

# RoboHit™ – Robofest® 2017 Game

V1.24 Oct. 1, 2016 (Pre-season International version; may be updated for official kick-off version)

## 1. Game Synopsis

A Ball-stand is located at the center of a white square (Junior) or rectangle (Senior) shaped baseball field, placed on dark floor. A fence with 2 poles attached at both ends of a board is located as shown in Figure 1.

A robot is to locate the ball stand (emptied water bottle with three AA batteries inside) and hit the ping-pong ball resting on the top of it using a standard pencil as a bat. Points are earned depending on where the ball is hit. A home-run will be scored if the ball flies over the fence or hits either pole. Points are also earned if the robot visits bases and returns back to Home-base, stops, and rests. A visit is defined by a block being completely removed from the field. An additional task is to search for 2 trash objects and remove them completely from the field.

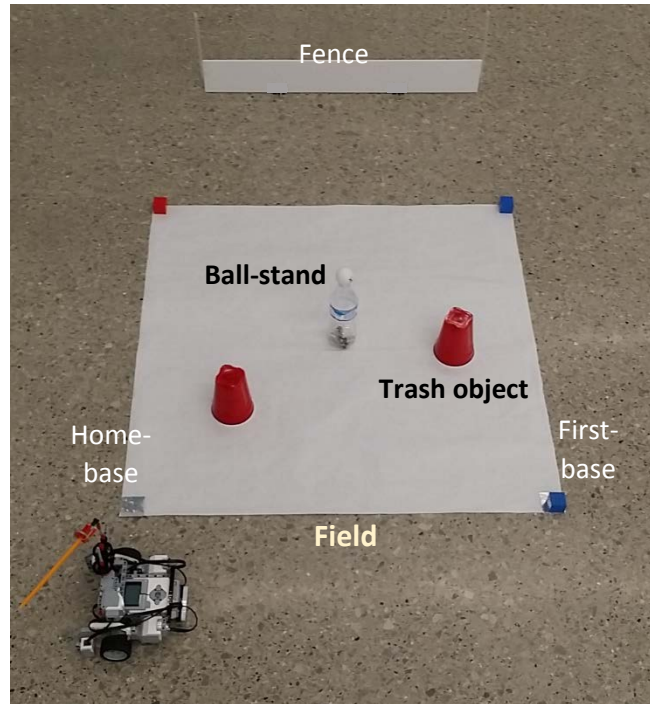


Figure 1. Jr. RoboHit Field

All the tasks should be done completely autonomously within 2 minutes without any external help. Any robot kits may be used. At the World Championship on June 3, 2017 at St. Pete Beach, there will be unknown task(s) that require program changes and/or additions.

## 2. Detailed Rules

- a) Violations are defined as the following:
  - If human player touches either the robot or any field material
  - The distance between the edge of the robot and the edge of the Field becomes greater than 35cm
  - If the robot (including the bat) touches the fence
- b) If any violation explained in “a)” occurs, then judges will announce violation, stop the run, and ask team if they want to reset the whole field. See “d)”
- c) The human player may also request a complete reset at any time even if there is no violation. See “d)”
- d) Only one complete reset is allowed for a run with a penalty defined on the scoring sheet.
- e) When the field is reset, all the points earned from the previous attempt are lost (cleared).

- f) The complete reset will be done by a Judge while the clock continues to run. Judges must reset as quickly as possible. No partial reset is allowed.
- g) The robot may visit bases in any order and/or clean up, before the hitting, that is, there is no required order to achieve the tasks except for the last stop at Home-base.
- h) Scoring will be done after the run is over.
- i) Unknown factors will be unveiled after the opening ceremonies. A 30 minute work-time will be given to adjust the robot after the unveiling. During this time, all people except contestants and authorized staff/volunteers will be evacuated from the pit/room.

### 3. Game Playing Field (example for Sr. Division with Rectangle Field)

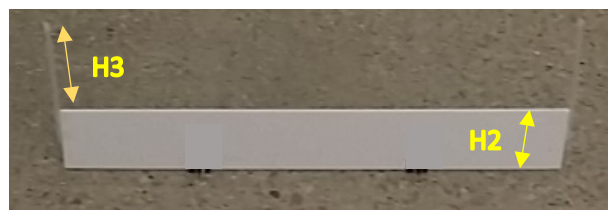
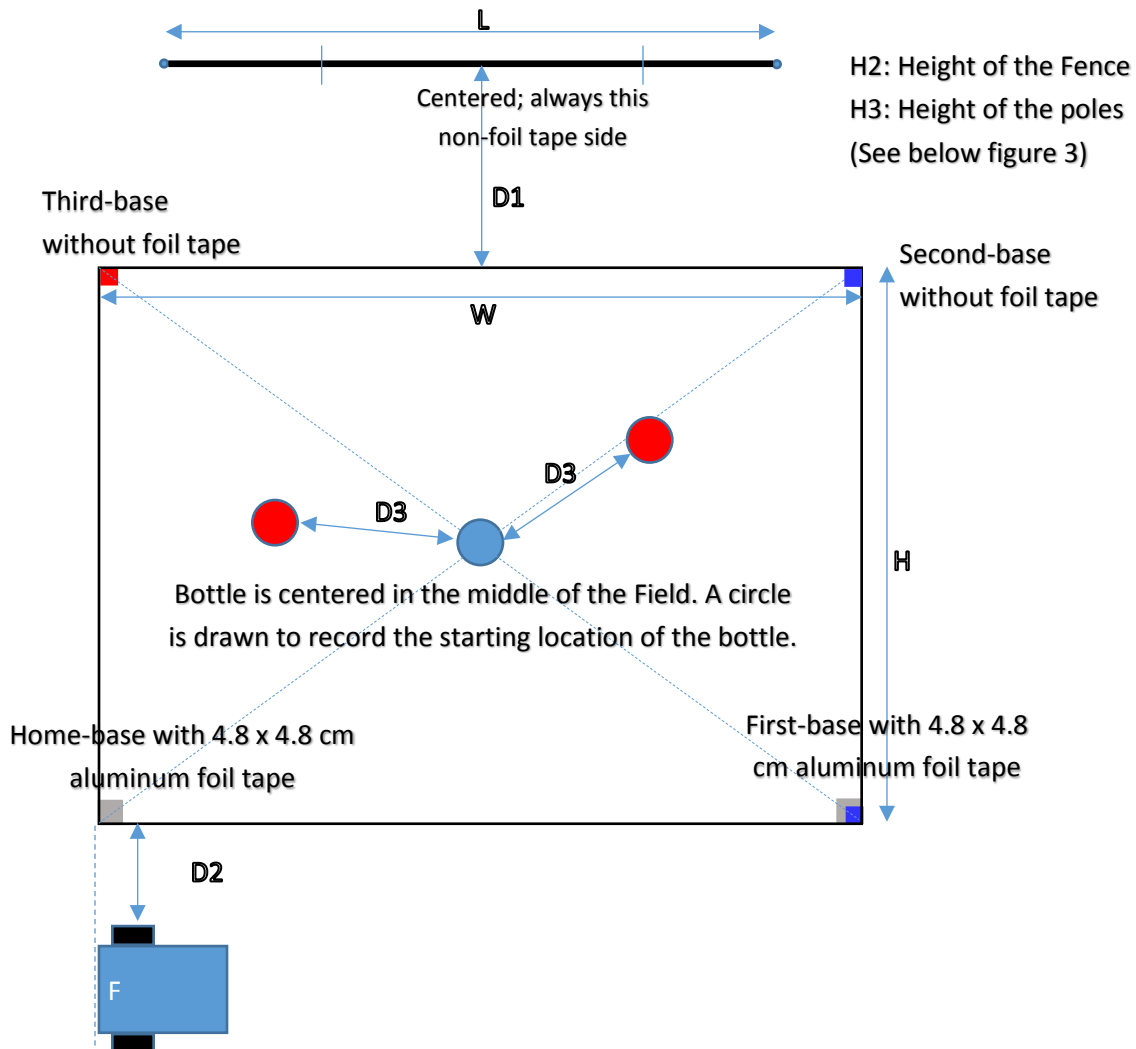


Figure 3. Fence with 2 poles

### Dimensions of the field

	Min value	Max value	Unveiled when?	Note
L	50cm	100cm	At the beginning of competition day	To be used for both rounds
W	80cm	120cm		
H	80cm	120cm		
H2	12cm	30cm		To be used for both rounds. See figure 3
H3	15cm	18cm		
D1	35cm	60cm	Unveiled before each round	See table 3
D2	10cm	40cm	Unveiled before each round	
D3	10cm	Unknown	Unknown; different each round	Robot needs to sense them

**Table 1. Field Dimension**

### Property/Color of the field component

Floor color	Unveiled at the beginning of competition day	If floor color is bright, dark papers or vinyl will be placed under the Field.
Field Material	White paper or vinyl; can be taped to the floor	
Fence	White poster foam board	Supporters will be placed & taped behind the fence.
Poles	Drinking straws. Diameter is 6 ~ 8mm	Taped at the edge of the fence
Home- & First-base	4.8 x 4.8 cm aluminum foil tape; shiny silver	3M HVAC tape
Bottle	500ml (16.9 FL Oz) bottle. The height without the cap is about 20cm	The teams may measure the height after check-in.
Ping-pong ball	Standard size 40mm; color is unknown (does not matter)	<a href="https://www.amazon.com/gp/product/B00M9VXF50">https://www.amazon.com/gp/product/B00M9VXF50</a>
Trash objects	Possible examples: color cup, soft drink can, etc. Actual locations will be announced after all the robots are impounded.	
Base objects	Unveiled at the unveil time (possible examples: Lego® blocks, less than 4.8 x 4.8 x 4.8cm)	
Robot orientation	West, North, East, or South – Unveiled before each round	

**Table 2. Field Component Properties**

### 4. Robot Specifications (For both Junior and Senior Division)

1. Your robot may expand to hit the ball. However, it must fit within a 35 x 35 x 35 cm box before expanding
2. Weight limitation: none
3. Any number of sensors/sensor types (unless it is harmful to humans)
4. Any number/type of motors/servo motors (multiplexor is OK to use)
5. Any material/robot kit may be used to construct your robot including tape, glue, bolts and nuts, rubber bands, etc.
6. A Robofest team ID tag on top of the robot is required.

- A label identifying the **front** side of the robot is required

## 5. Differences between Junior and Senior age divisions

	Junior (5 ~ 8 <sup>th</sup> grades)	Senior (9 ~ 12 <sup>th</sup> grades)
Field shape	Square	Rectangle
D1 value	Less than or equal to that of Sr.	Greater or equal to that of Jr.
Number of controllers	One	No limit

**Table 3. Differences between Jr. and Sr. age divisions**

## 6. Rules to Play Two Rounds and Determine Winners

- Playing field configuration may be different for each round.
- When unknown factors are unveiled, teams will be provided hard-copy of unveiled information.
- Teams will be given 30 minutes (work-time) after unknown factors are unveiled to work on their robots. During this time, no adults (including parents and coaches) are allowed in the pit/room
- All teams must submit their robot to the impound area when 30 minute work-time has expired.
- During the impounding process, judges will inspect robots. (size of the robot, Team ID, and label indicating the front side)
- After impounding, the judges will setup official playing fields with trash objects.
- Teams will compete in a pre-determined order decided by the site host.
- Only two contestants per team are allowed at the playing field during the run.
- Contestants must move away at least 1m from the field edge after starting the robot.
- A team member must sign the score sheet to confirm the team's score.
- Entered scores shall be displayed to teams to validate data entry.
- Winners in each age division will be decided by the **average** Final Score of the 2 rounds. Tie breakers will be: (1) best Final Score of two rounds, (2) Time left, (3) rerun, if needed.

## 7. Important Announcements Before Each Round

- No adult is allowed in the pit area during work-time.
- Any verbal/electronic communication between coach/parent/contestants is prohibited during work-time. If anyone sees any suspicious activities, please notify the nearest volunteer immediately.
- Students must stay in the pit area until their robot is impounded.
- Spectators are welcome to take pictures or video, but please make sure your flash is off.
- Any violations can result in deduction of points or disqualification

## 8. Special Notes

- Though every effort is made to be consistent and precise in all of the dimensions of the playing field and parts, Robofest assumes a tolerance of  $\pm 3$  mm, unless stated otherwise.
- If there are multiple playing fields at the competition sites, the Chief Game Judge will check consistency between the playing fields.
- Judges & contestants should maintain at least 1 meter distance from the field.
- Final decisions are at the discretion of the Chief Game Judge.

## 9. FAQs

- Is it a Home-run, if the ball flies over the fence above between the 2 poles? **Yes.**

## Robofest® 2017 Game RoboHit Scoring Sheet

Division: Junior / Senior Team Name: \_\_\_\_\_

Team School / Organization Name: \_\_\_\_\_ Team Number: \_\_\_\_\_

Round: First Second Field No.: \_\_\_\_\_

Judging Items	Location/ Or Count	Point Value (per count)	Score Earned / Lost
Ping-pong ball	Home-run (over the fence or hits a pole)	30	<i>Max. 30</i>
	Touched the fence without first hitting the floor	15	
	Bounces over fence	13	
	Outside field	10	
	On the field (off the bottle)	5	
	On the bottle	0	
Number Bases visited. The Lego blocks must be completely moved out from the field	0 1 2 3	10	<i>Max. 30</i>
Number of trash objects removed completely from the field	0 1 2	10	<i>Max. 20</i>
Bottle (ball stand) remained on original location. (Minor touch by the pencil is OK if not noticeably moved)	0 1 (no) (yes)	5	<i>Max. 5</i>
The robot came back to Home-base, stopped, <b>and</b> rested at the end of the run. Any part of the robot must be on <i>or</i> over the Home-base aluminum foil plate.	0 1 (no) (yes)	10	<i>Max. 10</i>
The robot remained intact throughout the run.	0 1 (no) (yes)	5	<i>Max. 5</i>
A Reset was done ( <b>Reset penalty</b> )	0 1 (no) (yes)	<b>-5</b>	<i>Max. 0</i>
	<b>Total Score</b>		<i>Max. 100</i>
	<b>Time left in seconds</b>		

Judge initials: \_\_\_\_\_

Team player initials: \_\_\_\_\_