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<b>Robot Farming Expansion</b> <b>Standard</b>	League	Participation	Construction
	Junior/ Challenge	1 Person 1 Robot	Pre-made

## 1. Game Description

It aims to cultivate field and plant trees by moving a block based on the mission using the humanoid robot. It will be conducted by 1:1 tournament and game management strategy and robotics controlling ability for quick mission complete. **This game is played face-to-face only.**

## 2. Robot

### 2-1. Types of robot

회사명	기종
Robotis	Steam-cup Premium Steam-cup Engineer KIT 1,2
Roborobo	Romanbo
Minirobot	MF-17RTW

### 2-2. Composition of robot

**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. Classification between standard and extreme game

1) Standard: Appoints first version of regular humanoid, and only robots approved by IROC can participate in the competition.

- Not allowed to participate if a part such as gripper has been modified, and not used as it is originally made.

2) Extreme: No limitation on components and items, and all humanoid robots can participate in the competition

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

### 2-3. Power

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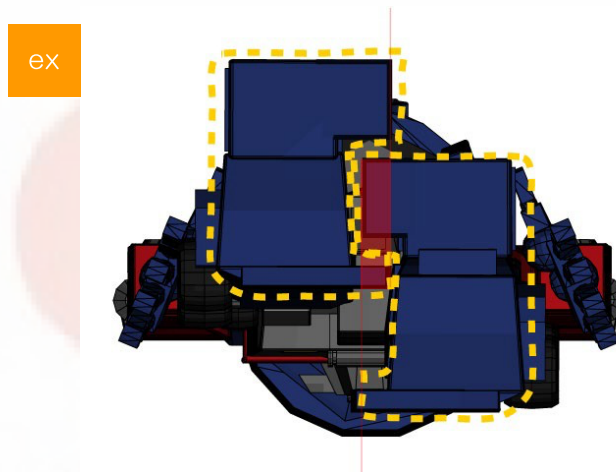
**2-3-1.** Autonomous movable independent power must be used, and combustion engine is not allowed to use.

**2-3-2.** No limit on current or voltage.

## 2-4. Operation

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

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



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

## 2-5. Program and control

**2-5-1.** Both robot moving itself and moving by remote controller are allowed.

### 2-5-2. Communication control specification

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

**2-5-2-2.** Smartphone are allowed to be used as a remote controller, but airplane mode must be turned on all the times.

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

**2-5-2-4.** If problem in communication happens and the change in the channel is impossible, the participant(team) will be disqualified.

## 2-6. Spare robot

**2-6-1. Robot preparation** The participant may have a spare robot other than the main robot, and both robots must be certified to the referee before starting.

**2-6-2. Usage of spare robot** Changing to the spare robot is allowed when referee certified before starting the competition.



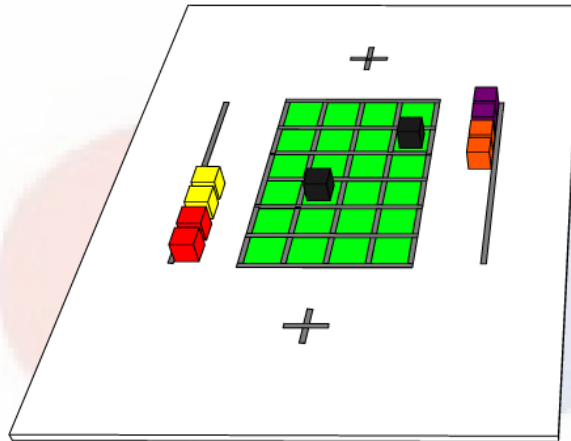
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### 3. Competition site

**3-1. Official 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 uses one playfield each.



<Example>

**3-2-1. Allowable range of error in the stadium** The slope less than  $2^\circ$  ( $\pm 10\%$ ) and a gap or bump less than 0.3cm ( $\pm 10\%$ ) is allowable.

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

**3-2-3. Distance between fields** Distance between two playfields are within 50cm.

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

#### 3-3-1. Mission map

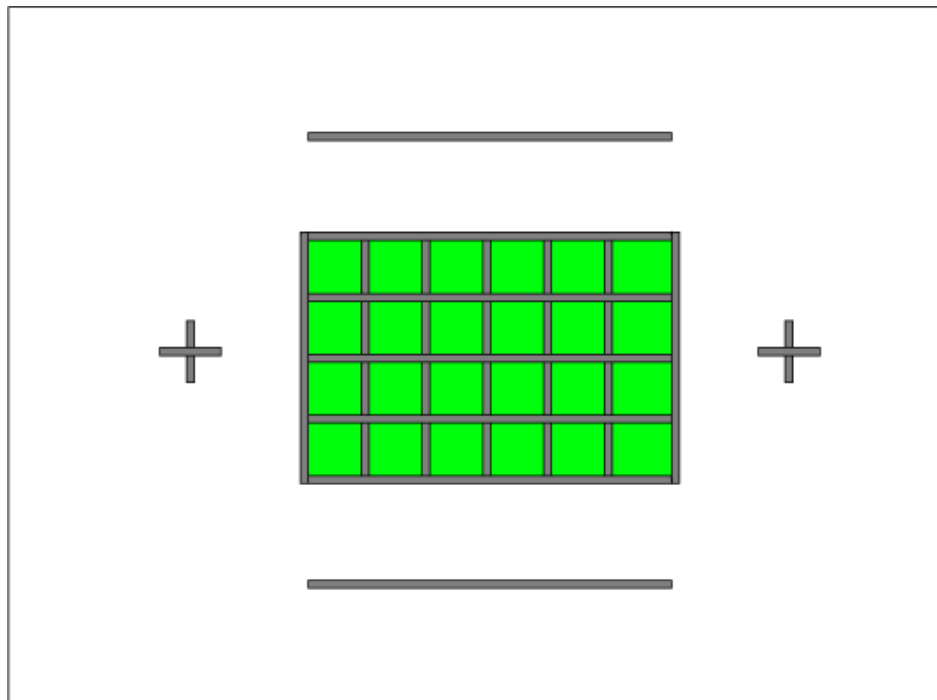
**3-3-1-1. Field** 4 x 6 square checkers with 7cm x 7cm each ( $\pm 10\%$ ) will be placed.

**3-3-1-2. Tree** Will be placed on the line located 20cm apart from the field.



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<Example>

### 3-4. Playfield adjuncts

#### 3-4-1. Block

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

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

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

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

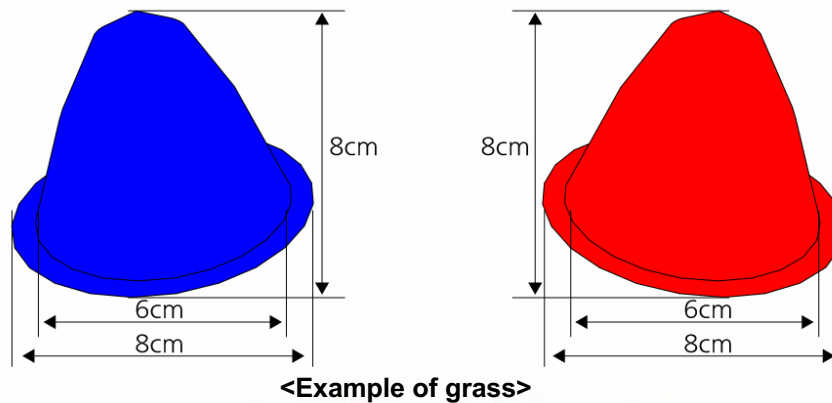
- 1) Red block: Apple tree
- 2) Orange block: Orange tree
- 3) Yellow block: Mango tree
- 4) Purple block: Grape tree
- 5) Black block: Stone

**3-4-2. Grass** Cone made in malleable PVC. 8cm x 8cm (D x H, error  $\pm 10\%$ ), weight 15g (error  $\pm 10\%$ )



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#### 4. Competition progress

**4-1. Way of game process** Game is processed by recording, and the chances are given twice. Rectifying time will be given between chances.

**4-2. Robot production and practicing time** At least 2 hours will be given for practicing, and will be noticed on the day.

**4-3. Assignment of playfield** Depends on number of participants and level of difficulty.

**4-4. Practicing** Participant can practice on the playfield until practicing time noticed, but cannot before playfield assignment.

**4-5. End of practicing** When time for modifying and practicing finishes, the participant must stop the robot and go back to their seat following staff and referee's instruction.

**4-6. 1<sup>st</sup> trial** 1<sup>st</sup> trial starts right after the practicing time (or after lunch).

**4-6-1. Preparing competition** All participants must bring their robots and wait in line following the instruction of staff and referee.

**4-6-2. Stand by after competition** All participants should not go back to their seat, but must wait in line after their trial until all participants finishes their trial.

**4-7. Modification** Time for modification will be given to all participant after 1<sup>st</sup> trial for robot modification and practicing. Modification time will be noticed on the day.

**4-8. 2<sup>nd</sup> trial** 2<sup>nd</sup> trial will be held right after the modification.

**4-8-1. Preparing competition** All participants must bring their robots and wait in line

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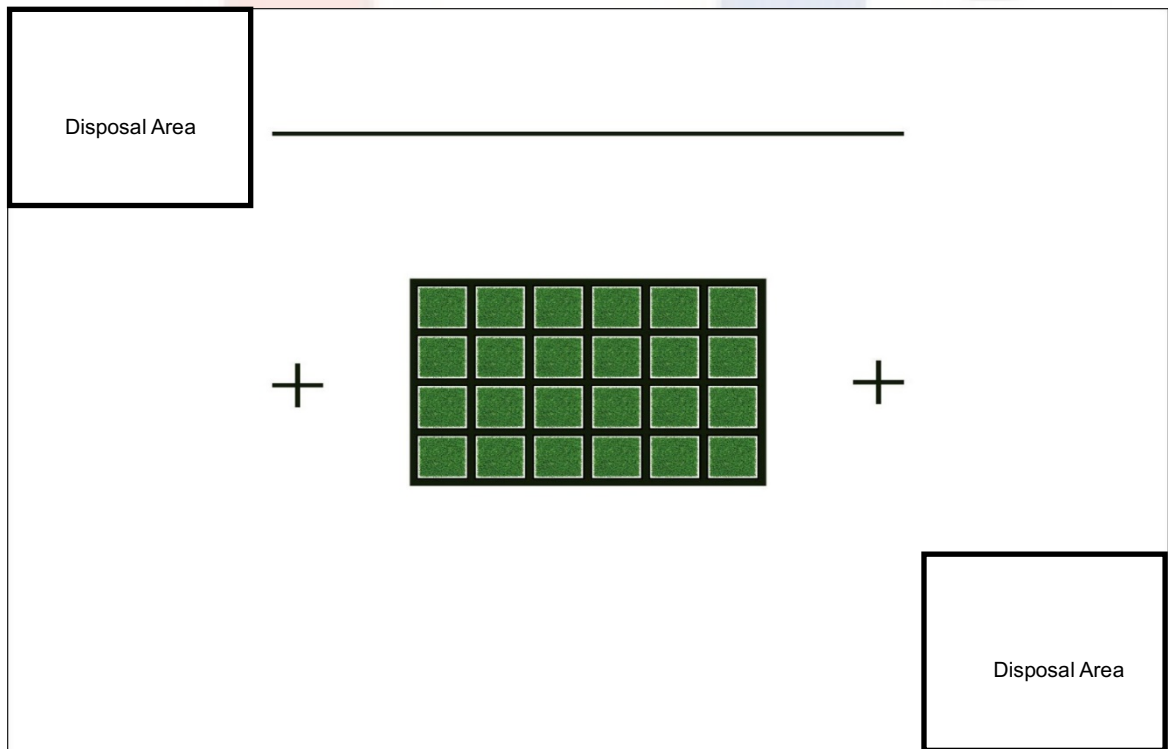
following the instruction of staff and referee.

**4-8-2. Stand by** All participant must go back to their seat after their trial.

## 5. Match

**5-1. Performing of the mission** The participant should move block to cultivate field, and plant tree to complete cultivating filed based on the mission given on the day.

- 1) Cultivating field: Remove stones and grasses to stone disposal place and grass disposal place.
  - Location and size of the disposal area will differ based on mission.
  - When moving stone and grass to the disposal area, points will be accepted when placing inside the black 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 tree: Move tree blocks based on the mission
- 3) Growing tree: Stack same tree block in 2 stacks.

## 5-2. Point

- 1) Cultivating field: 2 points per removing stone, 2points per removing grass
- 2) Planting a tree: 1 point per tree.

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3) Growing the tree: extra 2points per tree.

**5-3. Mission open** Missions will be noticed on the site before the competition starts as a mission paper.

#### **5-4. Usage of block**

**5-4-1.** Even though block has been fallen out of the playfield, they may be moved or used by robot freely.

**5-4-2.** During 2<sup>nd</sup> floor tree mission, if the block on the upper level overlaps the one on the lower level, it is considered as mission fail. (If the mission worth 2points, only 1point will be accepted.)

**5-4-3.** During 2<sup>nd</sup> floor tree mission, if the lower level tree succeeds, putting the upper tree without falling is also considered as a success.

**5-5. Start** Start by referee's start sign.

**5-5-1. Miss start** Announced when the robot starts before starting sign of referee, and the game will be started again.

**5-5-2. Restart** One chance will be given per game. If miss start happens twice per game, the participant will be disqualified.

**5-6. Limited time** The total competition time is maximum of 2 minutes.

#### **5-7. Decision of competition**

**5-7-1. Called game** If the participant completes the mission in a given time, the game ends. Final point and time record will be acknowledged.

**5-7-2. Time over** If robot doesn't clear the mission in the limited time, the points at when time limit finishes will be accepted as a record.

**5-7-3. Robot stop** If robot doesn't move or move the same place repetitively during the competition, referee gives 10 counts. If the robot doesn't move again while counting, robot stop will be declared, and the points when robot stops will be accepted as the record.

#### **5-8. Game over due to disqualification**

**5-8-1. Robot touch** If the participant touches robot without acceptance of referee or staff, robot touch will be declared, and the participant will be disqualified

**5-8-2. Robot modification while competition** Adding, removing, exchanging or modifying component of the robot during the competition is not allowed, and if holding extra

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components, tool, or battery while waiting in order to modify the robot, the trial will be disqualified.

**5-8-3. Defaulting assigned playfield** If playing or practicing at the playfield other than the assigned field, the participant will be disqualified.

**5-9. Rematch** When accident such as blackout or trouble in timer happens, rematch may occur by a decision of referee.

**5-10. Decision of referee** Referee has authorization to control all situations and participants at all times during the competition. Judgement of the competition is referee's own authorization and referee has the authorization for final judgement.

## 6. Evaluation

**6-1. Recording items** Mission points and time record

**6-2. Target mission record** Referee counts the numbers of completed missions after declaration of end of game.

**6-3. Time record** Time counted at the timer after clearing the mission will be acknowledged as the time record.

**6-4. Final record** Better record among 1<sup>st</sup> and 2<sup>nd</sup> trial will be considered as the final record.

**6-5. Priority of record**

**Target mission point > Comparison between time record**

**6-5-1. Priority on trial** If tied at the same trial, record of another trial will be compared.

**6-5-2. Priority when tied**

- 1) Better score among 1<sup>st</sup> or 2<sup>nd</sup> trial will be acknowledged, but when tied, the participant with better score on the 1<sup>st</sup> trial takes the priority.
- 2) If tied, followings will be considered to pick a winner.

**Number of succeeded 2<sup>nd</sup> floor tree > Number of succeeded 1<sup>st</sup> floor tree >**

**Number of cleared stone > Number of cleared grass**

