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Specially testing material of size and weight is still on progress, there will be new updates



## 1. Game Description

Resource Snatch is a tournament game, aims to secure more resources than opponent. We require robot to be driven autonomously through coding system and remote control.

## 2. Robot

**2-1. Robot type:** Any Robot which includes wheels and parts that can gather targets. Task must be completed with autonomous and remote-control device.

### 2-2. Construction

2-2-1. Construction: pre-made

All robots must be pre-made before the competition and extra time will not be given in the competition hall.

### 2-2-2. Size of robot

2-2-2-1. Size: Less than 25cm X 25cm X 25cm (L X W X H)

#### 2-2-3-1. Size measurement

- 1) Self-Check: Participants can self-check size of their robot before the game begins.
- 2) Official inspection: Referee will check the size of the robot with the measuring materials. Participant cannot give any objection toward the judge.
- 3) Ways of Measuring: After the power of robot is active, then will measure the equipment and participant cannot give any objection toward the judge.
- 4) Modify: If it exceeds size (20cm x 20cm), participant will be given 1 minute to modify their robot in front of the judge, on a designated desk. If participant fails to fit the standard size, he or she will be disqualified.
- 5) If size of the robot is different when the actual match begins, will be disqualified too.

2-2-3. Sensor of the Robot: No restriction

2-2-4. Power

2-2-4-1. Composition Robots should work with an independent electric power



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supply; it cannot use a combustible device.

**2-2-4-2. Capacity** There is no limitation on type of battery or voltage.

**2-2-5. Operation:** No restriction

**2-2-6. Parts:** Allowed to attach parts to push or pull objects

### 2-3. Programming and control

**2-3-1.** Both programmed robot and remote-controlled robot are both allowed.

#### 2-3-2. Communication control specification

2-3-2-1. Only Zigbee /Bluetooth /2.4Ghz wireless / **IR sensor** are allowed to use.

2-3-2-2. Smartphone are allowed as a remote controller, but airplane mode must be turned on all the time

2-3-2-3. Wired control is not allowed.

2-3-2-4. When communication system is interrupted, any team couldn't change channel or failed to function will be disqualified

### 2-4. Robot Classification

Two participants from each team completes the mission using their own robot, (1 robot per 1 person), mark the number to distinguish each robot.

2-4-1. Robot No. 1: It starts from A area in their playfield. After completing the golden ball mission (refer to 5-1-1), then allowed to use remote controller. (**When a robot fails the golden ball mission 3 times, robot No.1 should be moved to A area and then start the remote controlling.**)

2-4-2. Robot No. 2: It starts from B area in their playfield. After completing the obstacle mission, then allowed to use remote controller. (**When a robot fails the obstacle mission, robot No.2 should move to A area and then start the remote controlling.**)

### 2-5. Spare robot

#### 2-5-1. Robot preparation

Participant can bring spare robot to competition site and both main and spare robots should be confirmed by referee before the match.

#### 2-6-2. Use of spare robot

It is not allowed to switch robots during the match. After getting confirmation by the referee, then can switch spare robot before the match starts.

## 3. Competition Site

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

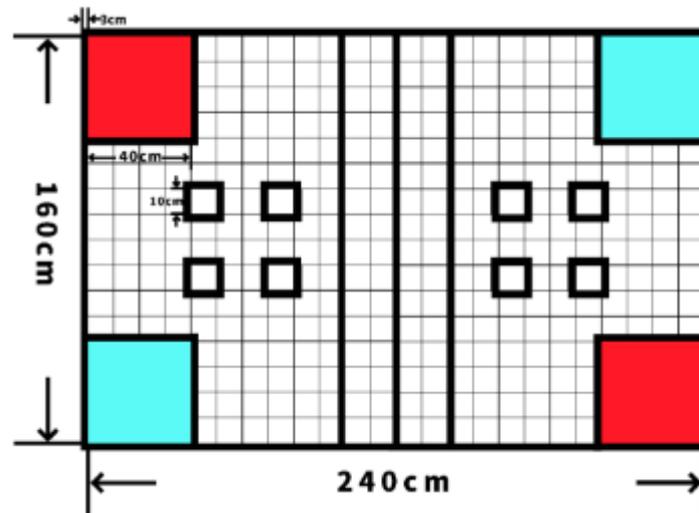
### 3-2. Size and composition

The size of playfield has to be 160cm X 120 cm ( $\pm 10\%$ ) and connecting two playfields.

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<Example of playfield>

3-2-1. **Allowable range of error in the stadium:** The slope that is less than  $2^\circ$  ( $\pm 10\%$ ) and a gap or bump that is less than 3mm ( $\pm 30\%$ ) is allowable.

3-2-2. **Prevention for falling robot:** There will be no special structure for falling robot.

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

3-3-1. **Mission map:** There is a mission map with 10cm square grids and it fixed with sheets and tapes in the playfield. Various targets and obstacles will be allocated on the mission map.

3-4. **Appendage of Competition**

3-4-1. **Target:** There are two colors of targets in the mission, these targets mean the resources. It will be allocated on the mission map.  
3cm x 3cm x 3cm (W x L x H,  $\pm 10\%$ )

<Example

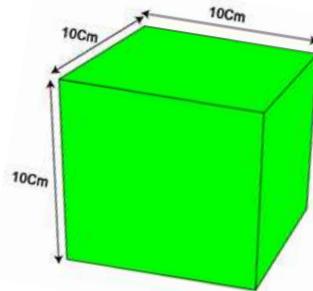


3-4-2. **Obstacle:** 10cm x 10cm x 10cm (W x L x H,  $\pm 10\%$ )

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<Example of obstacle>

### 3-4-3. Allocation of appendages

According to the mission, it can be located in anywhere on the mission map.

### 3-5. Destination

**3-5-1. Destination A:** The size of destination A is 40cm x 40cm. It will be located in the corner of the map; players are required to move resource 2 (Red cube) to destination A by remote control

**3-5-2. Destination B:** The size of destination B is 40cm x 40cm. It will be located in the corner of the map; players are required to move resource 1 (Blue cube) to destination A by remote control

**3-5-3. Golden ball:** Participants are required to transport golden ball autonomously to Destination C. Location of starting point and destination will be announced on the matchday. The size of destination C is 10cm x 10cm.

**3-5-4. Joint area:** Joint area will be set in the center of the playfield (40cm\*160cm), 10 resource 2 (Red cube) will be located randomly. 2 teams can freely transport it to their destination. Only robot no.1 (that has completed golden ball mission or has tried more than 3 times) can enter the area

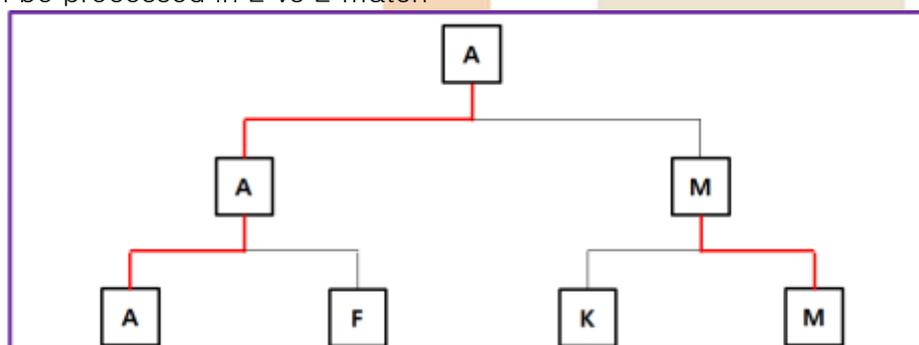
## 4. Competition

### 4-1. Game process

Game will be processed in 2 vs 2 match

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#### 4-1-1. Coding and practice time

Coding and practice time will be given minimum 2 hours and it will be announced on the day of match.

#### 4-1-2. Allocation of playfield

It will be allocated based on number of participants and level of difficulty of the game.

#### 4-1-3. End of coding and practice time

After coding and practice time, participants must stop their robot and follow the instruction of referee and staffs.

#### 4-2. Tournament (main match)

4-2-1. tournament opponent will be decided by lottery.

4-2-2. In case of 3 people being in a 1 group, **each team will play one round to determine the winner**, and 1 team will advance to next round

4-2-2-1. If 3 teams are tie even compared with the score difference, a team who gets the highest total score wins.

4-2-3. It will be given 2 minutes per each round and there are 2 rounds. After first round, each team switches the playfield and arranges the playfield. Right after arranging, second round will be started.

#### 4-3. Robot Modification

After the game is over all teams can have equal modification time based on decision of the referee.

### 5. Competition

#### 5-1. Transporting target

5-1-1. **Golden ball:** Participants are required to transport golden ball autonomously to 1 of Destination C among 4 Destination Cs. Location of starting point and destination will be announced on the matchday.

5-1-1-1. The chance for golden ball mission will be given 3 times, points will be aggregated according to rule 6-1-1. (Refer to rule 6-1-1)

5-1-1-2. **After a robot No.1 complete the golden ball mission (refer to 5-1-1), a robot should be moved to A area(a participant moves the robot by their hands), and then it can be used by remote controller. If a participant failed to complete golden ball mission 3 times, proceed to remote controlling mission.**

5-1-1-3. **During remote controlling mission. If robot touches golden ball, 1 point will be deducted. If a robot moves out of destination, this won't be counted. 1 point will also be deducted per every touch of robot and golden ball.**

5-1-1-4. **A participant shouldn't touch competitor's golden ball. If the competitor's golden ball moves out of destination because of their robot touch, it will be deducted,**

5-1-2. **Resource 1 (Blue Cube)** 8 blue cubes will be located around the map randomly. After completing task 5-1-1 golden ball mission and 5-2 obstacle mission, then

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remotely control robot to transport object to Destination B

5-1-2-1. There is no limitation on number of targets that you can move at once.

**5-1-3. Resource 2 (Red Cube)** Resources in the joint area should be transported to Destination A

5-1-3-1. Robot No1 can enter joint area after accomplishing golden ball mission.

5-1-3-2. Both Robot No1,2 can transport resources that has been moved out of joint area.

5-1-3-3. Resource 2 can be transported only 1 at a time.

**5-2 Obstacle** Each team must move away 1 obstacle that is randomly located in the map

5-2-1. Robot 2 should move away obstacle autonomously by using coding method.

5-2-2. Obstacles can be moved remotely after accomplishing autonomous mission.

5-2-3. Robot 2 can be remote-controlled after completing the task.

**5-3. A participant should start the robot when the referee starts the game**

5-3-1. **Miss Start** If participant couldn't start within 5 counts from referee's signal, 'miss start' will be declared, will be given 1 more chance.

5-3-2. **False start** If starts robot before referee's signal, will be given one more chance to start

5-3-3. **Restart** Including miss start and false start, chance of restarting the match will be given only once.

5-4. If Robot drops out of the field, will be disqualified.

**5-5. Time limit**

Time will be given 2 minutes per 1 round; Game will be processed 2 rounds and 4 minutes. After 1<sup>st</sup> round, each team will rearrange the playfield and proceed to next round.

**5-6. End of Match**

**5-6-1. Complete the mission**

If participant completes the mission in given time, match will be finished, and mission points will be recorded at the moment match ends

**5-6-2. Time limit**

If robot couldn't complete the missions within given time. Points will be aggregated at the moment match ends.

**5-6-3. Robot stop (Malfunction)**

If the robot doesn't move, the referee will count 10 seconds and if the robot still

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cannot move, referee will call it a robot stop. Your teammates should keep playing.

#### **5-6-4. TKO (Technical Knock Out)**

During the match, referee can declare of TKO without 10 counts when referee judge that the robot can't drive properly anymore. Your teammates should keep playing.

#### **5-7. Disqualification**

Participants can be disqualified if violation is spotted by referee or staff, other players can continue his/ her play.

##### **5-7-1. Robot touch**

During matches, if participants touch the robot without judge and supervisor's authorization, it will be declared as 'Robot Touch' and it will be disqualified.

##### **5-7-2. Disobey of seat allocation**

If participant practice or play the game at the playfield that they're not assigned, participant will be disqualified.

##### **5-7-3. False Start**

If participant conduct 'False Start' twice, participants will be disqualified.

##### **5-7-4. Miss Start**

If participant conduct 'Miss Start' twice, participants will be disqualified.

##### **5-7-5. Intruding opponent's side**

If participant's entire wheels intrude opponent's side, will be disqualified.

##### **5-7-6. Intruding joint area**

If entire wheel of Robot No.2 intrudes joint area, will be disqualified.

##### **5-7-7. Collision in the joint area**

If participant's robot deliberately interrupts opponent while collecting resources, blocking opponent's path or deliberate collide with opponent's robot, will be disqualified.

##### **5-7-7-1**

If referee judges that there wasn't impure intention in the colliding situation, referee can proceed as usual

##### **5-7-7-2**

In case of 5-7-7-1, under instruction of referee, both players should move his robot to right corner of the joint area. Will resume the match with referee's signal.

If false start occurs in this case, rule 5-7-3 will apply.

**5-8. Referee will control all situations from and referee have authority to control participants. The judgment of game result is exclusive authorization of referee. The declaration shall be final.**

## **6. Evaluation**

### **6-1. points**

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6-1-1. If succeeds to transport golden ball to destination C

1<sup>st</sup> trial = 10 points

2<sup>nd</sup> trial = 8 points

3<sup>rd</sup> trial = 5 points.

6-1-2. If succeeds to transport resource 1 to destination A = 1 point per each

6-1-3. If succeeds to transport resource 2 to destination B = 2 points per each

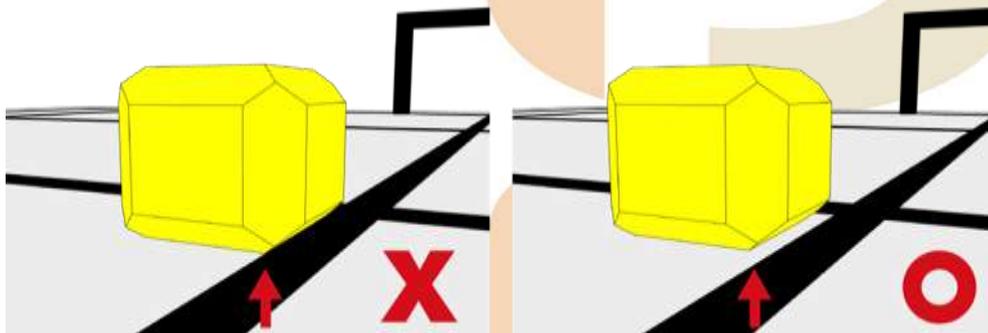
6-1-4. No points will be added for removing obstacles, but if any obstacles remain in the player's field at the end, 3 points will be deducted.

6-1-4-1. If obstacle remains in the joint area, both teams will get penalty.

6-1-4-2. If obstacle lie across the border of player's area and joint area, the team will get penalty.

6-1-5. During remote controlling mission. If robot touches Resource 1, 1 point will be deducted, If golden ball moves out of Destination C, will be counted 0, if continuously touches golden ball, 1 point will be deducted per every touch.

6-2. Target points. After final call of the referee, referee will judge target points by final status of targets in the field. If bottom of the target is touching to the border, won't be counted as score.



6-3 Winning condition. The team with the higher total point in the 1<sup>st</sup> and 2 round wins.

#### 6-4. Tie-Breaker

6-4-1. The team with higher golden ball point wins the game.

6-4-2. If it's still tie, team with less penalty wins.

6-4-3. If it's still tie, will measure weight of robot 1,2(Including battery), lighter team wins the game