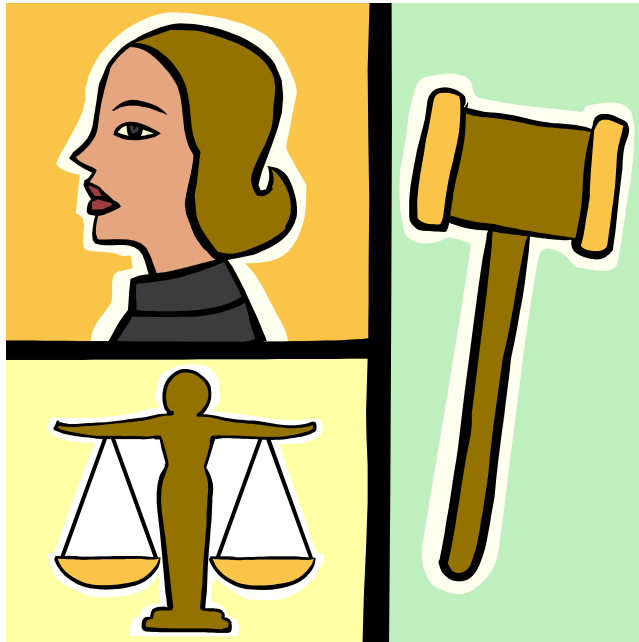


ROBOFEST 2016

RoboGolf Game Judging Guidelines



Go to
www.robofest.net and click on
Get Involved → *Game*.

Print scoresheets from:
http://www.robofest.net/2016/RoboGolf_ScoreForm.pdf

Rule Updates and FAQs can be found at
<http://www.robofest.net/index.php/current-competitions/game>

February 29, 2016

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

RoboGolf Game Judging

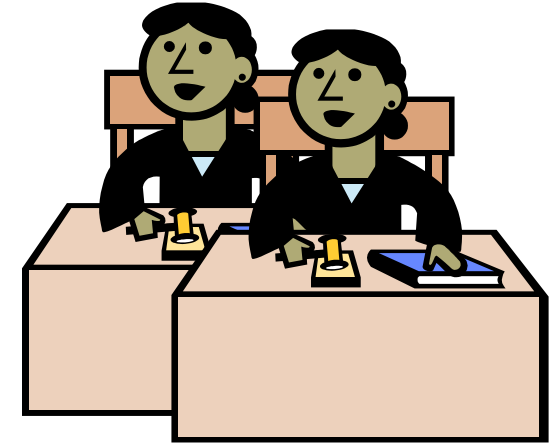
- Based on Official Rules (v2.0) published on Jan 16, 2016
- Additional Rule Changes, Clarification and FAQs on www.robofest.net → Get Involved → Game

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 RoboGolf Setup

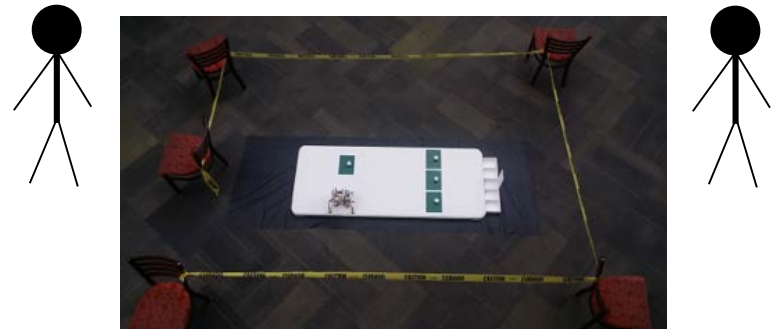
Timer*

2 Judges / Competition Table



Timer*

2 Judges / Competition Table



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

Impound area

should be blocked and supervised at all times; **Charging is not allowed**



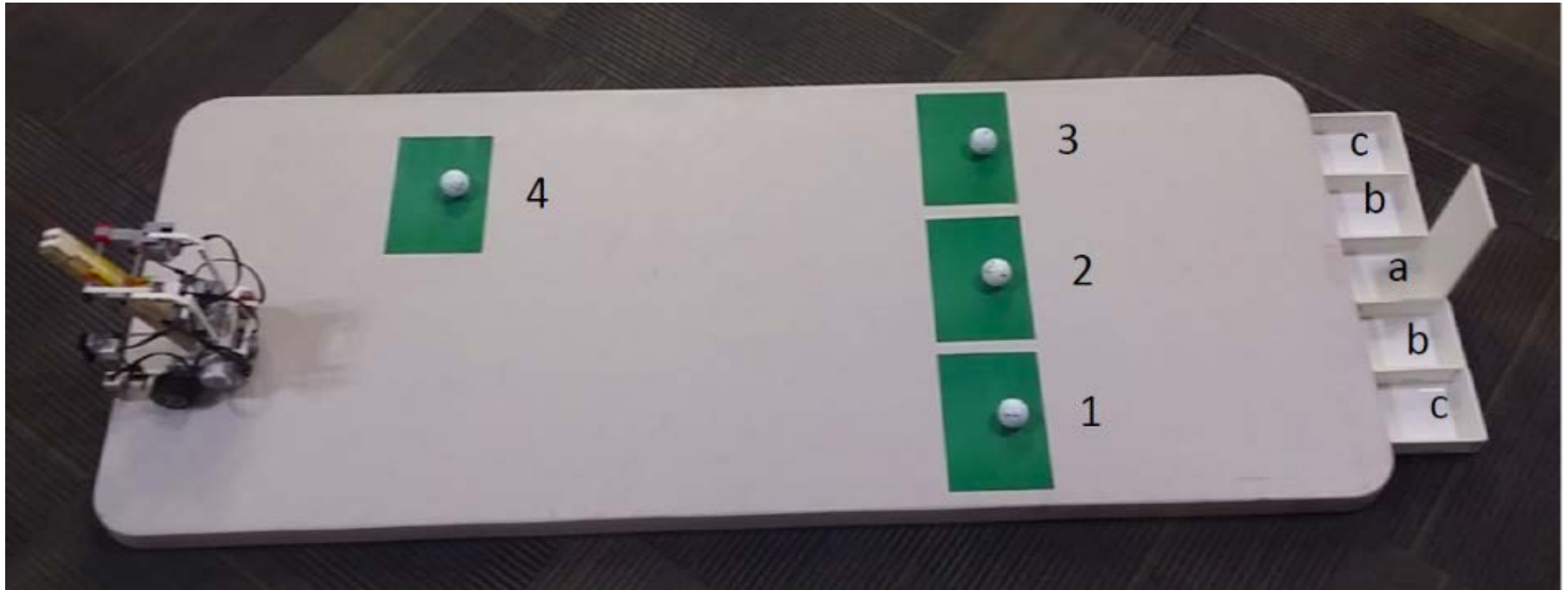
Chief Judge



Score Keeper with Laptop/Excel

(*) Centralized or Smartphone App.

RoboGolf – 2016 Game



Autonomously find each green area, locate a standard golf ball, **stop**, and putt the ball into a hole by using a piece of wood (wooden putter) **moved by at least one actuator (motor)**

2016 Game “RoboGolf” Videos

- Go to robofest.net and click on “Game” link to watch 5 videos
- Example video 1:

<https://youtu.be/bgDL4n1xs3U>

RoboGolf Rules

- 4 standard golf balls with numbers 1 ~ 4 will be used.
- 2 minutes are given per game round.
- Starting location & orientation are unveiled before the work-time for each round. The starting location will not be on green areas. It will not be between green areas 1~3 and the holes.
- The robot can putt only one ball at a time. The ball may only be struck/hit once and at the original location on the green.
- The robot body must be at rest while the robot is striking the ball with the putter.
- The wooden putter must be moved by at least one actuator
- Teams cannot touch the robot during the round.
- There is no Home Base. The robot does not need to return to where it started.
- Only Judge can end the round.

If any of the following violations occur, the round ends. Scores earned before the end of a round are retained.

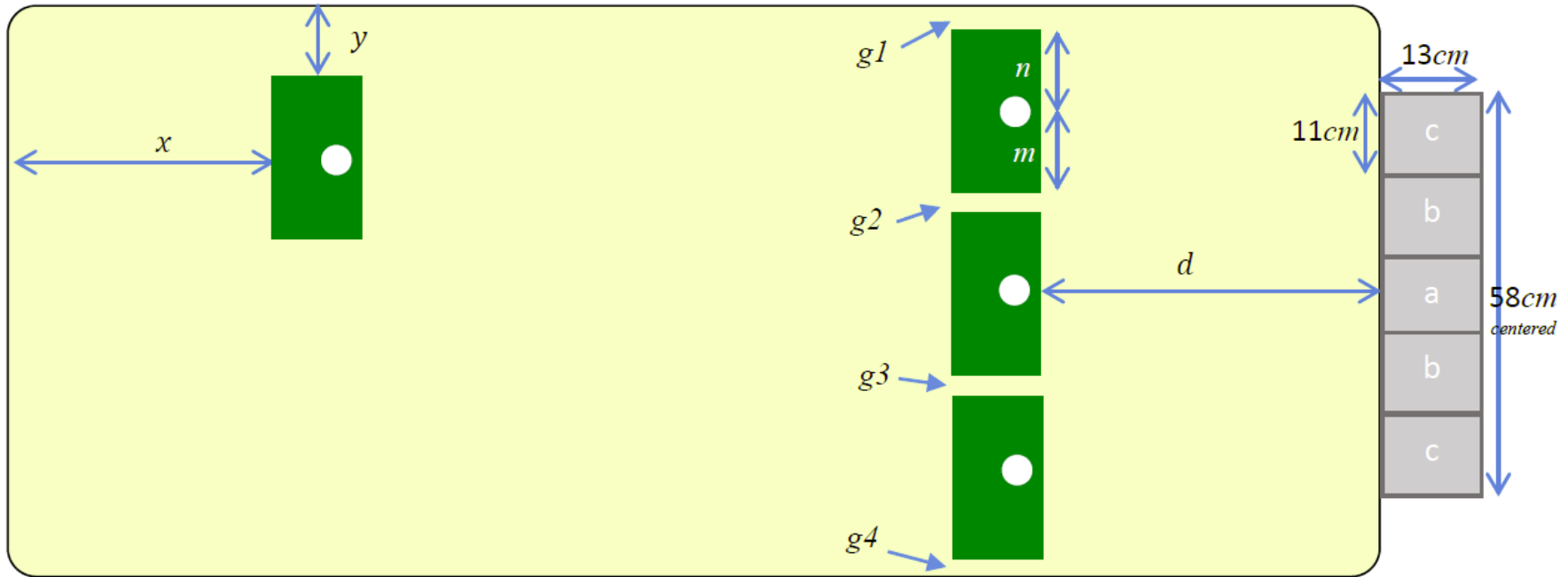
1. Human contact/touch with the official playing field materials
2. Human contact/touch with the robot at any point after the start (See item G on scoresheet)
3. The robot touches the hole-structures
4. The robot falls off the table (any part of the robot is touching the floor)

Invalid ball is declared when it goes into a hole-slot by illegal putting as below:

- The ball was hit by the robot body, not by the wooden putter
- The ball was *pushed*, but not hit or struck by the putter
- The ball was legally putted, not from the original location
- The robot body was moving when the putter struck/hit the ball

If the above cases occur, the Judge must immediately announce “Invalid” and record the invalid ball number on the score sheet. The round continues, and the Judge leaves the ball where it lies either in the hole or on the table.

Playing Field Layout

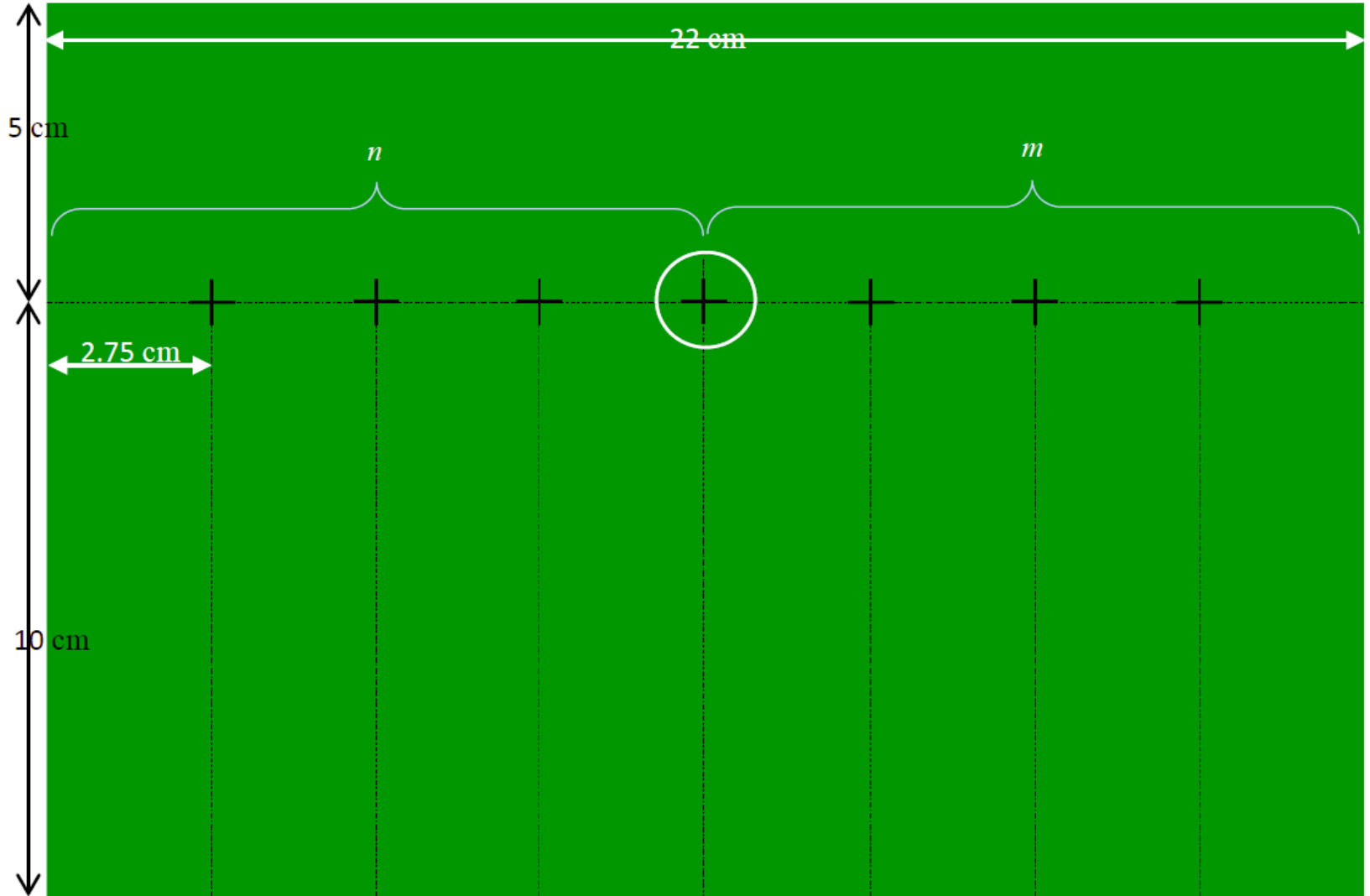


	Min	Max	Unveiled?
d	35 cm	50 cm	The tables will be set up at the competition and remain in that configuration during the entire event. Teams are supposed to measure the values.
$g1 \sim g4$	1.5 cm	2.3 cm	
x	35 cm	50 cm	Yes for Junior, No for Senior
y	5 cm	10 cm	Yes for Junior, No for Senior
n/m	1/7	7/1	Junior is 1 (= 4/4); Senior unveiled

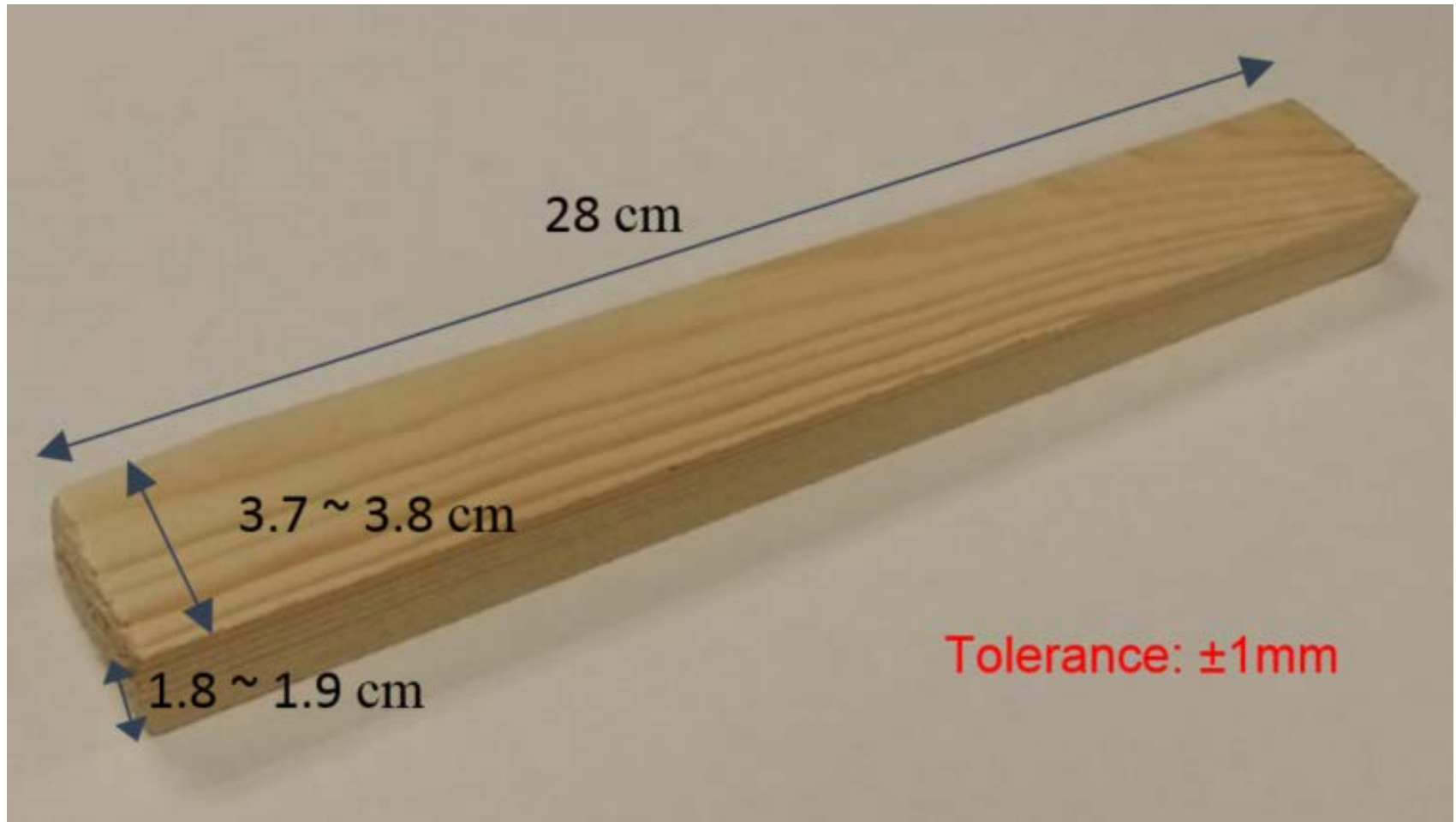
4.5cm (rule update)

Green Area papers

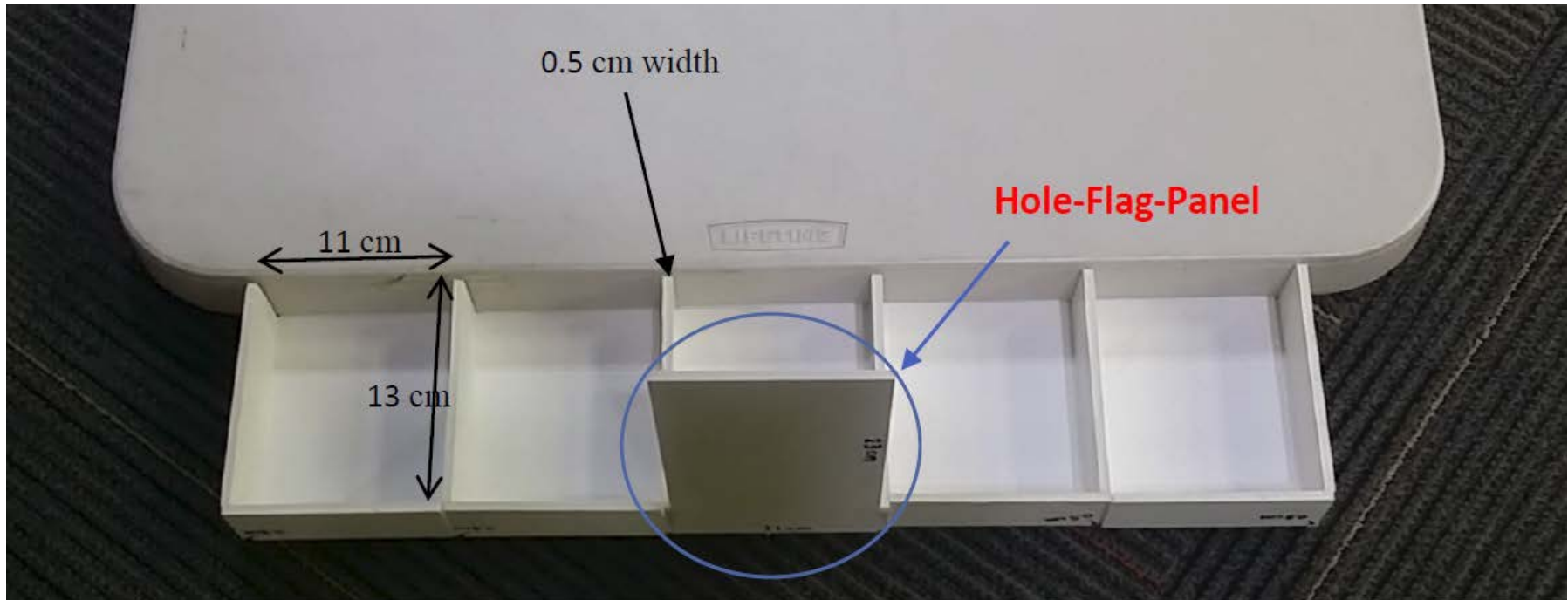
Rule update: Greens #1-3 will each be taped along their entire leading edge (edge opposite the hole locations) as well as the two remaining corners. Green #4 will be taped along the entire length of all four edges.



Wooden Putter



Setup of Hole-Slots



They are taped together

Robot Specifications

(For both Junior and Senior Division)

- Your robot may expand to putt the ball. However, it still must fit within a box with a 50 x 50 x 50 cm base when fully expanded.
- 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.
- A team ID tag on top of the robot is required.
- A label identifying the **front** side of the robot is required



Differences between Junior and Senior age divisions

	Junior (5 ~ 8th grades)	Senior (9 ~ 12th grades)
n/m	1 (n is equal to m)	Unveiled. Can be between 1/7 and 7/1
x and y	Unveiled prior to the work-time for each round	Not unveiled at all. Robot must search for the green area No. 4.
Number of controllers	One	No limit

Rules to Play Two Rounds (1/2)

1. Playing field configuration may be different for each round.
2. When unknown factors are unveiled, teams will be provided hard-copy of unveiled information.
3. Teams will be given 30 min (work-time) after unknown factors are unveiled to work on their robots. During this time, no adult (including parents & coach) is allowed in the pit.
4. All teams must submit their robot to the impound area when the 30 minute work-time is expired.
5. During the impounding process, judges will inspect robots. (size of the robot, the putter, Team ID, and label indicating the front side)
6. After impounding, the judges will reset Green Area No. 4 location. (Senior division only)
7. The Emcee shall announce **the next slide** before the work-time begins each round.

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.

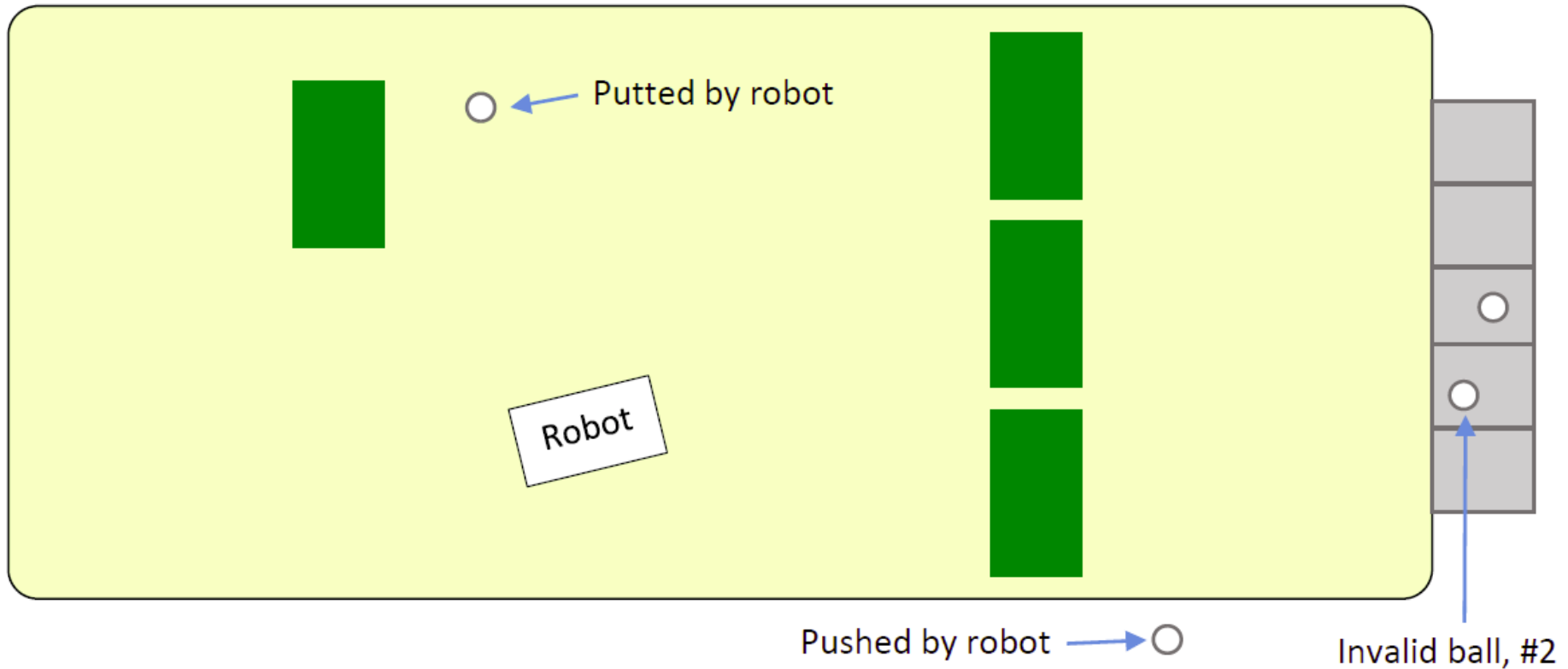
Rules to Play Two Rounds (2/2)

8. Teams will compete in a pre-determined order decided by the site host.
9. Only two contestants per team are allowed at the playing field during your run.
10. Contestants must move away at least 1m from the table edge after starting the robot.
11. A team member must sign the score sheet to confirm the team's score.
12. Entered scores shall be displayed to teams to validate data entry.
13. 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) rerun, if needed. At the World Championship on May 14, completion time *may* be used as another tie breaker, if necessary.

Scoring Sheet

Judging Items (Check after the game is over)		Count	Point Value (per count)	Score Earned
A	Number of legal balls in the center hole	0 1 2 3 4	22	Max. 88
B	Number of legal balls in the 2 nd layer holes	0 1 2 3 4	15	Max. 60
C	Number of legal balls in the 3 rd layer holes	0 1 2 3 4	10	Max. 40
D	Number of invalid balls in the hole-slots <i>Circle invalid ball numbers: 1 2 3 4</i>	0 1 2 3 4	5	Max. 20
E	Number of <i>undisrupted</i> balls outside their own green (not in the hole-slots)	0 1 2 3 4	5	Max. 20
F	The robot remained intact from start until end	0 1 (no) (yes)	6	Max. 6
G	The robot remained on the table from start until end. (if touched by human hand, score = 0)	0 1 (no) (yes)	6	Max. 6
Rule clarification: Undisrupted balls outside their own green are defined as those that have been moved off their green as a result of direct physical contact with any part of the robot or another ball.			Total Score	
			Time taken in seconds (may be used as a tie breaker for World Championships)	

Score Sheet Example Case

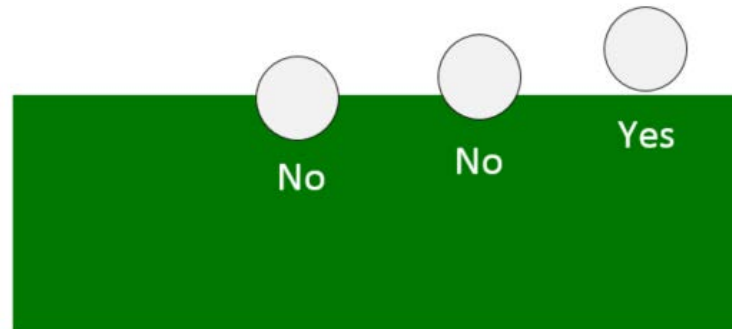


Score Sheet Example Case

Judging Items (Check after the game is over)		Count	Point Value (per count)	Score Earned
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B	Number of legal balls in the 2 nd layer holes	0 1 2 3 4	15	0 <i>Max. 60</i>
C	Number of legal balls in the 3 rd layer holes	0 1 2 3 4	10	0 <i>Max. 40</i>
D	Number of invalid balls in the hole-slots <i>Circle invalid ball numbers: 1 2 3 4</i>	0 1 2 3 4	5	5 <i>Max. 20</i>
E	Number of <i>undisrupted</i> balls outside their own green (not in the hole-slots)	0 1 2 3 4	5	10 <i>Max. 20</i>
F	The robot remained intact from start until end	0 (no) 1 (yes)	6	6 <i>Max. 6</i>
G	The robot remained on the table from start until end. (if touched by human hand, score = 0)	0 (no) 1 (yes)	6	6 <i>Max. 6</i>
			Total Score	49
			Time taken in seconds (may be used as a tie breaker for World Championships)	

FAQs (1/3)

1. What happens if the ball is putted before the 2 minutes end and enters into the hole after the 2 minutes end? **It is valid.**
2. What happens if a ball hits another ball? **The game round continues and scoring is done at the end of the round.**
3. What happens if a ball bounces out of the hole-slot after hitting another ball in the slot? **Game continues and scoring is done at the end of the game. The slot has enough room for more than 4 balls.**
4. The ball was putted and landed on another green area. Can the team get 5 points? **Yes.**
5. How to decide whether a ball is outside the green? It must be completely outside. **See Figure below.**



FAQs (2/3)

6. Are the greens #1, #2, and #3 parallel to each other? **The Green Areas will be setup as parallel as possible. But there will be some error margin.**
7. Can teams use pool stick style or baseball batting style putting? **Yes.**
8. Can you add more weight to the putter? **We will check only the dimension of the wood.**
9. Can holes be drilled in the wood? **Yes. We encourage students to use screws or nuts and bolts rather than glue, since we will require teams to detach the wood from the robot to start the competition at the World Championship.**
10. How will the starting location be determined by the center of the robot or by the edge? **By the edge. Team should select what is considered the “front” of their robot and label it. Once it is chosen and labeled, it cannot be changed.**
11. Is there a chance to restart? **No. Once started, no more restart.**



FAQs (3/3)

12. Can student verbally say when they want the round to be ended? **No. Team members cannot terminate the game or approach the table to grab the robot. The game will end only if one of the following occurs:**
- The 2 minute time limit expires
 - All 4 balls have been hit and have come to rest AND the robot stops on the table
 - The robot leaves the table (the table will be on the floor, so it would not fall)
 - The Judge asks the team members if they would like to end the round if the robot malfunctions or stops moving
13. Can a robot use a touch sensor to start? **Yes.**
14. Balls moved since Robot was heavy or it struck the table. Do we reset the balls? **No. Game continues. Robots should be constructed to move without disrupting the balls on the table. Disrupted balls will not get any points. See “E” on Scoresheet.**

FAQs added after final version (1/5)

- **Q15.** Does it matter which ball/green the robot goes to first? **No. Robots may go ball/green area in any order.**
- **Q16.** How do we print/prepare the green areas? **When printing Green Area PDF, be sure to select "Actual Size" under Page Sizing & Handling to ensure proper dimensions. Please trim around the green area and discard the white.**
- **Q17.** Green area is not in pure green color? **Since over 30% teams are using robot kits without color sensors, we made the green color as dark green (in RGB color space, R: 0, G: 120, B: 0).**
- **Q18.** Can you show some other examples of the ball location in terms of n/m? **See www.robofest.net/2016/n_m_ex.pdf**
- **Q19.** Can we add another wooden putter that will not be used for putting? **No, since it will be difficult to Judge.**

FAQs added after final version (2/5)

- **Q20.** Rule B.5 says that the robot body must be at rest (stopped) while putting. How long the robot needs to be at rest? **The Judge must observe the robot to come to a complete stop.**
- **Q21.** Can the putter be pulled back in a locked position by the actuator and then use rubber bands to propel it forward? **Yes. However, the actuator needs to be used to trigger the putter.**
- **Q22.** Can we use gravity to provide the force to move the putter and strike the ball? **Yes. The actuator also needs to be used to set/release the putter.**
- **Q23.** Can sensors or other miscellaneous parts/objects be attached to the putter, as long as the wood portion of the putter maintains the proper dimensions? **Yes. But the contact area to hit the ball must be wood. See section H.**
- **Q24.** Can robot's starting location be between fourth green area and end of table (towards opposite to flag pole side)? **Yes**

FAQs added after final version (3/5)

- **Q25.** Will robot orientation be parallel to edge/side of table? **The starting location and the orientation of the robot is unknown. It may or may not be parallel to the edge/side of the table.**
- **Q26.** The ball was moved not intentionally, because the table was shaking from robot motion or gravity. Is it a disruption? **Yes. Teams must design the robot to move softly and gently.**
- **Q27.** Can we intentionally blow air to move balls? **No.**
- **Q28.** If a ball is hit legally, then the moving ball hits another ball on the table before it comes to rest in a hole, will the first ball be counted as valid? Will the second ball at rest that was hit be considered valid? How about the second ball moves and falls into the hole? **Judges are concerned only when the ball goes into a hole. See the following cases: (1) A ball is putted legally and hits another ball. If either or both balls go into the hole, they are valid/legal. (2) A ball is putted illegally and hits another ball. If the first ball goes into the hole, it is not valid. If the second ball goes into the hole, it is valid/legal.**

FAQs added after final version (4/5)

- **Q29.** If a ball is legally hit (or touched) by the putter and then it touches another part of the robot or putter, is it valid? **No, the ball may only be hit/struck/touched once by the putter (even if the ball is not moved by the initial contact).**
- **Q30.** How do we determine the starting location of the robot? **The edges of the robot are defined as the widest points of the robot as viewed from above including any overhanging parts. The dimension “z” will be measured from the edge of the table to the edge of the robot. No part of the robot (or putter) is allowed to overhang the table edge or the specified location dimension at the start of the round.**

FAQs added after final version (5/5)

- **Q31.** What is a “push” as opposed to a “hit” or a “strike”?
Anytime a ball is “hit” or “struck” by the motor-actuated movement of the putter, it is legal as long it is only a single “strike”
- no double hits allowed. A “push” is defined as any movement of the ball which is a result of physical contact with the robot body or the non-actuated putter.

Work Time

- 30 Minutes are allowed for teams to adjust programs to accommodate unveiled Unknown Factors.
- No Communication is allowed between the Team and Coaches/Parents/Spectators.
- For Jr. Game, reset Green Area #4 at start of each work time for each round
- Emcee will make announcements when 10 Minutes and 5 Minutes remain until the end of the Work Time.
- If any non-game related communication is necessary during the 30 minute work time, Coaches/Parents may speak with team members away from the Pit Area under the supervision of a judge or proctor. No additional time will be granted for teams who have been interrupted in this manner.

Impound Procedure (1/2)

- Each Team will have a designated “Place Mat with Team ID” on a table set up away from the Pit and Spectator Areas to secure the robots between the end of the Work Time and the End of the Game Round.
- 5 to 10 minutes are given based on # of teams at the site.
- Impound Tables should be blocked and supervised at all times.
- Only one member of the team should present their Robot to the impound area. All other team members should remain at the Team Table.
- Robot (L x W x H) will be measured using the 50x50 cm board and Checked for the “TEAM #” and “FRONT” label. If passed, the robot is placed on the “Team Placemat” on the Impound Table. If not passed, teams may come back before the end of impounding time.

Impound Procedure (2/2)

- If teams are ready to impound their Robot early (before the end of the Work Time), they can present the robot to the Impound Table when ready.
- Participants are not to touch/remove robots from the table for any reason once the robot has been impounded.
- Teams may NOT be allowed to charge their robots during impound. (Added rule clarification)
- Robots not impounded at the end of announced impounding period are automatically disqualified for the round.
- For the Sr Game, the Green Area #4 will be reset after all Sr Robots have been impounded for each round.



Judging Tips

- Check **violations** carefully during the run
- Mark invalid balls in the hole-slots
- Record disruptions
- Chief judge at individual Sites has the authority to interpret any and all questions that may arise during the competitions

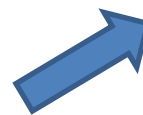
Game Ending

- 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

Scorekeeper Instructions

- Enter score for each round
- Entered scores of a round shall be projected on the screen to validate data entry after each round. Do not display Avg and Rank

	A	B	C	D	E	F	G	H
1	Team ID	Team Name	Round1	Round2	Avg	Rank	Trophy	Advance?
2	120-1	Team 1	80	100	90.00	2		
3	999-5	Team 2	55	70	62.50	4		
4	1114-2	Team 3	45	60	52.50	5		
5	1234-6	Team 4	95	90	92.50	1		
6	1234-7	Team 5	95	55	75.00	3		



Do not project

RoboGolf Videos for Judging Practices

Use score sheets to score the following game animations.

http://www.robofest.net/2015/RoboBowl_ScoreForm.pdf

- Go to www.robofest.net → Get Involved → Game
- Scenario 2: <https://youtu.be/6nCLpDrFdxs>
- Scenario 3: <https://youtu.be/h7Ym3LFTR8s>

More Judge Training Videos from Warm-up Competition

Go to www.robofest.net → Get Involved → Game
(under Judging Section)

#1 <https://youtu.be/8ICOuLAHTeU>

#2 <https://youtu.be/Je0AZJxrnSc>

#3 <https://youtu.be/detJurCPy5o>

#4 <https://youtu.be/0dS3a75lGZQ>

#5 <https://youtu.be/rm2dHZ82jU4>

#6 <https://youtu.be/W2aYx6jEj4A>

#7 <https://youtu.be/Ffbp0RK09IA>

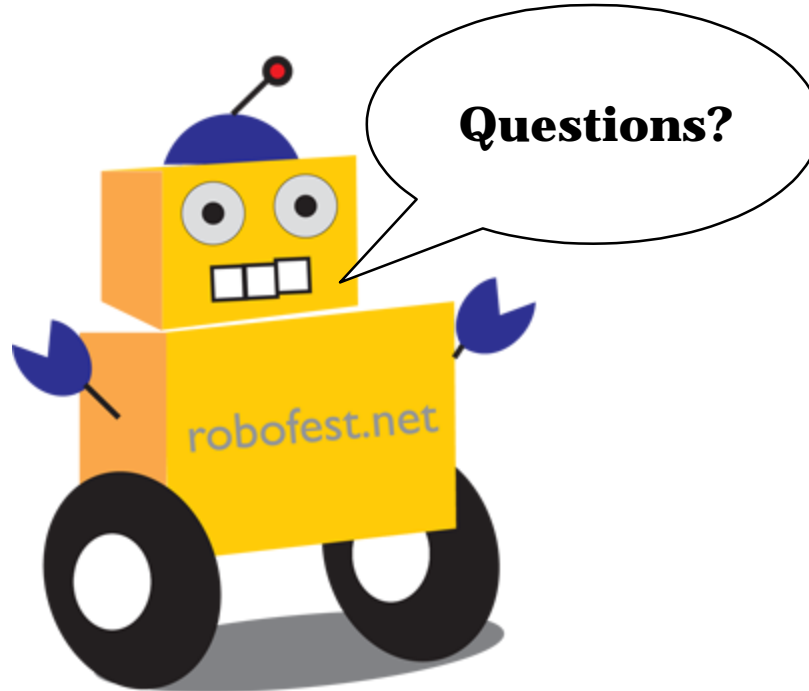
#8 <https://youtu.be/B-plfht24Og>

Little Robots, Big Missions

Go to
www.robofest.net
and click on Get
Involved → Game

This Powerpoint file
and related
materials are
available under
Judging section

Recorded Judge
Training Webinar
will be on the web



Contact:
robofest@LTU.edu

