



# International Robotic Olympiad 2021

## Ocean Exploration Competition Rules (V1)

### (Primary School Division)



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## General Rules

### Game Rules

1. Single motor category robots may use only one set of motor-gear box.
2. Multi-motor category robots may use only two sets of motor-gear box for walking.
3. All contestants should wear uniform during the competition.
4. Name list of the student contestants cannot be altered without the Organizer's permission.
5. Contestants not accompanied by their instructors or teachers are not allowed to take part in the competition.
6. Instructors or teachers cannot enter the restricted area to instruct students to play the game.
7. Judges have the right to give warning or disqualify the contestants, instructors or teachers who do not obey the rules or the decision of judges.
8. Only applications from half-day/whole-day formal Primary and Secondary Government schools, Aided/Direct Subsidized schools or Private schools will be accepted (non-tutoring centers or institutes). The responsible teachers must be employed by the respective schools

### Robot Rules

9. Except for the servo motor robot category, all participating robots must use Tamiya70093 gear box (203.7:1, 58.2:1, 16.6:1) and its matching motor for competition. The gear ratio may only be adjusted in accordance to the manufacturer's instructions. Contestants are not allowed to modify the motor or the gear box in any way. Gearbox should be exposed and cannot be sealed. Transparent materials must be used if gear box is to be sealed. Before and after the game, sealed gear box must be disassembled for checking.
10. Prior to the matches, all participants must submit their robots for inspection by the judges. These robots are then kept in a designated location. When the matches begin, participants may take their robots away from the designated location to the game field for competition. These robots must be returned to the same designated location after the competition. All these participating robots will then be sent to the testing center by the judges for motor performance check.
11. Participating robot and motor will be dissembled for further inspection if the performance of the motor is found exceeding that of the original motor. Participants will be disqualified if found not using original motor or additional devices are used for the competition and a three-year suspension penalty will be served to both the participants and their schools.
12. All motors must pass the power consumption check. The motor cannot consume more than 280mA when 3V supplied by the power regulator.
13. The weight of the robot means the total weight including all accessories and parts (including batteries).
14. Participating robots must comply with the dimensions, weights and specific requirements set by the Organizer.
15. All robots cannot add on control devices not approved by the Organizer. All wireless installations must be able to alter frequency channels. Participants must immediately change the frequency or channel of their transmitters found interfering others otherwise they would be disqualified for the competition. Participants are suggested to use wireless remote control devices that are free from interference. All approved models of electronic controller accessories, wireless installations and their suppliers would be announced on the website.
16. The competition aims to encourage participants to apply their science and technology knowledge to create and build their own robots. Through this process, their ability, skill set and experience of building robots will further be enhanced. As such, any commercial robotic kits available in the markets are not allowed to be used in the competition. Except for screws, nuts, washer and gear box, the mechanical parts (including perforated plastic strip or metal strip) of the robots must be made by the participating students from raw materials themselves. No ready-made model nor toy be used as the major part of the robot. However, decorative accessories from ready-made toy components may be used but not exceeding 30% of the overall parts of the robot.





17. In the “Hand Generator Category Competitions”, **no more than** two student contestants are allowed to operate the hand generator (attachment 1) as they can change at any time.
18. Pneumatic device cannot be used.

### Other Points to Note

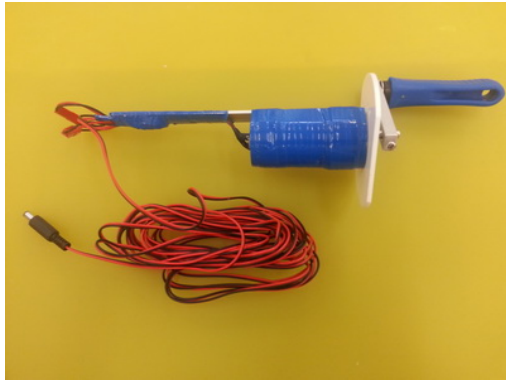
19. Except for specific competitions, participants should use the batteries (1.5V AA) provided by the Organizer in the International Competition. Participants will prepare their own batteries in the respective regional competitions.
20. All participants must use the hand generators (attachment 1) provided by the Organizer.
21. Registration number of the robot must be engraved or printed with permanent ink on its chassis.
22. The Organizer may check robots on their specifications any time after registration. Units found not meeting specifications would be disqualified for the competition.
23. The Organizer reserves the right to use all participating items for marketing and publicity purposes.
24. Violation of the above rules would lead to immediate disqualification of the competition and its result.
25. The organizer will set up a camera in the swimming events and will not accept complaints other than the film taken by the organizer.
26. Complaints must be submitted by the teacher within 30 minutes after the end of the competition.
27. The Organizer reserves the right to modify the game rules. Please visit our website regularly for updated game rules.



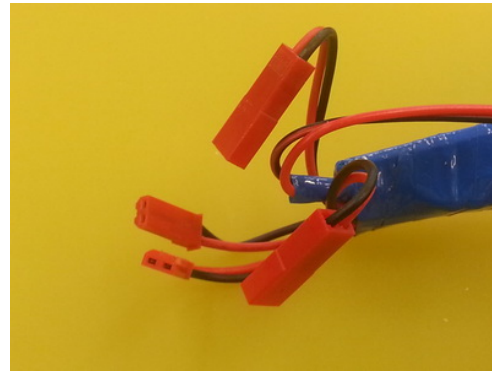


### Hand Generator

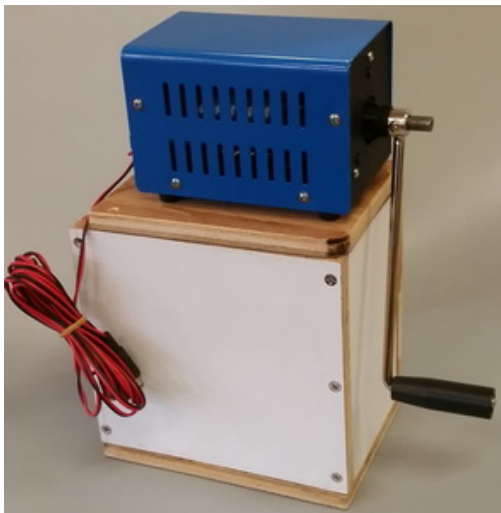
### Attachment 1



Type 1 Generator: Hand Held Hand Generator



Switch the plugs to change the polarity and turning direction of handle



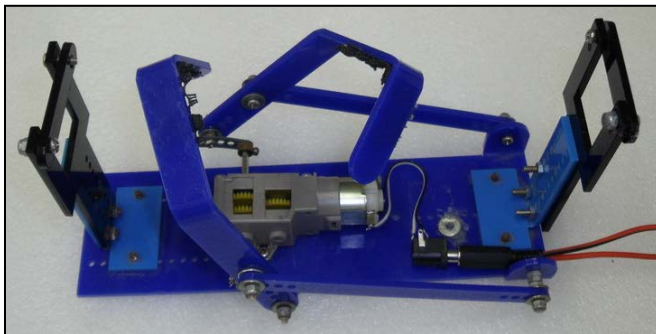
Type 2 Generator: Desktop Hand Generator



2.1mm plug and socket



Different types of 2.1mm socket



Each Single Motor Robot should be equipped with a 2.1mm socket for the plug of hand generator.





## Individual competition rules

1. Environmental Protection – Sea Surface Sweeper Robot Game
2. Water Polo Robot Game
3. Shipwreck Rescue and Salvage Robot Game
4. Ocean Treasure Hunting Robot Game
5. Hand Generator Robot Backstroke Swimming Competition
6. Hand Generator Robot Breaststroke Swimming Competition
7. Hand Generator Robot Butterfly Stroke Swimming Competition
8. Hand Generator Robot Freestyle (front crawl) Swimming Competition
9. Hand Generator Robot Medley Relay Swimming Competition
10. Hand Generator Robot Fish Short Distance Swimming (Vertical style) Competition
11. Hand Generator Robot Fish Short Distance Swimming (Horizontal style) Competition
12. Hand Generator Robot Two-Oar Rowing Boat Competition
13. Hand Generator Robot Duck Short Distance Swimming Competition
14. Robot Dragon Boat Race
15. Robot Dragon Boat Relay Race
16. Robot Dragon Boat Appearance Design Competition



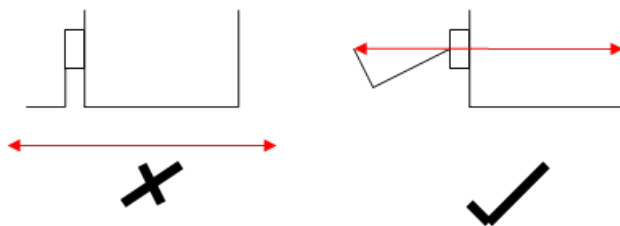


## 1. Environmental Protection – Sea Surface Sweeper Robot Game

Floating rubbish on the sea poses health hazard as well as danger to marine traffic. This competition aims to arouse attention of students to environmental protection and to develop their design creativity. Each school may have a maximum of two teams and each team may submit one robot for the competition.

### Robot Specification

1. The size of the robot, with its arms fully stretched forward cannot exceed 300mm (Length) x 200mm (Width) x 200mm (Height). The height of the robot will not take into consideration if the catcher is stretched upward or downward.



2. The actuators and catcher of the robot must be controlled by wired manual controller.
3. No restriction on the quantity of actuators (motor, gear box, servo mechanism and propeller) on the robot. All participating robots must use Tamiya70093 gear box (203.7:1, 58.2:1, 16.6:1) and its matching motor for competition. The gear ratio may only be adjusted in accordance to the manufacturer's instructions. Contestants should not modify the motor or the gear box in any way.
4. No more than 8 pieces 1.5V AA alkaline batteries can be used to drive the actuators and catcher and NO additional energy installment can be made. Batteries must comply with the specification set by the Organizer.
5. Only FA-130 or RE-260 motors can be used to drive the propeller.

FA-130



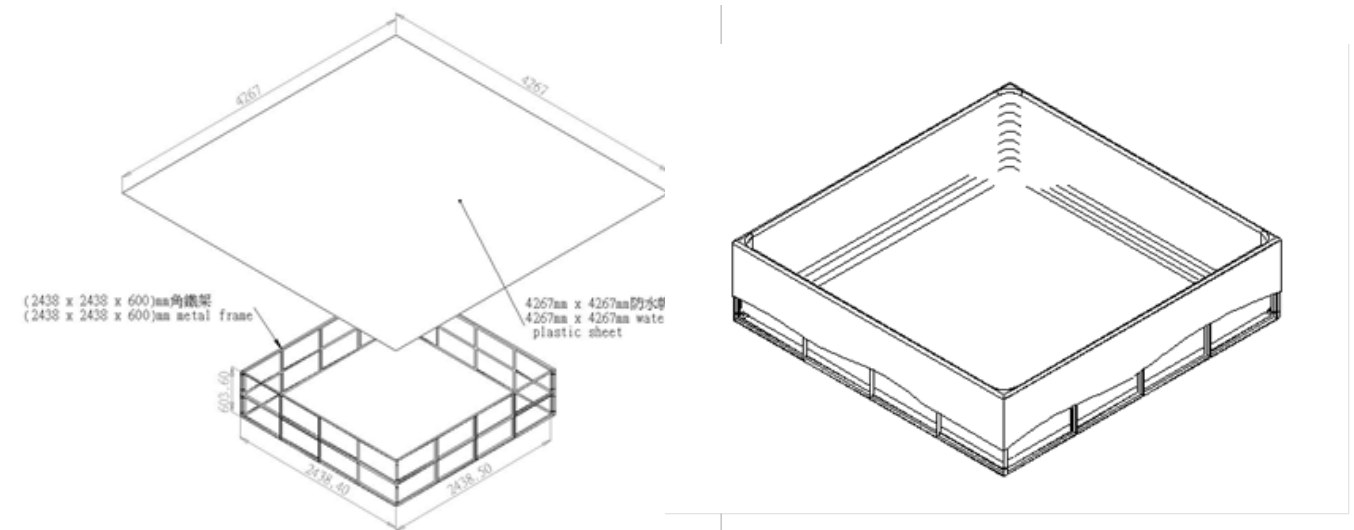
RE-260





## Playing Field Specification

1. Water tank dimension: 2438mm (Length) x 2438mm (Width) x 610mm (Height), **uneven wrinkles may appear on the bottom of the tank**
2. Water is filled to about 150mm deep



## Game Rules

1. **Each team plays once.** Each robot is controlled by one participant.
2. Ping-pong are used as rubbish. There are about 200 each orange balls (10 points) and white balls (-50 points) in the water tank.
3. The game time is 2 minutes. Only one team plays in the game at a time. The participating robot must use its own designed catcher to collect and place the ping-pong into its own bin. Only balls collected that are separated from the water surface will be scored.
4. At the end of the game, balls inside the bin will be scored. The balls in the catcher that are 25mm above the water surface will also be scored. The robot that has the most points wins.





## 2. Water Polo Robot Game

The water Polo robot game is a team competition. Each team has two robots. The participating robots should have good ability to pick up and throw balls with skillful control.

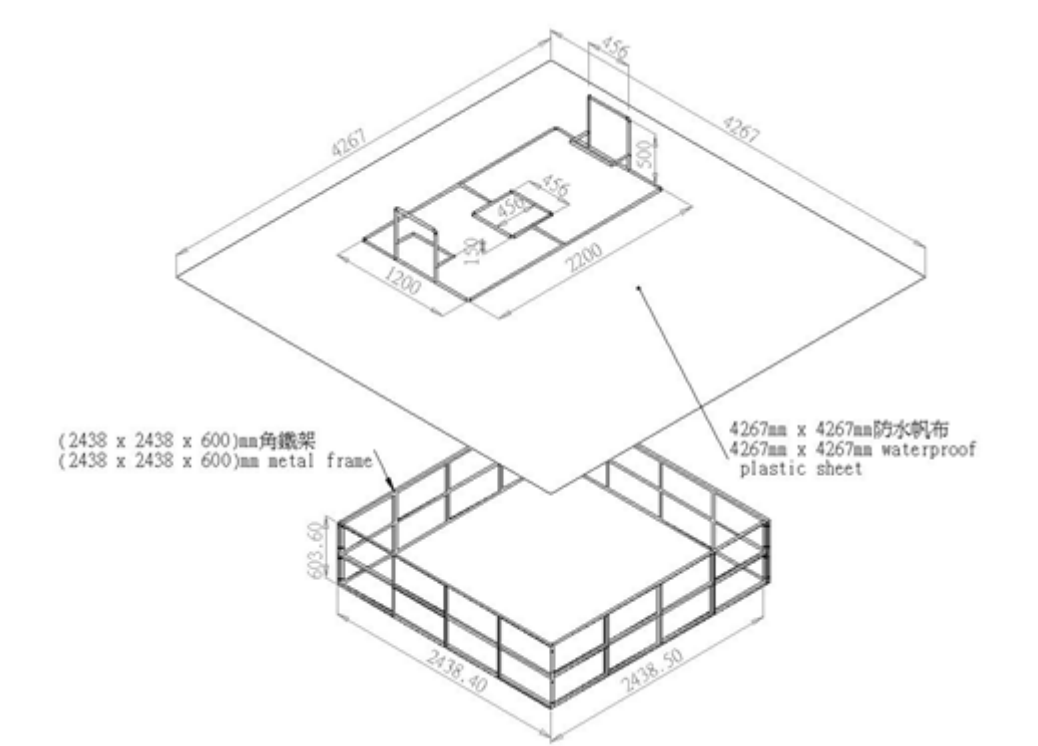
### Robot Specification

1. The size of the robot, with its arms fully stretched forward, cannot exceed 300mm (Length) x 200mm (Width) x 200mm (Height). The height of the robot will not take into consideration if the catcher is stretched upward or downward.
2. The robot is controlled by wired manual controller.
3. No restriction on the quantity of actuators (motor, gear box, servo mechanism and propeller) on the robot. All participating robots must use Tamiya70093 gear box (203.7:1, 58.2:1, 16.6:1) and its matching motor for competition. The gear ratio may only be adjusted in accordance to the manufacturer's instructions. Contestants should not modify the motor or the gear box in any way.
4. No more than 8 pieces of 1.5V AA alkaline batteries can be used to drive the actuators and catcher and NO additional energy devices can be installed. Batteries must comply with the specification set by the Organizer.
5. Only FA-130 or RE-260 motors can be used to drive the propeller.

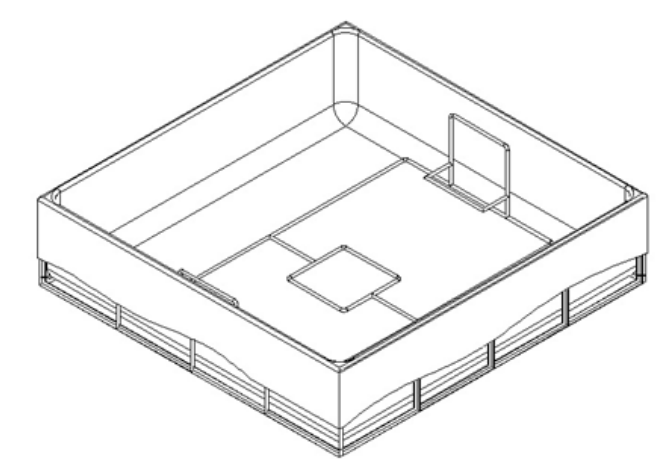


### Playing Field Specification

1. Water pool dimension: 2438mm (Length) x 2438mm (Width) x 610mm (Height), **uneven wrinkles may appear on the bottom of the tank.**
2. Penalty area: 456mm (Length) x 200mm (Width)
3. Water is filled to about 150mm deep







## Game Rules

1. Each robot is controlled by one participant only.
2. 'Toss a coin' is used to decide on the goal and the **first possession of the game**. Each time when a robot **starts the game** at the center of the pool, the other three robots are to get prepared on the sides of their own **goal area**. A **throw into the opponent's goal** directly from **the first possession of the ball** is not counted.
3. A Ping Pong is used as the water polo ball. A goal scores 1 point if the ball completely passes into the **opponent's goal**. After a goal is scored, the opposite team restarts the game from the center of the pool.
4. There are two halves in the match and each is of 3 minutes duration. The game is conducted on a knockout basis.
5. The team that scores the most points at the end of the match wins. If it tied, the team that first scores a goal within the extra 3 minutes game time via 'sudden death' wins. If it still tied, each team sends 2 robots to take turn for the **Penalty Throw** one at a time and the time of each goal is recorded. The team with the most goals wins. In case of draw, the team with the shortest amount of goal scoring time wins. Second round will be conducted until a winner is identified.
6. **Penalty Throw**: A ball is placed at the 'mid-court' of the pool. Each robot is given one minute, with no limit on the number of attempts, to shoot the ball into the open goal (i.e. without a defending robot) until a goal is scored and its time recorded. Robot cannot enter the goal area to get or shoot the ball.
7. The robot must throw the ball (the ball enters inside the robot) within 5 seconds once the ball is in its possession; otherwise it is a foul and the opposite team is awarded a free throw at where it is.
8. Robot cannot enter the opponent's goal area to shoot. If the ball falls inside the goal area or outside the field area, a robot from the defense team takes a 'goal throw' on the side of the goal area.
9. A goal is counted if the robot shoots the ball with its throwing device directly into the goal. It is not a goal if the ball is bumped in by the robot's body or if the ball is drifted into the goal by itself (it is a goal if the ball hits a defending robot and bounces into the goal).
10. There are no foul balls. A scrambling for the ball at the center of the pool will be taken if two teams scramble for the ball on the side of the pool causing the match ceases for over ten seconds. A robot from each team is to move from the top of its own goal area to the center of the field to scramble for the ball. All other team members have to wait on the side of the goal area and may only move until a scrambling robot touches the ball.
11. A penalty shot is awarded to the opposite team if the robot causes the opponent to fall not during the course of dribbling or trying to gain possession of the ball. Timer will pause at the collision incident until the fallen robot is properly positioned.





### 3. Shipwreck Rescue and Salvage Robot Game

The shipwreck rescue and the salvage robot is a team competition, each team composes of two robots. The participating robot must be able to move forwards and backwards, turn left and right, float and sink, and has a mechanism capable to salvage a sunken ship. The team uses the shortest amount of time to salvage the sunken ship at the bottom to the collector wins.

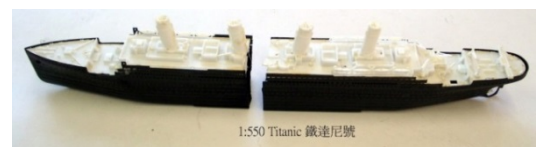
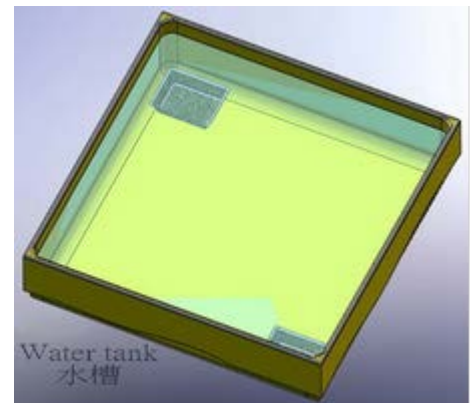
#### Robot Specification

1. The robot, when fully stretched, cannot exceed 300mm (Length) x 200mm (Width) x 200mm (Height).
2. The robot is controlled by wired manual controller. The entire robot may only operate and move under water with no part above water surface.
3. No restriction on the quantity of actuators (motor, gear box, servo mechanism and propeller) on the robot. All participating robots must use Tamiya70093 gear box (203.7:1, 58.2:1, 16.6:1) and its matching motor for competition. The gear ratio may only be adjusted in accordance to the manufacturer's instructions. Contestants should not modify the motor or the gear box in any way.
4. No more than 8 pieces of 1.5V AA alkaline batteries can be used to drive the actuators and catcher and NO additional energy devices can be installed. Batteries must comply with the specification set by the Organizer.
5. Only FA-130 or RE-260 motors can be used to drive the propeller.



#### Playing Field Specification

1. The playing field is a water tank of 2438mm (Length) x 2438mm (Width) x 610mm (Height), filled with water to 450mm deep, **uneven wrinkles may appear on the bottom of the tank.**
2. A collector of 400mm (Length) x 400mm (Width) x 150mm (Height) is placed at the opposite corner on each side of the tank (as shown in figure) for placing the salvaged vessel.
3. A 1:550 Titanic model is used as the sunken ship in the competition. Half of the sunken ship weighs approximately 85 grams and is approximately 255mm long. The height is approximately 60 mm from the bottom to the deck and approximately 105mm from the bottom to the chimney respectively. The width of the sunken ship is approximately 52 mm.



#### Game Rule

1. **Each team plays once and each robot is controlled by one participant only.**
2. Each team has two salvage robots. The titanic ship, broken into two halves, rests on the bottom of water tank. The two robots start initially from the collector position to salvage the broken ship bodies and place them in anyone of the collectors within a time limit of 5 minutes (the entire boat must be placed within the outer edges of the collector).
3. The time to transport each broken ship body to the collector is recorded. The team that uses the shortest amount of time to salvage the entire ship wins. Should none of the teams complete the mission in 5 minutes; the team that salvaged half of the ship in the shortest amount of time wins.





## 4. Ocean Treasure Hunting Robot Game

The sea although is immeasurably deep, it would not stop men's curiosity from exploring it. Besides, the very rich resources, there are treasures from numerous sunken vessels lying in the seabed. The participant is to design two robots capable of diving under water, and transport the treasure from the seabed to the collector. The one who salvages the most will be the winner.

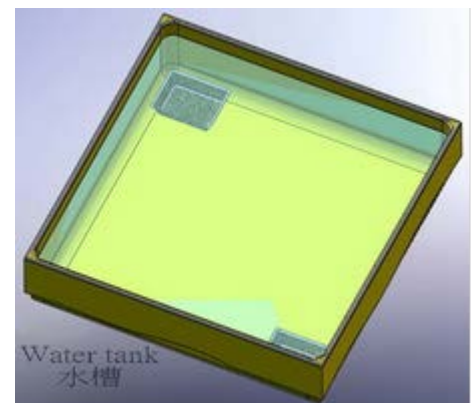
### Robot Specification

1. The robot, when fully stretched cannot be larger than 300mm (Length) x 200mm (Width) x 200mm (Height).
2. The robot is controlled by wired manual controller. The entire robot may only operate and move under water with no part above water surface.
3. No restriction on the quantity of actuators (motor, gear box, servo mechanism and propeller) on the robot. All participating robots must use Tamiya70093 gear box (203.7:1, 58.2:1, 16.6:1) and its matching motor for competition. The gear ratio may only be adjusted in accordance to the manufacturer's instructions. Contestants should not modify the motor or the gear box in any way.
4. No more than 8 pieces of 1.5V AA size alkaline batteries can be used to drive the actuators and catcher and NO additional energy devices can be installed. Batteries will be provided by the Organizer.
5. Only FA-130 or RE-260 motors can be used to drive the propeller.



### Playing Field Specification

1. The playing field is a water tank of 2438mm (Length) x 2438mm (Width) x 610mm (Height), filled with water to 450mm deep, **uneven wrinkles may appear on the bottom of the tank.**
2. A collector of 400mm (Length) x 400mm (Width) x 150mm (Height) is placed at the opposite corner on each side of the bottom of the tank (as shown in figure) for placing the salvaged treasure.
3. Colored plastic stones are used as treasure.



### Game Rule

1. **Each team plays once. Each robot is controlled by one participant.**
2. Two robots are placed inside the collectors and start the treasure hunting to pick as many stones as possible in 5 minutes. The robot that scores the most wins.
3. Only stones inside the two collectors and those stones entirely placed inside the collector of the robot will be counted provided that the robot must return to the platform before the time is up to count the stones it has carried.



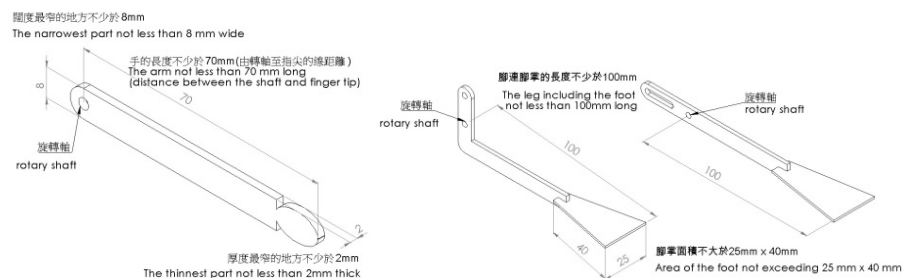
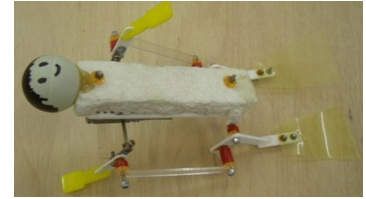


## 5. Hand Generator Robot Backstroke Swimming Competition

Students are required to make a single motor robot that simulates the backstroke swimming action by applying mechanical principles.

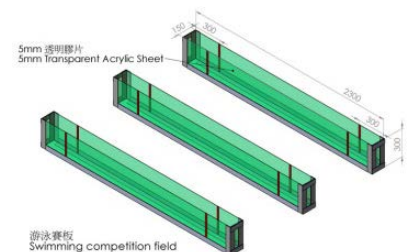
### Robot Specification

1. The robot operates only with one motor which must be beneath the water surface when the robot is swimming in the water. Contestants must use the Desktop Hand Generator provided by the Organizer to supply power to the robot. Hence the robot must be equipped with a 2.1mm socket for connection to the Desktop Hand Generator.
2. Whether it is in the course of inspection or competition, the size of the robot cannot exceed 300mm long, 150mm wide and 180mm tall. The arm should not be less than 70mm long (distance between the shaft and the finger tip), the narrowest part not less than 8mm wide and the thinnest part not less than 2mm thick. The leg including the foot cannot be less than 100mm long. The area of the foot cannot exceed 25mm x 40 mm. A ping-pong must be used as head.
3. Only one piece of floating object not exceeding 80mm long, 30mm wide and 30mm tall may be installed on to the robot. These dimensions are not inter-changeable. The robot has a body and four limbs only. Any additional supporting devices, wheels or floating objects are not allowed.
4. The robot must complete the game in backstroke swimming action with both arms and legs. No propeller can be used.
5. The Backstroke Swimming Robot is different from a Freestyle Swimming Robot particularly in the directions of their faces.



### Game Field Specification

1. A swimming competition board is used (see diagram)
2. Dimension of the transparent swimming track: 2300mm (Length) x 150mm (Width) x 300mm (Height) filled with water to 150mm deep.
3. The start zone is 300mm long.



### Game Rules

1. Each team plays twice and the best time is recorded. The team with the shortest amount of time to complete the game is the winner.
2. Contestants must use the Desktop Hand Generator provided by the Organizer to supply power to the robot. **Only the contestant himself/herself operates the Desktop Hand Generator and nobody is permitted to assist.**
3. The wire of the Desktop Hand Generator is long enough so that the contestants must stay behind at the start zone. Moving along the field with the robot is prohibited. **Contestants may assign one student to help lower the wire in the water.** Pulling the wire of the Desktop Hand Generator is prohibited.
4. Contestants cannot touch the robot **once it leaves the start zone.** **The competition is considered as incomplete if the robot stops moving or fails to reach the destination within the 30 seconds game time.** The game ends when the robot reaches the acrylic board at the end of the runway.



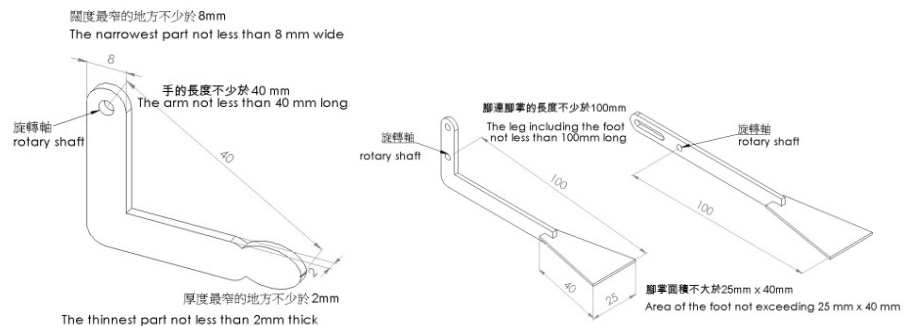
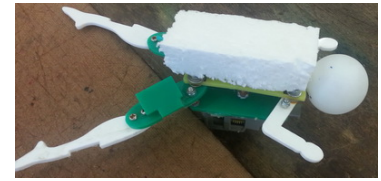


## 6. Hand Generator Robot Breaststroke Swimming Competition

Students are required to make a single motor robot that simulates the breaststroke swimming action by applying mechanical principles.

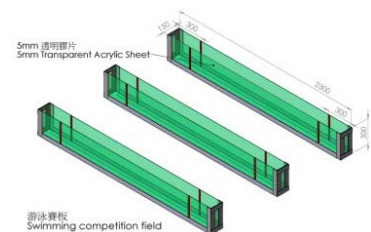
### Robot Specification

1. The robot operates only with one motor which must be beneath the water surface when the robot is swimming in the water. Contestants must use the Desktop Hand Generator provided by the Organizer to supply power to the robot. Hence the robot must be equipped with a 2.1mm socket for connection to the Desktop Hand Generator.
2. Whether it is in the course of inspection or competition, the size of the robot cannot exceed 300mm long, 150mm wide and 180mm tall. The arm cannot be less than 40mm long (distance between the shaft and the finger tip), the narrowest part not less than 8mm wide and the thinnest part not less than 2mm thick. The leg including the foot cannot be less than 100mm long. The area of the foot cannot exceed 25mm x 40 mm. A ping-pong must be used as head.
3. Only one piece of floating object not exceeding 80mm long, 30mm wide and 30mm tall may be installed on to the robot. These dimensions are not inter-changeable. The robot has a body and four limbs only. Any additional supporting devices, wheels or floating objects are not allowed.
4. The robot must complete the game in breaststroke swimming action with both arms and legs. No propeller can be used.



### Game Field Specification

1. A swimming competition board is used (see diagram)
2. Dimension of the transparent swimming track: 2300mm (Length) x 150mm (Width) x 300mm (Height) filled with water to 150mm deep.
3. The start zone is 300mm long.



### Game Rules

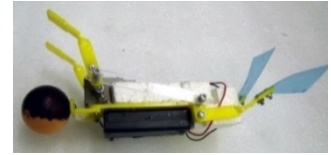
1. Each team plays twice and the best time is recorded. The team with the shortest amount of time to complete the game is the winner.
2. Contestants must use the Desktop Hand Generator provided by the Organizer to supply power to the robot. **Only the contestant himself/herself operates the Desktop Hand Generator and nobody is permitted to assist.**
3. The wire of the Desktop Hand Generator is long enough so that the contestants must stay behind at the start zone. Moving along the field with the robot is prohibited. **Contestants may assign one student to help lower the wire in the water.** Pulling the wire of the Desktop Hand Generator is prohibited.
4. Contestants cannot touch the robot **once it leaves the start zone.** **The competition is considered as incomplete if the robot stops moving or fails to reach the destination within the 30 seconds game time.** The game ends when the robot reaches the acrylic board at the end of the runway.





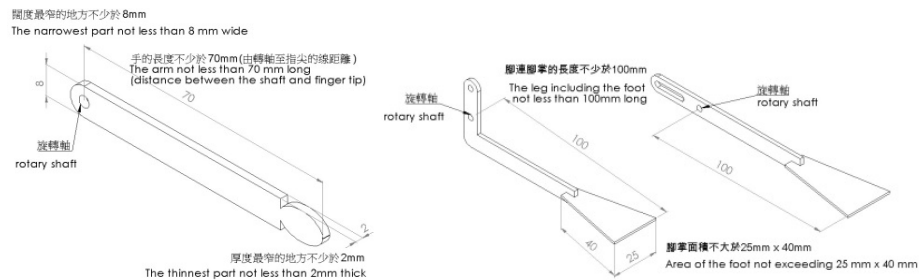
## 7. Hand Generator Robot Butterfly Stroke Swimming Competition

Students are required to make a single motor robot that simulates the butterfly stroke swimming action by applying mechanical principles.



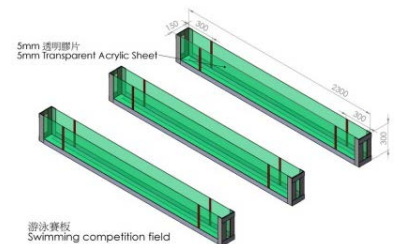
### Robot Specification

1. The robot operates only with one motor which must be beneath the water surface when the robot is swimming in the water. Contestants must use the Desktop Hand Generator provided by the Organizer to supply power to the robot. Hence the robot must be equipped with a 2.1mm socket for connection to the Desktop Hand Generator.
2. Whether it is in the course of inspection or competition, the size of the robot cannot exceed 300mm long, 150mm wide and 180mm tall. The arm cannot be less than 70mm long (distance between the shaft and the finger tip), the narrowest part not less than 8mm wide and the thinnest part not less than 2mm thick. The leg including the foot cannot be less than 100mm long. The area of the foot cannot exceed 25mm x 40 mm. A ping-pong must be used as head.
3. Only one piece of floating object not exceeding 80mm long, 30mm wide and 30mm tall may be installed on to the robot. These dimensions are not inter-changeable. The robot has a body and four limbs only. Any additional supporting devices, wheels or floating objects are not allowed.
4. The robot must complete the game in butterfly stroke swimming action with both arms and legs. No propeller can be used.



### Game Field Specification

1. A swimming competition board is used (see diagram).
2. Dimension of the transparent swimming track: 2300mm (Length) x 150mm (Width) x 300mm (Height) filled with water to 150mm deep.
3. The start zone is 300mm long.



### Game Rules

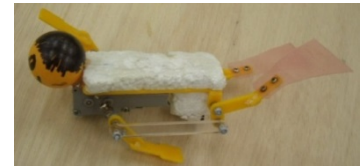
1. Each team plays twice and the best time is recorded. The team with the shortest amount of time to complete the game is the winner.
2. Contestants must use the Desktop Hand Generator provided by the Organizer to supply power to the robot. **Only the contestant himself/herself operates the Desktop Hand Generator and nobody is permitted to assist.**
3. The wire of the Desktop Hand Generator is long enough so that the contestants must stay behind at the start zone. Moving along the field with the robot is prohibited. **Contestants may assign one student to help lower the wire in the water.** Pulling the wire of the Desktop Hand Generator is prohibited.
4. Contestants cannot touch the robot **once it leaves the start zone.** **The competition is considered as incomplete if the robot stops moving or fails to reach the destination within the 30 seconds game time.** The game ends when the robot reaches the acrylic board at the end of the runway.





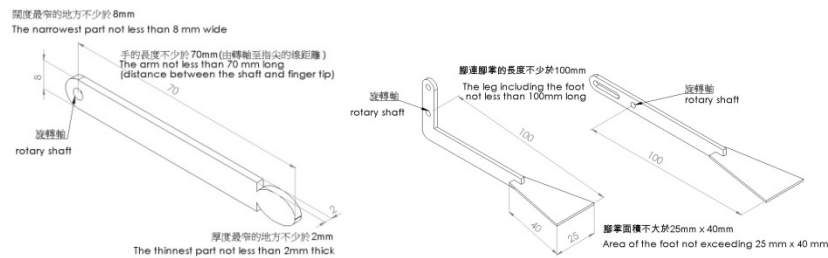
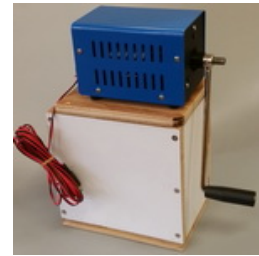
## 8. Hand Generator Robot Freestyle (*front crawl*) Swimming Competition

Students are required to make a single motor robot that simulates the front crawl swimming action by applying mechanical principles.



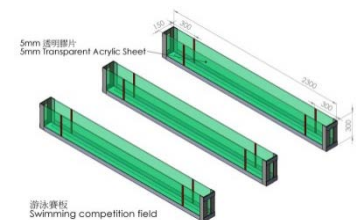
### Robot Specification

1. The robot operates only with one motor which must be beneath the water surface when the robot is swimming in the water. Contestants must use the Desktop Hand Generator provided by the Organizer to supply water to the robot. Hence the robot must be equipped with a 2.1mm socket for connection to the Desktop Hand Generator.
2. Whether it is in the course of inspection or competition, the size of the robot cannot exceed 300mm long, 150mm wide and 180mm tall. The arm cannot be less than 70mm long (distance between the shaft and the finger tip), the narrowest part not less than 8mm wide and the thinnest part not less than 2mm thick. The leg including the foot cannot be less than 100mm long. The area of the foot cannot exceed 25mm x 40 mm. A ping-pong must be used as head.
3. Only one piece of floating object not exceeding 80mm long, 30mm wide and 30mm tall may be installed on to the robot. These dimensions are not inter-changeable. The robot has a body and four limbs only. Any additional supporting devices, wheels or floating objects are not allowed.
4. The robot must complete the game in freestyle swimming action with both arms and legs. No propeller can be used.
5. Freestyle is performed face down and both arms move synchronously with a small synchronized kick.



### Game Field Specification

1. A swimming competition board is used (see diagram).
2. Dimension of the transparent swimming track: 2300mm (Length) x 150mm (Width) x 300mm (Height) filled with water to 150mm deep.
3. The start zone is 300mm long.



### Game Rules

1. Each team plays twice and the best time is recorded. The team with the shortest amount of time to complete the game is the winner.
2. Contestants must use the Desktop Hand Generator provided by the Organizer to supply power to the robot. **Only the contestant himself/herself operates the Desktop Hand Generator and nobody is permitted to assist.**
3. The wire of the Desktop Hand Generator is long enough so that the contestants must stay behind at the start zone. Moving along the field with the robot is prohibited. **Contestants may assign one student to help lower the wire in the water.** Pulling the wire of the Desktop Hand Generator is prohibited.
4. Contestants cannot touch the robot **once it leaves the start zone.** **The competition is considered as incomplete if the robot stops moving or fails to reach the destination within the 30 seconds game time.** The game ends when the robot reaches the acrylic board at the end of the runway.





## 9. Hand Generator Robot Medley Relay Swimming Competition

Medley Relay is a combination of four different swimming styles by four robot swimmers into one race. It not only tests the mechanical design of robots but also the ability to cooperate among the players.

### Robot Specification

1. Each robot operates only with one motor which must be beneath the water surface when the robot is swimming in the water. Contestants must use the Desktop Hand Generator provided by the Organizer to supply power to the robot. Hence the robot must be equipped with a 2.1mm socket for connection to the Desktop Hand Generator.
2. Dimensions and specific requirements of respective robots for this game refer to the games rules on Backstroke Swimming, Breaststroke Swimming, Butterfly Stroke Swimming and Freestyle (front crawl) Swimming respectively.
3. The robots must complete the game consists of four different strokes with both arms and legs. The four strokes are performed in the order of: Backstroke, Breaststroke, Butterfly stroke and Freestyle(front crawl). No propeller can be used
4. The Backstroke Swimming Robot is different from a Freestyle Swimming Robot particularly in the directions of their faces



Backstroke

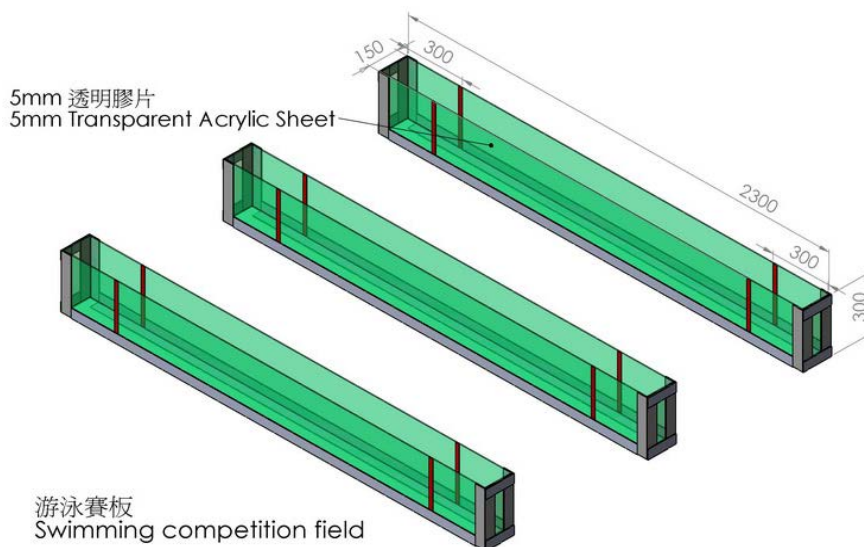
Breaststroke

Butterfly stroke

Freestyle (front crawl)

### Game Field Specification

1. A swimming competition board is used (see diagram)
2. Dimension of the transparent swimming track: 2300mm (Length) x 150mm (Width) x 300mm (Height) filled with water to 150mm deep
3. The start zone is 300mm long.







## Game Rules

1. Each team plays once. Each team composed of four different swimming styles robot swimmers. The game is performed in the order of: Backstroke, Breaststroke, Butterfly Stroke and Freestyle.
2. Each team has two team members at the start and finish zones respectively. A Desktop Hand Generator will be provided to each team at the start zone and destination. The wire of Desktop Hand Generator is long enough so the contestants must remain at their original position. Moving along the field with the robot is prohibited. Only the contestant himself/herself operates the Desktop Hand Generator and nobody is permitted to assist. Contestants may assign one student to help lower the wire in the water at the start and finish zones respectively. Pulling the wire of Desktop Hand Generator is prohibited.
3. Upon the Referee's signal to start the game, contestants may start to operate the Desktop Hand Generator to supply power to the robots. When the Backstroke Swimming Robot reaches the acrylic board at the end of the runway to finish the first stroke, the Breaststroke Swimming Robot at the destination starts swimming until it reaches the acrylic board at the end of the runway to end the second stroke. At the same time the wire of the Desktop Hand Generator plugged on the Backstroke Swimming Robot is unplugged and pulled back for preparing the Butterfly Stroke Swimming Robot at the start zone. When the Breaststroke Swimming Robot finishes its part, the game is continued by Butterfly Stroke Swimming Robot. The wire of the Desktop Hand Generator plugged on the Breaststroke Swimming Robot is unplugged and pulled back for preparing the Freestyle Swimming Robot. When all four robots have completed the game, the total amount of game time is counted. The team with the shortest amount of time to finish the game is the winner.
4. If contestants pull the wire, whether intentionally or not, in order to move the robot forwards, the team will be warned and 10 seconds is added to the total game time. The team will be disqualified upon second offence.





## 10. Hand Generator Robot Fish Short Distance Swimming (Vertical style) Competition

There are a wide variety of marine organisms with numerous kinds of fishes in the ocean. Their swimming style may be different from one another. Students are required to make a single motor robot fish that simulate the fish swimming action (vertical style) by applying mechanical principles.

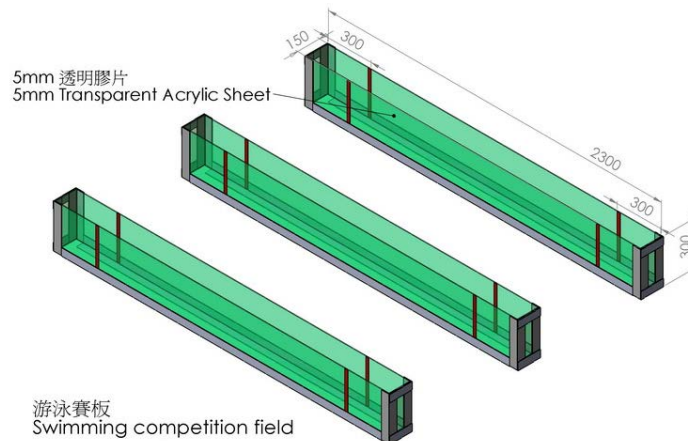
### Robot Fish Specification

1. The robot fish operates only with one motor. Contestants must use the Desktop Hand Generator provided by the Organizer to supply power to the robot. Hence the robot must be equipped with a 2.1mm socket for connection to the Desktop Hand Generator.
2. Whether it is in the course of inspection or competition the size of the robot fish cannot exceed 300mm long, 50mm wide and 100mm tall.
3. The robot fish must complete the game in fish swimming action (vertical style). No propeller can be used.
4. The robot fish has a body only and no additional supporting devices nor wheels be installed on the left, right or bottom part of the robot fish.



### Game Field Specification

1. A swimming competition board is used (see diagram)
2. Dimension of the transparent swimming track: 2300mm (Length) x 150mm (Width) x 300mm (Height) filled with water to 150mm deep
3. The start zone is 300mm long.



### Game Rules

1. Each team plays twice and the best time is recorded. The team with the shortest amount of time to complete the game is the winner.
2. Contestants must use the Desktop Hand Generator provided by the Organizer to supply power to the robot fish. **Only the contestant himself/herself operates the Desktop Hand Generator and nobody is permitted to assist.**
3. The wire of the Desktop Hand Generator is long enough so that the contestants must stay behind at the start zone. Moving along the field with the robot fish is prohibited. **Contestants may assign one student to help lower the wire in the water.** Pulling the wire of the Desktop Hand Generator is prohibited.
4. Contestants cannot touch the robot fish **once it leaves the start zone.** **The competition is considered as incomplete if the robot fish stops moving or fails to reach the destination within the 30 seconds game time.** The game ends when the robot fish reaches the acrylic board at the end of the runway.



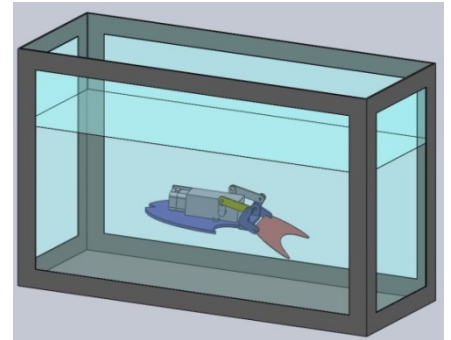


## 11. Hand Generator Robot Fish Short Distance Swimming (Horizontal style) Competition

There is a wide variety of marine organisms with numerous kinds of fishes in the ocean. Their swimming style may be different from one another. Students are required to make a single motor robot fish that simulates the fish swimming action (Horizontal style) by applying mechanical principles.

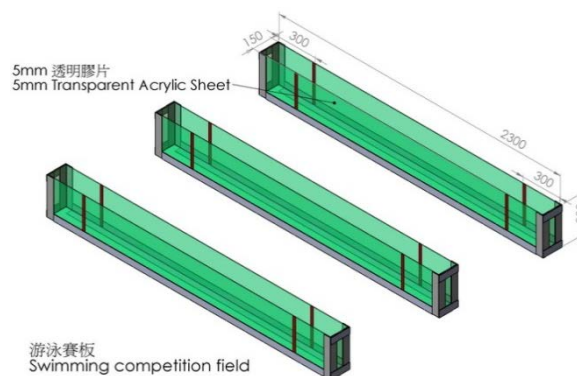
### Robot Fish Specification

1. The robot fish operates only with one motor. Contestants must use the Hand Generator provided by the Organizer to supply power to the robot. Hence the robot must be equipped with a 2.1mm socket for connection to the Hand Generator.
2. Whether it is in the course of inspection or competition, the size of the robot fish cannot exceed 300mm long, 100mm mm wide and **50mm** tall.
3. The robot fish must complete the game in fish swimming action (horizontal style). Except for the floating object, the robot fish must be below the water surface throughout the course of competition. No propeller can be used.
4. The robot fish could only have a body, no additional supporting devices, wheels be installed on the left, right or bottom part of the robot fish.



### Game Field Specification

1. A swimming competition board is used (see diagram)
2. Dimension of the transparent swimming track: 2300mm (Length) x 150mm (Width) x 300mm (Height) filled with water to 150mm deep
3. The start zone is 300mm long.



### Game Rules

1. Each team plays twice and the best time is recorded. The team with the shortest amount of time to complete the game is the winner.
2. Contestants must use the Desktop Hand Generator provided by the Organizer to supply power to the robot fish. **Only the contestant himself/herself operates the Desktop Hand Generator and nobody is permitted to assist.**
3. The wire of the Desktop Hand Generator is long enough so that the contestants must stay behind at the start zone. Moving along the field with the robot fish is prohibited. **Contestants may assign one student to help lower the wire in the water.** Pulling the wire of the Desktop Hand Generator is prohibited.
4. Contestants cannot touch the robot fish **once it leaves the start zone.** **The competition is considered as incomplete if the robot fish stops moving or fails to reach the destination within the 30 seconds game time.** The game ends when the robot fish reaches the acrylic board at the end of the runway.





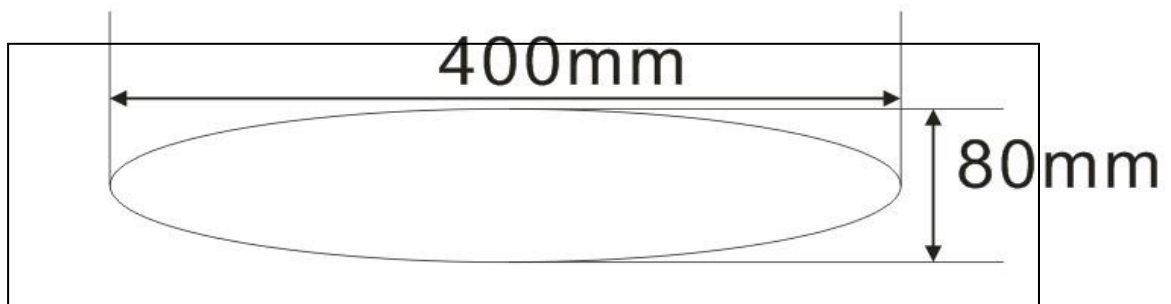
## 12. Hand Generator Two-Oar Robot Boat Competition

Rowing competition is one of the Olympic sports as well as an annual event held by the Cambridge University and Oxford University. Participants are required to design and make a two-oar rowing robot.



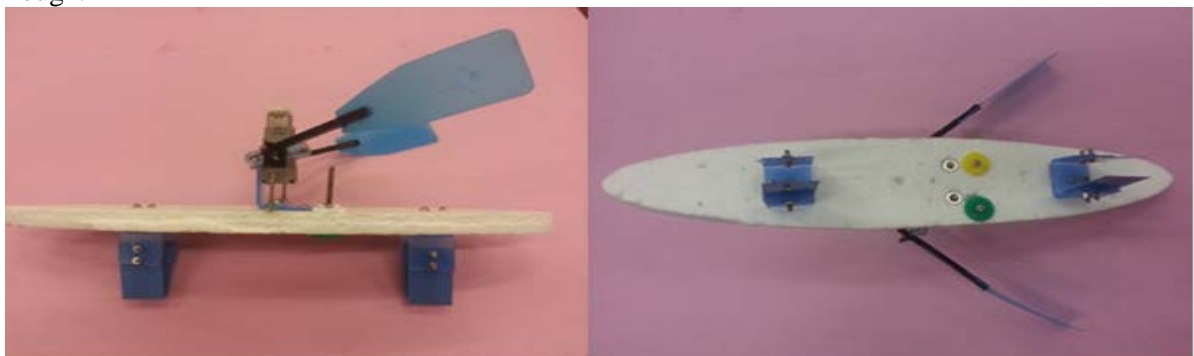
### Robot Specification

1. The robot boat operates only with one motor. Contestants must use the Hand Held Hand Generator provided by the Organizer to supply power to the robot boat. Hence the robot boat must be equipped with a 2.1 mm socket for connection to the Hand Held Hand Generator.
2. The total size of the robot boat (including the robot, oars and the boat) cannot exceed 400 mm long, 400 mm wide, and 240mm tall. The entire robot boat (excluding oars and supporting device) must be able to pass through a 400 mm long, 80 mm wide oval shape template (as shown below). Catamaran is not allowed.



Oval shape template

3. The robot paddles with two oars moving simultaneously. No propeller can be used.
4. A device should be installed at the bottom of the boat for a 5mm diameter guiding nylon rope to pass through.



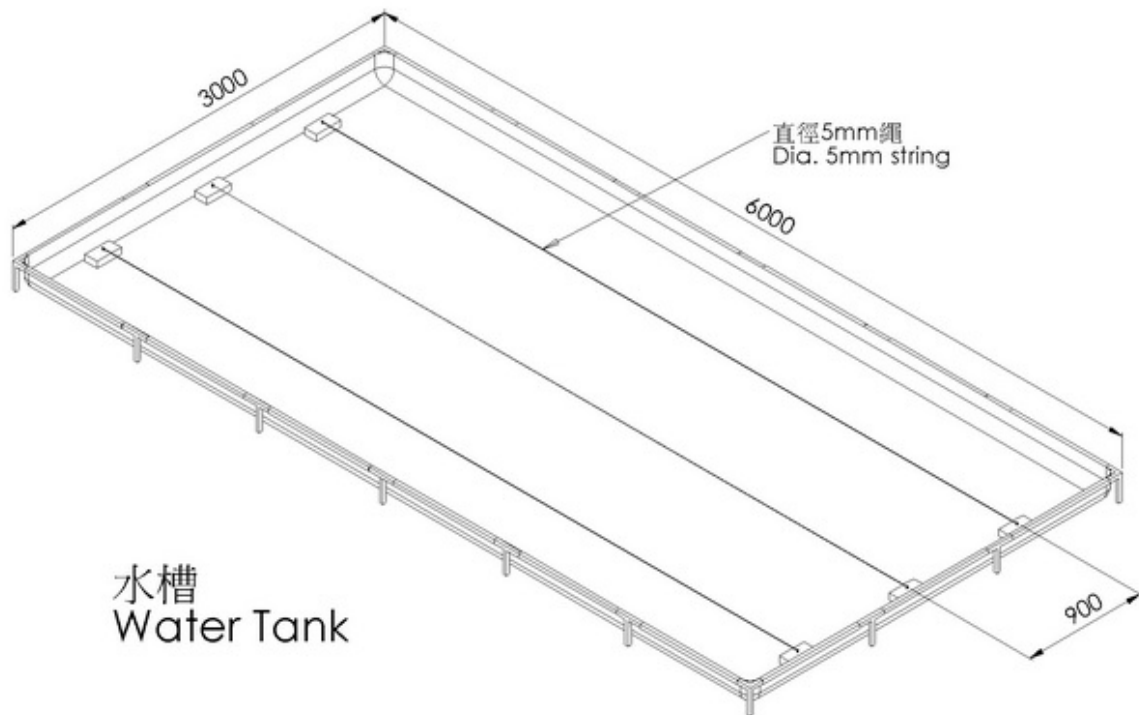
Guiding nylon rope device location





## Game Field Specification

1. The playing field is a water tank of 6000mm (Length) x 3000mm (Width) x 200mm (Height), filled with water to 150mm deep.
2. A 5mm diameter nylon rope is installed across the water tank approximately 20mm with  $\pm 10$ mm deviation, beneath water surface to form a fixed rowing track.



## Game Rules

1. Each team plays twice and the best time is recorded. The team with the shortest amount of time to complete the game is the winner.
2. Contestants must use the Hand Held Hand Generator provided by the Organizer to supply power to the robot boat. **Only the contestant himself/herself operates the Hand Held Generator and nobody is permitted to assist.**
3. Contestants are not required to stay at the starting area and can move along behind the robot boat. The wire is long enough to connect to the Hand Held Generator. **Contestants may assign one student to help lower the wire in the water.** Pulling the wire of the Hand Held Generator is prohibited.
4. The poop of the robot boat is placed against the end of the start zone before the game starts. The game is considered completed once the bow of the robot boat touches the rim of the destination and the time is recorded.
5. Contestant cannot touch the robot boat **once it leaves the start zone.** **The competition is considered as incomplete if the robot duck stops moving or fails to reach the destination within the 60 seconds game time.**



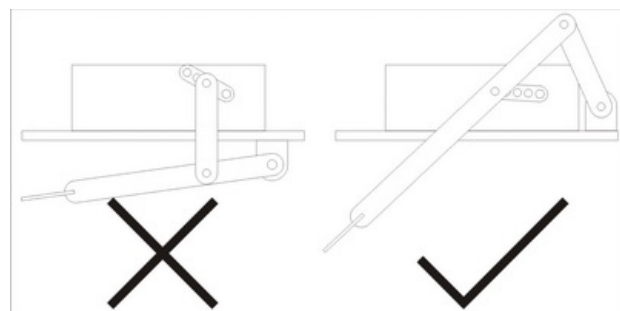
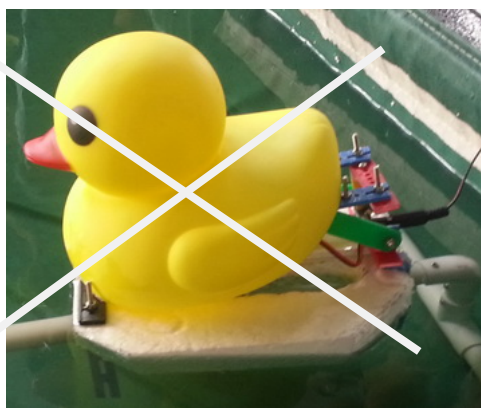
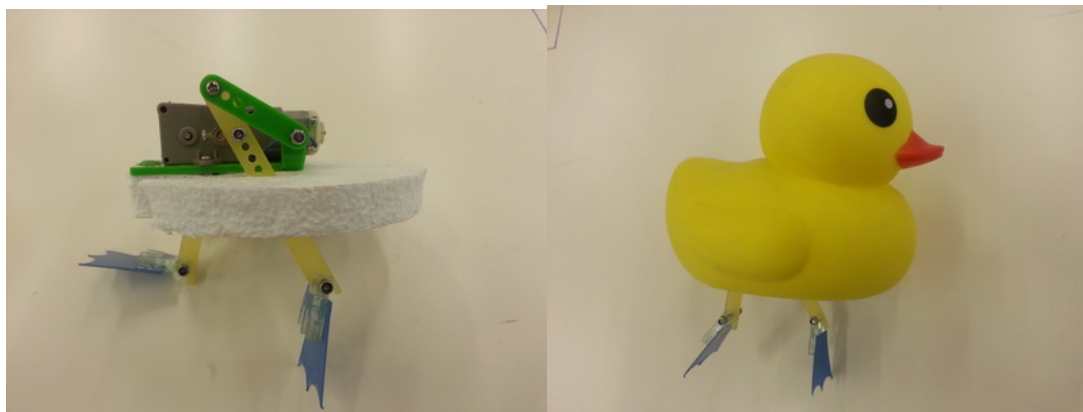


### 13. Hand Generator Robot Duck Short Distance Swimming Competition

Ducks swim with two webbed feet in the water. Students apply simple mechanical principle to make a robot duck that simulates the ducks swimming action.

#### Robot Specification

1. The robot duck operates only with one motor. Contestants must use the Hand Held Hand Generator provided by the Organizer to supply to the robot duck. Hence the robot duck must be equipped with a 2.1 mm socket for connection to the Hand Held Hand Generator.
2. The robot duck must have a yellow plastic case as shown in the diagram and the total dimension of the robot duck cannot exceed 200 mm long, 200 mm wide and 200mm tall. No additional floating object is allowed on the plastic case. All floating objects must be completely concealed inside the yellow plastic case.
3. The robot duck is to paddle with two mechanical webbed feet as shown in the diagram. No propeller can be used.
4. A device should be installed at the bottom of the robot duck for a 5mm diameter guiding nylon rope to pass through.



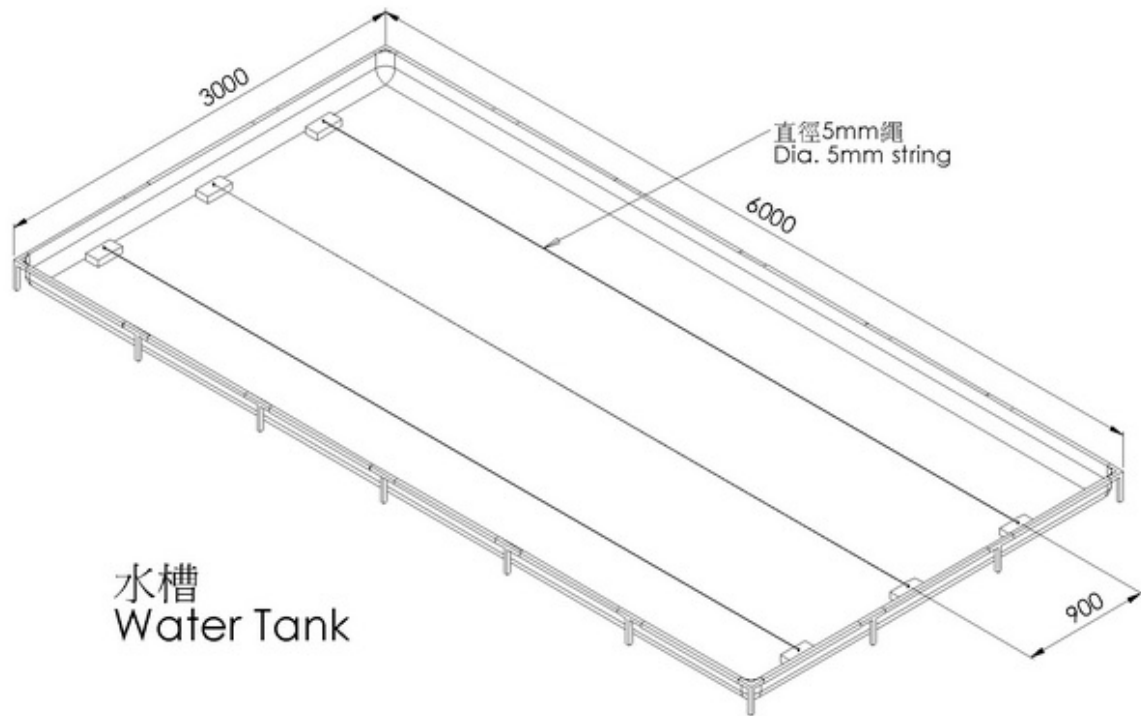
Floating material should be installed inside the body. Non duck-leg mechanical design cannot be used





## Game Field Specification

1. The playing field is a water tank of 6000mm (Length) x 3000mm (Width) x 200mm (Height), filled with water to 150mm deep.
2. A 5mm diameter nylon rope is installed across the water tank approximately 20mm, with  $\pm 10$ mm deviation, beneath water surface to form a fixed rowing track.



## Game Rules

1. Each team plays twice and the best time is recorded. The team with the shortest amount of time to complete the game is the winner.
2. Contestants must use the Hand Held Hand Generator provided by the Organizer to supply power to the robot duck. **Only the contestant himself/herself operates the Hand Held Generator and nobody is permitted to assist.**
3. Contestants are not required to stay at the starting area and can move along behind the robot duck. The wire is long enough to connect to the Hand Held Generator. **Contestants may assign one student to help lower the wire in the water. Pulling the wire of the Hand Held Generator is prohibited.**
4. The robot duck is placed with its poop against the end of the start zone before the game starts. The game is considered completed once the front part of the robot duck touches the rim of the destination and the time is recorded.
5. Contestant cannot touch the robot duck **once it leaves the start zone.** **The competition is considered as incomplete if the robot duck stops moving or fails to reach the destination within the 60 seconds game time.**





## 14. Robot Dragon Boat Race

Dragon boat races are one of the major activities carried out in a Chinese traditional festival called the Tuen Ng Festival, also known as Dragon Boat Festival. A team of paddlers, follow the beat of the drum, paddle together exhibiting a strong team spirit. Participants are to design and build their own robot dragon boat for the race.

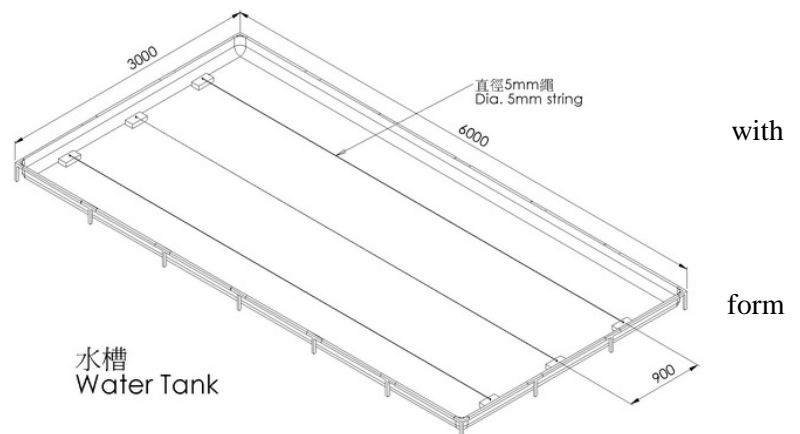
### Robot Specification

1. The robot dragon boat operates with only one set of gear box. Participants use 2 pieces 1.5V AA alkaline batteries to supply power to the robot.
2. The overall dimensions of the robot dragon boat cannot exceed 500mm long, 100mm wide and 180mm tall. The robot dragon boat must have 6 paddlers on each side with a total of 12 paddles.
3. The appearance of the robot dragon boat must look like the traditional Chinese dragon boat. The body of the boat is hollow as shown in the picture on the right. For reference, please refer to the sketch on our website. No external supporting devices nor floating objects be installed to the robot dragon boat.
4. The robot dragon boat must apply the traditional Chinese dragon boat paddling method for advancement. Rowing nor canoeing method for advancement are not allowed. No propeller can be used.



### Game Field Specification

1. The playing field is a water tank of 6000mm (Length) x 3000mm (Width) x 200mm (Height), filled with water to 150mm deep.
2. A 5mm diameter nylon rope is installed across the water tank approximately 20mm, with  $\pm 10$ mm deviation, beneath water surface to a fixed rowing track.



### Game Rules

1. Each team plays **twice and the best time is recorded**. The team with the shortest amount of time to complete the race is the winner.
2. Contestants use 2 pieces 1.5V AA alkaline batteries to supply power to the robot dragon boat.
3. Contestants must station at the start zone and are not allowed to move along with the robot dragon boat.
4. All robot dragon boats are placed with their poop against the end of the start zone before the game starts. The game is considered completed once the bow of the robot dragon boat touches the rim of the destination and the time is recorded.
5. The time is of 1 minute. Contestants cannot touch their robot dragon boat that already left the start zone. The competition is considered incomplete if the robot dragon boat fails to move during the course of competition.







## 15. Robot Dragon Boat Rely Race

Robot dragon boat relay race is to test the team spirit and mechanical design ability of the participating students

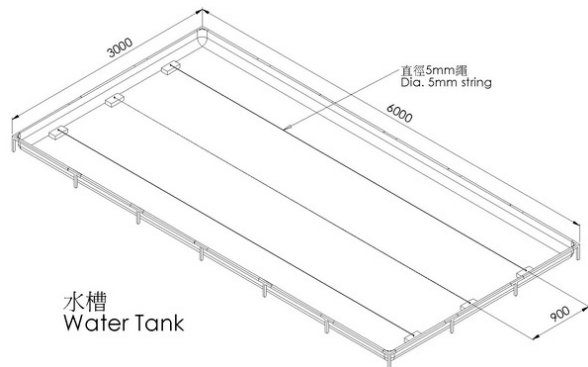
### Robot Specification

1. Each team must have 4 robot dragon boats. Each robot dragon boat operates with only one set of gear box. Participants use 2 pieces 1.5V AA alkaline batteries to supply power to the robot.
2. The overall dimensions of the robot dragon boat cannot exceed 500mm long, 100mm wide and 180mm tall. The robot boat must have 6 paddlers on each side with a total of 12 paddles.
3. The appearance of the robot dragon boat must look like the traditional Chinese dragon boat. The body of the robot dragon boat is hollow as shown in the pictures on the right. For reference, please refer to the sketch on our website. No external supporting devices nor floating objects be installed to the robot dragon boat.
4. The robot dragon boat must apply the traditional Chinese dragon boat paddling method for advancement. Rowing nor canoeing for advancement are not allowed. No propeller can be used.



### Game Field Specification

1. The playing field is a water tank of 6000mm (Length) x 3000mm (Width) x 200mm (Height), filled with water to 150mm deep.
2. A 5mm diameter nylon rope is installed across water tank approximately 20mm, with  $\pm 10$ mm deviation, beneath water surface to form a fixed rowing track.



### Game Rules

1. Each team assigns 4 robot dragon boats for the race. Each team plays only once and the team with the shortest amount of time to complete the race is the winner.
2. Each team has 2 members station at the start zone and the destination respectively. They are not allowed to move along with the robot dragon boats.
3. A team member at the start zone operates the 1st robot dragon boat upon the judge commands start of the race. Another team member at the destination picks up the 1st robot upon its arrival and places the 2nd robot dragon boat to continue the race. A team member at the start zone picks up the 2nd robot dragon boat upon its arrival and places the 3rd robot dragon boat to continue the race and so forth until all 4 robot dragon boats complete the race. The total game time of the team is recorded. The team with the shortest amount of time to complete the race is the winner.
4. The game time is of 4 minutes. Contestants cannot touch their robot dragon boat that already left the start zone. The competition is considered incomplete if the robot dragon boat fails to move during the course of competition





## 16. Robot Dragon Boat Appearance Design Competition

The robot dragon boat appearance design competition encourages students to express their creativity. The loose game rules allow more esthetic and creative approach to the design of the robot dragon boat appearance.



### Game Rules

1. The participating robot dragon boats may not take part in any other competitions.
2. Robot dragon boats that had taken part in the last year's Appearance Design Competition are not allowed to take part in this year's Appearance Design Competition.
3. The robot dragon boat including its peripheral decorations cannot exceed 500mm X 300mm X 230mm (the length, width and height dimensions may be interchanged).
4. The robot dragon boat is powered by 2 pieces 1.5V AA alkaline batteries and must be able to move all the paddles.
5. The contesting student may submit an A4 size introduction on the design concept and features (annex 1) in the specified format. However, the contents must not reflect or imply in any way the name of contestant or school. No presentation is required on the day. Failure to comply may lead to disqualification of the item.

### Evaluation Criteria

Appearance / Dynamics	Creativity	Production skills	Application of material	Total
25%	30%	25%	20%	100%





## Robot Dragon Boat Appearance Competition Product Introduction

Category: Robot Dragon Boat Appearance Competition Primary School Division

Contest Registration No. : \_\_\_\_\_

**Product Introduction :**

**Design concept:**

**Materials application:**

**Problems encountered:**

**Solution:**

Note: The content must not reflect or imply in any way the name of contestant or school. Failure to comply may lead to disqualification of the item.

