 wins the championship and all the match results show as below:

Qualification Round 1	Qualification Round 2	Qualification Round 3	Qualification Round 4	Total Points in Qualification Round
300	200	400	350	1250
<b>Total Points in Single Championship</b>				
500				

\*Annual points that team X10000 can obtain from this competition = (1250+500)

\*0.01+15 = 32.5

## Appendix 2. Engineering Notebook Guideline

### \*Instruction:

**1. The value of engineering notebook:** It helps the team establish files and record the whole learning process. Therefore, it is necessary to record engineering notebook during the entire preparation for the competition.

**2. Engineering notebook submission:** Teams can use online documents or handwriting. No matter which way to use, each team must submit a paper version onsite.

Paper engineering notebook: As the Challenge & Premier programs require the assessment process, one copy of the paper version shall be submitted by each team to the judges onsite. If there is no assessment process (Starter & Explorer), each team will need to submit one copy of the paper version to the staff at the inspection area. Teams that cannot submit the original engineering notebook should prepare their own copies.

**3. An engineering notebook will be required for the evaluation of all technical awards. Please refer to the MakeX Awards Guide for the evaluation criteria.**

#### Basic Requirements for Cover

The team's name, team number, and competition program must appear on the cover of the engineering notebook.

#### Basic Requirements for Contents

##### 1. Clear content

Creating content brings convenience for the judges to review and quickly find the corresponding section.

##### 2. Process records (Required)

Every improvement of the robots should be recorded from prototype design, construction, to the debugging. Keep pictures of all manuscripts, design drawings, calculation processes, circuit diagrams, etc., and insert them into the engineering notebook in the form of pictures.



- 1) Schedule of robot building progress
- 2) Design inspiration/sketch
- 3) Technical principle (it can be disassembled into different parts)
- 4) Production step by step (with clear pictures)
- 5) Problems encountered and solutions

Examples of problems:

What technical failures did you encounter? Why did you fail? How did you solve the problems finally?

What efforts have you made for the robots? What improvements have been achieved?

Does your project progress schedule go as planned? What accidents or delays have occurred? How to fix it?

Have there been any disputes among the team members and how to settle them in the end?

### **3. Projects summary**

- 1) The structure and function of the project (with pictures and text enclosed)
- 2) The technical innovations of the project
- 3) Competition strategies for scoring and defense

### **4. Team introduction**

- 1) A brief biography of each team member and their role on the team
- 2) Culture displaying (logo, team flag, slogan, posters, T-shirt, etc.)
- 3) Excellent achievements sharing (Stories)

### **5. Feelings and other things you want to share (optional)**

- 1) Achievement in the competition (Technical)
- 2) Growth in the competition (Spiritual)
- 3) Suggestions for competition



# Appendix 3. Robot Self-Check Form

## MakeX Starter Robot Self-Check Form

Please follow the requirements of the self-checklist and check the box if your robot meets the requirements. And submit the signed self-checklist during the inspection day. Thanks for your cooperation.

Team Name: \_\_\_\_\_ Mentor Name: \_\_\_\_\_  
 Team Member: \_\_\_\_\_

1. Basic Information			
Robot Mainboard Number: _____ (A 12-bit code consist of numbers and alphabet, please find in the "Setting" section from the CyberPi)			
Robot Size: Length _____ mm, Wide _____ mm, Height _____ mm. (Robot size should not exceed: length 280mm, width 280mm, height 300mm. Please measure your robot and fill in the maximum extension size)			
Robot Wheel Diameter: _____ mm (Should not exceed 70mm)			
Robot Weight: _____ kg (Should not exceed 2.5kg)			
Team Marker: Length _____ mm, Wide _____ mm, Height _____ mm. (Height over 120mm, vertical projection of the prop should be within 100mm*100mm square area)			
2. Equipment			
Name and quantity of sensors:			
Name and quantity of motors:			
Name and quantity of servos:			
Wireless control: Version of Bluetooth: BT4.0 <input type="checkbox"/> Yes			
Name and parameters of battery: (18650 Lithium-ion , 3.7V 2500mAh) <input type="checkbox"/> Yes			
3. Others			
No.	Items	Specific Requirements	Meet required States





1	High-power Equipment	Dangerous high-power equipment is not allowed to be used by the Teams during the competition and the preparation of the competition.	<input type="checkbox"/> Yes
2	Energy Storage Device	If robot is using any energy storage device for operation, safety must be ensured at the first place.	<input type="checkbox"/> Yes
3	Safety and Protection	Any structures that may hurt human during the operation must be protected with appropriate manners.	<input type="checkbox"/> Yes
4	Damage of Arena	Any robot operation must not damage the arena.	<input type="checkbox"/> Yes
5	Forbidden Materials	Robot must not use flammable gas, fire hazard materials, hydraulic structures, mercury content parts, explosive materials, dangerous counterweight, structures may cause entangle with another robot, sharp edge parts, liquid or sticky materials or any electrical leakage device or materials.	<input type="checkbox"/> Yes
6	Self-made Parts	Teams can use self-made parts by 3D printing or corrugated cardboard, woods, acrylic and Rubber band, etc. All self-made parts cannot have producers' logo.	<input type="checkbox"/> Yes
7	Mechanical Parts	Teams can use self-made mechanical parts by 3D printing or laser cutting. Teams must not use commercial structures with mature design, including but not limit to multi-DOF robotic arms or hands.	<input type="checkbox"/> Yes

Our team has checked our own robot according to the self-check form and has filled in the actual data on this form and submitted it to MakeX Robotics Committee. We promise that we will participate in the competition in the above state and will report any changes in time. During the competition, if the robot does not comply with the requirement or our team uses any in-compliance robot, the competition result will be disqualified and all responsibilities will be taken by the team without objection.

Team Leader Signature:

Date:



# Appendix 4. MakeX Starter Score Sheet



2022-2023 MakeX Robotics Competition Zero Carbon -  
Championship Round Scoring Form

Match Information: \_\_\_\_\_ (Arena No.) \_\_\_\_\_ (Match No.)

Alliance Info: Red Team No: \_\_\_\_\_ Blue Team No. : \_\_\_\_\_

Independent Mission			Alliance Mission		Remark
Red Team		Blue Team			
(30Points/Each)	M01 Yellow Cube	(30Points/Each)	M05 Red/Blue Cube	(30Points/Each)	(Comment here if you have any complain or disagreement)
(50Points/Each)	M02 Big Ball	(50Points/Each)	M06 Red/Blue Ball	(10Points/Each)	
(30Points/Each)	M03 Red/Blue Ball	(30Points/Each)	M07 Red/Blue Cube	(30Points/Each)	
(50Points/Each)	M04Green Ball	(50Points/Each)	M08 Team Marker	(30Points/Each)	
	Independent Mission Score		Alliance Mission Score		

Penalty		Single Match Score			Signature		
Red Team		Team	Red Team	Blue Team		Red Team	Blue Team
		Independent Mission Score			Team Represent	(Please confirm the scoring before sign)	(Please confirm the scoring before sign)
		Alliance Mission	Alliance Scoring				
		Penalty			Referee	(Please confirm the scoring before sign)	(Please confirm the scoring before sign)
		Total Score	Total Scoring				
		Total Competition Time	Minutes	Seconds	Date		

\*This Table is For Referee Only



2022-2023 MakeX Robotics Competition Zero Carbon -  
Qualification Round Scoring Form

Match Information: \_\_\_\_\_ (Arena No.) \_\_\_\_\_ (Match No.)

Alliance Info: Red Team No: \_\_\_\_\_ Blue Team No. : \_\_\_\_\_

Independent Mission			Alliance Mission		Remark
Red Team		Blue Team			
(30Points/Each)	M01 Yellow Cube	(30Points/Each)	M05 Red/Blue Cube	(30Points/Each)	(Comment here if you have any complain or disagreement)
(50Points/Each)	M02 Big Ball	(50Points/Each)	M06 Red/Blue Ball	(10Points/Each)	
(30Points/Each)	M03 Red/Blue Ball	(30Points/Each)	M07 Red/Blue Cube	(30Points/Each)	
(50Points/Each)	M04Green Ball	(50Points/Each)	M08 Team Marker	(30Points/Each)	
	Independent Mission Score		Alliance Mission Score		

Penalty		Single Match Score			Signature		
Red Team		Team	Red Team	Blue Team		Red Team	Blue Team
		Independent Mission Score			Team Represent	(Please confirm the scoring before sign)	(Please confirm the scoring before sign)
		Alliance Mission Score	Alliance Scoring				
		Penalty			Referee	(Please confirm the scoring before sign)	(Please confirm the scoring before sign)
		Total Score	Sum of Red Team	Sum of Blue Team			
		Total Competition Time	Minutes	Seconds	Date		

\*This Table is For Referee Only



## Appendix 5. Competition Resources

Competition resources include but are not limited to official resources provided by the committee, such as Competition Guide, Equipment Instructions, Rules Videos, etc.

The contestants are obliged to keep abreast of the update of competition resources before the competition, and any problems caused by the contestants' failure to keep abreast of the updates shall be borne by the contestants themselves. All official competition resources will be updated in MakeX Website.

MakeX Robotics Competition Committee will revise and improve the Rules Guide with the progress of the competition and the new version will be announced in MakeX Website. The contestants and mentors can download the latest version in MakeX Website.

MakeX Website Download <https://www.makex.cc/en/information/download>.

MakeX Official Website: <https://www.makex.cc/en>.

Any Feedback & Question Please Sent to:

[makex\\_overseas@makeblock.com](mailto:makex_overseas@makeblock.com)

**MAKE** 

Edited By Makex Robotics Competition Committee

RULES GUIDE

MAKEEX STARTER

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