

Hong Kong Engineers Week 2024

Guangdong-Hong Kong-Macao Greater Bay Area Tertiary Institution Innovation Project GBA Invitational Competition

Background

The Guangdong-Hong Kong-Macao Greater Bay Area Tertiary Institution Innovation Project GBA Invitational Competition (GBA Invitation Competition) is one of the key activities of the Hong Kong Institution of Engineers Week 2024. We hope to inspire and nurture the innovation and teamwork skills of engineering students in higher education institutions in the Greater Bay Area.

The purpose of the competition is to deepen the collaboration and coordination capabilities of engineering students from universities in the Guangdong-Hong Kong-Macao Greater Bay Area and encourage them to solve various challenges through synergy. We want to highlight the importance of engineering to the public and provide an interactive platform for engineering participants to present their unique ideas and designs. This is a golden opportunity for participants to gain valuable exchange experience, broaden their horizons and have fun learning!

Eligibility

Students from tertiary institutions in engineering disciplines in the Greater Bay Area, including Hong Kong, Macao and the Mainland, are invited to form joint teams to participate in the competition, demonstrating the diversity and depth of the engineering field. Whether you're a participant in different engineering departments such as mechanical engineering, civil engineering/architectural engineering, electrical engineering, environmental engineering or hydraulic engineering, it is time to collaborate across institutions and disciplines to showcase exceptional skills and innovative thinking!

Competition details

Date:	9 March 2024 (Saturday)
Time:	8:15 am - 9:00 am Reception registration 9:15 am – 9:45 am Sandcastle building training 9:45 am – 10:00 am Opening Ceremony 10:00 am - 2:00 am Competition 2:00 pm - 4:00 pm Award Ceremony and Interview
Venue:	Beach Volleyball Stadium, South China Sports Club, Causeway Bay
Accommodation:	Hong Kong Institute of Vocational Education (Tsing Yi) student dormitory
Notes:	The conference will arrange specific rest areas for participants to rest and have meals.

Competition content

Each institution is invited to form a small team to register, and the number of participants is 5.

Each joint team will be composed of a local university in Hong Kong and a higher education institution in Macau/Mainland. Each joint team is limited to a maximum of 10 members. The total number of joint teams is tentatively determined to be 8 to 10, with a total of 16 to 20 schools.

Participating institutions will participate in a hybrid Briefing Session held at the headquarters of the Hong Kong Institution of Engineers on 18 December 2023, and draw lots to determine the partner institutions on the same day.

The conference provides specific specifications before the GBA Invitational Competition. Each joint team can purchase a ready-made remote-control car online according to the specifications, and program, modify and add a robotic arm, or assemble the entire remote-control car and robotic arm according to the specifications. Each joint team must prepare a total of two remote-control cars before the GBA Invitational Competition. One is the responsibility of the local institution in Hong Kong, and the other is the responsibility of the Macau/Mainland institution. In addition, each joint team must prepare a bridge.

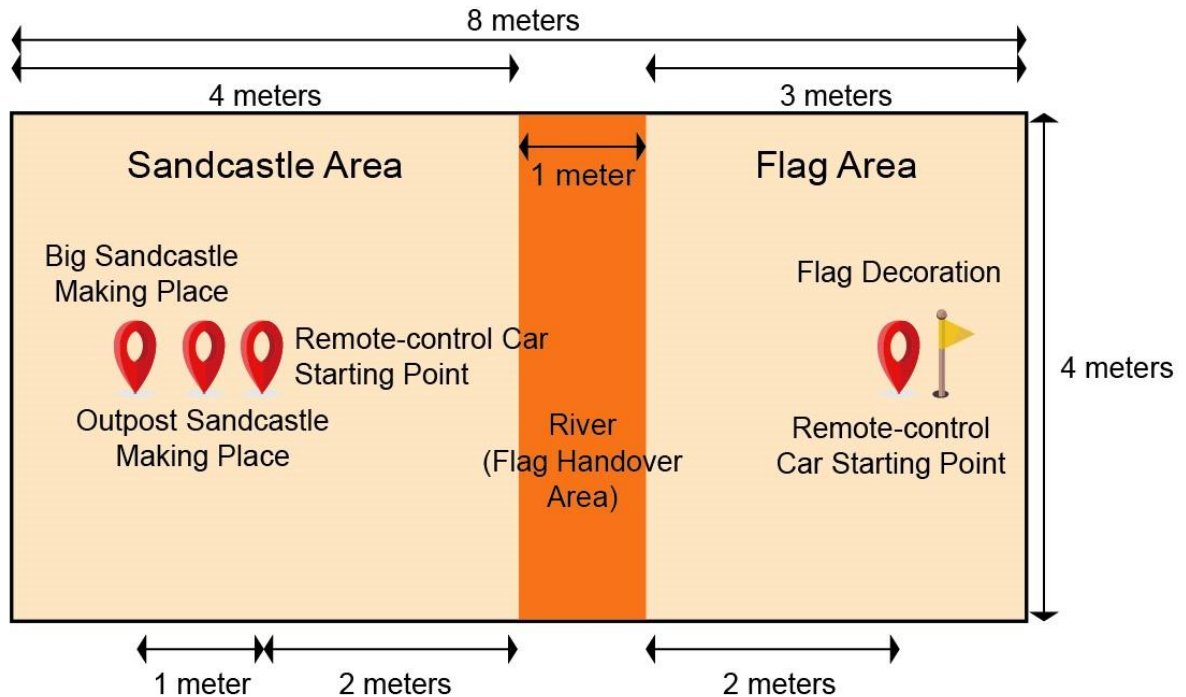
The two remote-control cars and the bridge must be completed before the GBA Invitational Competition and brought to the GBA Invitational Competition venue. In addition, each joint team must submit a "Progress Report" before 23 February 2024.

The participating students from Macau and Mainland China stayed in the student dormitory of the Hong Kong Institute of Vocational Education (Tsing Yi Campus) on 8 March 2024, and have dinner with their partnering Hong Kong team members for exchanges and final preparations before the competition.

Venue arrangement

The GBA Invitational Competition will be held on 9 March 2024. Joint teams need to bring pre-prepared remote-control cars and bridges to the GBA Invitational Competition venue. On the day of the competition, each joint team will be allocated a beach area of approximately 4 meters by 8 meters. The beach area is divided into three parts, namely the Flag Area, the river area made of cloth, and the sandcastle area.

- Flag Area: 2 meters away from the river is the Remote-control Car Starting Point, and there will be a flag decoration next to it.
- River Area: The river is 1 meter wide and is also regarded as Flag Handover Area.
- Sandcastle Area: 2 meters away from the river is the Remote-control Car Starting Point, 3 meters away from the river is the Big Sandcastle Making Place, and in front of the Big Sandcastle Making Place is the Outpost Sandcastle Making Place.



Competition process (sandcastle making)

On the day of the GBA Invitational Competition, each joint team has 3 hours to make sandcastles in the assigned beach area. The joint team needs to build a Big Sandcastle no less than 1 meter high and an Outpost Sandcastle no less than 0.3 meters high.

During the process of making sandcastles, the judges will go to each joint team to observe the process, and the joint team members will have 2 minutes to explain the creative concepts of remote-control cars, bridges and sandcastles to the judges.

If the joint team encounters any difficulties during the sandcastle making process, they can seek assistance from the professional sandcastle coach. The coach will provide 10 minutes of support. However, each request for the coach's help will result in a deduction of points from the joint team's total score. As the number of coaches is limited, the joint team that raises their hand first will be given priority for assistance. If multiple teams raise their hands at the same time, the team with fewer requests for help will be given priority for assistance. After the 3-hour time limit for sandcastle construction expires, the joint teams must stop making their sandcastles. The event staff will then take photographs and measure the height of each sandcastle.

Competition process (flag relay transportation and timing)

After the completion of the sandcastle construction, the flag relay and timing will take place simultaneously for every 5 joint teams in sequence, time-limited to 15 minutes.

The joint team should place the pre-assembled bridge on a cloth river and position the two remote-control cars at the starting points on either side of the river. Once the bridges and remote-control cars are set, the event staff will announce the start of the timing.

The joint teams use remote control to drive the remote-control car in the flag area, pick up a 200-gram flag decoration at the starting point, and then drive to the bridge to prepare to hand the flag to another remote-control car. At the same time, the joint team also used remote control to drive the remote-control car in the sandcastle area to the bridge to prepare to pick up the flag.

The two remote-control cars must complete the flag handover in the river area. The remote-control car starting from the Flag Area must not extend any part beyond the Sandcastle Area, and the remote-control car starting from the Sandcastle Area must not extend any part beyond the Flag Area.

After the remote-control car receives the flag, the joint team can choose to place the flag decoration at either the highest point of the Outpost Sandcastle or the highest point of the Big Sandcastle (only one option can be chosen). Placing the flag at the outpost will result in fewer points, while placing it at the main sandcastle will earn more points.

Once the flag decoration is placed, the timing will stop. If during the process of transporting the flag decoration, the remote-control car overturns, the bridge collapses, or the sandcastle collapses, the joint team must reassemble the remote-control car, bridge, or sandcastle. The remote-control car should be placed back at the starting point, and the joint team can restart the process, and the timer will continue.

If a joint team fails to complete the entire sandcastle construction or successfully transport the flag and place it at the highest point of the sandcastle within the competition time limit, it will have an impact on the scoring.

Award Categories

Remote-control Car Categories	
1. Most Creative Remote-control Car Design Award	This award will be presented to the joint team with the most innovative overall remote-control car design that demonstrates outstanding practicality.
2. Most Environmentally Friendly Remote-control Car Design Award	This award will be presented to the joint team with the most environmentally friendly and energy-efficient car design.
3. Lightest Remote-control Car Award	This award will be presented to the joint team with the lightest remote-control car.
4. Fastest Remote-control Car Award	This award will be presented to the joint team that completes the flag transportation and placement in the fastest time.
Bridge Categories	
5. Most Creative Bridge Design Award	This award will be presented to the joint team with the most innovative bridge design that demonstrates outstanding practicality.

6. Most Environmentally Friendly Bridge Design Award	This award will be presented to the joint team that utilizes the most environmentally friendly materials and demonstrates the most efficient production process in their bridge design and construction.
7. Least Support and Lightest Bridge Award	This award will be presented to the joint team that designs a bridge using the least amount of support and achieves the lightest weight.

Sandcastle Categories	
8. Tallest Sandcastle Award	This award will be presented to the joint team that builds the tallest sandcastle within the given time limit.
9. Best Sandcastle Design Award	This award will be presented to the joint team that designs and constructs a sandcastle with the most outstanding and visually artistic shape, showcasing creativity.

Other Category	
10. Best Team Collaboration Award	This award will be presented to the joint team that best demonstrates collective brainstorming and teamwork.

- All 10 awards mentioned above will have a Champion, Runner-up, and Third-place position.
- The awards will be scored as follows: 15 points for the Champion, 10 points for the Runner-up, and 5 points for the Third-place joint team.
- The total score for each joint team will be the sum of base score of 100 points, their award points and their performance points in each category.
- The joint team with the highest cumulative score, considering both award points and performance points, will be crowned the Overall Champion of the GBA Invitational Competition.

Scoring Method

Performance Points

The invitational teams will earn the corresponding scores for completing the following tasks in the GBA Invitational Competition:

Task	Score
Remote-control car successfully picks up flag decoration at the starting point and drives to the river area*	10
Remote-control car in the Flag Area successfully transfers the flag to the remote-control car in the Sandcastle Area	10
Remote-control car in the Sandcastle Area successfully places the flag on the Outpost Sandcastle#	5
Remote-control car in the Sandcastle Area successfully places the flag on the Big Sandcastle#	10
1 remote-control car successfully drives on the bridge##	5
2 remote-control cars successfully drive on the bridge##	10
Successful construction of an Outpost Sandcastle with a minimum height of 0.3 meters	5

Successful construction of a Big Sandcastle with a minimum height of 1 meter	10
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*Even if the remote-control car cannot complete the entire task, if it can successfully drive up to 1 meter, it will still receive 5 points.

#Participants can only receive points for one of these tasks at most.

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Awards Points

Remote-control Car Categories	
1. Most Creative Remote-control Car Design Award	<p>Each judge will evaluate the "Progress Report" content and the results of the on-site GBA Invitational Competition to select the top 3 designs they consider outstanding. The first-place design will receive 3 points, the second-place design will receive 2 points, the third-place design will receive 1 point, and the rest will receive 0 points.</p> <p>The scores from all judges will be collected by the event organizers and averaged. The design with the highest average score will be awarded the Champion (15 points), the design with the second-highest score will be awarded the Runner-up (10 points), and the design with the third-highest score will be awarded the Third-place (5 points).</p>
2. Most Environmentally Friendly Remote-control Car Design Award	<p>Each judge will evaluate the "Progress Report" content and the results of the on-site GBA Invitational Competition to select the top 3 designs they consider outstanding. The first-place design will receive 3 points, the second-place design will receive 2 points, the third-place design will receive 1 point, and the rest will receive 0 points.</p> <p>The scores from all judges will be collected by the event organizers and averaged. The design with the highest average score will be awarded the Champion (15 points), the design with the second-highest score will be awarded the Runner-up (10 points), and the design with the third-highest score will be awarded the Third-place (5 points).</p>
3. Lightest Remote-control Car Award	Weighing on-site
4. Fastest Remote-control Car Award	Timing on-site

Bridge Categories	
5. Most Creative Bridge Design Award	<p>Each judge will evaluate the "Progress Report" content and the results of the on-site GBA Invitational Competition to select the top 3 designs they consider outstanding. The first-place design will receive 3 points, the second-place design will receive 2 points, the third-place design will receive 1 point, and the rest will receive 0 points.</p>

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6. Most Environmentally Friendly Bridge Design Award	<p>Each judge will evaluate the "Progress Report" content and the results of the on-site GBA Invitational Competition to select the top 3 designs they consider outstanding. The first-place design will receive 3 points, the second-place design will receive 2 points, the third-place design will receive 1 point, and the rest will receive 0 points.</p> <p>The scores from all judges will be collected by the event organizers and averaged. The design with the highest average score will be awarded the Champion (15 points), the design with the second-highest score will be awarded the Runner-up (10 points), and the design with the third-highest score will be awarded the Third-place (5 points).</p>
7. Least Support and Lightest Bridge Award	<p>Weighing on-site. (Consider support first, and if the numbers of supports are the same, consider the actual weight.)</p>

Sandcastle Categories

8. Tallest Sandcastle Award	<p>Weighing on-site. (The height of the sandcastle will be measured on-site, from the lowest point to the highest point of the sandcastle.)</p>
9. Best Sandcastle Design Award	<p>Each judge will evaluate the results of the on-site GBA Invitational Competition to select the top 3 designs they consider outstanding. The first-place design will receive 3 points, the second-place design will receive 2 points, the third-place design will receive 1 point, and the rest will receive 0 points.</p> <p>The scores from all judges will be collected by the event organizers and averaged. The design with the highest average score will be awarded the Champion (15 points), the design with the second-highest score will be awarded the Runner-up (10 points), and the design with the third-highest score will be awarded the Third-place (5 points).</p>

Other Category

10. Best Team Collaboration Award	<p>Each judge will evaluate the results of the on-site GBA Invitational Competition to select the top 3 designs they consider outstanding. The first-place design will receive 3 points, the second-place design will receive 2 points, the</p>
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	<p>third-place design will receive 1 point, and the rest will receive 0 points.</p> <p>The scores from all judges will be collected by the event organizers and averaged. The design with the highest average score will be awarded the Champion (15 points), the design with the second-highest score will be awarded the Runner-up (10 points), and the design with the third-highest score will be awarded the Third-place (5 points).</p>
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- The awards will be scored as follows: 15 points for the Champion, 10 points for the Runner-up, and 5 points for the Third-place joint team.
- The total score for each joint team will be the sum of base score of 100 points, their award points and their performance points in each category.
- During the sandcastle building process, if a team seeks help from a professional sandcastle coach, 2 points will be deducted from their total score each time, and the deduction will increase with the number of times assistance is sought. That is to say, the first call for help will result in a 2-point deduction, the second call will result in a 4-point deduction, the third call for help will deduct 6 points, and so on.
- The joint team with the highest cumulative score, considering both award points and performance points, will be crowned the Overall Champion of the GBA Invitational Competition.

Competition Rules

Remote Control Car

- 1) The conference provides specific specifications before the GBA Invitational Competition. Each joint team can purchase a ready-made remote-control car online according to the specifications, and program, modify and add a robotic arm, or assemble the entire remote-control car and robotic arm according to the specifications. Each joint team must prepare a total of two remote-control cars before the GBA Invitational Competition. One is the responsibility of the local institution in Hong Kong, and the other is the responsibility of the Macau/Mainland institution.
- 2) The dimensions of the remote-control car are limited to 0.5 meters (length) by 0.5 meters (width) by 0.5 meters (height) (in standby mode) and 0.5 meters (length) by 0.5 meters (width) by 1.2 meters (height) (maximum extension of the robotic arm). The weight must not exceed 8 kilograms, and the battery voltage DC is within 24 volts. The remote-control car can be operated using either a wired or wireless controller. If a wired controller is used, the connection and wiring of the remote-control car should be taken into account. The remote-control car should be designed to be detachable for ease of weighing.
- 3) The remote-control car must move along the ground and is not allowed to fly.
- 4) Joint teams are required to submit a "Progress Report" to the organizers by 23 February, 2024. The presentation should appropriately use charts, images, and videos to support the explanation and demonstrate the joint team's understanding of remote-control car

modification, assembly, and operation. Please refer to Appendix 1 for the format of the "Progress Report".

- 5) Joint teams must adhere to the competition's code of ethics and are strictly prohibited from plagiarism.
- 6) Joint teams must present their remote-control cars for evaluation and weighing by the judging panel.

Bridge

- 1) Joint teams must complete the assembly of the bridges before the competition.
- 2) The bridge must not exceed 1.4 meters in length, have a minimum width of 0.5 meters. The highest point of the bridge bottom must be at least 0.1 meters from the river surface.
- 3) Joint teams are required to submit a "Progress Report" to the organizers by 23 February, 2024. The presentation should appropriately use charts, images, and videos to support the explanation and demonstrate the team's understanding of bridge design and construction. Please refer to Appendix 1 for the format of the "Progress Report".
- 4) Joint teams must adhere to the competition's code of ethics and are strictly prohibited from plagiarism.
- 5) Joint teams must present their bridges for evaluation and weighing by the judging panel.

Sandcastle

- 1) Prior to the start of the GBA Invitation Competition, the organizers will arrange sandcastle coaches to provide basic training on sandcastle construction for participating students.
- 2) Participants must complete their sandcastle within a designated area of approximately 4 meters by 8 meters within a time limit of 3 hours. Non-participants are not allowed to enter the competition area.
- 3) The organizers will provide each joint team with 1 large shovel, 1 small shovel, 4 smoothing shovels, 4 buckets, 2 sets of sandcastle molds, 1 large bucket, 1 medium bucket, and 1 trowel. These tools will be distributed to each joint team representative during registration and collected back by the organizers before the end of the event. The joint teams are allowed to bring their own additional tools, except for electric or motorized tools.
- 4) The Big Sandcastle must be at least 1 meter in height, measured from the lowest point of the sandcastle base, and should include two castles and a walled enclosure with a gate. Joint teams are free to design the shape of their sandcastle but are prohibited from carving inappropriate sentences or images on the outer walls/fence. The Outpost Sandcastle must be at least 0.3 meters in height, measured from the lowest point of the sandcastle base.
- 5) During the judging process, the evaluation will be based on visual assessment of the sandcastle's condition by the judges.

Others

- 1) Joint teams must comply with all arrangements made by the organizers. The final decisions of the judges will be binding, and there is no appeals mechanism provided by the organizers.

- 2) After the competition, joint teams are responsible for cleaning up all brought items and garbage. They must also return any materials provided by the organizers and follow the instructions of the staff to maintain the cleanliness of the venue.
- 3) Joint teams, including team leaders, coaches, and team members, must adhere to the venue rules.

Important Dates

6 November 2023:	Registration opens
4 December 2023:	Registration deadline and payment submission
18 December 2023:	Online and physical Briefing Session and draw lots.
23 February 2024:	Deadline for submitting "Progress Report"
8 March 2024:	Dinner for participants from Hong Kong, Macau, and Mainland. Participants from Macau and Mainland check in the student dormitories of the Hong Kong Institute of Vocational Education (Tsing Yi Campus)
9 March 2024:	Competition day

Registration Procedure

Please fill out the online registration form.

<https://hkengineersweek.com/en/application-gba.php>

Registration Fee

- A. The registration fee for each Hong Kong team is HKD 1900. The cost includes 5 students and one teacher:
- Meals: Dinner on 8 March, 2024, and lunch on 9 March, 2024.
 - Transportation: Arrangements will be made for a dedicated vehicle to transport students to the Hong Kong Institute of Vocational Education (Tsing Yi Campus) on 8 March, 2024.

Please make the registration fee payment for Hong Kong teams by crossed check payable to "The Hong Kong Institution of Engineers." Please mail the check to:

The Secretariat of the 2024 Engineers Week, The Hong Kong Institution of Engineers
Level 4, Lee Garden Three, Causeway Bay, Hong Kong
(c/o Creative Consulting Group Limited)

- B. The registration fee for each Macau/Mainland team is HKD 3000. The cost includes 5 students and one teacher:
- Accommodation: One night's room rental on 8-9 March 2024.
 - Meals: Dinner on 8 March 2024, breakfast and lunch on 9 March 2024.
 - Transportation: Dedicated vehicles will be arranged on 8 March 2024 to pick up participants from relevant immigration control points in Hong Kong, including the

high-speed rail station/border crossing/terminal, and transport them to the accommodation venue. On 9 March 2024, transportation will be provided from the accommodation venue to the competition venue and from the competition venue back to the relevant immigration control points in Hong Kong, including the high-speed rail station/border crossing/terminal for departure.

To add more teachers, it is an additional 600 Hong Kong dollars per teacher.

Please make the registration fee payment for Macau/Mainland teams through a bank transfer method, the account details are as below.

Account Name: The Hong Kong Institution of Engineers

Account No (HKD): 364-060319-668

Bank Name: Hang Seng Bank Limited

Bank Address: Shop D&E, G/F & 1/F Eton Tower, No. 8 Hysan Avenue, Causeway Bay, Hong Kong

Bank Code: 024

Swift Code: HASEHKHH

Chip UID: 010522

Prizes

All participants will receive a participation certificate. The winning joint team will receive a trophy and exquisite gifts.

The Overall Champion joint team will be awarded a trophy and a scholarship of HKD 10,000.

Judging Panel

The judging panel consists of leaders from the Hong Kong Institution of Engineers, renowned scholars, and distinguished industry leaders.

Enquiries

Ms. Chen / Ms. Wan

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Appendix 1 - Progress Report format

"Progress Report" is limited to 8 slides, written in Chinese, and appropriately utilizes charts/images/videos to support explanations. The format is as follows:

Slide 1: Title Page

Names of the participating schools
Names of the joint team members
Date of report submission

Slide 2: Abstract

Joint team introduction and division of tasks
Key design features and creative highlights of the remote-control car and bridge

Slides 3-4: Remote-Control Car Design

Overview of the overall design of the remote-control car, including its appearance and structure
Introduction to the design of the robotic arm, material selection, and functionality

Slides 5-6: Bridge Design

Overview of the overall design of the bridge, including its appearance and structure
Introduction to the dimensions, support methods, material selection, and structural stability of the bridge

Slides 7-8: Preliminary Sandcastle Design

Expressing the preliminary sandcastle design and introducing the design concept through visuals