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# **2026 InnoBot**

## **5th Asia-Pacific STEM/AI Technology**

### **Innovation Challenge**

#### **Green Guardians [Singapore Station]**

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"Green Sanctuary" Series — Competition Rules V1.3

**Revision History:**

<b>Version</b>	<b>Description of Changes</b>	<b>Date</b>
V1.0	Initial release of competition rules.	2025/8/20
V1.1	Updated playfield diagram; updated robotic vehicle size restrictions and diagrams; added supplementary match rules and event statements.	2025/9/24
V1.2	Supplement details regarding AI vehicles and mechanical vehicles reacquiring resources; correct errors in certain text.	2026/2/3
V1.3	Updated penalties for AI Robotic Vehicle and Mechanical Robotic Vehicle, see 7.1.2 and 7.2.2 for details.	2026/2/6

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# 1 Competition Overview

Earth is our shared home. Rapid modernization has intensified environmental pollution, resource waste, and climate change, threatening ecosystems.

To address global sustainability challenges, this competition cultivates youth awareness of environmental responsibility, innovation, and interdisciplinary collaboration. Participants of the 2026 InnoBot, 5th Asia-Pacific STEM/AI Technology Innovation Challenge will become "Green Guardians". Using AI and robotics to simulate green reconstruction tasks like wind power generation, waste recycling/classification, and tree planting.

Together, we will harness technology to build a cleaner, greener future.

Together, we will build our Green Sanctuary!

## 1 赛事简介

地球是我们共同的家园。随着现代化进程加快，环境污染、资源浪费和气候变化等问题日益严峻，生态环境正面临巨大压力。

为积极应对全球可持续发展挑战，着力培养青少年的环保责任意识、科技创新能力与跨学科协作能力，现正式发起 2026 InnoBot 第五届亚太区 STEM/AI 科技创新挑战赛——「绿色家园」系列赛《绿色守护者》。本届赛事以“科技守护绿色家园”为主题，参赛选手将化身为“绿色守护者”，运用人工智能、机器人技术，完成风力发电、垃圾回收与分类、树苗种植等仿真任务，重建一个更加绿色、清洁、可持续的美好家园。

让我们携手并肩，勇敢行动，用创意与科技守护地球，共同迎接一个更加美好的未来！

## 2 Participant Guidelines

### 2.1 Participant Requirements

- **Teams:** Primary School Category (all members must be enrolled in primary school) and Secondary School Category (all members must be enrolled in secondary school).
- Cross-category teams are not allowed.

- Each school may enter up to **2 teams**. Each team consists of **2–6 students** and **1–2 instructors**.

## 2.2 Equipment Requirements

- Each team must design 2 programmable robotic vehicles: one AI Robotic Vehicle (autonomous) and one Mechanical Robotic Vehicle (remote controlled).
- Each team is allowed 1 backup set (1 AI Robotic Vehicle and 1 Mechanical Robotic Vehicle).



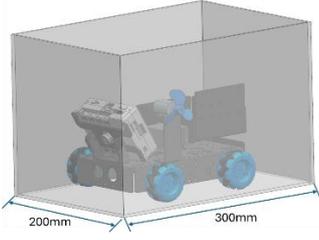
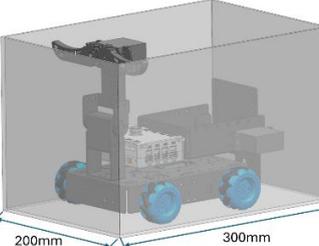
AI Robotic Vehicle



Mechanical Robotic Vehicle

The robots will undergo pre-competition check-in on the day of the finals, and the check-in must strictly comply with the following requirements:

- **Control:** AI Robotic Vehicle must be fully autonomous; Mechanical Robotic Vehicle must be controlled via Bluetooth Joystick Controller.
- **Voltage:** Maximum voltage must not exceed **12V**.
- All mechanical vehicles are eligible for upgrades and modifications, but must meet the following conditions:
  - ① **AI Robotic Vehicle:** up to 2 servos and 6 DC motors.
  - ② **Mechanical Robotic Vehicle:** up to 4 servos and 5 DC motors.
  - ③ **Prohibited Devices:** Disruptive devices (e.g., lasers, signal jammers) are strictly forbidden.
  - ④ **Size Restrictions (Box Test) :**  
Both Robotic Vehicles are limited to the following size restrictions, tested via placing an enclosure over the Robotic Vehicles, as shown in the table below.

Schematic diagram for placement during check-in	Size limitation
 <p data-bbox="391 526 614 560">AI Robotic Vehicle</p>	<p data-bbox="726 376 1252 526"><b>Robotic vehicles will be tested by placing them into a fixed-size enclosure (Length: 300mm, Width: 200mm).</b></p> <ul style="list-style-type: none"> <li data-bbox="758 548 1284 638">◦ The vehicle must fit with all four wheels on the ground.</li> <li data-bbox="758 660 1300 806">◦ Height is unrestricted. Any modifications must be measured at their minimum retractable size.</li> </ul>
 <p data-bbox="343 884 662 918">Mechanical Robotic Vehicle</p>	

## 2 参赛须知

### 2.1 参赛人员须知

- 参赛选手分小学组和中学组，小学组参赛队员须在赛事报名时为小学在读学生，中学组参赛队员须在赛事报名时为中学在读学生。
- 不允许小学组与中学组跨组别组队。
- 每个学校最多 2 支队伍参赛，每支参赛队伍由 2 至 6 名同学组成，每支队伍有 1 至 2 名指导老师。

### 2.2 参赛器材要求

每支参赛队伍须设计 2 台轮式可编程机械人（AI 车与机械车），每支队伍至多可配备 1 套备用机械人（1 台 AI 车和 1 台机械车）。



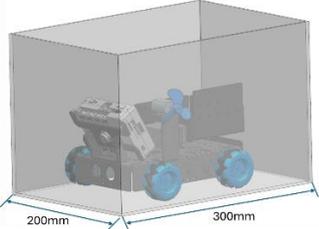
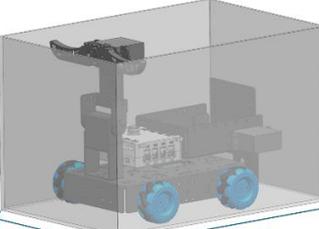
AI 车



机械车

机械人在决赛当天会进行赛前检录，检录需严格遵守以下要求：

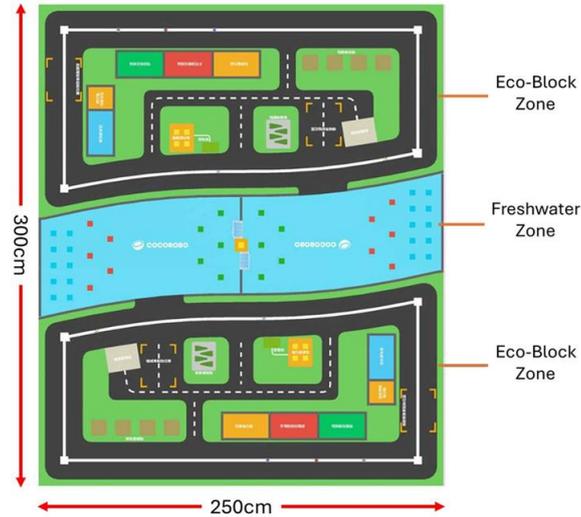
- 机械车需使用蓝牙手柄进行控制，AI 车为自动运行不能使用任何控制器操控。
- 电池供电电压不超过 12V。
- 机械车均支持升级改造，但均需满足以下条件：
  - ① AI 车最多可使用 2 个舵机、6 个电机；机械车最多使用 4 个舵机、5 个电机。
  - ② 禁止在机械人上安装干扰对方机械车比赛进行的一切装置，如激光灯、信号干扰器等。
  - ③ 机械人的尺寸需满足以下表格的限定标准，对于超出的部分，需由参赛选手在检录前自行调整：

检录时摆放示意图	尺寸限定
 <p style="text-align: center;">AI 车</p>	<p>分别将 AI 车、机械车以竖直状态（摆放角度不受限定，但需确保四个车轮着地）放进箱子内（箱子固定尺寸长为 300mm，宽为 200mm），若小车能按上述要求放入检录的箱子，则检录通过，反之不通过。</p> <p>* AI 车与机械车的高度不受限制； * 如有改装，按可收缩的最小尺寸进行检测。</p>
 <p style="text-align: center;">机械车</p>	

### 3 Competition Content

**Playfield:** 2500mm x 3000mm, consisting of **2 Eco-Block Zones** and **1 Freshwater Zone**.

**Movement:** AI Robotic Vehicle navigates the white line in the Eco-Block Zone. Mechanical Robotic Vehicle moves within both the Eco-Block and Freshwater Zones.



**Competition Playfield Diagram**

**Scoring Objects (Per Team):**

Object	Description	Quantity	Each Party's Assigned Quantity	Score
Non-recyclable Waste		30mm Red Cube	5	5 points each
Recyclable Waste		30mm Green Cube	5	5 points each
Freshwater		30mm Blue Cube	10	5 points each
Energy Pack		30mm Yellow Cube	4	Multiplier (x1)
Sapling		30mm*30mm* 75mm Tree Figurine	4	15 points each

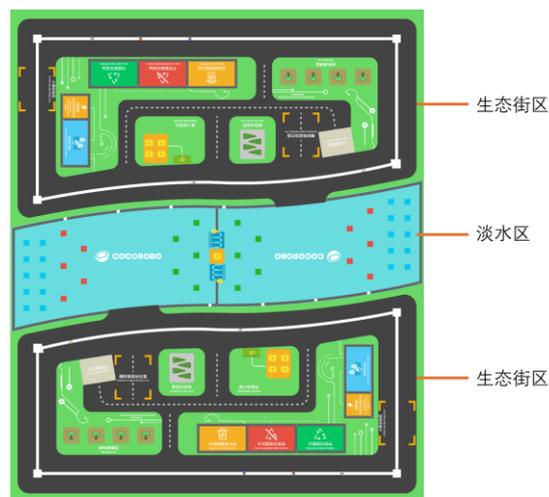
Additionally, there is a hydroelectric power zone in the middle of the river, featuring a contestable power pack.

The first team to complete all waste collection and sorting on their side of the river (i.e., accurately unloading 5 non-recyclable items at the [Non-Recyclable Waste Station] and 5 recyclable items at the [Recyclable Waste Station]) may then contest the hydroelectric power-generated energy pack. This team may subsequently enter the opposing team's freshwater zone to assist with waste collection and freshwater resource acquisition.

### 3 比赛内容

比赛地图尺寸为 250cm\*300cm，由 2 个生态街区、1 个淡水区组成。

比赛开始后，每一方参赛队伍的 AI 车需在生态街区的白色实线上自动运行，机械车可在己方生态区、己方淡水区执行任务。



比赛场地示意图

每一方的比赛场地得分任务内容如下表所示：

得分任务内容	图例	规格描述	双方各有数量	分值
不可回收垃圾		30mm 红色实心立方体	5 个	5 分/个
可回收垃圾		30mm 绿色实心立方体	5 个	5 分/个
淡水		30mm 蓝色实心立方体	10 个	5 分/个

电力能源包		30mm 黄色实心立方体	4 个	1 倍积分/个
树苗		30mm*30mm*75mm	4 棵	15 分/棵

另外，河道中间有个水利发电区，有一个可争夺的电力包。

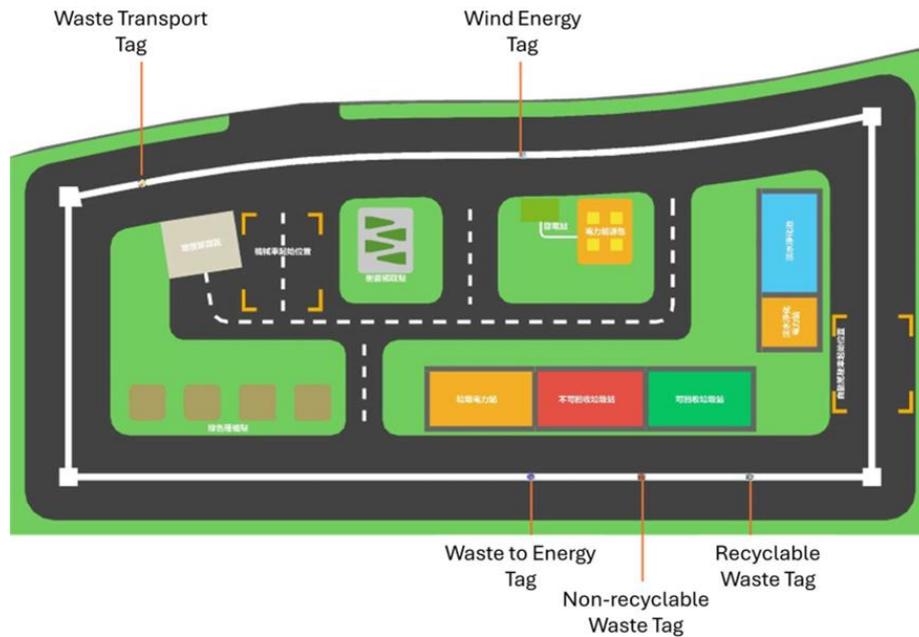
当某一方优先完成己方一侧河道内的全部垃圾回收与分类（即：5 个不可回收垃圾准确卸放至【不可回收垃圾站】、5 个可回收垃圾准确卸放至【可回收垃圾站】）的队伍，方可争夺水利发电产生的 1 个电力能源包，继而可以进入对方淡水区内协助进行垃圾回收、淡水资源获取。

## 4 Competition Tasks

The **match duration is 7 minutes**; participants must **strictly adhere to the competition rules** and use the **AI Robotic Vehicle** and **Mechanical Robotic Vehicle** that have passed the **pre-match inspection** to complete the competition tasks. Detailed tasks are provided in the **descriptions below**.

### 4.1 AI Robotic Vehicle Tasks

The **AI Robotic Vehicle** is a fully autonomous robot that utilizes **line following sensors and an AI camera** to navigate within the **Eco-Block Zone**. While following the **white path**, it uses its **AI camera to recognize various image tags** representing different stations, and subsequently completes the following tasks **autonomously or in collaboration** with the **Mechanical Robotic Vehicle**:



- **Autonomous Navigation:** The **AI Robotic Vehicle** waits at the **start area** for the match to begin. Once the referee announces "Match Start," the AI Robotic Vehicle begins to **follow the white path**, navigating autonomously around the block.
- **Wind Power Generation:** Upon recognizing the "**Wind Energy**" tag, the AI Robotic Vehicle activates its **fan module** to spin the turbine of the power station, initiating wind power generation to complete the **charging of 4 Energy Packs**.
- **Waste to Power Station — Energy Pack Transport:** **AI Robotic Vehicle** can transport power energy packs from the cargo hold (power energy packs from waste power stations must be picked up by mechanical vehicles and placed into the AI Robotic vehicle's cargo hold) to the vicinity of the **[Waste Power Station Tag]** and accurately unload them within the **[Waste Power Station]** area.

**Note:**

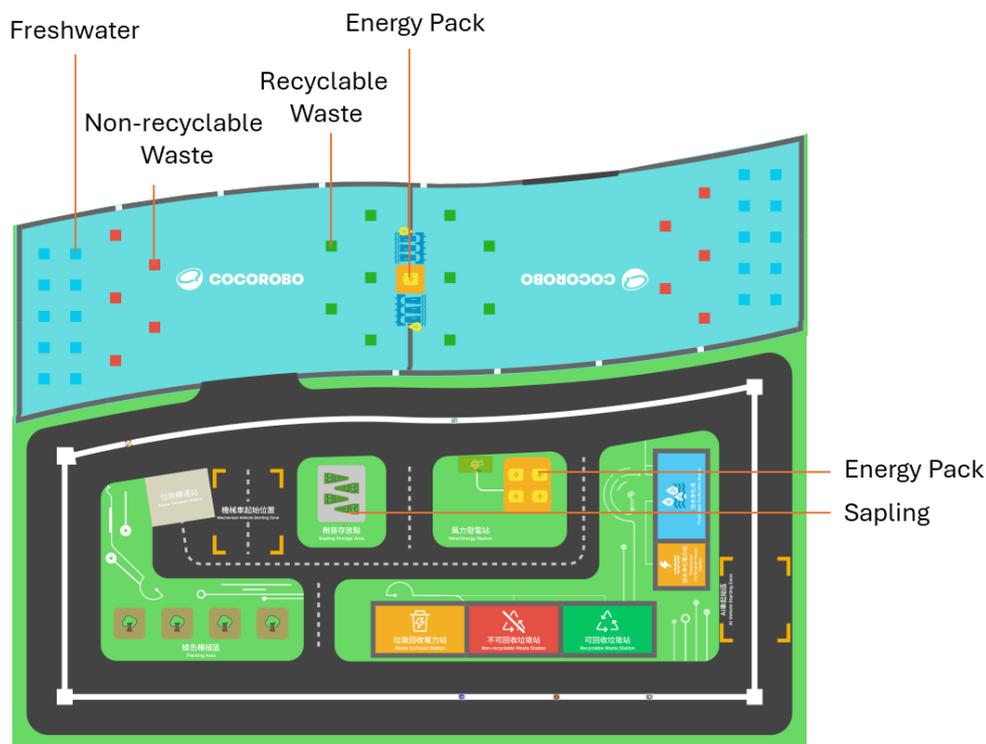
- Mechanical Robotic Vehicles cannot directly place power energy packs into the **[Waste Power Station]**.
- Power energy packs already placed inside the **[Waste Power Station]** cannot be removed and transferred elsewhere.

- **Recyclable/Non-recyclable Waste Handling:** After recognizing the "**Waste Transport**" tag, the AI Robotic Vehicle waits for a specific duration for waste loading and unloading. During this time, participants use the **Bluetooth Remote Control** to

operate the **Mechanical Robotic Vehicle** to pick and place **Recyclable** or **Non-recyclable Waste** onto the AI Robotic Vehicle's flatbed. Using a combination of **line following and tag recognition** technologies, the AI Robotic Vehicle then transports the waste to the corresponding waste stations.

## 4.2 Mechanical Robotic Vehicle Tasks

The **Mechanical Robotic Vehicle** is manually controlled by participants in real-time using a **Bluetooth Remote Control**. Within the **Freshwater Zone** and the **Eco-Block Zone**, it utilizes its **robotic claw** to perform the picking and placing of four types of objects: waste, energy packs, freshwater, and saplings. The detailed task descriptions are as follows:



- **Energy Pack Handling:** Fully charged power packs may be picked up by Mechanical Robotic Vehicles during the competition and placed into AI Robotic Vehicle compartments, or directly placed into the **[Freshwater Purification Power Station]**.

### Note:

- Mechanical Robotic Vehicles may not directly place power packs into the **[Waste Power Station]**.
- Power packs placed into the **[Freshwater Purification Power Station]** may not be

picked up again and moved elsewhere.

- **Recyclable/Non-recyclable Waste Handling:** Participants control the robotic claw to directly pick and place **Recyclable/Non-recyclable Waste** onto the **AI Robotic Vehicle's flatbed**, or temporarily store the objects on its own flatbed. When the AI Robotic Vehicle stops near the **"Waste Transport" tag**, the Mechanical Robotic Vehicle can climb the **slope at the Waste Transport Station** to unload the waste from its own flatbed onto the AI Robotic Vehicle's flatbed.

**Note:**

When a competing team accurately unloads all 5 non-recyclable waste items from their side into the **[Non-Recyclable Waste Station]** and 5 recyclable items to the **[Recyclable Waste Station]**, the team may claim the single power energy pack in the freshwater zone. This pack can be allocated to either the **[Waste Power Station]** or **[Freshwater Purification Power Station]**. Subsequently, the team may enter the opposing team's **[Freshwater Zone]** to seize recyclable/non-recyclable waste and freshwater resources.

- **Freshwater Acquisition and Transport:** After Mechanical Robotic vehicles retrieve freshwater, it can be transported directly to the **[Freshwater Purification Zone]** for unloading via either mechanical claws or vehicle compartments.
- **Sapling Planting:** Pick up **Saplings** lying flat at the collection point, transport them, and place them **vertically (standing)** within the marked squares of the **Tree Planting Station**. (Note: Each station only scores for one successfully planted sapling).

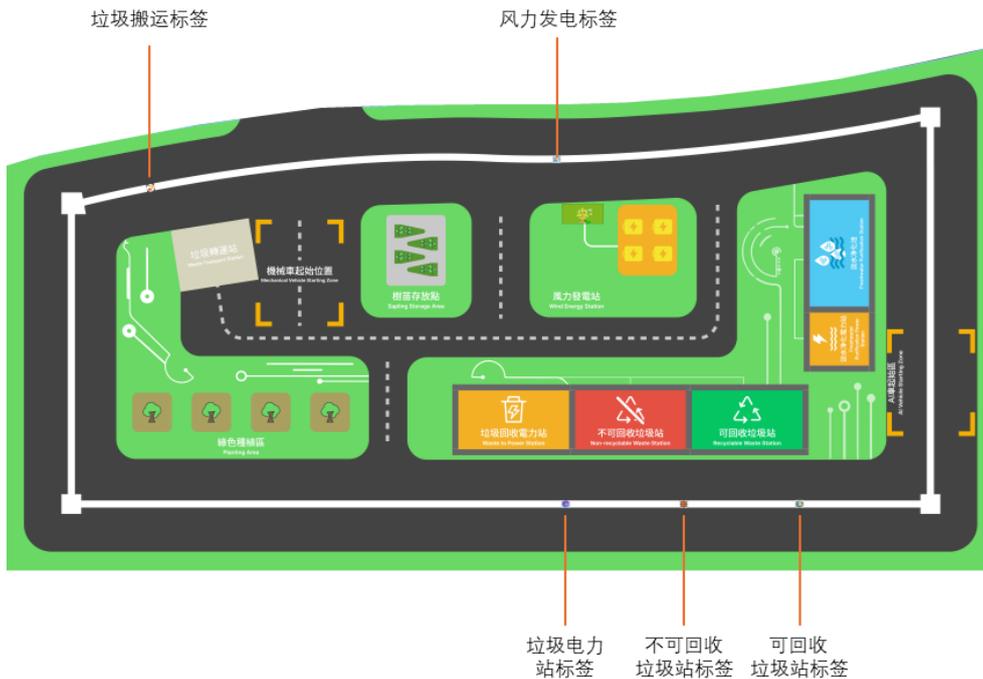
## 4 比赛任务

比赛时长为 7 分钟，参赛选手需严格遵守赛事规则，使用检录合格的 AI 车、机械车完成比赛任务。具体任务详见下方描述。

### 4.1 AI 车任务

AI 车是一款靠“**循线传感器+摄像头**”，在 **【生态街区】** 实现自主运动的小车。在循线行驶

期间，通过摄像头识别不同站点标签后，自主/协同机械车完成以下任务：



- **自主循线：**AI 车在出发区等待比赛开始，当裁判宣布“比赛开始”后，AI 车开始循着白色实线，环绕街区进行自主运动。
- **风力发电：**AI 车识别【风力发电标签】后，启动风扇带动发电站的扇叶转动，启动风力发电，完成 4 个电力能源包的充电。
- **垃圾电力站-电力能源包运送：**AI 车可将车厢内的电力能源包（垃圾电力站的电力能源包需由机械车配合夹放至 AI 车的车厢内），运送至【垃圾电力站标签】附近，并准确卸放至【垃圾电力站】区域内。

**注意：**

- a) 机械车不可以直接将电力能源包夹放至【垃圾电力站】内；
  - b) 已放入【垃圾电力站】内的电力能源包，不允许再次夹出至其他地方。
- **可回收/不可回收垃圾搬运：**AI 车识别【垃圾搬运标签】后，等待一定时间进行垃圾装卸（即：选手通过蓝牙手柄控制机械车将【可回收/不可回收垃圾】夹放/卸放至 AI 车厢内），结合“循线+标签识别”技术，将垃圾搬运至对应的垃圾站内。

## 4.2 机械车任务

机械车由参赛选手通过蓝牙手柄进行实时操控，在【淡水区】与【生态街区】内，借助机械爪执行“垃圾、电力能源包、淡水、树苗”这四类物品的夹取，具体任务描述如下：



- **电力能源包夹取：**已充满电的电力能源包，在比赛期间均可由机械车将其分配夹放至 AI 车车厢内、或直接将电力能源包夹放至【淡水净化电力站】内。

**注意：**

- 机械车不可以直接将电力能源包夹放至【垃圾电力站】内；
- 已放入【淡水净化电力站】内的电力能源包，不允许再次夹出至其他地方。

- **可回收/不可回收垃圾的夹取/卸放：**参赛选手可控制机械爪将【可回收/不可回收垃圾】直接夹放置 AI 车厢内，或暂时存放至自身车厢内，待 AI 车停在【垃圾搬运标签】附近，爬上【坡度卸货区】，倾倒车厢内的垃圾至 AI 车厢内。

**注意：**

当参赛选手将己方一侧的 5 个不可回收垃圾准确卸放至【不可回收垃圾站】、5 个可回收垃圾准确卸放至【可回收垃圾站】，淡水区中间的 1 个电力能源包即可由该队伍获取并分配至【垃圾电力站】或【淡水净化电力站】，继而可以进入对方的【淡水区】内进行可回收/不可回收垃圾、淡水的抢夺。

- **淡水获取与搬运：**机械车夹取淡水后，可选择机械爪、或车厢搬运的方式，将淡水直接搬运至【淡水净化区】进行卸放。
- **树苗种植：**将平放在【树苗领取点】的树苗，转运并竖直放置在【绿色种树区】的方框内（每个种植框，只计种植一棵树的得分）。

## 5 Criteria for Winning

### 5.1 Task Scoring

- **Waste Recycling — Scoring Description**

Task Description	Scoring Formula
Energy Pack placed in <b>Waste to Power Station</b>	<b>Multiplier</b> (increases by 1 per pack)
Recyclable Waste in <b>Recyclable Waste Station</b>	5 points per cube <b>X</b> Number of Energy Packs (Multiplier)
Non-recyclable Waste in <b>Non-recyclable Waste Station</b>	5 points per cube <b>X</b> Number of Energy Packs (Multiplier)

- **Freshwater Purification — Scoring Description**

Task Description	Scoring Formula
Energy Pack in <b>Freshwater Purification Power Station</b>	<b>Multiplier</b> (increases by 1 per pack)
Freshwater in <b>Freshwater Purification Station</b>	5 points per cube <b>X</b> Number of Energy Packs (Multiplier)

- **Tree Planting — Scoring Description**

Task Description	Scoring Formula
Sapling placed inside the square of a <b>Tree Planting Station</b> (Only 15 points per station will be counted regardless of quantity)	15 points per station

- **Total Score per Match = Task Points + Bonus Points**

- **Task Points = Waste Recycling Points + Freshwater Purification Points + Tree Planting Points**

- **Bonus Points:** 50 bonus points will be awarded if at least 1 Energy Pack is placed in both the Freshwater Purification Power Station and the Waste to Power Station; otherwise, no bonus points are given.

### Example 1:

In a single round, a team successfully recovers 5 **Non-recyclable Waste** cubes, 4 **Recyclable Waste** cubes, and 8 **Freshwater** cubes. There is 1 **Energy Pack** in the **Waste to Power Station** and 2 **Energy Packs** in the **Freshwater Purification Power Station**. Finally, they successfully plant 2 **Saplings**. The score is calculated as follows:

- **Waste Recycling Points:**  $(5 + 4) \text{ cubes} \times 5 \text{ points/cube} \times 1 \text{ Multiplier} = 45 \text{ points}$
- **Freshwater Purification Points:**  $8 \text{ cubes} \times 5 \text{ points/cube} \times 2 \text{ Multiplier} = 80 \text{ points}$
- **Tree Planting Points:**  $2 \text{ stations} \times 15 \text{ points/station} = 30 \text{ points}$
- **Bonus Points:** **50 points** (since both power stations contain Energy Packs)
- **Total Score:**  $45 + 80 + 30 + 50 = 205 \text{ points}$

## 5.2 Winner Determination

The team with the **highest score** wins the round upon the completion of the match time. In the event of a **tie score**, task points will be compared in the following order to determine the winner: ①**Waste Recycling Points**.②**Freshwater Purification Points**.③**Tree Planting Points**.

## 5.3 Group Qualifying Stage

The **Group Qualifying Stage** will be held first on the match day. Teams will be organized into smaller groups to compete against each other in a round-robin format (group sizes and team names will be announced in the competition handbook). **Game points** will be awarded as follows: **Win = 3 points, Draw = 1 point, Loss = 0 points**. At the end of the stage, the **top 2 teams** with the highest game points in each group will qualify for the next stage.

If two or more teams are tied in game points and the top two cannot be determined, the team with the higher **Total Task Points** (the sum of all scores earned in the qualifying stage) will rank higher.

If both the **game points** and the **Total Task Points** (the sum of all scores earned across all matches in the qualifying stage) remain tied, rankings will be determined by comparing the following items in sequence: **Total Task Points**, total **Waste Recycling Points**, total

**Freshwater Purification Points**, total **Tree Planting Points**, and total **Bonus Points**. The total for each scoring category is defined as the sum of points earned for that specific item across all match sessions. The team that first achieves a scoring advantage in this specified order will rank higher.

If a tie still cannot be resolved and the qualifying teams cannot be determined, a **lottery** will be conducted to select the higher-ranking teams.

## 5.4 Knockout Stage

After the completion of the **Group Qualifying Stage** on the match day, teams that **qualify** from their groups will proceed to the **Knockout Stage**. In this stage, teams will compete in a **single elimination** format where **winners will proceed** to the next round and losing teams are eliminated.

If a winner still cannot be determined according to the **Winner Determination** criteria in Section 5.2, a **lottery** will be conducted to select the winning team.

## 5 获胜判定

### 5.1 任务得分说明

- 垃圾回收-任务得分说明

任务得分情况描述	分值计算
垃圾电力站内有电力能源包	有效系数值增加 1 /个
可回收垃圾站内有可回收垃圾	5 分/个 × 电力能源包数量 (有效系数值)
不可回收垃圾站内有不可回收垃圾	5 分/个 × 电力能源包数量 (有效系数值)

- 淡水净化-任务得分说明

任务得分情况描述	分值计算
淡水净化电力站内有电力能源包	有效系数值增加 1/个
淡水净化电力站内有淡水	5 分/个 × 电力能源包数量 (有效系数值)

● 树苗种植-任务得分说明

任务得分情况描述	分值计算
【绿色种树区】的方框内有树苗 (每个种植框, 只计种植一棵树的得分)	15 分/棵

**单场总得分=任务得分+额外加分;**

**任务得分=垃圾回收得分+淡水净化得分+树苗种植得分**

**额外得分:【淡水净化电力站】和【垃圾电力站】均有电力能源包, 即可获得 50 分; 否则不得分。**

例:

参赛队伍在一轮比赛中, 成功回收 5 个不可回收垃圾、4 个可回收垃圾、8 个淡水; 垃圾电力站内有 1 个电力能源包, 淡水净化电力站内有 2 个电力能源包; 最后并成功种植 2 棵树苗, 其得分如下所示:

垃圾回收得分 = (5 + 4) 个 × 5 分/个 × 1 有效系数/个 = 45 分;

淡水净化得分 = 8 个 × 5 分/个 × 2 有效系数/个 = 80 分;

树苗种植得分 = 2 棵 × 15 分/棵 = 30 分;

额外加分: 50 分;

单场得分 = 45 + 80 + 30 + 50 = 205 分。

## 5.2 获胜判定

比赛时间结束, 单场分高的一方获胜。若单场得分相同, 则依序比较以下项目: 垃圾回收得分、淡水净化得分、树苗种植得分, 优先取得得分优势的队伍获胜。

## 5.3 小组赛

比赛日当天会先进行小组赛, 若干个队伍组为一组, 轮流每两个队伍进行比赛 (小组内队伍数量及队伍名称后续在比赛手册公布)。一局比赛中获胜的队伍积 3 分, 平局各积 1 分, 落败积 0 分, 小组赛结束后积分排名前二的队伍可出线。

小组赛结束后出现两个或多个小组赛积分相同且未能排出小组前二, 则小组赛总分数 (小

组赛内所有单场得分总和) 较高的队伍排名靠前。若小组赛积分和小组赛总分数相同, 则依序比较以下项目: 总任务得分、总垃圾回收得分、总淡水净化得分、总树苗种植得分及总额外加分 (总项目得分是所有场次相同项目得分之和), 优先取得得分优势的队伍排名靠前。若最后仍无法从积分相同队伍选出出线队伍, 则抽签选出排名靠前队伍。

## 5.4 淘汰赛

比赛日当天小组赛结束后小组出线的队伍可进行淘汰赛, 获胜队伍晋级, 落败队伍淘汰。若 5.2 获胜判定未能选出获胜队伍, 则抽签选出获胜队伍。

# 6 Resets & Repairs

## 6.1 Resetting Robotic Vehicles

Each team is allowed an **unlimited number of reset requests** per match. Team members must **verbally request** a reset from the nearest referee by stating either "**AI Robot Reset**" or "**Mechanical Robot Reset**". Only upon the acknowledgement and approval of the referee can the team member physically pick up and return the Robotic Vehicle to the corresponding **starting area** to restart. The referee will remove any **scoring objects** from the Robotic Vehicle and place them back to their original positions on the playfield.

## 6.2 Repairing Robotic Vehicles

- If a Robotic Vehicle requires **repair**, team members must first request a reset and then take the Robotic Vehicle **off the playfield** for repairs. Once repairs are completed, the vehicle must restart from its corresponding starting area. **Scoring objects are not allowed to be taken off the playfield**; the referee will remove any objects from the vehicle and return them to their original positions on the field.
- If a team needs to **swap for a backup Robotic Vehicle**, team members must first **verbally request for a reset** from the nearest referee. Only upon the acknowledgement and approval of the referee can the team member physically pick up and remove the Robotic Vehicle from the **playfield**. The **same team member** must

then place the backup Robotic Vehicle onto the **corresponding starting area** to restart. This entire swap process **must be completed by the same individual**. At any point in time during the match, there should **not be more than 1 AI Robotic Vehicle and 1 Mechanical Robotic Vehicle** (i.e., multiple robots of the same type) present on the playfield.

- No repairs are permitted to be carried out on the playfield to avoid interfering with the progress of the match.

## 6 维修/重置

### 6.1 机械人重置

每支参赛队伍每场比赛有可以无限次重置机械人，参赛队员可向旁边裁判口头发起重置请求“申请重置 AI 车”或“申请重置机械车”，当裁判回答同意后，参赛队员须将机械人拿到对应出发区再次出发，裁判会将申请重置的机械人上的道具拿走并恢复到场地上。

### 6.1 机械人维修

- 若机械人需要维修，参赛队员须在申请重置后将机械人拿出比赛地图外进行维修，维修结束后从对应出发区再次出发。维修时不允许将道具带出场地，裁判会将维修的机械人上的道具拿走并恢复到场地上。
- 若需要更换备用机械人，队伍须在申请重置后派出一名队员将机械人拿出比赛地图外，并且同一名队员将备用机械人拿到场地上对应出发区重新启动。单次更换机械人动作须为同一名队员完成，不允许比赛地图上同一支队伍同时存在多合同类型机械人（多台 AI 车或多台机械车）。
- 不允许在场地上进行维修机械人影响比赛正常进行。

## 7 Detailed Match Rules

The duration for each match is strictly **7 minutes**, based on the on-site timing. Once the 7 minutes are up, the match will be terminated immediately.

During the match, if participants encounter emergencies such as **robotic vehicle malfunctions** that require repair or a restart, they must first obtain **acknowledgement and**

**approval from the referee** before retrieving the vehicle. Any collected **scoring objects** (such as freshwater, waste, or energy packs) found on the vehicle must be **returned to their original positions** on the playfield.

Participants are **strictly prohibited** from touching their AI or Mechanical Robotic Vehicles without prior permission from the referee. Any violation will result in the vehicle being returned to its **starting area**. If the Robotic vehicle contains any collected playfield objects (such as 'freshwater, waste, or energy packs'), all such items will be **restored to their original locations** on the map.

## 7.1 AI Robotic Vehicle Rules

### 7.1.1 AI Robotic Vehicle Preparation Stage

- The **AI Robotic Vehicle** must be placed at its designated **starting area**, and its vertical projection must not exceed the boundaries of that area.
- Teams are **strictly prohibited** from using another team's robotic vehicle. If discovered, both teams involved will be **disqualified** immediately.

### 7.1.2 AI Robotic Vehicle Task Execution Stage

- **Off-track Handling:** During AI Robotic Vehicle lane-following operation, if the AI Robotic Vehicle drifts off the lane markings and cannot be controlled back onto the lane, the vehicle will be reset to its starting position. If the vehicle contains collected 'Energy Packs' or 'Recyclable/Non-Recyclable Waste', these items will be fully restored to their original locations on the map. Participants may then resume resource collection.
- **Object Unloading Criteria:** When the AI Robotic Vehicle unloads energy packs or waste into the designated task areas:
  - 1) **The task is determined as SUCCESSFUL if:**
    - ① The object lands anywhere on the map or on other objects and then **bounces into the correct unloading area**.
    - ② The object is not fully inside the designated zone but has **at least one side touching the designated task area** (the area enclosed by adhesive strips, excluding the strips themselves).

- ③ Resources located on the adhesive tape that are accidentally **knocked into the designated mission area** by the AI vehicle or by new resources when the AI vehicle performs resource unloading again.
- 2) **The task is UNSUCCESSFUL but the item can be RETRIED If:**
- (Note: The item must be re-picked up by the Mechanical Robotic Vehicle and placed into the AI Robotic vehicle, and the AI Robotic vehicle must complete the resource retrieval autonomously):
- ① The resource is incorrectly unloaded onto other open ground on the team's side of the map (excluding other areas enclosed by strips), including the team's Freshwater Zone.
  - ② The resource lands entirely on the black adhesive strips without touching any part of the map surface.
  - ③ The resource falls into the designated area but then bounces out; after bouncing, it does not contact any part of the designated task area (i.e., the area enclosed by strips, excluding the strips themselves).
- 3) **The task is UNSUCCESSFUL and the incorrectly placed resource will be restored by the referee to its original position on the map If:**
- ① In any case, the resource unloaded by the AI Robotic Vehicle falls into another area enclosed by strips (e.g., if the AI Robotic Vehicle incorrectly unloads 'Recyclable Waste' into the [Non-Recyclable Waste Station], the misplaced 'Recyclable Waste' will be restored by the referee to its original position on the map).

## 7.2 Mechanical Robotic Vehicle Rules

### 7.2.1 Mechanical Robotic Vehicle Preparation Stage

- The **Mechanical Robotic Vehicle** must be placed at its designated **starting area**, and its **vertical projection** must not exceed the boundaries of that area.
- Teams are **strictly prohibited** from using another team's robotic vehicle. If discovered, both involved teams will be **disqualified** immediately.

## 7.2.2 Mechanical Robotic Vehicle Task Execution Stage

- **Unauthorized Resource Drop into Opponent's Area:**

If the Mechanical Robotic Vehicle picks up 'Freshwater, Recyclable/Non-Recyclable Waste, or Power Energy Pack' in the [Freshwater Zone] and the resource cube falls — by any means — into the opponent's area (including the opponent's Freshwater Zone), the resource will be restored by the referee to its original position on the map.

- **River Opening Trigger:**

The river between both sides is considered opened and both teams' Mechanical Robotic Vehicles may enter the opponent's [Freshwater Zone] to compete for resources immediately when a Power Pack inside the [Freshwater Zone] is picked up by either team's Mechanical Robotic Vehicle.

- **Incorrect Unloading into Enclosed Areas:**

When the Mechanical Robotic Vehicle unloads 'Freshwater' or 'Power Energy Pack' and the resource falls into another area enclosed by adhesive strips (e.g., Freshwater incorrectly unloaded into the [Freshwater Purification Zone]), the corresponding misplaced resource will be restored by the referee to its original position on the map.

- **Vehicle Reset Conditions:**

During task execution, if any of the following occurs, the Mechanical Robotic Vehicle will be reset to the starting area and all resources on it will be restored to their original positions on the map:

- 1) The AI Robotic Vehicle fails to place the 5 Recyclable Waste items and 5 Non-Recyclable Waste items from the [Freshwater Zone] into the [Recyclable Waste Station] and [Non-Recyclable Waste Station] respectively, yet picks up the Power Energy Pack in the [Hydroelectric Power Zone].
- 2) After picking up a resource, the Mechanical Robotic Vehicle places it directly into the Waste Recycling & Power Station, Non-Recyclable Waste Station, or Recyclable Waste Station.

- **Tree-Planting Success Criteria:**

To successfully complete the tree-planting task, the base of the sapling must have at least one side touching the inside of the planting frame (excluding the wooden prop border) and remain upright; otherwise, no score will be awarded. Contestants may use

the Mechanical Robotic Vehicle to make multiple adjustments to unsuccessfully planted saplings.

- **Malicious Collisions:**

Malicious collisions are strictly prohibited. The vehicle making the first contact will be returned to the starting area for a 15-second penalty. Any collected scoring objects (freshwater, waste, or energy packs) on the vehicle will be confiscated by the referee.

Determination criteria:

- 1) Contact in narrow paths is not considered a collision.
- 2) Normally, the robot making the initial contact is penalized.
- 3) If malicious blocking causes a collision, the team performing the block is penalized.

- **Entanglement Recovery Procedure:**

If both teams' Mechanical Robotic Vehicles become entangled due to structural issues and cannot separate within 10 seconds, upon confirmation by the referee, contestants may return their own robot to the corresponding starting position and restore all props on both robots.

- **Zero Score for Mobility Loss Due to Malicious Ramming:**

If a robotic vehicle loses its mobility due to a malicious collision caused by the opponent, the violating team's score for that match will be 0.

## 7 比赛细则

单场竞赛限时 7 分钟，以现场计时为准，时间结束即终止比赛。

比赛期间，参赛选手如遇机械人故障等突发情况需维修、重启等，须经裁判批准后方可取回车辆，且须将已回收的任务物资（如淡水/垃圾/电力能源包）恢复至原位。

参赛选手未经裁判准许，不得触碰本人操控的 AI 车或机械车；否则小车将被恢复到起始位置，若小车内有已回收的地图道具（如“淡水/垃圾/电力能源包”等），则将被全部恢复到地图原位置。

## 7.1 AI 车比赛细则

### 7.1.1 AI 车准备阶段

- AI 车需放置于 AI 车起始位置，其垂直投影不得超出该区域。
- 不得使用其他参赛队的小车进行比赛，如发现，两支参赛队直接取消比赛资格。

### 7.1.2 AI 车执行任务阶段

- AI 车循线行驶过程，如若 AI 车驶离车道线无法控制回到车道，小车将被恢复到起始位置，若小车内有已回收的“电力能源包、可回收/不可回收垃圾”，则将被全部恢复到地图原区域内，选手可再次进行资源回收。
- AI 车运送电力能源包、可回收/不可回收垃圾到达指定任务区域，进行物资卸放时：
  - 1) 若出现以下情况，判定为完成任务：
    - ① 道具掉落到地图及道具上的任何位置后，弹进正确的卸放区域内；
    - ② 道具未完全卸放至指定区，但有至少一侧触碰到指定任务区域（即胶条所包围的区域，不包含胶条）。
    - ③ 位于胶条上的资源，在 AI 车再次进行资源卸放时，不小心被 AI 车或新资源撞进指定任务区域内。
  - 2) 若出现以下情况，则代表本次任务未成功，但允许机械车再次夹取该资源放入 AI 车厢，由 AI 车自主完成资源的回收：
    - ① 资源被错误卸放在己方地图一侧的其他空地（不包含其他被胶条所围的其他区域），包括己方的淡水河道。
    - ② 资源完全掉落在黑色胶条上，未触碰到地图表面的任一区域。
    - ③ 资源掉落到指定区域后弹出，弹出后且完全没接触到指定任务区域（即胶条所包围的区域，不包含胶条）。
  - 3) 若出现以下情况，则表示本次任务未成功，且放错区域的对应资源将被裁判重新恢复至地图原区域内：
    - ① 在任何情况下，AI 车卸放的资源掉落在胶条所围的其他区域内（如：AI 车将“可回收垃圾”错误卸放至【不可回收垃圾垃圾站】内，则对应放错区域的“可回收

垃圾“将会被裁判重新恢复至地图原区域内)。

## 7.2 机械车比赛细则

### 7.2.1 机械车准备阶段

- 机械车需放置于机械车起始位置，其垂直投影不得超出该区域。
- 不得使用其他参赛队的小车进行比赛，如发现，两支参赛队直接取消比赛资格。

### 7.2.2 机械车执行任务阶段

- 机械车在淡水区夹取“淡水、可回收/不可回收垃圾、电力能源包”时，资源方块以任何形式落入到对方区域（包括对方淡水区），资源将会被裁判恢复至地图原位置上。
- 当【淡水区】内的电力包被某一方机械车夹起的瞬间，双方河道被打通，双方机械车即可进入对方淡水区进行资源抢夺。
- 机械车卸放“淡水、电力能源包”物资时，资源掉落在胶条所围的其他区域内（如将淡水错误卸放至淡水净化区域内），放错区域的对应资源将被裁判重新恢复至地图原区域内。
- 机械车执行任务期间，若出现以下情况，机械车将被重置到起始区域，且机械车上的资源将被全部恢复到地图原位置：
  - a) 当 AI 车未成功将淡水区的 5 个可回收垃圾、5 个不可回收垃圾分别放入【可回收垃圾站】、【不可回收垃圾站】内，机械车夹取【水利发电区】的电力能源包。
  - b) 机械车夹取资源后，直接放至【垃圾回收电力站】、【不可回收垃圾站】、【可回收垃圾站】内。
- 种植树苗时，树苗底座必须至少有一侧触碰到种植框内（不包含木制道具边框），并保持竖立状态才算任务成功，否则不计分；参赛选手可使用机械车，对未成功种植的树苗进行多次的调整。
- 不能恶意撞击对方机械车，如出现碰撞，则先碰撞者被恢复到起点停止 15s，若小车内有已回收的淡水/垃圾/电力能源包，则机械车上的资源将被全部恢复到地图原位置。判定标准如下：
  - a) 狭窄路段不算撞击。
  - b) 正常情况下，先撞击者的机械人受罚。
  - c) 恶意阻挡导致自己被撞者受罚。

- 参赛选手双方的机械车因结构问题纠缠到一起导致 10s 内不能主动分开，裁判确认后，参赛选手可将己方机械人拿回对应出发位置，并恢复双方机械车上的道具。
- 若因恶意冲撞导致一方机械人丧失运动能力，则违规一方本场比赛得分为 0 分。

## 8 Event Statement

The **Organizing Committee** reserves all rights for the **final interpretation, amendment, and execution** of all competition rules and matters, including but not limited to **participant eligibility, robotic vehicle requirements, scoring details, violation determinations, and on-site operational standards**.

The Organizing Committee also has the authority to **adjust the competition schedule or rules** based on actual on-site conditions, such as **technical malfunctions or emergency safety concerns**. Any such adjustments will be finalized and communicated through **on-site announcements or referee notifications**.

For further activity details, please visit [gba.cocorobo.hk](http://gba.cocorobo.hk).

## 8 活动声明

本竞赛所有规则事项（包括但不限于参赛资格、机械人要求、评分细则、违规判定及现场操作规范）的最终解释权、修订权及执行权归大赛组委会所有。

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