

\* General Rule applies for all games. Please read the General Rule in advance. \*

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<b>Robot Gathering</b>	<u>Division</u>	<u>Team</u>	<u>Building</u>
	Junior/Senior	1 Member	On-Site
		1 Robot	

## 1. Description

Robot Gathering is a record game requiring the robot to gather the targets at the first destination and move to the final destination. Accurate movement of the robot is required since mission record prioritizes to the time record. Techniques such as sensor adjusting technique, programming, and dynamic principles, order in completing missions, and problem-solving ability in establishing running course creatively may be evaluated.

## 2. Robot

**2-1. Types of robot** Wheel driving robot with structure to collect the targets.

**2-2. Building robot** All robot except controller must be made on site by the participant and soldering is allowed. The size of the robot must be able to measure by the measuring instrument and fit the size restriction.

### 2-2-1. Size of the robot

**2-2-1-1. Size of the robot** Within 18cm in width and 22cm in length.

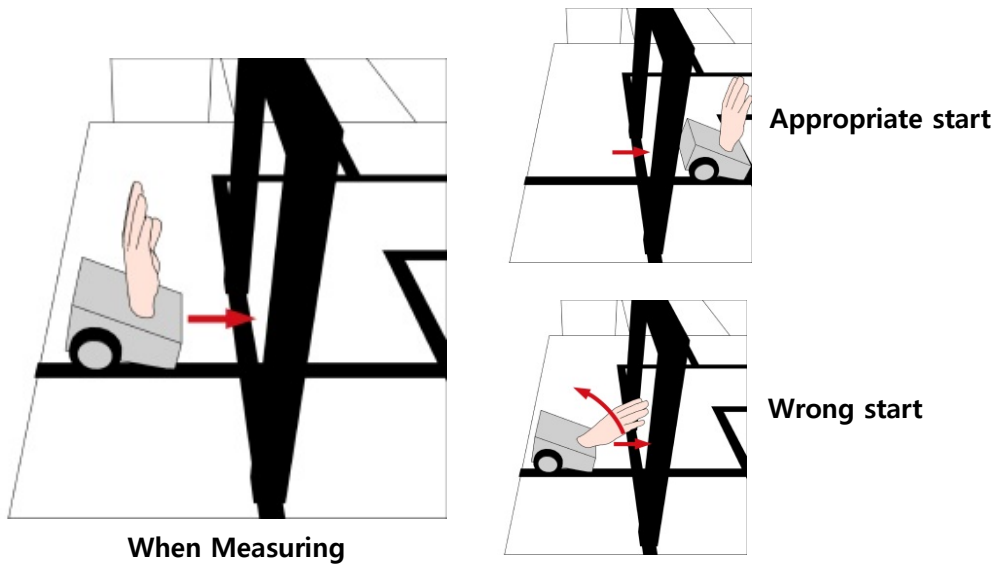
### 2-2-1-2. Measuring size

- 1) Self-measurement: Participant can measure the size during building and practicing time given.
- 2) Official measurement: Referee measures before competition starts.
- 3) Way of measurement: Measured with the robot turned on with the measurement tool. The participant is not allowed to object to referee's judgement.
- 4) Modification: If the size goes over the limit, the participant gets a chance to modify for a minute at the recording seat. Software modification is not allowed. If failed to modify, the trial will fail and be considered 'over size limit'.
- 5) If the size changes when going through the starting line from the size measured, it is considered 'over size limit'. Applies when width and height changes when going through the starting line.



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**2-2-2. Sensor of the robot** No restriction.

**2-2-3. Power of the robot**

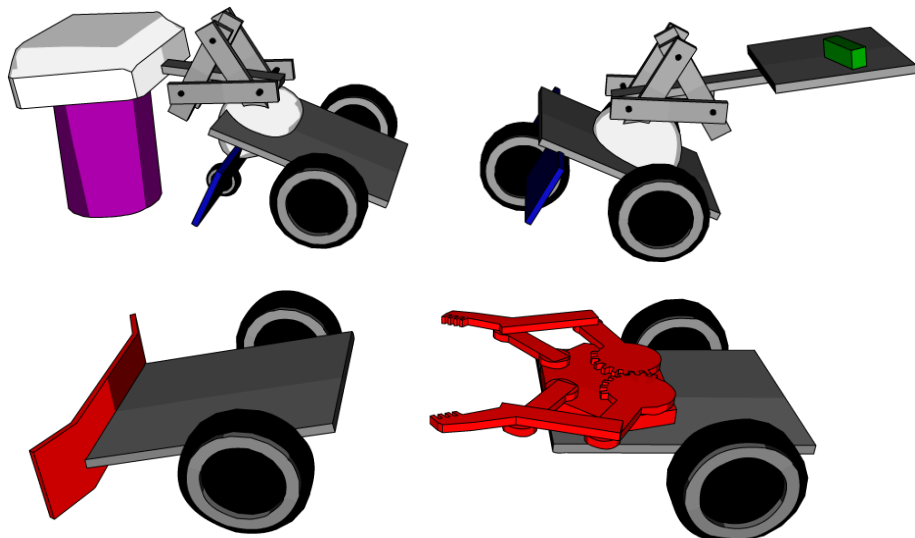
**2-2-3-1. Composition of the power** Independent movable power must be used. Combustion engine are not allowed to use.

**2-2-3-2. Size of the power** No restriction on current and voltage.

**2-2-4. Movement of the robot** No restriction.

**2-2-5. Structure of the robot** The robot can have structure to push or catch.

**Example of structure of robot allowed**



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**2-3. Programming and control** Robot must be autonomously moved via program, and not be controlled by person except when starting.

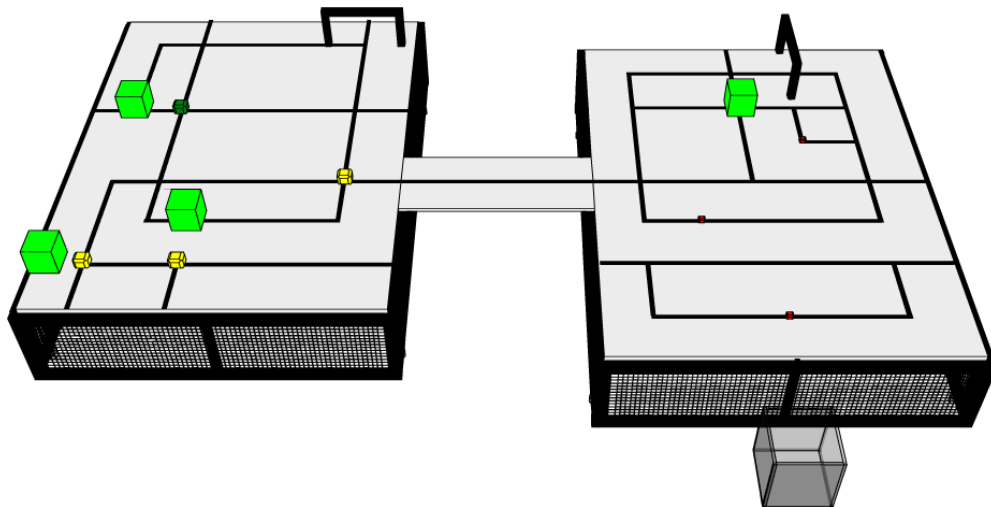
**2-4. Disassemble of motor horn and wheel** Wheel and tire doesn't need to be disassembled and wheel and motor horn shouldn't be attached in advance.

### 3. Stadium

**3-1. Official stadium** Official stadium regulated by International Robot Olympiad Committee must be used.

**3-2. Size and structure of the official field** Field is constructed of more than two fields of 160cm x 120cm (error  $\pm 10\%$ ) connected.

**Example: Connection using bridge, arrangement, mission and lines used for the competition will open on the day of competition**



**3-2-1. Connection of the fields** Fields are connected using bridge of 25cm width (error  $\pm 10\%$ ) in straight or curved shape. Bridge is connected to the field using either tapes or sheets.

**3-2-2. Errors in field** Field may have  $2^\circ$  (error  $\pm 10\%$ ) in its slope, and 3mm (error  $\pm 10\%$ ) of cracks or gaps.

**3-2-3. Structure for preventing robot from falling** No extra structure to prevent robot from falling is equipped.

**3-3. Field** Field is made of matt, white, PET paper. Advertisement or logo of the host may be

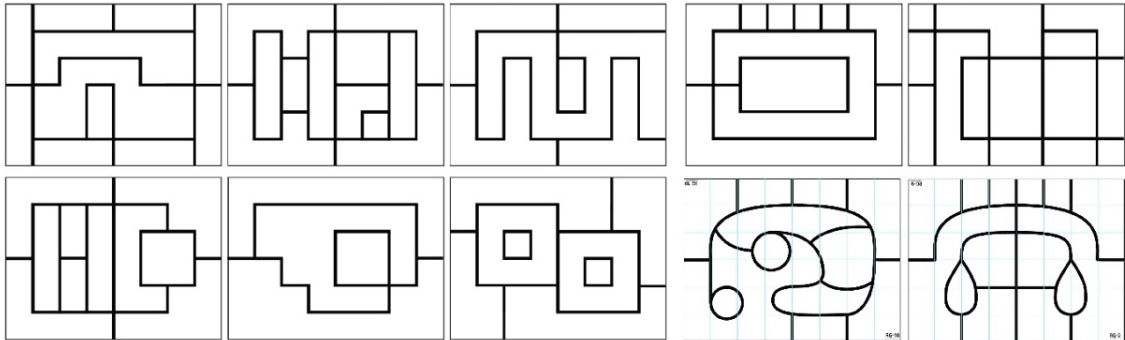
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printed.

**3-3-1. Mission map** Mission map is constructed of combination of straight and curved lines, and attached on the field using sheets and tapes.

#### Example of 10 Robot Gathering mission maps



**3-3-2. Line** Black line of 2cm width (error  $\pm 10\%$ )

**3-3-3. Installation of timer** Timer is installed at the starting and finishing point to measure time record. Location and direction may change in accordance with mission given. Extra structure such as bridge may be used.

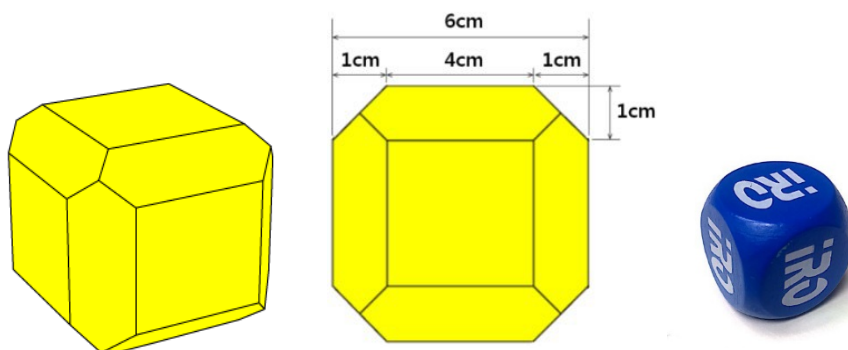
#### 3-4. Field adjuncts

**3-4-1. Target** Polyhedron block of two size in weight of 10~30g (error  $\pm 10\%$ ) is used.

##### 3-4-1-1. Size of the target

- 1) Big cube: 6cm x 6cm x 6cm (width x length x height, error  $\pm 10\%$ )
- 2) Small cube: 3cm x 3cm x 3cm (width x length x height, error  $\pm 10\%$ )

#### Example of big cube(yellow) and small cube(blue)



**3-4-1-2. Target color** Color of the target can be used freely.

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**3-4-1-3. Target allocation** Target can be allocated freely on the mission map.

**3-4-2. Destination** Destination will be selected and arranged on the field and differs based on mission. Destination is divided in to two, inner-destination and outer-destination.

**3-4-2-1. Inner-destination** A random area in the field is designated as an inner-destination.

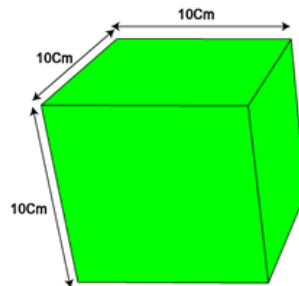
**3-4-2-2 Outer-destination**

- 1) Size: Noticed on the day
- 2) There may be an extra section outside the field selected as an outer-destination.
- 3) Arrangement: Destination will be set on the floor within 15cm from the field.

**3-4-3. Obstacle** Physical restriction will be given to the robot's movement by fixing the structure.

**3-4-3-1. Size of the obstacle** Cube of 10cm x 10cm x 10cm (width x length x height, error  $\pm 10\%$ ) in size

**Example of the obstacle**



**3-4-3-2. Allocation of the obstacle** Any place in the mission map is allowed to allocate the obstacle, and will be fixed on the mission map.

#### **4. Competition progress**

**4-1. Way of competition progress** Two trials of record games will be given. Time to modify the robot will be given between the trials.

**4-2. Time given to build and practice** Two hours in minimum will be given to build the robot and practice, and will be noticed on the day of match.

**4-3. Field assignment** Field is assigned based on number of participants and difficulty of the mission.

**4-4. Robot building and practicing** Participant can practice at the designated field before

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building and practicing time finishes, and cannot practice before field designation.

**4-5. End of robot building and practicing time** The participant must stop the robot and go back to their seat following staffs' instruction after the time for building robot and practicing.

**4-6. 1<sup>st</sup> trial** 1<sup>st</sup> trial start either directly after the building and practicing time or after lunch.

**4-6-1. Before game** All participants must bring their robot and follow referee and staffs' direction.

**4-6-2. After game** All participants should go to the end of the line, not back to the seat, until all participants finish the game.

**4-7. Modification** All participants get time to modify their robot or practice after their 1<sup>st</sup> trial. The details are notified on the day.

**4-8. 2<sup>nd</sup> trial** 2<sup>nd</sup> trial of the game starts directly after the modification.

**4-8-1. Game preparation** All participants must bring their robot and wait following referee and staffs' direction.

**4-8-2. Stand-by** All participants must go back to their seat after the game till all participants finish the game.

## **5. Game**

**5-1. Completing the mission** Sequence in collecting the target or the way moving is not given. The participant must their own direction and sequence in collecting the target.

**5-2. Acquiring points** Points are acquired based on successfully collected targets. 1 collected target worth 1 point.

**5-3. Start** Start by referee's start sign and considered starting when the timer recognizes as starting.

**5-3-1. Miss start** Considered a 'miss start' when the robot doesn't move in 5 seconds. Two extra trials are given for miss start.

**5-3-2. False start** Considered a 'false start' when the robot moves before the starting sign given from the referee. One extra trial is given for false start.

**5-3-3. Restart** Restart is given twice for miss start and once for false start. Maximum trial given as a restart is twice. (One extra trial is given for miss start after a false start.)

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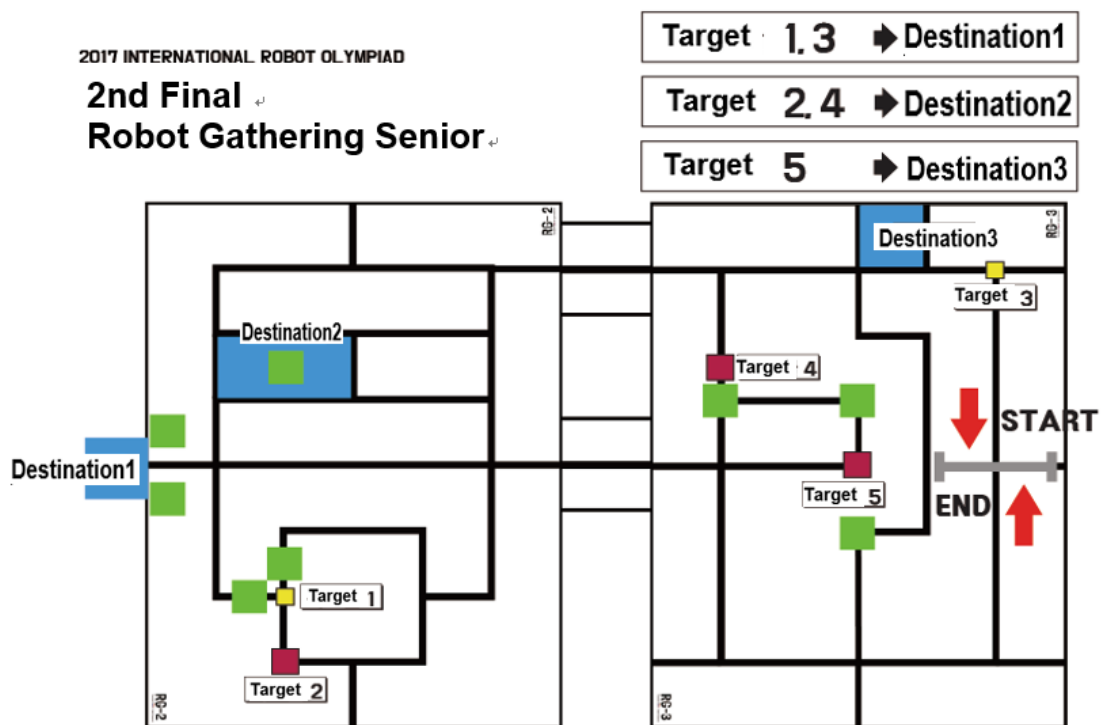
**5-4. Arrival** Considered as an arrival when the robot reaches the line or crossway with the timer on the destination. (Robot must stop at the line or crossway with the timer.)

**5-4-1. Arrival mission** Considered success when staying on the destination for more than 3 seconds of referee's count.

**5-5. Time limit** Total time for the competition is maximum of 2 minutes.

**5-6. Mission opening to the public** Mission including structure of the field and bridge, placement and number of target and destination, and structure of line is open to public on the day as a form of mission paper.

### Example of the mission



**This mission map must not be brought outside till the end of the competition.**

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**5-6-1. Moving target** Target can be moved to a place out of destination.

**5-6-2. Number of moving target** One target can move at once.

**5-6-3. Moving the target over number limit** If the robot moving target touches the other target with gripper or moving target, the moving target is not considered as a point according to rule 5-6-2.

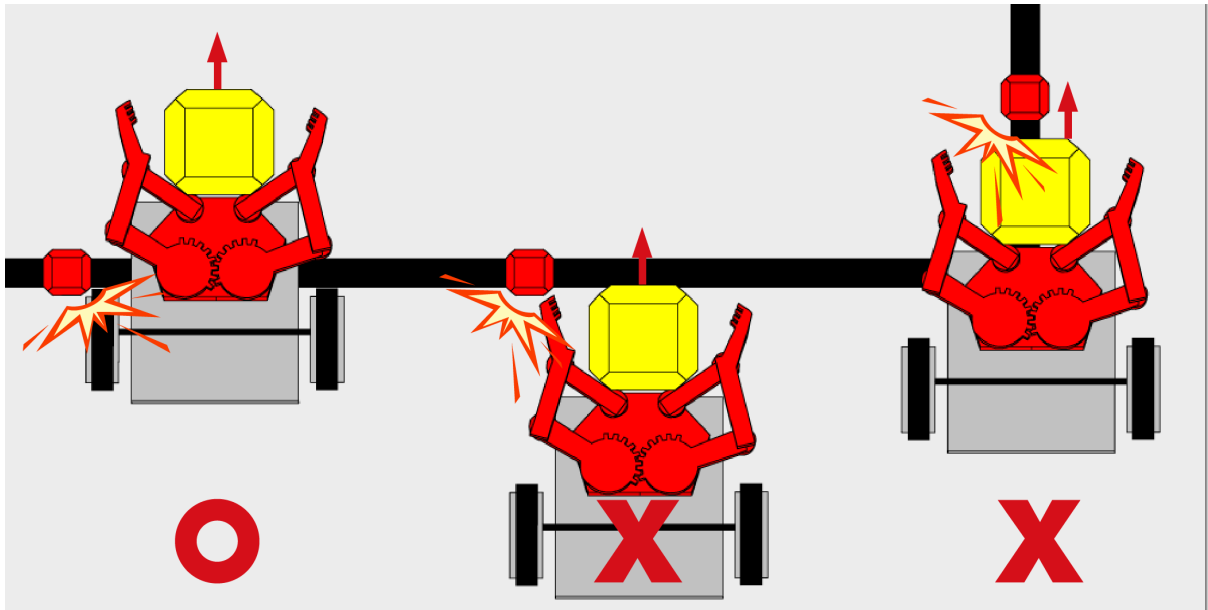
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**5-6-3-1.** If gripper or target the robot is holding touches other target while moving the target, the move is not considered as a point.

**5-6-3-2.** If gripper or target the robot is holding touches a target placed on the destination while moving the target, the move is not considered as a point.

### Example of the losing point by touching



**5-6-4. Target adjustment** No limit on number of touches on the target placed on the destination.

**5-6-5. Target loss** Target fallen from the field cannot be brought back to the field.

**5-6-6. Target crossing** Robot can go through the where target was placed

**5-6-7. Touching obstacle** No points loss

### 5-7. End of the game

**5-7-1. Robot arrival** If the timer stops by robot arriving before the time limit, the game stops and the mission point at the moment of arrival and the time record is approved.

**5-7-2. Time limit** If the robot fails to go through the arrive within limited time, points at the moment of time limit is approved.



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**5-7-3. Robot stop** If the robot stops during the game, referee can give 10 seconds waiting for the robot to move again. If the robot doesn't move again, robot stop is declared, and points at the moment of robot stop is approved.

**5-7-4. TKO(Technical Knock Out)** If the robot seems impossible to move, referee can declare TKO in accordance with robot stop. (e.g. moving back and forth repeatedly, stopping at a point caught by an obstacle, robot falling, etc.)

**5-8. Game stop upon disqualification** If the participant doesn't follow the game rules or disturbs game, the game stops according to disqualification, and the record for the trial does not get approved.

**5-8-1. Robot touch** If the participant touches the robot without permission from the referee, robot touch is declared and the participant may be disqualified for the trial.

**5-8-2. Robot modification during game** Participant is not allowed to add, remove, change or exchange any part of the robot during game. If the participant possesses extra component for the robot, tool, or battery to modify the robot, the participant may be disqualified for the trial.

**5-8-3. Sensor tuning** If the participant tries to tune sensor in the site before game, the participant may be disqualified for the trial.

**5-8-4. Line out** If the robot goes out the line, meaning two wheels going out the line, the participant may be disqualified for the trial.

**5-8-5. Breach in field arrangement** If the participant practices or plays not in the assigned field, the participant may be disqualified for the trial.

**5-8-6. False start** If the participant starts a false start twice in a trial, the participant may be disqualified for the trial.

**5-8-7. Miss start** If the participant starts a miss start three times in a trial, the participant may be disqualified for the trial.

**5-9. Rematch** Rematch can be held in accordance with referee's decision if unexpected accident such as black out or error in timer happens.

**5-10. Referee's decision** Referee has authority to supervise and generalize all situation during the game. Game result is referee's inherent authority and referee's declaration is the final declaration.

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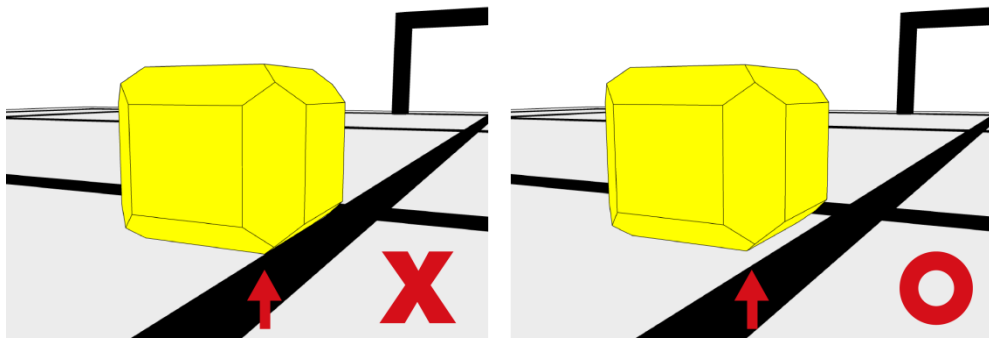
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## 6. Record

**6-1. Recording subjects** Points collected from target mission, time record, destination mission

**6-2. Record from target mission** Judgement in target mission is judged based on targets collected in the destination after the game over declaration from the referee. If the bottom of the target touching the floor touches the line, the target is not approved as point.

**Example of the point approval upon target touching line**



**6-3. Time record** Time recorded on the timer at the starting point and destination is acknowledged as time record. Time record for the robots declared robot stop, robot falling from the field, and TKO is not approved.

**6-4. Final record** Better record from first and second trial gets approved as final record.

**6-5. Priority in record** Groups are divided by number of succeeded target mission, and comparison in driving record in each group is considered to choose the ranking. If arrived at the destination, the robot succeeded destination mission has superiority.

**Number of succeeded target mission > Time record availability > Destination mission availability**

**6-5-1. Priority in trial** If the score in each trial is same, record in the other trial is compared to choose the ranking.

**6-5-2. Priority when tied** Better record upon first or second trial is approved. However, when tied, participant with better record on the first trial is gets priority.