

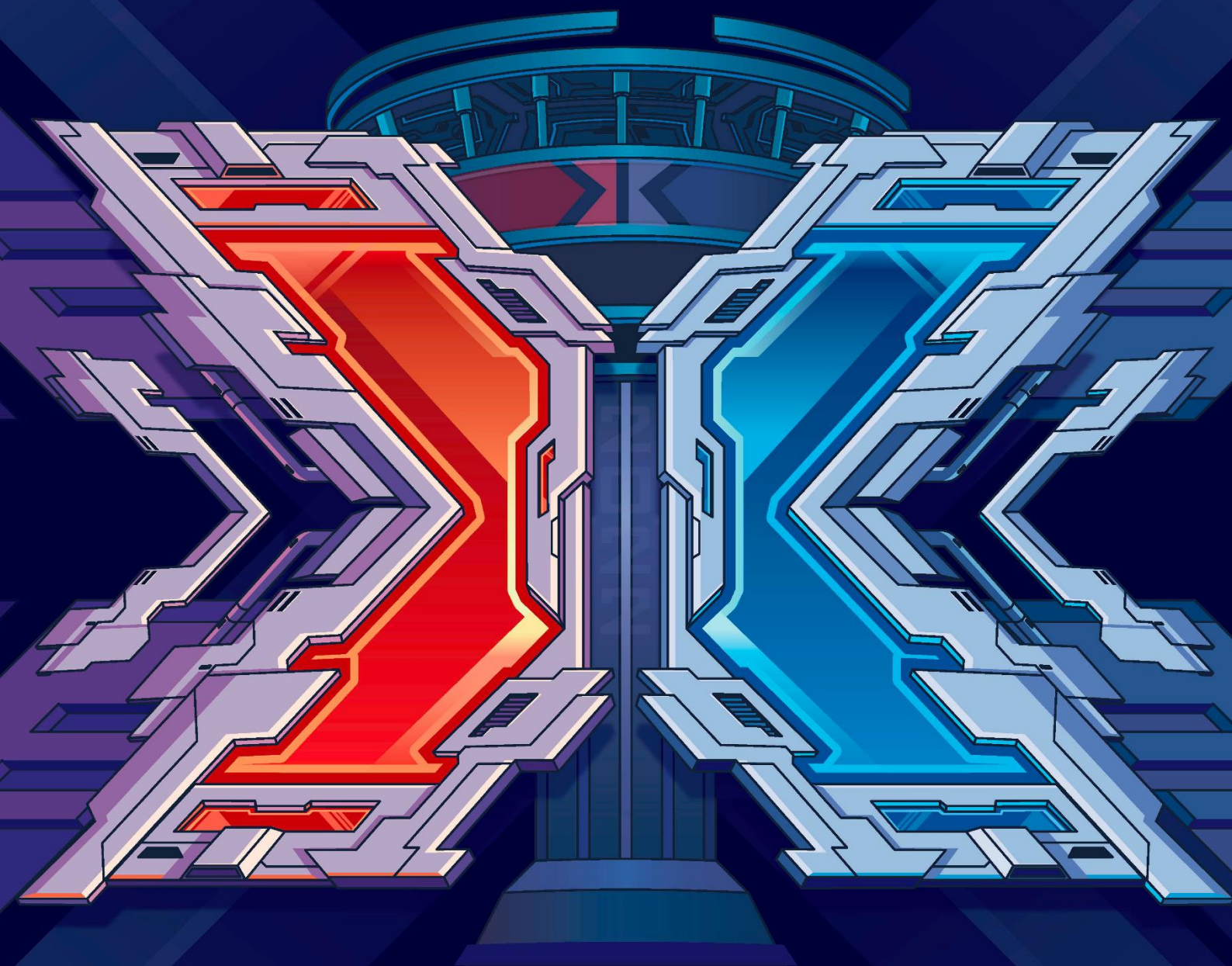
**MAKE X**

**V1.0**

2022 MakeX Robotics Competition

# RULES GUIDE

**MAKEX SPARK**



Edited By MakeX Robotics Competition Committee

**Updates:**

Date	Version	Modifications Record
2021.09	1.0	2022 Season MakeX Spark Infinite Life Rules Guide First Publish.

# MAKE X



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MAKE 

# 1. Introduction

## 1.1 About MakeX

MakeX is a robotics competition 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, etc.

MakeX Robots Competition is hosted by the MakeX Robotics Competition Committee, organized by Shenzhen Makeblock Co., Ltd. As the core activity of MakeX, it aims that through the competition, young people will discover the spirit of creativity, teamwork, fun and sharing. It is committed to promoting innovation in science, technology, education through high-level competition events, guiding young people to learn Science (S), Technology (T), Engineering (E), Art (A) and Mathematics (M) and apply such knowledge in solving practical problems through the exciting and challenging competitions.

## 1.2 MakeX Spirit

**Creativity:** we advocate curiousness and innovation by 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 their knowledge and responsibility with society,



and work hard to achieve their grand aspiration of changing the world and creating the future!

### 1.3 About MakeX Spark

The theme of 2022 Season MakeX Spark is "Infinite Life". The United Nations General Assembly designated Apr.22 as the International Mother Earth Day, through a resolution adopted in 2009. In the pursuit of harmony between human beings and nature, International Mother Earth Day is designed to further promote the sustainable development of human beings and nature by formulating standards for sustainable development and exchanging experiences of countries that meet the standards. With the development of science and technology as well as innovation, human beings will empower the earth with growing vitality.

# MAKE X

## 2. Participation Requirements

### 2.1 Contestants

The contestants' requirements for MakeX Spark are as followed:

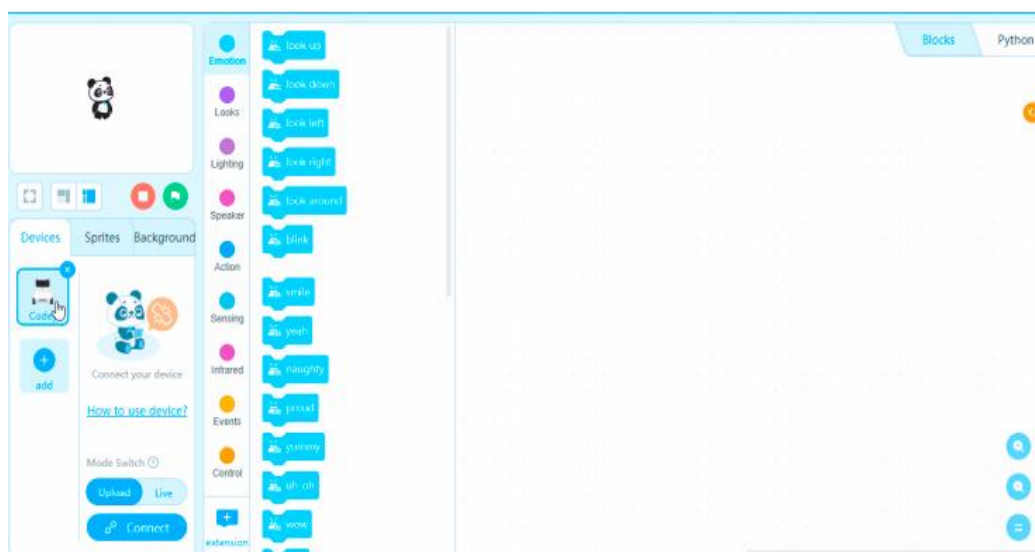
For online competitions, contestants shall participate in teams. Each team is composed of 1 or 2 members and instructed by 1 or 2 mentor(s). Contestants are divided into two groups: 6-9 years old (inclusive) for elementary group (Date of Birth: January 2,2012 - December 31,2016), 10-13 years old (Date of Birth: January 2, 2008-January 1,2012) for intermediate group.

For onsite competitions, contestants shall participate in teams or alliances. Each team or alliance is composed of 2 to 4 members and instructed by 1 or 2 mentors. Contestants are divided into two groups: 6-9 years old (inclusive) for elementary group (Date of Birth: January 2,2012 - December 31,2016), 10-13 years old (Date of Birth: January 2, 2008-January 1,2012) for intermediate group.

Each team must have at least an adult mentor over 18 years old.

### 2.2 Software and Hardware

MakeX Spark is an innovation contest for contestants to conduct hardware construction and software programming. The competition project should be constructed with mechanical and electronic parts. The requirements for software and hardware are as follows:







**Programming Software:** Contestants must use mBlock, a programming platform developed by Shenzhen Makeblock Co., Ltd. across different devices (Windows, Mac, Linux, Chromebook, iOS, Android).



**Hardware Mainboard:** Contestants are allowed to use either CyberPi or Halocode as the hardware mainboard, and then create projects based on their selected mainboard.



## 2.3 Recommended Equipments



## CyberPi Educational Competition Kit



## Nextmaker Box



### Laserbox (Desktop Smart Laser Cutter)



If you want to buy any equipment, please contact the local distributor or MakeX Committee: [makex\\_overseas@makeblock.com](mailto:makex_overseas@makeblock.com).

# MAKE X

## 3. Competition Plan

### 3.1 Introduction

MakeX Spark is an innovation competition program in the form of online or onsite events. Teams need to focus on the theme of each competition, carry out the projects through software programming and hardware construction, and the display the projects to others. With the characteristics of low entry threshold and flexible forms, Spark focuses on guiding teenagers to not only learn interdisciplinary knowledge and apply them on practical problems, but also improve their problem-solving and logical-thinking skills, developing their creativity and imagination. Through the theme learning and practice in the competition, contestants are able to effectively improve their ability to communicate and express, thus gaining a joy of sharing.



Fig. 2022 Season MakeX Spark Theme

### 3.2 Schedule

In 2022 MakeX Spark competition, there will be five online competitions in total, with three matches in China region, and two matches in global region. Each match is independent with one specific sub-theme. Contestants are able to participate in one or more matches in China region or global region.

Arrangements for national competitions and world championship shall be subject to the pre-competition notice. Please pay attention to the competition page published on MakeX official website in time for the specific competition date. Winning teams will have the opportunity to be promoted to the 2022 MakeX World Championship.

Name of competition	Language	Type	Sub-theme	Time
MakeX Spark Global Online Competition-1st Match	English	Online	Low-carbon Life	May
MakeX Spark Global Online Competition-2nd Match	English	Online	Climate Action	October
MakeX Spark Regional Competition, National Competition	English or Native Language	Online/Onsite	All local competitions will subject to the local organizers	The time will be subject to the local organizers
MakeX Word Championship	English/Chinese	Onsite	The sub-theme will be released onsite	November to December

### 3.3 Sub-theme Interpretation

Each match has different subthemes based on annual theme in MakeX Spark competition. The theme mainly comes from STEAM education at home and abroad, important international or national events, latest developments in science and technology, news reports and daily life, etc. Contestants are encouraged to participate in multiple matches to gain a full and thorough understanding of the competition. The theme of the project should be positive and closely related to the theme of each match. The following is the detailed introduction of the specific theme for each match. Contestants are suggested to focus on the theme, make full use of imagination and creativity during software programming and hardware construction.

#### 3.3.1 Theme of 1st Match—"Low-carbon Life"

The earth is suffering from a fever as a result of increasing greenhouse gases. Over the past 200 years, with the advance of industrialization, the discharge of a large number

of greenhouse gases, mainly carbon dioxide, has resulted in rising of the global temperature and climate change. On December 8th, according to the report of "Global Climate State in 2009" released by World Meteorological Organization, the last decade was the hottest on record. In addition, global warming has caused the Antarctic glaciers to melt, which led to a rise in sea level. It is of great significance to raise awareness of "energy saving and emission reduction", make simple and easy changes to your lifestyle or consumption habits to reduce global greenhouse gas emissions.

The theme of 2022 MakeX Spark 1st match is "Low-carbon Life". contestants are required to design their projects based on this theme. Low-carbon Life calls for reducing energy consumption, especially carbon dioxide emissions, so as to reduce air pollution and slow down ecological deterioration. We are encouraged to change our lifestyle from three aspects: electricity saving, gas saving and recycling. Low-carbon Life is not only a lifestyle, but also an environmental responsibility for sustainable development. Share your ideas and create a Low-carbon Life with everyone!



**\*Image from Internet**

### **3.3.2 Theme of 2nd Match —— "Climate Action"**

After more than 150 years of industrialization, deforestation and large-scale agricultural production, the greenhouse gases have increased to an unprecedented level in 3 million years. Climate change has had an unprecedented impact on a global scale, with changing weather patterns leading to threats to food production and an increased risk of catastrophic flooding due to rising sea levels. If not taking urgent action right now, it will become more difficult and costly to adapt to these impacts in

the future.

The theme of 2022 MakeX Spark 2nd match is "Climate Action". contestants are required to design their projects based on this theme. Human activities are the main cause of the subsistent climate change. How to disseminate more knowledge about man-made climate change? How to reduce greenhouse gas emissions? What can we do in the face of climate warming, melting ice and snow, and expanding ocean area? Please give full play to your talents and call on everyone to take action!

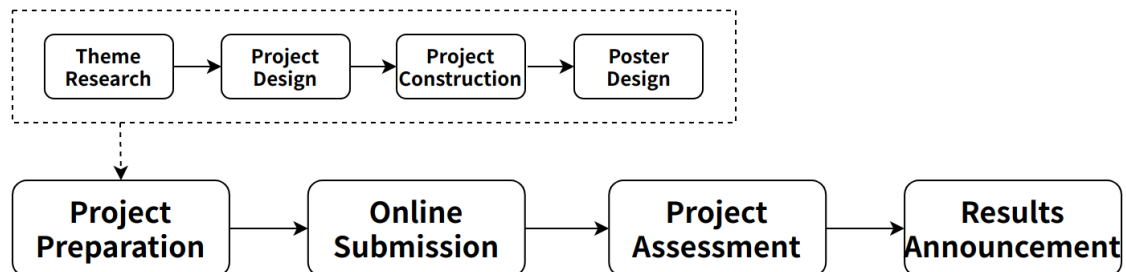


\*Image from Internet



## 4. Procedure and Rules of Online Competition

### 4.1 Participation Procedure



The period of MakeX Spark online competition is two to four months, ranging from project preparation, online submission to project assessment and results announcement. Under the guidance of mentors, the contestants follow a step-by-step project-based learning process and then prepare and submit their projects.

#### Project Preparation

In the early stage of the competition, contestants can focus on the research of realistic problems, and put forward the general structure of the project. After confirming the project plan, project function and equipment list, the contestants are required to construct and program the project, as well as recording the process including the idea of code, construction structure and exterior design. The contestants are also required to create a poster and submit it online. Please refer to "**4.2 Project Submission Rules of Online Competition**" for the specification.

#### Online Submission

Online submission is usually valid for 10 days, and each team must turn to the submission webpage to publish projects, fill in the correct registration information and upload the poster before the deadline of submission.





## Webpage and Submission Link of Previous Online Competition

### Project Assessment

The judge panel of MakeX Spark Online Competition consists of judge, judge group leader, expert judge. Judges are responsible for the preliminary evaluation of all projects; Judge group leaders are for the re-evaluation of the project; The expert judges are for arbitration, dealing with the complaints that judges and judge group leaders can not solve, and confirming the scoring results and awards.

### Results Announcement

The awarding results will be announced on the competition webpage.

## 4.2 Project Submission Rules

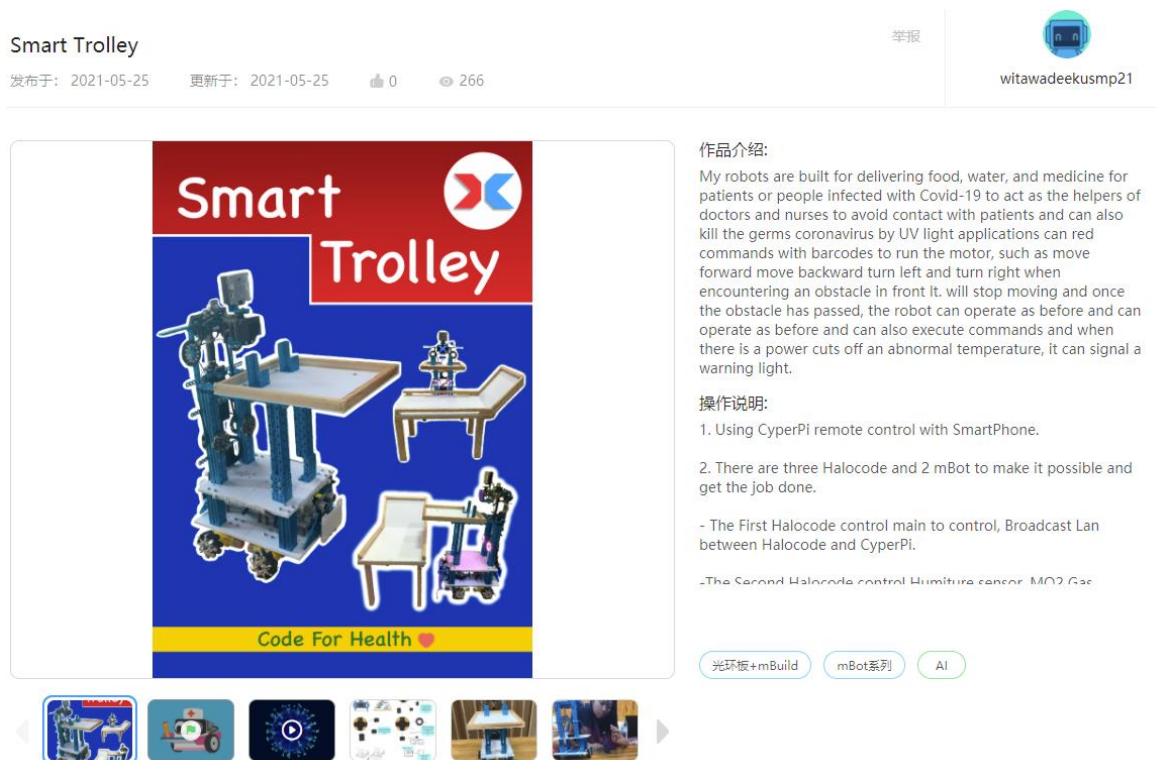
### 4.2.1 Publishing Rules

- R01.** Each team can only publish one project to participate in a single match.
- R02.** Each team must publish original and non-adapted project.
- R03.** Each team must publish the project before the deadline of submission. Please do not publish your project in advance.
- R04.** The Name of the Project: The published project must include the official name of the project, which must be exactly the same as the name of project poster.
- R05.** Project Introduction: The introduction of the project shall include the content of theme and the functions of project. The description should not exaggerate the actual functions and working mechanism of the project. The introduction of the whole project is generally 700 to 900 words long, without exceeding 2000 words.
- R06.** Instruction: The steps should be clearly identified in the instructions, and there should be a sequential relationship between the steps. Avoid situations that readers cannot understand, perform or achieve the desired effect with the instructions. Do not mistake, miss, or skip steps.
- R07.** Project Program: The uploaded program should have clear notes on the implementation of each function. The notes should be as straightforward as possible to help the judges understand the logic of the program.
- R08.** Project Videos: The video content shall include oral introduction by the contestant and functional demonstration of the project. The videos support MP4 and MOV formats, with single storage no more than 200M. The shooting lighting should be clear and bright to avoid blurry video. There is no limited display form for the video,

but it needs to be easily understood.

**R09.** Project Picture: The photos support GIF, JPG, PNG format, and the size of a single one should not exceed 10M. Uploading at least three photos, and choose one photo as the cover of the project when publishing the project. Photos should be clearly visible with no ambiguity in the main displaying subject. Take photos from several angles to fully present the structure and design of the project.

**R10.** Check the uploaded materials initiatively after the submission just in case anything goes wrong. Contestants may fail to get a score of the corresponding dimension if there is no corresponding information in the submitted materials.



### Previous Project Sample-Smart Trolley

#### 4.2.2 Poster Specifications

**S01.** The poster must be created by the contestants themselves and drawn manually. Paper and digital versions are both accepted. Contestants are encouraged to give full play to their imagination and artistic creativity to display their project embedded with pictures and texts in a vivid and concise way.

**S02.** Format Requirements: The name of the poster must be the same as the submitted project when submitting the poster. The poster is preferably submitted in PDF format. If failing to transfer the poster into PDF, the contestant is suggested to take HD pictures and upload with up to 3 pictures and size no more than 30M in total.

The size of single poster should not exceed 297mm\*420mm (standard A3 paper size). Paper or other environment-friendly display board materials can be used, with clear content for easy reading.

**S03. Content Recommendation:** The content of poster should include the basic information of the project, including but not limited to the name of the project, the author, main functions and inspirations of the project. The poster can also display problem discovery – problem solving process, preferably with manuscripts such as the design drafts, structure and the logical of programming. Please list the main hardware materials on the poster. If a large number of non-quantifiable material such as paper shell or metal beam is used, just fill in the name of the material without marking the quantity. For example: CyberPi x1, Paper shell several, ultrasonic sensor x1.



**Project Poster Sample**

## 5. Procedure and Rules of Onsite Competition

### 5.1 Participation Procedure



The period of MakeX Spark onsite competition is usually two to three days, ranging from theme announcement, project construction, display board design to onsite assessment and results announcement. According to the competition theme announced on the spot, participating teams must carry out teamwork with ideas and creativity and complete the project construction, programming, display board design, etc. in a limited time, while joining in the onsite assessment. The specific process and duration of a single competition will depend on actual situation.

#### Theme Announcement

The theme of a single match in MakeX Spark onsite competition is usually announced on the spot, and the theme content is projected to be formulated based on the annual theme of "Infinite Life ". After announcing the theme, the contestants should carefully read and understand the theme content, brainstorm and exchange ideas with teammates, and determine the name of project and the action plan.



Previous Onsite Competition- Theme Discussion



## Project Construction

Before the project construction, teams must cooperate efficiently to ensure that each contestant engages in the preparation deeply. Teams are also encouraged to allocate their work based on different tasks in terms of career development, such as engineers, software engineers, designers and so on. Please refer to "5.2 Creation Rules of Onsite Competition" for the specifications.



Previous Onsite Competition-Project Construction

## Display Board Design

The contestants are required to design a display board based on the competition theme and individual project. The contestants are encouraged to prepare and decorate their display board with clothes, badges and other design elements, so as to fully display the team culture. Please refer to "5.2 Onsite Creation Rules" for the specifications.



Previous Onsite Competition-Display Board Design



## Onsite Assessment

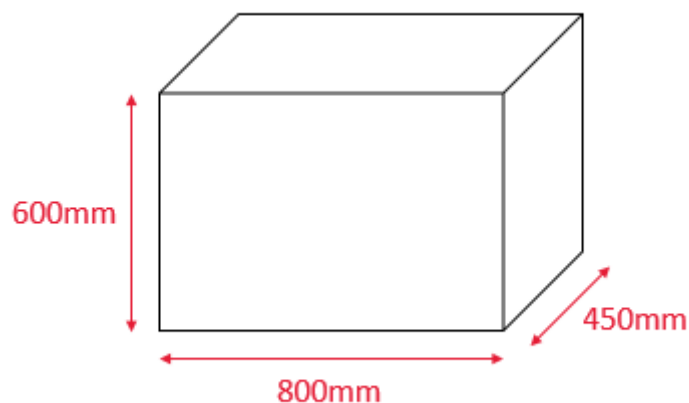
The judge panel will consist of invited excellent judges and experts from education sector or robotics competition sector. The number of judges is generally 3-5. Onsite assessment will be conducted in the form of rotating assessment and road show. In this process, the contestants will be required to introduce and demonstrate their projects and answer questions from the judges, while displaying the team's culture and expressing their own thoughts. The number of judges and the judging process will depend on actual situation of single competition.

## Results Announcement

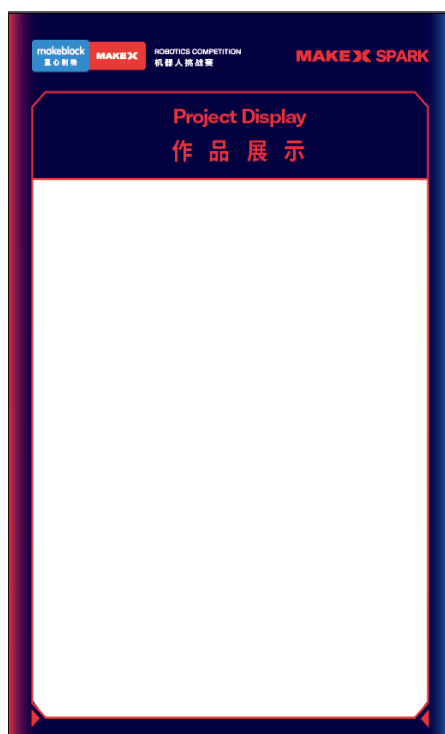
The awarding results will be announced onsite.

## 5.2 Onsite Creation Rules

1. Before the formal competition, contestants are advised to collect related information and prepare materials. Besides, they can search and learn the contents related to the annual theme, prepare project ideas, the materials including mechanic parts, electronic components, blank KT board, kits, wooden boards, cardboard, colored pens, crayons, marker pens, any decorative materials, and daily necessities in advance.
2. The contestants are required to bring their own laptops and install mBlock in advance.
3. There is no access to network in competition venue, therefore, please prepare your own WiFi equipment if have any network demand for debugging your project.
4. Usually, the organizers may provide some tools such as laser cutting machine, basswood board, corrugated paper, printing paper, painting brush, children's scissors, screwdriver, etc. Whether these tools are available will depend on actual situation and shall be used safely under the guidance of staff.
5. Before the start of the competition, the staff will inspect the equipment and display board carried by the participating teams. All equipment must be spare parts that have not been assembled, and complete projects or semi-finished projects are forbidden. If the equipment is exception to the rules, it must be disassembled on site, and the competition cannot be started until you finish it.
6. During the competition, the size of the project (including all materials such as the main part and the decorative part of the project) should not exceed 800mm (length) \* 450mm (width) \* 600mm (height), that is, the vertical projection of the project should not exceed 800mm \* 450mm, and the vertical height should not exceed 600mm (height).

**Fig. Project Size**

7. The display board is suggested to be KT board of 600 mm \* 800 mm. If there is no KT board, it can be replaced by other materials. The contents of the display board should include basic information such as the title of the project, the name of the contestant, the function of the project, etc. It can introduce your inspiration, record the creation process, and be accompanied by manuscript drawings such as the design drafts, structure and codes, etc. Please list the main hardware materials on the poster. If a large number of non-quantifiable material such as paper shell or metal beam is used, just fill in the name of the material without marking the quantity. For example: CyberPi x1, Paper shell several, ultrasonic sensor x1.

**Fig. Project Display**





8. During the competition, projects or equipment shall not be taken away from the competition area. When entering the competition area, contestants are not allowed to bring complete project or semi-finished project. If above circumstance occurs for the first time, the team will be cautioned. If serious offense occurs, the team will be disqualified.
9. During the competition, no one other than the contestants, including but not limited to parents or mentors, shall enter the competition area by any means or act as a substitute or mentor. If above circumstance occurs for the first time, the team will be cautioned. If serious offense occurs, the team will be disqualified.
10. All cheating is prohibited in the competition. Contestants shall report to staff in advance if they carry mobile phones, phone watches and other devices. Contestants are not allowed to use electronic communication devices (except laptops) without permission. If it is found that communication devices are used by contestants to communicate with the person outside the competition area during the competition, it will be cautioned for the first time, and those with serious offense will be disqualified.
11. During the competition, contestants should not leave the competition area and should keep silence while creating projects. No food or drinks are allowed in the competition area.
12. After the construction, contestants should take the initiative to clean up their own construction area and keep a clean environment.

## 6. Assessment

### 6.1 Grades

Through MakeX Spark, the teams and their projects will be assessed in five dimensions, including design ability, innovative thinking, electronic technology, programming ability, and communication skill. Each dimension consists of 1 or 2 sub-dimensions. In this competition, the score result of each dimension and sub-dimension will be closely related to the contestants' performance and their projects. Please refer to **Appendix 1: Assessment Criteria Details**.

1. **Design Ability:** It includes 2 sub-dimensions of structural application and exterior design, and the score range of each sub-dimension is 0-5;
2. **Innovative Thinking:** It includes 2 sub-dimensions of innovation and theme research, and the score range of each sub-dimension is 0-5;
3. **Electronic Technology:** It includes 1 dimension of electronic technology, which scores 0-5;
4. **Programming Ability:** It includes 1 dimension of programming ability, which scores 0-5;
5. **Communication Skill:** It includes 2 sub-dimensions of oral expression and process presentation, and the score range of each sub-dimension is 0-5;



Fig. 6.1 Radar Chart of Capability Assessment Report

All the contestants who obey the competition rules can get a STEAM Assessment Report (Scores for each dimension in the report will be specified to two decimal places). The competition encourages original ideas. Contestants are encouraged to think independently and incorporate insights, experiences, and thoughts into their projects.



It is believed that each contestant may have a different understanding of the theme, and we wish to see distinct elaborate designs, rather than copies of the same products.

## 6.2 Awards

To truly guide the contestants to experience and reap the fruits from MakeX spirit: creativity, teamwork, fun and sharing, a series of awards will be set up to show recognition and encouragement for the outstanding abilities and performance of the contestants. The types of the award may be updated during the season. The award list is as follows:

**Young All-Rounder**—In each competition, the team of top three will receive "Young All-Rounder"(It is divided into elementary and intermediate group, and it can also be obtained with special award.).

**Young Designer**—Contestants present the potential to become future designers with excellent design and aesthetic capabilities. Those who perform well in the dimension of "Design Ability" will have the opportunity to win the "Young Designer" award.

**Young Innovator**—The project is creative and very attractive with clear positioning. Contestants show their unique theme exploration and innovation ability in the competition. Those who perform well in the dimension of "Innovative Thinking" will have the opportunity to win the "Young Innovator " award.

**Young Engineer**—Contestants show the potential to become future engineers with excellent capabilities of electronic technology and programming. Those who perform well in the two dimensions of "Electronic Technology" and "Programming Ability" will have the opportunity to win the "Young Engineer" award.

**Best Demonstration**—Contestants show excellent communication skills in the competition. Those who perform well in the dimension of "Communication Skill" will have the opportunity to win the "Best Demonstration" award.

The above special awards will be awarded respectively based on two groups (elementary/intermediate). On the premise of complying with the rules, awards are given according to the corresponding dimension ranking in the sequence of Young Designer, Young Innovator, Young Engineer, Best Demonstration. The quota for each special award is 15%. Each team can only obtain one special award, and if the team is qualified to receive more than one special award, the award will be given based on the project with the highest score.

Each contestant can obtain a certificate of participation by submitting a written application to the committee.



In addition, the competition specially sets up the following awards for schools or educational organizations that actively arrange students to participate in MakeX Spark: Excellent Mentor and Excellent Organization. The awards will be comprehensively issued based on the number of participating teams and the number of awarding projects guided by the same mentor or organization.

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## 7. Safety Rules

1. Contestants must follow the instructions of mentors or staff in the preparation process of the competition. Do not carry out dangerous operations without authorization.
2. Pay attention to safety when assembling various parts and using various tools (such as screwdrivers, sharp knives and other dangerous materials) in the construction process, and use them under the guidance of mentors or staff.
3. The use of hazardous materials such as contaminated and unstable chemicals is prohibited.
4. The use of high-power equipment and dangerous materials that may cause personal injury is prohibited.
5. The judging panel has the right to disqualify the teams based on the safety problems of the projects.

# MAKE X

## 8. Statement

MakeX Robotics Competition Committee reserves the final interpretation right of 2022 MakeX Spark Infinite Life Rules Guide.

### 8.1 Rules Explanations

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, and then 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 judging panel.

This Rules Guide is the basis for assessment, and the judging panel has the final right of adjudication during the competition.

### 8.2 Disclaimer

All contestants in 2022 MakeX Robotics Competition shall fully understand that safety is the most important for the sustainable development of the 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 2022 MakeX Spark shall acknowledge and abide by the following safety provisions:

Contestants shall take adequate safety precautions when constructing the projects, and all parts used for construction shall be purchased from legal manufacturers.

During the competition, the contestants should ensure that all the actions such as constructing, testing and demonstration will not do harm to other contestants, audiences, equipment and venues.

In the process of construction and competition, if any action that may violate the national laws, regulations or safety 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., should be used in accordance with the instructions. Shenzhen Makeblock Co., Ltd. and MakeX Robotics Competition Committee will not be responsible for any injury or loss of property 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.

MAKE X





## Appendix 1. Assessment Criteria Details

Assessment Dimension 1: Design Ability		
Sub-dimension	Grade	Assessment Criteria
Structure Application	5	Design and construct at least 3 kinds of simple or difficult mechanical structures. Combine various structures reasonably.
	4	Design and construct 1-2 kind/s of difficult mechanical structures, such as robot claws and robot arms, etc.
	3	Design and construct 1-2 kind/s of relatively difficult mechanical structures, such as the combination of crank, connecting rod and parallelogram structure, etc.
	2	Design and construct 1-2 kind/s of simple mechanical structures, such as pulleys, gear sets, belt drives and chain drives, etc.
	1	Use the simplest building block bricks for stacking without any other mechanical connection or any mechanical transmission method.
	0	The project has no structure with only electronic parts connected. Or the structures have nothing to do with the function of the project. Or the structure cannot work at all.
Exterior Design	5	Use various art or other environmentally-friendly processing materials; Use materials of both 3D printing and laser cutting; The project and poster are attractive in design, and the project is equipped with an interactive device.
	4	Use various art materials or environmentally-friendly processing materials; Use one of 3D printing or laser cutting to design; The overall project and poster are very beautiful.
	3	Use 3 or more kinds of art materials or other art processing materials to design the project exterior; The project and poster are relatively beautiful.
	2	Use 1-2 kind/s of art materials or other art processing materials to design the project exterior; The project and poster are ordinary.
	1	Use ready-made products or tools for decoration; The project is simple without poster.
	0	The project has no exterior design with only mechanical structure and electronic parts connected. Or the designed exterior has nothing to do with the theme of the project.



Assessment Dimension 2: Innovative Thinking		
Sub-dimension	Grade	Assessment Criteria
Innovation	5	The project solution is very unique and innovative, no other simulated projects or products on the market, reflects unique creativity.
	4	The project solution is relatively innovative, combined with functions from other projects or products on the market, has some improvements, reflects certain creativity.
	3	The project solution is innovative, improve the single function from other projects or products on the market, reflects certain creativity.
	2	The project solution is common, repeating the functions of other projects or products on the market, but no improvement.
	1	The project solution is ordinary, only repeating single function of other projects or products on the market .
	0	The project solution does not have any personal creativity, highly similar to other projects or products.
Theme Research	5	The target user and orientation of the project is clear; Reflect the collection of information from 3 or more typical sources; The project is related to the theme.
	4	The target user and orientation of the project is clear; Reflect the collection of information from 1-2 typical sources, such as experts, related industries or organizations; The project is related to the theme.
	3	The target user and orientation of the project is blur; Reflect the collection of information from 3 or more typical or ordinary sources; The project is related to the theme.
	2	The target user and the orientation of the project is blur; Reflect the collection of information from 1-2 typical or ordinary sources, such as internet search, media news, daily life observation; The project is related to the theme.
	1	The target user and the orientation of the project is blur; The core of the project is barely related to the theme.
	0	The project has nothing to do with the theme.



Assessment Dimension 3: Electronic Technology		
Sub-dimension	Grade	Assessment Criteria
Electronic Technology	5	Use electronic modules that enable vision sensing, voice recognition or techniques with same difficulty in combination with various input and output modules; Electronic modules are connected correctly and achieve the functions of the project.
	4	Use wireless communications technologies such as Wifi and Bluetooth in combination with various input and output modules; Electronic modules are connected correctly and achieve the functions of the project.
	3	Use servo, LED panel, speaker or other electronic output modules in combination with various sensors; Electronic modules are connected correctly and achieve the functions of the project.
	2	Use 3 or more kinds of sensors. Electronic modules are connected correctly and achieve the functions of the project.
	1	Only use 1-2 kind/s of sensors. Electronic modules are connected correctly and achieve the functions of the project.
	0	No electronic module, or use the techniques listed above but no function is achieved, or the functions are irrelative to the theme of each match.



Assessment Dimension 4: Programming Ability		
Sub-dimension	Grade	Assessment Criteria
Programming Ability	5	Use block-based programming languages combining various program structures and algorithms, adopt AI algorithm to achieve voice and image recognition or functions with same difficulty.  Or use text-based programming languages like Arduino C and Python to realize PID control, voice and image recognition or functions with same difficulty;
	4	Use block-based programming languages combining various program structures and algorithms, realize PID control in the program or functions with same difficulty.
	3	Use block-based programming languages, choose data structure and algorithm logically, comprehensively use “event”, “variable” and “function” in the program.
	2	Use block-based programming languages, include 3 kinds of programming structures: “order”, “loop”, “select”. Use 1-2 type/s of blocks from “event”, “variable” and “function” in the program.
	1	Use block-based programming languages, include 0-2 kind/s of programming structures from “order”, “loop”, “select”. No block from “event”, “variable” and “function” in the program.
	0	No program provided, or the program is completely irrelevant to the project.



Assessment Dimension 5: Communication Skill		
Sub-dimension	Grade	Assessment Criteria
Oral Expression	5	Fluent and well-organized expression, rich vocabulary, clear pronunciation, accurate use of words and idioms to describe the project, including all required information.
	4	Fluent expression, lack of organization, rich vocabulary, clear pronunciation, can accurately describe the project, lack of some required information.
	3	Fluent expression, lack of organization, moderate vocabulary, clear pronunciation, lack of some required information, with a lot of irrelevant information.
	2	Some pauses, limited vocabulary, clear pronunciation, lack of required information.
	1	Multiple pauses, poor vocabulary, slurred pronunciation, and no required information.
	0	No oral expression in the video.
Process Presentation	5	Present a complete problem solving process, including problem definition, problem analysis, generation of possible solutions, selection and testing of solutions, analysis and evaluation of results.
	4	Shows the key steps in the problem solving process, including problem definition, solution testing and results analysis.
	3	Shows the whole problem solving process, but some steps are irrelevant to the final project. Lack interpretable logic.
	2	Shows 3 steps of the problemsolving process, but not all the key steps (problem definition, solution testing, results analysis). Lacks interpretable logic.
	1	Only shows 1-2 steps of the solving problem process. Lack of thinking process. Making people confused about why the problem exists, what problems have been solved, and how the final project solves the problem, etc.
	0	The problem solving process is completely absent, or the presentation content is completely unrelated to the project.



## Appendix 2. Competition Resources

Join MakeX Spark Online Competition Skype Group:

<https://join.skype.com/X5KZg8YXsnXp>



\*Note: Please sign in with a Skype account before you click the **Join Link** above. Otherwise if you select **Join as guest without account**, your guest conversation will only last for 24 hours.

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