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# Robot Farming

## Extreme

League  
Junior/  
Challenge

Participation  
1 Person 1 Robot

Construction  
Pre-made

### 1. Game Description

It aims to complete various missions such as cultivating a field, planting trees by controlling the humanoid robot. It will be conducted by tournament and game management strategy and robotics controlling ability is important to complete the mission.

### 2. Rules

**2-1. Type of robot:** Articulated two-legged walking robot (humanoid).

#### 2-2. Composition of robot

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. Classification into standard and extreme game

- 1) Standard: It appoints first version of regular humanoid, only robots approved by IROC can participate the competition.
  - Not allowed to modify anything in the kits such as gripper.
- 2) Extreme: No limitation on components and items, all humanoid robot can participate in the competition

#### 2-3. Power

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

2-3-2. There are no limitations on battery type and voltage level

#### 2-4. Operation

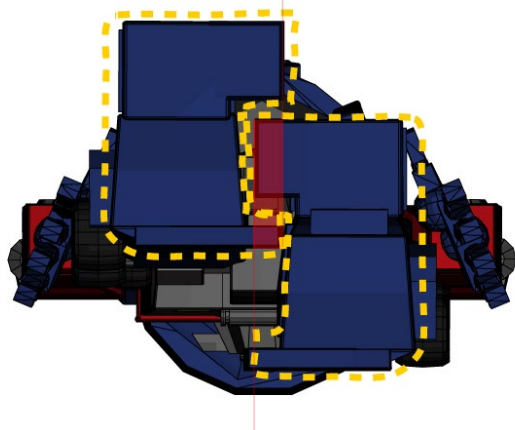
2-4-1. It should be articulated two-legged walking robot without linking structure

2-4-2. While it is standing, both 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 both allowed.

2-5-2. communication control specification

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

2-5-2-2. Smartphone are allowed as a remote controller, but airplane mode turned on all the time.

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

2-5-2-4. When communication system is interrupted, any team couldn't change channel or failed to function will be disqualified.

## 2-6. Spare robot

2-6-1. 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.

2-6-2-1. League: Substitution is allowed before the league matches start.

2-6-2-2. Tournament: Substitution is allowed before start of every game.

## 2-7. Module of Camera

2-7-1. This extreme category requires installation of camera module that can transfer video images in real time.

2-7-2. There is no limitation on standard of telecommunication and pixel.

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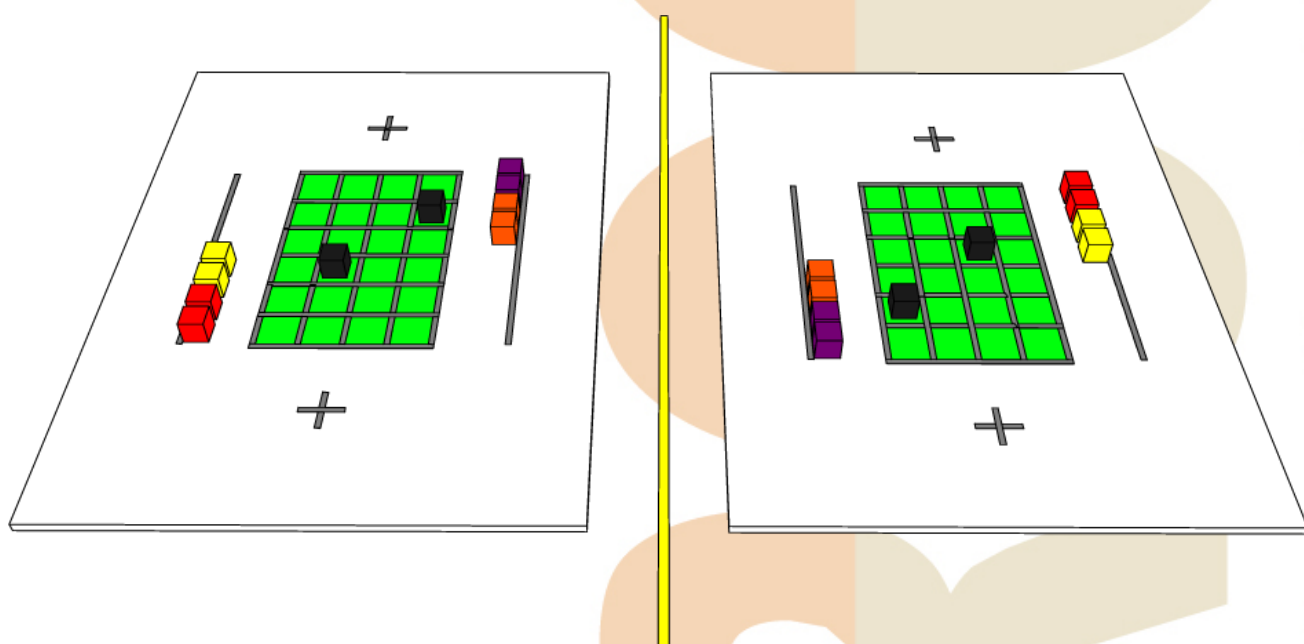
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### 3. Site Competition

**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 each participant uses only one playfield.



<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..

3-2-3. Distance between the playfield: The distance between each playfield will be within 50 cm from the yellow line.

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

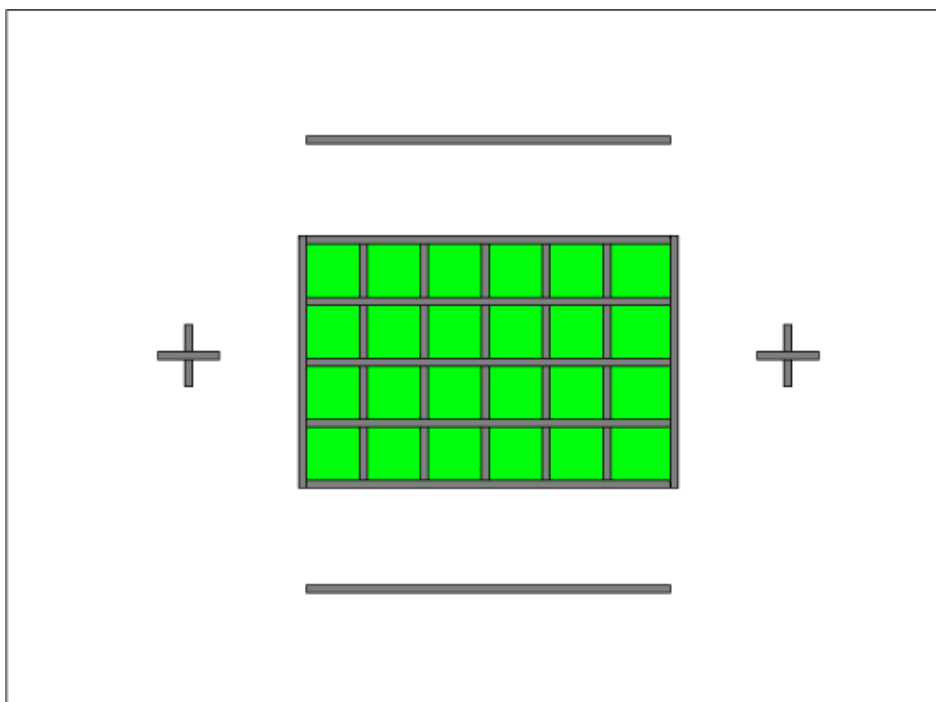
3-3-1. Mission map

3-3-1-1. Field: It will be given in the middle of the both side of the board. It will be 4 square x 6 square checkerboards and the size of each square will be 7cm\*7cm. ( $\pm 10\%$ ).

3-3-1-2. Tree: There will be in a line which is located 20 cm apart from the field. The

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<Example>

### 3-4. Appendage of Competition

#### 3-4-1. Sponge block

3-4-1-1. Shape: a hexahedron

3-4-1-2. Weight: less than 50g ( $\pm 10\%$ )

3-4-1-3. Size: 5cm x 5cm x 5cm (W x L x H,  $\pm 10\%$ )

3-4-1-4. Type: Four types of block

- 1) Red block: Apple tree
- 2) Orange block: Orange tree
- 3) Yellow block: Mango tree
- 4) Purple block: Grape tree
- 5) Black block: Stone

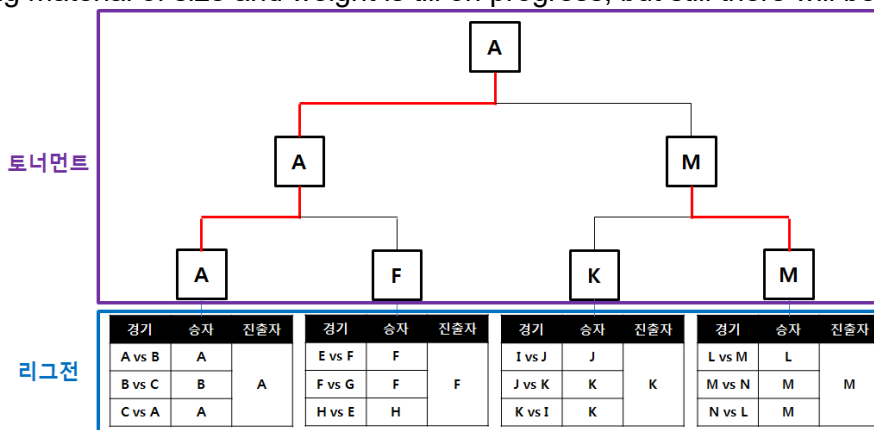
## 4. Competition progress

### 4-1. Game process

Winners form the league (qualifying round) precede to the tournament (main match).

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## 4-2. League (qualifying round)

4-2-1. Group fixture: Participants will form a group of 3 members through lottery.

4-2-2. Winning point and Advance to the next round

The participant with highest Points proceeds to tournament.

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

## 4-3. Tournament (main match)

4-3-1. tournament counterpart will be decided by group draws for league game.

4-3-2. If there are 3 teams run a tournament game, then main match will be conducted in a league.

## 4-4. Modification of robot

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

## 5. Match

### 5-1. Performing of the mission

According to the mission, participant should move a block to cultivate a field, plant a tree. Finally have their own field.

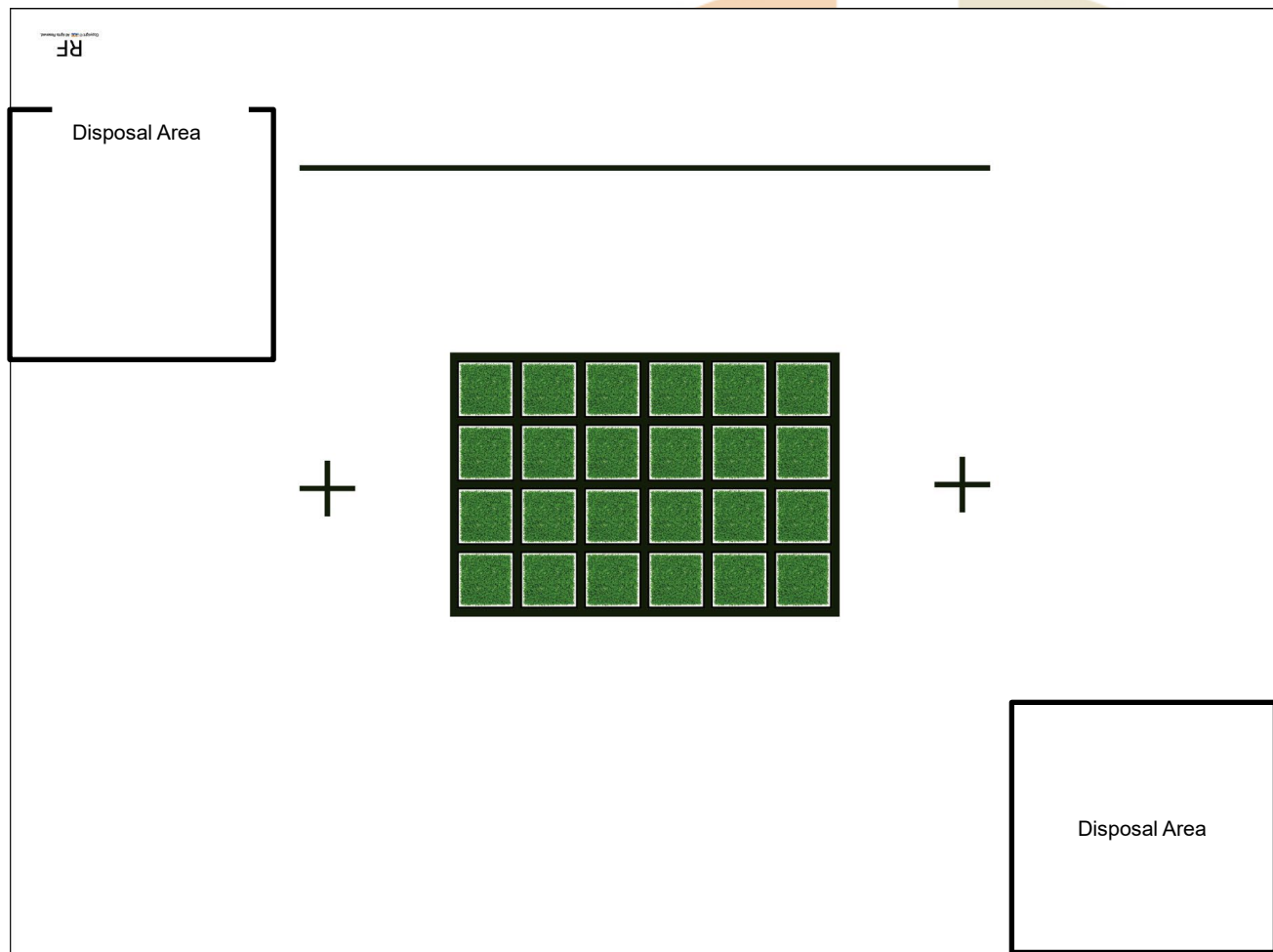
1) Cultivate a field: remove stones (black blocks) in the field. (Move black blocks to the disposal area)

- Location and size of the disposal area will be differed according to the mission

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- While placing stones (black blocks) to the disposal area, points will be accepted fully placed inside the line. (Points will not be accepted if the block is touching the line)
- Disposal area will be printed in A4 sheet and attached to the mission map.



<Example of Disposal Area>

- 2) Planting a tree: move tree blocks to designated area
- 3) Growing the tree: stack same tree block in 2 stories.

### 5-2. Point

- 1) Cultivate a field: 2 points per one stone. (black block)
- 2) Planting a tree: 1 point per one tree.
- 3) Growing the tree: extra 2points per one tree.

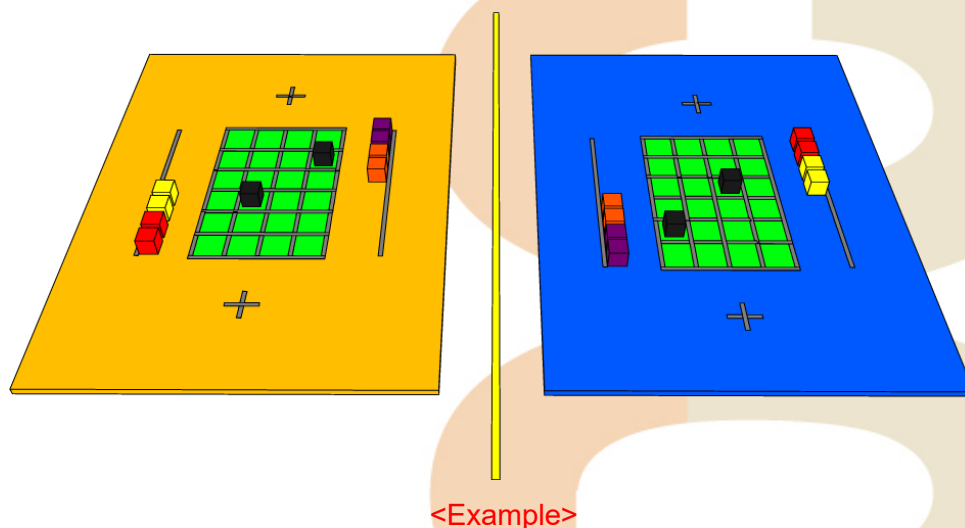
### 5-3. Officialize of the Mission

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#### 5-4. Battlefield

Area of the playfield will be divided according to the picture below; each robot should move in their area only. (Traveling floor of their own area is allowed.)



##### 5-4-1. Area decision

5-4-1-1. Group league: each participant should play in the different area during 2 games.

5-4-1-2. Tournament: area is decided through draw like rock paper scissor, flipping a coin and winner has a right to choose the area.

##### 5-4-2. Location of trees

It will be located as it is shown above the picture.

#### 5-5. Block use

5-5-1. **The block which is fallen out of playfield is allowed to reuse or rearrange.**

5-5-2. Allowed to use block to hit opponent's block to disturb construction.

5-5-3. Allowed to throw the block to opponent's side until 30 second to finish the game. (Main game is within 90 second, overtime is within 30 second)

5-5-4. If the block is thrown after given time, then team will be disqualified, and game victory will be turned to opponent.

5-5-5. If thrown block remains in your side or thrown back to your side, you can reuse the block.

5-5-6. Participant can use the block thrown by the opponent

5-5-7. If robot throw its stones (black blocks) away to the opponent playfield, it will not be counted as a point.

5-5-8. If the thrown stone (black blocs) came back to your playfield, it won't be counted

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5-5-9. In double deck/floor mission, If there is wrong cube on the 2<sup>nd</sup> floor, won't be counted as points

**5-6. Start** A participant should start the robot when the referee starts the game.

5-6-1. False start

If the participant starts the robot before the referee's signal, it is declared as 'False start' and they have only one more chance to restart.

5-6-2. Restart

The opportunity of restart will be given only once and if conducts false start twice in a row, he/she will be disqualified.

**5-7. Time limit**

According to the mission announced on the day of match, it will be given maximum 2 minutes for the match.

**5-8. Match decision**

5-8-1. Called game

If one participant completes all missions, the game ends and counts the points at the match end.

5-8-2. Time limit

If robots couldn't complete the missions within 2 minutes, will record the point when the match ends.

5-8-3. Robot stop (Malfunction)

If the robot doesn't move during match or hovers around a specific space, the referee will count 10 seconds. If the robot still cannot move, referee calls it a robot stop and the robot will be excluded from the match. Opponent robot will continue its match.

5-8-4. Robot falls

When robot falls off the playing field, referee will pick up the robot on the place where the robot falls and restart the game after 10 seconds count. If robot moves during those 10 counts, it will be declared as 'False Start' and participant will have one more chance to restart after 10 counts again.

**5-9. Penalty**



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5-9-1. When penalty has been issued, referee will give you a stop signal. Participant should not move without referee's permission.

5-9-2. After rearrangement of robot and referee's decision, the match will begin with the signal of referee.

5-9-3. If robot moves without the referee's permission, penalty will be charged again.

5-9-4. If participant gets the penalty, 3 points will be deducted from their points. (Ex. If participant get charged the penalty 3 times, it will be deducted 9 points from their points.)

## 5-10. Disqualification

5-10-1. Robot touch

During the match, if participants touch the robot without approval of judge, it will be declared robot touch and will be disqualified.

5-10-2. Penalty

If participant get charged penalty over 3 times, participant will be disqualified and point will not be counted.

5-10-3. If participant break into the Yellow line(refer to 3-2-3.), participant will be disqualified.

## 5-11. Rematches

During the match if expected situation occurs, such as blackout or breakdown of measuring instrument, referee can decide to do rematch.

**5-12. 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. Ranking decision factors:** Participant who gets more points in the limited time.

### 6-2. Order of priority to result

6-2-1. Group league

If there are teams who get the same points, below formula will be applied.

6-2-1-1. Point difference with opponent > Total score > Less penalty point

6-2-1-2. Extra time

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If still can't decide the winner, 1 more minute will be given, will be restarted in the initial state, will decide the winner by number of points.

#### 6-2-2. Tournament

6-2-2-1. Extra time: If still can't decide the winner, 1 more minute will be given, will be restarted in the initial state, will decide the winner by number of points.

6-2-2-2. If the winner hasn't been decided yet, extra time will be conducted to find out the winner

6-2-2-3. If there are 3 people in the tournament, it will be conducted as Group league and above rule (6-2-1.) will be applied.

