International Robotic Olympiad 2016

Ocean Exploration Competition Rules (V5)

(Secondary School Division)

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 the walking actions.
3. All contestants should wear uniform during the competition.
4. Name list of the student contestants should not 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 the judges.

Robot Rules

8. 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.
9. 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 centre by the judges for motor performance check.
10. 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.
11. All motors must pass the power consumption check. The motor cannot consume more than 280mA when 3V supplied by the power regulator.
12. The weight of the robot means the total weight including all accessories and parts (including batteries).
13. Participating robots must comply with the dimensions, weights and specific requirements set by the Organizer.
14. All robots cannot add on control devices not approved by the Organizer. All wireless installations must be able to alter frequency channels. Transmitters found interfering must be immediately changed channel; otherwise it would be disqualified for the competition. 2.4 G wireless remote control device are recommended. All approved models of electronic controller accessories, wireless installations and their suppliers would be announced on the website.
15. 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 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.
16. In the "Hand Generator Category Competitions", more than one student contestants are allowed to operate the hand generator (attachment 1). They can change at any time.

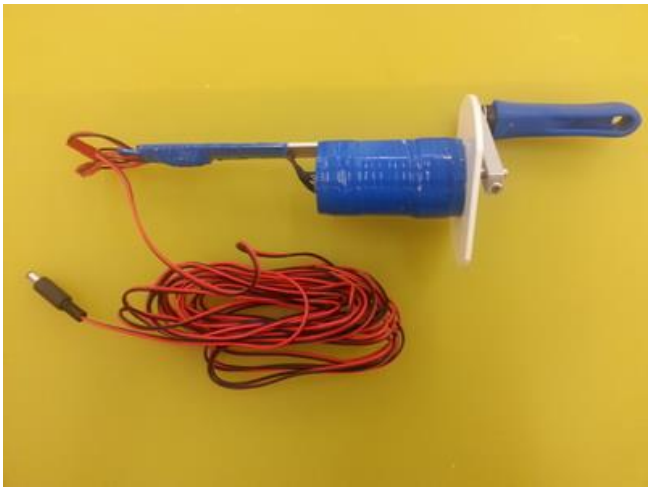
17. Pneumatic device cannot be used.

Other Points to Note

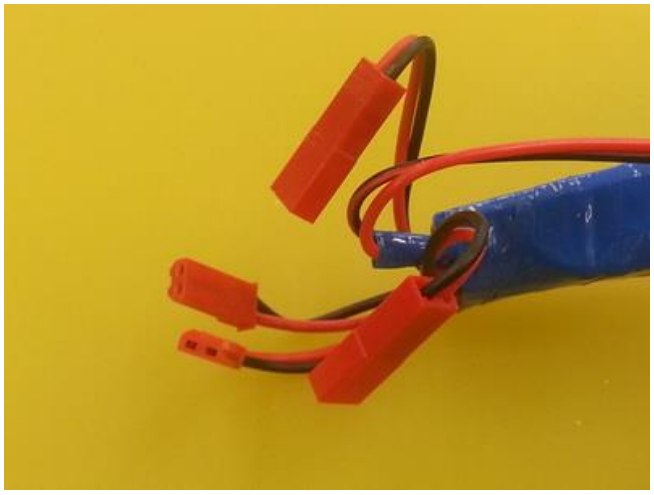
18. Hand generators (attachment 1) and batteries provided by the Organizer should only be used in the national competition (batteries will be prepared by contestants in regional competitions).
19. Registration number of the robot must be engraved or printed with permanent ink on its chassis.
20. The Organizer may check robots on their specifications any time after registration. Units found not meeting specifications would be disqualified for the competition.
21. The Organizer reserves the right to use all participating items for marketing and publicity purposes.
22. Violation of the above rules would lead to immediate disqualification of the competition and its result.
23. The Organizer reserves the right to modify the game rules and announce them on its website.

Hand Generator (24V 350rpm)

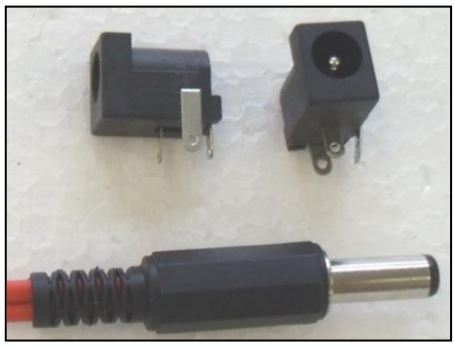
Attachment 1



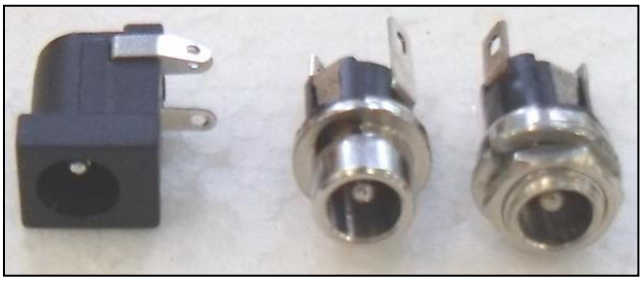
24V 350rpm Hand Generator



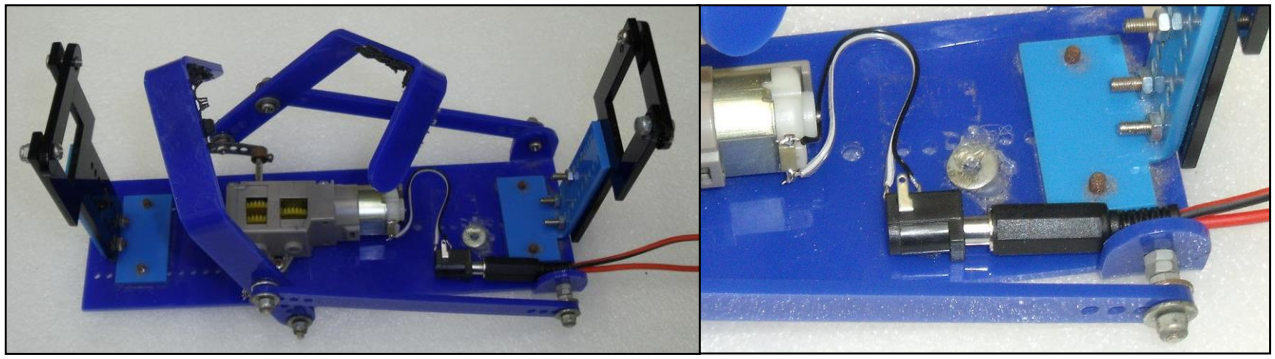
Exchange the plugs to change the polarity and turning direction of handle



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

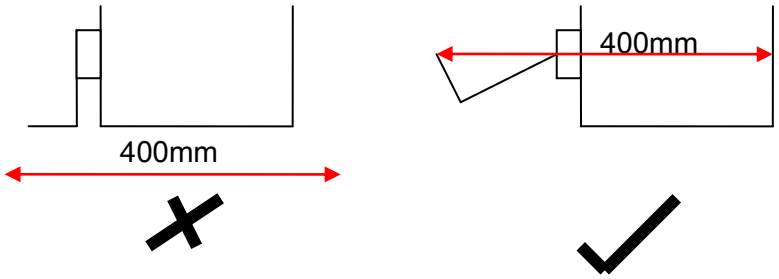
1. Environmental Protection – Sea Surface Sweeper Robot Game
2. Water Polo Robot Game
3. Shipwreck Rescue and Salvage Robot Game
4. Ocean Treasure Hunting Robot Game
5. Land and Water Robot Obstacle Avoidance Competition
6. Hand Generator Robot Backstroke Swimming Competition
7. Hand Generator Robot Breaststroke Swimming Competition
8. Hand Generator Robot Butterfly Stroke Swimming Competition
9. Hand Generator Robot Freestyle (front crawl) Swimming Competition
10. Hand Generator Robot Medley Relay Swimming Competition
11. Hand Generator Robot Fish Short Distance Swimming (Vertical style) Competition
12. Hand Generator Robot Fish Short Distance Swimming (Horizontal style) Competition
13. Hand Generator Robot Duck Short Distance Swimming Competition
14. Wired Control Robot Fish Obstacle Avoidance Competition
15. Wireless Control Servo Motor Robot Fish Obstacle Avoidance Competition
16. Hand Generator Robot Four-Oar Rowing Boat Competition
17. Hand Generator Robot Canoe Competition
18. Wireless Control Servo Motor Robot Four-Oar Rowing Boat Obstacle Avoidance Competition
19. Wireless Control Servo Motor Robot Duck Obstacle Avoidance Competition

1. Environmental Protection – Sea Surface Sweeper Robot Game

Rubbish floating in the sea not only bad for hygiene but also creates risk 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

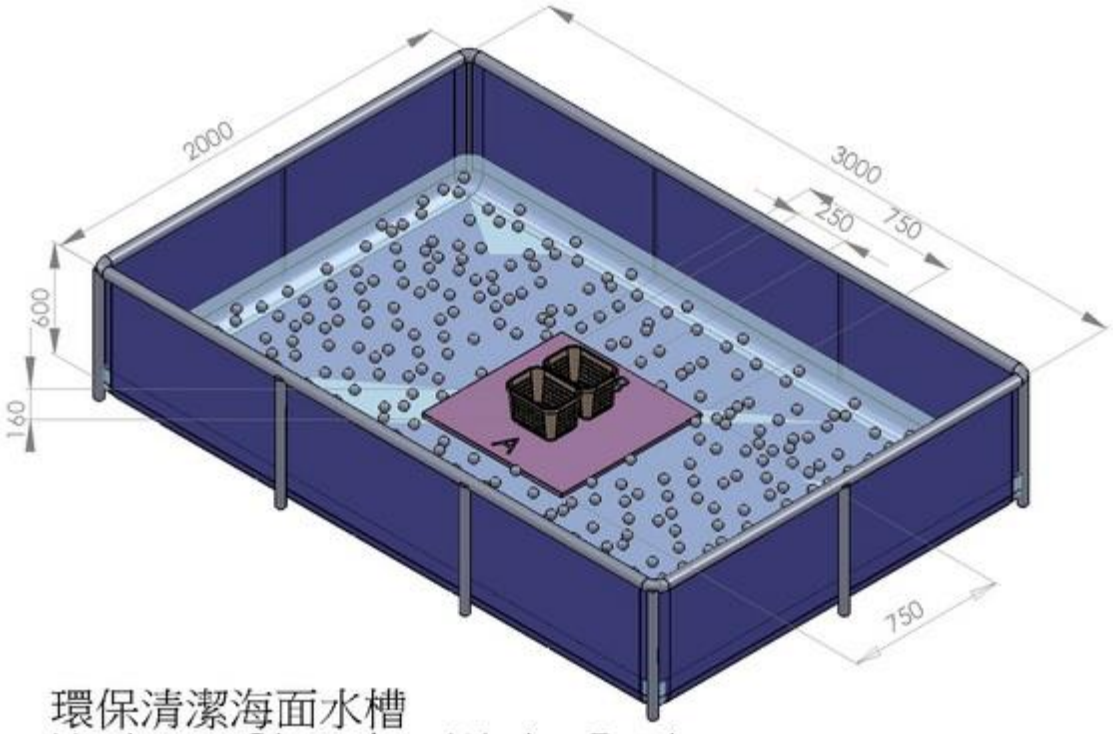
1. The robot, with its arms fully stretched forward, cannot exceed 400mm (Length) x 300mm (Width) x 300mm (Height). The height of the robot will not take into consideration if the catcher is stretched upward or downward.



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 of 1.5V 2A size batteries can be used to drive the actuators and catcher and NO additional energy installment can be made. Batteries must meet the specifications set by the Organizer.
5. Only FA-130 and RE-260 motors can be used to drive the propeller.

Playing Field Specification

1. Water tank dimension: 3000mm (Length) x 2000mm (Width) x 600mm (Height)
2. Water is filled to about 150mm deep
3. A Square floating board with 750mm long is placed in the centre of the water tank
4. Each side has a trashcan of 250mm (Length) x 180 mm (Width) x 160 mm (Height) on the floating board.



環保清潔海面水槽
Harbour Cleaning Water Tank

Game Rules

1. Ping-pong are used as rubbish; There are about 200 each of orange ball (10 points) and white balls (-50 points) in the water tank.
2. Each game shall last for two minutes. The participating robot must use its catcher to collect and throw the ping-pong into its own bin on their side. Robot can also throw the white balls (with negative scores) to its opponent's bin. However, robots cannot cross the floating board to shoot the balls.
3. At the end of the game, balls inside the bin will be scored. The robot sweeper that has the highest points wins the competition.
4. Each game has two teams. A verbal warning with a 30 seconds detainment penalty will be served to any robot found deliberately obstructing the other team. The team would be disqualified on receiving three warnings.
5. The robot that deliberately sinks other robots would be disqualified.

2. Water Polo Robot Game

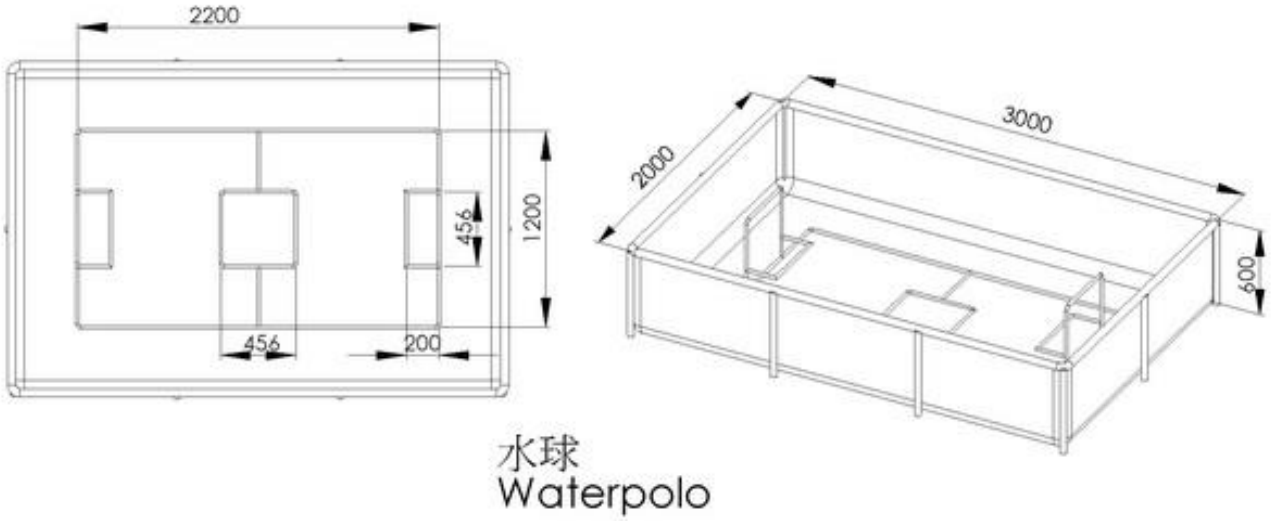
The water Polo robot game is a team competition. Each team has two robots. The participating robots should have good ability to pick up and throw balls with skillful control.

Robot Specification

1. The robot, with its arms fully stretched forward, cannot exceed 400mm (Length) x 300mm (Width) x 300mm (Height). The height of the robot will not take into consideration if the catcher is stretched upward to downward.
2. The robot must only 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 of 1.5V 2A size batteries can be used to drive the actuators and catcher and NO additional energy devices can be installed. Batteries must meet the specifications set by the Organizer.
5. Only FA-130 and RE-260 motors can be used to drive the propeller.

Playing Field Specification

1. Water pool dimension: 3000mm (Length) x 2000mm (Width) x 600mm (Height)
2. Penalty area: 456mm (Length) x 200mm (Width)
3. Water is filled to about 150mm deep



Game Rules

1. 'Toss a coin' is used to decide on the goals and the serve right. The Kick-off side is to kick-off the ball in the centre of the pool. The defensive robots are to get prepared in their own penalty area.
2. Ping Pong is used as the water polo ball. Each successful goal scores one point. After each successful score, the losing team will kick-off the ball at the centre of the pool.
3. There are two halves in the match and each is of three minutes duration. The first stage of the competition will be conducted on a round-robin basis. The winning side will get 3 points, losing side 0 point and each side 1 point in case of a draw. The second stage will be conducted on a knockout basis.
4. The game is divided into two halves, each of 3 minutes duration. The team that scores higher points will win. Should there be a draw at the end of the game during the knockout stage, the first team scores the goal within an extra 3 minutes game time wins. Should there be no score or same score in the extra time, each team takes turn to send their robots to do the fix point shooting one at each time. The time of each successful shooting is recorded. After the two robots of each team have done the fix point shooting, the team that scores higher points will win. In case of draw, the team with the shorter total shooting time of the two shootings will win. Second round will be conducted until a winner is identified.
5. **Fix Point Shooting**: A ball is placed at the mid-court of the pool. Each team would be given one minute to shoot the ball without defensive robot. If unsuccessful, repeat shooting attempts are allowed. Robot cannot shoot or get the ball inside the penalty area.
6. The robot should not hold the ball longer than 5 seconds; otherwise a penalty would be given. The opposite side will be given a penalty kick at where the game stops.
7. The robot cannot shoot inside the opponent's penalty area. If the ball falls in the penalty area or outside the field area, the defensive robot would serve from the side of the penalty area.
8. The robot has to shoot the ball with the throwing device directly into the goal to score. Score would not be counted if the ball is bumped in by the body nor if the ball is drifted into the goal by itself.
9. There are no foul balls. A central struggle ball will be served if both sides struggling for the ball for over ten seconds at the edge of the field. A robot from each team is to move from the penalty area to the centre of the field to scramble for the ball while other team members have to stop nearby the penalty area and could only move until either robot touches the ball.

3. Shipwreck Rescue and Salvage Robot Game

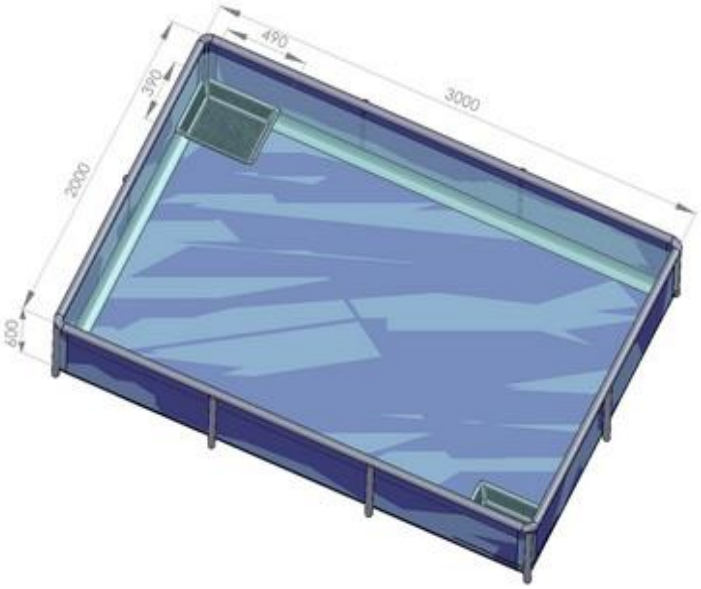
The shipwreck rescue and the salvage robot is a team competition, each team composes of two robots. The participating robot must be able to move forwards and backwards, turn left and right, float and sink, and has a mechanism capable to salvage a sunken ship. The team uses the shortest time to salvage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

Robot Specification

1. The robot, when fully stretched, cannot exceed 400mm (Length) x 300mm (Width) x 300mm (Height).
2. The robot must be 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 2A size batteries can be used to drive the actuators and catcher and NO additional energy devices can be installed. Batteries must meet the specifications set by the Organizer.
5. Only FA-130 and RE-260 motors can be used to drive the propeller.

Playing Field Specification

1. The playing field is a water tank of 3000mm (Length) x 2000mm (Width) x 600mm (Height), filled with water to 450mm deep.
2. A collector of 490mm (Length) x 390mm (Width) x 120mm (Height) is placed at the opposite corner on each side of the bottom 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 has two salvage robots. The titanic ship, broken into two halves, rests on the bottom of water tank. The two robots would start initially from the collector position to salvage the broken ship bodies and place them on one of the collectors within a time limit of five minutes (the entire boat must be placed within the outer edges of the collector).
2. The time to transport each broken ship body to the collector is recorded. The team that uses the shortest time to salvage the entire ship wins the competition. Should none of the teams complete the mission in five minutes; the team that salvaged half of the ship in the shortest time becomes the winner.

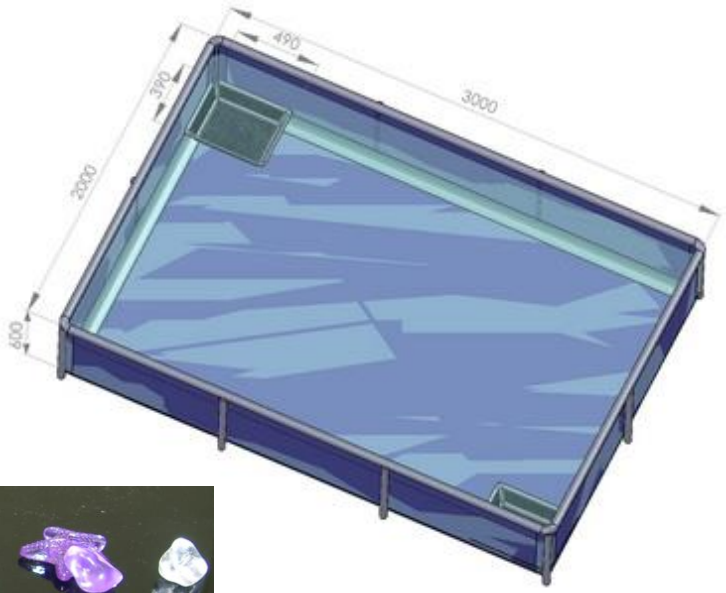
4. Ocean Treasure Hunting Robot Game

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 must design two robots capable to dive 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 with its arms fully stretched, cannot exceed 400mm (Length) x 300mm (Width) x 300mm (Height).
2. The robot must be 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 batteries can be used to drive the actuators and catcher and NO additional energy devices can be installed. Batteries must meet the specifications set by the Organizer.
5. Only FA-130 and RE-260 motors can be used to drive the propeller.

Playing Field Specification



1. The playing field is a water tank of 3000mm (Length) x 2000mm (Width) x 600mm (Height), filled with water to 450mm deep.
2. A collector of 490mm (Length) x 390mm (Width) x 120mm (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. The points scored for each of the color stones are:

Red	Orange	Yellow	Green	Blue	Violet	White
4	5	6	7	8	9	10

Game Rule

1. Two robots are placed inside the collectors and start the treasure hunting to pick as many stones as possible in five minutes. The robot that scores the highest points wins the competition.
2. Only stones inside the two collectors and those stones entirely placed inside the collector of the robot would be counted provided that the robot must return to the platform before the time is up to count the stones it has carried.

5. Land and Water Robot Obstacle Avoidance Competition

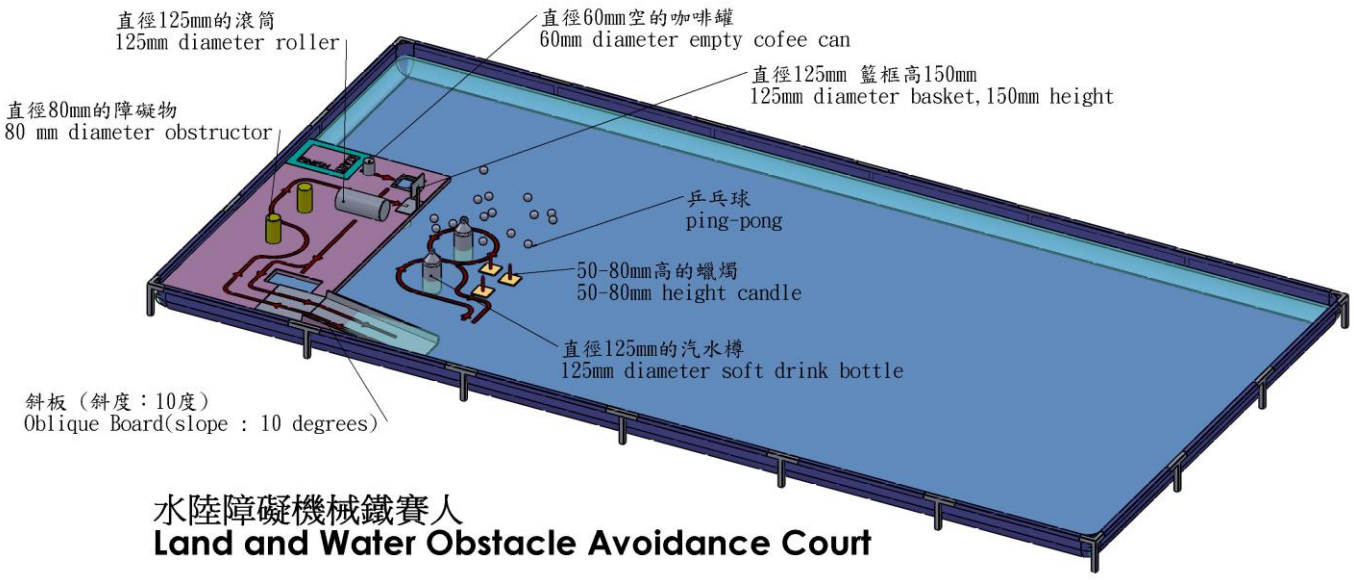
Oblique platform, drawbridge, water tank and cylindrical obstacle are placed in the obstacle avoidance game field. The participating robot is required to navigate through the oblique platform, drawbridge, water tank and cylindrical obstacle to reach the destination in the shortest time to win. This game tests the ultimate performance of the robots as well as the navigation control ability of the players.

Robot Specification

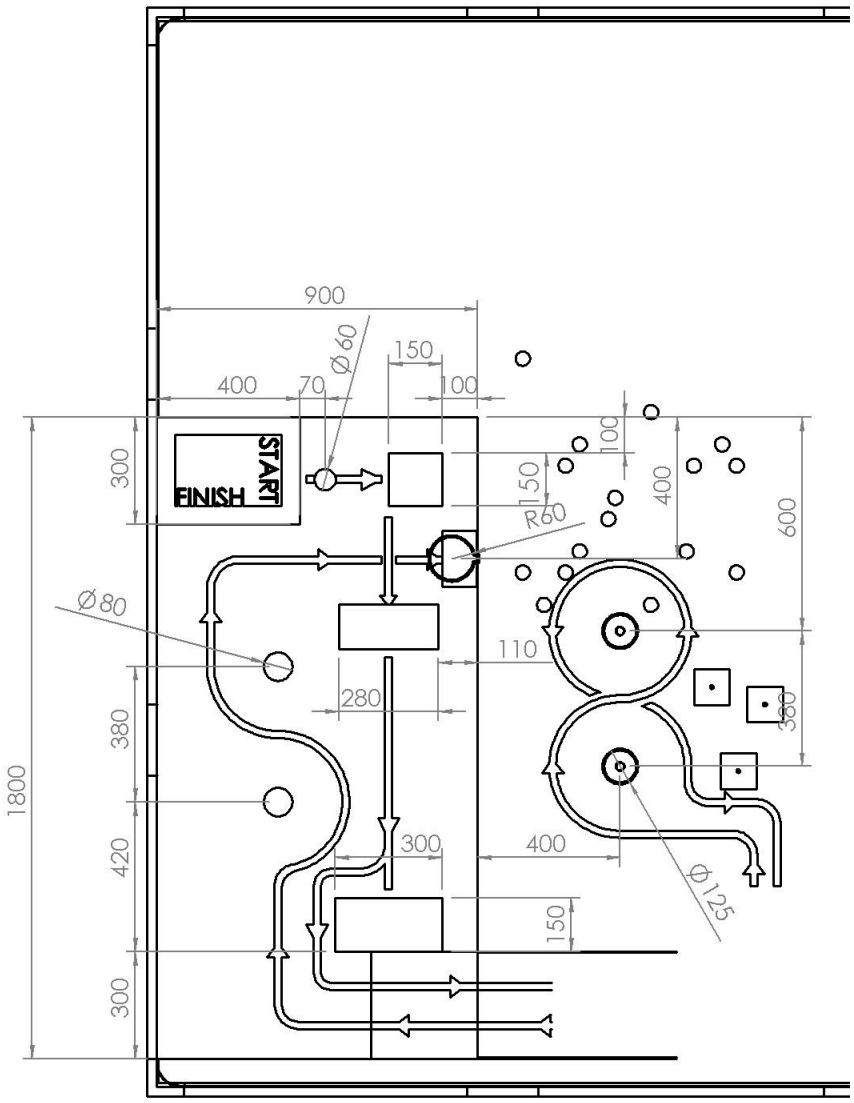
1. The robot cannot exceed 400mm long, 300mm wide, 300mm tall, nor 1kg（excluding wired controller）in weight.
2. The robot is controlled by wired manual controller. Player may also use shorter wire and move around with the robot. Only batteries provided by the Organizer could be used (batteries are prepared by the participants prep for the Hong Kong region competition).
3. The robot can use only two gear boxes for walking motion, two gear boxes for mechanic movement and two motorized propellers to move in the water.
4. No more than 8 pieces of 1.5V AA size batteries can be used to drive the actuators and catcher and NO additional energy devices can be installed. Batteries must meet the specifications set by the Organizer.
5. Only FA-130 and RE-260 motors can be used to drive the propeller.

Game Filed Specification

1. This game uses the land and water robot obstacle avoidance playing field (diagram referred).
2. The area of land playing field is 1800mm × 900mm and no fencing on four sides. It is placed in a water playing field with 6m long x 3m wide x 300mm tall. The oblique platform is slippery proof.
3. The diameter of the can (an empty coffee can) is 60mm, the height is 90mm and the weight is 50g. The diameter of the cylindrical obstacle is 80mm, the height is 150 mm. The diameter of roller (1.25 Liter soft drink bottle) is 125mm, the height is 280 mm.
4. The length of the oblique platform is 720mm, the width is 300mm and the slope is is 10^{o}.
5. The fire is three 50-80mm long 8mm in diameter candles. It is placed on a candlestick floating in the water tank.



水陸障礙機械鐵賽人
Land and Water Obstacle Avoidance Court



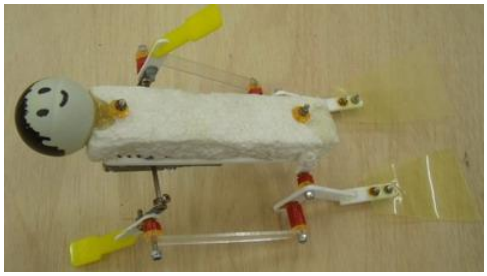
Game rule

1. The robot is placed at the "START" position and a golf ball (the weight) is placed on the robot. The timer begins to count when the judge signals start of the game.
2. The robot has to follow the designated route. First, the robot pushes an empty coffee can to a square hole which is 150mm in length. If the robot or the can fall in the water, contestant has to restart again.
3. The robot then pushes away a roller to a rectangular hole. If the robot or the roller falls in the water, contestant has to restart from the roller original position. The robot gets down into the water through the oblique bridge. After putting out three candle fire (no limit in method), the robot has to pick up a ball before moving back to the land field through the oblique bridge. After passing through all the cylindrical obstacles, the robot will then throw the ping-pong into the basket. If the ping-pong is dropped off, the robot may pick it up or return to the water tank and get another ping-pong.
4. Maximum game time is 5 minutes. Robots that cannot complete the game would be recorded as 5 minutes game time.
5. Players cannot touch their robot or steer it by pulling the control wire during the competition. 10 seconds would be added for each offence.
6. Each team can play twice and the best time will be recorded.

6. Hand Generator Robot Backstroke Swimming Competition

Students are required to make a single motor robot which can simulate the backstroke swimming action by applying mechanical principles.

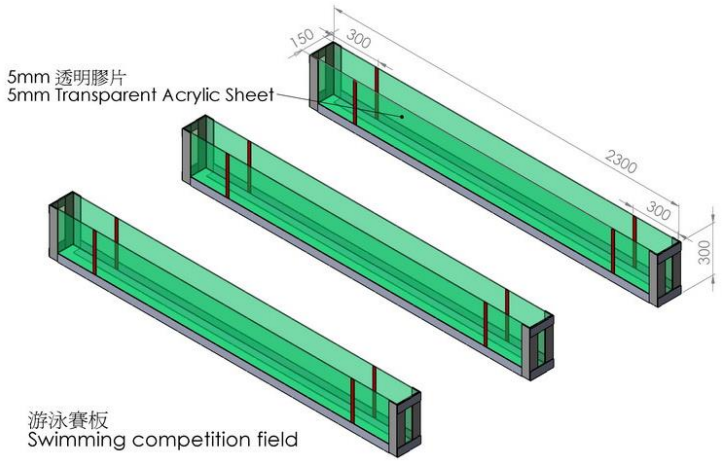
Robot Specification



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 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. The size of the robot cannot exceed 300mm long, 150mm wide and180mm tall. The hand cannot be less than 70mm long and the leg cannot be less than 100mm long. 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. Except a body and four limbs, the robot should not have any additional supporters nor floating objects.
4. The robot must complete the game in backstroke swimming action with both hands 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 starting area is 300mm long. A timer is placed at end of the runway.



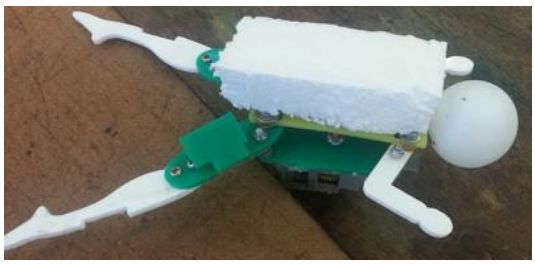
Game Rules

1. Each team can play twice and the best time will be recorded. The shortest time to complete is the winner.
2. Contestants must use the Hand Generator provided by the Organizer to supply power to the robot. Pulling the wire of hand generator is prohibited.
3. The wire of Hand generator is long enough so that the contestants must stay behind at the starting area. Moving along the field with the robot is prohibited.
4. Once the game begins, the contestants cannot touch the robot until it reaches the acrylic board at the end of the runway. The maximum game time is 30 seconds.

7. Hand Generator Robot Breaststroke Swimming Competition

Students are required to make a single motor robot which can simulate the breaststroke swimming action by applying mechanical principles.

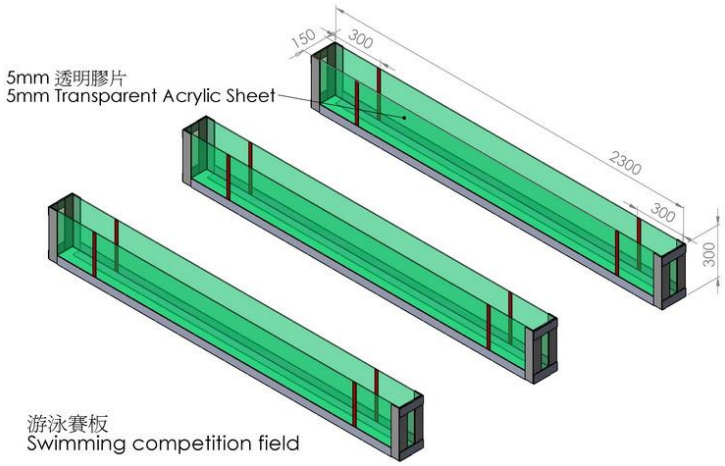
Robot Specification



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 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. The size of the robot cannot exceed 300mm long, 150mm wide and 180mm tall. The hand cannot be less than 70mm long and the leg cannot be less than 100mm long. A ping-pong should 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. Except a body and four limbs, the robot should not have any additional supporters nor floating objects.
4. The robot must complete the game in breaststroke swimming action with both hands 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 starting area is 300mm long. A timer is placed at end of the runway.



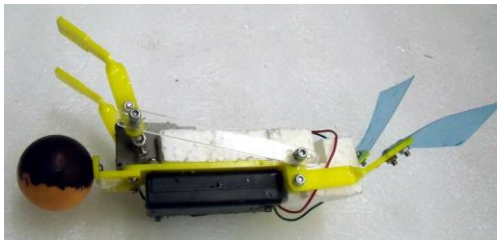
Game Rules

1. Each team can play twice and the best time will be recorded. The shortest time to complete is the winner.
2. Contestants must use the Hand Generator provided by the Organizer to supply power to the robot. Pulling the wire of hand generator is prohibited.
3. The wire of Hand generator is long enough so that the contestants must stay behind at the starting area. Moving along the field with the robot is prohibited.
4. Once the game begins, the contestants cannot touch the robot until it reaches the acrylic board at the end of the runway. The maximum game time is 30 seconds.

8. Hand Generator Robot Butterfly Stroke Swimming Competition

Students are required to make a single motor robot which can simulate the butterfly stroke swimming action by applying mechanical principles.

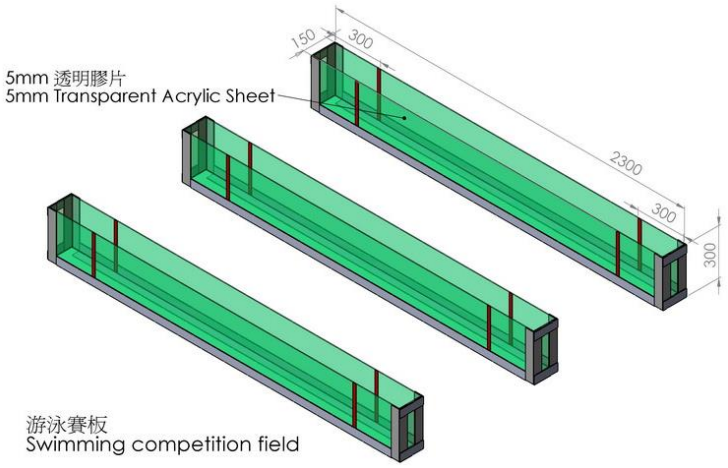
Robot Specification



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 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. The size of the robot cannot exceed 300mm long, 150mm wide and 180mm tall. The hand cannot be less than 70mm long and the leg cannot be less than 100mm long. A ping-pong should 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. Except a body and four limbs, the robot should not have any additional supporters nor floating objects.
4. The robot must complete the game in butterfly stroke swimming action with both hands 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 starting area is 300mm long. A timer is placed at end of the runway.



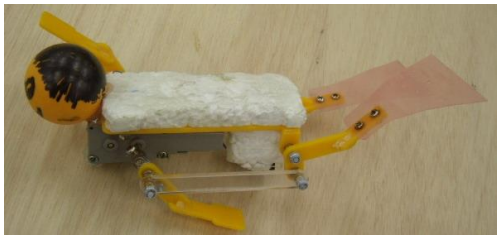
Game Rules

1. Each team can play twice and the best time will be recorded. The shortest time to complete is the winner.
2. Contestants must use the Hand Generator provided by the Organizer to supply power to the robot. Pulling the wire of hand generator is prohibited.
3. The wire of Hand generator is long enough so that the contestants must stay behind at the starting area. Moving along the field with the robot is prohibited.
4. Once the game begins, the contestants cannot touch the robot until it reaches the acrylic board at the end of the runway. The maximum game time is 30 seconds.

9. Hand Generator Robot Freestyle (front crawl) Swimming Competition

Students are required to make a single motor robot which can simulate the front craw swimming action by applying mechanical principles.

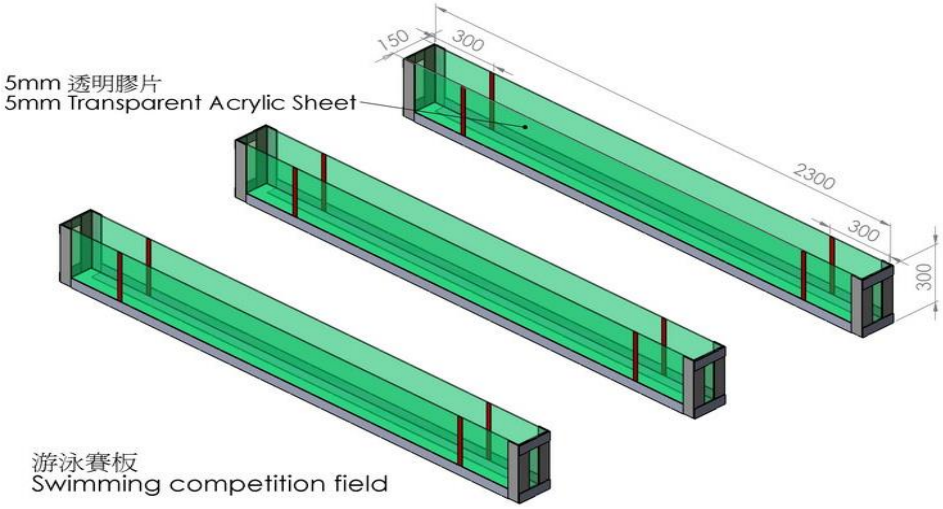
Robot Specification



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 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 Hand Generator.
2. The size of the robot cannot exceed 300mm long, 150mm wide and 180mm tall. The hand cannot be less than 70mm long and the leg cannot be less than 100mm long. A ping-pong should 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. Except a body and four limbs, the robot should not have any additional supporters nor floating objects.
4. The robot must complete the game in freestyle swimming action with both hands 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 starting area is 300mm long. A timer is placed at end of the runway.



Game Rules

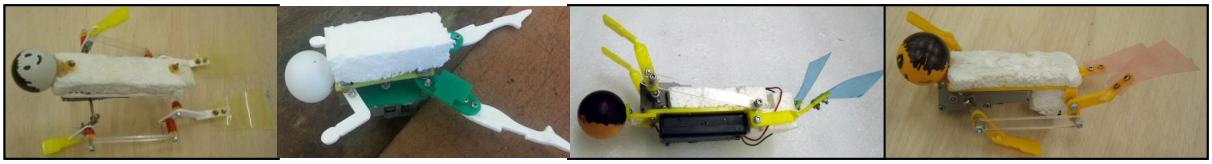
1. Each team can play twice and the best time will be recorded. The shortest time to complete is the winner.
2. Contestants must use the Hand Generator provided by the Organizer to supply power to the robot. Pulling the wire of hand generator is prohibited.
3. The wire of Hand generator is long enough so that the contestants must stay behind at the starting area. Moving along the field with the robot is prohibited.
4. Once the game begins, the contestants cannot touch the robot until it reaches the acrylic board at the end of the runway. The maximum game time is 30 seconds.

10. Hand Generator Robot Medley Relay Swimming Competition

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

Robot Specification

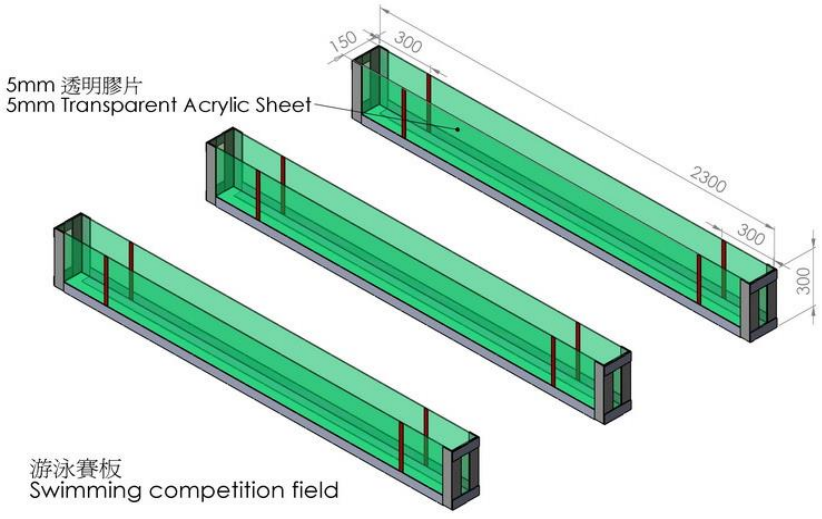
1. Each robot operates only with one motor which must be beneath the water surface when the robot is swimming in the water. Contestants must use the Hand Generator provided by the Organizer to supply power to the robot. Hence the robot must be equipped with a 2.1mm socket for connection to the Hand Generator.
2. The size of the robot cannot exceed 300mm long, 150mm wide and 180mm tall. The hand cannot be less than 70mm long and the leg cannot be less than 100mm long. A ping-pong should 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. Except a body and four limbs, the robot should not have any additional supporters nor floating objects.
4. The robots must complete the game consists of four different strokes with both hands and legs. The four strokes are performed in the order of: Backstroke, Breaststroke, Butterfly stroke and Freestyle(front crawl). No propeller can be used.
5. 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 starting area is 300mm long. A timer is placed at end of the runway.



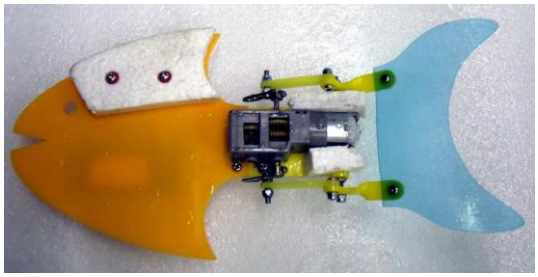
Game Rules

1. Each team composed of four different swimming styles robot swimmers. Two Hand Generators will be given to each team.
2. The game is performed in the order of: Backstroke, Breaststroke, Butterfly stroke and Freestyle.
3. Each team has two team members at the starting and finish point respectively. A Hand Generator will be provided to each team at the starting and finish points. The wire of Hand generator is long enough so the contestants must remain at their original position. Moving along the field with the robot is prohibited.
4. Upon the Referee's signal to start the game, contestants may start to operate the 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 finish point 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 hand generator plugged on the Backstroke Swimming Robot will be unplugged and pulled back for preparing the Butterfly Stroke Swimming Robot at the starting point. When the Breaststroke Swimming Robot finishes its part, the game is continued by Butterfly Stroke Swimming Robot. The wire of the hand generator plugged on the Breaststroke Swimming Robot will be unplugged and pulled back for preparing the Freestyle Swimming Robot. When all four robots have completed the game, the total time will be counted. The team with the least time is the winner.
5. 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.

11. 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 which can simulate the fish swimming action (vertical style) by applying mechanical principles.

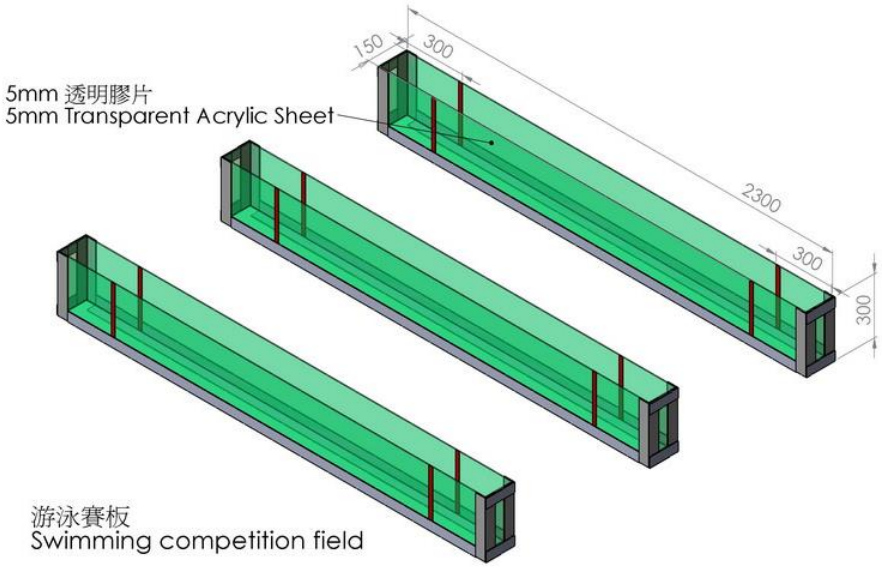
Robot Fish Specification



1. The robot fish operates only with one motor. Contestants must use the 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. The size of the robot fish cannot exceed 300mm long, 150mm wide and180mm tall.
3. The robot fish must complete the game in fish swimming action (vertical style). 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 starting area is 300mm long. A timer is placed at end of the runway.



Game Rules

1. Each team can play twice and the best time will be recorded. The shortest time to complete is the winner.
2. Contestants must use the Hand Generator provided by the Organizer to supply power to the robot. Pulling the wire of hand generator is prohibited.
3. The wire of Hand generator is long enough so that the contestants must stay behind at the starting area. Moving along the field with the robot is prohibited.
4. Once the game begins, the contestants cannot touch the robot fish until it reaches the acrylic board at the end of the runway. The maximum game time is 30 seconds.

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

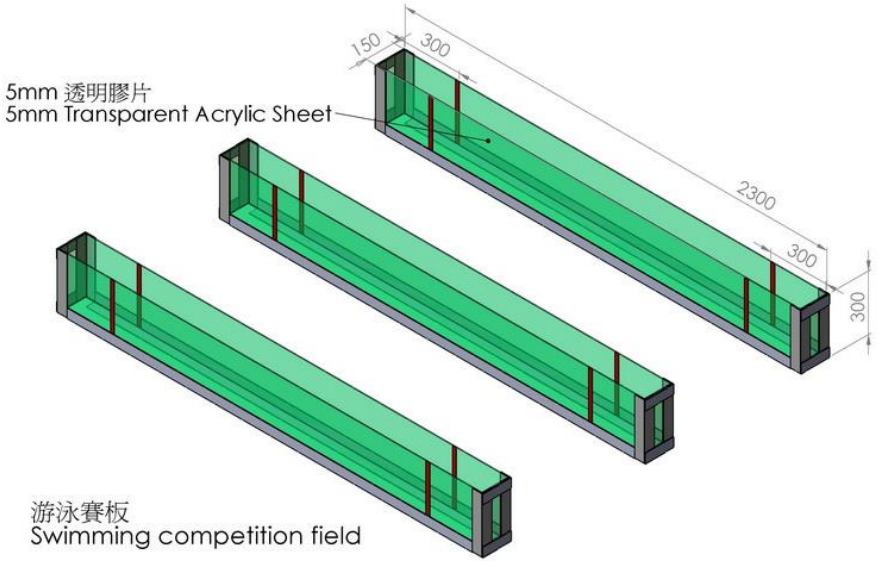
There are a wide variety of marine organisms with numerous kinds of fishes in the ocean. Their swimming style may be different from one another. Students are required to make a single motor robot fish which can simulate the fish swimming action (Horizontal style) by applying mechanical principles.

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. The size of the robot fish cannot exceed 300mm long, 150mm wide and180mm tall.
3. The robot fish must complete the game in fish swimming action (horizontal style). 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 starting area is 300mm long. A timer is placed at end of the runway.



Game Rules

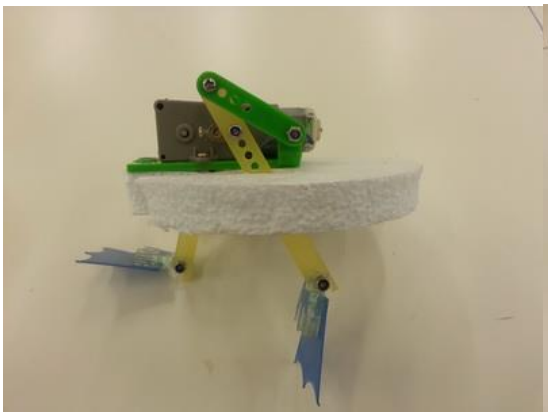
1. Each team can play twice and the best time will be recorded. The shortest time to complete is the winner.
2. Contestants must use the Hand Generator provided by the Organizer to supply power to the robot. Pulling the wire of hand generator is prohibited.
3. The wire of Hand generator is long enough so that the contestants must stay behind at the starting area. Moving along the field with the robot is prohibited.
4. Once the game begins, the contestants cannot touch the robot fish until it reaches the acrylic board at the end of the runway. The maximum game time is 30 seconds.

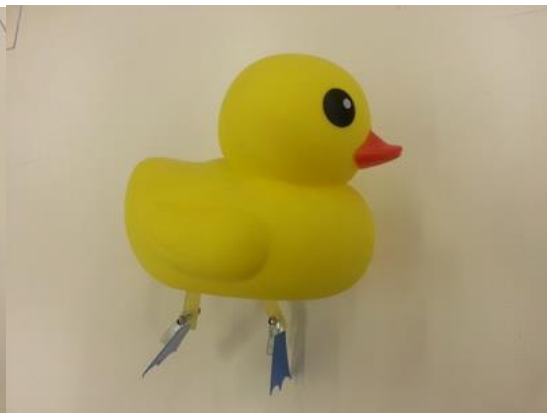
13. Hand Generator Robot Duck Short Distance Swimming Competition

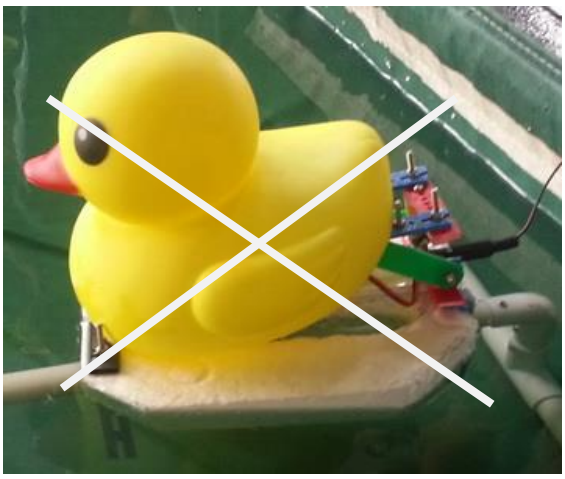
Ducks swim with two webbed feet in the water. Students apply simple mechanical principle to make robot duck that simulates the ducks swimming action.

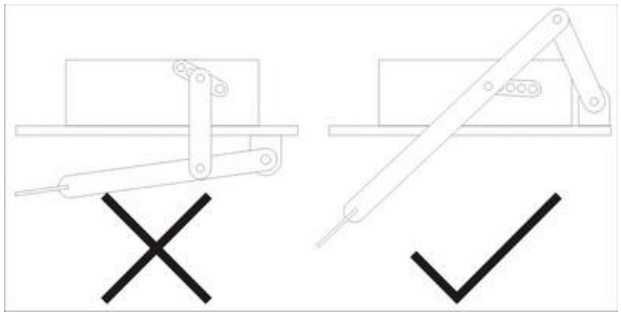
Robot Specification

1. The robot duck operates only with one motor. Contestants must use the Hand Generator provided by the Organizer to supply power to the robot duck. Hence the robot duck must be equipped with a 2.1 mm socket for connection to the Hand Generator.
2. The robot duck must have a yellow plastic case as shown in the diagram and the total dimension of the robot duct 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.







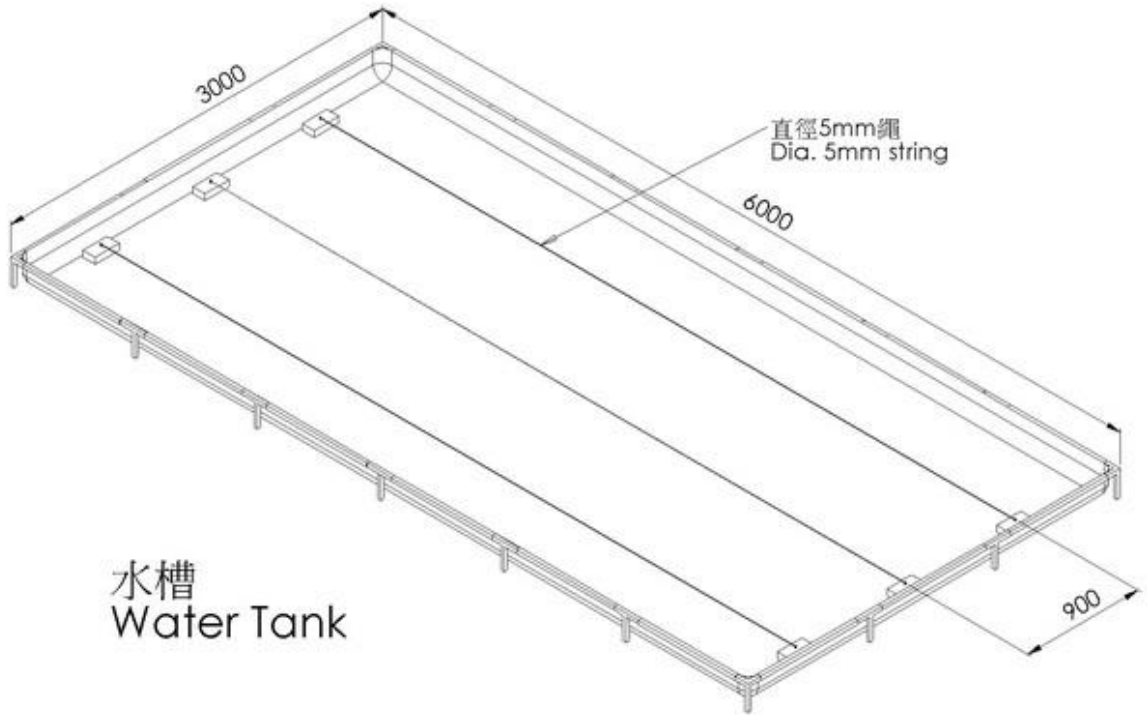


Floating material should be installed inside the body.

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 ±10mm deviation , beneath water surface to form a fixed rowing track.



Game Rules

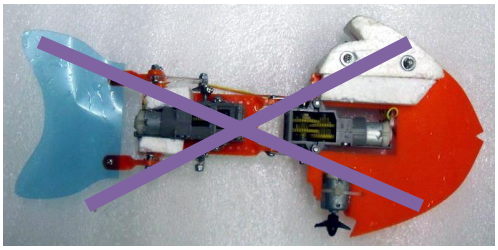
1. Each team can play twice and the best time will be recorded. The shortest time to complete is the winner.
2. Contestants must use the Hand Generator provided by the Organizer to supply power to the robot duck. Pulling the wire of hand generator is prohibited.
3. Contestants can move along behind the robot duck.
4. The robot duck is to be placed with its poop against the side of the starting area before the game starts. The game is considered completed once the front part of the robot duck touches the rim of the finish area and the time is recorded.
5. Once the game begins, the contestants cannot touch the robot duck. The maximum game time is 60 seconds.

14. Wired Control Robot Fish Obstacle Avoidance 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 robot fish which can simulate the fish swimming action by applying mechanical principles. The robot fish is required to navigate among obstacles. This game tests the ultimate performance of the robots as well as the navigation control ability of the players.

Robot Fish Specification

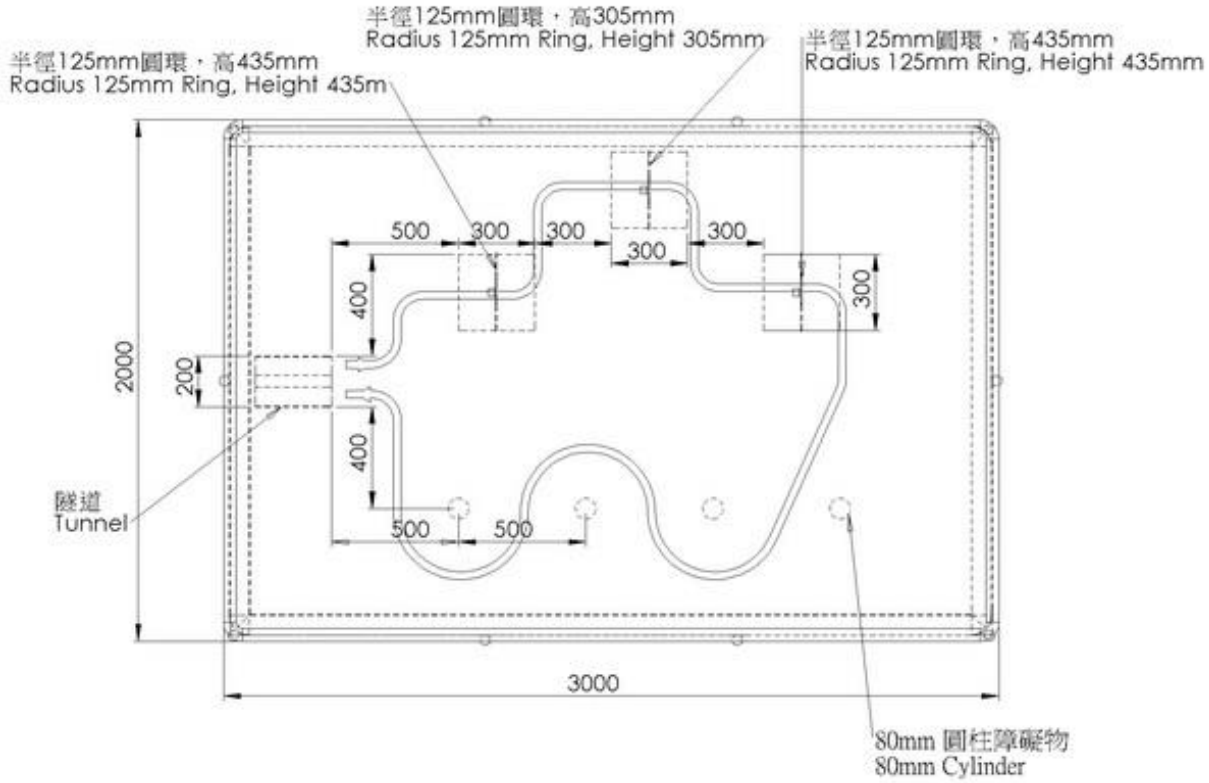
1. The robot fish when fully stretched cannot exceed 300mm (Length) x 200mm (Width) x 240mm (Height).
2. No restriction on the quantity of actuators (motor, gear box, servo mechanism, propeller) on the robot. All participating robots must use Tamiya70093 gear box (203.7:1, 58.2:1, 16.6:1) and its matching 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.

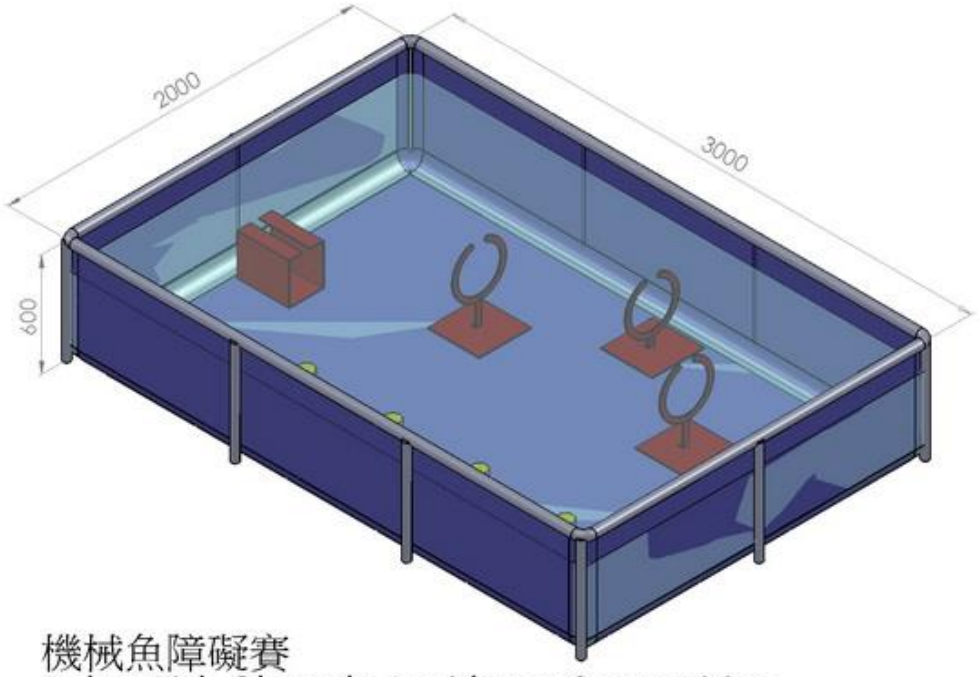


3. The robot fish must complete the game in fish swimming action. No propeller is allowed to be used for floating nor sinking function. Instead a device can be installed for the purpose of controlling the centre of gravity of the robot fish by moving a heavy weight back and forth causing the robot fish to tilt upward or downward. As a result driving the robot fish to swim upward or downward.
   The robot fish is controlled by wired manual controller. No more than 8 pieces of 1.5V 2A size batteries can be used to drive the actuators and catcher and NO additional energy installment can be made. Contestants must use the batteries provided by the Organizer (batteries are prepared by contestants for the Hong Kong region competition) to supply power to the robot fish.

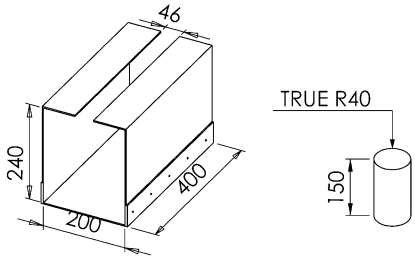
Game Field Specification

The playing field is a water tank of 3000mm (Length) x 2000mm (Width) x 600mm (Height), filled with water to 450mm deep (as shown in the figures below).



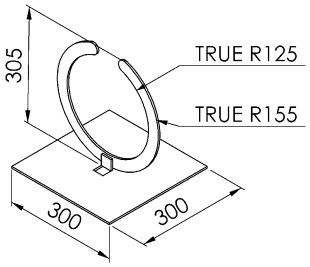


機械魚障礙賽
Robot Fish Obstacle Avoidance Competition

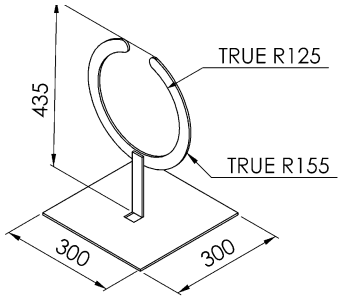


隧道
Tunnel

圓柱障礙物
Cylinder



半徑125mm圓環，高305mm
Radius 125mm Ring, Height 305mm



半徑125mm圓環，高435mm
Radius 125mm Ring, Height 435mm

Game Rules

1. Contestants must use the batteries provided by the Organizer (batteries are prepared by contestants for the Hong Kong region competition) to supply power to the robot fish. Pulling the wire of controller is prohibited.
2. The robot fish is placed at the starting area inside the tunnel. The robot fish can be started after the Referee gave the signal and timer begins.
3. The robot fish must finish the game by following the designated path. It should first swim through the tunnel, bypass the 3 rings of different height. It then turns and, bypassing 4 cylinders. Once the whole body of robot fish swims completely into the second tunnel, the timer is stopped and the time will be recorded.
4. The maximum game time is 3 minutes. If the robot fish cannot complete the game, a 3 minutes game time is recorded as well its completed distance.
5. Each team can play twice and the best time will be recorded. The shortest time to complete is the winner.

15. Wireless Control Servo Motor Robot Fish Obstacle Avoidance Competition

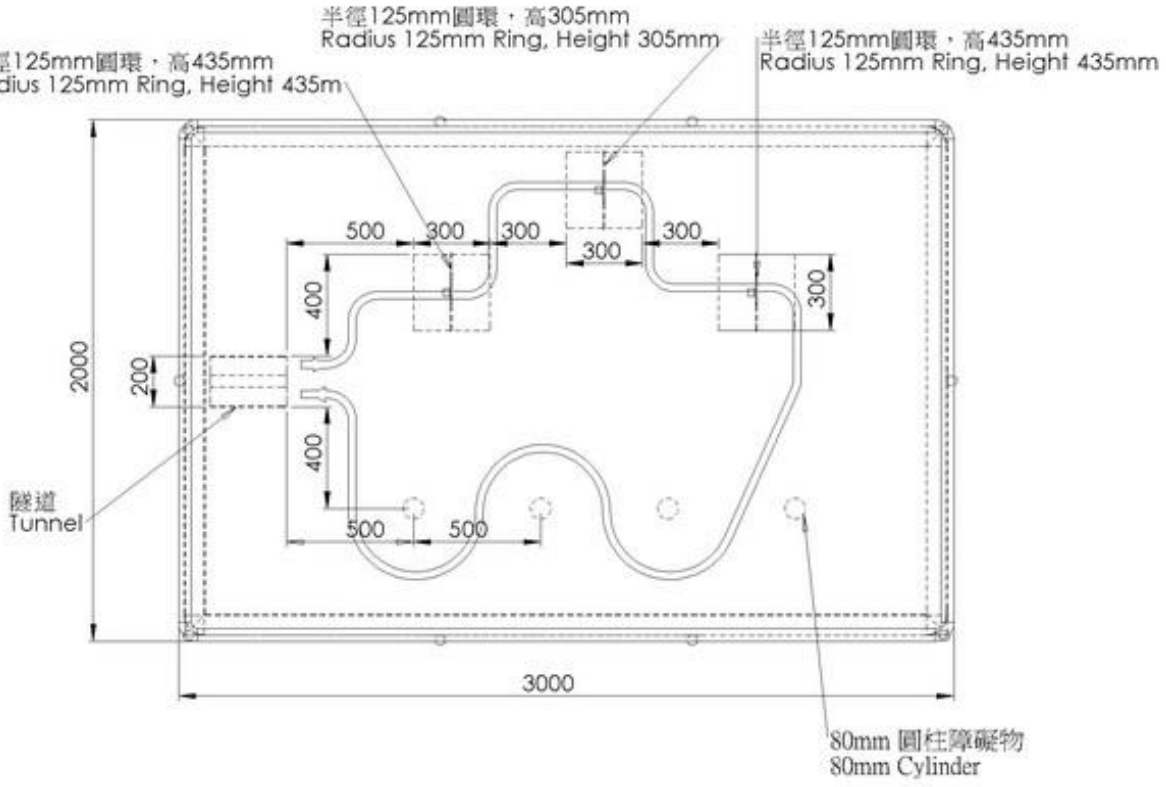
There are a wide variety of marine organisms with numerous kinds of fishes in the ocean. Their swimming style may be different from one another. Students are required to make a robot fish which can simulate the fish swimming action by applying mechanical principles. The robot fish is required to navigate through obstacles. This game tests the ultimate performance of the robots as well as the navigation ability of the players.

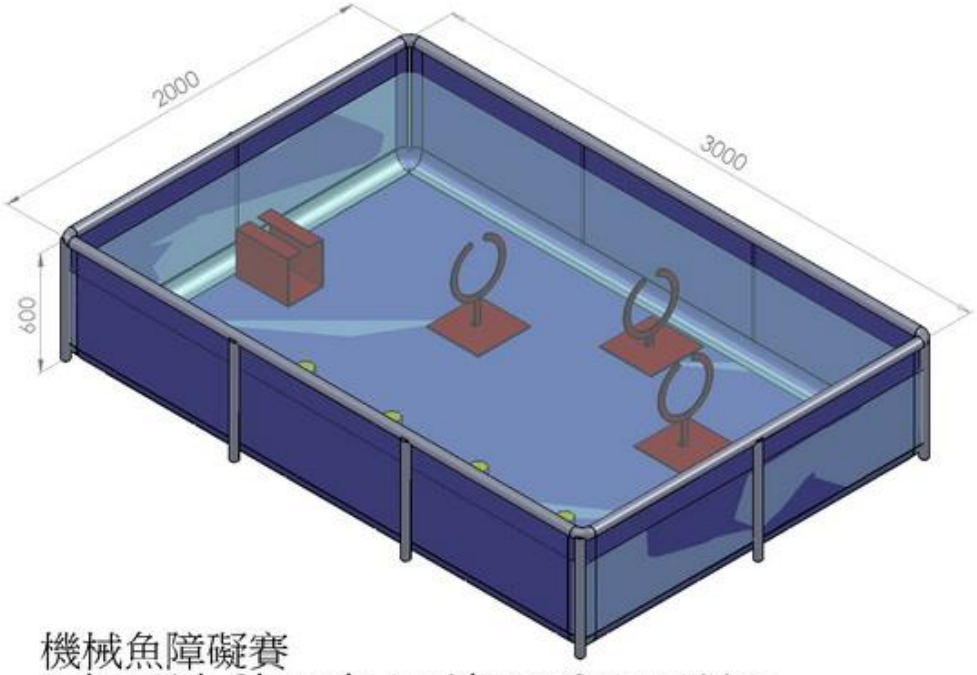
Robot Fish Specification

1. The robot fish when fully stretched cannot exceed 400mm (Length) x 200mm (Width) x 240mm (Height).
2. The robot fish operates only with servo motors. No restriction on the quantity of servo motor.
3. The robot fish must complete the game in fish swimming action. No propeller is allowed to use for floating and sinking function. Instead a device is installed for the purpose of controlling the centre of gravity of the robot fish by moving a heavy weight back and forth causing the robot fish to tilt upward or downward. As a result driving the robot fish to swim upward or downward.
4. The robot fish is controlled by wireless controller. Contestants are to prepare their own batteries.

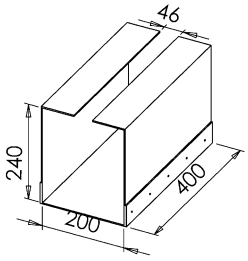
Game Field Specification

The playing field is a water tank of 3000mm (Length) x 2000mm (Width) x 600mm (Height), filled with water to 450mm deep (as shown in the figures below).

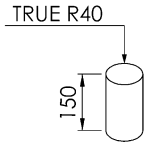




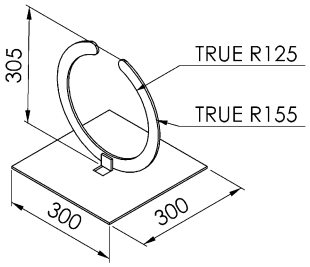
機械魚障礙賽
Robot Fish Obstacle Avoidance Competition



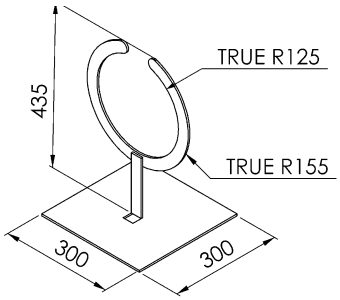
隧道
Tunnel



圓柱障礙物
Cylinder



半徑125mm圓環，高305mm
Radius 125mm Ring, Height 305mm



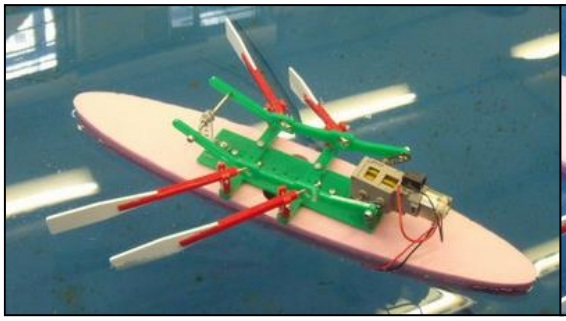
半徑125mm圓環，高435mm
Radius 125mm Ring, Height 435mm

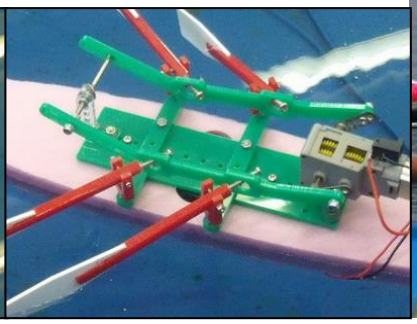
Game Rules

1. The robot fish is placed at the starting area inside the tunnel. The robot fish can be started after the Referee gave the signal and timer begins.
2. The robot fish must finish the game by following the designated path. It first swims through the tunnel, bypasses the 3 rings of different height. It then turns and, bypassing 4 cylinders. Once the whole body of robot fish swims completely into the second tunnel, the timer is stopped and the time will be recorded.
3. The maximum game time is 3 minutes. If the robot fish cannot complete the game, a 3 minutes game time is recorded as well its completed distance.
4. Each team can play twice and the best time will be recorded. The shortest time to complete is the winner.

16. Hand Generator Four-Oar Robot Boat Competition

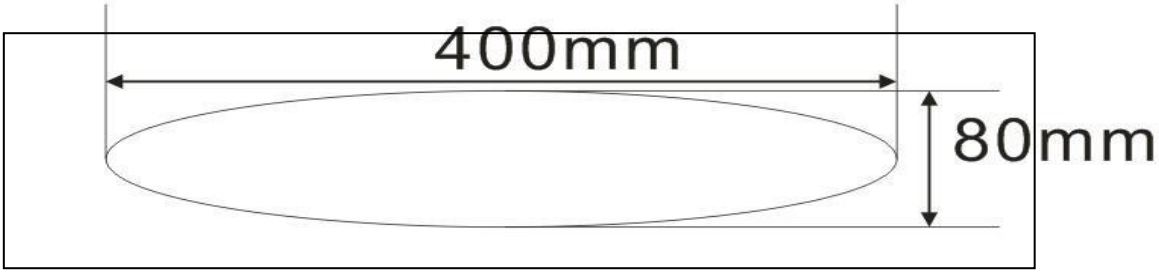
Rowing competition is one of the Olympic sports as well as an annual event held by Cambridge University and Oxford University. Participants are required to design and make a four-oar rowing robot boat.





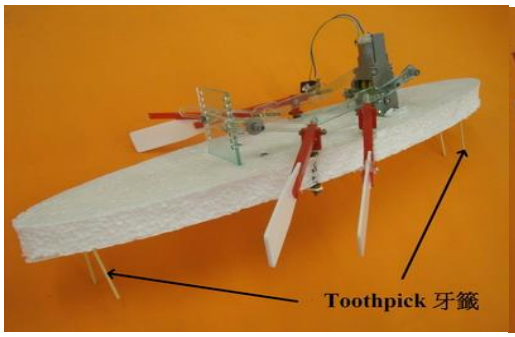
Robot Boat Specification

1. The robot boat operates only with one motor. Contestants must use the 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 Generator.
2. The total size of the robot boat (including the robot, 4 oars and the boat) cannot be exceed 400 mm long, 400 mm wide, and 240mm tall. The entire robot boat (excluding four oars and supporters) must be able to pass through a 400 mm long, 80 mm wide oval shape template (as shown below). Catamaran is not allowed.

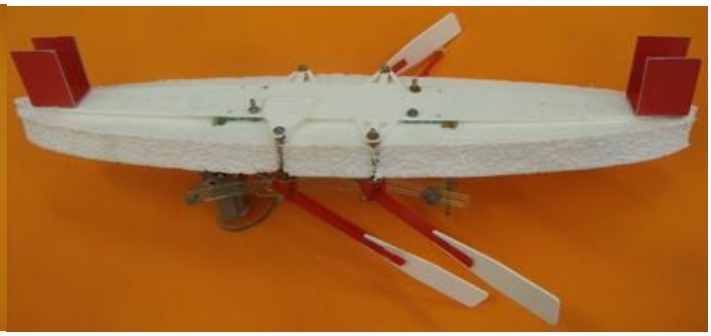


Oval shape template

3. The robot boat paddles with all 4 four 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.



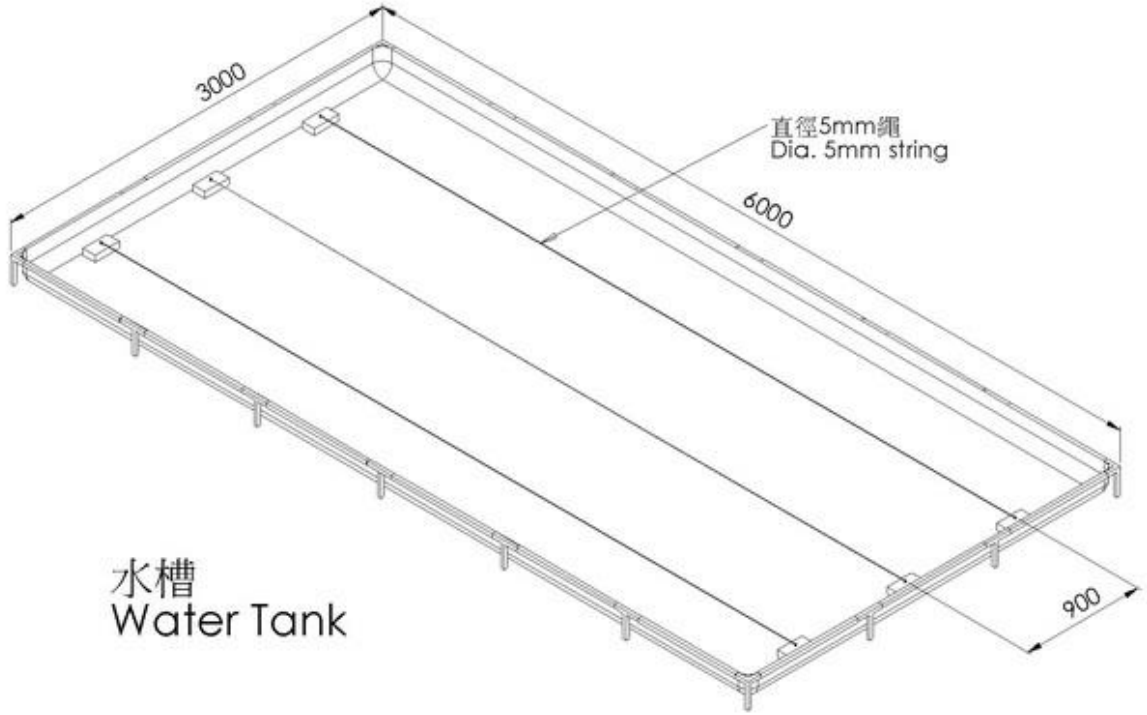
Guiding nylon rope 1



Guiding nylon rope 2

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 ±10mm deviation, beneath water surface to form a fixed rowing track.



Game Rules

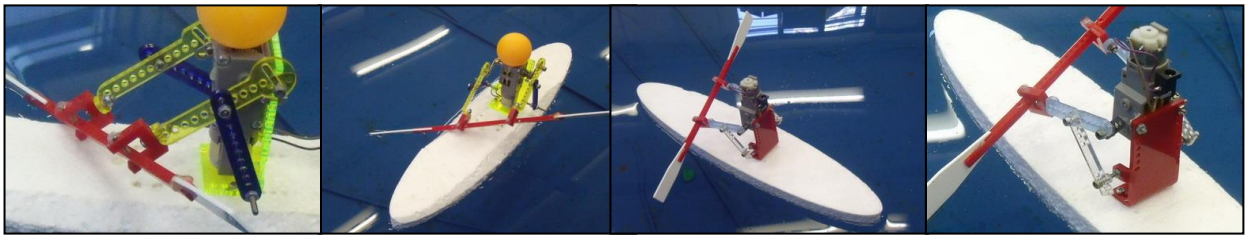
1. Each team can play twice and the best time will be recorded. The shortest time to complete is the winner.
2. Contestants must use the Hand Generator provided by the Organizer to supply power to the robot boat. Pulling the wire of hand generator is prohibited.
3. Contestants can move along behind the robot boat.
4. The poop of the robot boat is to be placed against the side of the starting area before the game starts. The game is considered completed once the bow of the robot boat touches the rim of the finish area and the time is recorded.
5. Once the game begins, the contestants cannot touch the robot boat. The maximum game time is 60 seconds.

17. Hand Generator Robot Canoe Competition

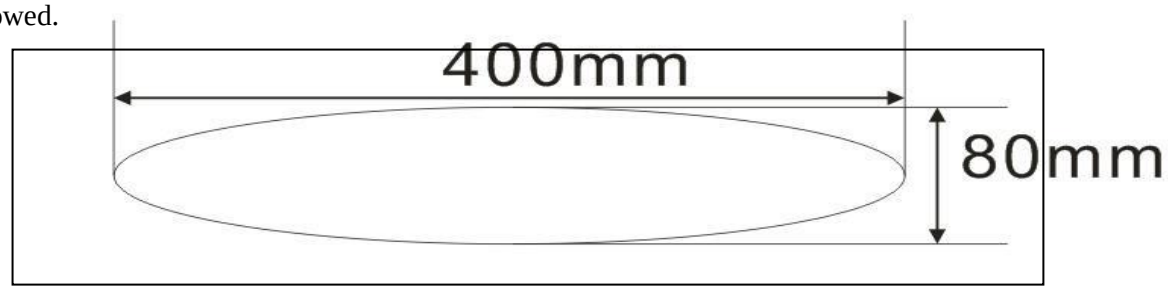
In the ancient time, men already knew to hollow a tree trunk to make a canoe to commune on the water. Participants are required to design and make a Single-Oar robot canoe.

Robot Canoe Specification

1. The robot canoe operates with only one motor. Contestants must use the Hand Generator provided by the Organizer to supply power to the robot canoe. Hence the robot canoe must be equipped with a 2.1 mm socket for connection to the Hand Generator.

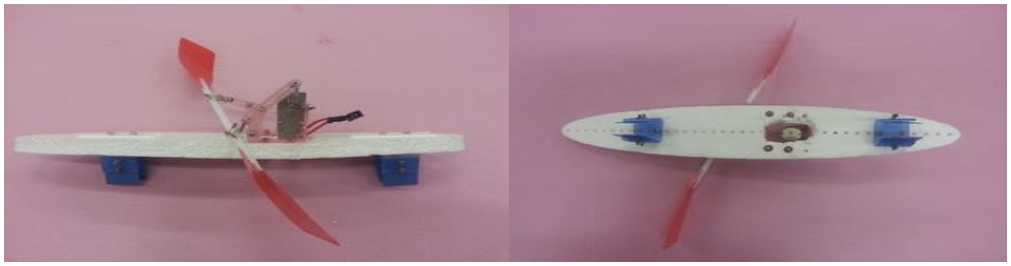


2. The total size of the robot canoe (including the robot, the oar and the canoe) cannot exceed 400 mm long, 400 mm wide, 240mm tall. The entire robot canoe (excluding the oar and supporters) must be able to pass through a 400 mm long, 80 mm wide oval shape template (as shown below). Catamaran is not allowed.



Oval shape template

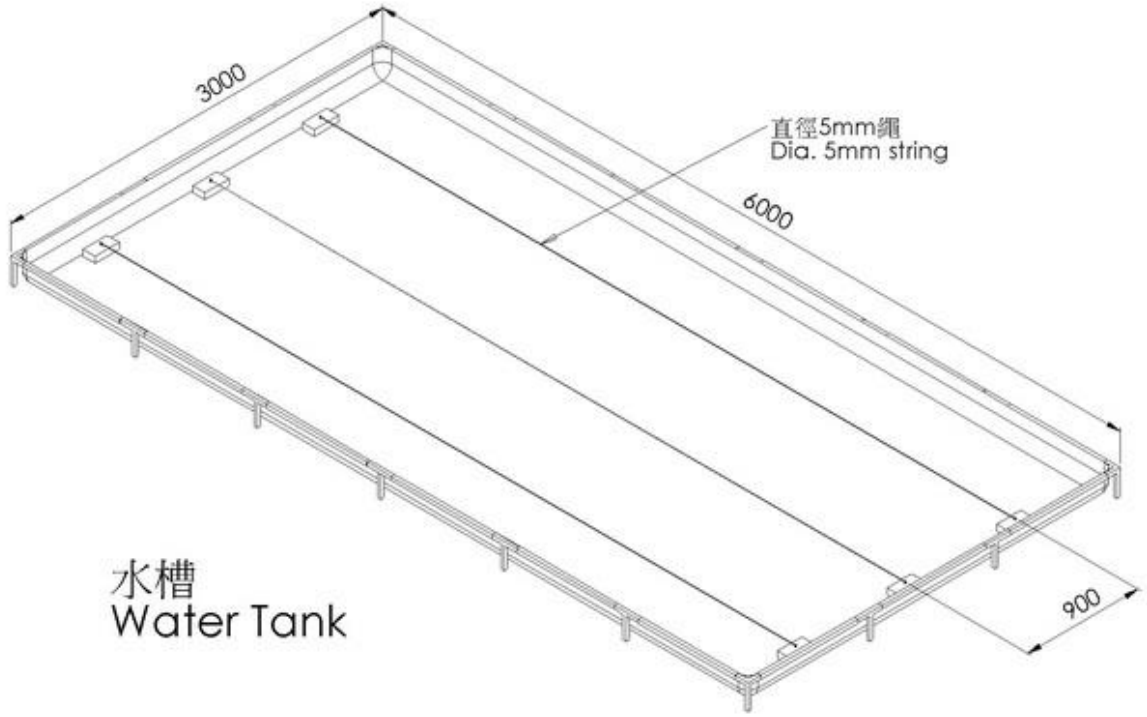
3. Robot canoe advances in a canoe moving pattern. No propeller can be used. No device can be used to hold the oar except hands.
4 A device should be installed at the bottom of the canoe for a 5mm diameter guiding nylon rope to pass through.



Guiding nylon rope device

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 ±10mm deviation, beneath water surface to form a fixed rowing track.



Game Rules

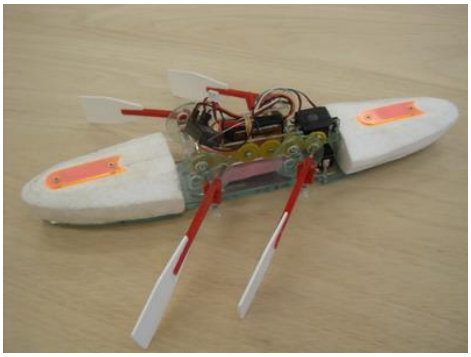
1. Each team can play twice and the best time will be recorded. The shortest time to complete is the winner.
2. Contestants must use the Hand Generator provided by the Organizer to supply power to the robot canoe. Pulling the wire of hand generator is prohibited.
3. Contestants can move along behind the robot canoe.
4. The robot canoe is to be placed with its poop against the side of the starting area before the game starts. The game is considered completed once the bow of the robot canoe touches the rim of the finish area and the time is recorded.
5. Once the game begins, the contestants cannot touch the robot canoe. The maximum game time is 60 seconds.

18. Wireless Control Servo Motor Four-Oar Robot Boat Obstacle Avoidance Competition

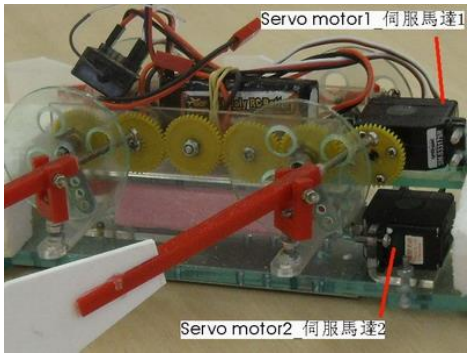
This match is to test the robot control ability of the players. Several obstacles are placed in the playing field and the contestants are required to make a four-oar robot boat bypassing all the obstacles using wireless control.

Robot Boat Specification

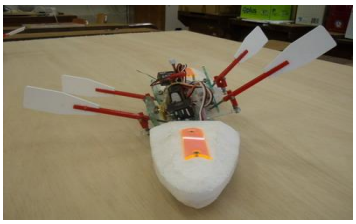
1. The robot boat operates only with two servo motors. One servo motor is to drive the four oars paddle simultaneously and the other one is to drive the upper part of the robot boat to paddle sideways to make turns. No propeller or rudder can be used.
2. The robot boat is controlled by wireless controller. Contestants are to prepare their own batteries.
3. The total volume of the robot boat (including the robot, four oars and the boat) cannot exceed 400 mm long, 400 mm wide and 240mm tall. The standard size of the robot canoe is 400 mm long, 80 mm wide. There is no weight limit. Catamaran is not allowed.



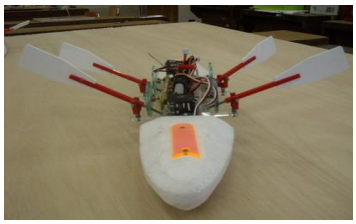
Servo motor 1: for backwards and forwards movements



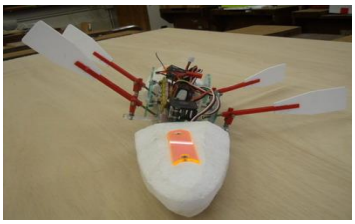
Servo motor 2: for left or right turns



Sway to left



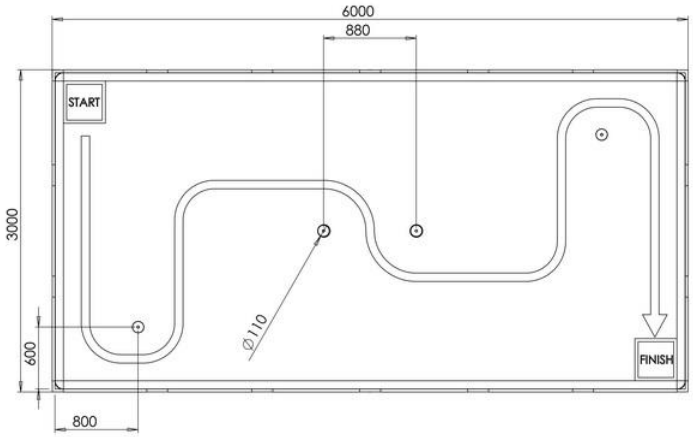
backwards and forwards movements

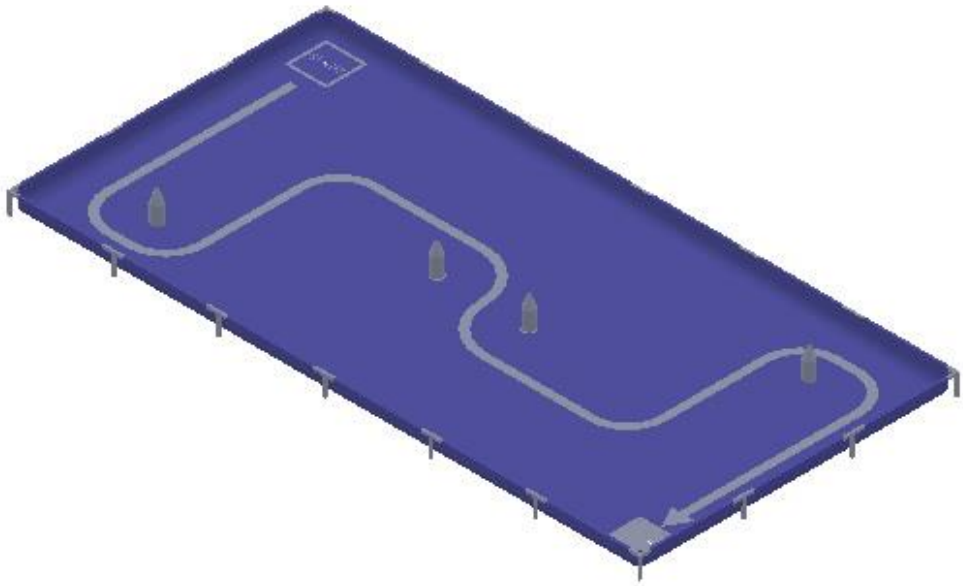


Sway to right

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. The obstacle is a 1.25L soft drink plastic bottle of 110 mm in diameter.





Game Rules

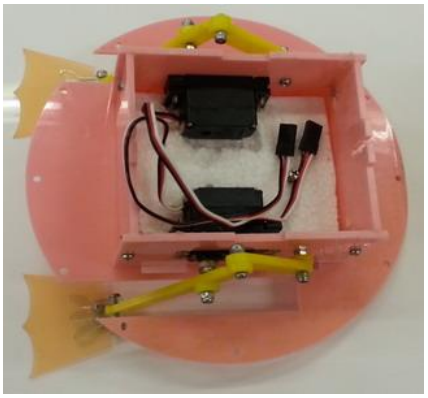
1. The robot boat is placed at the “START” position. When the judge signals start of the game, the timer begins to count the time.
2. The robot boat has to follow the designated route. Players can pick up and place back the robot boat where it overturned or sunk during the course and continue to play but the timer will not pause.
3. Each player will be awarded 100 scores before the game starts. Players cannot touch the robot boat once the game begins. 20 scores will be deducted for each touching. The robot boat has to stop the game once all 100 scores are deducted.
4. The game is considered completed once the robot boat touches the rim of the finish area and the finish time is recorded.
5. The maximum game time is 5 minutes. If the robot boat cannot complete the game, a 5 minutes game time is recorded as well as its completed distance.
6. Each team can play twice and the best time will be recorded. The shortest time to complete is the winner.

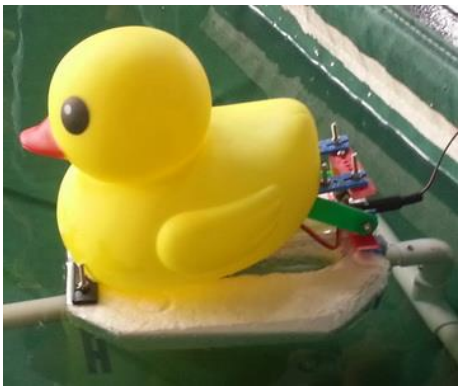
19. Wireless Control Servo Motor Robot Duck Obstacle Avoidance Competition

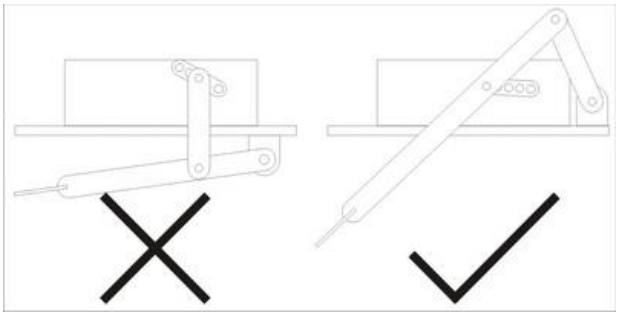
Ducks swim with two webbed feet in the water. Students apply simple mechanical principle and servo motors to make a robot duck that simulates ducks swimming action. In order to test the participants' robot control ability, a number of obstacles are placed in the field. Participants should use wireless controller to control the robot duck to navigate along the designated route by passing all the obstacles.

Robot Specification

1. The robot duck operates only with two servo motors. The robot duck paddles with two webbed feet. No propeller can be used.
2. The robot duck must have a yellow plastic case and the total dimension of the robot duct cannot exceed 250 mm long, 160 mm wide and 250mm 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 controlled by wireless controller. Contestants are to prepare their own batteries.





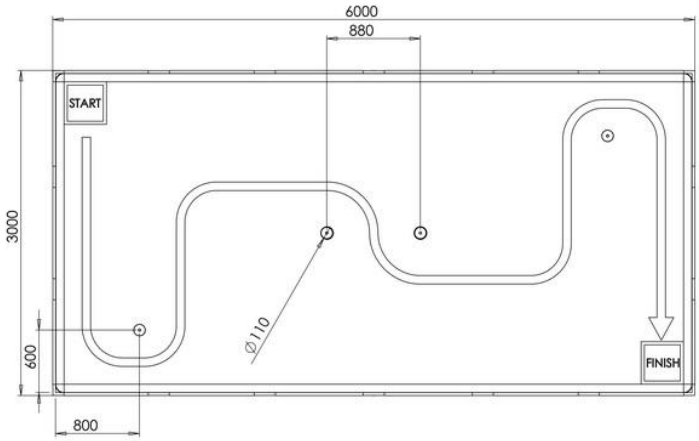


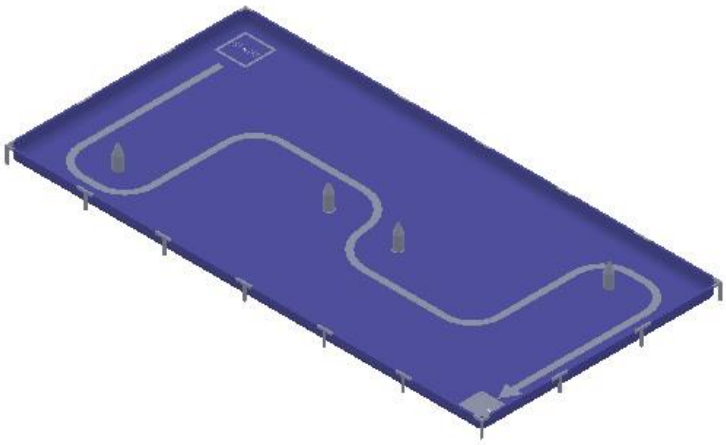
Floating material should be installed inside the body.

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. The obstacle is a 1.25L soft drink plastic bottle of 110 mm in diameter.





Game Rules

1. The robot duck is placed at the "START" position. Upon the judge's signal to start the game, the timer begins to count.
2. The robot duck has to follow the designated route. Players can pick up and place back the robot duck where it overturned or sunk during the course and continue to play but the timer will not pause.
3. Each player will be awarded 100 scores before the game starts. Players cannot touch the robot duck once the game begins. 20 scores will be deducted for each touching. The robot duck has to stop the game once all 100 scores are deducted.
4. The game is considered completed once a robot duck touches the rim of the finishing area and the finishing time is recorded.
5. The maximum game time is 5 minutes. If the robot duck cannot complete the game, a 5 minutes game time is recorded as well as its completed distance.
6. Each team can play twice and the best time will be recorded. The shortest time to complete is the winner.