International Robotic Olympiad 2016

Land-based Robot 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 over two sets of motor-gear boxes, but only two sets of them 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

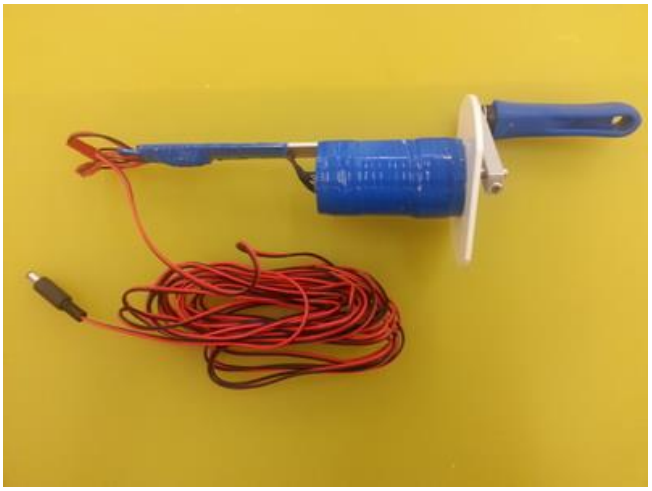
8. All participating robots may only move in walking mode except the worm robot.
9. Except for the servo motor robot group, all participating robots must use Tamiya70093 gear box (203.7:1, 58.2:1, 16.6:1) and its matching motor for competition. The gear ratio may only be adjusted in accordance to the 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 centre 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. 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.
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 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", more than one student contestants are allowed to operate the hand generator. They can change at any time.
18. Pneumatic device cannot be used.

Other Points to Note

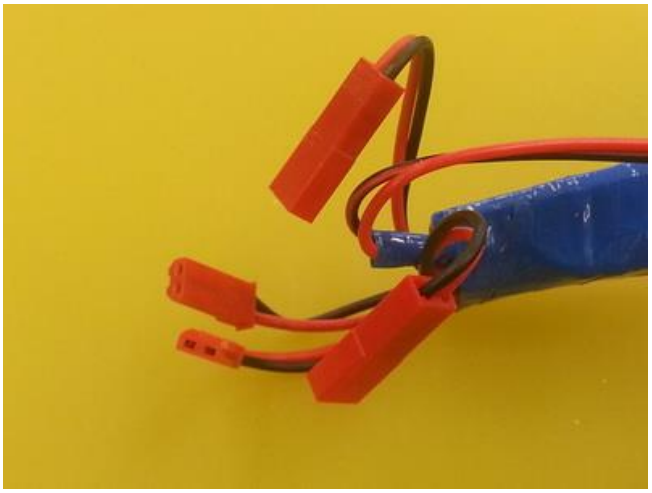
19. Hand generators (attachment 1) and batteries provided by the Organizer should only be used in the national competition. (Batteries will be prepared by contestants in regional competition.)
20. Registration number of the robot must be engraved or printed with permanent ink on its chassis.
21. The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

Hand Generator

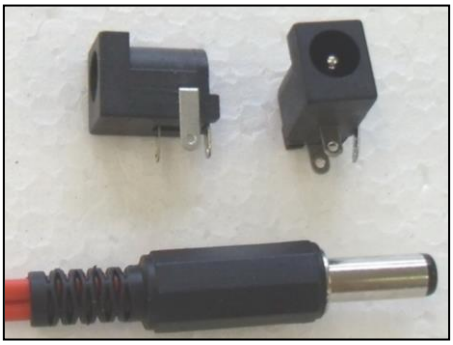
Attachment 1



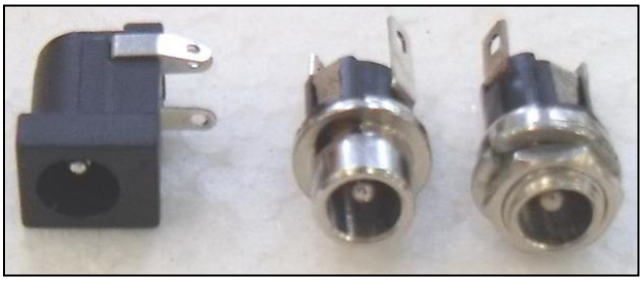
24V 350rpm Hand Generator



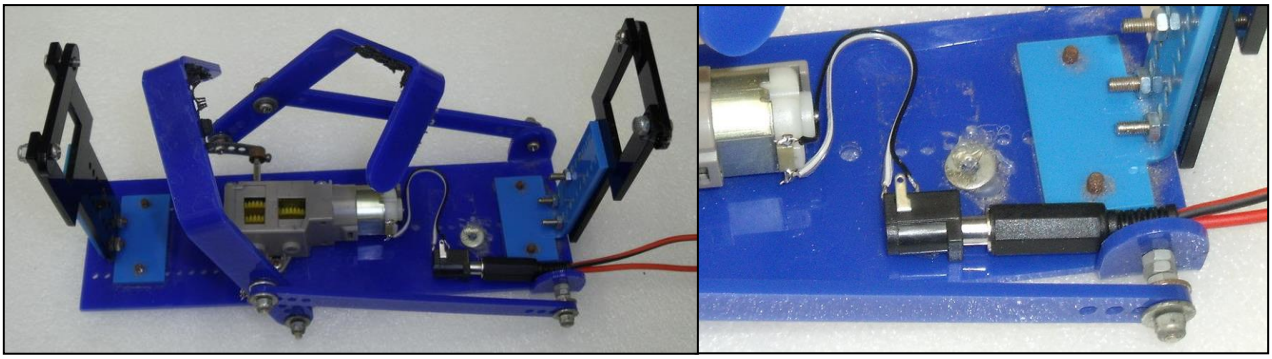
Exchange the plugs to change the polarity and turning direction of handle



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 Game Rules

Category A: Single Motor Robot (for students at Junior Secondary 2 or below)

1. Hand Generator 2 Legs Robot Short Distance Run Competition
2. Robot Horse Relay Competition
3. Hand Generator Robot Sled Race
4. Hand Generator Triathlon Robot Relay Competition
5. Hand Generator Single Motor Robot Appearance Design Competition
6. Hand Generator Worm Robot Short Distance Run Competition
7. Hand Generator Worm Robot Appearance Design Competition

Category B: Multi-Motor Robot (for students at Senior Secondary 3 or below)

8. Robot Boxing Competition
9. Planet Exploration Competition
10. Multi-Motor Robot Appearance Design Competition

Category C: Wireless Controlled Robot (for students at Senior Secondary 3 or below)

11. Robot Soccer Competition
12. Robot Penalty Shoot-out Competition
13. Robot Basketball Competition

Category D: Servo Motor Robot (for students at Senior Secondary 3 or below)

14. Multi-leg Servo Motor Robot Short Distance Run Competition
15. C- shape Foot Two Legs Servo Motor Robot Short Distance Run Competition
16. Interchange Centre of Gravity Two legs Servo Motor Robot Short Distance Run Competition
17. Humanoid Free Gymnastics Competition
18. Servo Motor Robot Performance (Dance) Competition
19. Servo Motor Robot Appearance Design Competition

Servo Motor Humanoid Robot Competition Events – Robot Specification

20. Servo Motor Robot Obstacle Avoidance Competition
21. Humanoid Free Fighting Competition
22. Servo Motor Humanoid Robot - Super Brawl
23. Servo Motor Humanoid Robot - Curling Race
24. Servo Motor Humanoid Robot - Steeplechase
25. Servo Motor Humanoid Robot - Relay Race
26. Servo Motor Humanoid Robot - Soccer Race

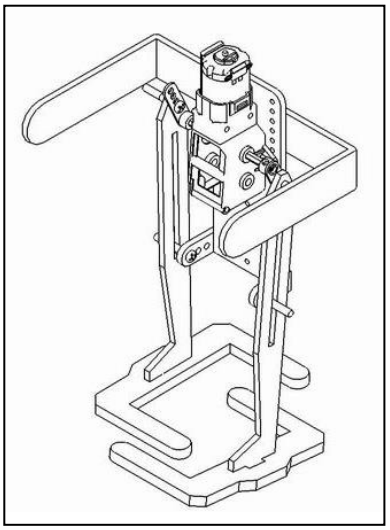
Category E: Creative Design

27. Life Inspired Innovative Model Design competition

1. Hand Generator 2 Legs Robot Short Distance Run Competition

Robots compete for speed in this game. A hand generator (attachment 1) will be used to provide power for the 2 legs robot. The robot that finishes 2M run with the shortest time is the winner.

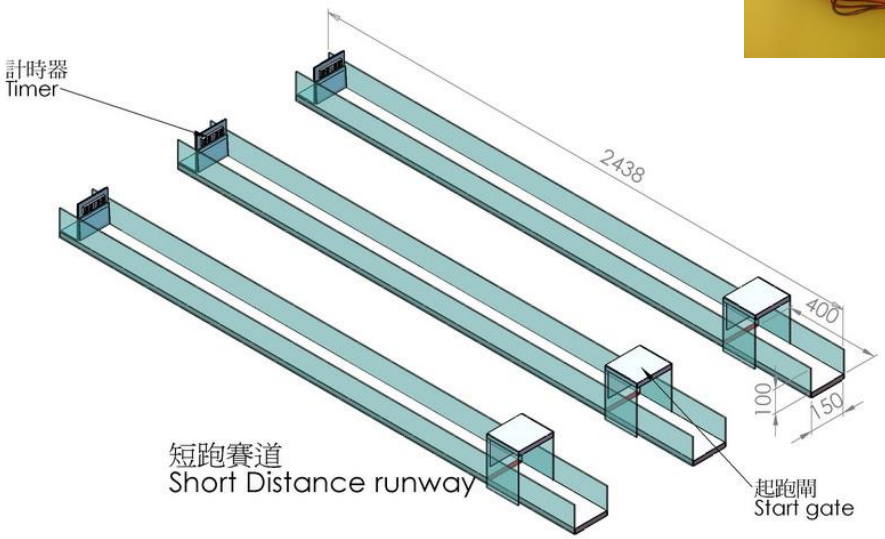
Robot Specification



1. The robot operates only with one motor. Contestants must use the Hand Generator provided by the Organizer (*attachment 1*) to supply power to the robot. Hence, the robot must be equipped with a 2.1mm socket for connection of the Hand Generator.
2. The size of the robot cannot exceed 300mm long, 150mm wide and 180mm tall (the length, width and height dimensions are not inter-changeable), nor overall weighs more than 500g.
3. The robot must complete the game in walking mode on 2 legs. No auxiliary parts can touch the ground.
4. The robot cannot have any installation that would change its original dimension during competition.

Game Field Specification

1. Level runway is used for preliminary rounds. The track is 2000mm long. The starting block is 400mm long.
2. The runway has 3 tracks. Each track is 150mm wide.
3. A timer is placed at the finish end of each runway.



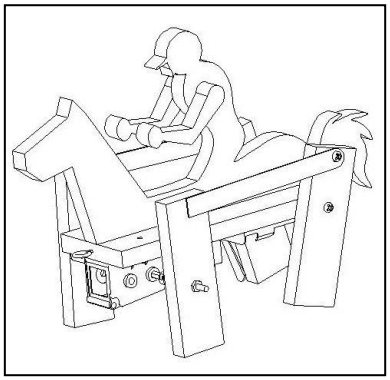
Game Rules

1. Each team can play twice and the best time will be recorded. The team with the shortest recorded time to complete will be the winner.
2. Contestants must use the Hand Generator (attachment 1) 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 for the contestants so that they must remain behind at the starting district. Moving along the runway with the robot is prohibited.
4. Once the game begins, the contestants cannot touch the robots until the game finishes. The maximum game time is 30 seconds. Robots that cannot complete the game would be recorded 30 seconds game time.

2. Robot Horse Relay Competition

4 legs robot horse relay competition is a team competition. The computer timer would record the game time of four robots in the team. The team scoring the least accumulated time is the winner.

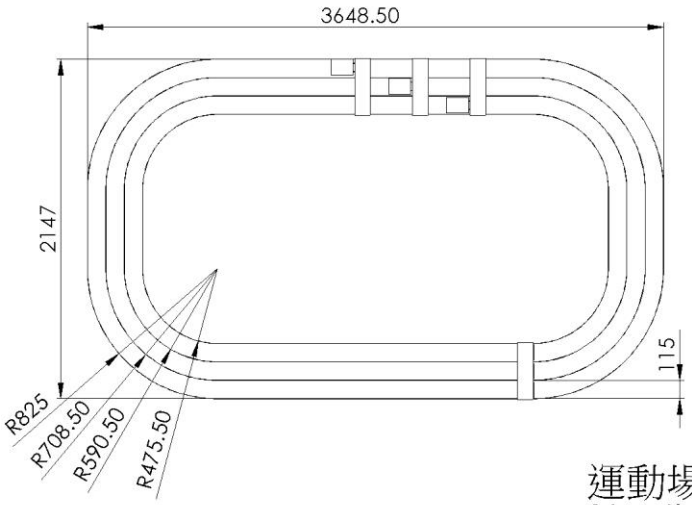
Robot Specification

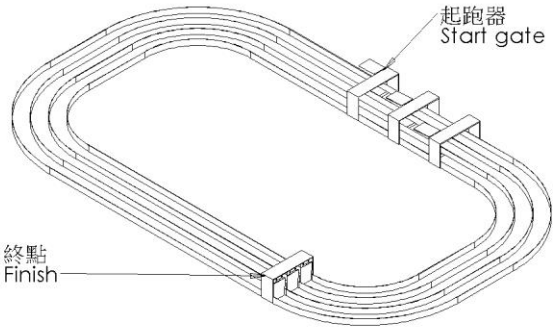


1. The robot operates only with one motor and two AA size batteries.
2. The size of the robot ***cannot*** exceed 200mm long, 110mm wide and 150mm tall (length, width and height dimensions are not inter-changeable), nor overall weighs more than 500g (including batteries).
3. The robot horse must have a horse appearance with a jockey and complete the game in walking mode.
4. The robot cannot have any installation that would change its original dimension during competition.

Game Field Specification

1. The runway has 3tracks. Each track is 115mm wide.
2. A 3648mm x 2147mm stadium runway is used for competition.





運動場式跑道
Stadium runway

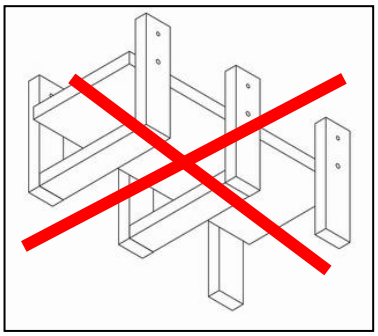
Game Rules

1. Contestants can switch on the robot before or after the gate is open.
2. The first robot in the team is switched on and placed inside the ”starting block”. The computer then opens the gate of the starting block and the timer begins to count. The robot should leave the starting block in 3 seconds and the gate would then be closed automatically. When the first robot arrives at the finish point, the computer records the time and opens the gate to release the second robot. When all four robots have completed the run, the computer adds up the total time. The team with the least run time is the winner.
3. Contestants cannot touch the robot once it is placed inside the starting block or during the run until the game is over. The team is disqualified if any of their robots cannot move or stops moving. The maximum game time is 2 minutes. Robots that cannot complete the game would be recorded 2 minutes game time.
4. Robots will run in anti-clockwise direction.
5. Each team can play twice and the best time will be recorded. The team with the shortest recorded time to complete the game is the winner.

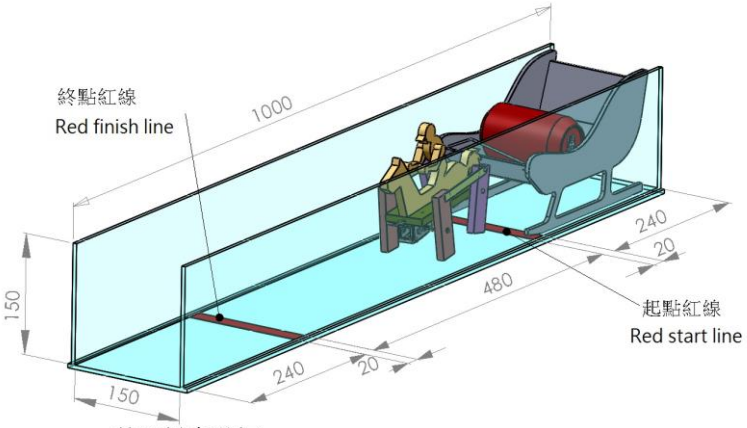
3. Hand Generator Robot Sled Race

This game primarily tests the strength of the robots. The robot is to move on a 4 leg walking mode. The robot that uses the least time to pull the sled with a can of soft drink to the finish line is the winner.

Robot Specification



1. The robot operates only with one motor. Contestants must use the Hand Generator (attachment 1) 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 200mm long, 150mm wide and 150mm tall (length, width and height dimensions are not inter-changeable), nor overall weighs more than 500g.
3. A M3 x 15mm diameter screw is installed at the middle of the tail end of robot about 60mm to 100mm above ground for connecting the sled wire.
4. The robot should move on 4 legs in walking mode. The area of the sole of the foot should not exceed 25mm x 50mm. Each foot should leave the ground as it walks. The robot cannot have any part touching the ground permanently. ***NO*** 6 legs walking robot structure (sample as shown in the figure on the right) be used.
5. The robot should be able to walk across an A-4 size paper. The part which touches the ground should not have high viscosity (that means it would not stick up a piece of 80g A4 typing paper for more than 3 seconds).



拉雪橇賽道板
Sled pulling competition board

Game Field Specification

1. A sled pulling competition board is used. The board is 1000mm long x 150mm wide x 150mm tall.
2. The weight of the sled is 351g and the weight of a canned soft drink is 361g.

Game Rules

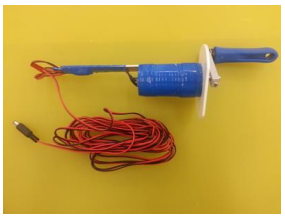
1. A sled is placed with its legs close to the red start line. The judge signals the start of contest. The robot that pulls the sled to the red finish line with the least time is the winner. In case of draw, the lighter weight robot wins the game.
2. Maximum game time is one minute. In case the robot fails to pull the sled to the red finish line within the game time, the distance between the position of the sled and the red start line is measured. In case of draw, the lighter weight robot wins the game.
3. The robot loses the game should it fail to move at the start or during the contest.

4. Hand Generator Triathlon Robot Relay Competition

This competition involves teams each formed by a set of 3 different robots racing in a triathlon relay. The team that finishes within the shortest time is the winner.

The first part is 2 legs robot short distance run; the second part is ladder climbing; the third part is rod climbing.

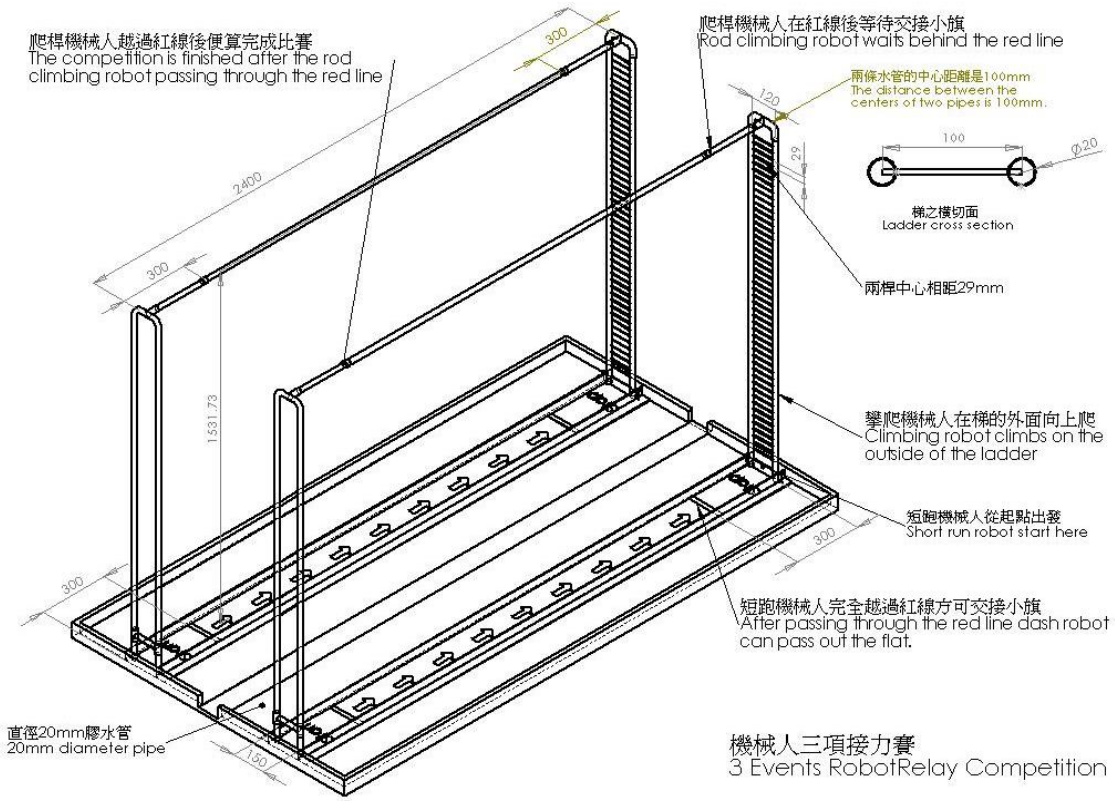
Robot Specification



1. Each robot operates only with one motor. Contestants must use the Hand Generator (attachment 1) provided by the Organizer to supply power to the robot. Only one hand generator is used for all three robots.
2. The size of each robot cannot exceed 300mm long, 150mm wide and 180mm tall (length, width and height dimensions are not inter-changeable). The gross weight should not exceed 500g.
3. No robot should be powered by wheel actions (or rotate like a wheel) nor auxiliary wheel.
4. Robot short distance run must complete the race on 2 legs (specification same as Hand Generator 2 legs Robot Short Distance Run Competition). No auxiliary parts can touch the ground.
5. Each robot must be equipped with a 2.1mm socket for connection of the Hand Generator. The plug of the hand generator can then be unplugged and transferred to another robot during the relay.

Game Field Specification

1. A Triathlon Relay court is used. The maximum outer width of the ladder is 120mm and inner width is 80mm.
2. An easy hanging device should be designed for the rod climbing robot. Contestants cannot pull out the top bar to hang in the rod climbing robot.



Game Rules

1. Each team may have a maximum of 6 members.
2. The maximum game time is 3 minutes. The first robot (2 legs short distance running robot) begins from the starting point. Once the front end of the first robot touches the red line at the end of the track, the plug of the hand generator can be unplugged and transferred to the second robot (the ladder climbing robot). The ladder climbing robot starts climbing up on the exterior of the ladder to the top. The plug of the hand generator can be unplugged and transferred to the third robot (the rod climbing robot) when the second robot passes through the red line. When the front end of the rob climbing robot passes through the red line, the game is finished.
3. If a robot fails to move, it can retry from the starting point of that particular race. There is no limit on the number of re-try.
4. Each team can play twice and the best time will be recorded. The team with the shortest recorded time to complete is the winner.

5. / 10. Hand Generator Single Motor / Multi-motor Robot Appearance Design Competition

The robot appearance design competition encourages students' expression of creativity. The loose game rules allow more esthetic and creative approach to the design of robot appearance.

Competition Category

1. Single Motor Robot Category permits the use of single motor in the mechanism design. This category is only for Junior Secondary 2 students or below.
2. Multi-motor Robot Category permits the use of two or more motors in the mechanism design. This category is for Senior Secondary 3 students or below only.
3. Each school may nominate up to two walking robots for each category in this competition

Game Rules

1. The participating robots may not take part in any other competitions.
2. Robots that took part in last year's competition cannot re-enter the same game this year.
3. The robot including its peripheral decorations cannot exceed 425mm X 300mm X 230mm (the length, width and height dimensions may be interchanged).
4. The robot under Single Motor Robot Category operates only with one motor and the power can only be supplied by the Hand Generator.
5. The robot must be able to complete its basic maneuver.
6. 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%

Hand Generator Robot Appearance Design Competition

Product Introduction

Category: *Single Motor* / *Multi-motor* Contest Registration No. : _____

Product Introduction :

Design concept:

Materials application:

Problems encountered:

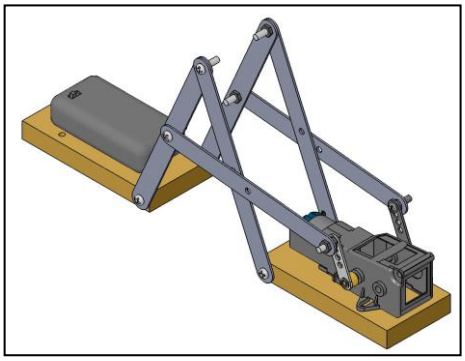
Solution:

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.

6. Hand Generator Worm Robot Short Distance Run Competition

The robot moves like a worm, it is one of the simplest moving actions in the nature. The robot that finishes 2M run with the shortest time is the winner.

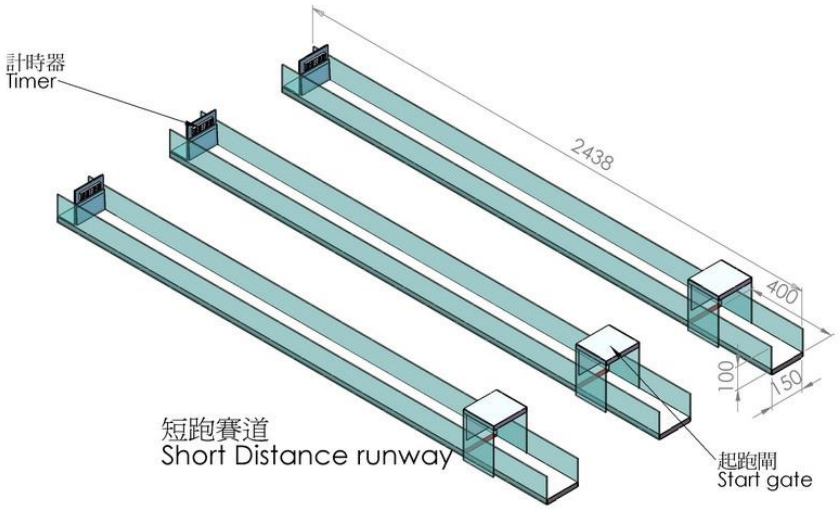
Robot Specification



1. The robot 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 of the Hand Generator.
2. The size of the robot cannot exceed 300mm long, 150mm wide and 180mm tall (length, width and height dimensions are not inter-changeable), nor overall weighs more than 500g.
3. The robot moves by 'contraction and stretch' method and should not use ratchet to assist the motion.
4. Only the sole of the feet is allowed to touch the ground. Any other parts of the robot touching the ground are prohibited.
5. The robot cannot have any installation that would change its original dimension during competition.

Game Field Specification

1. Level runway is used for preliminary rounds. The track is 2000mm long. The starting block is 400mm long.
2. The runway has 3 tracks. Each track is 150mm wide.
3. A timer is placed at the finish end of each runway.



Game Rules

1. Each team can play twice and the best time will be recorded. The team with the shortest recorded time to complete is the winner.
2. Contestants must use the Hand Generator (attachment 1) provided by the Organizer to supply power to the robot. Pulling the wire of the hand generator is prohibited.
3. The wire of the Hand generator is long enough so that the contestants must remain behind at the starting district. Moving along the runway with the robot is prohibited.
4. Once the game begins, the contestants cannot touch the walking robots until the game finishes. The maximum game time is 60 seconds. Robots that cannot complete the game would be recorded 60 seconds game time.

7. Hand Generator Worm Robot Appearance Design Competition

The worm robot appearance design competition encourages students to fully use their creativity. The loose game rules allow more esthetic and creative approach to the design of robot appearance.

Competition Category

It is the Single Motor Robot Category and permits the use of single motor in the mechanical design. This competition is for Junior Secondary 2 students or below only.

Game Rules

1. The participating robots may not take part in any other competitions.
2. Robots that took part in last year's competition cannot re-enter the same game this year.
3. The robot including its peripheral decorations cannot exceed 425mm X 300mm X 230mm (the length, width and height dimensions may be interchanged).
4. The robot must be able to complete its basic maneuver. The robot operates only with one motor and the power can only be supplied by the Hand Generator. It moves by 'contraction and stretch' method and should not use ratchet to assist the motion.
5. The contesting student may submit an A4 size introduction on the design concept and features (annex 2) 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%

Hand Generator Worm Robot Appearance Design Competition

Product Introduction

Category: *Single Motor* Contest Registration No. : _____

Product Introduction :

Design concept:

Materials application:

Problems encountered:

Solution:

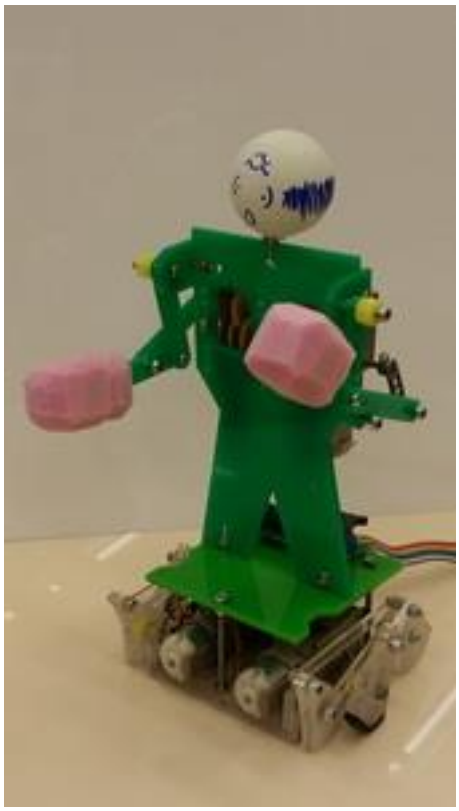
Note: The contents must not reflect or imply in any way the name of contestant or school. Failure to comply may lead to disqualification of the item.

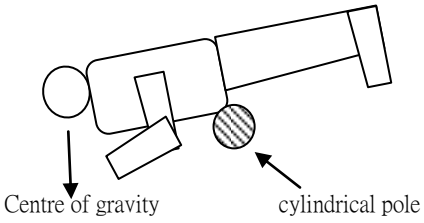
8. Robot Boxing Competition

This game tests the power of the robot as well as players' control skill and team spirit. The team that knocks down the opponent with the highest scores within the time limit wins the game.

Robot Specification

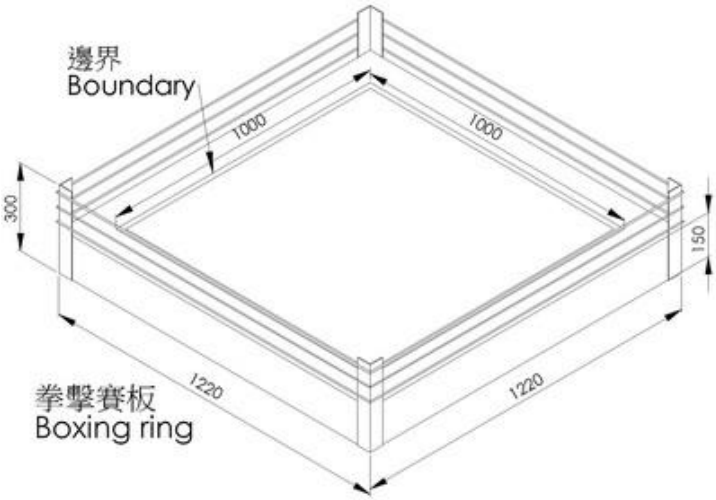
1. The robot may use up to 4 sets of gear boxes, in which 2 sets for walking and 2 sets for boxing. The robot must have a head and two hands in boxing gloves.
2. The robot is controlled by wired manual controller with power supplied by not more than six pieces 1.5V AA size batteries. The batteries will be provided by the Organizer (batteries will be prepared by contestants in the respective regional competitions).
3. The base of the robot cannot exceed 120x120mm. The overall height and weight of the robot cannot exceed 250mm and 1.5 kg respectively.
4. The robot must pass the centre of gravity test. The robot is placed horizontally on a cylindrical pole with its centre of gravity must be at the upper part of its body. That is the upper part of the robot's body slants down (see diagram below).
5. The wire of the robot must be long enough for the robot to move around.





Game Field Specification

The boxing ring is 1220mm long, 1220mm wide and 300mm tall.



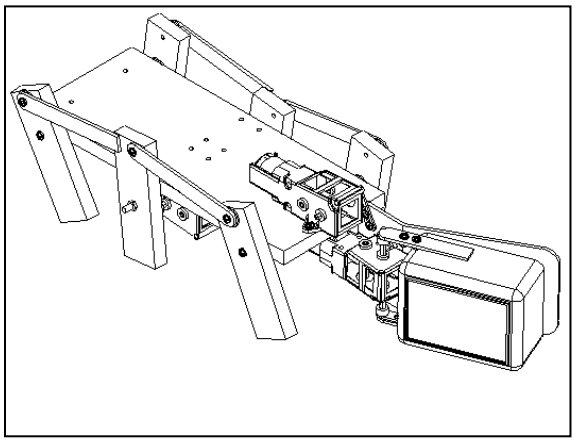
Game Rules

1. Each team assigns one robot for the competition. The robot is controlled by one member.
2. The robots are placed at the corner opposite to each other. The judge checks the robots to ensure that there is no movable dangerous mechanism design before game start.
3. The winner is determined in a 2-minute match. One point is scored for each successful knock down the opponent. No score if the opponent falls down itself. The robot with the highest scores wins.
4. If the winner is unable to determined at the end of the game, the lighter weight robot wins the game.
5. The judge will warn the team that continually dodges the opponent and refuses to attack. The team will be disqualified after receiving the second warning.
6. The robots stop combat if a robot falls down and will continue after the judge has put up the fell down robot. If the robot fails to move or fight anymore, the opponent will become winner.
7. There is a red line along the boundaries of the boxing ring. A warning will be served when the robot steps outside of the red boundary line. The opponent will score one point after 5 warnings are served.
8. The Panel judges' decision is final.

9. Planet Exploration Competition

Students are encouraged to design flexible gripper to explore the planet but not a mining tool. Robots have to pick up stones (ping pong) and deliver them to a designated storing area. They should pick the 'useful' stones (white ping pong) and avoid the 'harmful' stones (orange ping pong).

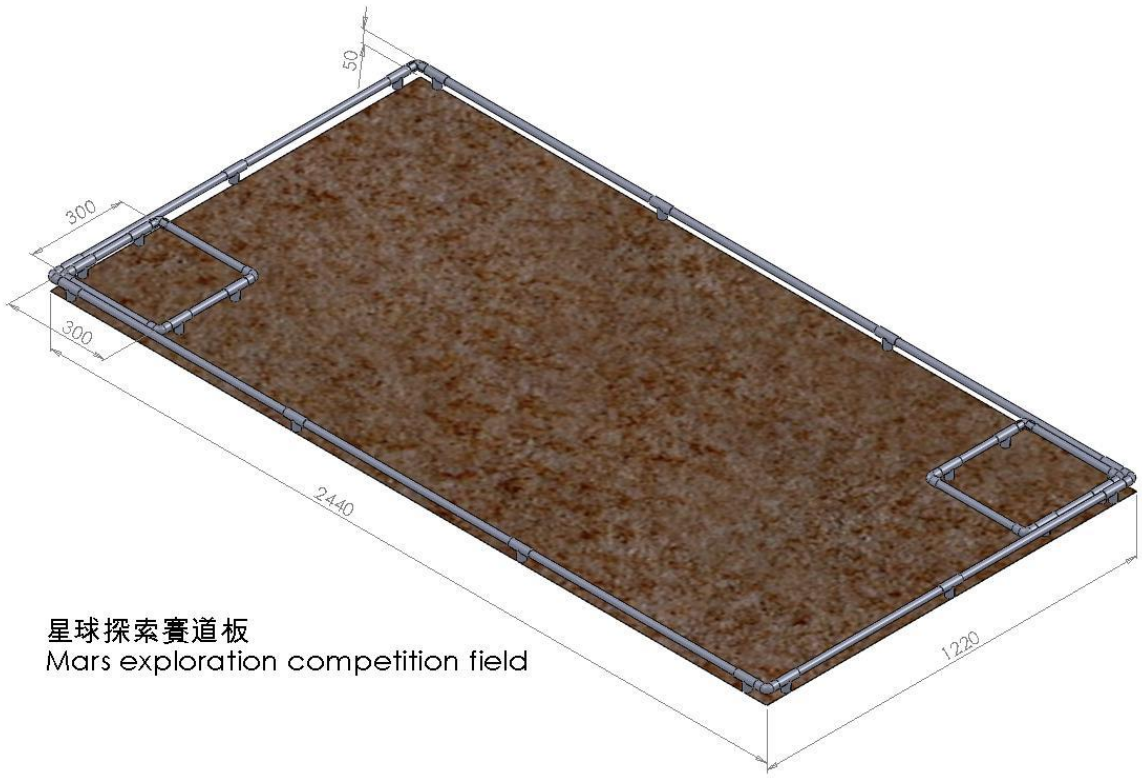
Robot Specification



1. The robot, with its arm contracted, cannot exceed 300mm long, 200mm wide and 240mm tall (length, width and height dimensions are not inter-changeable) nor overall weighs more than 1.5kg.
2. The robot may use up to five sets of gear boxes. It must move in walking mode. There is no limit on the number of stones for each pick as long as gripper or hand-folding action is used. 'Shoveling' or 'sweeping' actions are not allowed.
3. The robot is controlled by wired manual controller supplied by not more than six pieces 1.5V AA size batteries. The batteries will be provided by the Organizer (batteries will be prepared by contestants in in Hong Kong region competition).

Game Field Specification

1. This game uses a universal playing field. Approximately 200 number each yellow and white ping pongs are used as stones.
2. The area of playing field is 2440mm × 1220mm with 50mm tall fencing surrounding the four sides.
3. A base tank for storing stones (ping pongs) is located at both ends of the universal playing field, the size of the base tank is 300mm long x 300mm wide x 50mm tall.



星球探索賽道板
Mars exploration competition field

Game Rules

1. Each robot is controlled by one member.
2. The robot attempts to pick as many stones (ping pong) as possible within the 2 minutes game time. Different color stones score different points. The team has the stones in the base tank with the highest accumulated point is the winner. The stones (white and orange color ping pongs) on the body of the robot will not be scored. If the points are same, the team with more orange color stones wins.
3. The points scored by different color stones are as follows:

Color	Points
White	-50
Orange	+10

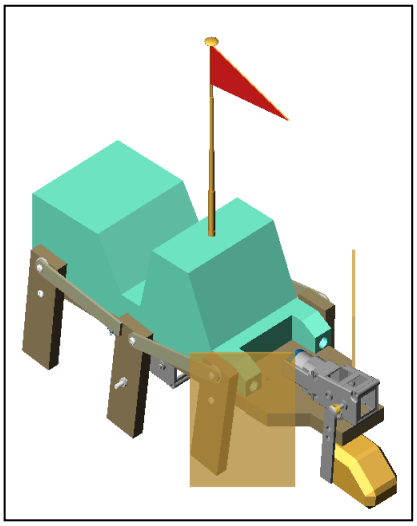
4. A robot may not damage or obstruct other competing robots. The judge would serve warning to the offending player. The player would be disqualified after two warnings and asked to leave the playing field immediately.
5. During the competition, a robot may receive repair off the field. After repair, the judge then places it back to where it left and continues the game. No extra time would be given to the robot.

11. Robot Soccer Competition

This is a team competition. Each team should have four robots with one of them as reserve. Students are encouraged to work as a team to build robots with efficient walking actions for the competition. During the game, the two competing team players would use their "legs" to kick the ball into their opponent's goal. The team with higher score is the winner.

Robot Specification

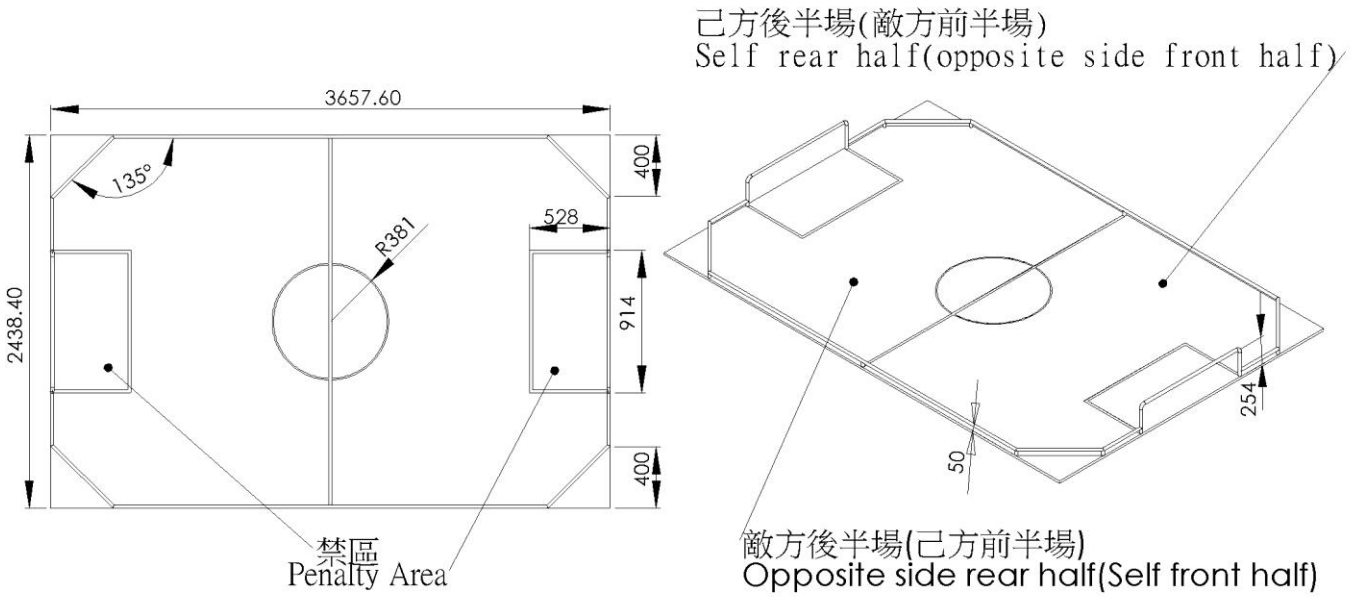
1. The size of the robot cannot exceed 300mm long, 200mm wide and 240mm tall (length, width and height dimensions are not inter-changeable) nor weighs more than 1.5kg (including batteries and receiver).



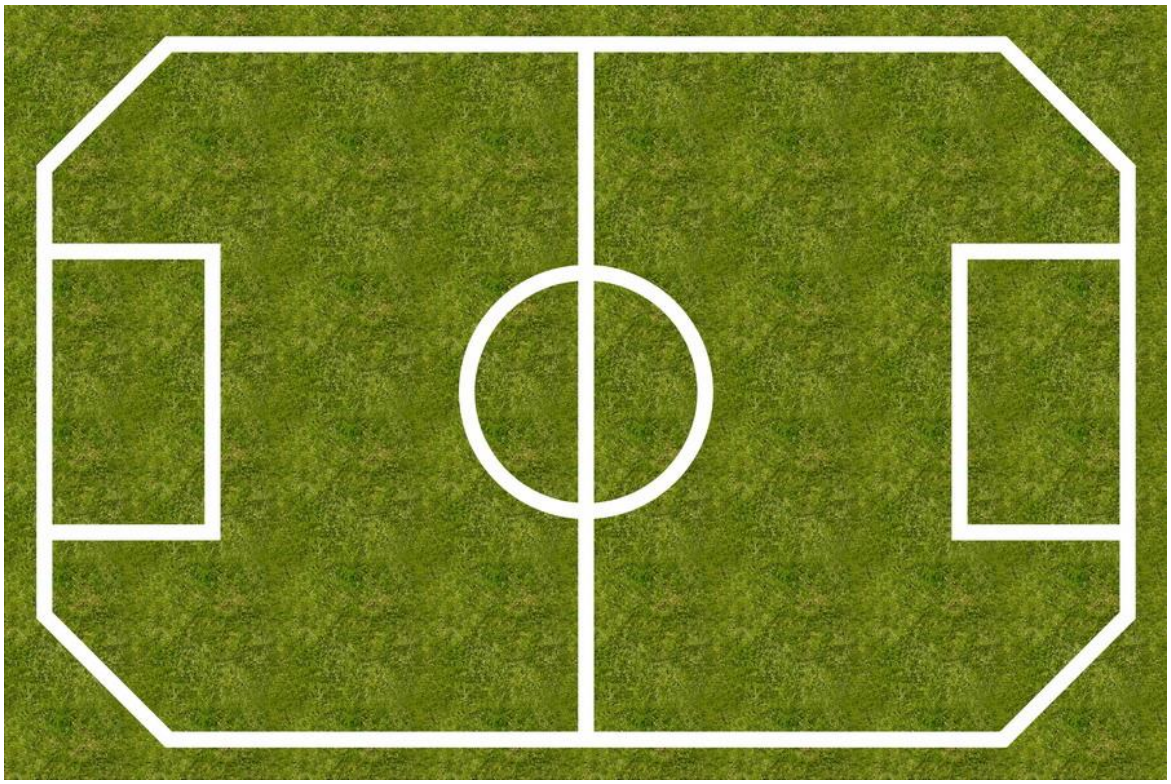
2. Each team consists of three robots.
   a) The Forward robot identifies itself with a yellow semi-circular flag on its 200mm pole. It may move around in the front half of its own playing field including the opponent's penalty area.
   b) The Midfield robot identifies itself with a red triangular flag on its 200mm pole. It may move around in the entire playing field except the two penalty areas.
   c) The Defending robot identifies itself with a blue rectangular flag on its 200mm pole. It may move around in the rear half of its own playing field including its own penalty area.
3. A flap is installed on each side of the robot front end, slanting backward at 30-45 degree from the gear box to prevent the robot front legs from kicking the football. The opening between the two flaps at the robot front end should not be more than 30mm wide. Therefore, the foot for kicking the ball may not be larger than 30mm (diagram referred).
4. All robots are controlled by wireless controller 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. A 2.4 G wireless remote control device is recommended.
5. Motor driver of robot cannot use more than 9V Alkaline batteries, 7.2V rechargeable battery or 7.4V Lithium-polymer battery. There is no limit on the batteries for transmitter and receiver. Participants are to prepare their own batteries in the regional competition.
6. The robot must kick the ball with a swing (not rotation) action.

Game Field Specification

1. Football court is used for the competition.
2. The area of playing field is 3658mm (12ft) × 2438mm (8ft), surrounded by 100mm tall 45 degree triangular fence. The goal is 915mm (width) x 200mm (height) x 200mm (depth). A 60mm diameter rubber ball is used for the competition.



機械足球賽板
Robot Soccer Field



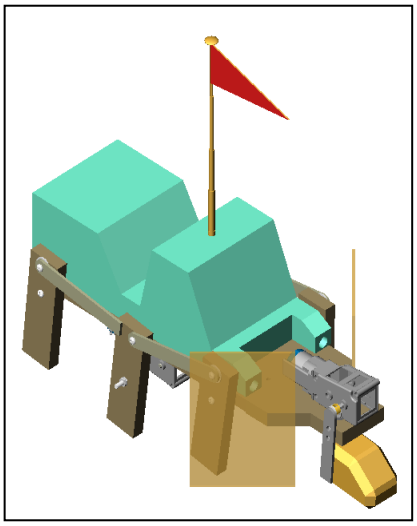
Game Rules

1. The Robot may only kick but not hold or push the ball.
2. The reserve robot and its controller must be placed in a location specified by the referee; otherwise contestants would not be allowed to replace the robot.
3. The game has two halves, each lasts for 2 minutes. The first stage of the competition will be conducted on a group 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 is an elimination match.
4. Choice of side and kick-off is determined by toss of coin. Each side places its Forward robot in position first and then the Defending robot in their own respective penalty area. The kick-off team places its Midfield robot inside the centre circle first follows by the opposing team to place its Midfield robot outside of centre circle.
5. The timer begins to count when the referee signals start of the game. The kick-off team should kick the ball within five seconds otherwise the right goes to the opposing team. All other robots must stay still before the kick-off.
6. If the robots tangle over the ball for over ten seconds, the judge may pause the match and separate the robots 300mm away from the ball and re-start the match.
7. Players of each team should stay at the designated areas to control their robots. Once the game starts, players are not allowed to touch the robots or the ball until either the ball goes into the goal or the match ends.
8. The goal would not be counted as score by kick-off or pushing opponent and the ball together into the goal.
9. During the match, request should be made to the referee for repair or replacement of robot. Upon approval, the robot should only be removed and returned to the field by the referee. The timer would not pause and the match continues. The robot on returning to the field should wait for the referee's permission to move and continue the game.
10. Each goal scores one point. The losing team would re-start the game from the middle field. The timer would not pause. The side with higher score at the end of the game is the winner.
11. If it is unable to determine a winner at the end of the game, it will be regarded as a draw in the group round-robin match. Should there be a draw at the end of the elimination match, an extra time of 2 minutes will be given to determine the winner via 'sudden death'. Each team can send only one robot for the extra time game.
12. If it is still unable to determine a winner at the end of the extra time game, each team assigns 3 robots to takes turn to do Fix Point Shooting.** Each goal scoring time will be recorded and the team with the most goals will win. In case of draw, the team with shorter total goal scoring time will win. Second round will be conducted if they still draw until a winner is identified.
13. **Fix Point Shooting: The ball is position in the centre circle and each robot is given one minute, with no limit on the number of attempts, to shoot the goal (without defending robot), until a goal is scored. Robot cannot shoot but get the ball inside the penalty area.
14. A warning will be served to a robot for purposely charges against its opponent (not handling a ball), ignoring the referee's instruction or disobeying the referee's judgment. Upon receiving two warnings, the team will be penalized with a penalty kick.
15. Penalty kick: The ball is placed at the mid-point of the top goal line of the penalty area. The shooting robot is placed outside the penalty area. The defending team then places its defending robot (with the robot's shortest side faces the ball) perpendicularly at the mid-point of the bottom goal line. The Defending robot cannot move before the shooting robot kicks the ball otherwise it will receive a warning and the shooting would be retaken.
16. The Panel Referee's decision is final.

12. Robot Penalty Shoot-out Competition

The penalty shootout is a method of determining a winner in football matches that would have otherwise been drawn or tied. Contestant controls the robot to make five penalty kicks. The team with higher score is the winner.

Robot Specification Competition



1. The size of the robot cannot exceed 300mm long, 200mm wide and 240mm tall (length, width and height dimensions are not inter-changeable) nor weighs more than 1.5kg (including batteries and receiver).

2. The robot may use up to three sets of gear boxes and must move in a walking mode.

3. A flap is installed on each side of the robot front end, slanting backward at 30-45 degree from the gear box to prevent the robot front legs from kicking the football. The opening between the two flaps at the robot front end should not be more than 30mm wide. Therefore, the foot for kicking the ball may not be larger than 30mm (diagram referred).

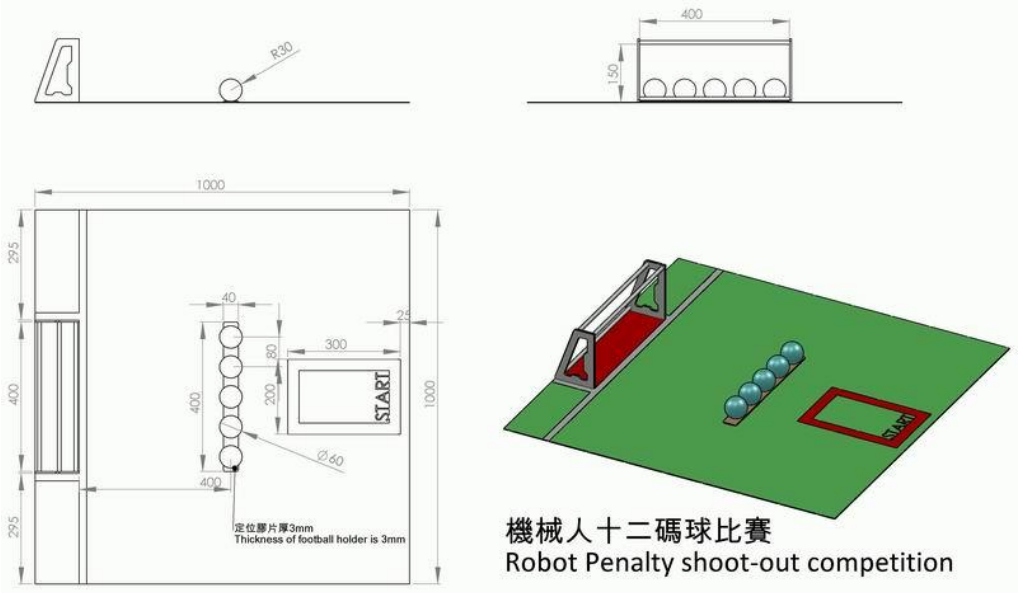
4. All robots are controlled by wireless controller. A 2.4 G wireless remote control device is recommended.

5. Motor driver of robot cannot use more than 9V Alkaline batteries, 7.2V rechargeable battery or 7.4V Lithium-polymer battery. There is no limit on the batteries for transmitter and receiver. Participants are to prepare their own batteries in the regional competition.

6. The robot must kick the ball with a swing (not rotation) action.

Game Field Specification

1. This game uses a penalty shoot-out playing field.
2. Five 60mm rubber balls will be used and they are placed at an equidistance 80 mm apart on a rack.



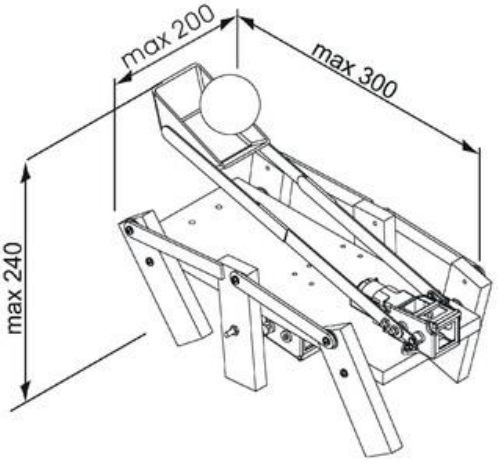
Game Rules

1. The robot is placed in the start position prior to the game starts and it may move to kick the ball upon receiving the judge's signal.
2. Contestant has four minutes to finish five penalty kicks**.** Each successful kick will score 2 points. If the ball crosses the goal-line even though it rebounds from the goal, such kick is considered successful. However, the kick is considered fail if the ball rebounds from the goal posts.
3. The robot can kick the ball only once per each penalty kick. Two or more attempts to kick the ball for each penalty kick is not allowed.
4. Each team continuously plays 2 rounds of the five penalty kicks and the sum of all the scores is recorded. If the scores are the same at the end of the game, the team with the least time to finish all kicks is the winner.

13. Robot Basketball Competition

Robot basketball match is another team competition. It emulates human basketball match including passing and shooting activities. Each team should have at least two robots with good ability to pick up and throw balls. Each match has one game of six minutes duration. Each score counts for two points and the team with the highest points at the end of the match is the winner.

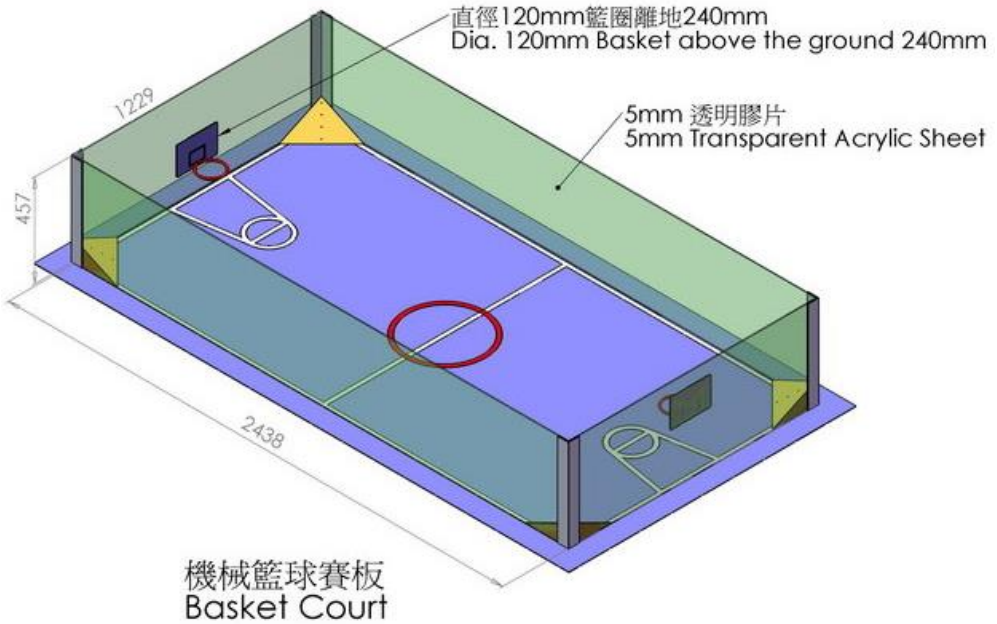
Robot Specification



1. The size of the robots when fully stretched (pick-up arm and shooting mechanism) cannot exceed 300mm long, 200mm wide and 240mm tall (length, width and height dimensions are not inter-changeable) nor an overall weight of 1.5kg (including batteries and receiver).
2. The robot may use up to five set of gear boxes. It must move in walking mode.
3. All robots are controlled by wireless controller 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 is recommended).
4. Motor driver of robot cannot use more than 9V Alkaline batteries, 7.2V rechargeable battery or 7.4V Lithium-polymer battery. There is no limit on the batteries for transmitter and receiver. Participants are to prepare their own batteries in the regional competition.

Game Field Specification

1. Basketball court is used for the match. The four sides are fenced with 457mm tall transparent wall. The 180mm diameter shooting net is 240mm above ground.
2. An orange ping-pong will be used as a basketball.



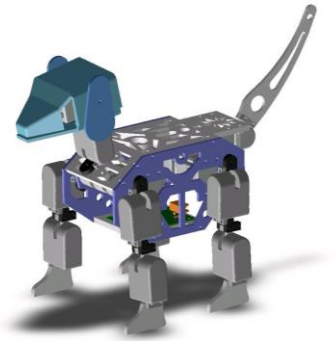
Game Rules

1. Each team may have three robots. Two for the game and the third robot serves as a reserve and kept by the referee. The team without reserve robot will repair the damaged robot during the course of the game.
2. Robots from the two teams should be placed in their own respective half court outside the mid-court The referee would put a basketball at the centre of the mid-court 300mm above the ground for robots from the two teams to scramble for.
3. The robot should not hold the ball longer than five seconds, otherwise a warning would be given (holding). Referee will then give the right to the opponent to start the game at the original position. The team that threw the basketball into the basket of the opponent will score two points.
4. During the match, request should be made to the 2nd referee for repair or replacement of robot. Upon approval, the robot should only be removed and returned to the field by the referee. The timer would not pause and the match continues. The robot on returning to the field should wait for the referee's permission to move and continue to play.
5. After the goal, losing side will start the game at the base line of its own half court.
6. Robots of both sides enter the penalty area exceeding 5 seconds will get warning from referee. Referee will give the right to the opponent to start the game at the original position.
7. A penalty will be given to the robot on receiving two warnings. The opponent will get a chance to shoot outside the penalty area. If the basketball is thrown into the basket, 2 points will be awarded; otherwise the game will continue to play.
8. The duration of the game is 6 minutes. The team with higher points is the winner. The first stage of the competition will be conducted on a round-robin basis. The winning team will get 3 points, losing team 0 point and each team 1 point in case of a draw. The second stage will be conducted on a knockout basis.
9. Should there be a draw at the end of the game time during the knockout stage, extra time of 3 minutes will be given to determine the winner via 'sudden death'. No switch of goal or replacement of robot is allowed. Only one robot from each team would be placed in their own half court outside the mid-court and facing its opponent. The referee would put the basketball at the centre of the mid-court 300mm above the ground for robots from the two teams to scramble for. The team that first scores points is the winner.
10. Should there be no score or same score in the extra time game, each team takes turn to send the 2 robots to do ***Fix Point Shooting*** one at each time within one minute. Time of each successful shooting will be recorded and sum up. After the 2 robots of each team have finished the fix point shooting, the team that scores higher points will win. In case of draw, the team with less time of the 2 shootings will win. Second round will be conducted if they still draw until a winner is identified.
11. **Fix Point Shooting**: The robot is placed in the mid-court and the ball is placed on the top of the penalty area. Each team would be given 1 minute to pick and shoot the goal without defensive robot. Repeat attempts of shooting if unsuccessful. Robot cannot shoot but get the ball inside the penalty area.

14. Multi-Leg Servo Motor Robot Short Distance Run Competition

We can use servo motor to make different kinds of joint type robot; multi-leg servo motor robot is one of the simplest forms of joint type robot. Contestant has to build a servo motor robot which walks with many legs, and program the motion with computer. The robot that finishes 2M run with the shortest time is the winner.

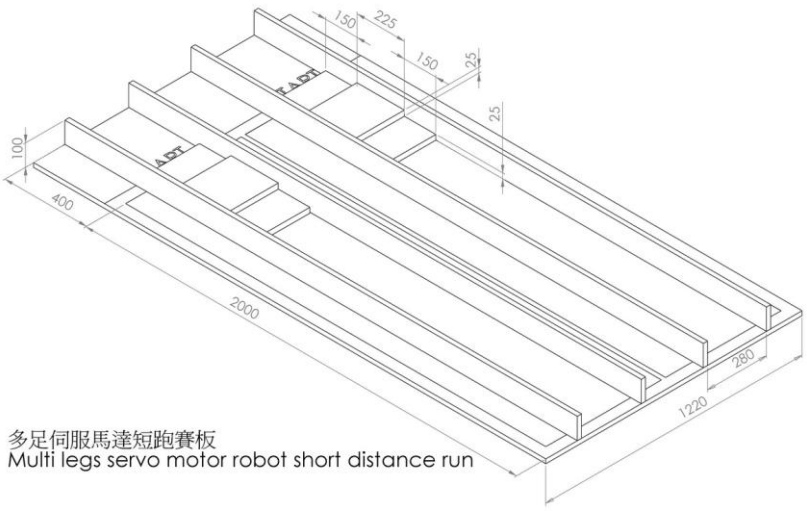
Robot Specification



1. No market robot can be used. The robot should be built with servo motors with simple animal figure. There is no restriction to the number of servo motors used. Each leg should have at least 2 servo motor joints.
2. The size of the robot cannot exceed 400mm long, 280mm wide and 400mm height. There is no limit in weight.
3. The robots must move in walking actions autonomously without connecting to a computer or external power supply.
4. The robot cannot have installation that would change its original dimension during competition, such as moving the head from upright position at the beginning and level the head when it approaches the finish.

Game Field Specification

1. Multi-Legs Servo motor Robot Short Distance Run Competition Board is used for the match. The track is 2400mm long. The starting area is 400mm long.
2. The runway has four tracks. Each track is 280mm wide. A stepping block is placed at the starting point as shown in figure



多足伺服馬達短跑賽板
Multi legs servo motor robot short distance run

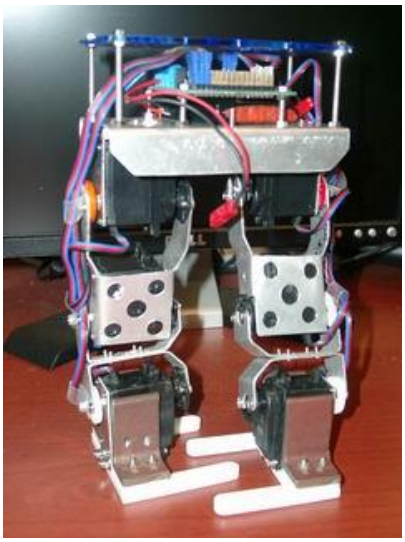
Game Rules

1. The robot that takes the shortest time to complete the specified distance is the winner.
2. The robot can be switched on and placed at the “START” position first. Contestants can release the robot after the judge signals start the race and the timer begins to count.
3. If the robot stops moving or falls down during the run, contestant can pick up the robot and place it at the starting point and restart again. The timer would continue without reset.
4. The maximum game time is 2 minutes. Robots that cannot complete the game would be recorded 2 minutes game time.

15. C-Shape Foot Two Legs Servo Motor Robot Short Distance Run Competition

We can use servo motor to make different kind of joint type robot. 2 legs servo motor robot is considered one of the complicated forms of joint type walking robot. Contestant has to make a servo motor robot which walks on 2 legs in C-Shape feet and program the motion with computer. The robot that finishes 2M run with the shortest time is the winner. The C-Shape feet overlap and have larger touching ground area, so it walks more steadily and easy for programming (diagram refers).

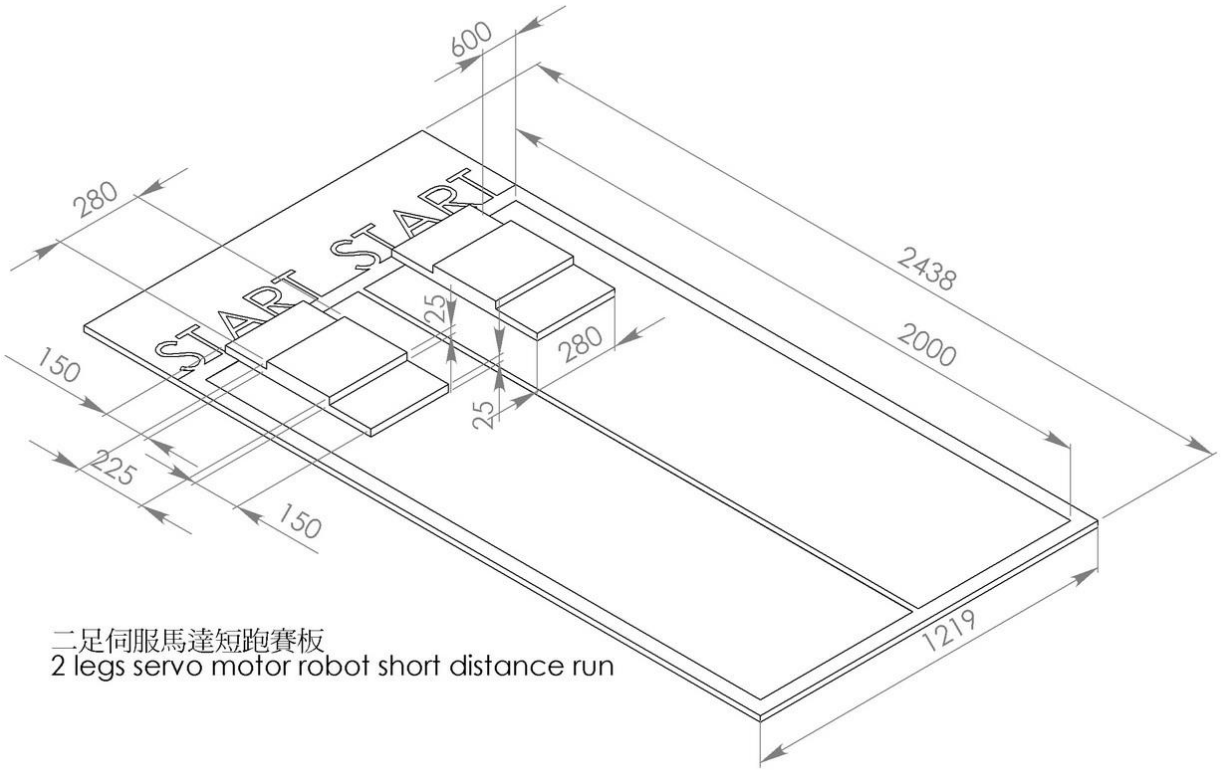
Robot Specification



1. No market robot can be used. The robot should be built using not more than 8 servo motors and move in walking mode. Robot cannot use "interchange centre of gravity" method to move nor walk sideways.
2. The size of the robot cannot exceed 200mm long, 200mm wide and 300mm tall. There is no weight limit nor size of the sole.
3. The robots must move in walking actions autonomously without connecting to a computer or external power supply.

Game Field Specification

1. 2-Leg Servo motor Robot Short Distance Run Competition Board is used for the match. The track is 2438mm wide and 1219mm long.
2. The runway has two tracks. Each track is 600mm wide and 2000mm long. A stepping block is placed at the starting point as shown in figure.



二足伺服馬達短跑賽板
2 legs servo motor robot short distance run

Game Rules

1 The maximum game time is 3 minutes. The robot must finish the following specified motion:

a) *First, step up and then step down the 'stepping block'*

b) *Walk 3 steps forward*

(e.g. First, the right leg steps out, Second, the left leg steps out, Third, the right leg steps out again)

c) *Stand at attention*

d) *Make a forward somersault 2 times*

e) *Stand at attention*

f) *Walk 2 steps forward*

g) *Stand at attention*

h) *Make a backward somersault 2 times*

i) *Stand at attention*

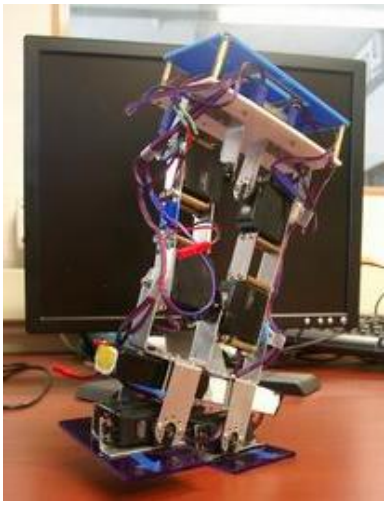
j) *Walk to the destination quickly.*

2. Marks will be deducted if the robot fails to perform the specified motion in specified sequence.
3. 10 marks will be deducted for each missing motion.
4. 10 marks will be deducted for each vague motion.
5. The foot should clearly leave the ground for each step the robot made (no dragging step). 10 marks will be deducted for each dragging step.
6. If the sole of the foot touches the centre line of the competition board, a corrective action must be made immediately by the contestant. 10 marks will be deducted for each touching. If the sole of the foot touches the border line, correction is not necessary.
7. Contestant can correct the walking direction of robot or put the robot up right again after falling, but 10 marks will be deducted for each touching.
8. The robot that cannot complete the game would be recorded the distance between the starting point and the robot. The total marks deducted will also be recorded.
9. The robot will be disqualified if it reaches the destination without completing all the specified motions.
10. Each team can play twice and the best result will be recorded.
11. The team who completed the game with the least marks deducted is the winner. If same marks are deducted, the team used the least time to finish the game is the winner.
12. If all the teams cannot complete the game, the team with the least marks deducted is the winner. Otherwise, the team whose is the nearest to the destination is the winner.

16. Interchange Centre of Gravity Two Legs Servo Motor Robot Short Distance Run Competition

We can use servo motor to make different kinds of joint type robot, 2 legs servo motor robot is considered one of the complicated forms of joint type walking robot. Contestant has to make a servo motor robot which walks on 2 legs and program the motion with computer. The robot that finishes 2M run with the shortest time is the winner. The robot walks by interchanging the centre of gravity between the two legs. This motion is closed to the walking motion of human. It is easy to fall down and hard to program.

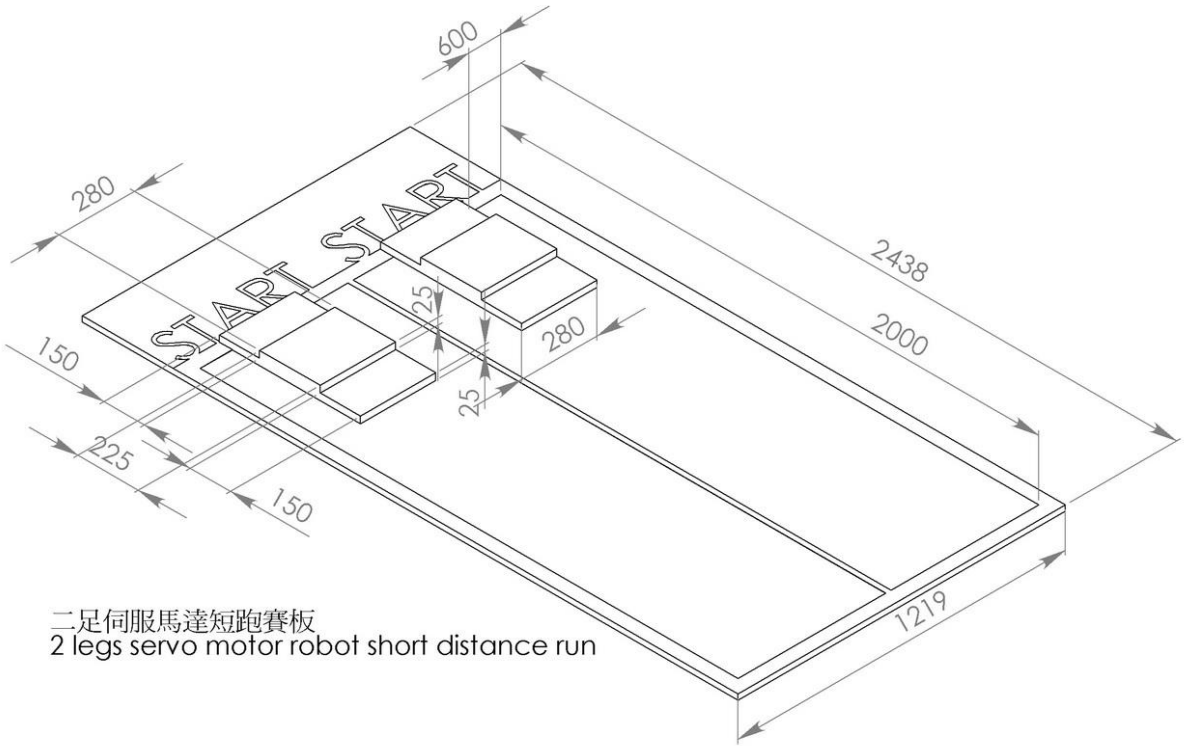
Robot Specification



1. No market robot can be used. The robot should be built using not more than 8 servo motors and move in walking mode. Robot must use "interchange centre of gravity" method to move. Robot cannot walk sideways.
2. The size of the robot cannot exceed 200mm long, 200mm wide and 300mm tall. The area of the sole must not exceed 150mm long x 60mm side. There is no weight limit
3. The robots must move in walking actions autonomously without connecting to a computer or external power supply.

Game Field Specification

1. 2-Leg Servo motor Robot Short Distance Run Competition Board is used for the match. The track is 2438mm wide and 1219mm long.
2. The runway has two tracks. Each track is 600mm wide and 2000mm long. A stepping block is placed at the starting point as shown in figure.



二足伺服馬達短跑賽板
2 legs servo motor robot short distance run

Game Rules

1. The maximum game time is 3 minutes. The robot must finish the following specified motion:
   a) *First, step up and then step down the 'stepping block'*
   b) *Walk 3 steps forward*
      (e.g. First, the right leg steps out, Second, the left leg steps out, Third, the right leg steps out again)
   c) *Stand at attention*
   d) *Make a forward somersault 2 times*
   e) *Stand at attention*
   f) *Walk 2 steps forward*
   g) *Stand at attention*
   h) *Make a backward somersault 2 times*
   i) *Stand at attention*
   j) *Walk to the destination quickly.*
2. Marks will be deducted if the robot fails to perform the specified motion in specified sequence.
3. 10 marks will be deducted for each missing motion.
4. 10 marks will be deducted for each vague motion.
5. The foot should clearly leave the ground for each step the robot made (no dragging step). 10 marks will be deducted for each dragging step.
6. If the sole of the foot touches the centre line of the competition board, a corrective action must be made immediately by the contestant. 10 marks will be deducted for each touching. If the sole of the foot touches the border line, correction is not necessary.
7. Contestant can correct the walking direction of robot or put the robot up right again after falling, but 10 marks will be deducted for each touching.
8. The robot that cannot complete the game would be recorded the distance between the starting point and the robot. The total marks deducted will also be recorded.
9. The robot will be disqualified if it reaches the destination without completing all the specified motions.
10. Each team can play twice and the best result will be recorded.
11. The team who completed the game with the least marks deducted is the winner. If same marks are deducted, the team used the least time to finish the game is the winner.
12. If all the teams cannot complete the game, the team with the least marks deducted is the winner. Otherwise, the team whose robot is the nearest to the destination is the winner.

17. Humanoid Free Gymnastics Competition

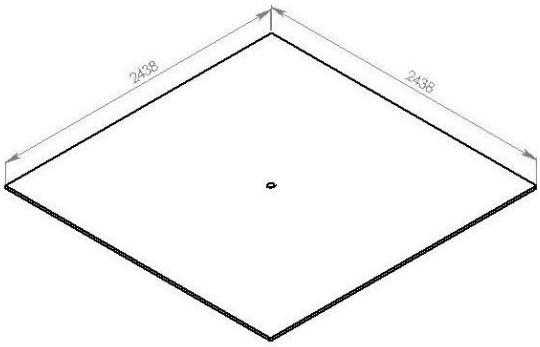
This event requires students to design a dexterous and steady servo motor robot applying their creative and presentation skill. The participating robot will play alone and perform different gymnastic motions. All motions of the robot are computer programmed without manual control.

Robot Specification

1. No market robot can be used.
2. The robot should be built with not more than 10 servo motors
3. The size of the robot must not exceed 400mm long x 300mm wide x 300mm tall (length, width and height dimensions are inter-changeable). There is no weight limit.
4. The participating robot must move in walking mode without connecting to a computer or external power supply.
5. The robot must perform autonomously without manual control.

Game Field Specification

Two Polly boards (2438mm x 1219mm) are put together to form a 2438mm x 2438mm competition area.



Game rule

1. The robot has to carry out a not more than 4-minute gymnastics performance on a 2438mm x 2438mm size platform The performance includes:

   Opening motion ➔ Standard motions + Self-design motions ➔ Closing motion

   a) Opening motion: stand at attention, bow and single hand waving
   b) Standard motions:
      - forward somersault 360°
      - backward somersault 360°
      - left hand push up
      - right hand push up
      - two hands push up,
      - left cartwheel 360°
      - right cartwheel 360°
      - a handstand
      - a handstand with two legs open at 180°

   The standard motions may be repeated once only but the sequence can be differ from the above.
   c) 11 self-design motions.
   d) Closing motion: stand at attention, bow and single hand waving.

2. Contestant should design 20 motions (9 Standard motions +11 Self-design motions).
   Note: After each motion performed, contestants should have a 3-second break time to explain to the judges. Sequence of the motions must be written down on the mark sheet and handed in to the judges before the competition.

Markings:

1. If the robot walks out of the boundary or falls down, contestants can pick up and place the robot at where it falls; and continue the performance. Time will not be compensated.
2. Each complete motion can get 5 marks; no mark will be given for incomplete motion.
3. 10 marks will be deducted for each touching the robot.
4. 10 marks will be deducted for missing the 3-second break time for explanation between each motion.
5. The total marks are equal to the sum of motion marks and judges' marks minus the marks deducted. The team who gets the highest marks will win the game. If the marks are the same, the team who uses the least time to finish the performance will win.

Assessment criteria

Appearance / Creativity	Dynamics / entertaining	Production Technique	Action Difficulty	**Total Score**
20%	30%	15%	35%	**100%**

Humanoid Free Gymnastics Competition Mark Sheet

Contest Registration No. : _____

order	Motion	completed	Not completed	order	Motion	completed	Not completed
	Stand at attention			11			
	Bow and single hand waving			12			
1				13			
2				14			
3				16			
4				16			
5				17			
6				18			
7				19			
8				20			
9					Stand at attention		
10					Bow and single hand waving		
					Motion marks ***Total*** :		

*** *Each complete motion gets 5 marks, no marks will be given for incomplete motion.*

Time completed : _____

Assessment criteria

Appearance/Creativity 20%	Dynamics / entertaining 30%	Production Technique 15%	Action Difficulty 35%	**Total Score** 100%

Interference	Number of touching (@ -10 marks)	**Marks Deducted**
Put up a fell down robot		
Adjust the position of robot which is out-of-bounds		

Total marks = *Motion marks*_____ + *Judge's marks*_____ - *Deduction*_____ =

Signature of Judge _____

18. Humanoid Performance (Dance) Competition

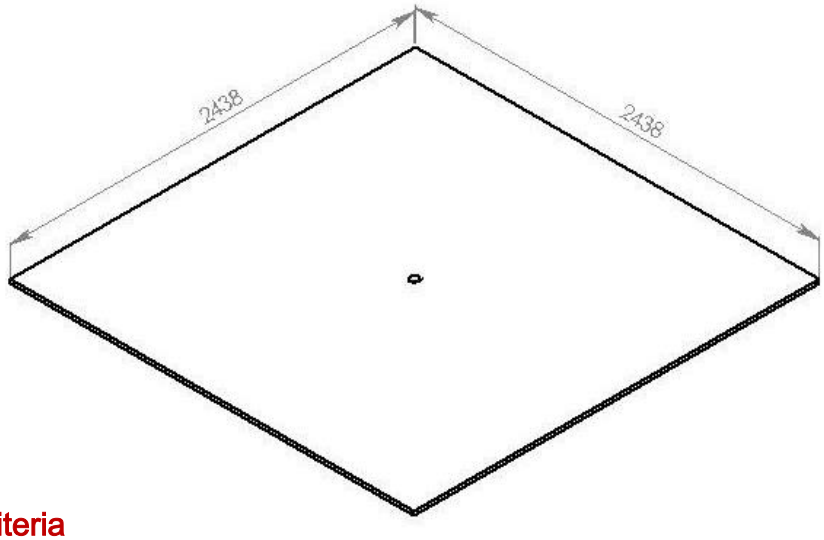
This competition requires students to build a flexible humanoid applying their creative and presentation skill. It may be in the form of solo or team performance. During the competition the robot may demonstrate a series of difficult actions in coordination to the background music or various audio effects. Organization of the entire performance should match the characteristics of the robot and controlled by a computer program via a wired or wireless control. Manual control is not allowed.

Robot Specification

1. No market robot can be used.
2. The robots should mainly be built with servo motors along with gear boxes as an auxiliary. There is no limit on the quantity of motors used and the number of participating robots for each team.
3. The size of the robot must not exceed 500mm long x 500mm wide x 500mm tall. There is no weight limit.
4. The participating robots must move in walking actions without connecting to a computer or external power supply.
5. The robot must be computer programmed to perform autonomously without manual control.

Game Field Specification

Two Polly boards (2438mm x 1219mm) are put together to form a 2438mm x 2438mm competition board.



Assessment Criteria

1. Contestants can create their own background music or use the music with right.
2. Each team has a maximum of five minutes for setting and performance.

Appearance / Creativity	Dynamics / entertaining	Production Technique	Action Difficulty	Total Score
30%	30%	15%	25%	100%

19. Servo Motor Robot Appearance Design Competition

The Servo Motor Robot appearance design competition encourages students to fully use their creativity. The loose game rules allow more esthetic and creative approach to the design of robot appearance.

Competition Category

Servo Motor Robot Category permits the use of Servo Motor in mechanical design. This category is suitable for all Secondary students.

Robot Specification

1. No market robot can be used.
2. The robot should be built mainly with servo motors along with gear boxes as auxiliary. There is no limit on the quantity of motors used. Each team can have one participating robot.
3. The size of the robot must not exceed 500mm long x 500mm wide x 500mm tall. There is no weight limit.
4. The robots must not be connected to a computer or external power supply.
5. The robot must be computer programmed to perform autonomously without manual control .

Game Rules

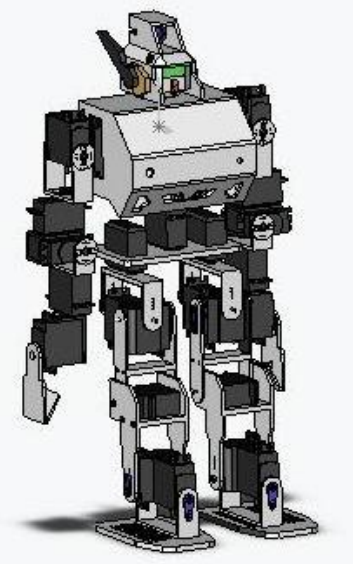
1. The participating robots may take part in other competitions.
2. Robots that took part in last year's competition cannot re-enter the same game this year.
3. The robot including its peripheral decorations cannot exceed 1m × 1m × 1m.
4. The robot is free to move in different style.
5. The contesting student may use 2 minutes to introduce and demonstrate the robot to the judges.

Evaluation Criteria

Appearance / Dynamics	Creativity	Production skills	Application of material	Total
30%	30%	25%	15%	100%

Servo Motor Humanoid Robot Competition – Robot Specification

Servo motor humanoid robot is considered one of the complicated forms of joint type walking robots. Contestants are required to build a 2-leg walking humanoid robot using servo motors and to computer program its motion.



All robots participating in the Servo Motor Humanoid Robot Competitions should comply with the following servo motor humanoid robot specifications:

Non-Marketed Robot Specification

1. The overall weight of the robot should be 3 kg or below (including power devices).
2. Supporting devices/mechanical structure/body parts (excluding servo motors) are built by the participant.
3. There is no restriction on the number of servo motors used and torque.
4. The robot should be built with simple human figure such as head, body, two hands and two legs etc. However, the robot cannot have more than two legs, either movable or non-moveable limb and any supporting devices.
5. Table 1 shows the size of the sole (the part making contact with the ground) which varies according to the weight of the robot). The length of the sole from front to back is X% of 'the length of the leg'. The width of the sole from left to right is Y% of 'the length of the leg'. Vacuum/suction devices cannot be used on the sole of the foot.

   The length of the leg refers to the measurement taken from the shaft (for forward and backward movement) at the uppermost part of the leg to the sole (bottom part of the foot) with the legs at fully-stretched position.

Table 1
Size of sole according to weight of robot

Weight of robot	X	Y
Below 1kg	60%	40%
Below 2kg	55%	35%
Below 3kg	50%	30%

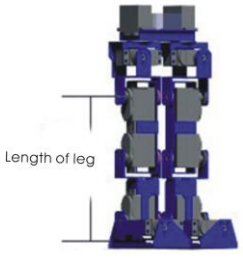


Fig. 1

Fig. 2

Fig.1 – shows the Length of Leg from the shaft (for forward and backward movement) at the uppermost part of the leg to the sole of the foot with the legs at fully stretched position

Fig. 2 – shows the size of sole (from front to back, left to right)

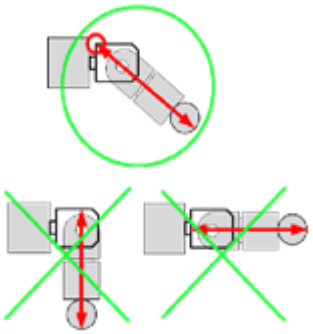
Length of leg(cm)	Weight of robot below 1KG		Weight of robot 1KG-2KG		Weight of robot 2KG-3KG	
	Length of sole X (cm) (front to back of foot)	Width of sole Y (cm) (left to right of foot)	Length of sole X (cm) (front to back of foot)	Width of sole Y (cm) (left to right of foot)	Length of sole X (cm) (front to back of foot)	Width of sole Y (cm) (left to right of foot)
10	6	4	5.5	3.5	5	3
15	9	6	8.25	5.25	7.5	4.5
20	12	8	11	7	10	6
25	15	10	13.75	8.75	12.5	7.5
30	18	12	16.5	10.5	15	9

Note: The size of the sole is based on the weight of robot. In case of dispute, the referee will make the decision and his decision is final.

6. Length of hand
According to table 2, the length of hand refers to the length between the body and the moving parts (such as wrist, tail, neck etc. except foot) is **Z.**

Table 2
Length of hand (Z) based on the weight of robot

Weight of robot	Z
Below 1kg	20 cm
Below 2kg	25 cm
Below 3kg	30 cm



7. The is no specific requirement on the size of the market robot but the overall weight cannot exceed 3 kg.

Marketed Robot Specification

1. 'Marketed robot' refers to robots that are available in the markets without any alterations in the design, function etc. from that originally intended by the manufacturer. The overall weight of the robot should be 2 kg below (including power devices).
2. Usage of 'marketed robot', or robot that is built with the supporting devices/mechanical structure from a marketed robot.
3. The robot should have a simple 2-leg human figure such as head, body, two hands, two legs etc. However, the robot cannot have more than two legs, either movable or non-moveable limb and any supporting devices.
4. There is no specific requirement on the size of the robot but the overall weight cannot exceed 2 kg.

All participating servo motor humanoid robots must comply with the following criteria:

1. Contestants are free to design their weapon but without any movable dangerous devices such as the use of launcher, gun powder or spring. High speed rotating weapons are not allowed.
2. The robot must move in walking mode actions and cannot be connected to a computer or external power supply. It must be controlled manually.
3. Vacuum/suction devices cannot be used on the sole of the foot.
4. Power devices must be installed on the body of the robot.
5. No interference to other robots' wireless communication devices.
6. No more alternations are allowed on the day of competition once the robot has gone through standard checks by the organizer.

20. Servo Motor Robot Obstacle Avoidance Competition

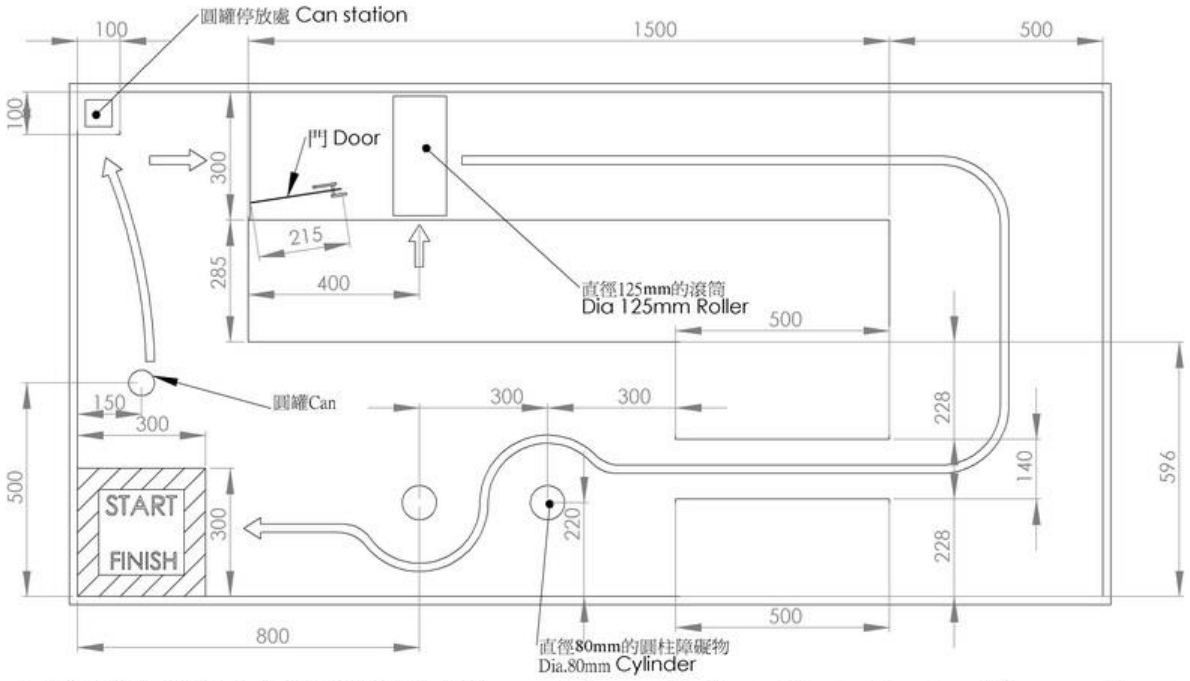
The participating robot is required to navigate through the door, cylindrical obstacle, removing the ball and roller and to reach the destination in the shortest time to win. This game tests the ultimate performance of the robots as well as the navigation control ability of the players.

Robot Specification

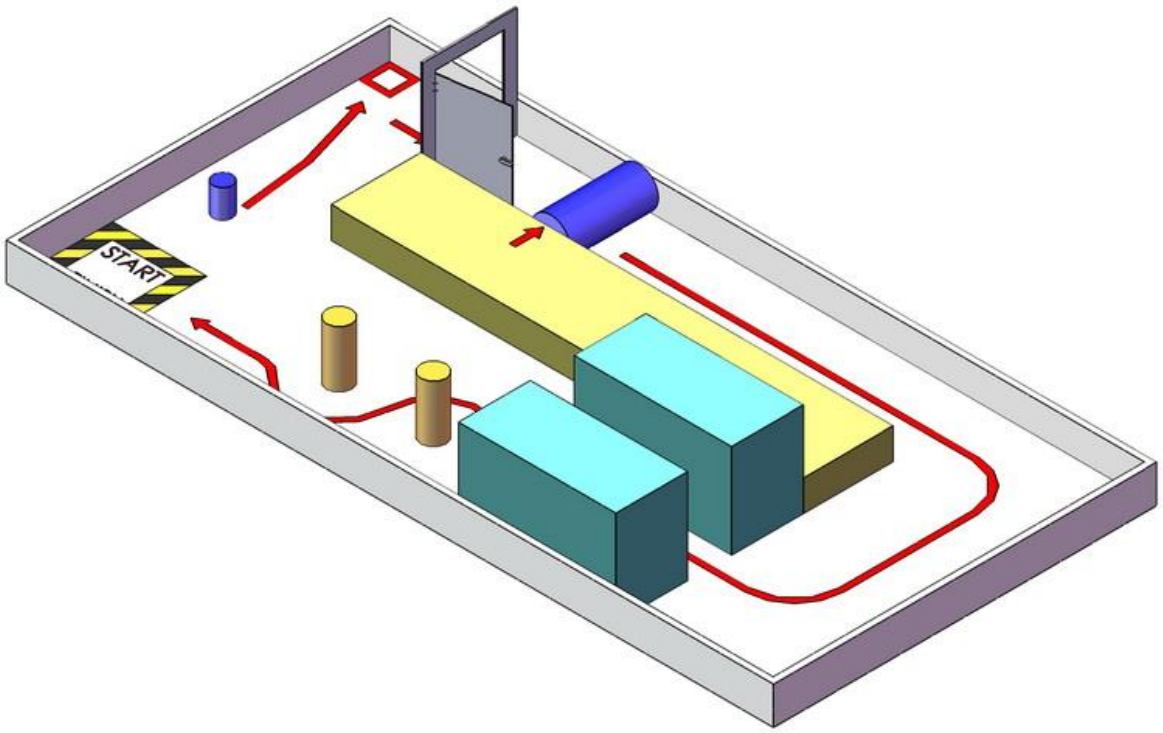
The robot must comply with the Servo Motor Humanoid Robot specification (as stated on pages 39 and 40).

Game Field Specification

1. Servo motor Robot Obstacle Avoidance Competition Court is used for the match (diagram refers).
2. The area of playing field is 2438mm × 1219mm, surrounded by 100mm tall fence.
3. Obstacle includes: I) a can (an empty coffee can) of 60mm in diameter, 90mm tall, weight 50g; II) a roller of 125mm in diameter and 280mm long; III) a cylindrical obstacle of 80mm in diameter and 150mm tall; IV) a door of 215mm wide and 300mm tall.



伺服馬達機械人障礙賽板 Servo Motor Robot Obstacle Avoidance Court



伺服馬達機械人障礙賽板 Servo Motor Robot Obstacle Avoidance Court

Game rule

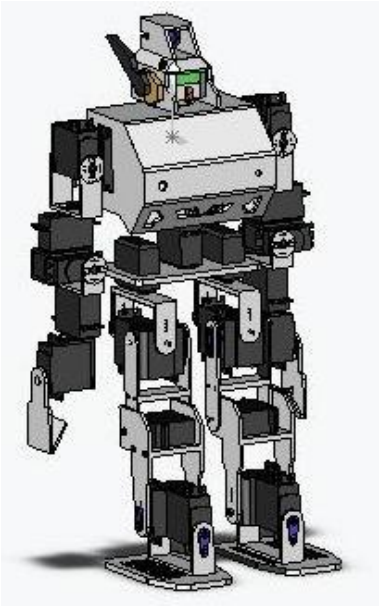
1. The robot is placed at the "START" position. Upon the judge signals start of the game, the timer begins to count.
2. The robot has to travel along the designated route. First, the robot pushes the can to the square at the corner. It then proceeds to the door, presses down the door handle and passes through the door. The robot then pushes away the roller and turns right to the cylindrical obstacle zone . At last, the robot detours around the cylindrical obstacle zone and run to the destination (Start position).
3. The maximum game time is 5 minutes. Robots that cannot complete the game would be recorded 5 minutes game time.
4. Once the game begins, contestants cannot touch the robot until the game finishes. 10 seconds will be added for each touching.
5. During the match, request should be made to the referee for repairing the robot. On approval, the robot should only be removed and returned to the field by the referee. The timer would not pause and the match continues. The robot on returning to the field should wait for the referee's permission to move and continue the play.
6. Each team can play twice and the best time will be recorded. If no robots could finish the game, the one with the longest distance completed will win. If the completed distance is the same, the team with the shortest travelling time will be the winner.

21. Humanoid Free Fighting Competition

2 legs servo motor robot (humanoid) is a complicated form of joint type robot. Contestant has to build a 2 legs servo motor walking robot using computer to program its motion. The team that knocks down the opponent's robot wins the game.

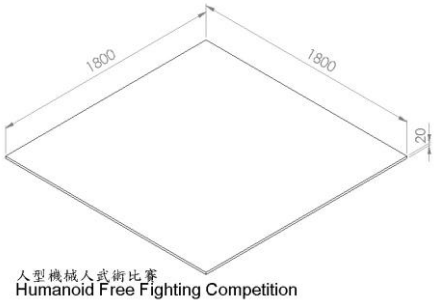
Robot Specification

The robot must comply with the Servo Motor Humanoid Robot specification (as stated on pages 39 and 40).



Game Field Specification

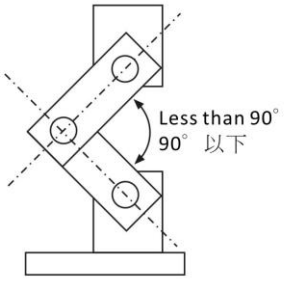
1. The platform is 1800mm long, 1800mm wide and 20mm tall.
2. The robots are placed at the opposite corners of the platform at the start of game.



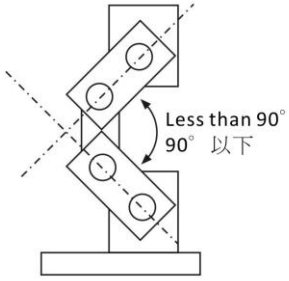
人型機械人武術比賽
Humanoid Free Fighting Competition

Game rule

1. The referee checks the robots for any movable designs that would harm the opponent or damage the platform before the game.
2. Crouched walking** is prohibited, whether it is regarded as crouched walking or not during the competition is subject to the decision of the referee.



One axle-knee joint less than 90°



Two axles-knee joint less than 90°

**"Crouched walking" means from the side view of the robot, the knee joint of the foot that touches the ground is bent less than 90 degree during the course of walking. Same standard applies to Two axles-knee joint robot.

3. Matches will be conducted in one 3-minute round. Team with the least number of 'DOWN' is the winner. If a winner could not be determined at the end of the game, the match will be extended for two minutes. If a winner still could not be determined after the extension, the robots will be weighed and the lighter weight robot wins the match.

4. The moves or actions executed by the robot must be in compliance with the rules and confirmed by the referee. Objections must be raised at the time when the judgment is made. Any objections or requests raised after the game is over will not be accepted.
5. If the 'confirmation of action' is under reviewed, the match will be suspended and the timer paused.
6. If the team finds that the referee's judgment is inconsistent with the rules, they should raise objections before the game starts or resumes. The objections will then be reviewed and the decision made by the event referee is final. The result whether it is "Confirmation change" or "Restart" will be carried out according to the decision made by the referee.
7. The referee has the final decision right, even after reviewing the video, the verdict will not be changed.
8. Scores will not be changed after they are confirmed by the team..
9. If a team is declared disqualified by the referee, the team with their robot should retire immediately and will be given zero score in that round.
10. The Organizer has the right to disqualify the team who violates the rules.
11. During the game, it is prohibited to use any communication devices except for remote control competition category. The offending team will be disqualified and retire immediately.
12. The referee may arrange for a rematch if the match is delayed caused by the game field, props or scoring. If a team suspects their scores is affected by the field and props, they should voice out and request for a rematch immediately on the spot. Any comments raised after the team has left the game field will not be accepted. If there is a rematch, the scores attained in the rematch will be final whether the robot is able to complete the game or not.
13. If the team has any doubts or questions, they should raise to the referee on the spot immediately. The referee will give a reasonable explanation. The Organizer does not accept any comments made by the team after they left the field. The referee has the final decision right.
14. After the robot is knocked down or fell down, it has to get back up on its feet itself and continue the game, otherwise it will be the loser and the game will end.
15. The competing robots will be separated by the referee and return to the initial position for rematch if the following situation occurs:
    a. Robots entangled together and cannot be separated or they are unable to touch each other for more than five seconds.
    b. When the robots stuck with each other, with the referee's permission, contestants may cut off the power to protect the robot.
    c. Both robots almost fall outside of range at the same time.
    d. Both robots lost mobility.
    e. The referee determines that both parties could not win the game.

    If any of the above situations happens again after rematch, the referee may place the two robots in a designated position and restart the match. In case of draw again, the lighter weight robot wins the game.

16. In case the rules are not comprehensive enough to address all situations, the Organizer will make the final decision. The Organizer has the ultimate authority on the interpretation and implementation of rules.

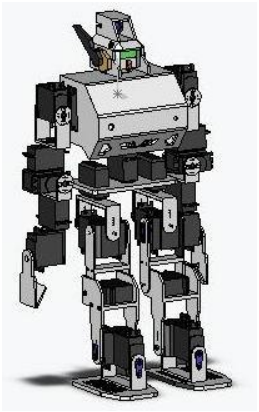
Points Scoring rules：

Item	Guidelines	Points
1	Receive1 red card	1 DOWN
2	Receive 2 yellow cards	1 DOWN
3	Successfully launch a valid attack and knock down the opponent. (Knocked down by instant hit during pause or senseless attack is not counted.)	1 DOWN
4	Falls out of field caused by its own actions (whether in the course of advancement or attack)	1 DOWN
5	Falls out of field due to opponent's attack (it is not end of the round)	1 DOWN
6	Unable to leave the start position within 10 seconds. Countdown will be repeated every 10 seconds.	1 DOWN
7	If the robot stands still and fails to move within three seconds. Countdown will be repeated every 5 seconds.	1 DOWN
8	Pause (the pause duration is 2 minutes).	1DOWN
9	Attacked by opponent's suicide attack**. Suicide attack (each robot has only one chance having two or more points of its body touching the floor of the playing field) can only be used once in each round, regardless if the attack is successful. "Suicide attack" refers to the attacking technique with other parts of the body (except for the sole of the feet) touching the floor of the playing field. For example, pouncing itself on the opponent, hit the opponent with its head while having its hands and feet touching the floor.....and so on, are regarded as suicide attack.	1DOWN
10	If the robot fails to get back up on its feet within 10 seconds after it is knocked down or falls on the floor itself.	5 DOWN
11	Fail to keep a distance away from its opponent after each knock down (includes causing the opponent cannot get back up on its feet)	1 DOWN
12	If the robot attacks the opponent immediately when the opponent gets back on its feet after it is knocked down or fell down before the 3 seconds countdown is over. (This attack is considered invalid)	1 yellow card
13	Except for suicide attacks, robot cannot have more than 2 points of its body touching the ground whether it is walking or making attacks. It will get 1 yellow card for each failure.	1 yellow card
14	If the robot continuously making meaningless attacks or swing actions (for example when the opponent is very far away from itself, etc.)	1 yellow card
15	The robot falls on the ground on its own when it attacks but fails to strike down the opponent.	0 DOWN
16	If a robot goes out of the boundary while recovering from a "down" caused by a valid attack, it will not be considered another "down".	0 DOWN
17	Use 'crouch' style of walking (advancement) or attack and knock down the opponent	0 DOWN
18	Disobey or disrespect for the referee	0 DOWN
19	Use sideway attack and knock down the opponent	0 DOWN

Note: Reference is made to the Hong Kong Robot Boxing League's tournament Regulations

22. Servo Motor Humanoid Robot – Super Brawl

2 legs servo motor humanoid robot is a complicated form of joint type walking robot. Contestant has to build a 2 legs servo motor walking robot using computer to program its motion. All participating robots are placed on the game field and combat among themselves simultaneously using their own methods to knock down or push the opponents out of the arena until the last one remains on the field.

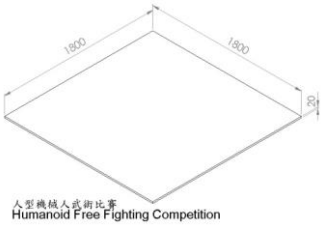


Robot Specification

The robot must comply with the Servo Motor Humanoid Robot specification (as stated on pages 39 and 40).

Game Field Specification

1. The platform is 1800mm long, 1800mm wide and 20mm tall.
2. All participating robots are placed along the borders inside the game filed.



Game Rules

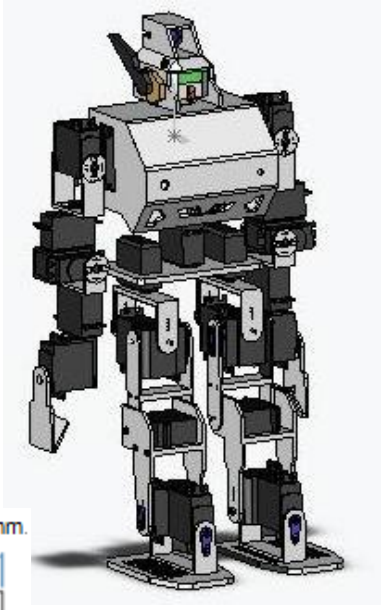
1. The referee inspects all robots to ensure they are not equipped with any dangerous movable devices before the match begins.
2. Participants have to ensure the robot's power devices, wireless controller and its mobility are functioning properly.
3. There is no time limit. The last robot remains on the game field is the winner.
4. Once the match begins, only the referee may touch the robots. All participants are not allowed to touch any robots.
5. There is no pause during the match.
6. The robot is allowed to continue with the match as long as it is able to stand up on its feet after being knocked down or fell down to the floor within 10 seconds. If the robot fails to stand up on its feet after 10 seconds, it will be regarded as 'loser' and will be removed from the arena.
7. The robot will be regarded as loser once it falls out of the arena under any circumstances.
8. The robot will be regarded as 'loser' if it stands still and fails to move within 5 seconds. It will be removed from the arena.
9. Participants robots may knock down their opponents by attacking them in the front, sideways or using 'suicide attack' or push their opponents out of the arena.
10. The referee may separate the robots and return to a safe position for rematch if the following situation occurs:
    a. Robots entangled together and cannot be separated
    b. When the robots stuck with each other, with the referee's permission, contestants may cut off the power to protect the robot.
11. The Organizer has the authority to disqualify any teams violating the game rules.
12. In case the rules are not comprehensive enough, the Organizer will make the final decision. The Organizer has the ultimate authority on the interpretation and implementation of rules.

23. Servo Motor Humanoid Robot - Curling Race

Curling is a sport in which players slide stones on a board towards a target area which is segmented into three concentric circles. Contestant has to build a 2 legs humanoid walking robot using servo motor and to computer program its motion. It is a one to one match and the robot is to kick the 'curling stone' to the target, the house. The team with the highest number of accumulated points at the end of the match is the winner.

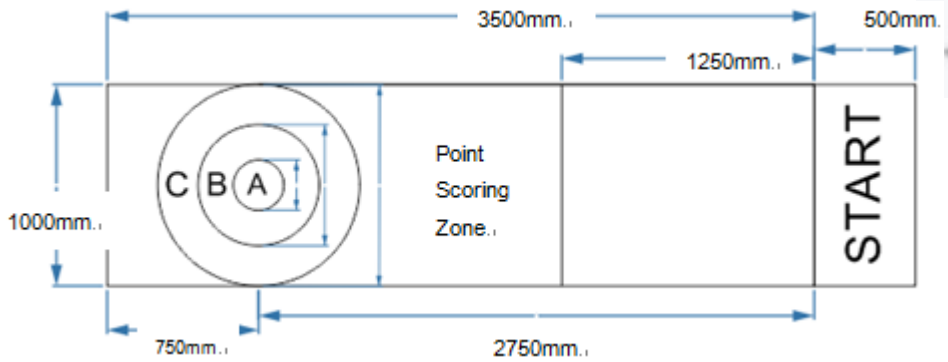
Robot Specification

The robot must comply with the Servo Motor Humanoid Robot specification (as stated on pages 39 and 40).



Game Field Specification

1. The arena (3500mm x 1500mm) is made up of several PVC boards. The diameters of Circle A: 250mm, Circle B: 600mm, Circle C: 1000mm respectively
2. The 'curling stone' is 70mm in diameter, 25mm tall and weighs 30g. It is made of PLA materials created by a 3D printer.



Game Rules

1. The match consists of three rounds. A draw is used to determine which team plays first. Each team is given a culing stone for curling in each round. For example in the first round, each team assigns one robot to take turn to kick its curling stone into the points scoring zones within the 2-minute game time. The match ends upon completion of the three rounds and points are scored. The team with the higher scores wins.
2. Contestant may place the robot and the curling stone at any position within the 'Start' zone before the match begins. Contestant is not allowed to touch the robot once the match begins until end of the round.
3. The robot is allowed to touch the curling stone maximum 3 times during each round. However, the robot is not allowed to touch the curling stone once the curling stone gets into the points scoring circles and the round ends. The curling stone will remain where it is on the arena.
4. Under whatever situation, once the robot touches the curling stone is regarded as one touching.
5. The game will immediatley stop once the curling stone or the robot leaves or falls out of the arena during the match. Points scored during such round will be forfeited and the team will not get a repleacement curling stone.
6. It is only acceptable to use its own curling stone to hit against other curling stones, and even the opponent's curling stone outside of the Point Scoring Zone.

7. Points are scored and summed up according to the position of the stones on the arena at the end of the match to deterime the winner. Below are points scoring:

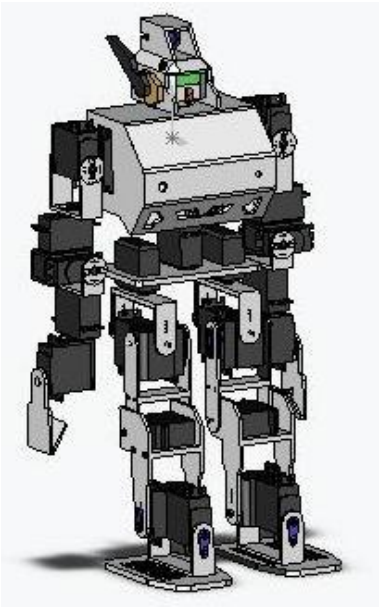
Final resting position of the curling stone	Points
Inside zone Circle A	7
Inside zone Circle B	5
Inside zone Circle C	3
Inside Point Scoring Zone but outside of the three concentric circles	1

If the curling stone rests across two different point scoring zones, the higher one will be used.

8. A rematch will be arranged in case of draw and both teams swap their order of play. In case of draw again, the lighter weight robot wins.

24. Servo Motor Humanoid Robot - Steeplechase

Contestants are required to build a 2-leg servo motor humanoid robot using computer to program the robot to run and pass over the obstales. The robot is to complete the race in the shortest time.

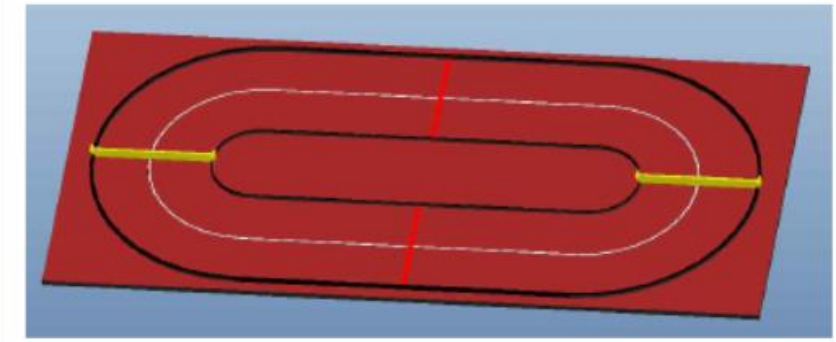


Robot Specification

The robot must comply with the Servo Motor Humanoid Robot specification stated on pages 39 and 40.

Game Field Specification

1. The surface of the game field is covered with 2mm thick felt fabric. The dimensions of the game field refers to the diagram (1) below.



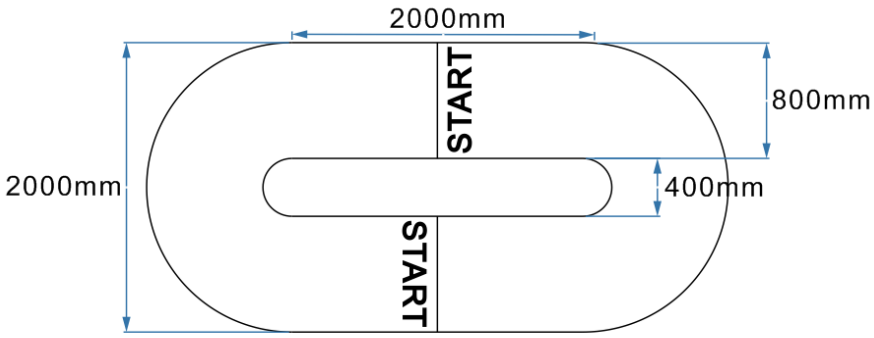


Diagram (1)

2. Obstacles are securely locked on the tracks, please refer to diagram (1) for exact positions and diagram (2) below for the dimensions of the obstacle.

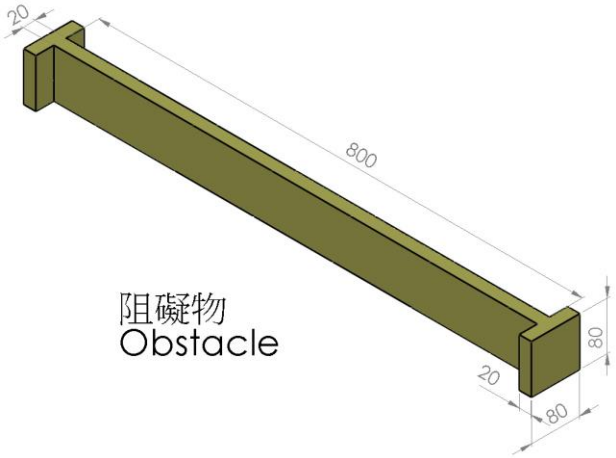


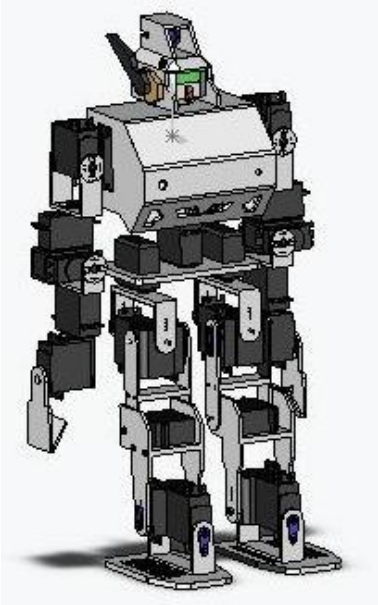
Diagram (2)

Game Rules

1. Constestants are required to complete one lap in anti-clockwise within 3 minutes.
2. Contestants are not allowed to touch the robots once the match begins.
3. Robots are required to run in a backward and forward movement mode. Robot is allowed to make right or left turns to adjust its direction only (robots are prohibted to run in a left or right movement mode under any circumstances).
4. Robots are required to make forward movement to pass over the obstacles (for example hurdling, somersaulting etc.)
5. Robot with any parts of its body touching the exterior of the track boundary will be disqualified.
6. There is no pause during the match.
7. Each team has 2 rounds and the shorter game time is recorded. If no robot could complete the race, the one covers the longerst distance from the starting line wins.

25. Servo Motor Humanoid Robot - Relay Race

Contestants are required to build three 2-leg servo motor humanoid running robots using computer to program their motions. Each robot has to complete 2 laps in the shortest time. As each team has three robots so they have to complete a total of 6 laps.

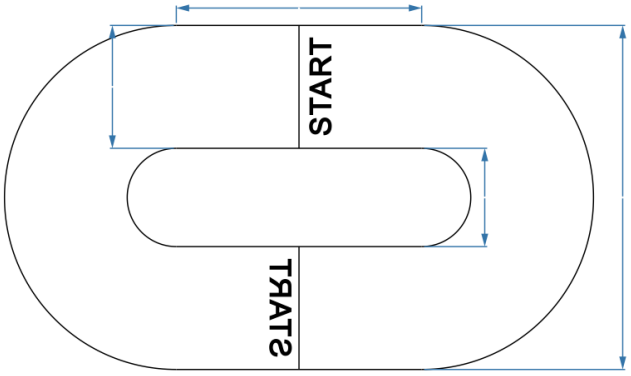


Robot Specification

The robot must comply with the Servo Motor Humanoid Robot specification (as stated on pages 39 and 40).

Game Field Specification

1. The surface of the game field is covered with 2mm thick felt fabric. The dimensions of the game field refers to the diagram below.

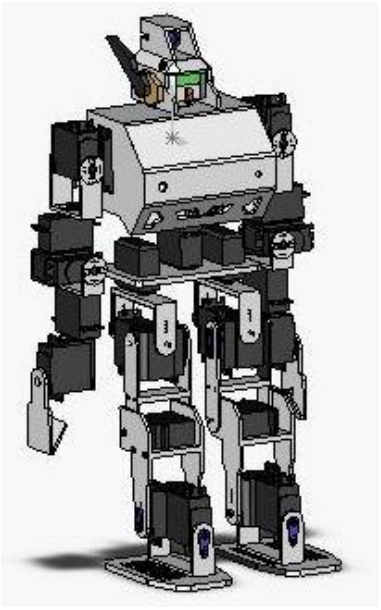


Game Rules

1. Each team sends out three robots for the match.
2. Two robots, each from two different teams, will compete simutaneously. Each robot is to complete 2 laps in anti-clockwise in the shortest time. Each team has 3 robots which means they will need to complete a total of 6 laps.
3. If one of the two teams completes 6 laps or the 10-minute game time expires, whichever is earlier, the match will end.
4. Robots are required to run in a backward and forward movement mode. Robot is allowed to make right or left turns to adjust its direction only (robots are prohibited to run in a left or right movement mode under any circumstances).
5. Contestants are not allowed to touch the robots once the match begins
6. If the robot with any parts of its body touches the exterior of the track boundary for 5 seconds, the referee will place it back in the middle of the track.
7. If the robot wants to overtake its opponent, it should not collide with its opponent. The robot in the front also should not obstruct its opponent behind. Violation of these rules will be disqualified.
8. The handoff baton robot must first have its whole body crossed the START line which imply transferring of baton. The recipient robot will then set-off from the START line .
9. There is no pause during the match.
10. Each team compete once only and the team completes the 6 laps in the shortest time is the winner. If none of the teams could finish the game within the game time, the team covers the longerest distance wins the match.

26. Servo Motor Humanoid Robot – Soccer Race

This event requires the contestants to computer program a humanoid robot for the soccer race. Soccer is one of the world's most pouplar sports. Through this exercise, the contestants' interest in the structure and programming of the robots will be raised as well as their team spirit willl further be enhanced.

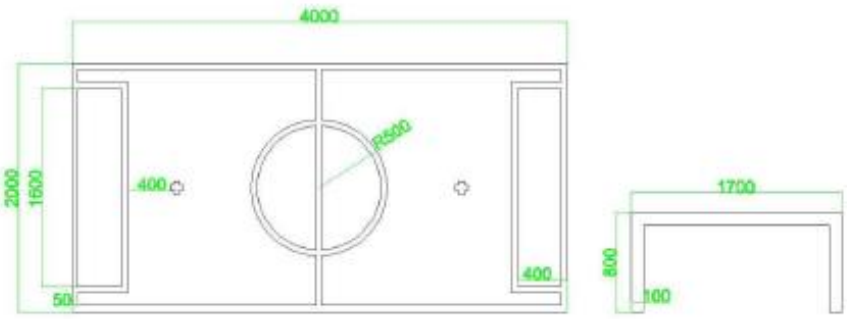


Robot Specification

The robot must comply with the Servo Motor Humanoid Robot specification (as stated on pages 39 and 40).

Game Field Specification

1. The surface of the game field is covered with 2mm thick felt fabric. The dimensions of the game field refers to the diagram below.



2. Size of soccer:
   It is rubber hollow ball with 12cm in diameter.

Game Rules

1. Eech teams sends out 2-3 robots for the match and one of which must be the goalkeeper. It is acceptable to have a maximum of one extra robot as reserve.
2. Contestants are not allowed to touch the robots once the match begins.
3. The match is comprised of two 3-minute halves. The halves are separated by a half-time period of 1 minute. An extra 2-minute game time will be added if a winner cannot be determined at the end of the match. If it is still draw, a fix-point penalty kick will be used to determine the winner.
4. There is no pause during the match. With the referee's permission, the robot may be removed from the arena for repair, if necessary, and the timer will not pause.
5. Except the robot goalkeeper may use its hands to touch the ball, all other robots are not allowed to use their hands to touch the ball. Robot that commits a foul will be required to leave the field for 30 seconds.
6. The robot goalkeeper may only move around within the penalty area. It can punch, catch, kick the ball into play and defend the goal from scoring by the opponent team.
7. Other than the robot goalkeepers, robots of both teams are not allowed to enter the penalty area. All robots on the field are not allowed to attack other robots. Robot that commits a foul will be required to leave the field for 30 seconds.
8. If the ball falls out of bound, the game is restarted with a free kick on the border of the field.
9. The team with the most goals wins the game.

27. Life Inspired Innovative Model Design Competition

The competition encourages students to transform the everyday objects into cute and delightful characters using their imagination and creativity.

Game Rules

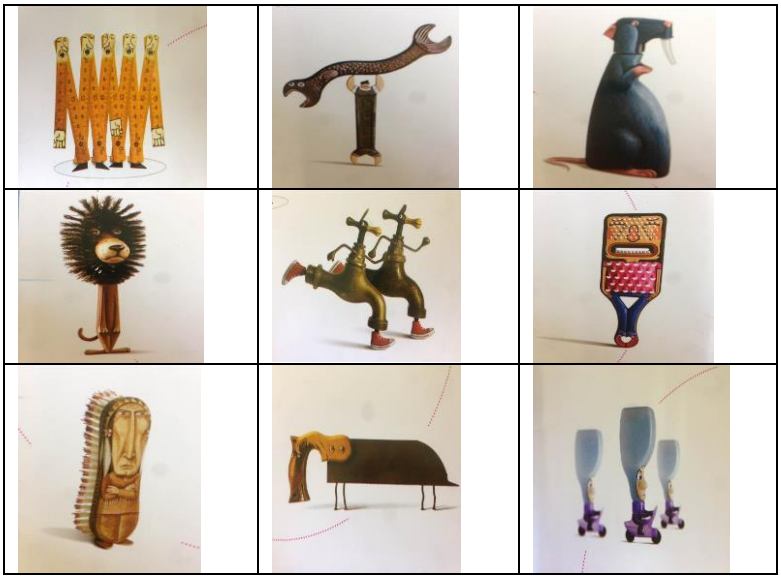
1. The participating article may not take part in any other competitions.
2. The article including its peripheral decorations cannot exceed 500mm X 500mm X 500mm. Peripheral decoration is optional.
3. The contestant may submit an A4 size introduction on the design concept and features (annex 3) in the 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

The original shape of the article should be kept as much as possible and use of additional parts should be minimised.

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

Examples: French artist Gilbert Legrand using his imagination and creatively by painting or adding small details to our everyday domestic objects and turn them into cute characters and give them new life….. a tap becoming a running lady, a brush seen as a Native American, a toilet brush conjures a lion …..



Annex 3

Life Inspired Innovative Model Design Competition

Product Introduction

Category: _____ 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.