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Robot Biathlon

Standard

League
Junior/
Challenge

Participation
1 Person 1 Robot

Construction
Pre-made

1. Game Description

Robot Athlon will be played at the stadium provided by the host. It is a tournament game aiming to move the humanoid to empty the targets in the cabinet or to come back to the starting point as fast as they can. Emptying the targets will prioritize in the record, thus, precise understanding about their robot and skilled control is important. This game is played face-to-face only.

2. Robot

2-1. Types of robot Humanoid

2-2-1. Production All robots must be pre-made before the competition, and no extra time for producing robots will be given on site.

2-2-2 Motor Following motors are only allowed to use.

Manufacturer	Motor type	Motor Specification.
Robots	AX-12A(AX-12+)	12.0V / 1.50Nm / 59rpm / Cored / TTL

2-2-3. Use of parts All certified parts of the models KITS are allowed to use freely (sensor, motor, etc.)

2-3. Power

2-3-1. Autonomous movable independent power must be used, and combustion engine is not allowed to use.

2-3-2. No limitations on battery type and voltage level.

2-4. Operation

2-4-1. It should walk by two legs, without any linking structures.

2-4-2. While standing, its feet should not cross each other.

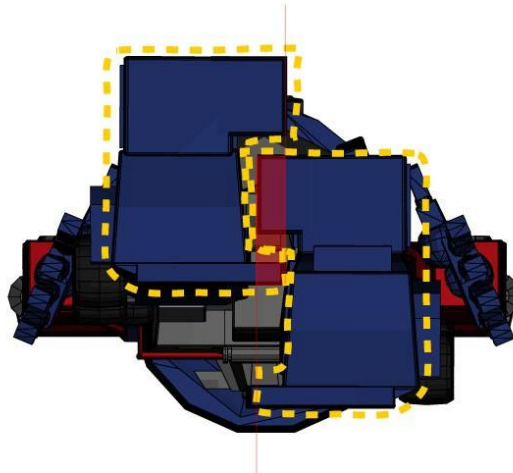


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<While robot is standing, feet should not cross like above picture>

2-5. Programming and control

2-5-1. Both programmed robot and remote-controlled robot are allowed.

2-5-2. Communication control specification

2-5-2-1. Only Zigbee /Bluetooth /2.4Ghz wireless are allowed.

2-5-2-2. Smartphones are allowed as a remote controller, but airplane mode must be turned on in the competition hall at all times.

2-5-2-3. Cable-based control is not allowed.

2-5-2-4. When communication system gets interrupted, the team that couldn't change the channel will be disqualified.

2-6. Spare robot

2-6-1. **Robot preparation** Participant can bring spare robot to competition site, but both main and spare robots must be confirmed by referee before the match.

2-6-2. **Use of spare robot** Before the declaration of starting the competition, the spare robot must get a confirmation by the referee. The time when switching the robots are available are as followings.

2-6-2-1. League match: Replacements available before the start of play in that group

2-6-2-2. Tournament: Replacements available before the start of each match

2-6-2-3. **30 minutes to modify the mission code**

3. Competition

3-1. **Competition site** Playfield approved by International Robot Olympiad Committee.

3-2. Size and composition

The size of playfield has to be 160cm X 120 cm ($\pm 10\%$) and is constituted with two blocks and a bridge connecting the two.

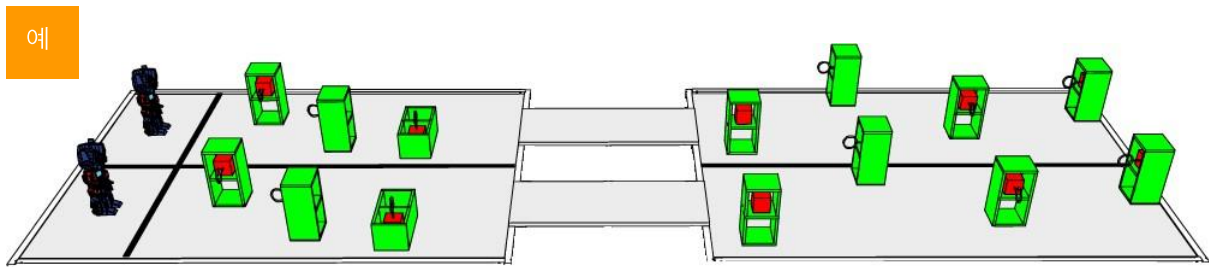
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<Example of a playfield and the cabinet and arrangement of the targets may differ based on types of the mission.>

3-2-1. Bridge 25cm width in straight or curved shape, fixed on a playfield using sheet and tape.

3-2-2. Allowable range of error in the stadium The slope under 2° (error $\pm 10\%$) and a gap or bump under 3mm ($\pm 10\%$) is allowable.

3-2-3. Prevention for falling robot There will be no special structure to prevent robot from falling.

3-3. Playfield

3-3-1. Field Covered with a white sheet paper, and there may be an advertisement or a logo of the host.

3-3-2: Guide lane No extra guide lane is equipped but guided by an 2cm (error $\pm 10\%$) black line in the middle of the playfield.

3-3-3. Mission map Constituted with different shapes of targets and arrangements of its ways.

3-3-4. Starting point, finishing point, half point Pointed by a black line with width of 2cm (error $\pm 10\%$).

3-4. Playfield adjuncts

3-4-1. Target

3-4-1-1. Shape A hexahedron connected with a ring

3-4-1-2. Weight Less than 100g (error $\pm 10\%$)

3-4-1-3. Size

hexahedron: 6cm x 7cm x 5cm (W x L x H, error $\pm 10\%$)

ring: inner diameter 2~3cm (error $\pm 10\%$)

connector: 0.5~0.7cm (error $\pm 10\%$)

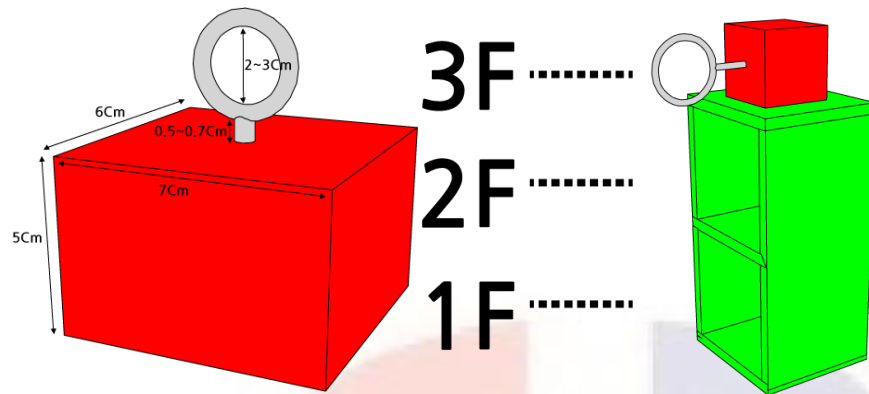
3-4-1-4. Arrangement Target will be arranged somewhere between 1~3rd floor of the cabinet, and the ring will be arranged based on the mission



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<Example of target and cabinet>

3-4-2. Destination

3-4-2-1. Shape Cabinet

3-4-2-2. Size

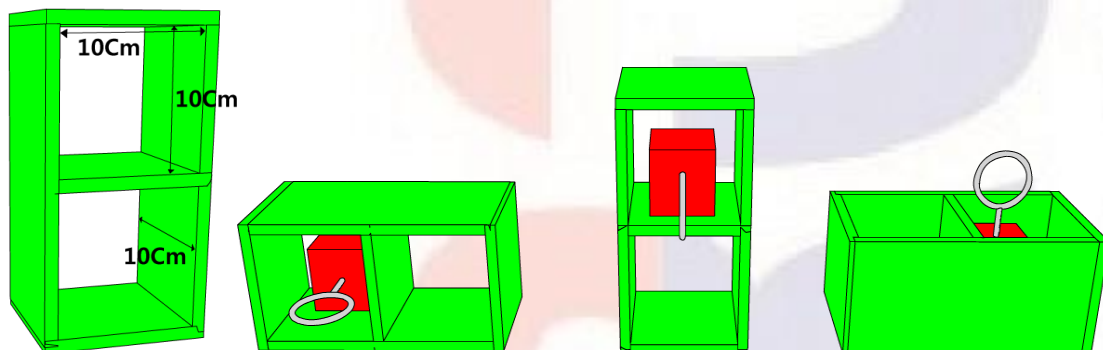
Outer: 12cm x 11cm x 23cm (W x L x H, error $\pm 10\%$)

Inner: 10cm x 10cm x 10cm (W x L x H, error $\pm 10\%$)

Frame thickness: 1cm (error $\pm 10\%$)

3-4-2-3. Arrangement

Cabinet will be arranged based on mission in various shapes and ways.



<Example of cabinet arrangement>

4. Process

4-1. Game process Winners form the league in a qualifying round, can precede to the tournament as a main match.

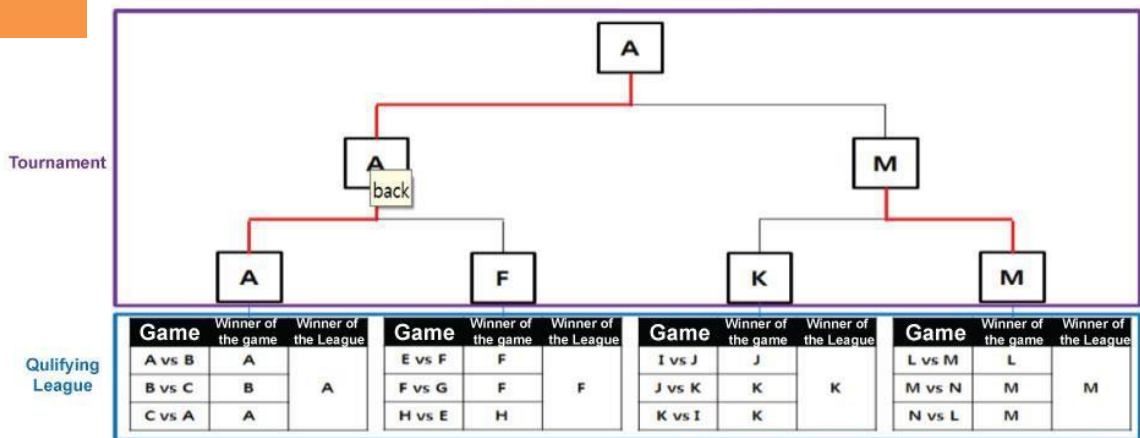
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4-2. League (Qualifying round)

4-2-1. Group fixture Participants will form a group of 3 for league by lottery.

4-2-2. Winning point and advance to the tournament

The participant with the highest points proceeds to tournament.

(Win: 3 points, Draw: 1 point, Lose: 0 point).

4-3. Tournament (Main match)

4-3-1. Counterpart of the tournament will be decided when drawing groups at the league.

(i.e. first place of team A vs first place of team C, first place of team C vs first place of team D)

4-3-2. Ties are not accepted, and extra round will be held till winner gets decided.

4-3-3. If 3 teams are running a tournament, main match will be conducted by league.

4-4. Modification of robot After the game finishes, all teams can have equal modification time based on the decision of referee.

5. Match

5-1. Performing mission The humanoid must go through the assigned starting point of the lane, empty or move the target from the cabinet following the mission map. Then go clear the turning point mission, and go back to the starting point.

5-2. Mission open Mission including cabinet, arrangement and number of the targets will

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be opened before the game starts on-site.

5-3. Running time Robot that went through the starting line must finish the mission in 2 minutes. If not, the game ends, and the record till the end will be accepted.

5-4. Lane assignment Lane will be chosen by the participant who wins the games such as rock-scissors-and paper or throwing coin.

5-5. Returning area

5-5-1. Returning area Returning area is a standard place for robot to go back to their starting point after finishing all of their missions. Composition of returning area may change based on the mission.

5-5-2. Arrival Judge accepts when both feet of the robot go through the line of the returning point. If not accepted, the robot can't go back to the starting point.

5-6. Dealing target

5-6-1. Target must be dealt based on the mission map. However, the sequence of dealing must be decided by the participant.

5-6-2. When asked to erase the target

5-6-2-1. Only targets that are completely removed from the interior space of the cabinet can be scored.

5-6-2-2. Considered that the target is not directly in contact with the cabinet, and that it is airborne into the interior space of the cabinet has not been removed.

5-6-2-3. Even if the target has been removed from its initial position, it shall not be removed if it enters another compartment or another cabinet.

5-6-2-4. It is possible to turn the target removed from the cabinet off the field or into the opponent's lane.

5-6-2-5. The point of recognition of the target removal score is when the referee declares the removal of the score as soon as the target is removed. I admit it at the moment. Count the moment when the target removal score is obtained, not the score obtained at the end of the competition. (Amended on 2023.08.14)

5-6-3. When asked to move the target

5-6-3-1. Target movement is to move target from the cabinet to the assigned place in the cabinet. Only the target removed completely may be accepted as a point.

5-6-3-2. Not counted as a point if the target touches a structure other than cabinet such as floor of the stadium.

5-6-3-3. Target that got accepted by judge as a point may be accepted even though it dropped out from the cabinet or be hit by the counterpart.

5-7. Robot movement

5-7-1. Path Path of a robot must be decided by a participant.



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5-7-2. Only moving to the front is allowed when moving on the bridge. If moved side-by-side, it must stop for 10 count at the site, then may move again.

5-7-3. If robot trips, it must stand by itself or by controlling. If considered it can't move by itself, the game of the participant ends, and only the score beforehand is accepted. Counterpart's game still proceeds.

5-7-4. Lane compliance Robot must obey the lane asked when moving. If both feet go over the counterpart's lane, it must go back to the place they were right before going over the lane, stop for 10 counts, then move again.

5-7-5. Crash between robots Robots must not hit or crash to each other. If the two touches each other, the one who leads the crash must stop at the point for 10 counts, then move again.

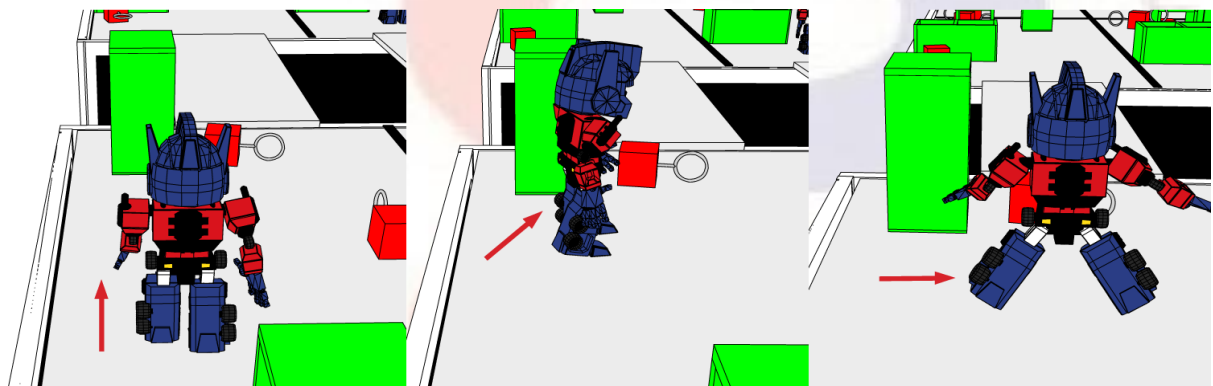
5-7-6. Robot falling If robot falls out of the playfield, it must go back to the place they were right before falling, stop for 10 counts, then move again.

5-7-7. Moving after the returning point

5-7-7-1. When coming back after the going over the returning point, only moving front and back is available, and when moving side-by-side, they must stop at the site for 10 counts, then move again.

5-7-7-2. Only moving forward by changing direction is allowed to avoid the cabinet.

5-7-7-3. When going over the returning point, touching the target that has been ridden from the cabinet or putting the target again to the cabinet doesn't get excluded from the point.



Only moving forward after the returning point is allowed!

Allowed

Not allowed:
Moving side to side

5-8. Not operating (Robot stop): When robot stops while moving, the robot that doesn't move will be left still and the competition proceeds. The participant can't touch the robot, but if the stopped robot moves again, they are allowed to proceed the game.

5-9. Reasons for disqualification

5-9-1. Robot touch When touching the robot without an acceptance of the judge while competition, robot touch will be declared, and the participant will be disqualified.

5-9-2. Robot modification while competition Adding, removing, exchanging or

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modifying component of the robot during the competition is not allowed, and if do so, the participant will be disqualified.

5-10. Suspension of competition When structures or belongings of the playfield breaks due to robots' movement or while removing the target or if the robot secedes from the playfield, the play stops and repair of the structure will be done. In this case, the timer stops, and the robot must stay still on the site where it used to be when the game stopped.

6. Evaluation

6-1. Ranking decision factors

6-1-1. During the limited time The robot that finishes the mission and goes back to the starting point wins

6-1-2. After the limited time

6-1-2-1. The robot that went through the returning area > The robot that didn't go through the returning area

6-1-2-2. If both robots went through the returning area: The robot closer to the starting point wins

6-1-2-3. If both robots didn't go through the returning area: The robot with more empty cabinet wins

6-1-2-4. If both robots have same number of empty cabinets: The robot closer to the returning area wins

6-2. Tiebreakers

6-2-1. League

6-2-1-1. Extension game When teams are tied, they must play an extension game.

6-2-1-2. Way of extension game Only one cabinet will be placed as a target. The team who removes the target first wins.

6-2-1-3. Time of extension game 1 minute

6-2-2. Tournament

6-2-2-1. Extension game If judge cannot decide the winner in a situation like the situation when arriving at the same time after clearing the mission, they must play the extension game.

6-2-2-2. Way of extension game Only one cabinet places as a target. The team who removes the target first wins.

6-2-2-3. Time of extension game 1 minute

6-2-2-4. If the main game plays as a league since only 3 people advances to the league, winner must be chosen following the rule 6-2-1.



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