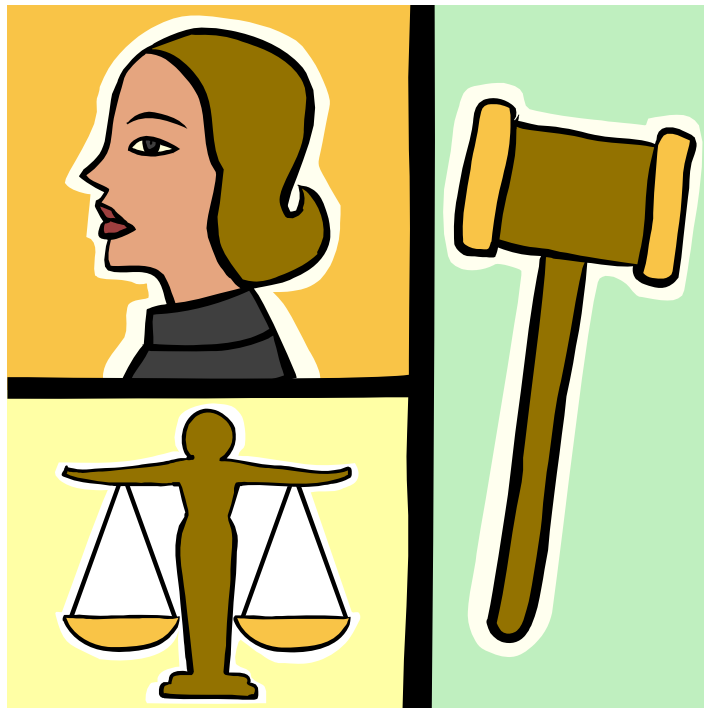


**2015**

# RoboBowl Game Judging Guidelines



Go to

[www.robofest.net](http://www.robofest.net) and click on  
*Get Involved → Game.*

Print scoresheets from:

[http://www.robofest.net/2015/RoboBowl\\_ScoreForm.pdf](http://www.robofest.net/2015/RoboBowl_ScoreForm.pdf)

FAQs can be found at

[http://robofest.net/2015/RoboBowl\\_Clari\\_fications\\_Faqs.pdf](http://robofest.net/2015/RoboBowl_Clari_fications_Faqs.pdf)

**Updated February 24,  
2015**

*This presentation is for all volunteers, coaches,  
mentors, site hosts, and team members*



# RoboBowl Game Judging

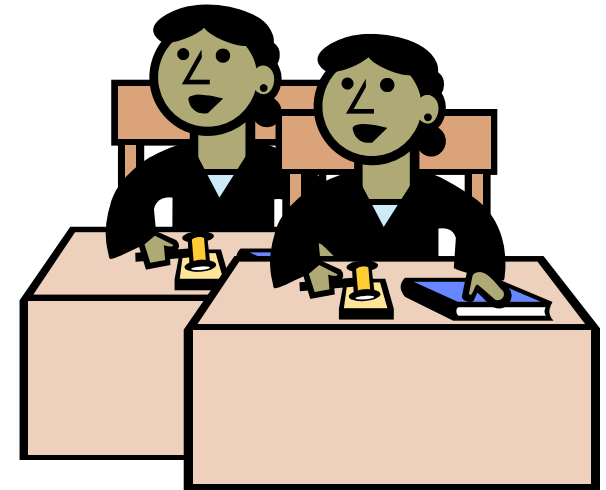
- Based on Official Rules (v1.0) published on Jan 15, 2015
- Additional *Rule Clarification and FAQs* on [www.robofest.net](http://www.robofest.net) → Get Involved → Game

# Judge Types and Roles



Chief Judge

*Judges' decisions are final!*



2 Judges per  
Game table

About 20%  
of  
teams

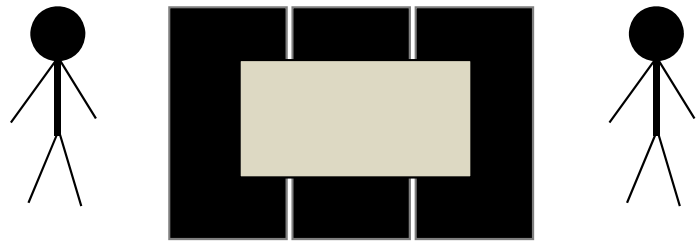


Qualify for MI and  
World  
Championships

# Recommended RoboBowl Setup

**Timer\*\***

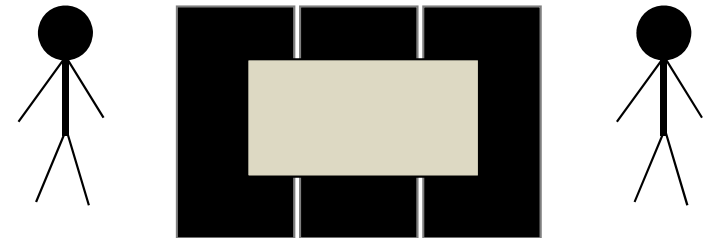
2 Judges / Competition Table



3 6ft tables\* covered with black vinyl

**Timer\*\***

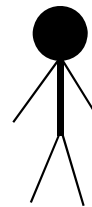
2 Judges / Competition Table



3 tables\* covered with black vinyl

*Chief judge works closely with scorekeeper to review score. The **Chief Judge is ultimately responsible for final scores.***

Impound area



**Chief Judge**

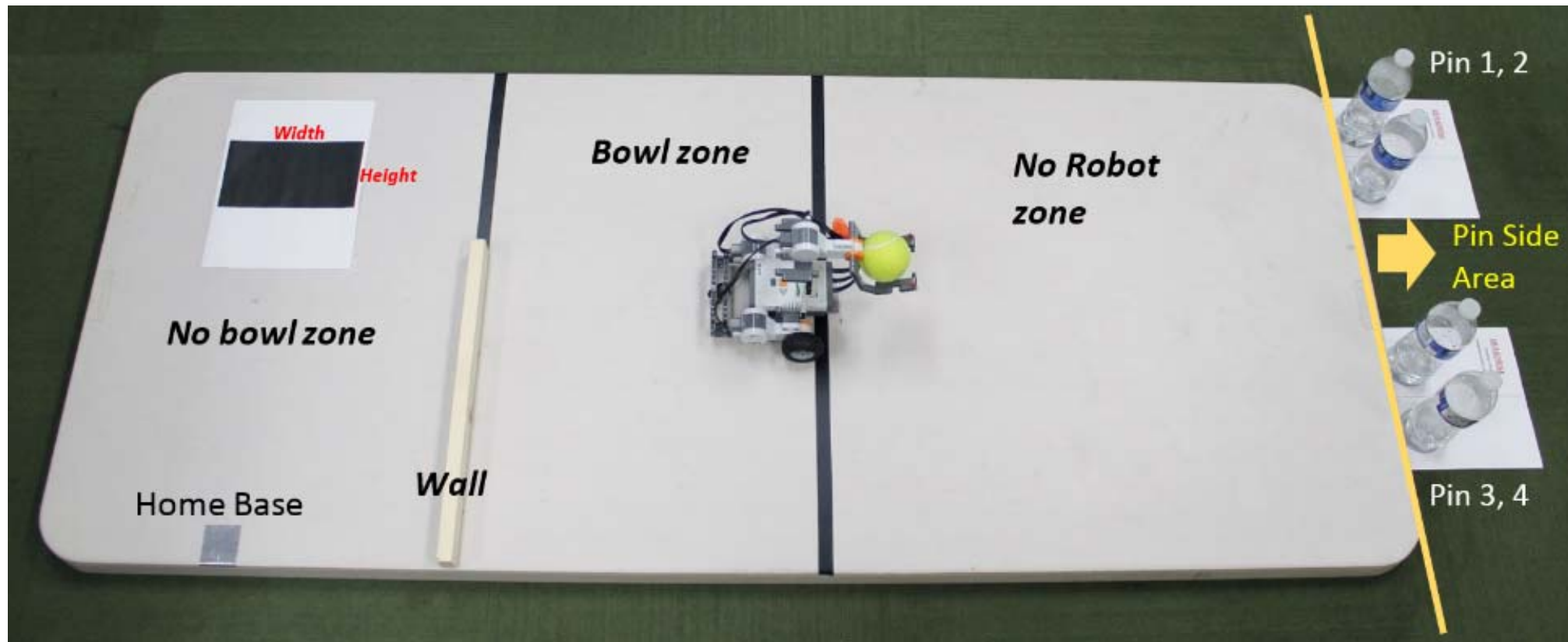


**Score Keeper with Laptop/Excel**

(\*) or two 8ft tables

(\*\*) can be shared. Use also Smartphone App.

# RoboBowl – 2015 Game



- Knock down 4 pins (water bottles) by bowling max. 7 tennis balls
- *Measure the height of the black rectangle in millimeters*

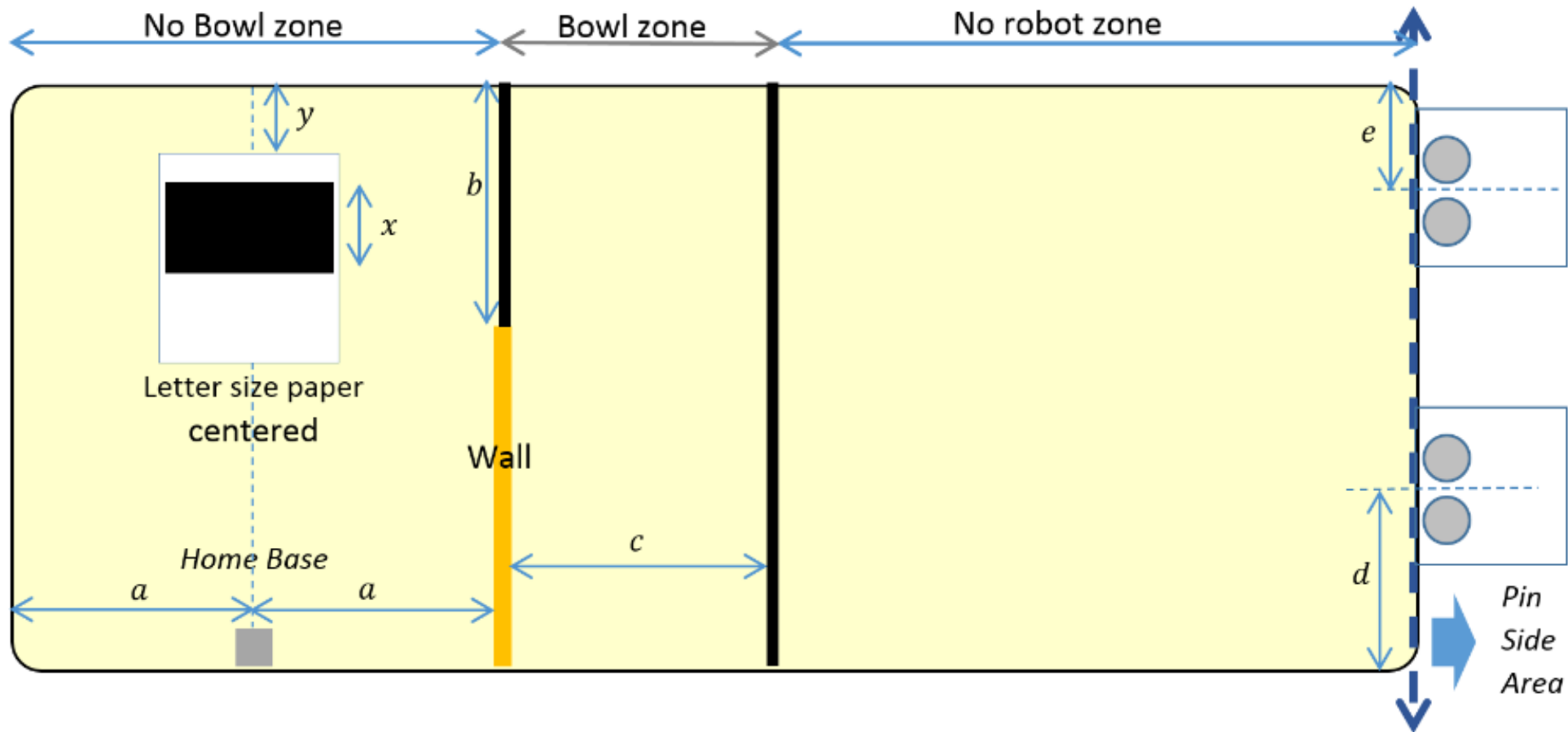
# 2015 Game “RoboBowl” Animations

- Go to [www.robofest.net](http://www.robofest.net) and click on “Get Involved” then “Game”
- Please Watch [Scenario 1](#)

# RoboBowl Rules

- 7 tennis balls (modification not allowed) & 2 min per round
- The robot can carry (play) only one ball at a time.
- Once the ball is released, it cannot be (re-)moved by anyone.
- The ball is manually loaded by a human player only when the robot is at Home Base (HB).
- Players may touch/modify the bot when it is on or over HB
- The robot cannot *physically touch* the “No Robot” zone, Part of the robot may hover above the “No Robot” zone, as long as it does not touch the table surface.
- Bot must return to HB after each bowl, to get a next ball
- The robot is required to display the height  $x$  of the black rectangle printed on the letter size paper in millimeters on LCD panel ***after*** the game is over.

# Playing Field Layout



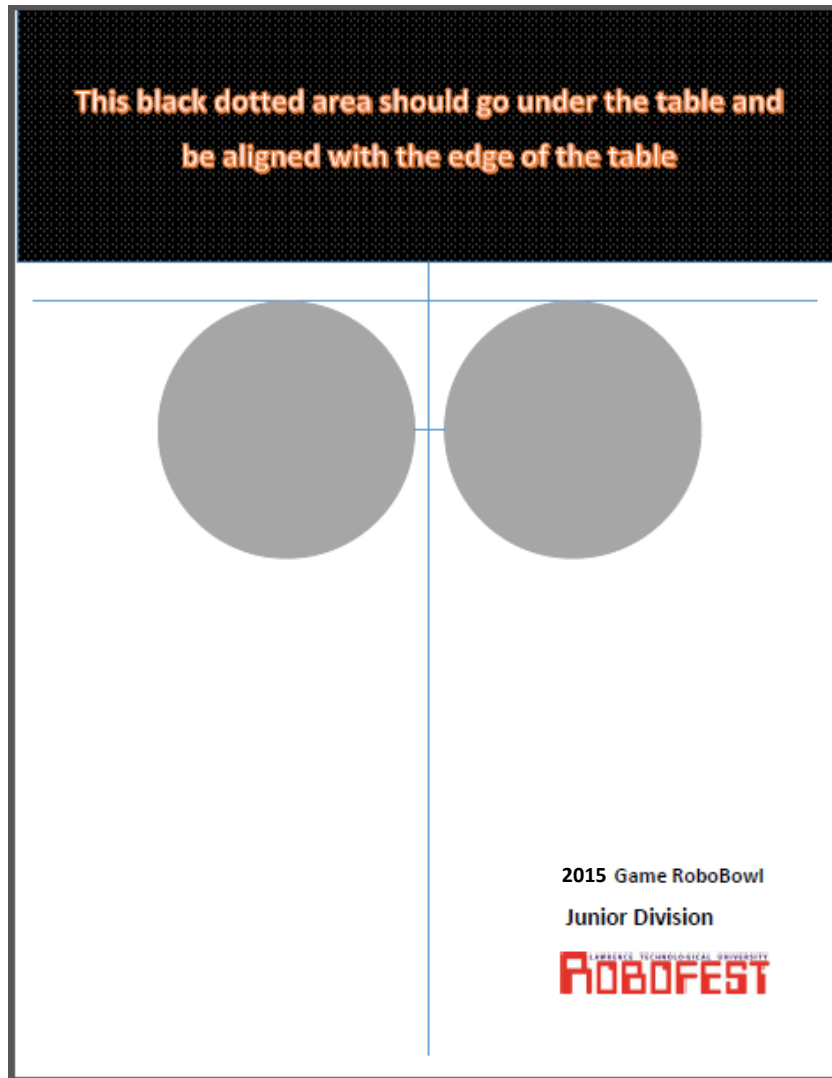
	Min	Max	Unveiled?
$a, b$	25cm	30cm	The tables will be set up at the competition and remain in that configuration during the entire event
$c$	35cm	50cm	
<i>Weight of the bottles</i>	See table 2 below		The bottles with Jr. or Sr. label will be set up at the venue and remain in that weight during the entire event
$d$	See table 2 below		A formula to calculate $d$ will be unveiled. For example: $d = x/2$
$e$	12cm	18cm	Unveiled
$x$	90mm	235mm	The robot must measure this value
$y$	5cm	10cm	Changing for each round



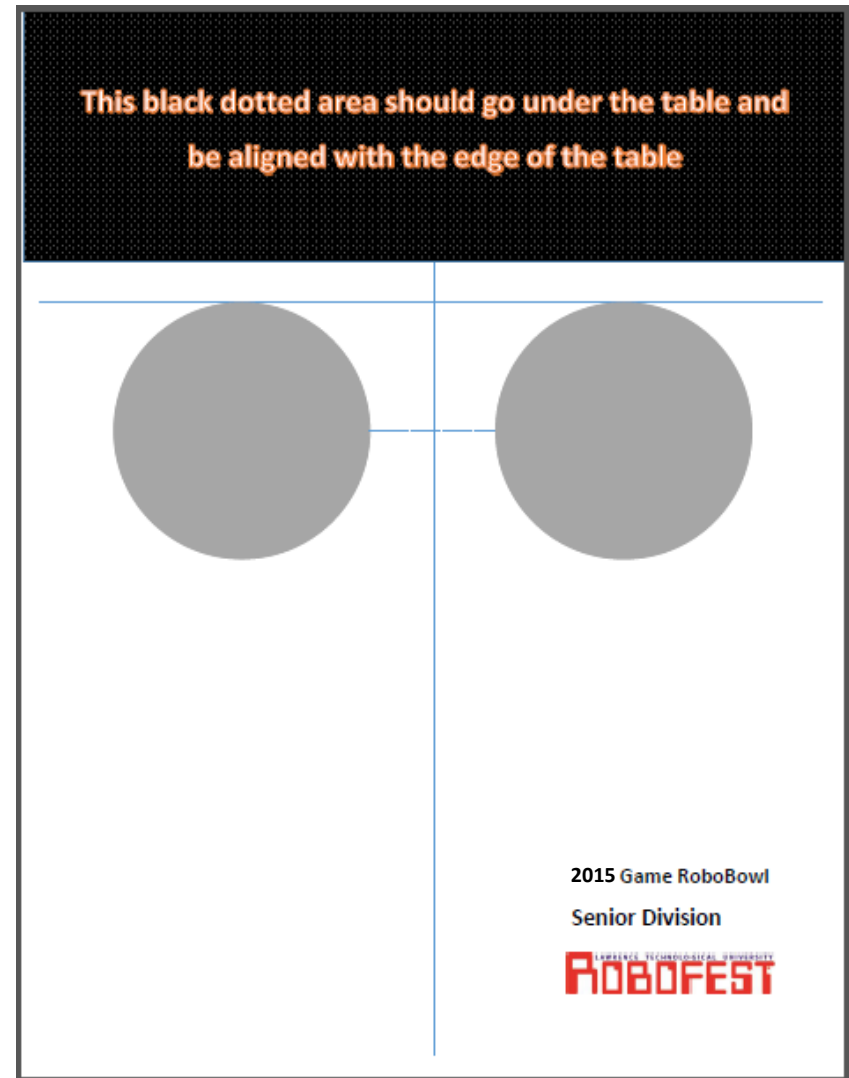
# Differences between Junior and Senior age divisions

	<b>Junior (5 ~ 8<sup>th</sup> grades)</b>	<b>Senior (9 ~ 12<sup>th</sup> grades)</b>
Weight of the bottle with water	between 120g and 170g	Between 150g and 250g
The formula to calculate $d$	Simple $20cm \leq d \leq 40cm$	Complex $15cm \leq d \leq 50cm$
Distance between two bottles	~ 7mm	~ 34mm
Number of controllers	One	Not limited

# Pin locator papers



Jr



Sr

# Rounds

- 2 rounds, 2 minutes per round
- Playing field configuration including rectangle size may be different for each round.
- Teams will be given 30 minutes after unknown factors are unveiled.
- All teams must submit their robot to the impound area when 30 minutes has expired.
- After impounding, the judges will re-setup tables

# Unveiling Unknown factors and Rules during the 30 minutes

- The team pit area will remain closed for the entire competition day starting with opening ceremonies; no outside help may be given to teams at any time.
- Right after opening ceremonies, Chief Judge will unveil the formula to calculate  $d$  (*unit used is cm*) and the value of  $e$  (*unit used is cm*)
- Different from prior years: Robots may start in any orientation, as long as part of the robot is over Home
- 30 min timer will begin for teams to work in pit area; Judges/proctors will watch teams during this period to ensure teams do not receive outside help
- Teams can use official playing fields for practice

# Impounding Robots

- The following items must be checked when the robots are impounded
  - Width & Length: max. 35 cm (if robots expand, judges must check expanded size of robot)
  - Visible Team ID tag on the robot
- During this time, official playing fields will be closed and setup with new rectangles, pin locations, and water bottles.

# Robot Specifications (Both Jr. & Sr.)

- **Maximum** width and length (**fully extended**) is 35cm x 35cm
- Height and weight limitation: none
- Any number of sensors/sensor types (unless it is harmful to humans)
- Any number/type of motors/servo motors (multiplexor is OK to use)
- Any material/robot kit may be used to construct your robot including tape, glue, bolts and nuts, rubber bands, etc.
- Team ID tag on top of the robot is required.
- Number of controllers (brains): Jr – 1, Sr - unlimited

# How to start the robot

- Robot will be placed at Home Base (aluminum foil tape) as long as part of it is on or over the foil tape and it meets the size requirements, May hang over the edges of the table
- Players may pick up their robot without penalty only when any part of the robot is on *or* over the foil tape; players may move the robot away from home base if needed, but then must return the robot to home to re-start

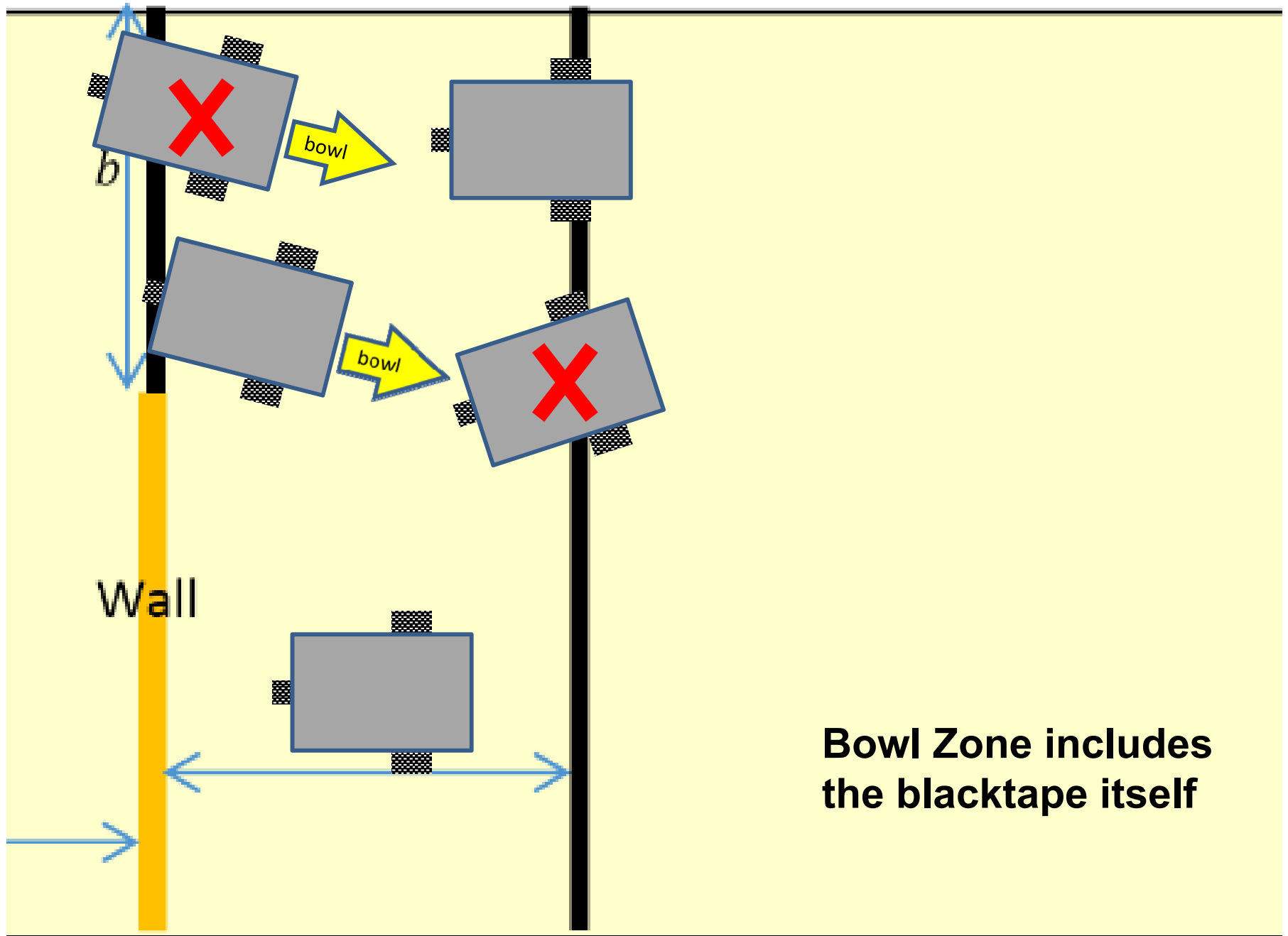
If any of the following violation occurs, **a ball is removed & marked as dead**. Restart at Home. The clock does not stop!

- Human contact with the official playing field materials, other than balls at Home Base
- Human contact with the robot at any point on table other than Home Base
- Robot falls off the table (Any part of the robot is touching the floor)
- If any part of the robot touches the “No Robot” zone. The black tape itself is not regarded as No robot Zone.
- The ball was released when any part of the robot was touching the “No Bowl Zone”, near Home Base. The black tape itself is not regarded as No Bowl Zone.
- Any attempt to knock down pins other than bowling the tennis ball. For example, air.



Bowl zone

No robot zone



**Bowl Zone includes  
the blacktape itself**

# Scoring Sheet (1/2)

Judging Items	Count	Point Value (per count)	Score Earned / Lost
Number of pins knocked down	0 1 2 3 4	15	Max. 60
Number of pins moved that were not knocked down	0 1 2 3 4	10	Max. 40
Number of balls in "Pin Side Area"	0 ~ 7	2	Max. 14
Number of live (unused) balls <b>after all four pins knocked down</b>	0 ~ 6	3	Max. 18
The robot reported the height, x: _____ (*) (Measured Value) in millimeters <b>at the end of the Game.</b>	0 1 (no) (yes)	5	Max. 5
The robot remained intact throughout Game.	0 1 (no) (yes)	5	Max. 5

# Scoring Sheet (2/2)

Number of dead balls due to violations (just to count)	0 ~ 7	0	
<p>(*) If Measured Value is “blank”, Final Score is Total Score.</p> <p>If Measured Value is a number, calculate</p> $e = \frac{  \text{CorrectValue} - \text{MeasuredValue}  }{\text{CorrectValue}}$ $\text{Final Score} = \begin{cases} \text{Total Score} & \text{if } e > 1.0 \\ \text{Total Score} + 11 * (1 - e) & \text{otherwise} \end{cases}$	<b>Total Score</b>		
	<b>Final Score **</b> Calculated by Scorekeeper using Excel. Not to be rounded.		

- No adult help is allowed during the competition, so only team members may dispute judges’ rulings. The Chief Judge resolves disputes between team members and judges.
- The team & judge initial the scoresheet after the game has ended indicating all parties agree upon score

# Game Ending

- It is a team's responsibility to design robots in such a way that the height displayed on LCD can be shown to Judges at the end of the game.
- Get signatures from a team player. Coaches must ask students to check carefully before signing. This is part of the educational process
- Judges also sign the scoresheet
- Give the score sheet to Chief Judge
- After checking, Chief Judge will give the score sheet to score keeper

# Judging Tips

- Check **violations** carefully during the run
- **Reset** any pins knocked down or moved due to violations
- **Judges must be at least 4 ft from the table if distance sensors are being used**
- **Count** number of balls lost due to violations, and number of balls in the pin side area during the run
- **Score after the game by observing if pins were knocked down or moved only, number of remaining balls if all 4 pins knocked down, etc.**
- Chief judge at individual Sites has the authority to interpret any and all questions that may arise during the competitions

# RoboBowl Videos for Judging Practices

Use score sheets to score the following game animations.

[http://www.robofest.net/2015/RoboBowl\\_ScoreForm.pdf](http://www.robofest.net/2015/RoboBowl_ScoreForm.pdf)

- Go to [www.robofest.net](http://www.robofest.net) → Get Involved → Game
- [Scenario 2](#)
- [Scenario 3](#)
- [Scenario 4](#)

# Scorekeeper Instructions

- Chief judge must verify secret values (height of rectangle) in the excel scoresheet
- Enter in the total score for each team under “Total”
- If no measured value is given, leave the “Measured” column blank. e and Final score are calculated automatically.
- Recommended to display scoresheet to teams after each round, **hiding** the **secret value** and **measured value**

← from Chief Judge

Jr. Game	Round 1 Secret Value: 70650				Round 2 Secret Value: 96162.5			
	Round 1				Round 2			
Team Name	Total	Measured	e	Final	Total	Measured	e	Final
Sample 1	10		no data	10.000	20		no data	20.000
Sample 2	50	30010	0.58	32.743	65		no data	65.000

- Do not convert to mm. Enter data as is.

# How to determine winners

- Winners in each division will be decided by ***average*** scores of Rounds 1 and 2
- Tie breakers:
  - 1) Best score
  - 2) Rerun, if needed

*Note that the accuracy of the measurement will be an important factor in deciding winners.*



# FAQs (1)

**Q1.** A bottle was knocked down or moved because it was hit by another bottle. Is that counted as “knocked down” or “moved”? **Yes**

**Q2.** A ball was released or dropped in the No Bowl Zone. What should Judge do? **It is a violation! Judge will announce the ball as dead, remove the ball, and ask the team to restart with a new ball.**

**Q3.** A ball was released when the robot was touching the No Robot Zone and a bottle was knocked down. What should Judge do? **It is a violation! Judge will announce the ball as dead, remove the ball, reset the bottle, and ask the team to restart with a new ball.**

**Q4.** The robot fell off the table while holding a ball. What should Judge do? **Violation! Judge will take the ball and announce the ball as dead, and ask the team to restart with a new ball.**

**Q5.** The robot without a ball fell off the table when it comes back to Home Base. What should Judge do? **Violation! Judge will take one ball and announce the ball as dead, and ask the team to restart with a new ball.**

## FAQs (2)

**Q6.** A human player touches the robot with a ball outside Home Base. What should Judge do? **Violation! Judge will take the ball and announce the ball as dead, and ask the team to restart with a new ball.**

**Q7.** A human player touches the robot without a ball outside Home Base. What should Judge do? **Violation! Judge will take a ball and announce the ball as dead, and ask the team to restart with a new ball.**

**Q8.** There was a violation, but there is no ball alive. What should Judge do? **Judge will ask the team to restart. (The team may try the rectangle shape height reporting)**

**Q9.** Can the height of the rectangle shape be measured more than once? **Yes. But it should be reported only once at the end of the game.**

**Q10.** A ball hits and moves a bottle but does not knock it down. Can the team request the reset of the bottle? **No.**

**Q11.** Is there any penalty if the robot hits the “wall”? **No.**

## FAQs(3)

Q12. Will the Judge give a starting orientation for the robot? **No.**  
**The robot can use any orientation.**

**Q13.** A ball was dropped on “Bowl Zone” or “No Robot Zone”. Is the ball removed? **No, Judge will not remove the ball, since it is not a violation.**

Q14. What happens if your robot can't come back Home Base? **A player can pick up the robot. But violation will be announced.**

Q15. Can the robot just stop after the last bowl and display the value? **Yes**

Q16. Can multiple programs be used? **Yes. But the program selection must be done only at Home.**

Q17. Can the robot be repaired at Home Base? **Yes**

**Q18.** The measurement is shown to Judge. Can they continue to bowl? **No. If you show the number, the game is over.**

# FAQs (4)

## Clarification or updates of the Rules

- Pins knocked down or moved due to violations shall be reset by Judges
- If needed especially when the robot is tall, the robot can be moved off the Home Base to load a ball
- **Unit used in the formula for  $d$  is cm, not mm**

## Additional FAQs

- Q19. Robot bowls the ball toward the “No Bowl Zone” from the legal “Bowl Zone”. Is this a violation? **No. Since it is not a violation, the Game continues. The ball is not retrieved.**
- Q20. A team completes the Game before 2 minutes are expired. Is there an advantage? **No.**
- **Q21.** A ball was dropped on “No Bowl Zone” when the robot was on No Bowl Zone. What should Judge do? **Declare violation, remove the ball, and ask the team to restart.**

## FAQs (5)

- Q22. A ball was dropped on “Bowl Zone” when the robot was on Bowl Zone, which is not a violation. Then the robot went back Home and came back to the Bowl Zone with a new ball. Can this robot push the ball toward the pins? **Yes, as long as it is just one ball. Rules state that only 1 ball can be played at a time.**
- Q23. Same situation as in Q22. Can this robot use an arm to load on the robot? **Yes. (However, two balls cannot be bowled at the same time)**
- **Q24.** A robot in “Bowl Zone” bowls the ball successfully. After the bowl, the robot cross the line into the No Robot Zone. If the pins are knocked down or moved by the ball, are they valid to count? **Yes, since the violation occurred after the bowling. But due the violation, the robot must be restarted and one ball becomes dead.**
- Q25. At the end of the game, how is the number of unused balls determined? Do we include the ball loaded on the robot at the Home Base? No. **(balls not touched/loaded)**

## FAQs (6)

- Q26. Are sensor or motor wires (connector cables) counted as the size of the robot? **No**
- **Q27.** What if sensor or motor wires (connector cables) touch the “No Robot Zone”? **It is a violation.**
- **Q28.** The pin was “shaken” by a ball or other pin. Is it considered as the “location” move? **No. Judges will only check if the pin location was moved after the game.**
- Q29. Can teams pre-load the ball before the game starts? **No.**
- Q30. Can teams move bottles during the (30 min) practice time? **Yes.** It is encouraged to re-set using rulers or tape measures based on the unveiled numbers

# Additional RoboBowl Videos for Judging Practices

Use score sheets to score the following game animations.

[http://www.robofest.net/2015/RoboBowl\\_ScoreForm.pdf](http://www.robofest.net/2015/RoboBowl_ScoreForm.pdf)

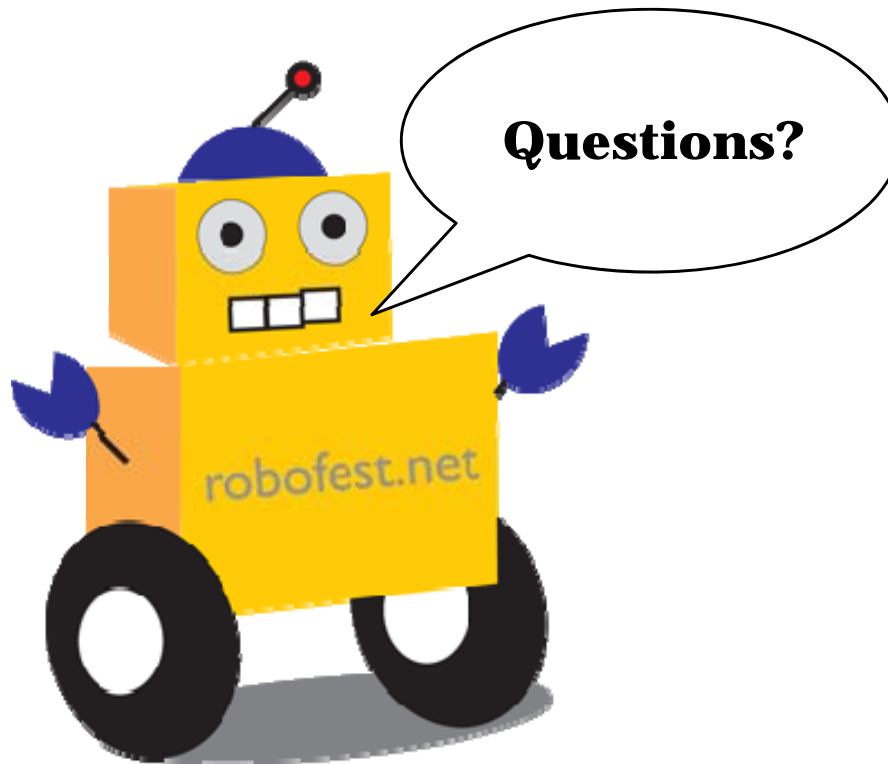
- Go to [www.robofest.net](http://www.robofest.net) → Get Involved → Game
- [Scenario 5](#)
- [Video1](#) | [Video 2](#) | [Video 3](#)
- Additional videos will be available later



## Little Robots, Big Missions

Go to  
[www.robofest.net](http://www.robofest.net)  
and click on Get  
Involved → Game

This Powerpoint file  
and related  
materials are  
available under  
Judging section



Contact:  
[robofest@LTU.edu](mailto:robofest@LTU.edu)

