2024 World GreenMech Contest Regulations

Hosts : ● Universitas Katolik Parahyangan (UNPAR), West Java (Jawa Barat), Indonesia
● World Forum For GreenMech Promotion

Co-Organizers : ● Rumah Edukasi
● Tarumanagara University
● Genius Toy Taiwan Co., Ltd

Supported by : ● Center of National Achievement - Indonesia Ministry of Education, Culture, Research, and Technology
● Genius Toy Taiwan Co., Ltd

World GreenMech Official Website : www.worldgreenmech.com

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1. Purpose

The 2024 World GreenMech Contest is an engineering-for-fun challenge, run by the World Forum for GreenMech Promotion. Using scientific principles, this competition combines Science, Technology, Engineering, Art, and Mathematics (STEAM) to promote learning and growth. There are three contests: (i) GreenMech (ii) R4M and (iii) GreenMech Jr. Each seeks to inspire contestants in their own way, and to engage in scientific study, creative problem solving, and help contestants understand the use of scarce resources when project planning. Contestants will enjoy pitting their different skills, abilities, and creativity against each other in a fun and friendly environment. There is ample opportunity for all contestants to make their contribution count.

1.1. Notes on the Regulations:

"Organizer" refers to the GreenMech (hereafter GM), the Robot for Mission (hereafter R4M) and GreenMech Jr. (hereafter GMJr.) competition Organizers.

All times and dates use the standard US system, mm/dd/yyyy and the 24-hour clock.

2. General Information

2.1. Summary of Events

2024 World GreenMech Contest					
Auction	**GreenMech** (GM)	**R4M** (R4M)	**GMJr.** Jr. Science	**GMJr.** Jr. Programmer	**Remarks**
Participant Selection	Full time students in grades 1-12. Three groups: (1) elementary school (2) junior high school (3) senior high school	Full time students in grades 1-12. Three groups: (1) elementary school (2) junior high school (3) senior high school	Kindergarten and Full-time students in grades 1-4 (Born between Sep 1, 2013 and Aug 31, 2018.)	Kindergarten and Full-time students in grades 1-4 (Born between Sep 1, 2013 and Aug 31, 2018.)	Students in education until June 6, 2024
Team Size	3 to 4 people	3 to 4 people	1 to 2 people	1 to 2 people	For rules governing replacement of players see in section 2.2
No. of Instructors	1 to 3 people	1 to 3 people	1 person	1 person	The instructor can be a teacher or parent

2.2. Player Replacement

If a player should be unexpectedly absent from the contest for any reason, the team leader can apply for replacements, subject to a per team limit of 50% of the original number of applicants. Application for a replacement must be prior to July 12, 2024.

2.3. Prohibition of Cross-group Registration

In order to avoid disputes, cross-group registration is prohibited. If students are unable to present their student registration certificate on arrival at the competition venue, a photograph will be required for confirmation of identity. If a contestant has broken the rules, they will be disqualified and any prizes/certificates will be revoked.

2.4. Enrollment & Qualification

Notes	All countries
Enrollment through countries is strongly recommended.	Local and national organizers for each country and region will be responsible for their region.

2.5. Event Schedule

Online Registration Date	Admission Announcements	Contest Date	Contest Location
06/12/2024 ~ 06/14/2024	06/18/2024	08/03/2024 (GreenMech, R4M) ~ 08/04/2024 (GreenMech Junior: Science, Programmer)	Universitas Katolik Parahyangan (UNPAR), West Java (Jawa Barat), Indonesia

2.5.1. Registration Deadlines

Registration for the World GreenMech Contest must be completed within the time limits specified by online registration, there will be no flexibility in this regard. Deadlines remain the same for independent applications and regional qualifying.

3. Information for Applicants

3.1. Registration Information

Participation must be completed within the time limits specified for online registration (06/12/2024 – 06/14/2024). More information can be found at the WGM official website: www.worldgreenmech.com

3.2. Team Names

Teams must use English for their team name. If the name is duplicated, the name will be granted on a first come, first served basis. The second applicant will be required to choose a different team name. The English team name is limited to 30 letters (including spaces) and there must be no indecency or innuendo. The Organizer has the right to ask teams to change their names.

3.3. Registration Fee

(1) GM, R4M: Teams must pay a USD $100 registration fee. This is not a returnable deposit and can be paid online during registration. Individual contestants each receive a T-shirt, and a commemorative medal.

(2) GMJr.- Science: Teams must pay a USD $50 registration fee. This is not a returnable deposit and can be paid online during registration. Each team will receive a set of Gigo #1261 Scientific Tour. Individual contestants each receive a T-shirt, and a commemorative medal.

(3) GMJr.- Programmer: Teams must pay a USD $30 registration fee. This is not a returnable deposit and can be paid online during registration. Each team will receive a set of Gigo #7442-A “coding & robotics: challenge pack 1”. Individual contestants each receive a T-shirt, and a commemorative medal.

3.4. Up-to-date Information

For up-to-date information and announcements, please check the event website regularly. Contestants are expected to take personal responsibility in this regard.

Event Website

4. Venue Regulations

4.1. Identity Check

Please fill in the Certificate of Student Enrollment shown in 11.1 Submit the required identity documents at the time of the contest. If the identity information is not received, contestants will need to be photographed for future reference. If a contestant’s identity is in question, proof of identity must be validated. If the student cannot supply the required proof, they will be disqualified.

4.2. On-site Facilities

This contest only provides the contestants with display tables. Each GM, R4M and GMJr. Programmer team have one whole table, GMJr. Science teams share one table between two teams. Competing teams can bring their own chairs, but only for rest, not for use in competitions. Any additional furniture should not obstruct main pathways or exits.

4.3. Permitted Materials

Contestants can carry written materials, pictures, video file and other printed data into the contest area.

4.4. Record Keeping, Videos and & Evidence

To avoid any unwanted controversy after the contest, each contesting team should cooperate with the Organizer to record their project in operation for future reference.

4.5. Dispute Handling

Contestants should always respect the final decision of the Organizer. If there is any doubt about a decision during production or appraisal, the contestants should object to the assessment immediately. If a consensus cannot be reached, the staff present will take contestants to the information counter to fill out an official complaint form (see section 11.2) and then invite the Evaluation Committee to make a final ruling. Contestants shall sign and confirm details regarding the complaint after the Evaluation Committee has explained the outcome of the appeal. After the contest, no further objections can be raised or heard.

4.6. Access Restrictions

During the contest, team leaders or parents are not allowed to enter the contest area or pass anything to the contestants. Any violations will result in a 5-point deduction from the team score.

4.7. Causing Unwanted Disturbances

During the contest, no person or team can disturb the work of other persons, teams or judges in any way. This includes running around or making loud noises. If this rule is violated and a warning has already been given, violators will receive a 5-point deduction.

4.8. Communications & Communication Devices

During the contest, contestants shall not speak to or exchange information with any non-contestant. This ban includes team leaders or parents, and all means of communication including phones or written notes. Upon confirming such communication has taken place, an offending team will suffer a 5-point deduction from their score after being warned. In the event of distress, contestants should contact event services for help.

4.9. Theft or Sabotage

In the highly unlikely event of any theft, between group sabotage, robbery or fraudulent seeking of another's possessions, event Organizers will first verify the claim. If the claim is verified, the offending team will receive a 5-point deduction as a minimum punishment.

5. Awards

5. 1. World GreenMech Awards (GM Basic & R4M Basic)

Position	Prizes	Number of Awards
Gold Medal (1st place)	1. Award certificate for contestants and team leaders 2. Cash USD $ 330 3. One Princess Cup Trophy	One team for each division
Silver Medal (2nd place)	1. Award certificate for contestants and team leaders 2. Cash USD $ 165 3. One Princess Cup Trophy	One team for each division
Bronze Medal (3nd place)	1. Award Certificate for Contestant and team leaders 2. Cash NTD USD $ 80 3. One Princess Cup Trophy	One team for each division
Honorable Mention Award	Award certificate for contestants and team leaders.	For top 50th percentile in each division, except teams receiving a gold, silver or bronze award.
STEAM Overseas Educational Contribution Award	Award certificate for contestants and team leaders.	For overseas countries

5. 2. World GreenMech Awards (GM Advanced & R4M Advanced)

Position	Prizes	Number of Awards
Gold Medal (1st place)	1. Award certificate for contestants and team leaders 2. Cash USD $ 660 3. One Princess Cup Trophy	One team for each division
Silver Medal (2nd place)	1. Award certificate for contestants and team leaders 2. Cash USD $ 330 3. One Princess Cup Trophy	One team for each division
Bronze Medal (3nd place)	1. Award Certificate for Contestant and team leaders 2. Cash USD $ 160 3. One Princess Cup Trophy	One team for each division
Honorable Mention Award	Award certificate for contestants and team leaders.	For top 50th percentile in each division, except teams receiving a gold, silver or bronze award.
STEAM Overseas Educational Contribution Award	Award certificate for contestants and team leaders.	For overseas countries

5. 3. GreenMech Junior Contest Award (Jr. Science & Jr. Programmer)

Position	Prizes	Number of Awards
Gold Medal (1st place)	1. Award certificates for contestants and team leaders 2. One product prize for each participant 3. One Princess Cup Trophy	One team for each division
Silver Medal (2nd place)	1. Award certificates for contestants and team leaders 2. One product prize for each participant 3. One Princess Cup Trophy	Two teams for each division
Bronze Medal (3nd place)	1. Award Certificates for contestants and team leaders 2. One product prize for each participant 3. One Princess Cup Trophy	Three teams for each division
Honorable Award	Award certificate for contestants and team leaders.	For top 50th percentile in each division except teams receiving a gold, silver or bronze award.
STEAM Overseas Educational Contribution Award	Award certificate for contestants and team leaders.	For overseas countries

5. 4. Award Revision

The Contest Organizers hold the right to adjust the above prize schedules for any reason, which may mean increasing or decreasing them. The total number of teams entered in the competition may be a factor in deciding final prizes if the number of contestants' changes.

5. 5. Award Distribution

The Gold Medal, Silver Medal, Bronze Medal winners of each contest will be announced at the award ceremony on the contest day. All certificates will be sent to the first named advisor listed on the registration document. Certificates will be sent after the contest and can be expected to arrive within one month of the award ceremony.

5. 6. Competition Certificates

All contestants will be presented with digital certificates as a gesture of encouragement. These certificates will be downloadable by contestants and team leaders after the contest, and can be printed by participants.

5. 7. Awards Delivered by Mail

Merit certificates for winning teams will be sent out within one month of the completed contest. Please pay attention to official website announcements. Winning teams that have not received awards should contact the Organizer for replacements. In the event of incorrect personal information being submitted during registration (i.e., wrong name, mail or email address) postage and other costs for replacement will be borne by the contestant for USD$7 /each certificate.

5. 8. Winning Team Obligations

Winning teams must cooperate with the Organizer to display and preserve their works. The Gold, Silver and Bronze Medal winners of the world-series are required to provide their model for filming within one month of the competition, to facilitate promotion and further education. If it is preferred, contestants can film their model in operation before the contest. The award cash will be transferred to the team after the team provides the video.

(1) Video Name: 2024_Contest Name_Group_School_Team Name.
e.g. 2024_GM Basic_Harry Elementary School_Super Man
(2) Video Content: Total length of the video can be up to 5 minutes. Must at least include the names and scientific principles of each device.
(3) Video Format: YouTube link and original editable file (1920 * 1080 MP4)

6. Legal Policy

6. 1. Contestant Insurance

The Organizer shall buy group insurance for all the contestants. This covers the day of the contest only. The contestants and the team leaders shall fill out their correct personal information in the Registration Information Form online. Without this, the Organizer will not be able to buy group insurance and cannot be held liable for payment of any damages.

6. 2. Intellectual Property Rights

During the online registration, team leaders must sign to confirm the contestants' original production statement and to ensure their works do not infringe on known patent or intellectual property rights of others. If the contestants need to use another person's IPR, they must submit a letter of authorization from the copyright owner at the time of registration to prove legitimate use.

6. 3. Organizer's IPR

All competing teams shall grant their project's IPR to the Organizer, who for the need of publicity, is entitled to revision, photography, publishing, book-compilation, exhibition, production and plate display of the created works, with no objection from the winners. In case the Organizer needs to carry out derivative designs of the award-winning work, the winners should cooperate in supplying pictures and the documents.

7. GreenMech (GM) Contest

7. 1. Notice

1. Elementary, junior high, and senior high schools have two contest levels, basic and advanced. Participating teams can join either competition.

7.2. Dimensions

7.2.1. Space Limits

All work must be constructed on a table 180cm long and 60cm wide.

A virtual rectangular space shown in Figure 1 extends upwards for 100cm. Work is not limited in height, but projects may only extend outward beyond the horizontal boundaries above 100cm. Projects extending must be safe and steady. If the constructions do not meet these requirements and have not been modified after a warning, 5 points will be deducted.

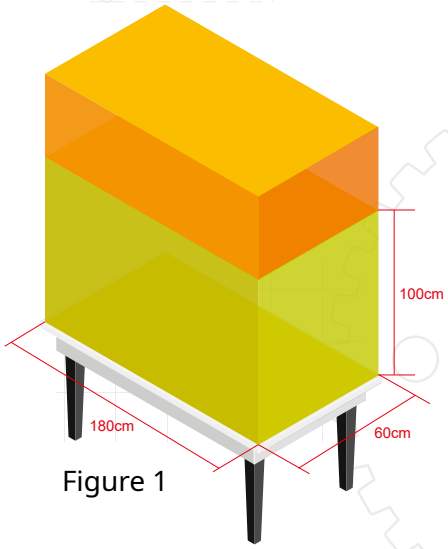


Figure 1

7.2.2. Material Specifications

Teams must carry any unassembled GreenMech parts themselves. All parts are certified non-toxic to state-level thresholds, CE (European), ASTM (US), ST (Taiwan), and CCC (China). Any uncertified materials brought in to the contest may lead to a point penalty or disqualification. Lost, broken, or damaged parts cannot be replaced.

7.2.3. Additional Materials

(1) Teams may carry un-processed materials and recycled materials such as cardboard, wood, cans, and bottles to augment their projects.

(2) Remote or programming control is not permitted for devices. Violation of this rule will result in a 5-point penalty.

(3) All electronic products including mobile phones, tablets, laptops, etc., are not recommended for use in projects. Teams using such devices will not be granted any bonus for including them.

(4) This contest allows the use of 3D printed parts and laser-cut parts. Each piece must not exceed 4cm x 4cm x 4cm and no components may be assembled in advance. Violation of this rule will result in a 5-point penalty.

7.2.4. Safety of Materials

Dangerous materials are strictly prohibited. Anything flammable, corrosive, electronically dangerous, or biologically discomfiting will be sufficient cause for disqualification.

7.2.5. Power Source Regulations

There is no power supply available in the contest venue for safety reasons. All contestants need to bring their own batteries. Battery voltages must 5V or less. Multiple batteries in series must be 15V or less, for safety reasons. Any violation in this regard will result in a 5-point deduction from the team score. The competition prohibits the use of lead batteries, uninterruptible power systems (UPS) or other large, potentially dangerous batteries. Violation of this rule will result in a 5-point penalty. If bodily injury should occur as a result of this rule breach, the team shall be immediately disqualified and expected to make recompense for the situation.

7.3. Basic (Elementary, Junior & Senior High School)

7.3.1. Event Schedule (Half-day contest, with 90 minutes production time.)

Registration	Materials Inspection	Clarification of Rules	Opening Ceremony	Production & Testing	Appraisals
07:30 ~ 08:00	08:00 ~ 08:20	08:20 ~ 08:40	08:40 ~ 09:10	09:10 ~ 10:40	10:40 ~ 12:40

7.3.2. Contest Tasks: Each team should design and correctly connect 4 basic devices and 1 designated device.

7.3.2.1. Material Specifications

To ensure fairness and standardization in the competition, we strongly encourage the use of Gigo building blocks when constructing devices. If there is a need to use everyday objects (such as paper, wood, styrofoam, electronic circuit components etc.), these objects must be in their original, unprocessed form. Any cutting, assembly, or modifications of these objects for devices must be done on-site during the competition, and may not be preprocessed, glued, or assembled beforehand. During the materials inspection phase, any everyday objects that do not comply with the rules will be removed. During the scoring process, if any everyday objects are found to be in violation of the rules, the score of the device will be zero.

7.3.3. Contents of Device

The first device is designated as a hydraulic device. Teams should make a pneumatic and hydraulic powered device using Gigo building blocks. The last device is the designated self-made launcher. The remaining three devices are the pulley, ratchet, and lever. The order of these three devices can be decided by teams.

Contents of Devices	
Hydraulic Device	Teams should design their devices according to the contest requirements. For example, if a team designs a ratchet, it must clearly demonstrate ratchet properties, and function correctly and smoothly.
Pulley	
Ratchet	
Lever	
Content of the Last Device - A Launcher	

1. On the day of the competition, teams are required to make their own automatic launcher that will automatically release 4-centimeter balls (Gigo A-40mm BALL-2945C BLUE :7330-W11-M1B) into a designated target area via mechanical triggers.
2. The Organizer shall make the target area and place it in a specified location.
3. There are 3 chances to automatically launch a ball, and the combined score from these 3 launches are counted as the score of the designated mission.
4. At the moment of ball launch, the horizontal distance between the ball's position and the target area must be greater than 90 centimeters.
5. After the ball is launched, balls must not touch any devices or objects, and the final resting position of the balls is used for scoring.

7.3.4. Scoring (Basic)

<table>
<tr><th colspan="2">Scoring</th></tr>
<tr><td>Smoothness
20%</td><td>1. When the device is in operation, 2 points will be deducted if anything falls out of the device area.
2. If there is a problem with the functioning of a device after it has been put in the arena and it requires manual intervention to resume operation, the team will receive a 2-point deduction.
3. The smoothness score will be multiplied by the score for the total number of devices used.</td></tr>
<tr><td>Total Number of Devices
10%</td><td>The total number of devices must be correct. Each device must be labeled clearly, in order, from “Device 1” to “Device 5”. Each correctly labeled device receives 2 points. (Refer to Device Labels)</td></tr>
<tr><td>Hydraulic Device
10%</td><td rowspan="4">1. Uniqueness (4%)
2. Sophistication (4%)
3. Demonstrate the corresponding scientific principles in each device (2%)</td></tr>
<tr><td>Pulley
10%</td></tr>
<tr><td>Ratchet
10%</td></tr>
<tr><td>Lever
10%</td></tr>
<tr><td>Designated Device and Mission
30%</td><td>The target area is the 30*20 cm area in the lower left corner of the map. This area needs to be cleared during grading. The Organizer will place the target area before grading begins.
1. Automatic launch (2 points)
2. Meet the horizontal distance requirements (2 points)
3. Balls do not touch any items or devices (2 points)
4. Score, according to the ball location:
<table>
<tr><td>Zone A</td><td>4 points</td></tr>
<tr><td>Zone B</td><td>3.5 points</td></tr>
<tr><td>Zone C</td><td>3 points</td></tr>
<tr><td>Touching the target area when falling, but not in the ABC area</td><td>2 points</td></tr>
<tr><td>Falling without touching the target area</td><td>0 points</td></tr>
</table></td></tr>
<tr><td>Decision Criteria Order
(if two team scores are the same)</td><td>1. Smoothness
2. Designated Device and Mission
3. Pneumatic Hydraulic Device
4. Pulley
5. Ratchet
6. Lever
7. Total Number of Devices</td></tr>
</table>

7.3.4.1. Scoring Considerations (Basic)

Scoring Considerations	
Smoothness 20%	The Smoothness is scored by the operation from the first device to the fifth device. The Smoothness score operates from the first device to the fifth device. 5 minutes is granted for fine-tuning before scoring begins. Contestants must sign to acknowledge their score after it has been given.
Total Number of Devices 10%	
Hydraulic Device 10%	1. Uniqueness (4%): Devices should exhibit unique characteristics, and be different from other teams. 2. Sophistication (4%): Movements can be shown in a variety of ways, more complex designs can earn more points. 3. Demonstrate the correct scientific principles for each device (2%). When judges are evaluating one device, teams should reset the sequence of actions so that it begins from the last action of the previous device. 4. The four devices will be graded by different judges. There is a 2-minute preparation time before scoring begins, and contestants do not need to sign after scoring.
Pulley 10%	
Ratchet 10%	
Lever 10%	
Designated Device and Mission 30%	The smoothness score is evaluated by the smoothness judge for 3 times. After the smoothness score is completed, the landing score of the first launch is recorded. The landing scores of the second and third launches are only recorded after the automatic launch is triggered by the last action of the previous level.

On the day of the competition, the Organizer will make this area and put it onto the team's table.

The launcher is designated as the 5th device. The others are market 1 thorough 4, and their order and position can be determined by the teams.

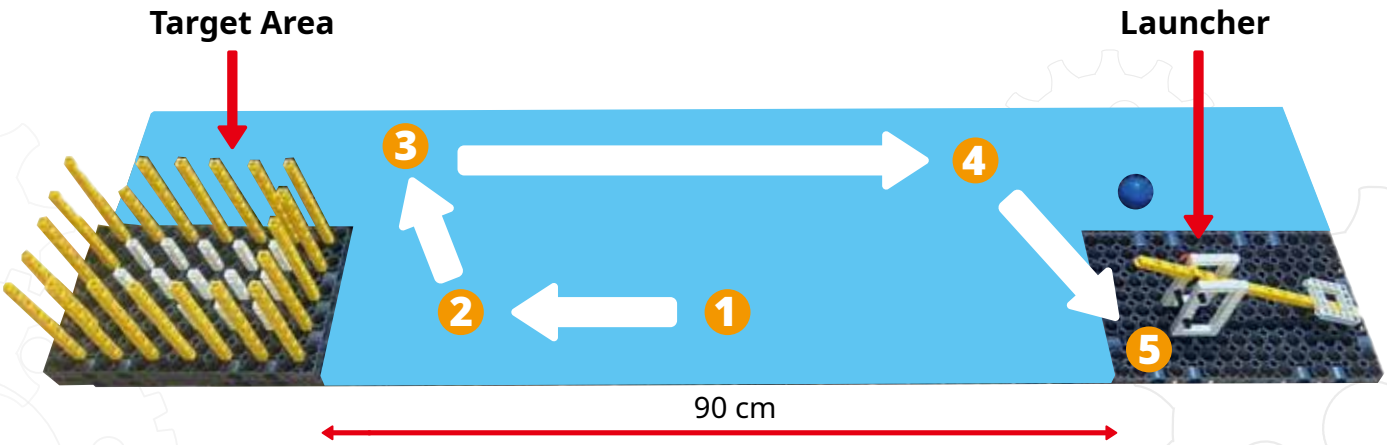


Diagram of the overall work

The target area and launcher must require the use of C-JUMBO BASE GRID (2 pieces in total).
In other areas, the C-JUMBO BASE GRID is optional, and the teams can adjust the number of C-JUMBO BASE GRID by themselves.

The target area is the 30 X 20 cm area in the lower left corner of the map. This area needs to be cleared during scoring. The Organizer will replace the target area before grading begins.

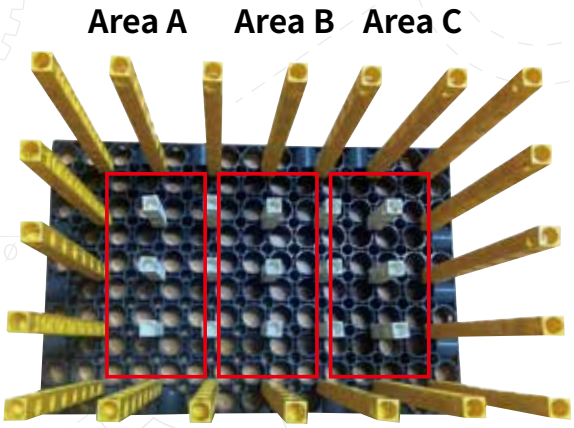
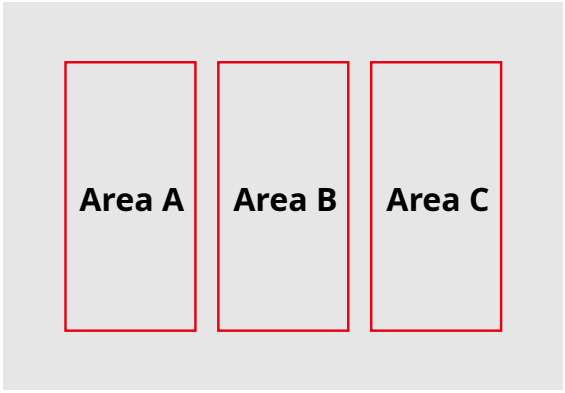


Diagram of the target area



7.4 Advanced (Elementary, Junior & Senior High School)

7.4.1. Net Zero Transformation

Some scientists are concerned about climate change and there may be negative impacts if people do not take responsibility for using the Earth's resources responsibly. Political groups and large corporations work closely with local organizations to try and reduce environmental harm. A few countries around the world are also trying to reduce their carbon-based emissions to zero by the year 2050, in a program called "Net Zero Emissions by 2050". The countries will continue to try and prevent environmental harm, using four major transformation strategies: energy, industry, daily life, and society. Gradually we will create a more sustainable society.
Please design a creative challenge based on one of the four goals of the net-zero transformation, and complement this goal with the overall project design to demonstrate the concept of net-zero emissions.

7.4.2. Event Schedule (Full-day contest, and the production time is 160 minutes.)

Registration	Materials Inspection	Clarification of Rules	Opening Ceremony	Production & Testing	Appraisals
07:30 ~ 08:00	08:00 ~ 08:20	08:20 ~ 08:40	08:40 ~ 09:10	09:10 ~ 11:50	13:00~15:30

7.4.3. Contest Tasks

Each team should make a total of 8 devices (4 general devices, 1 creative device, and 3 green energy devices) and the devices should connect and operate correctly.

7.4.4. Criteria

Work Configuration Chart: the sequence of devices is designed and planned by teams.
(1) Devices need to be labeled 1-8, and the creative devices and green energy devices should be marked on the label.
(2) The order of operations must fit the sequence according to the device label number.
(3) Only general devices are graded for scientific concepts.
(4) Green energy sources cannot be the first or last device.

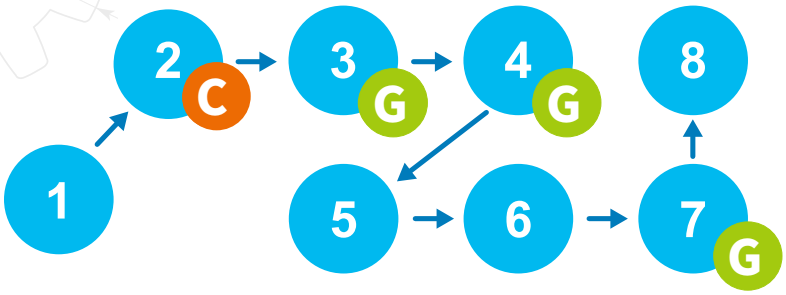


Figure 1. Work configuration chart showing devices and labels. Orange C indicates a Creative Device, Green G indicates a Green Energy Device.

7.4.4.1. Scoring Items (Advanced)

Scoring	
Smoothness 20%	1. When the device is in operation, 2 points will be deducted if anything falls out of the device area. 2. If there is a problem with the functioning of a device after it has been put in the arena and it requires manual intervention to resume operation, the team will receive a 2-point deduction. 3. The smoothness score will be multiplied by the score for devices used (Total Number of Devices).
Total Number of Devices 16%	A device labeled correctly earns 2 points.
Green Energy 24%	Three green energy devices
Scientific Concept 16%	Eight scientific concepts or principles because there are four general devices. Each general device has two scientific concepts.
Creative Device 16%	One of the four goals of the “net-zero transformation”
Design of the Whole Work 8%	The whole project should show the chosen goal of the “net-zero transformation”. Contestants must be able to describe their project using spoken English.
Decision Criteria Order (if two team scores are the same)	1. Smoothness 2. Total Number of Devices 3. Green Energy 4. Scientific Concept 5. Creative Device 6. Design of the Whole Work

7.4.4.2. Scoring Considerations (Advanced)

<table>
<tr><th colspan="2">Scoring Considerations</th></tr>
<tr><td>Smoothness
20%</td><td rowspan="2">The Smoothness score operates from the first device to the fifth device. 5 minutes is granted for fine-tuning before scoring begins. Contestants must sign to acknowledge their score after it has been given.</td></tr>
<tr><td>Total Number of Devices
16%</td></tr>
<tr><td>Green Energy
24%</td><td>1. There are total 5 minutes of preparation time for Green Energy and Scientific Concept is allowed before scoring begins. After scoring, the contestants need to sign for confirmation.
2. Green energy devices cannot be the first or last devices.
3. Teams have two chances of the operation: If the system works on first operation, teams earn 5 points. If the system works on second operation, teams earn 3 points. Otherwise, no points are earned.
4. Each green energy device earns 8 points. Three devices count to 24 points.
<table>
<tr><th>Scoring Items</th><th>Scores</th></tr>
<tr><td>This green energy device can activate the first action of next device successfully</td><td>5 points</td></tr>
<tr><td>The content of device is using the green energy resources</td><td>3 points</td></tr>
</table>
</td></tr>
<tr><td>Scientific Concept
16%</td><td>Scoring are applied according to the Scientific Concepts demonstrated. Scores are applied based on the Scientific Principles Reference Table. There are total 5 minutes of preparation time for Green Energy and Scientific Concept is allowed before scoring begins. After scoring, the contestants need to sign for confirmation.</td></tr>
<tr><td>Creative Device
16%</td><td>1. Unique ness: Devices have their own characteristics and are different from those of other teams.
2. Sophistication: The movements are displayed in a variety of ways, and the mechanism design is more difficult than those of other teams.
3. Theme: On-target and clearly stated.
4. The content of the creative device will be graded by the judge. There is a 2-minute preparation time before scoring begins, and contestants do not need to sign after scoring.</td></tr>
<tr><td>Design of the Whole Work
8%</td><td>Contestants must describe and explain the design concepts relating to their project, in spoken English. There is a 2-minute preparation time before scoring begins, and contestants do not need to sign after scoring.
(1) Design concept and storytelling (6 points): Overall project design.
(2) Spoken English (2 points): English can be simple, but must be clear.</td></tr>
</table>

7.4.4.3. Scoring Details (Advanced)

Scoring	Weighting	Standards
1 Total Number of Devices	16%	(1) The number of devices is calculated by the main path of the projects. Branch devices are not included in the scoring process. Teams must clearly specify the order of each device, as well as the order of operations. (2) The project has 8 devices, including 4 general devices, 3 green energy devices, and 1 creative device. (3) 2 points are awarded for correctly tagging each device, including device number, green energy, and creative devices. No points are awarded for unlabeled devices. See section 7.7.2 for device labels.
2 Green Energy Source Applications	24%	(1) There are five kinds of green energy sources: wind, hydro, solar, magnetic and chemical. Teams earn 3 points for compliance with green energy specifications. Each green energy-driven device that successfully activate the first action of next device will earn 5 points at the first operation. (2) Green energy devices cannot be used in the first nor the last device. These three green energy applications may not be repeated. The highest score available from this part is 24 points. (3) If a team uses green energy sources for the first or the last device, they will not be awarded any green energy score. (4) For more information on green energy use, refer to section 7.6
3 Smoothness	20%	(1) The smoothness score is based on the operation of the all 8 devices. Contestants should describe the scientific concepts and green energy applications for each device. (2) Contestants should be able to brief judges on the objectives they have completed for all devices including green energy. Contestants should be prepared to discuss the scientific concepts, green energy design and the scientific principles of any devices they have, and explain how they fulfill the requirement of the device. (3) When the device is in operation, 2 points will be deducted if anything falls out of the device (60cm x 180cm). If several objects fall together at one time, points will only be deducted once. If the same item falls multiple times, points will be deducted multiple times. (4) No points will be deducted if powder or liquid are dropped within reason. Contestants should remember, however, that negatively affecting the cleanliness of the contest area may be cause for point deduction. (5) If there is a problem with the functioning of a device after it has been put in the arena and it requires manual intervention to resume operation, the team will receive a 2-point deduction. (6) If a scientific principle or green energy application fails in a device, but overall operation continues, the manual intervention penalty is applied. (7) The smoothness score is multiplied by the score for each device, e.g., if the score from the number of working devices is 14 points, with two manual interventions, and one object drop, the Smoothness score is calculated as: (20 - 4 - 2) x 14/16 = 12.25 points.

Scoring	Weighting	Standards
4 Scientific Principle Applications	16%	(1) The application of scientific concepts includes scientific principles, laws, phenomena and structures as set out in section 7.7.1 (2) The 4 general devices must demonstrate 8 scientific concepts. Scientific principles cannot be duplicated in other devices. Each concept demonstrated earns 2 points, therefore each team can earn a maximum of 16 points. (3) At the time of examination, the empty list of scientific concepts will be released. Contestants should refer to the list as their work to ensure they are fulfilling the required objectives. At 11:00, the Scientific Principles Reference Table will be collected by the Organizer. Submission of an incomplete table will not score points. (4) If there are more than two scientific concept designs for a device, contestants should tick only two scientific concepts to be presented for that device. Only 8 scientific concepts can be checked on the self-assessment form, with no score exceeding 2 points per device. (5) Please refer to section 7.5 Scientific Concepts for more information.
5 Creative Device	16%	The creative device can earn 16 points. Design a project following one goal of the four categories. The project must show the following: (1) Uniqueness (5%): Devices have their own characteristics and are different from those of other teams. (2) Sophistication (6%): The movements are displayed in a variety of ways, and the mechanism design is more complex than those of other teams. (3) Theme (5 %): On-target and clearly stated, within 3 minutes.
6 Design of the Whole Project	8%	Contestants must describe and explain the design idea of the whole work and its story in spoken English. A 2-minute preparation time is allowed before scoring begins. Contestants do not need to sign after the score is awarded. (1) Spoken English (2 points): English can be simple, but must be clear, within 3 minutes. (2) Design concept and storytelling (6 points): Overall project design.
7 Rule Violations	On-site points deduction	(1) All devices are not allowed to use programming language or remote control, graphic control, etc. to operate the mechanisms. If found to be used, 5 points will be deducted from the total score. (2) Size violations will result in a 5-point deduction. (3) Untidy work areas or poor “housekeeping” (e.g.: unruly scattered materials, wet and slippery floor), with no improvement after warning, will result in a 5-point deduction. (4) Failure to observe the contest rules, disturb the project work of others, with no correction after a yellow card warning, shall result in a 5-point deduction. Repeated severe infractions will lead to disqualification. (5) Violation of power usage regulations will result in a 5-point deduction. (6) Violation of regulations governing 3D printing parts and laser cutting parts will result in a 5-point deduction.

Remark: Creative presentation and story description do not require the preparation of promotional materials or other introduction items, and it is not recommended to prepare additional costumes and props. Creative presentation and story description will only be scored based on the mechanism design and description content of the contestants.

7.5. Scientific Concepts

Scientific concepts must meet the basic principles and be self-assembled and self-designed. Contestants should be able to understand the principles and contents of their devices and be able to explain the functions to judges.

(1) Scoring of scientific concepts occurs after the devices are assembled and have been demonstrated with the scientific functions. If a commercially available product or other finished product is used, no scientific concept score will be granted.

(2) 8 scientific concepts are needed; teams must be able to make an adequate explanation to reviewers and judges. Each action can be regards as one scientific concept.

(3) From the Science Principle Concept Table, only 8 concepts can be checked for scoring. Contestants should choose the scientific concepts they are most confident with. After the self-assessment form is submitted at around 11 am, no further changes may be made.

(4) Each device needs to contain two scientific concepts for scoring. If there are multiple scientific concepts to choose from, contestants should still check only the scientific concepts that require judgment.

(5) There are also five self-rating items on the self-rating form. Players may fill in up to five items according to their design, but may not duplicate the items in the self-evaluation form.

The following are examples of judgments of scientific concepts:

(1) Start the light source, the light source illuminates resulting in reflection, refraction, diffraction, and other optical phenomena. Teams then receive the optical concept score. If you turn on the power only to turn on the LED light, teams will only receive the electrical score.

(2) The ball rolls down and collides with a bell or other object to produce a regular or irregular sound for an acoustic score. If you turn the power on and the buzzer sounds, teams only receive the electrical score. If you hit a connecting rod to open a commercial music box and produce music, because the music box design is “finished; only the connecting-rod score is valid.

7. 6. Green Energy Requirements

1. These only apply to the advanced teams. The contest’s green energy component includes five types of green energy.

(1) There should be a green energy-driven mechanism in the device area and the successful starting of the next device will earn teams 8 points.

(2) In total teams should submit three different green energy devices and implement them somewhere after the first device and before the last device.

(3) The energy application for each of the three devices should not be duplicated. The highest score for this category is 24 points.

2. Many green energy applications previously did not meet the standards of the judges and reviewers. The competition aims to emphasize the concept of energy conservation, and so green devices must also be able to start the next device in the chain.

3. Green energy devices may not use batteries.

Wind energy

Must be started by the previous device. Must also be able to use wind power only, and through operation, be able to start the following device in the chain.

Water energy

Must be started by the previous device. Must also be able to use water power only, and through operation, be able to start the following device in the chain. Use of drive mechanisms to promote water flow exploiting potential-energy differences or pressure differences is permitted.

◎ Hydraulic linkages and buoyancy, are part of the science concepts and not included in the green energy score for water.

Solar Energy

Must be started by the previous device. Must also be able to use (simulated) solar power only, and through operation, be able to start the following device in the chain. Simulated solar light source should be shone on to the solar panel.

◎ Only lighting the LED light up but being unable to drive the next device will be counted as failure.

◎ Because the current generated by the solar panel is too small to start the motor, the general method is to use a series battery as a backup. At this time, the solar panel is only regarded as the circuit switch operation, and cannot be regarded as the main energy driving mechanism. It will be regarded as the failure of the green energy level.

Magnetic energy

Must be started by the previous device. Must also be able to use magnetic power only, and through operation, be able to start the following device in the chain.

◎ Magnetic energy can be converted into electrical energy or kinetic energy such as electromagnetic induction. For example, a Gaussian slingshot will accelerate the ball impact, leading to the next mechanism starting.

◎ Using only magnetic attraction and repulsion is a science concept, not a Green concept.

Chemical energy

Must be started by the previous device. Must also be able to use chemical power only, and through operation, be able to start the following device in the chain.

◎ Chemical green applications are usually more difficult to configure successfully. For example, the fruit battery required to drive the LED may require at least three or more groups of fruit in series or battery in parallel and it is often insufficient for motors or other mechanical functions. The fruit battery device is only an on-off device, it does not really use chemical energy.

◎ Rechargeable batteries are not recognized as an application of chemical energy for Green Energy devices.

7.7.Appendix for GreenMech

7.7.1. Scientific Principles Reference Table

Scientific Principles Reference Table					
Item	Device Number (Contestant Evaluation)	Judge Evaluation	Item	Device Number (Contestant Evaluation)	Judge Evaluation
Law of Inertia			Connecting Rod		
Force & Acceleration (Gravity Potential)			Truss		
Action and Reaction			Chain Gear/ Transmission		
Center of Mass / Domino Effect			Track		
Leverage			Ratchet & Pawl		
Circular Motion& Centripetal Forces			Acoustics		
Pascal's Principle			Electricity		
Communicating Vessels			Thermology		
Bernoulli's Principle			Magnetism		
Wheel and Axle			Elasticity		
Pendulum			Friction		
Static Electricity			Buoyancy		
Worm Screw Worm Gear			Other (to be completed by contestant)		
Capillary Action / Siphon			Other		
Pulley			Other		
Cam			Other		
Gear or Rack			Other		

Note 1: The form cannot be arbitrarily added or modified. Only the scientific principles of self-design can be filled in other parts.

Note 2: Scientific principles and green energy cannot be double-counted. Only 8 scientific principles can be selected.
If you choose more than 8, please delete more.

Note 3: The device number field can only be filled in with one single option. Do not fill in multiple device numbers, otherwise please delete for judge grading.

7.7.2. Device Labels & Green Labels (for both Basic & Advanced)

In GreenMech contest, contestants must print their own device labels, green energy labels, and creative device labels. The size should be such that all information can be seen clearly; black and white printing is acceptable.

8. Robot for Mission (R4M)

8.1. Contest Schedule

R4M Schedule		
Time	Item	Remarks
07:30 ~ 08:00	Registration	1. After registration, contestants should enter the venue and not leave until the event has concluded. 2. After 08:00, only contestants may be in the competition area. Team leaders and parents/guardians are not permitted after this time.
08:00 ~ 08:20	Materials Inspection	1. Team leaders shall stay in their assigned areas after 08:00 and shall not enter the competition venue. 2. Judges will carry out a building materials inspection. Blocks may not be assembled in advance. Chains are the only exception to this rule. 3. After passing the materials examination, a label will be applied. Students should then sit at the table and wait without touching the materials. 4. Personal items like bags can be brought into the venue but must be placed on the table in keeping with the inspection record. 5. Contestants need to submit their Certificate of Student Enrollment, see Section 11.1.
08:20 ~ 08:40	Clarification of Rules	Clarification of the rules and precautions of the competition
08:40 ~ 09:10	Opening Ceremony	Participants attend the opening ceremony.
09:15 ~ 11:15	Assembly & Practice Time	
09:40 ~ 11:30	Work Submission Period	1. Check to confirm the robot does not contain metal parts. 2. The robots, plus any additional parts are weighed. 2.1. Basic: (Three robots: A, B, and C, or one spare car) 3. Participating robots (including any additional components) need to be verified by judges and will be retained until the contest time. 4. 5-Points may be deducted for messy or untidy work areas. 5. For robot size regulations please obey the regulations of R4M Basic and R4M Advanced. 6. After submitting a project, contestants need to clear away all items from the competition area including notebook, blocks, and any un-used electronic control equipment.
11:30 ~ 12:30	Lunch	After lunch contestants are expected to assist with sorting trash and keeping the competition area clean.
12:30 ~ 12:50	Announcements	When entering the venue, contestants may only carry a notebook, tablet or mobile phone, other items are not permitted.
13:00 ~ 16:00	Competition Time	
16:30	Awards Ceremony	Organizers make every effort to finish on time, but some patience may be required depending on announcements and other possible delays.

8.2. R4M (Basic) - Scenario & Site Specifications

8.2.1. Size Restrictions

A, B and C robots must individually not exceed 30 × 20cm. There is no height limit. Mechanical extensions are excluded from these limits but these must be operated by remote control or servo motor, not manually.

8.2.2. Number of Robots

Teams should prepare 3 robots (A, B, and C) for the best performance. By the time the competition begins, teams should have at least two operational robots. If there are less than 2 robots, the team is considered to have withdrawn from the contest. If the robot needs to be repaired, the contestant must receive permission to intervene from a judge. Repair time is included in competition time, and the process must be re-started from the area specified by the judge. If contestants manually intervene without permission from the judge, the first violation will result in a verbal warning; the second will result in a 5-point deduction. Multiple violations accumulate additional points.

8.2.3. Building Materials

Each team is required to carry any unassembled Gigo blocks. Robot components cannot use metal materials, any uncertified materials brought into the contest may lead to a point penalty or disqualification. Lost, broken, or damaged parts cannot be replaced.

8.2.4. 3D Printed Components

For fairness, all robots must be assembled with Gigo blocks. 3D printed, laser cut, CNC parts, PP board pieces are not allowed.

8.2.5. Operation Devices (Smart Phones / Tablets)

Contestants are free to choose their own operation method (e.g., smart phones, tablets, laptops or remote-controllers or related equipment) to operate their robot. Devices should all be prepared ahead of time by the teams, and contestants should remember that there is no electricity available on site. The program version is not limited. (In addition to the public Bluetooth remote control allowed by the Organizer, contestants may also choose to use infrared remote control. Contestants should remember that because other players may use infrared with the same frequency, interference may occur. Any intentional interference will result in disqualification.)

8.2.6. Power Supplies & Restrictions

The contest site does not provide any power. All contestants need to bring their own batteries for their robots. The total voltage of the A and B robots is limited to power from the control box. No lithium-ion or “empty” batteries are permitted for the A or B robots. All batteries must be marked with their correct voltage.

Robot C should use a micro:bit main control box (1269-W85-A1). Voltages must comply with the safety regulations of the main control box, so contestants must use 6 AA carbon zinc batteries, AA alkaline batteries or AA rechargeable batteries as power supply. The rated total voltage of a battery must be 5 volts or less. Do not use lithium-ion batteries or “empty” batteries. Batteries must be marked with their correct voltage, covered and insulated correctly; they must not be exposed. Batteries should not cause any pollution or harm due to poor quality or age. If any players are hurt, the team will be disqualified and the team leader will be held responsible.

* Lead-acid batteries and other large dangerous batteries are strictly prohibited.

8.2.7. Motor Usage Restrictions

Robots A and B may have up to 4 servo motors and Robot C may have up to 2 servo motors. The motors and all robots for the competition can only be connected by means of Gigo pieces. It is not possible to connect them with quick-drying glue, rubber bands, foam glue, zip tie, double-sided tape or other methods. After the competition, the winners will be asked to dissemble their robots on the spot if the judges of Organizer think it's needed. If the judges find that a team violates the regulation, this team will be disqualified from winning the prize. And the prize goes to the next team on the score list.

8.2.8. Contest Motor Models

To create a level playing field for all contestants, everyone must use a motor model(s) selected from the following parts list. 7328-W85-A1-1, 7392-W85-B3, 7392-W85-B1, 7400-W85-A1, 7400-W85-A, 1247-W85-D1-1, 1247-W85-D2, 7447-W85-C, 7412-W85-A, 1247-W85-D3. For more information, please refer to Section 8.11. If a contestant using the above-mentioned motors installs a different Bluetooth control box; whether it connects a modified motor and the Bluetooth box, or automatically links the motor to other control devices, contestants must confirm that they have complete control over the robot's functions. If any problems arise during the contest, contestants are required to resolve the problem themselves and ensure completion of the mission.

Everyone must use control boxes selected from the following parts list: 1246-W85-A1, 1204RR-W85-A1, 7408-W85-A2, and 1269-W85-A1.

8.2.9. Material Safety

Dangerous or hazardous materials are strictly prohibited, including but not limited to: fire, corrosive chemicals, dangerous power components, alternate bios, or anything that may potentially cause harm to people. If such items or hazards are brought into the contest site unauthorized, the team will be disqualified.

8.2.10. Robot Movement & Site Restrictions:

There is no peripheral block wall on the basic R4M site. Only if all wheels or robot components exceeds the area of the base map, it is a rule violation. The first rule violation receives a verbal warning; the second earns 5-point deduction. Destruction of the site also earns a 5-point deduction. Violations are cumulative.

*The robot usually runs on wheels, but teams can replace a wheel with another component, the component touching the ground is regarded as a wheel.

8.3 Contest Theme for R4M Basic: "Gigo Container Port (Plus Version)"

8.4. Scenario & Site Specifications

8.4.1. The contest area is limited to a space not exceeding 140 x 300cm and is covered by matte PP photo paper. Each competition area accommodates one team only. The A robot, B robot, and C robot should be placed in the departure or designated areas.

Figure 1. Competition area

8.4.2. R4M Tasks (Basic)

Venue Setting: Positioning points and example images of storage objects (before the competition begins)

The picture above shows the place markers for the green and yellow pieces. As 40-foot containers, they can be placed anywhere inside the red frame.

The picture above shows the place markers for six pieces which represent 20-foot A-type shipping containers. Each Area must have three different color pieces, as shown. These pieces can be placed at any angle or position.

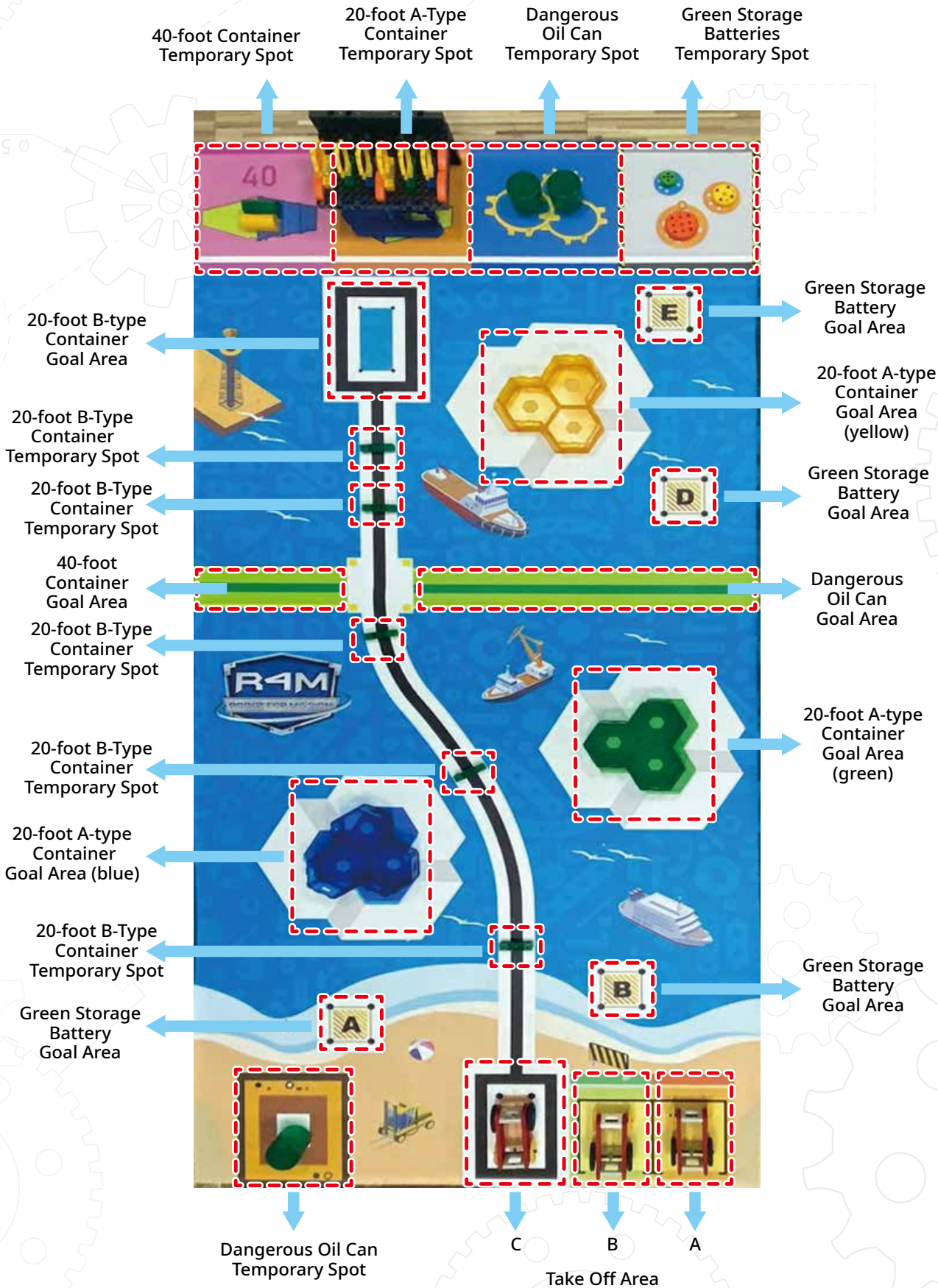
The two pictures above show the place markers for the green pieces as dangerous oil cans.

The picture above shows the place markers for the pieces as the storage batteries.

The picture above shows the place markers for the 20-foot B-type containers.

Gigo Container Port (Plus Version) – Area Definitions

Before each task starts, Robot A, B, and C (micro:bit, programmed) must be placed in their respective starting areas, marked A, B, and C on the map. Teams may begin the contest after the judge announces.



The block colors and patterns of this picture do not affect the rules of the competition. Participating teams can adjust these items during practice.

Competition Tasks

The contest uses a points-based task system. The team score is awarded after the contestants have completed the task. The total score from all tasks is used to calculate the total team score.

Task One: Robot A earns 5 points when the whole robot body has left Take Off Area A.
Robot B earns 5 points when the whole robot body has left Take Off Area B.
Robot C earns 5 points when the whole robot body has left Take Off Area C.

Task Two: Robot C must be equipped with a LINEFOLLOWER SENSOR (1247-W85-B3). The relevant specifications are provided in Appendix 8.11. Robot C must be programmed, not remote control. The program can be written, modified or uploaded by the contestants on the spot during the competition. Robot C must follow the black line and transport the 20-foot B-type containers to the goal area to score points. The full score table is shown below, and the total highest score is 160 points.

Status	Items	Points
A	Robot C delivers one piece of 20-foot B-Type Container to the Goal Area.	10
B	Robot C delivers two pieces of 20-foot B-Type Container to the Goal Area.	30
C	Robot C delivers three pieces of 20-foot B-Type Container to the Goal Area.	60
D	Robot C delivers four pieces of 20-foot B-Type Container to the Goal Area.	90
E	Robot C delivers five pieces of 20-foot B-Type Container to the Goal Area.	120
F	Robot C delivers five pieces of 20-foot B-Type Container to the Goal Area and the LINE FOLLOWER SENSOR (1247-W85-B3) of Robot C autonomously goes to the designated goal area, and is fully within the lines inside the black frame.	160

NOTES:

Note 1: After the Robot C starts operation, if a programming error is discovered, then contestants may make corrections so that the robot can continue working. However, time taken to correct the program, or make other modifications including reading and performing the task is all included in the total task time.

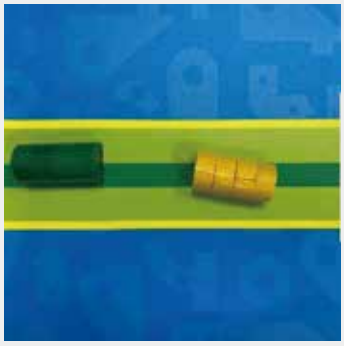
Note 2: The software used by Robot C is micro:bit, and the main control box is Gigo's C-micro:bit main control box (1269-W85-A1). Please refer to Appendix for exact specifications.

Note 3: The head of Robot C should be facing forward when it begins operation. It should not be aiming directly at the black line. Robot C should be completely within the black frame when it begins operation.

Note 4: Equipment used to program Robot C such as laptops, tablets, and cables, the micro:bit mainboard, and an internet connection should be prepared by the contestants.

Task Three: Use robots A and B to transport the 40-foot containers to the goal area to earn the corresponding points. The corresponding points table is as follows, with a full score of 80 points.

Status	Items	Points
A	There is one 40-foot container is transported to the goal area and stand up.	30
B	There are two 40-foot containers are transported to the goal area and stand up.	80
C	There is one 40-foot container is transported to the goal area (not standing up).	10
D	There are two 40-foot containers are transported to the goal area (not standing up).	30
E	There are two 40-foot containers are transported to the goal area (one as standing up, and the other not standing up).	40



Status B (team earns 80 points).

Status D (team earns 30 points).

Status C (team earns 10 points).

Task Four: Robots A and B must be used to transport the 20-foot A-type containers from the Temporary Spot to the Goal Areas.

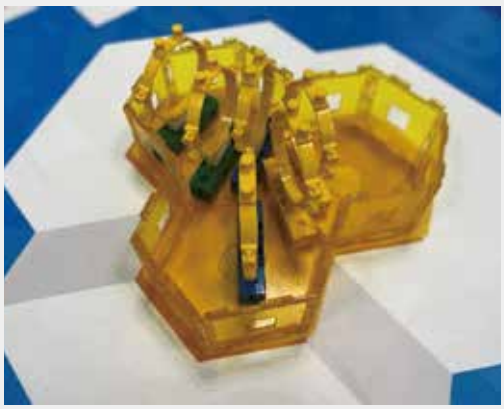
Points are awarded to teams based on the following criteria. The maximum score is 220 points.

(1) For elementary school teams, if one piece with any color is within the goal area, the team earns 30 points.

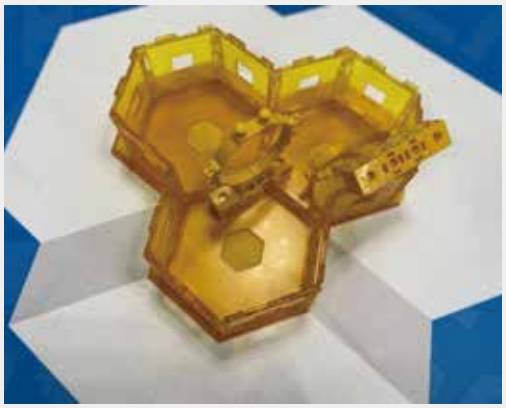
(2) For junior high school teams, if one piece with the correct color is within the goal area, the team earns 30 points. However, if one piece with a different color is within the goal area, the team earns 20 points.

(3) For senior high school teams, if one piece with the correct color is within the goal area, the team earns 30 points. However, if one piece with a different color is within the goal area, the team earns no points.

According to the picture above, teams (elementary school, junior high school, senior high school) can get 220 points.



According to the picture above,
teams (elementary school) can get 220 points.
teams (junior high school) can get 140 points.
teams (senior high school) can get 60 points.



According to the two pictures above, teams (elementary school, junior high school, senior high school) can get 30 points.
The 20-foot A-type container can get points only if the object is totally within the goal area.

Task Five: Robots A and B must be used to transport the dangerous oil cans from the Temporary Spots to the Goal Area. Teams earn 40 points for each standing piece placed within the area. Teams earn 20 points for each non-standing piece placed within the area. The maximum score is 150 points.

According to the picture above, teams can get the full 150 points.

According to the picture above, teams can get 60 points.
(Three non-standing)

According to the picture above, teams can get 40 points.
(Two non-standing)
(One outside)

According to the picture above, teams can get 40 points.
(One standing)
(Two outside)

Task Six: Teams should use Robot A or B to transport the green storage batteries from the Temporary Spot to the Goal Areas A, B, D, or E. Each piece scores 20 points. The maximum score is 80 points.

Points are awarded to teams based on the following criteria.

(1) For elementary school teams, if one piece is transported within any goal area, the team earns 20 points.

(2) For junior high school teams, one specific goal area is draw out before the competition.

(3) For senior high school teams, all three specific goal areas are draw out before the competition.

8.5. Scoring Criteria (Basic)

8.5.1. Score Calculation: 2 minutes are given to complete the task, and the highest scoring team wins. If there are more than 2 teams getting the full scores, the team with the least time wins.

8.5.2. Score Calculation (Total Weight): The total weight of the robot also affects the score. Lower weight robots receive higher scores.

8.5.3. Sequence Order: Awards are based on scores. If teams have the same score, the final result will be determined by the following order of decisions.

Sequence Order	Sequence Item
0	The total scores.
1	The competition time.
2	The number of tasks with scores.
3	The number of tasks with a full score.
4	Score of task four.
5	Score of task two.
6	Score of task five.
7	Score of task three.
8	Score of task six.
9	Score of task one.
10	Total weight. (Less, wins)
* Remark: If more than two teams earn a full score, the team with the shortest time wins.	

8.5.4. Competition Time

The total time of the contest is 2 minutes. After 2 minutes, contestants are not allowed to continue.

8.5.5. Damage to the Contest Area

Any damage to the contest site during the mission will result in a 5-point deduction. This contains damage to all props in the testing area.

8.5.6. Competition Order

Before the competition begins, teams should proceed to their designated area as specified by the map provided by the Organizer.

8.5.7. Work Submission

Teams that have finished their rounds must return their robots to the work display area until the end of the contest.

8.6. Contest Site Rules

8.6.1. Checking Items

After registration, contestants should enter the contest site directly. Toolboxes, personal bags, use of tools (including ornament props), and other potentially dangerous objects will be actively checked on site. If any signs of fraud or cheating are discovered, the team will be disqualified.

8.6.2. Assembly Time

The assembly time, including practice time, is 2 hours.

8.6.3. Missions

Contesting teams build their robots on site during the contest. After building, teams must follow the contest schedule to undertake the missions. No assembled components are allowed into the contest site. Violators of this rule will be disqualified.

8.6.4. Allowance for Practice

During assembly time, some limited opportunities for practice may arise. As practice spaces are limited, please follow the instructions of the staff regarding these opportunities.

8.6.5. Access Restrictions

During the contest, team leaders or parents are not allowed to enter the contest area or pass anything to the contestants. Any violations will result in a 5-point deduction from the team score.

8.6.6. Interference with Others

During the contest, no person or team is allowed to disturb the work of other persons, teams or the judges in any way. This includes running around or making loud noises. If this rule is violated and a warning has already been given, violators will suffer a 5-point deduction.

8.6.7. Communications & Communication Devices

Contestants are not allowed to talk, communicate, or text non-contestants (e.g., team leaders, parents). Violators of this rule will be disqualified. In an emergency situation, contestants should seek help from the Service Center.

Note: Contestants may bring mobile phones, tablets and laptops as controllers, however, to avoid any unwarranted or unjustified punishment, such devices should be on airplane mode or have the SIM card removed.

8.6.8. Private Property

Any deliberate destruction, theft, robbery or attempts to cheat other people of their possessions will lead to a 5-point deduction and probably more serious measures.

8.6.9. Portable Data

Contestants may bring writing, pictures, video files and other printed data.

8.6.10. Video Recording

To avoid disputes after the competition, each team must cooperate with the organizer to record the competition process of their works during the competition time for reference.

8.6.11. Motor Inspection

Winning teams must accept a motor inspection, if the motor does not meet the specifications in Section “Contest Motor Model List”, the team’s award will be withdrawn and the next team in line will be promoted.

8. 7. R4M (Advanced) -Scenario & Site Specifications

8.7.1. Size Restrictions

A, B and C robots must individually not exceed 30 × 20cm. There is no height limit. Mechanical extensions are excluded from these limits but these must be extended by remote control or servo motor, not manually.

The size of D automation platform is limited to one JUMBO BASE GRID 30 x 20 cm. The height (vertical size) of projects is not limited. The automation platform must be made and fixed to a single jumbo base grid. During the competition, the automation platform can only be fixed to the BASE GRID with four 30mm red round connectors (30mm CONNECTOR). No other pegs can be used.

8.7.2. Number of Robots

Teams should prepare 3 robots (A, B, and C) for the best performance. By the time the competition begins, teams should have at least two operational robots. If there are less than 2 robots, the team is considered to have withdrawn from the contest. Teams can decide whether they want to use the automation platform.

If the robot needs to be repaired, the contestant must receive permission to intervene from a judge. Repair time is included in competition time, and the process must be re-started from the area specified by the judge. If contestants manually intervene without permission from the judge, the first violation will result in a verbal warning; the second will result in a 5-point deduction. Multiple violations accumulate additional points.

8.7.3. Building Materials

Each team is required to carry any unassembled Gigo blocks. Robot components cannot use metal materials, any uncertified materials brought into the contest may lead to a point penalty or disqualification. Lost, broken, or damaged parts cannot be replaced.

8.7.4. 3D Printed Components

For fairness, all robots must be assembled with Gigo blocks. 3D printed, laser cut, CNC parts, PP board pieces are not allowed.

8.7.5. Operation Devices (Smart Phones / Tablets)

Contestants are free to choose their own operation method (e.g., smart phones, tablets, laptops or remote-controllers or related equipment) to operate their robot. Devices should all be prepared ahead of time by the teams, and contestants should remember that there is no electricity available on site. The program version is not limited. (In addition to the public Bluetooth remote control provided by the Organizer, contestants may also choose to use infrared remote control. Contestants should remember that because other players may use infrared with the same frequency, interference may occur. Any intentional interference will result in disqualification.)

8.7.6. Power Supplies & Restrictions

The contest site does not provide any power. All contestants need to bring their own batteries rated 9V or less for each of the A and B robots. 9V refers to the total voltage across the circuit. All batteries must be marked with their correct voltage. Carbon zinc batteries of 1.5 volts are limited to 6 pieces, 18650 batteries of 3.7 volts are limited to 2 pieces, and square 9-volt batteries are limited to 1 piece.

Robot C should use a micro:bit main control box (1269-W85-A1). Voltages must comply with the safety regulations of the main control box, so batteries are limited to 6 pieces of AA carbon zinc batteries, alkaline batteries or rechargeable batteries . The rated total voltage of a battery must be 5 volts or less. Do not use AA lithium-ion batteries or “empty” batteries. Batteries must be marked with their correct voltage, covered and insulated correctly; they must not be exposed. Batteries should not cause any pollution or harm due to poor quality or age. If any players are hurt, the team will be disqualified and the team leader will be held responsible.

Automation platform D can be operated by remote control, program control, or AI (Artificial Intelligence), but the voltage of the main control board must be the same as the A robot or lower.

*Lead-acid batteries and other large dangerous batteries are strictly prohibited.

8.7.7. Motor Usage Restrictions

Robots A , B and C may have up to 4 servo motors. The automation platform may have up to 6 servo motors. The motors and all robots for the competition can only be connected by means of Gigo pieces. It is not possible to connect them with quick-drying glue, rubber bands, foam glue, zip tie, double-sided tape or other methods. After the competition, the winners will be asked to dissemble their robots on the spot if the judges of Organizer think it’s needed. If the judges find that a team violates the regulation, this team will be disqualified from winning the prize. And the prize goes to the next team on the score list.

8.7.8. Contest Motor Models

To create a level playing field for all contestants, everyone must use a motor(s) selected from the following parts list. 7328-W85-A1-1,7392-W85-B3, 7392-W85-B1, 7400-W85-A1, 7400-W85-A, 1247-W85-D1-1, 1247-W85-D2, 7447-W85-C, 7412-W85-A, 1247-W85-D3,7447-W85-C1. For more information, see please refer to Section 8.11. If a contestant using the above-mentioned motors installs a different Bluetooth control box; whether it connects a modified motor and the Bluetooth box, or automatically links the motor to other control devices, contestants must confirm that they have complete control over the robot’s functions. If any problems arise during the contest, contestants are required to resolve the problem themselves and ensure completion of the mission.

8.7.9. Material Safety

Dangerous or hazardous materials are strictly prohibited, including but not limited to: fire, corrosive chemicals, dangerous power components, alternate bios, or anything that may potentially cause harm to people. If such items or hazards are brought into the contest site unauthorized, the team will be disqualified.

8.8. R4M (Advanced) – Theme: [AI Space Station]

8.9. Scenario & Site Specifications

8.9.1. The contest area is limited to a space not exceeding 120 x 200cm and is covered by matte PP photo paper. Each competition area accommodates one team only. Robots A, B, C, and D automation platform, should all be placed in their starting or designated areas, as appropriate.

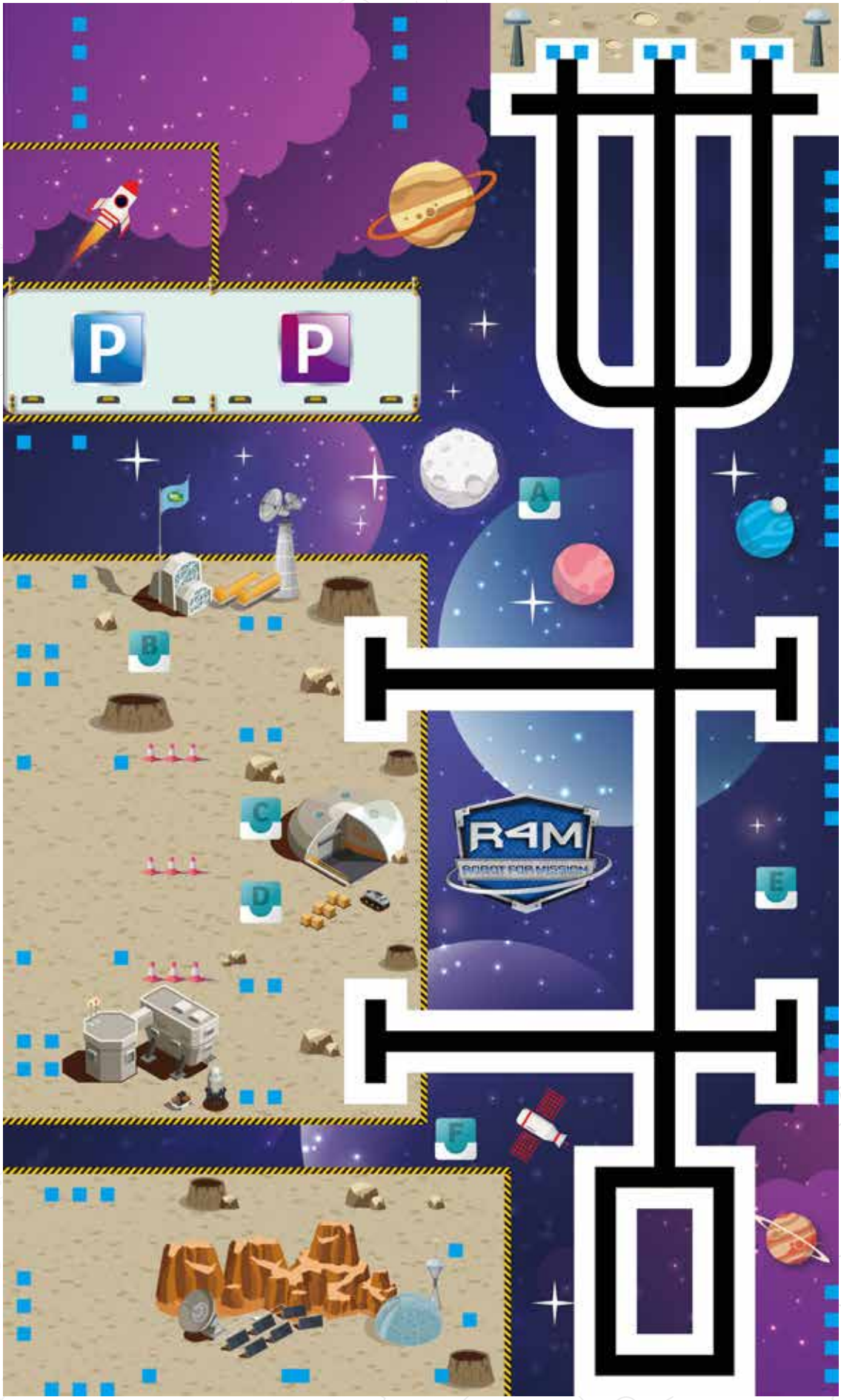


Figure 1. Competition area

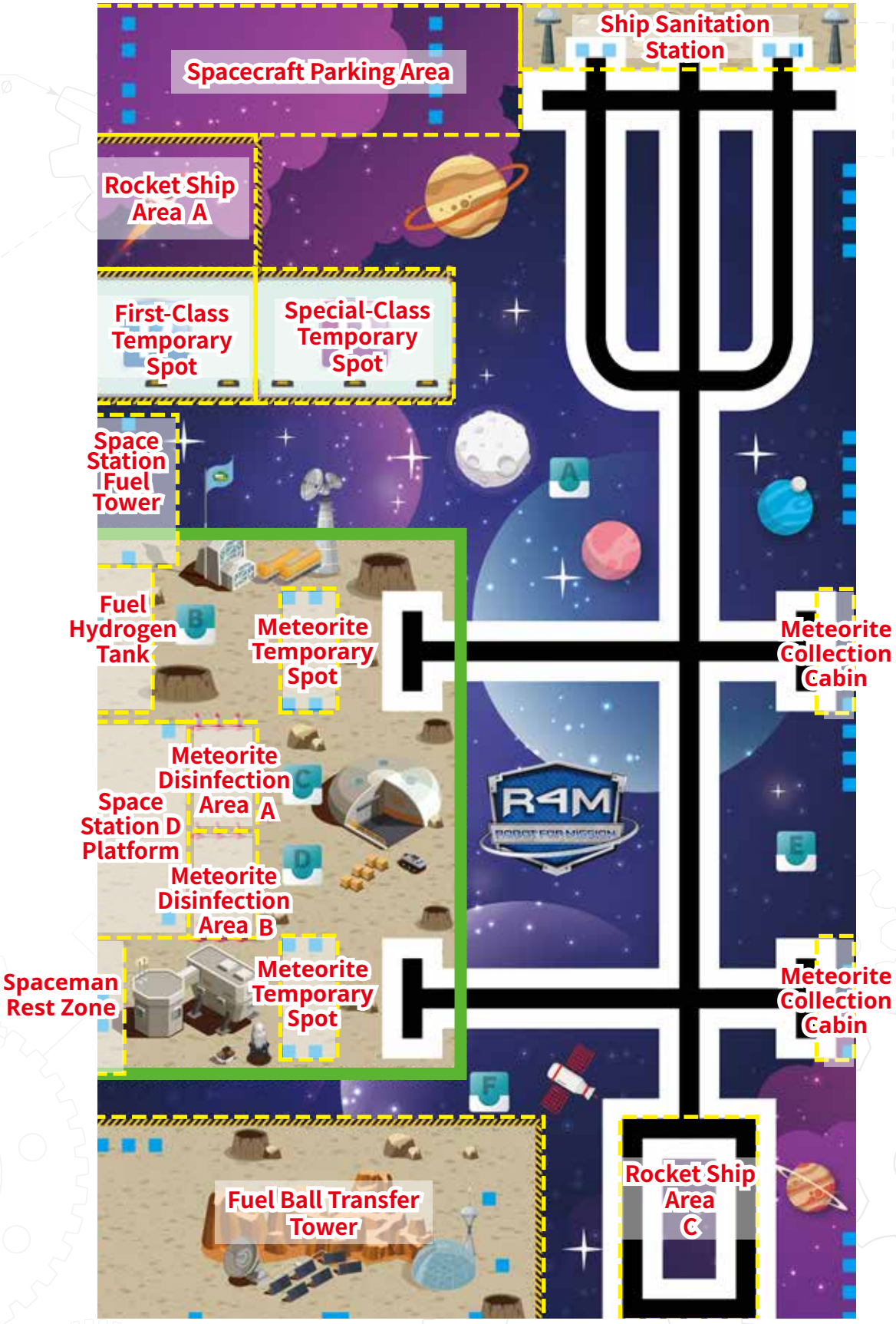
8.9.2. R4M Tasks (Advanced)

Venue Setting: Positioning points and example images of storage objects (before the competition begins)

Big meteorite & Small meteorite Locations

R4M (Advanced) : AI Space Station – Area Definitions

Before each task starts, Robot A and Robot C (in programmed autonomous mode, not remote control) must be placed in the Ship Areas A and C respectively. The automation platform D must be placed in Space Station D. Robot B can be placed anywhere. Teams may begin the contest after the judge announces.



Competition Tasks

The contest uses a points-based task system. The team score is awarded after the contestants have completed the task. The total score from all tasks is used to calculate the total team score.

Task One : Robot A earns 10 points when the whole robot body has left the Rocket Ship Area A.
Robot B earns extra 10 points when it successfully completes one task.
Robot C earns 10 points when the whole robot body has left the Rocket Ship Area C.
Teams earn 20 points if the automation platform D successfully completes at least one task and is operated by remote control.

Teams earn 40 points if the automation platform D successfully completes at least one task and is fully automated by programming or performs AI identification.

Task Two : Robot C must be equipped with a LINE FOLLOWER SENSOR (1247-W85-B3). The relevant specifications are provided in Appendix. Robot C must be programmed, not remote controlled. The program can be written, modified or uploaded by the contestants on the spot during the competition.

(Task 2.1.) Robot C must follow the black line and transport a small meteorite (2 pieces of small meteorite in total) to the Meteorite Collection Cabin to score points.

(1) Elementary school teams can use any method to move the small meteorite directly to the Meteorite Collection Cabin. Each meteorite scores 35 points;

(2) Junior high school teams and senior high school teams need to move the big meteorite to the Meteorite Disinfection Area first, and then teams can move the small meteorite to the Meteorite Collection Cabin. Each meteorite scores 35 points.

(Task 2.2.) When Robot C autonomously enters the Ship Sanitation Station, teams earn 70 points.

The Ship Sanitation Station is divided into three areas A, B, and C. During the competition, the judges randomly place three monster pictures (red, green, and blue). The elementary school teams must park in the red monster picture card area, and the junior high school teams must park in the green monster area. The senior high school teams must park in the blue monster area

Completion of tasks 2.1 and 2.2 earns 30 bonus points. The highest possible score for this task is 170 points.

The above two images show that a junior high school team has made their Robot C park in the green monster area, earning 70 points.

The above two images show that a team has moved a small piece of meteorite to the Meteorite Collection Cabin (inside the red frame).
For this, elementary school teams earn 35 points. junior or senior high school teams must first move the big meteorite to the Meteorite Disinfection Area, then to the Meteorite Collection Cabin to get the same points.

NOTES:

Note 1: After the Robot C begins operation, if a programming error is discovered, contestants may make corrections so that the robot can continue working. However, time taken to correct the program, or make other modifications, including reading and performing the task, is all included in the total task time.

Note 2: The software used by Robot C is WebAI x Gigo, or micro:bit and the main control box is C-Gigo AI CONTROL BOX (1206-W85-A) or C-micro:bit Control Box (1269-W85-A1). Please refer to Appendix for exact specifications

Note 3: The head of Robot C should be facing forward when it begins operation. It should not be aiming directly at the black line. And the whole of Robot C should be within the black frame.

Note 4: Equipment used to program Robot C such as laptops, tablets, and cables, and an internet connection should be prepared by the contestants.

Task Three： Constants may use Robot A, B or the automated platform to transport the goods from the Fuel Ball Transfer Tower to the Space Station Fuel Tower. The corresponding scoring table is shown in Note 2. A full score is 300 points.

Note 1: Any extended conveyor belt, arm or slide on the automation platform D can only be reached by remote control. Teams cannot use hands to extend these parts. Any extending parts of the automation platform D must remain within the green frame, before the competition begins. Any violation of this rule results in an accumulating 50-point team deductions. (e.g., four violations result in a 200-point deduction.)

Number of groups	Corresponding objects	Points
1	1 fuel ball	10 points
2	2 fuel balls & 1 fuel stick	60 points
3	3 fuel balls & 1 fuel stick	70 points
4	4 fuel balls & 2 fuel sticks	120 points
5	5 fuel balls & 2 fuel sticks	130 points
6	6 fuel balls & 3 fuel sticks	180 points
7	7 fuel balls & 3 fuel sticks	190 points
8	8 fuel balls & 4 fuel sticks	300 points

The picture above shows 1 fuel ball, scoring 10 points.

The picture above shows 2 fuel balls and 1 fuel stick, scoring 60 points.

The picture above shows 6 fuel balls and 3 fuel sticks, scoring 180 points.

The picture above shows 8 fuel balls and 4 fuel sticks, scoring the full 300 points.

Task Four： Robot A or B must be used to transport the First-Class Ship and Special-Class Ship from the Temporary Spot to the Spacecraft Parking Area. Points are awarded to teams based on the following system.

If the First-Class Ship is parked on the third floor of the Spacecraft Parking Area, each ship gets 30 points. 90 points are awarded if all three are on the third floor.

If the Special-Class Ship is parked on the second floor of the Spacecraft Parking Area, each ship gets 50 points. 150 points are awarded if all three are on the second floor.

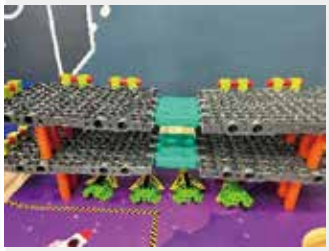
If all six ships are on the correct floor, teams can get bonus 60 points. The maximum scores is 300 points.

If the First-Class Ship or Special-Class Ship is parked on the first floor of the Spacecraft Parking Area, each ship gets 10 points.

The picture above is awarded the full 300 points.

The picture above is awarded 170 points

The picture above is awarded 30 points



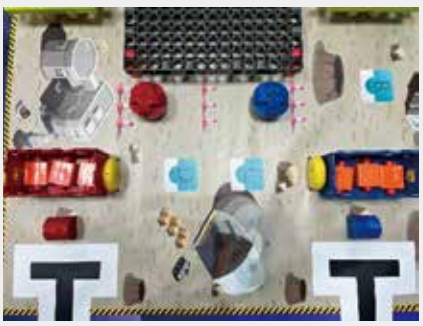
The picture above is awarded 40 points

Task Five： (Task 5.1.) Use Robot A and B, or the automated platform to deliver the six meteorite fragments from the A, B, C, D, E, and F areas to the two Meteorite Temporary Spots. Each fragment gets 15 points. All six meteorite fragments earns 90 points.

(Task 5.2.) Use Robot A and B, or the automated platform to deliver the big meteorites from the Meteorite Disinfection Area to the two Meteorite Temporary Spots. If the big meteorite is the same color with the area, each big meteorite gets 50 points, and two big meteorites with the correct color get 100 points. If the big meteorite is the different color with the area, each big meteorite only gets 20 points.

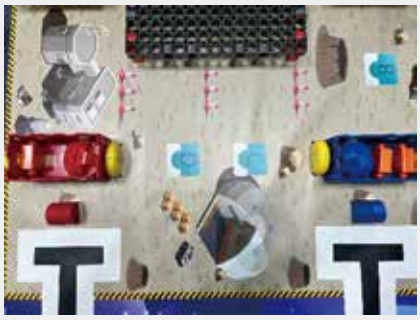
Completion of tasks 5.1 and 5.2 correctly will earn 30 bonus points. The highest possible score for this task is 220 points.

The picture above is awarded 60 points

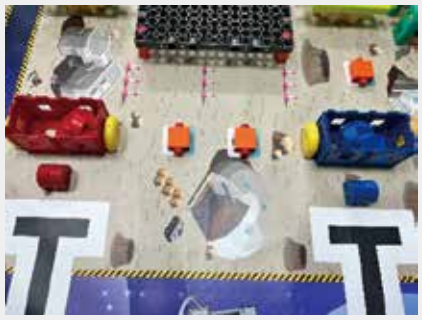


The picture above is awarded 90 points

The picture above is awarded 130 points



The picture above is awarded 145 points



The picture above is awarded 100 points

The picture above is awarded the full 220 points

Task Six： (Task 6.1.) Use Robot A, Robot B or the automation platform to move the Fuel Hydrogen Tank to the first floor of the Fuel Ball Transfer Tower. If the blue side of the cube is facing up, each cube earns 25 points. If not, each cube will only earn 10 points. If all three cubes have the blue side up, teams can earn 75 points.

(Task 6.2.) Use Robot A, Robot B or the automation platform to move the spacemen from the Spaceman Rest Zone to the second floor of the Fuel Ball Transfer Tower. Each spaceman earns 30 points. All three spacemen can earn 90 points.

Completing tasks 6.1 and 6.2 correctly will earn 35 bonus points. The highest possible score for this task is 200 points.

The picture above is awarded the full 200 points.

The picture above is awarded 150 points.

The picture above is awarded 90 points.

8.9.3. Scoring Criteria

8.9.3.1. Score Calculation: 3 minutes are given to complete the task, and the highest scoring team wins. If there are more than 2 teams getting the full scores, the team with the least time wins.

8.9.3.2. Score Calculation (Total Weight): The total weight of the robot also affects the score. Lower weight robots receive higher scores.

8.9.3.3. Sequence Order: Awards are based on scores. If teams have the same score, the final result will be determined by the following order of decisions.

Sequence order	Sequence item
0	The total scores.
1	The competition time.
2	The number of tasks completed.
3	The number of tasks with a full score.
4	Score of task two
5	Score of task three.
6	Score of task four.
7	Score of task six.
8	Score of task five.
9	Score of task one.
10	Total weight.
* Remark: If more than two teams earn a full score, the team with the shortest time wins.	

8.9.4. Competition Time

The total time of the contest is 3 minutes. After 3 minutes, contestants are not allowed to continue.

8.9.5. Damage to the Contest Area

Any damage to the contest site during the mission will result in a 5-point deduction. This contains damage to all props in the testing area.

8.9.6. Competition Order

Before the competition begins, teams should proceed to their designated area as specified by the map provided by the Organizer.

8.9.7. Work Submission

Teams that have finished their rounds must return their robots to the work display area until the end of the contest.

8.10. Contest Site Rules

8.10.1. Checking Items

After registration, contestants should enter the contest site directly. Toolboxes, personal bagsuse of tools (including ornament props), and other potentially dangerous objects will be actively checked on site. If any signs of fraud or cheating are discovered, the team will be disqualified.

8.10.2. Assembly Time

The assembly time, including practice time, is 2 hours.

8.10.3. Missions

Contesting teams build their robots on site during the contest. After building, teams must follow the contest schedule to undertake the missions. No assembled components are allowed into the contest site. Violators of this rule will be disqualified.

8.10.4. Allowance for Practice

During assembly time, some limited opportunities for practice may arise. As practice spaces are limited, please follow the instructions of the staff regarding these opportunities.

8.10.5 Access Restrictions

During the contest, team leaders or parents are not allowed to enter the contest area or pass anything to the contestants. Any violations will result in a 5-point deduction from the team score.

8.10.6. Interference with Others

During the contest, no person or team is allowed to disturb the work of other persons, teams or the judges in any way. This includes running around or making loud noises. If this rule is violated and a warning has already been given, violators will suffer a 5-point deduction.

8.10.7. Communications & Communication Devices

Contestants are not allowed to talk, communicate or text non-contestants (e.g., team leaders, parents). Violators of this rule will be disqualified. In an emergency situation, contestants should seek help from the Service Center.

Note : Contestants may bring mobile phones, tablets and laptops as controllers; however, to avoid any unwarranted or unjustified punishment, such devices should be on airplane mode or have the SIM card removed.

8.10.8. Private Property

Any deliberate destruction, theft, robbery or attempts to cheat other people of their possessions will lead to a 5-point deduction and probably more serious measures.

8.10.9. Portable Data

Contestants may bring writing, pictures, video files and other printed data.

8.10.10. Video Recording

To avoid post-match disputes, each team shall record its performance during the competition as evidence of its performance.

8.10.11. Motor Inspection

Winning teams must accept a motor inspection, if the motor does not meet the specifications in Section “Contest Motor Model List”, the team’s award will be withdrawn and the next team in line will be promoted.

8. 11. List of Motors, Control Boxes and Related Components

Robot for Mission Contest -Component List

2024 R4M Robot for Mission Contest
List of Motors, Control Boxes and Related Components

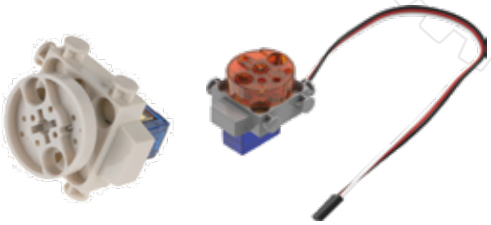
1	7328-W85-A1-1
NAME	C-30X MOTOR WITH WIRE CONNECTOR
MATERIAL	PC

2	7392-W85-B3
NAME	C-32X PLANETARY GEARBOX(DDM)
MATERIAL	PC/ABS

2-1	7392-W85-B1
NAME	C-CAR MOTOR
MATERIAL	PC/ABS

3	7400-W85-A1
NAME	C-40X MOTOR WITH WIRE CONNECTOR (DDM)
MATERIAL	PC

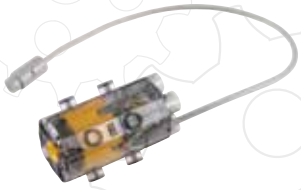
3-1	7400-W85-A
NAME	C-40X MOTOR WITH WIRE CONNECTOR
MATERIAL	PC/POM



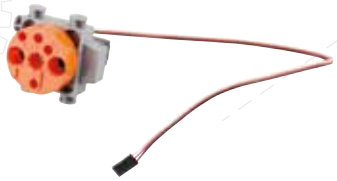
4	1247-W85-D1-1
NAME	C-180° SERVO MOTOR
MATERIAL	PC/ABS

5	1247-W85-D2
NAME	C-CONTINUOUS ROTATION SERVO MOTOR
MATERIAL	PC/ABS

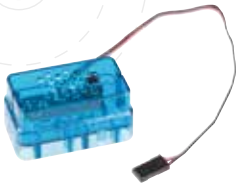
6	7447-W85-C
NAME	C-50X PLANETARY GEARBOX
MATERIAL	PC/POM



7	7412-W85-A
NAME	C-50X PLANETARY GEARBOX (DDM)
MATERIAL	PC/POM



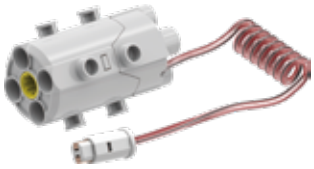
8	1247-W85-D3
NAME	C-180 SERVO MOTOR (METAL GEAR)
MATERIAL	PC



9	1247-W85-B3
NAME	C-LINE FOLLOWER SENSOR
MATERIAL	PC

10	1246-W85-C
NAME	C-FORCE SENSOR
MATERIAL	PC/ABS

11	1269-W85-A1
NAME	C-Gigo micro:bit CONTROL BOX
MATERIAL	PC/ABS



12	7447-W85-C1
NAME	C-50X PLANETARY GEARBOX II (New)
MATERIAL	PC/POM

13	1246-W85-A1
NAME	C-Gigo SMART CONTROL BOX
MATERIAL	PC/ABS

14	1204RR-W85-A1
NAME	C-Gigo MAKER CONTROL BOX
MATERIAL	PC

15	7408-W85-A2
NAME	C-BATTERY BOX WITH RECEIVER (4C/3M)
MATERIAL	PC/ABS

16	7407-W85-D
NAME	C-BATTERY BOX WITH RECEIVER (4C/2M)
MATERIAL	PC/ABS

17	1206-W85-A
NAME	C-Gigo AI CONTROL BOX
MATERIAL	PC/ABS

9. GreenMech Jr. - Science

9.1. Contest Theme: Super Cop

Competition One: In the Nick of Time / Competition Two: Bomb Disposal Vehicle

9.2. Event Schedule

2024 GreenMech Junior- Jr. Science Schedule

Time	Item	Remarks
7：30-8：15 (Aligned with the overall event planning)	Registration and Materials Inspection	1. Contestants should refer to the team location map on the official website before the contest begins, so they can go directly to their team table and report on the day of the contest. 2. Contestants should check the provided materials against the list they are given. If there is any part missing, the staff must be informed before the contest begins. Once the production time begins, materials cannot be replenished or replaced. 3. Contestants need to present their Certificate of Student Enrollment at this time, please see 11.1 in the full rule book for more information. 4. Contestants may only prepare additional parts according to the rules. Other parts cannot be brought into the contest.
8：15-8：40 (25 mins)	Rules Reminder	Lot Drawing 1. The number of heavy objects for Competition One (2 ~ 6 rubber tires) 2. The scoring area of 80 points for Competition Two
8：40-9：10 (30 mins)	Opening Ceremony	
9：10-9：35 (25 mins)	Competition One: Assembly & Practice Time	Models produced for the competition are built and tested at the same time.
9：35-10：15 (40 mins)	Competition One: In the Nick of Time Competition Time	1. During the competition, the work and heavy objects should be placed on the storage box with the lid locked, and the rest of the materials should be stored in the box, and no other parts may be used for modification or production. 2. Models (including the work, the rope and the heavy objects) will be weighed before the competition begins.
10：15-10：35 (20 mins)	Competition Two: Assembly & Practice Time	Contestants can only use materials provided by the organizer on site, please see 9.3 in the full rule book for more information.
10：35-11：15 (40 mins)	Competition Two: Bomb Disposal Vehicle Competition Time	1. During the competition, the work and the peg remover should be placed on the storage box with the lid locked, and the rest of the materials should be stored in the box, and no other parts may be used for modification or production. 2. Models (including the work, and the slope) will be weighed before the competition begins.
11：25-12：00 (35 mins)	Calculation and Confirmation of Scores	After competition, all teams will have lunch.

9.2.1. If a team fails to enter the venue at or before the designated check-in time, due to any force majeure factor, they may still join the competition, however, no time extension or regulation change will be granted. They may only participate in the remaining unspent time.

9.3. Material & Site Specifications

9.3.1. Material Specifications

Contest equipment is standardized for all groups and includes 1 set of Gigo #1261 Scientific Tour (including instruction manual).

Teams must prepare at least 6 rubber tires (1115-W85-F2S C-RACING TIRE) and some 8x12 base grids (7125-W10-A1S C-BASE GRID). Do not prepare or bring other materials or tools. Teams violating this rule will be disqualified.

9.3.2. All parts used in this event must not be modified in any way (cutting, grinding, etc.).

9.3.3. The team's work must not damage the venue. Teams that damage the venue will be disqualified from the competition. If the venue is damaged, the Organizer may change the competition map or replace it with another site.

9.4. Contest Method

9.4.1. Competition One: In the Nick of Time

9.4.1.1. Building Restrictions

(1) Each team makes a four-point landing device. The area of each landing point contacting the table must not be larger than a 2 cm x 2 cm square, and must not be wheel-shaped. A heavy object must be tied to the front end of this device with a wire. The gravity of the falling weight (heavy object) pulls on this device. Any team which does not operate in this way will not score points, and any device that does not have four feet on the ground will not score points.

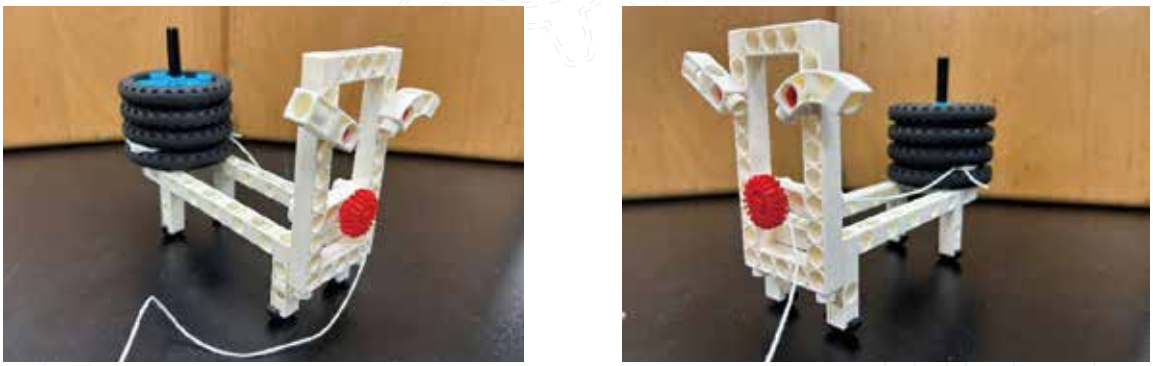


Figure 1. Sample model

(2) The size limit of this device is 30 cm x 30 cm in orthographic projection. When the device is placed on the edge of the table, the heavy object must not touch the ground when it hangs naturally. Otherwise, it will be deemed illegal.

9.4.1.2. Contest Rules

(1) This competition uses the site paper (Matt PP photo paper) as shown in Figure 2. The contest area uses a 180 x 60cm table, and the site paper is placed and pasted onto the table.

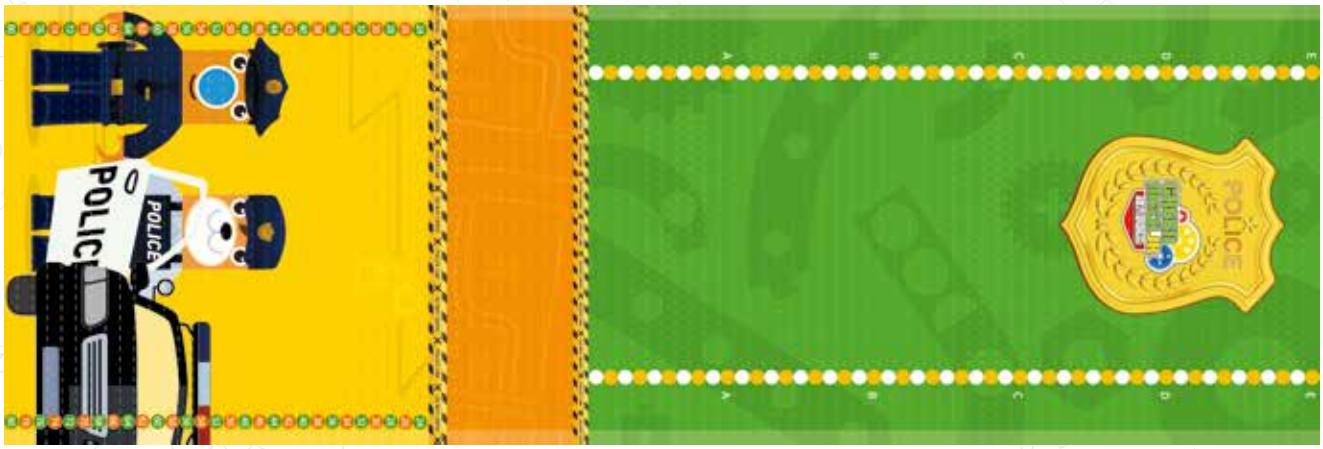


Figure 2. Contest Site

The upper and lower light-colored areas indicate where the site should be fixed to the desktop. These two areas are not valid target areas.

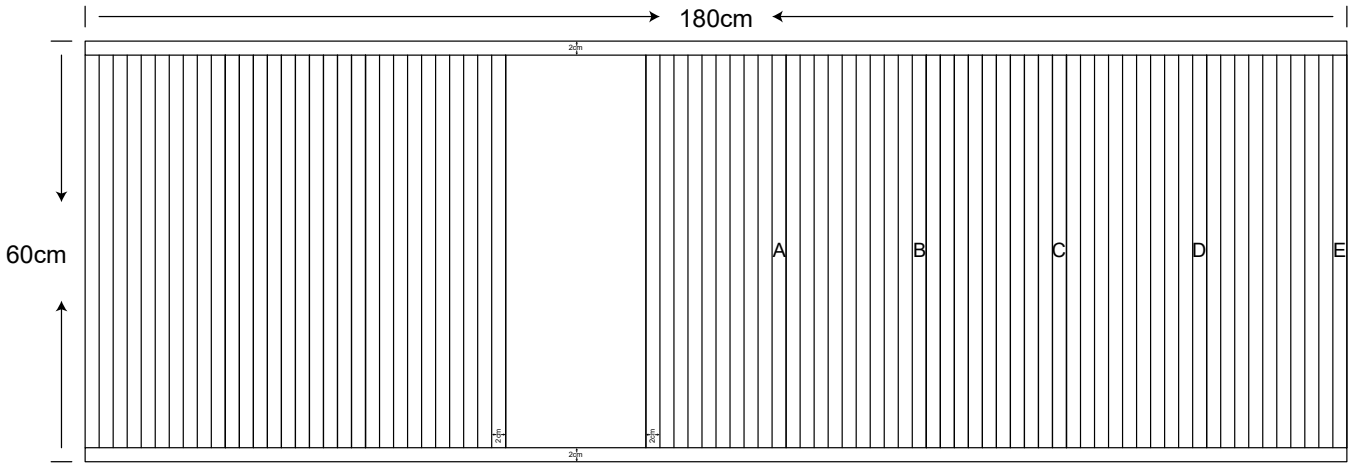


Figure 3. Dimensions and target areas in relation to preparation area

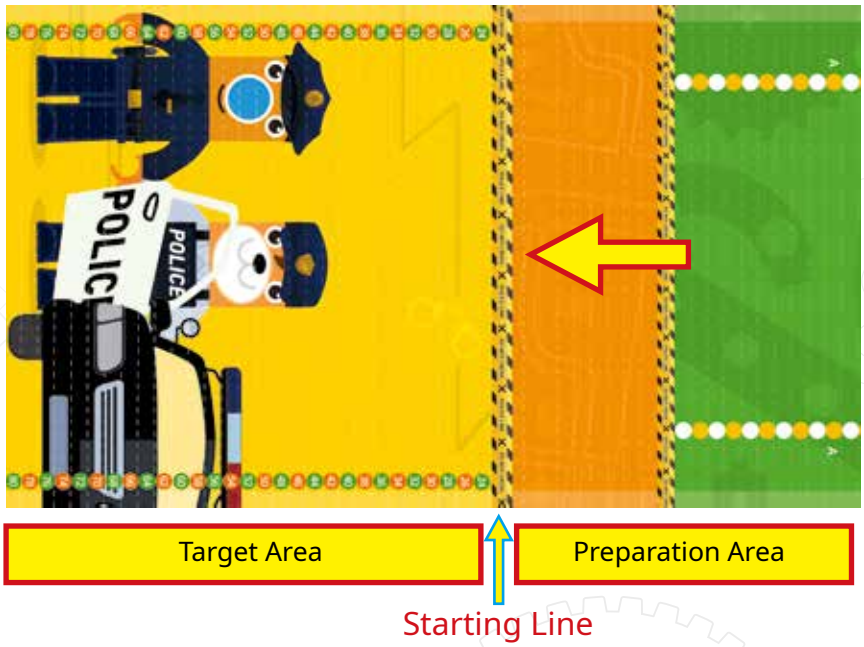


Figure 4. Descriptions of the site for competition one (The left side of the whole site paper)

(2) Before the contest, the number of rubber tires to be used will be drawn by lottery to determine the weight (range of 2 to 6 rubber tires).

(3) During the competition, contestants must grasp the end of the device with their hands, release their hands after starting, and then let the weight fall freely, and use this pulling force to pull the device to the target area. If a team violates this rule, they will be warned. If teams violate the rule a second time, they will score 0 points for that operation.

Figure 5. Team preparation

(4) The scores for this competition are as follows (see Figure 4). The leftmost area earns 80 points, and each square in sequence decreases by 2 points to the farthest right, which scores 24 points.

80 Points	78 Points	76 Points	74 Points	72 Points	70 Points	68 Points	66 Points	.....

(5) Each operating time is at most 10 seconds. After the weight falls and pulls the device and the device has not moved for 5 seconds, the score can be determined according to the position of the front most end of the four contact points of the device on the site map. If the front end exceeds the table without falling, an additional 10 points is awarded (i.e., 90 points). If the device is traveling too slowly, the judges will determine the score based on the front position of the contact points of the device, after 10-seconds of competition time has elapsed.

(6) If the contestant finds a problem with the car body before the contest begins, they have 30 seconds to resolve the issue. They can use a peg remover for repairs. If the team cannot repair the vehicle within 30 seconds, the team scores 0 points for this operation.

(7) The competition will be conducted 3 times, and the total score of the 3 times will be the score of this competition.

(8) Before the contest begins, the vehicle, heavy objects and the wire must all be weighed. If the total score of two teams are the same, total weight is used as the basis for ranking.

9.4.2. Competition Two: Bomb Disposal Vehicle

(Contestants can refer to the #1261 Railcar Model.)

9.4.2.1. Building Restrictions

(1) Each team must make a four-wheeled vehicle (the contact points are wheel-shaped) and a slope. Teams must choose the best slope angle for their vehicle. The slope is fixed during operation, and cannot be held by hand. Teams must use a switch to release the vehicle.

Figure 6. Example

(2) The car must be no bigger than 20 cm x 20 cm. Viewed from the top, the slope and car must be fully within the preparation area before the competition begins.

9.4.2.2. Contest Rules

(1) This competition uses the site map (Matt PP photo paper) shown in Figure 2. The contest area requires a 180 x 60cm table, and the site map is fixed to the table.

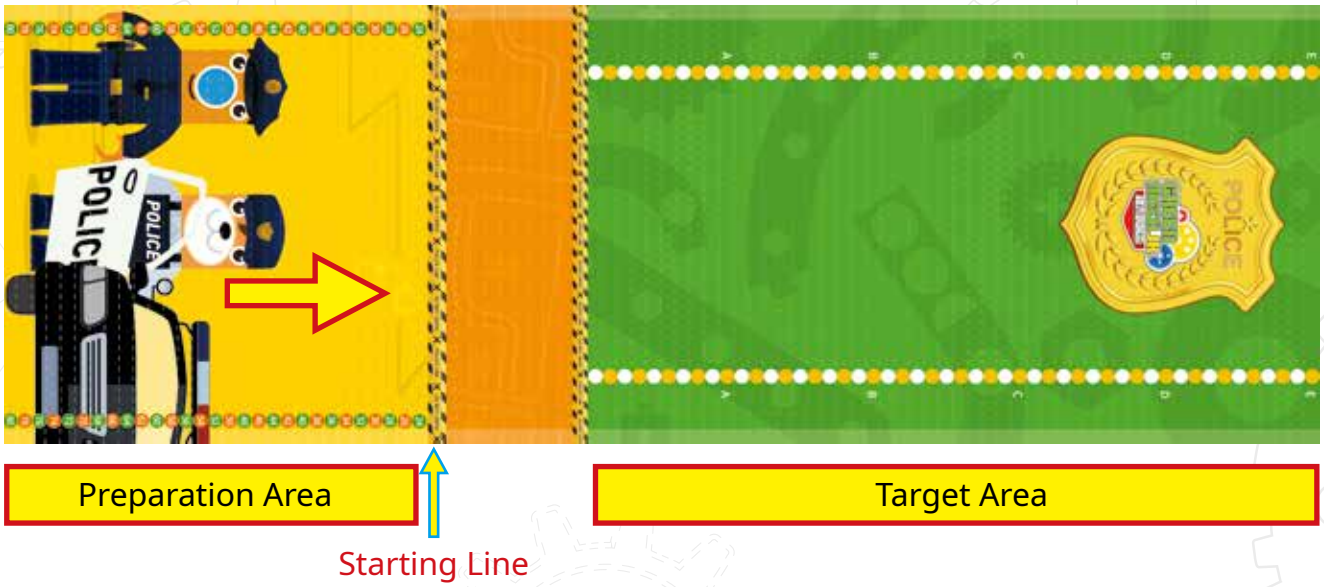


Figure 7. Description of the site for competition two

(2) Teams should assemble the car and slope according to the rules. Teams will have three opportunities to press the switch and release their vehicle. Teams have 30 seconds to adjust the car and slope before each operation.

(3) There must be a 40T blue gear on the car body as the basis for scoring. The judges will assign the score based on the position of the front end of the blue gear on the area map. The competition will be conducted 3 times, and the total score will be the score of the competition.

(4) To release the car, a switch must be designed and used (Figure 6). After the switch is triggered, the car will slide down the slope under the force of gravity (no external force is allowed). If a team violates this rule, they will be warned. If teams violate the rule a second time, they will score 0 points for that operation.

(5) On the day of the contest, one area will be drawn from the assigned areas A through E, which will be worth 80 points. The two adjacent squares will be worth 79 points. This scoring pattern will be continued to the edge of the map, as shown below:

.....	76 Points	77 Points	78 Points	79 Points	Area A 80 Points	79 Points	78 Points	77 Points	76 Points	.....

(6) Before the contest begins, the car and slope must both be weighed. If the total score of two teams are the same, total weight is used to determine the ranking

9.5. Criteria

9.5.1. This competition adopts a point based ranking system. If two teams' point scores are the same, the rankings will be arranged according to the following table.

Sequence order	Sequence item
1	Total combined score of the two competitions
2	Score of competition two
3	Score of competition one
4	Total weight of the two devices, where the lower weight is the winner.

10. GreenMech Jr. - Programmer

10.1. Contest Theme: Energy Minions

10.2. Event Schedule

2024 GreenMech Junior- Jr. Programmer Schedule		
Time	Item	Remarks
07:30-08:15 (Aligned with the overall event planning)	Registration and materials inspection	Teams may bring up to 3 Base Units, but all device memories must be erased during inspection. No code cards or map cards should be pre-assembled. No block components should be pre-assembled.
08:15-08:40 (25 mins)	Rules Reminder	
08:40-09:10 (30 mins)	Opening Ceremony	
09:10-12:00 (350 mins)	Official Competition Time (Lot Drawing) (Including Practice Time)	1. 20 minutes before the official competition, teams draw lots to determine their goals for Task 3 and Task 4. Then, there is 20 minutes for teams to practice and prepare on their own in the team preparation area. 2. After the 20-minute practice period, teams must disassemble the map cards into pieces, and them take them to the competition area and reassemble them during the competition time. 3. Teams have 6 minutes to complete their contest. Contestants can place and assemble the map cards and code cards, and the robots can score points. There is no time allowed for stopping during the 6-minute contest.
11:40-12:30 (50 mins)	Grading Time	After competition, all teams will have lunch.
13:30~ (Aligned with the overall event planning)	Awards Ceremony	Awards will be given after the results are settled.

Process	Time	Location	Remark
Lot drawing	Before the practice time	In the team preparation area	Draw the target positions for tasks 3 and 4.
Practice time	20 minutes	In the team preparation area	Contestants can assemble the blocks and write programs.
Competition time	6 minutes	In the contest area	Contestants can place and assemble map cards. Contestants can write and read the programs. One robot can score points. (Map cards should be disassembled before the competition begins.)

10.2.1. If a team fails to enter the venue at or before the designated check-in time, due to any force majeure factor, they may still join the competition, however, no time extension or regulation change will be granted. They may only participate in the remaining unspent time.

10.3. Material Specifications

With the exception of instructions, the competition map is standardized for all groups. Other required items are prepared by the participating teams, and must be disassembled. Teams are not permitted to preassemble any parts of the body in advance. Teams violating this rule will be disqualified.

10-4. Contest Method

10.4.1. Robot Specifications

(1) Each team may bring up to 3 Base Units to participate in the competition. The memory of all devices must be cleared by pressing and holding the delete button for 2 seconds while inspectors are present. The control box body shall not be modified, violation of this regulation results in disqualification. The size limit of each robot is 15 cm x 15 cm in length and width.

(2) During the execution of the program, if an error is found, the contestants can ask the judge's if they can retrieve the robot, but the robot can only be retrieved after the judge's approval. If this happens, countdown timer will continue running and the competition is not postponed.

(3) During a mission challenge, there can only be one robot on the field. When a robot on the field is operating, off-field robots can be prepared to read the program.

(4) After the robot program is executed or the program is re-read, the robot must start from the Start Area. The nuclear energy area is a controlled area. If the robot enters the nuclear energy area to perform a task, 10 points will be deducted from the team score for each occurrence. The robot must be immediately retrieved and returned to the Start area (AB78) to start again. Tasks in the nuclear energy area must use the specific Start area (P1).

10.4.2. Descriptions of Contest

10.4.2.1. Background

The global population is growing, and people need more and more energy. It is very important that we use energy properly and do not waste it. It is better to use renewable sources of energy wherever possible, because this is more sustainable and can be better for the environment. We need to find ways to use energy that keeps our world healthy for the future. As an Energy Minions, we need you to help achieve this sustainable energy goal.

10.4.2.2. Site Specification:

The contest area is 240 x 120cm, printed on a matte PP photo paper. Each space is 15 x 15cm. Teams have 6 minutes to complete their assigned task. Contestants must arrange the map cards correctly, and write and read the programs. One robot can perform the tasks to score points. There is no stopping or pausing during the 6-minute contest.

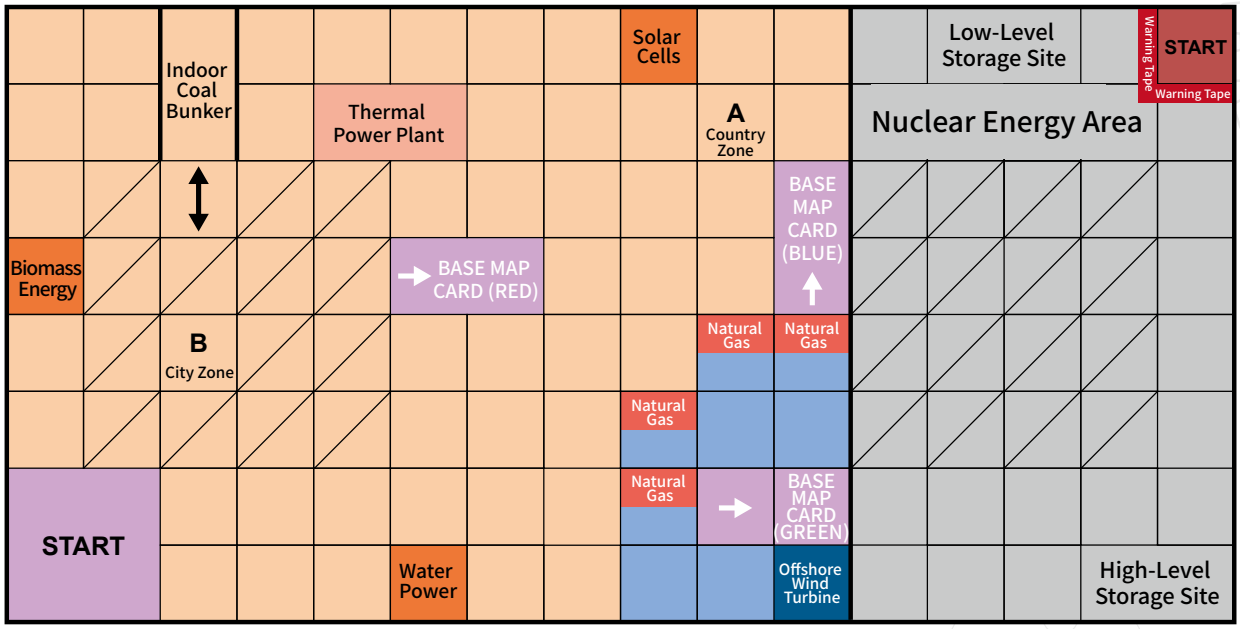


Diagram of the site (thick lines—indicate a wall that cannot be crossed).

10.4.2.3. General Mission

Each device starts in the Start Area. Each team plans the operation route of the robots and decides how to complete the missions. 20 minutes before the competition, each team draws lots to determine positions for task 3 (coal fuel and natural gas fuel) and task 4 (nuclear waste). Each team can then practice in the preparation area.

(1) Mission One : Renewable energy

1. Description: There are four renewable energy areas on the map, water power, biomass energy, solar cells, and offshore wind turbines. In order to increase the proportion of renewable energy use, the robot must go to each area and perform a specified action to earn points.

2. Scoring Items: When the robot goes to a renewable energy area and turns on the green light twice (not turn on the green light for 2 seconds), the team earns 5 points. For four renewable energy areas, the team scores a maximum of 20 points.

(2) Mission Two : Sustainable Energy

1. Description: There is one area A and one area B on the site paper. Area A (Country Zone) is a rural area and needs to expand energy infrastructure; Area B (City Zone) is a densely populated urban area with large energy usage and needs to upgrade energy conversion efficiency. The task here is that the robot enters area A to carry out energy infrastructure construction (complete specified actions) and that the robot enters area B to upgrade energy conversion efficiency (complete specified actions).

2. Scoring Items: When the robot enters area A and the robot turns left, turns right, turns left, and turns right, the team earns 5 points. When the robot enters area B and turns on the seven colors of light, the team earns 5 points. Complete one task item, the team gets 5 points. The maximum score is 10 points.

(3) Mission Three : Air Pollution

1. Description: There is a thermal power plant, surrounded by three lumps of coal fuel (black). The robot should deliver these three coal lumps to the indoor coal bunker for storage. The robot should deliver three natural gas fuels (red) to the thermal power plant to improve combustion efficiency and reduce the occurrence of PM2.5 pollution. Coal and natural gas fuels are represented by building blocks. Teams should use the robot to push the building blocks to designated areas (indoor coal bunker or thermal power plant) to score points. The indoor coal bunker can only be entered and exited in the direction of the arrow, because there are walls on the left and right sides, the robot cannot cross the walls.

Example of coal (black) and natural gas (red) fuel.

2. Scoring Items: The three coal fuels are black (5 points each), and the three natural gas fuels are red (5 points each). The three coal and natural gas positions are drawn before the competition. Teams can score points by pushing coal into the coal bunker correctly, entering in the correct direction according to the arrow. Entering from an incorrect direction does not score points. Teams can score points by pushing natural gas fuel into the thermal power plant (no direction restrictions).

3. Competition Draw: Each team draws the positions for the fuels before the competition begins. Three coal fuels will be in the 3 squares out of the 14 oblique-line squares. Three natural gas fuels will be placed in 3 out of the 4 surrounding squares.

4. Point Deductions: The indoor coal bunker can only be entered or exited in the correct direction shown. Teams going into the bunker in the wrong direction get a 10-point penalty. If this happens, the team will need to immediately retrieve their robot and start again from the Start Area.

(4) Mission Four : Nuclear Waste

1. Description: To perform the “Nuclear Waste” mission, teams need to start from the "Nuclear Energy Area Start" (top right of the map). There is a warning line outside Start Area. There are 5 low-level nuclear waste items (white blocks), and 3 high-level nuclear waste items (gray blocks), as well as two permanent nuclear waste storage sites (one is for low-level, the other is for high-level). The robot needs to deliver the low-level nuclear waste to the low-level storage site; and deliver the high-level nuclear waste to the high-level storage site. This will allow the radiation to dissipate to natural background values over time. Teams can score points by pushing low-level and high-level nuclear waste to the designated areas. The "Nuclear Waste" task score is only valid for robots that start from the "Nuclear Energy Area Start".

Example of low-level (white) and high-level (gray) nuclear waste.

2. Scoring Items: After the robot leaves the warning line, it must continue to emit emergency vehicle’s siren sound and turns on the red and blue light flashing effects before it can perform the following scoring tasks. The robot then delivers the low-level nuclear waste (white) to the low-level storage site, and delivers high-level nuclear waste (gray) to the high-level storage site. Each nuclear waste is worth 5 points. There are 5 low-level nuclear wastes and 3 high-level nuclear wastes. The maximum score is 40 points.

3. Competition Draw: Each team draws positions for the eight nuclear waste items before the competition begins. Five low-level nuclear waste and three high-level nuclear waste items are placed in 8 out of the 16 oblique-line squares.

4. Point Deductions: When the robot performs a nuclear waste task, the robot can only walk within the Nuclear Energy Area (the gray squares). Teams going outside the Nuclear Energy Area get a 10-point deduction for each occurrence. If this happens, the team will need to immediately retrieve their robot and start again from the Start Area.

(5) Mission Five : Clean Energy

1. Description: There are three base map cards on the site. After the robot completes the specified task, this means that the it can collect various applications of clean energy, and achieve the goal of sustainable development.

2. Scoring items:

- Red base map card (Solar Power): Designated action, turn on the red light (5 points);
- Green base map card (Wind Power): Designated action, turn on the green light (5 points) and make the windmill rotate its blades (10 points)
- Blue base map card (Tidal power): Designated action, execute one rotation of the robot (5 points)

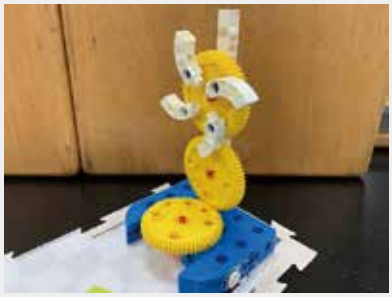


Diagram of a self-made windmill-device (can be modified by teams, but the windmill must be driven by the central output gear of the robot.)

10.4.3. Criteria :

This contest adopts a point based ranking system. If two teams' point scores are equal, the rankings will be arranged according to the following table.

Sequence Order	Sequence Item
1	Total score.
2	Mission 4 score.
3	Mission 3 score.
4	Mission 5 score.
5	Mission 1 score.
6	Mission 2 score.
7	Total contest time, where lowest is best.

11. Appendix & Forms

11.1. Certificate of Student Enrollment

2024 World GreenMech - Certificate of Student Enrollment				
Team Name				
Contest	☐ GreenMech	☐ R4M	☐ GreenMech Junior	
Group	☐ Basic	☐ Advanced	☐ GMJr.-Science	☐ GMJr.-Programmer
Category	☐ Elementary School (including Kindergarten)	☐ Junior High School	☐ Senior High School	
Photo	Clear photo of the face.	Clear photo of the face.	Clear photo of the face.	Clear photo of the face.
Student Name				
School				
Grade				
Date of Birth				
I certify that the above students are still studying in our school and that the above information is correct.				
Signed:		Principal:		
Director of Academic Affairs:		Date:		(dd/mm/yyyy)

11.2. Complaint Form

2024 World GreenMech- Complaint Form

Team Name	
Contest	☐ GreenMech ☐ R4M ☐ GreenMech Junior
Group	☐ Basic ☐ Advanced ☐ GMJr.-Science ☐ GMJr.-Programmer
Category	☐ Elementary School (including Kindergarten) ☐ Junior High School ☐ Senior High School
Plaintiff	
Complaint Details	
Case Officer	
Resolution	
Plaintiff Signature	

Notes:
Those who have not filled out this appeal will not be accepted; the overseas team and the GreenMech Junior teams may be sent by Organizers to file the complaint; however, they must still sign it personally to confirm that the details of the complaint are correct.
After the judge has made understood the situation and made a ruling, they must complete the section marked “Resolution” and explain the remaining process to the plaintiff.
If the plaintiff is still dissatisfied with the result of the treatment and refuses to sign, the judge may add a “refusal” in the “Plaintiff Signature” field.

1.Teams must be able to speak politely to judges and organizers. Upon receiving a warning, a second warning will result in a penalty, and a third warning will lead to disqualification.
2.If there are concerns regarding the competition results, please raise them within one hour after the competition results are announced.