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Robot Gathering	League	Participation	Construction
	Junior/ Challenge	1 Person	1 Robot On Site

1. Game description

Robot Gathering aims to arrive at the point of destination to arrive quickly collects the entire object given in the game. Carrying object mission priority is higher than completing driving. So when driving fast and accurate robot is important.

Mechatronics related knowledge production and programming robots using the principle of dynamics, so the basics of robot learning to understand sufficient on the robot's own understanding of the need and of the laws of physics that is applied to the robot and sensor adjustment technology, as well as programming skills.

2. Robot

2-1. Robot type: No restriction

2-2. Built on-site The robot should be built on-site by the participant during the construction time except for the robot controller. And while measuring the machine the assigned size has to be followed.

2-2-1. Size of robot

2-2-1-1. Size: Robot should be less than 18cm X 22cm (H*W)

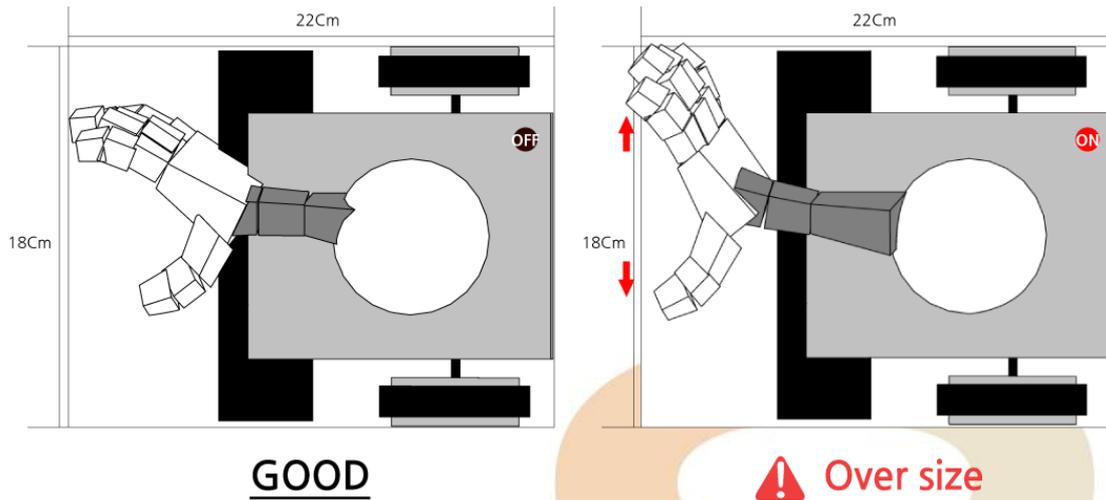
2-2-1-2. Size measurement

- 1) Self-Check: Participant can check size of the robot in testing time of constructing zone.
- 2) Official inspection: Before the competition, referee will check the size of the robot.
- 3) Ways of Measuring: When the power of robot start to move will start to measure the equipment and participant cannot give any objection toward the judge.
- 4) Modify: If the size is over there is a minute to modify in front of the judge. If there didn't finish the job in given time it will be disqualified as overcharge size regulation.
- 5) Before checking on measuring the instrument and shape if the size is changes it will be disqualified.

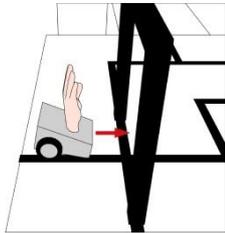
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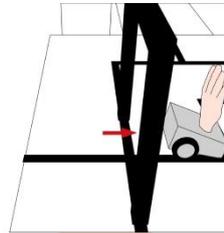
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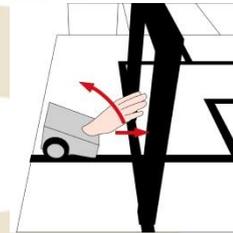
*When Length and weigh is changed, same rule applies.



<Size Measurement with figure>



<Right Start>



<Wrong Start>

2-2-2. Sensor of the Robot: No restriction

2-2-3. Power

2-2-3-1. Robots should work with an independent electric power supply; it cannot use a combustible device.

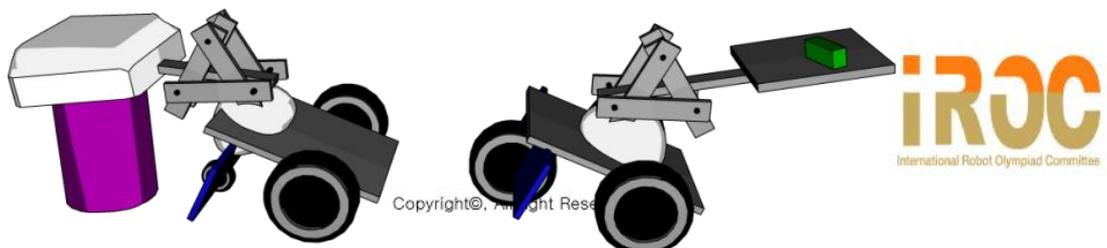
2-2-3-2. There is no limitation on type of battery or voltage.

2-2-4. Operation: No restriction

2-2-5. Structure in mission: Robot object can be move or having structure to load the object and cover with the basket.

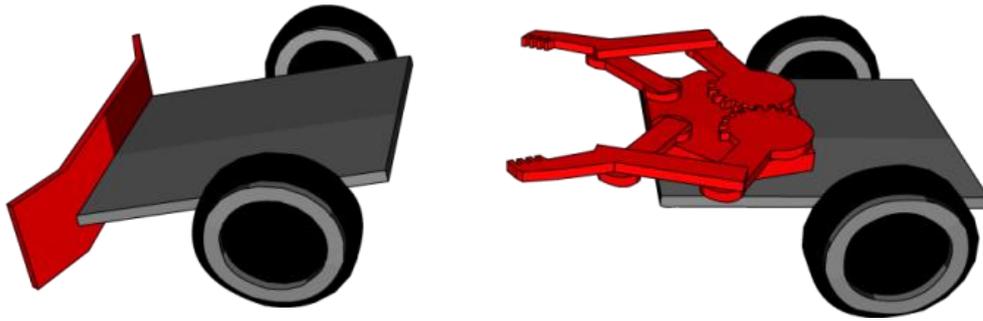
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Example of possible to use structural mission challenge



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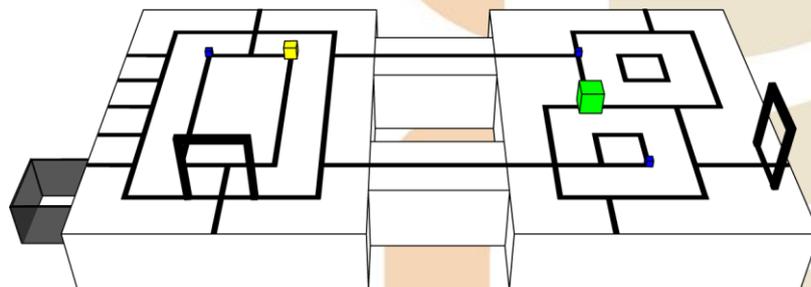
2-3. Robot must move autonomous by the program except the starting point and it cannot be operated by the outside.

3. Competition Site

3-1. Official Playfield: It must be an approval from International Robot Olympiad committee

3-2 .Size and Composition: The size of playfield has to be 160cm X 120 cm ($\pm 10\%$) and It consists of more than two bridges has to be connected with playfields.

EX



<Above the picture is example connection with bridge, arrangement, mission and line will be announce on the match day>

3-2-1. Connection: The size of bridge has to be 25cm ($\pm 10\%$) and it connects with straight line and curve field is stick with tapes and paper sheets.

3-2-2. Site error prohibited range: The gradient of site has to less than 2 ($\pm 10\%$) and there might be gap or bumpy which can be less than 3mm.

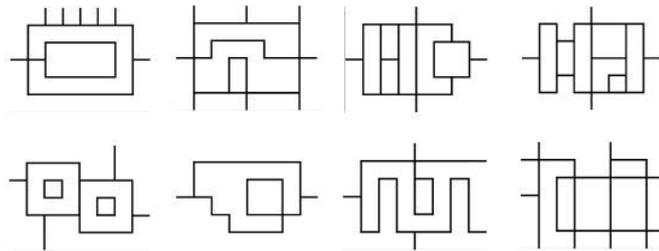
3-2-3. Prevention to stop falling robot: There will be no special structure for prevention to stop falling.

3-3. Playfield: It is cover with matt coat polyethylene terephthalate paper which includes advertisement and logo from the organizers.

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3-3-1. Mission Map: It consists of connection and intersection of straight line and curve line and it fix with sheets and tapes in the playfield.



< Mission map is use as following example in Robot Gathering 2016 >

3-3-2. Line: The color of line is black and its width is 2cm ($\pm 10\%$)

3-3-3. Installation of measuring instrument: In order to measure the time, starting and ending point measuring instrument will be installed, according to mission the direction can be changed, structure that is connected to the field can be used.

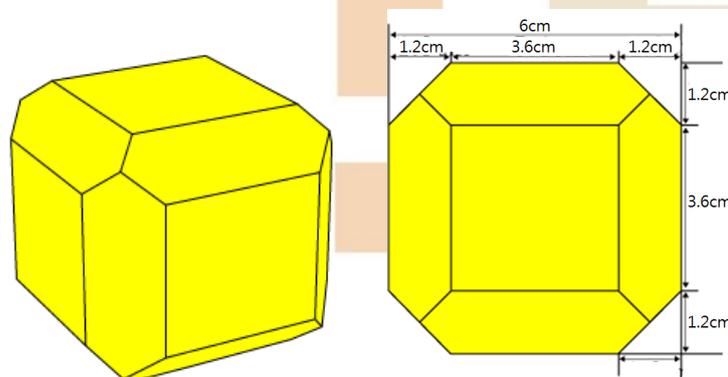
3-4. Appendage of Competition

3-4-1. Target: The Weight is between 10~30g ($\pm 10\%$) and can used as polyhedron with two different kinds of size blocks

3-4-1-1. Size of a Target

- 1) Large Cube: 6cm * 6cm * 6cm (W*H*H, $\pm 10\%$)
- 2) Small Cube: 3cm * 3cm * 3cm (W*H*H, $\pm 10\%$)

EX

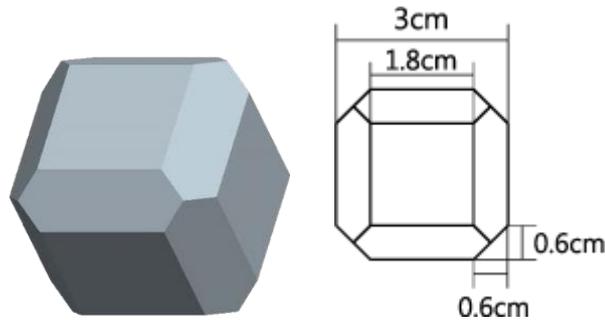


<Larges Cube>

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EX



<Small Cube>

3-4-1-2. Target colour can be used freely.

3-4-1-3. Allocating Targets

Location has to be intersection in mission map including starting point.

3-4-2. Destination

According to the mission, the site of competition is assigned and allocated and divided in to inner and outer destination.

3-4-2-1. Inner destination

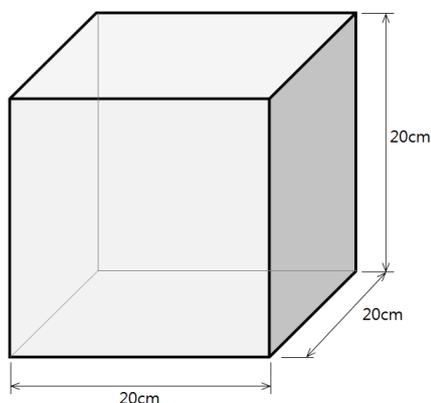
There will be given an optional area in site of competition and designate the destination.

3-4-2-2. Outer destination

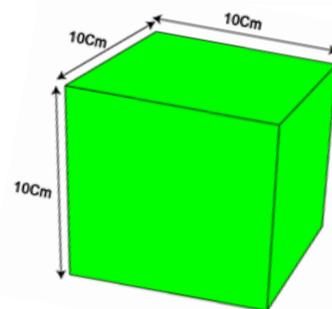
- 1) Size : 20Cm*20Cm*20Cm (Inform in competition day),
- 2) There will a special box in outside and desingate the destination
- 3) Installation : It will be in the ground and fixed next to side of the competition site.

3-4-3. Obstacle

In order to fix the structure it can give the physical limitation.



<Outside target Area>



<Obstacle>

3-4-3-1. Size of obstacle

It will be size of a regular hexahedron 10Cm*10Cm*10Cm (W*L*H, ±10%)

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3-4-3-2. Allocation of obstacle

Following mission, the intersection points can be above the starting point and fixed in site of competition.

3-4-4. Trap (Disable) can be shown unmovable spots

3-4-4-1. Spots can be shown as X in black in site of competition and mission map

3-4-4-2. Allocation

According to the mission, it can assign in intersection and above the starting point.

4. Competition progress

4-1. Game process

There will be 2 times recorded trials and after first trial there will be some modification time.

4-2. Construction and practice time

Construction and practice time is less than 2 hours and it will be announced on the match day.

4-2-1. Allocation of playfield

It will allocate based on number of participant and level of difficulty of the game.

4-2-2. Production and Practice

Participants can do the practice until announced time but before the game is prohibited.

4-3. 1st Run

After the construction and practice time the 1st run will begin.

4-3-1. preparation of the game

All of the participant has to take the robot out and be ready from referee and volunteer's instruction.

4-3-2. after the game standby

When participant is finish with their game, they have to line up and watch all of the participant game until end of the competition day.

4-4. Repair Time

After the end of 1st run, the entire participant has 30minutes repair and practice time.

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4-5. 2nd Run

After the repair time, 2nd Run will start to begin in the match.

4-5-1. preparation of the game

All of the participant has to take the robot out and be ready from referee and volunteer's instruction.

4-5-2. Stand by

All of the participants finish with their game; they will go back to their seats.

5. Competition

5-1. Perform the mission

Course of run and order of carrying is not designated but participant can decided freely.

5-2. Start

A participant should start the robot when the referee starts the game. If the participant starts the robot before the referee's signal, a participant must restart the game.

5-2-1. Miss Start

If there was a miss start regarding the starting signs, time counted from 5 and the robot doesn't start it will be miss start and there will be one more chance to the team.

5-2-2. Restart

The chances are only twice and if there is no move after the restart signal from the referee, it will be disqualified.

5-3. Arrival

Line installed in measuring instrument of the robot or arriving at intersection of the point(Robot needs to install the line of measuring instrument or stop at intersection point) had to stop the time measuring the instrument.

5-3-1. Mission

Robot arrives at the finishing point the referee counts until 3 second it will be admitted to reach the final stage of the game.

5-4. Limited Time

If teams do not complete the mission in two minutes, the match will be over and result will before the finishing point.

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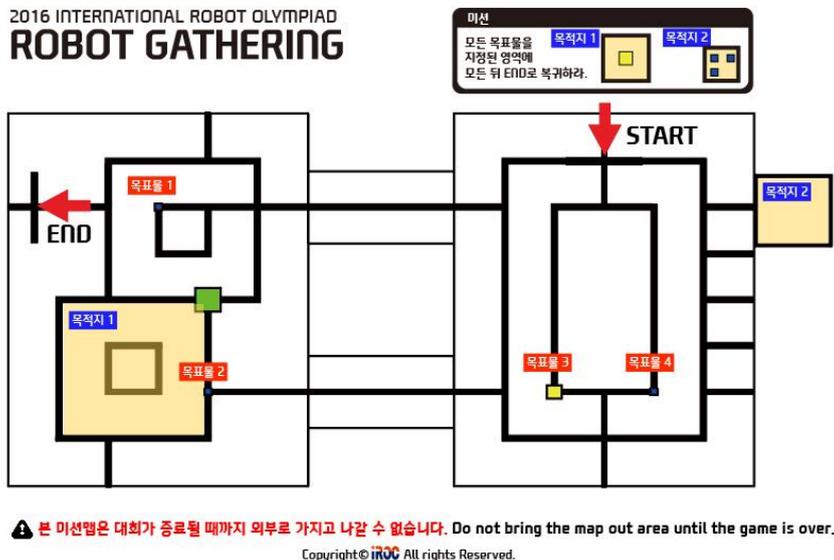
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5-5. Opening the Mission

Before the game the team has to follow is line structure, location and number of destination and object also shape of bridge in site of competition will be shown as given mission to participant.

Ex)

Example of the Mission



5-5-1. moving the target

It can be move not by destination but the location.

5-5-2. Numbers of moving target

It can be move only once in during the moving direction.

5-5-3. Adjustment of target

The double touch is possible from the target which is move from the direction, and there are no limitations of numbers of target.

5-5-4. Loss of target

Robot which had is collapse from outer site of competition cannot be reused.

5-5-5. Crossing

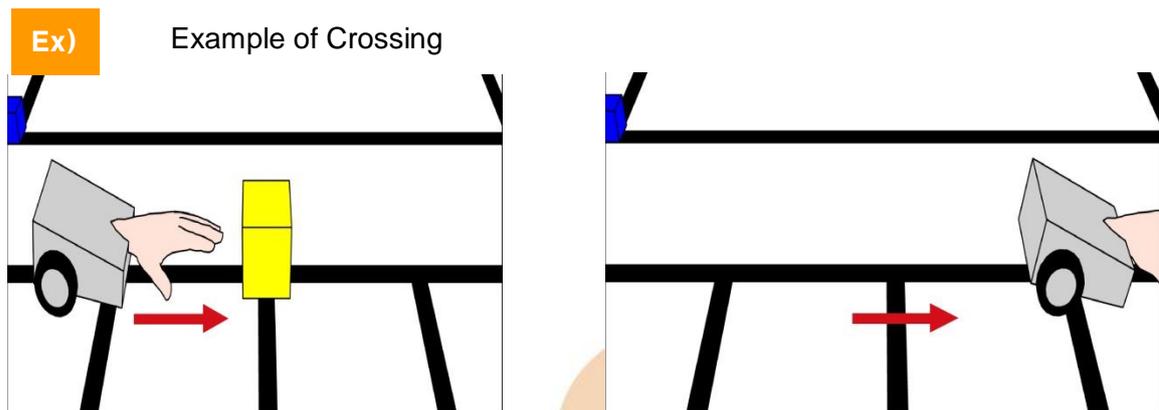
Robot can cross the target location

5-5-6. touching the obstacle

There is limitation of physical part, but the point will not be deducted from the participant.

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5-6. End of Competition

If robot could not continue match, referee will announce the match is over.

5-6-1. Robot Stop: If the robot doesn't move the referee will count 10 seconds and if the robot still could not move call it a stop and count the points before reaching the end point.

5-6-2. TKO (technical knockout): During the match, robot had been stopped over the structure and obstacle and could not start with the motion referee will decide the match cannot restart the reason of repeat motion of robot and it will be announce TKO and result will be admitted before the TKO.

5-6-3. leaving the line

Even if the robot is leaving the line, robot can recognize another line and continue driving the line then the match will keep going.

5-7. Due to disqualification of ending the match

During the match, when participant violate the rule or making interruption the match will be ended but result will not be admitted.

5-7-1. Robot Touch

During the match, participants touch the robot without judge and supervisor authorization it will be robot touch and disqualified.

5-7-2. Repair time during the match

During the match, additional, remove, exchange, changing the toll is prohibited but during the standby to repair the robot the participants has additional battery then the team will be disqualified.

5-7-3. sensor turning

Before the competition, there was a sensor turning situation happen then it will be disqualified.

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5-8. Rematches

During the match when it had been black out and breakdown of measuring instrument happens referee and coach can make a decision to do rematch.

6. Evaluation

6-1. Ranking decision factors

Mission points, time record and stop mission of finishing line.

6-2. Mission point

When the game finished, finally in the destination they will look over the object and decided the success of result. Some of target will be close to area and it's hard to look then it will be failure. The entire decision is upon the referee.

6-3. Time record

Time record is based on the measuring instruments.

6-4. Final score

Better score out of 1st and 2nd run will be the final score.

6-5. Order of priority to result

Groups will be divided according to the group and their record will be compare and result has to be decided, the arrival point if they succeed the stop mission the result will be on the top.

Number of success object > Time record > Success of stop mission > Compare to time result

6-5-1. Order of priority according to present

If is same result in the present time then the referee needs to look the other time of the record and decided the result.

6-5-2. Order of priority according to Tie-Breaker

In order to sum up the best result from first and second chance, if it's a tie it will be 1st to be in best rank.