GAR 2026 Future City

GAR 2026 - Version A

1. Scope of competition

(I) Competition groups: primary school group (grade 4-6), junior high school group, senior high school group (including technical secondary school and vocational high school).

(II) Number of participants: 2-3 contestants/team.

(III) Coach: 1 person (optional).

(IV) Each person is limited to participating in 1 event and 1 team.

(V) Group determination: based on the level of study of the contestants as determined by the local education administrative department (education committee, education department, education bureau).

2. Competition theme

When early morning packages wait between buildings, when the lives of the elderly require more convenient care, when the city's "capillaries" call for more efficient flow... these seemingly minute pulses of the city are crucial to people's daily well-being.

The rapid development of artificial intelligence and robotics is igniting hope for addressing these "soft spots" of urban life. This year's competition, themed "**GAR Future City**," envisions building a beautiful home where humans and machines coexist and are intelligently connected. Young students are invited to design and program intelligent robotic companions to independently complete a series of critical service tasks that improve quality of life, optimize urban operations, and deliver warmth and humanity. This competition not only comprehensively tests environmental perception, intelligent decision-making, precise execution, and collaborative collaboration, but also vividly demonstrates how technology can

be deeply integrated into daily life, warm hearts, and empower communities.

3. Competition process

(I) Registration: Participants must register in the prescribed manner and time. Successfully registered participants are eligible to participate in the Trials.

(II) Trials: Participants will compete within the prescribed timeframe, in accordance with the methods and procedures specified by the organizing committee, to determine the finalists.

(III) Finals: Shortlisted participants will compete within the prescribed timeframe to determine the first, second, and third prizes.

4. Competition environment

(I) Programming System: Use computer programming software (AIcode).

(II) Programming Computer: Participants must bring their own laptops for the competition and ensure that the laptops are fully charged during the competition (you can bring your own mobile charging device).

(III) Prohibited Devices: USB flash drives, mobile phones, tablets, intercom, etc.

(IV) Competition venue:

Map

1) The venue size is 2362mm Length × 1143mm Width.
2) The venue material is scraped cloth, and the black guide line is 2.5cm wide (±2mm).
3) The size of base is 30cm Length × 30cm Width.
4) The specific size of the actual competition venue, marking points, and props material, size, and weight shall be subject to the on-site provision.

Base map

There are two starting bases. During the competition, teams can adjust the structure and program of the equipment or temporarily store prop modules for certain tasks in the base. If a team member touches the robot outside the base, it will be recorded as a restart. The robot can return to any base autonomously, which does not count as a restart.

Restart: this occurs when a robot is manually brought back to base during a match. There's no limit to the number of restarts per round. After each round, **20** restart bonus points are awarded. Each restart deducts **5** points from the restart bonus. After the deduction, the robot can restart again, but no further points will be deducted. Scores already completed before the restart remain valid. If no points were scored but the mission model has changed from its initial state, manual recovery is not permitted.

5. Competition equipment

1) Each team is limited to one robot. The maximum length, width and height of the overall vertical projection of the robot before starting is limited to 30*30*30cm. After the robot starts, the size is not limited.
2) Only one controller is allowed. The controller must contain 2 PH-6PIN main

interfaces, 1 3PIN digital servo interface. The total number of motor interfaces on a single controller is 2, the total number of servo interfaces is 1, and the total number of sensor interfaces is not more than 5.

3) When the motor is used to drive the wheel, only a single motor can independently drive a single wheel on the ground.
4) The robot structure must be built with plastic building blocks, and the building blocks must use the design size based on the standard 8mm building system.
5) 3D printing or laser cutting shall not be used to make structural parts, transmission parts, and minimum unit housings. Auxiliary connection materials such as screws, screws, rivets, glue, and tape shall not be used.
6) The robot must have its own independent battery. The battery is not allowed to be fixed by screws or electric welding. The battery voltage shall not exceed 9V.

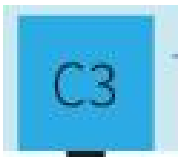
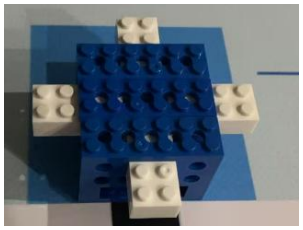
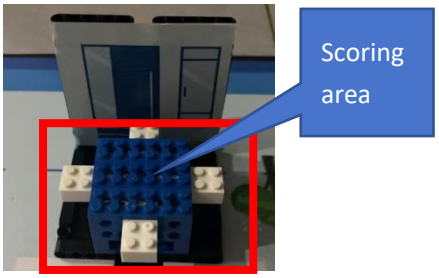
6. Competition Tasks

6.1 Task details:

There are seven tasks in total, some of which have random variables. There is no particular order in which to complete the tasks. During the competition, contestants are prohibited from touching the task props on the map. Robots may repeat a single task during the competition timer, provided the task is not broken.

Task 1: Smart Express

Robots need to pick up express packages at smart logistics hubs and deliver them to the recipient's doorway.

<table>
<tr><td> 
</td><td>  </td></tr>
<tr><td>Initial placement area for express model</td><td>Express model</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>"Doorway" model fixed area</td><td>Completion Status</td></tr>
</table>

(1) This task is worth a maximum of 40 points.

(2) The robot walks to the C3 position in the initial placement area of the express model to pick up the package. The vertical projection of the express model completely leaves the C3 position and remains there until the end of the single round. This is considered a success and is worth 10 points.

(3) The robot delivers the express model to the "doorway" model fixed at one of the C1 or C2 positions. The express model touches the upper surface of the "doorway" model but does not touch the map. This is considered a success and is considered a success and is worth 30 points.

Task 2: Fire pioneer

The robot needs to respond quickly to the alarm signal, arrive at the fire source area, and place the water model on the burning building model.

		
Placement area for burning building model	Water model (3 pieces)	Completion Status

(1) This task is worth a maximum of 30 points.

(2) The water model must contact the upper surface of the burning building model and remain in contact until the end of the single round.

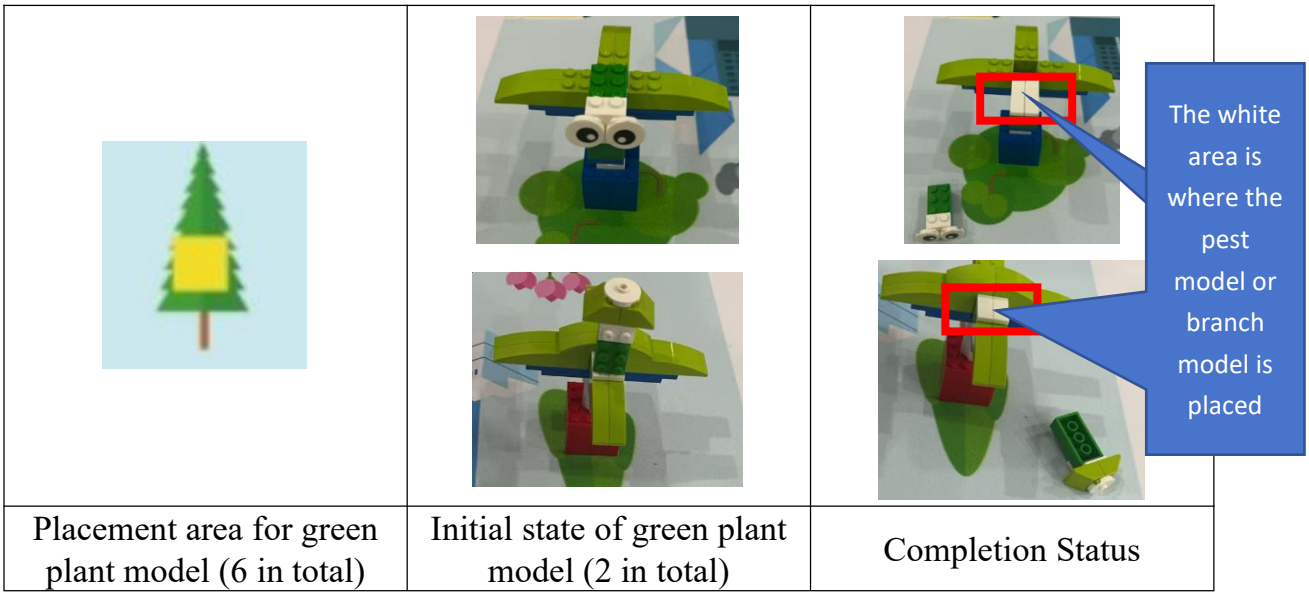
(3) There are three water models in total, and their initial position is at the base. The primary school group will receive 15 points for completing one water model, and the junior and senior middle school groups will receive 10 points for completing one water model.

(4) Multiple water models can be transported at the same time, but they must be transported separately (water models cannot be fixed together). Otherwise, only one water model will be counted.

(5) The burning building model is placed on the map. If the burning building model is pushed away (at any of the four contact points with area E leaves area E) , no points will be awarded for this task.

Task 3: Smart plant protection

The robot needs to complete ecological pest control and intelligent pruning of green plants.



Placement area for green plant model (6 in total)	Initial state of green plant model (2 in total)	Completion Status

(1) There are two types of green plant models (as shown above). This task is worth a maximum of 40 points.

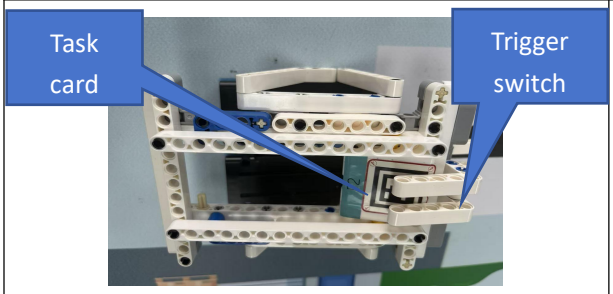
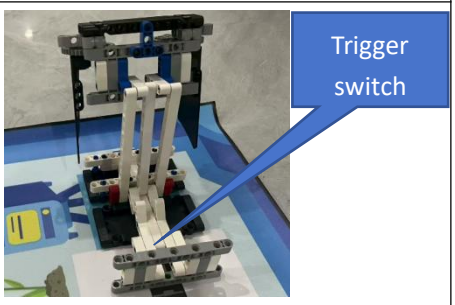
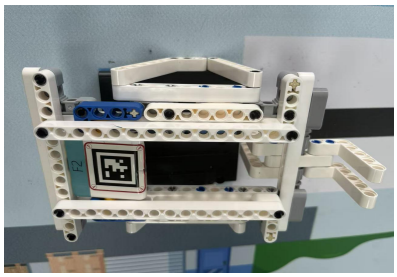
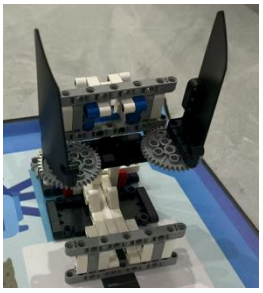
(2) Complete the task by making the pest model or branch model separate from the green plant model.

(3) Primary school students only need to complete one to get 40 points, and no additional points are awarded for completing two. Junior high and high school students are required to complete two, with each receiving 20 points.

(4) The plant model is placed on the map, with both the pest model and the branch model (on the task side) facing the main black line in the center of the map. If the base of the plant model is completely separated from the initial placement area, the plant model will not receive any points.

Task 4: Environmental data collection

Environmental data collection is an indispensable core link in the future intelligent and sustainable development of cities, and robots need to activate the correct environmental monitoring model.

	
Random model fixed position	Monitoring model fixed position
	
Random model initial state	Monitoring model initial state
	
Random model completion status	Monitoring model completion status

(1) This task is worth a maximum of 40 points.

(2) There is a fixed random model at position D (the random model trigger switch faces the black line in area D) and two monitoring models at positions F1 and F2 (the model trigger switches face the black lines next to the fixed area).

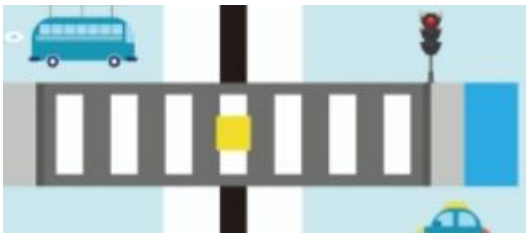
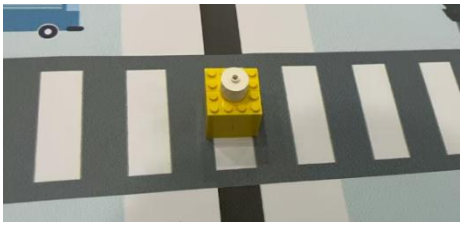
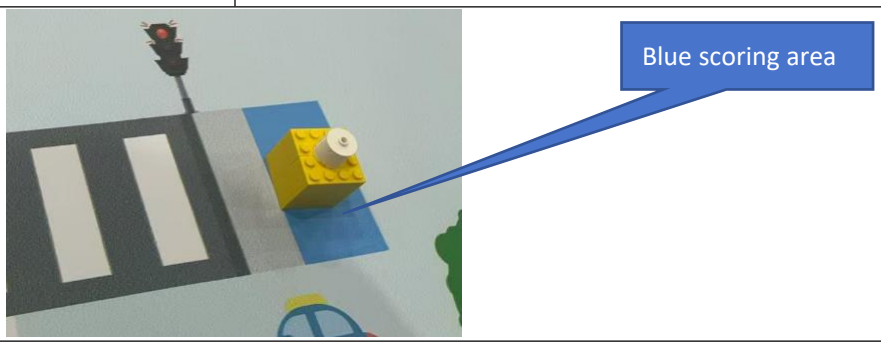
(3) The primary school group will get 40 points for completing the designated monitoring model. If they complete the monitoring model in the wrong position or complete both monitoring models, they will not get any points for this task.

(4) The junior and senior high school groups need to trigger the random model first, and the task card will roll down for 20 points. The task card has F1 on one side and F2 on the other side, corresponding to the monitoring models in the two positions. According to the position shown on the task card, completing the environmental monitoring model in the

correct position will get 20 points. If they complete the monitoring model in the wrong position or complete both monitoring models, they will not get any points for this task.

Task 5: Assist elderly pedestrians

Use the warmth of technology to protect the dignity accumulated over the years, and the light and equality of the future city will illuminate every journey of life. The robot quickly responds to the elderly crossing the road and escorts them to the side of the road.

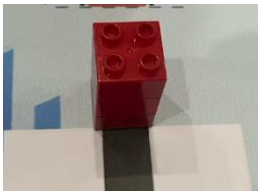
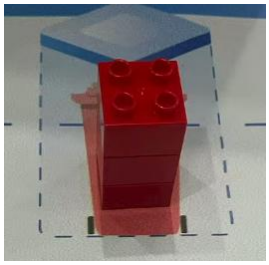
<table>
<tr><td>  </td><td>  </td></tr>
<tr><td>“Old man” model placement area (yellow area)</td><td>Initial placement area</td></tr>
<tr><td colspan="2"> 
</td></tr>
<tr><td colspan="2">Completion Status</td></tr>
</table>

(1) This task is worth a maximum of 20 points.

(2) The robot moves the "old man" model to the blue scoring area on the sidewalk. If the model does not fall over and its vertical projection touches the scoring area and remains in this position until the end of the round, it is considered a success and receives 20 points.

Task 6: Accurate classification

The essence of garbage classification is to transform the discarded "burden" into a flowing "resource" and build an invisible bridge to a sustainable future in the trash can. The robot needs to move the garbage model to the corresponding trash can.

		
Task model placement area	Garbage Models (one red, blue, and green)	Completion Status

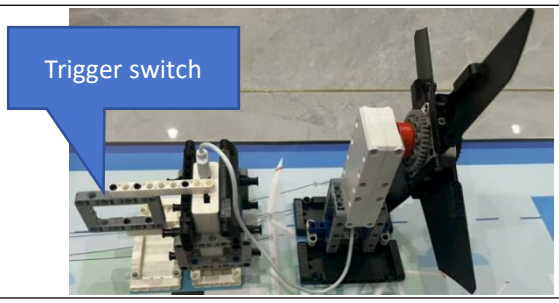
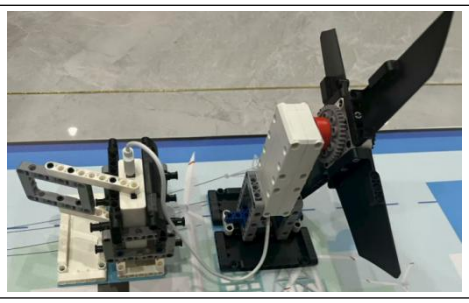
(1) This task is worth a maximum of 30 points.

(2) There are three types of garbage models (red - hazardous waste, blue - recyclable waste, green - kitchen waste). Before debugging, draw lots and place a garbage model of one color in area A.

(3) The robot moves the garbage model to the corresponding garbage bin area. If the vertical projection of the garbage model touches the corresponding garbage bin and remains in this position until the end of the single round, it is considered a success and receives 30 points.

Task 7: Start the energy windmill

Clean energy is the trend of the future. It will transform every breath of the city into a clean pulse and use the invisible wind to create a tangible future. Robots need to start energy windmills to provide energy for the operation of the city.

	
Start model fixed area	Windmill model fixed area
	
Initial status	Completion Status

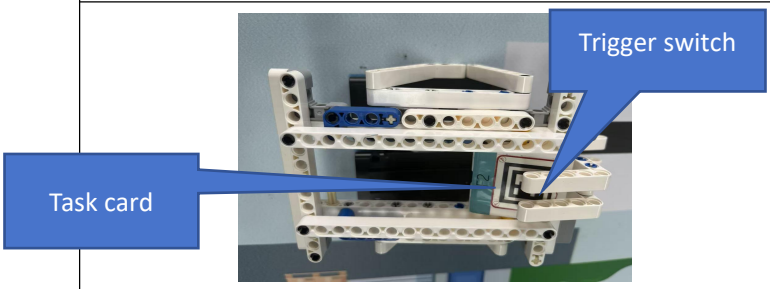
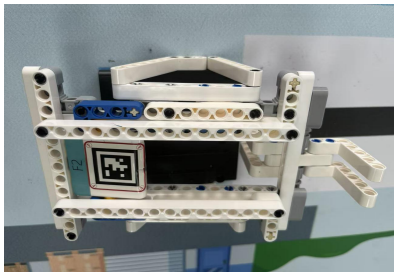
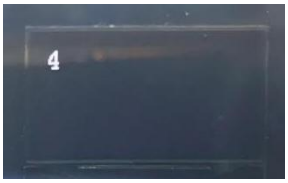
(1) This task is worth a maximum of 40 points.

(2) If the robot triggers the energy windmill switch, causing the model to rotate and keep rotating until the end of the single round, it is considered a success and receives 40 points.

(3) If the energy windmill stops midway, no points will be awarded for this task.

Task 8 Challenge Task: Intelligent Recognition Challenge

In the digital twin systems of future cities, every physical entity carries a unique information tag. It is crucial to enable robots to proactively perceive and recognize this environmental information, like "city detectives," and transform it into readable decision-making data.

<table>
<tr><td colspan="2"> 
</td></tr>
<tr><td colspan="2">Random model fixed position</td></tr>
<tr><td> 
</td><td>  </td></tr>
<tr><td>Random model Initial status</td><td>Random model Completion Status</td></tr>
<tr><td colspan="2"> 
</td></tr>
<tr><td colspan="2">Intelligent recognition of challenge completion status</td></tr>
</table>

(1) This task is only valid for senior middle school students, with a maximum score of 30 points;

(2) The robot needs to trigger a random model to flip the tag sticker on the task card so

that it is stationary with the tag facing upwards. Within three seconds, it must accurately identify the tag code number on the task card and display the corresponding number on the screen for no less than three seconds. No points will be awarded if the time limit is exceeded or the display is incorrect.

6.2 Task variables

(1) Except for the variables in the random model task cards and intelligent recognition challenges, all other variables were determined by drawing lots before the debugging began.

(2) **Smart express:** Initially, the "Door" model will be fixed in one of the following positions: C1 or C2.

(3) **Smart plant protection:** Initially, the green plant model will be placed in two of the six yellow areas.

(4) **Accurate classification:** Initially, the garbage model will be placed in one of the following positions: red, green, or blue.

(5) **Environmental Data Collection:** The primary school team will complete the monitoring model in one of the following positions: F1 or F2.

(6) **Intelligent Recognition Challenge:** Before each round of the senior middle school group competition, the judge randomly selects two tag code stickers corresponding to serial numbers 1-4 and sticks them on the front and back of the task card, and fixes them with either side facing up under the trigger switch.

6.3 Time and frequency

Group	On-site programming and debugging time	Task duration	Task frequency
Primary	Confirmed by the on-site judge team	180s/times	2 times
Junior middle		180s/times	2 times
Senior middle		180s/times	2 times

1. On-site programming and debugging time: During this time, all participating teams in each group will perform programming and debugging uniformly.
2. Specified task time: The start and end time specified by the robot to complete the competition. If the competition is not completed within the specified time, the competition will be forced to end.

7. Operation and End

7.1 Robot operation

1) Robot Startup and Operation: The robot must be stationary before starting at the base. Starting by pressing a button is permitted. After starting, the robot must operate autonomously.
2) No pauses are allowed within the time limit for completing the task.
3) If a part of a participating robot becomes detached within the time limit, the competitor may retrieve the detached part without affecting robot's normal operation.
4) Robots may not be replaced during the competition (replacing functional components required for the task is permitted), and robot software may not be modified. Borrowing another competitor's robot is not permitted.
5) The referee will determine the order of the competitors on-site.

7.2 End of competition

1) All tasks must be completed within the specified time.
2) The specified time limit expires.
3) The robot may suddenly stop and remain motionless for 10 seconds while moving.

4) The robot may tip over or over while moving.

5) The participating team may request to abandon the task.

8. Evaluation Criteria

8.1 Score Calculation

1) If only a portion of the task is completed within the allotted time, the score will be calculated based on the actual number of tasks completed.

2) If restarts are required, the number of restarts will be recorded and the corresponding restart bonus points will be deducted. Each restart will deduct 5 points, with a maximum deduction of 20 points per round. If more than four restarts are recorded, no further deductions will be made.

3) The sum of the two scores will be taken.

4) The higher score will be ranked higher. If scores are tied, the shorter time will be ranked higher. If both scores and time are tied, the shorter number of restarts will be ranked higher. If all three are tied, the teams will be ranked tied.

8.2 No awards

1) A competitor is more than 10 minutes late.

2) A competitor intentionally damages the competition venue.

3) A competitor fails to follow the referee's (judges') instructions.

4) Not all team members are present for the competition.

5) A competitor's score is zero.

6) A competitor is the subject of a complaint that is upheld.

7) A competitor participates in multiple events.

8) The robot cannot be remotely controlled after it is activated.

8.3 Related Notes

1) Each contestant is limited to one event. Duplicate or false registration is strictly prohibited. Upon discovery or reporting, the contestant will be disqualified.
2) Contestants may form teams from the same school or from other schools within a prefecture-level city. Teams that register for the competition outside of one province or prefecture-level city are prohibited. Upon discovery or reporting, the contestant will be disqualified.

GAR 2026 Future City Competition Score Sheet

GAR 2026 - Version A

Primary School Group, Junior Middle School Group, Senior Middle School Group Competition Score Sheet

Name: Contestant 1: Contestant 2: Contestant 3:			Group: Primary School Group ☐ Junior Middle Group ☐ Senior Middle Group ☐	
	Tasks	Score	Round 1 Scoring	Round 2 Scoring
1	Smart Express	40		
2	Fire pioneer	30		
3	Smart plant protection	40		
4	Environmental data collection	40		
5	Assist elderly pedestrians	20		
6	Accurate classification	40		
7	Start the energy windmill	40		
8	Intelligent Recognition Challenge	30		
	Restart times in single round Minus 5 scores per time	20		
	Time	180s		
	Total score (max. 300 scores)			
	Restart times			
Team signature			**Judge Signature**	