ROBOFEST 2020 GAME

GolfBowl
Judge Training

Rule Updates and FAQs can be found at:
Get Involved → Game page on the website
2020 Game Rules FINAL VERSION
2019 Game Score Sheet - Official Version
-

www.robofest.net   **robofest@ltu.edu**   248-204-3568

Room J233 Taubman Complex, LTU
21000 West 10 Mile Road, Southfield, MI 48075, USA

1010

GolfBowl Rules

- Based on Official Rules (v1.2) published on Jan 11, 2020
- View the **Judging Score Sheet** online by going to **2020 Game Score Sheet**

GolfBowl Mission

- Develop an autonomous robot that:
  - Putts 5 golf balls into a Hole-slot with a wood piece attached to the robot.
  - Alternative partial points will be given if bottles on the floor are knocked (bowled) over or moved.
  - Penalty points are given if the bottle on the table is knocked over or moved.
- At the World Championship, additional unknown task(s) will be added

Playing Field
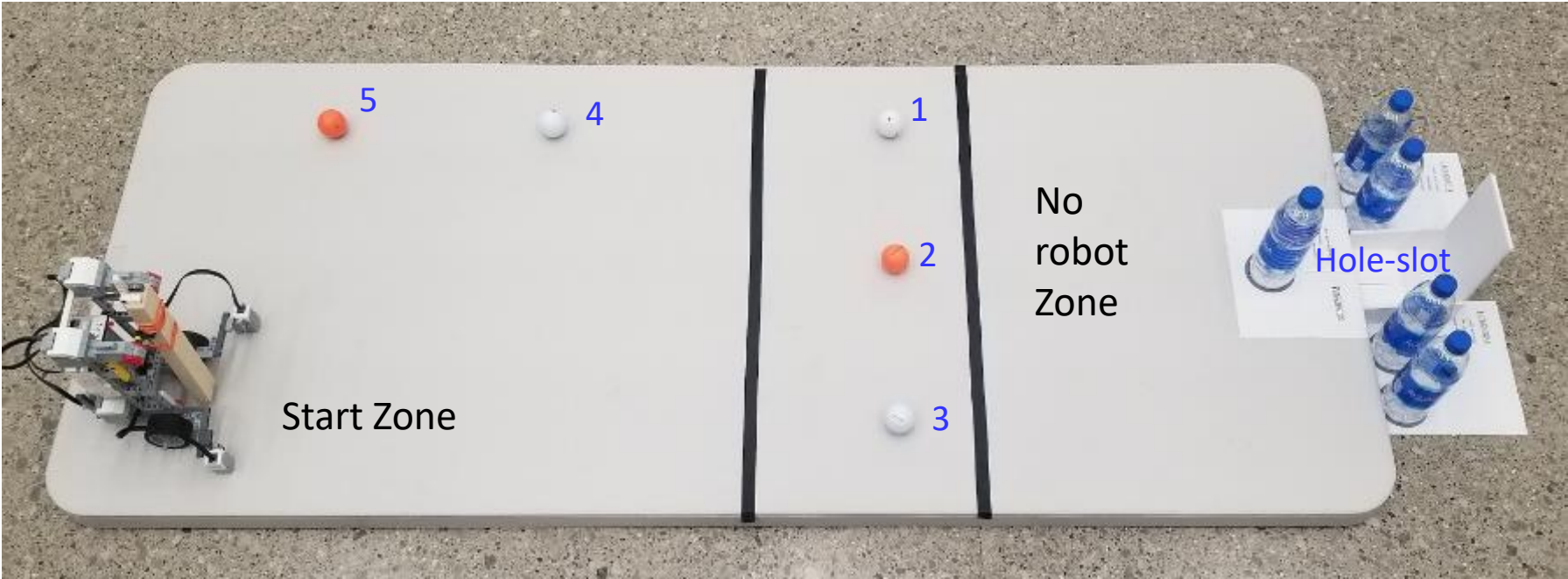
Playing Field (6ft table) Setup

Bottle locator template paper
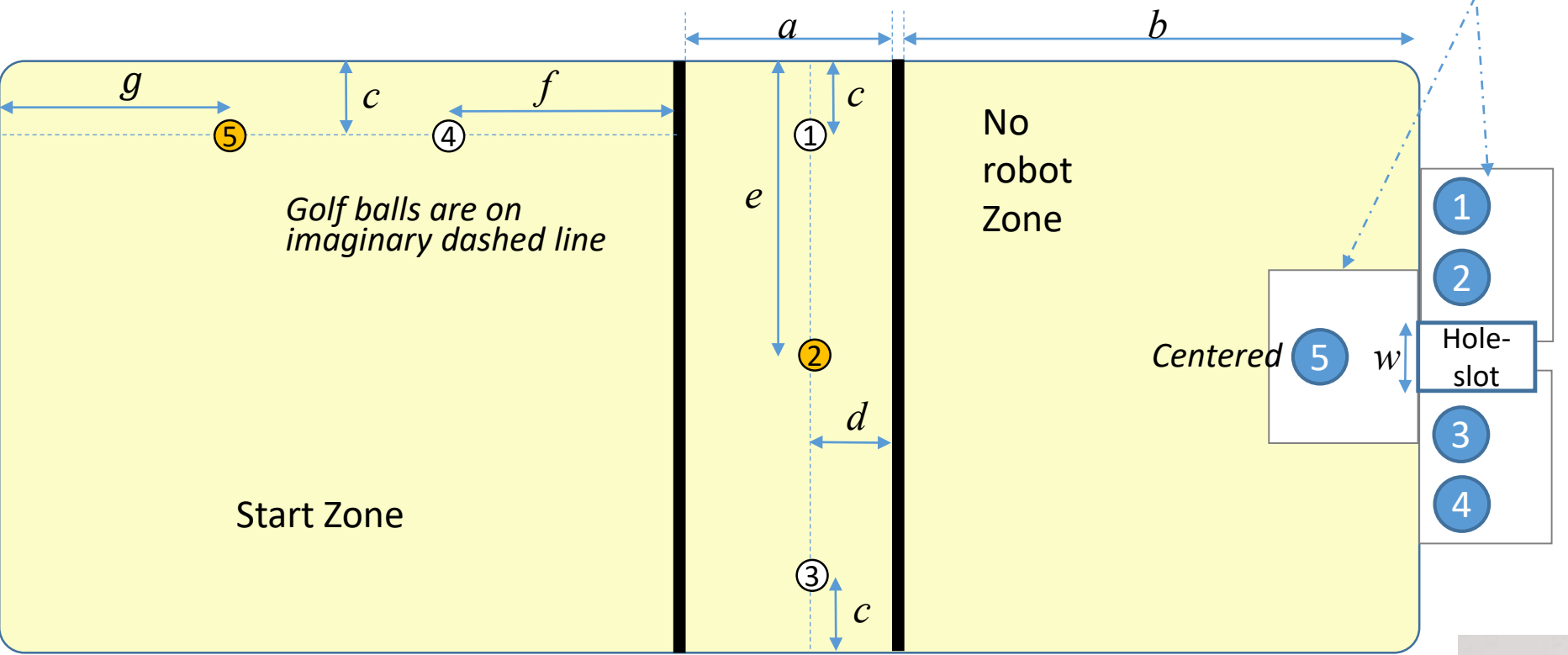
a	30cm (measure to the **edge** of tape)
b	55cm (measure to the **edge** of tape)
c	13cm
d	Unveiled before 30 min worktime $3cm \leq d \leq 15cm$ (measure to the edge of tape/center of ball; both for Jr and Sr)
f	30cm
w	12cm (inner edge)

g

c

f

a

b

⑤ ④ ① c

e

Golf balls are on imaginary dashed line

②

No robot Zone

Centered ⑤ w

Hole-slot

1
2
3
4
5

d

③ c

Start Zone

e & g	Jr: Unveiled before 30 min worktime
	Sr: Completely unknown. Robots must detect them.

$30cm \leq e \leq 45cm$ $20cm \leq g \leq 40cm$

d, e, g values will be different for each round.
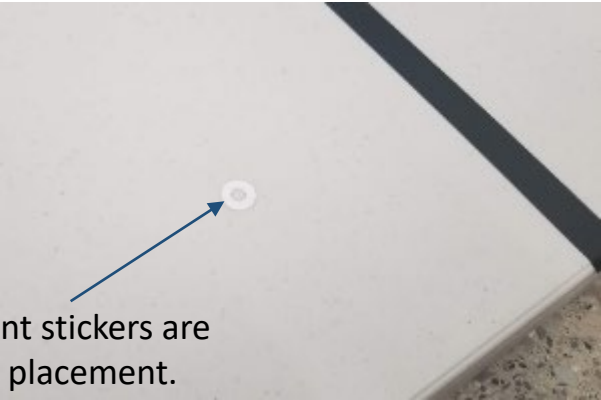
Hole reinforcement stickers are used to mark ball placement.

Game Synopsis

- White balls (balls 1, 3, 4) cannot be moved before putting. Orange balls (balls 2 & 5) may be moved by the robot before putting

- One full-reset of the playing field is allowed

- All the tasks must be done autonomously without any external help

- The robot may attempt/complete the putting in any order

- UTF (Unknown Task and Factors) will unveil the following just before the 30 minute work-time
    - The starting location and orientation of the robot
    - The locations of balls
    - How to end the game. New items/landmarks may be added on the table for the Game-Ending task

How Bottles will be Prepared & Located

Fixed on the surface using double-sided tape
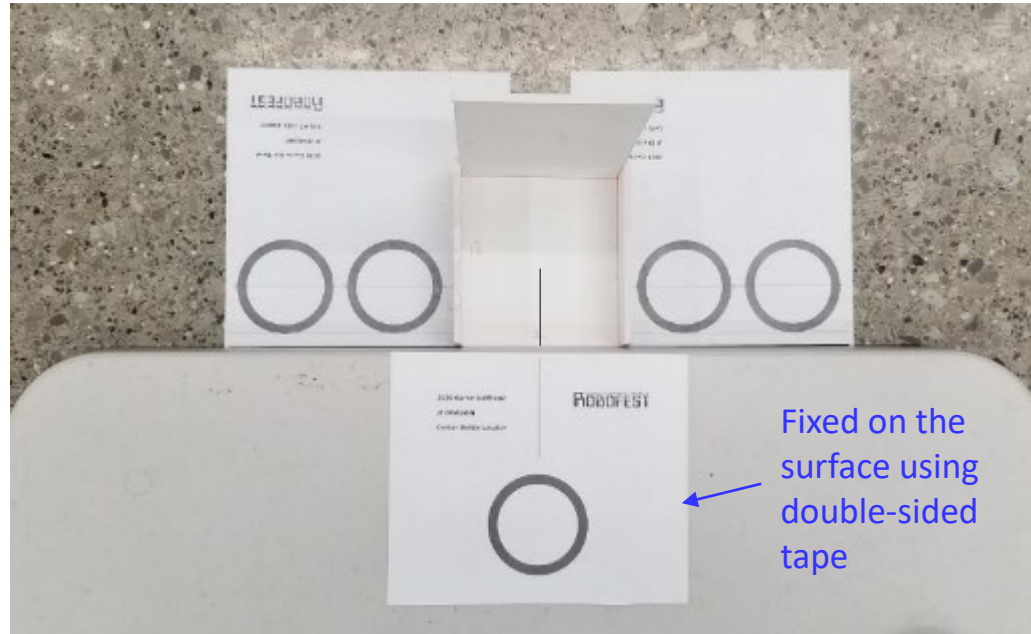
Exact locations of bottles is defined on the "bottle locator template" papers. Same for both Jr and Sr

The size, shape and brand will be the same for all 5 water bottles on the playing field
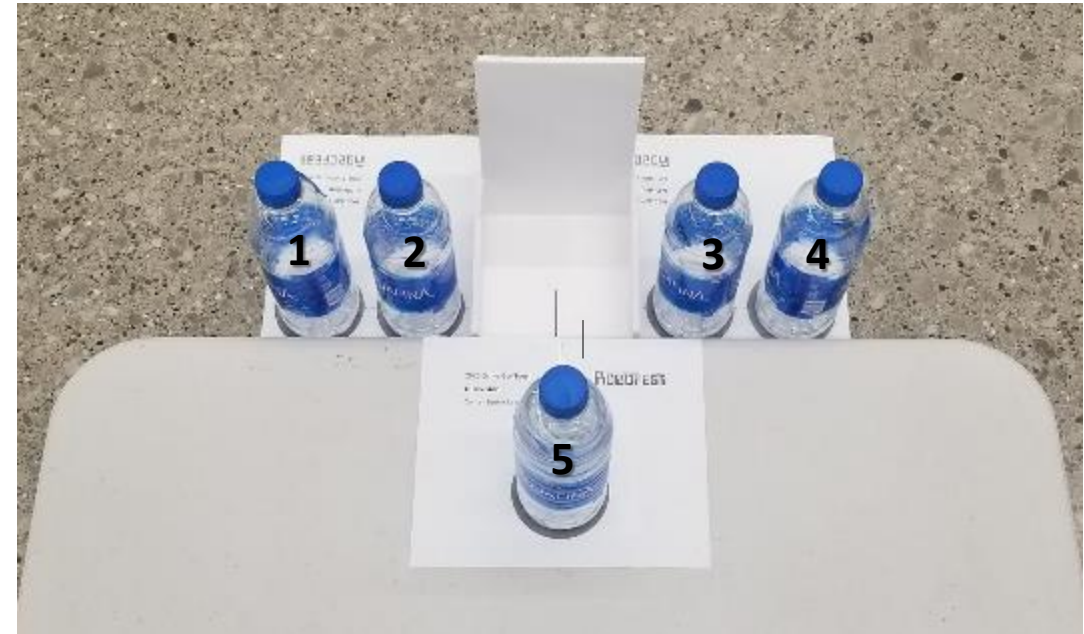
Initial Setup of bottles

Bottle Weight:
- #1, 2, 3, 4 Bottles: Partially full, around **75** gram
- #5 full water bottle = around 524g (Actual bottles to be used will be unveiled on the competition day.)

Violations and Full–Reset

When any of the following violations occur, Judges shall stop the game play immediately to avoid further disruption of the field:

- Human touch of the robot or playing field materials. Once the robot starts moving, the player cannot touch it

- Robot falls off the table

- Robot invades the "No Robot Zone". Any part of the robot must not "**touch**" the "No Robot Zone" table surface. On the black line is OK. A part of the robot can *hang over* the zone.

The team can request one-time full-reset (with penalty points) at any time OR declare the end of the game. If reset is selected, time continues to run while Judges reset the table.

Note : bottles moved or knocked (bowled) over by the above violations are not counted. Bottles will be reset.

If the ball went into the hole-slot by the above violations, it shall not be counted. Judges will remove it.

Invalid Putting Penalty for the Balls in the Hole-slot

When a ball goes into the Hole-slot as the result of the following actions, Judges shall announce "Invalid Ball No. x" and the ball remains in the slot and is recorded as invalid ball on the scoring sheet.

- Any ball goes into Hole-slot pushed or touched by robot body/part (not by the wooden putter)

- White ball putted after moving (White balls must be putted from their original location)

- White ball hit more than one time by wooden putter

Note:

- Bottles moved or knocked over by the invalid putting (not by violation) are OK and counted as they are

- If balls moved off the table as a result of the invalid putting (not by violation), "balls removed from the table" point will still be awarded
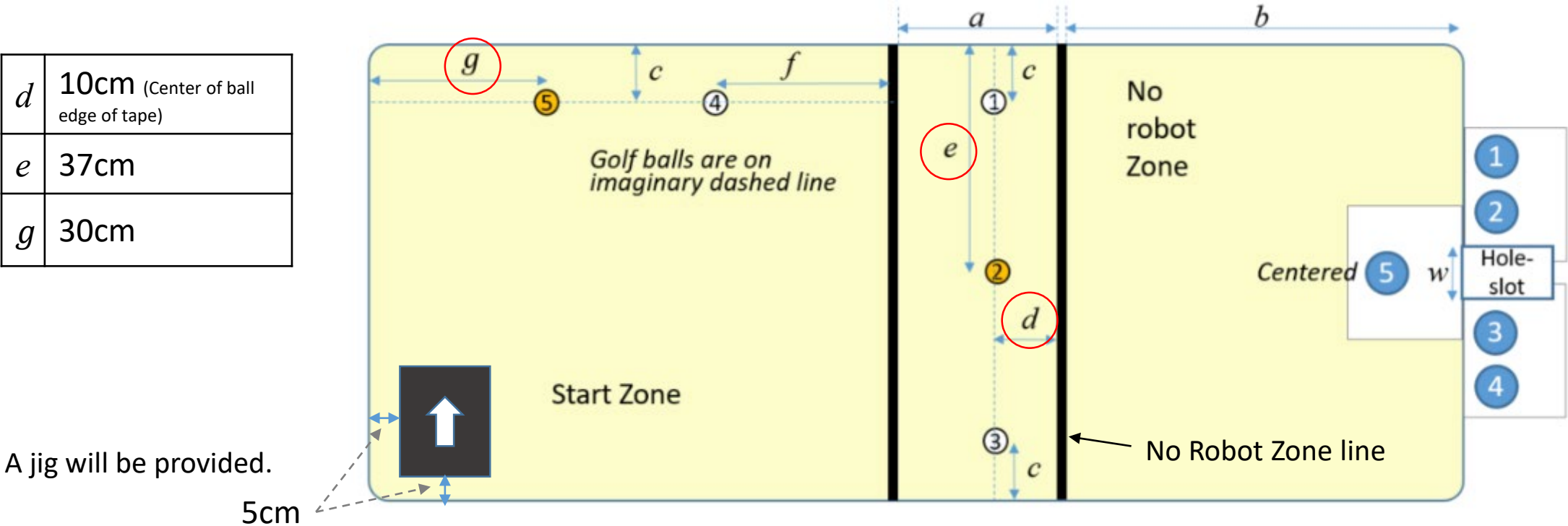
Procedure/Rules to Play 2 Rounds (1/2)

1. Only contestants are allowed to access the pit area, team tables, practice fields, and official game fields throughout the competition, including during the setup time before the opening ceremony, during work time and breaks. Adult coaches, mentors, or other volunteers may assist with transporting team materials only if necessary, escorted by proctors

2. When Unknown Tasks and Factors (UTF) are unveiled, teams will be provided a hard-copy of the UTF or it will be projected on a screen. See 8.1 and 8.2 for UTF examples

3. Teams will be given a 30-minute work-time after UTFs are unveiled to work on their robots. Prior to the start of the work time, all people except contestants and authorized staff/volunteers will be **dismissed** from the competition area(s)

4. During the practice time, teams must share the playing fields

5. All teams must submit their robot to the impound area when the 30 min work-time has expired. Robots may be taken to be impounded early. Only one team member should deliver the robot to the impound table. Penalty may be applied if not impounded in time

6. During the impounding process, judges will inspect the robots. (Size of the robot after expanding, putter length, Team ID & Name, "Front" label, number of computer controllers, etc.)

Procedure/Rules to Play 2 Rounds (2/2)

7. No power will be supplied at the impound table and the entire robot must be impounded, including rechargeable batteries

8. Teams will compete in a pre-determined order decided by the site host

9. During the Game Rounds, all team members must remain in the team spectator area – no pit access allowed

10. When a team is called to compete, a maximum of two contestants per team are allowed to retrieve the robot from the impound area and to be present at the playing field during the run

11. Judge (or Emcee) will check if (1) timer is ready (2) Judges' are ready, (3) teams are ready. Then count down "3-2-1 - Go" to start a Game

12. Contestants must stay near the Start Zone. They should not follow the robot. They can approach the robot only when they decide to pick it up or if the robot is in the Start Zone

13. Final scoring is done after the run is over. A team member must sign the score sheet to confirm the team's score. Displaying scores after the round is highly recommended
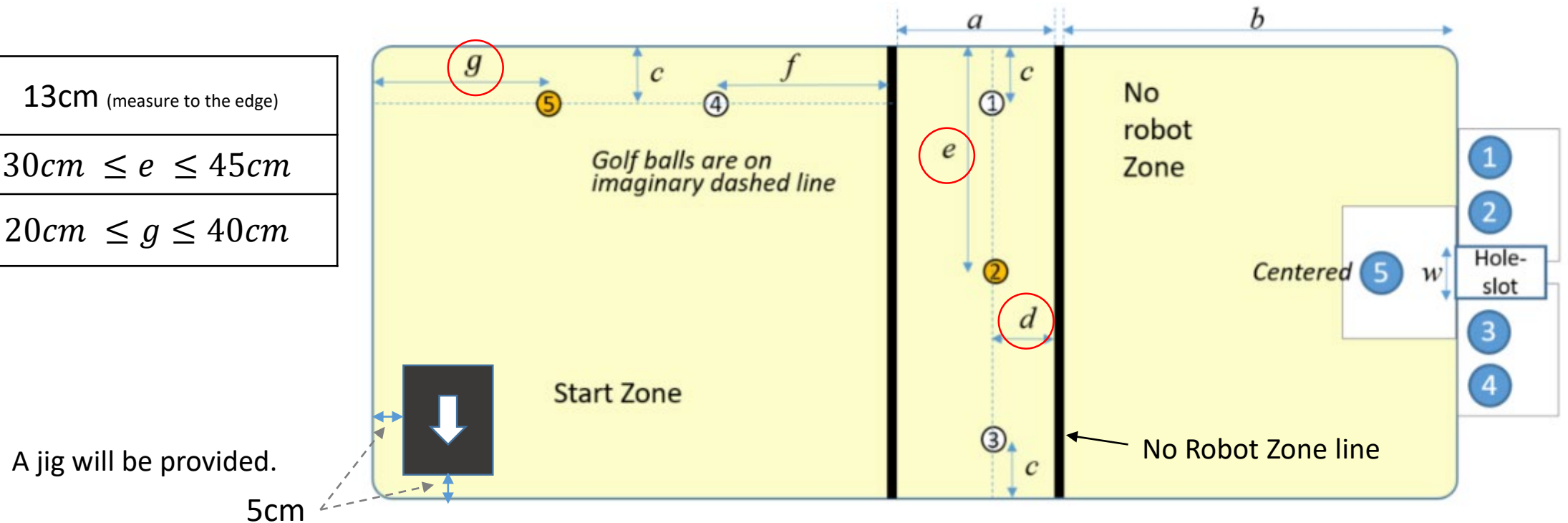
8.1 UTF Example (Jr)

- The starting location, ball locations and orientation of the robot: see the diagram below

- Game-Ending task: Detect the No Robot Zone line and stop there. The robot must be stopped with a sensor positioned above the line

d	10cm (Center of ball edge of tape)
e	37cm
g	30cm

Golf balls are on imaginary dashed line

No robot Zone

No Robot Zone line

Centered ⑤ w

Hole-slot

Start Zone

A jig will be provided.

5cm

8.2 UTF Example (Sr)

- The starting location, ball locations and orientation of the robot: see the diagram below

- Game-Ending task: Detect the No Robot Zone line and stop there. The robot must be stopped with a sensor positioned above the line

d	13cm (measure to the edge)
e	$30cm \le e \le 45cm$
g	$20cm \le g \le 40cm$

A jig will be provided.

5cm

Golf balls are on imaginary dashed line

No robot Zone

Start Zone

No Robot Zone line

Centered

Hole-slot

How to Score (1/2)

Scoring Sheet file can be found at: https://www.robofest.net/index.php/current-competitions/game

Judging Items (to be checked when the Game is ended)		Point Value	Score Earned / Lost
Bottle #1	Completely knocked over	11	
	Moved outside the solid circle line	3	
Bottle #2	Completely knocked over	13	
	Moved outside the solid circle line	5	
Bottle #3	Completely knocked over	13	
	Moved outside the solid circle line	5	
Bottle #4	Completely knocked over	11	
	Moved outside the solid circle line	3	
Bottle #5 (center)	Completely knocked over OR Moved outside the solid circle line	-2	
W: Number of white balls in the Hole-slot	0 1 2 3	15 each	W x 15 =
C: Number of colored balls in the Hole-slot	0 1 2	18 each	C x 18 =

GolfBowl Judge Training

How to Score (2/2)

|									
I: Number of invalid* balls in the Hole-slot	0	1	2	3	4	5	-3 each		*I x -3 =*
R: Number of Balls removed from the table**	0	1	2	3	4	5	1 each		*R x 1 =*
The robot remained intact throughout the run. No part was dropped on the table.							2		
A full-reset was done (full-reset penalty)*** *Note: partial reset is not allowed*							**-3**		
Game-Ending task is achieved							12		
(*) Any ball putted not by wooden putter; white ball putted after moving or more than one hit.							**Total Score**		*Max. 100+*
(**) if a ball is in the Hole-slot, it gets this additional 1 point. (***) when a violation occurs, the team can either stop the game or request a full-reset & rerun. When 2nd violation occurs, the game is terminated. Grab the robot immediately!							If **Total Score** is **100+**, record time in seconds	*Time Left*	
								Elapsed	

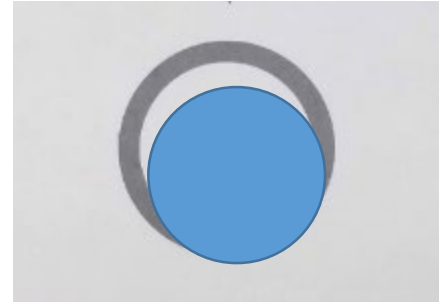# Bottle Scoring Examples
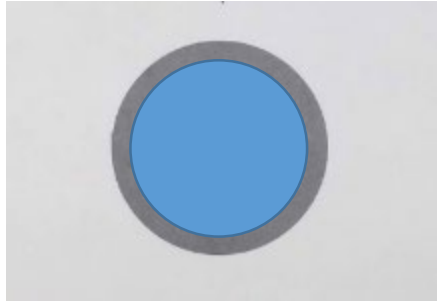
Initial Bottle Position

Not Moved
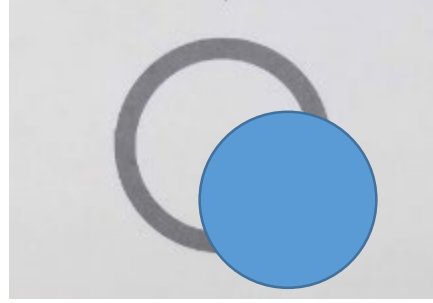
Moved

Not Moved

Moved

Moved
(Bottle completely out of circle)

Blue circles here refer to the projection, not the bottom, of the bottle.


Moved

Not moved

Lego blocks as a jig will be used to check as shown above.

Robot Specifications

- Maximum size is 50 x 50 x 50 cm *including expansion* (the swing of the putter). There is no initial size requirement

- 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 Robofest Team ID and Name tag on top of the robot is required

- A label identifying the "Front" side of the robot is required

- Must have a display screen for the Game-Ending task that may require to display numbers

GolfBowl Judge Training

Wood Putter Specifications

- United States Standard 1x2 un-painted wood piece

- Pine wood is recommended

- The dimension is shown on the right. The tolerance of the dimension is ±1mm. The wooden putter can be slightly modified (for example: drilled to make holes or sanded) as long as the dimensions are maintained

- The putter should be designed to hit the ball with wood part only

- Only one putter can be used

- The putter must be designed to be operated by one or more actuator(s)

25 ~28 cm

Tolerance: ±1mm

3.7 ~ 3.9 cm

1.7 ~ 1.9 cm
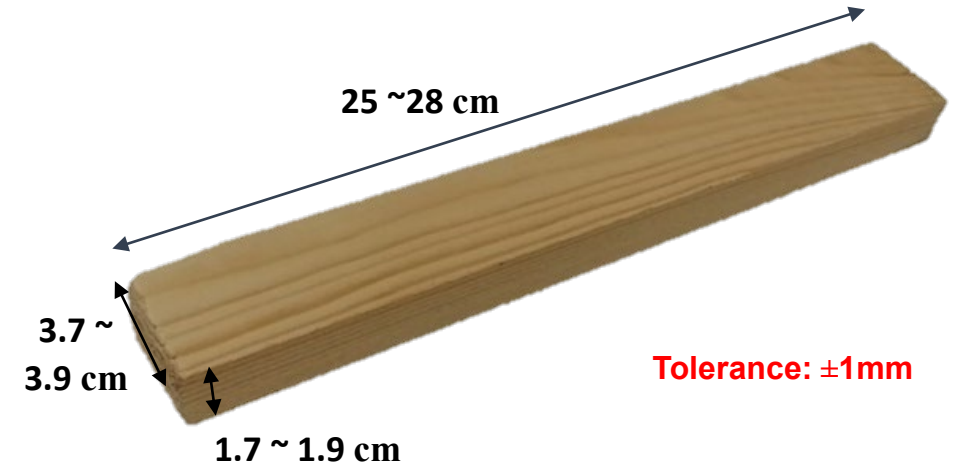
Differences between Junior and Senior age divisions

	Junior (5th ~ 8th grades)	Senior (9th ~ 12th grades)
Game-Ending task	Easier	Harder
Location of orange golf balls	Unveiled before work-time	Completely unknown. Robots must detect orange golf balls
Number of on-board computer controllers	One	No limit

Rules to Determine Winners & Break Ties

- Winners in each age division will be decided by the **average** total score of the 2 rounds

- Tie breakers will be: (1) best score of two rounds, (2) highest time left from best score, (3) rerun, if needed

- For example:

Team Name	Round 1 score	R1 time left	Round 2 score	R2 time left	Avg. Score	(1) Best score	(2) Time left best score	Rank
Team A	80		100	15	90	100	15	**1**
Team B	100	10	80		90	100	10	**2**
Team C	90		90		90	90		**3**

Reminders of General Rules and Restrictions

- Proctors are watching for the following violations:
  - Coaches or parents in the pit area during practice or work-time (except for initial transport of materials)
  - Coaches or parents accessing the practice or official game tables at any time
  - Verbal/electronic communication between the team and coach/parent while the team is setting up and practicing in the pit area and during work-time
  - Team members leave the pit unsupervised during work-time before their robot is impounded
  - Any team member alters his/her own robot after impounding
  - Team handles or interferes with another team's computer or robot, either in the pit or in the impound area
  - Destruction of property
  - Use of inappropriate words and/or behavior toward team members, other teams, audience, judges or staff
- Any violations can result in deduction of points or disqualification at the judges' discretion
- If anyone sees any suspicious activities, please notify the nearest volunteer immediately
- Spectators are welcome to take pictures or video, but please make sure your flash is off

FAQs

- If a golf ball knocks down a bottle and goes in the hole-slot, can we can get more than 100 points? **Yes**

- What if a ball went into Hole-slot hit by another ball? **Scored as Invalid, since it was not putted by the wooden putter**

- What if a ball moved a bottle hit by another ball? **This is OK. Scored as the bottle is moved**

- A bottle is moved by a ball bounced off the center #5 bottle. **This is OK. Scored as the bottle is moved**

- How to count a ball that was hit prior to time running out but scores after? **Counted as scored like basketball rules**

- A player failed in starting the robot. Can the player retouch the robot to start? **Yes**

Qualifying Site - Judge Roles

Judges' decisions are final!

Chief Judge
(Chairperson)

2 Judges per
Game field

About 20%
of teams

Qualify for
World Championships

GolfBowl Judge Training

2/15/20

Site Set Up

- Site Hosts will receive Playing Field Initial Setup document with dimensions for each division

- If multiple fields are used (8+ teams), Site Host should set up all playing fields in the same direction, numbering each field clearly with enough distance for teams to stand 1m away from the field

- Practice fields should also be set up before teams arrive

- Confidential items (such as site host setup documents) should be kept secure

- Impound Table –Team Placemats –Assign impound proctor to watch table at all times

- Pit Area –Team Signs on tables –Assign proctors to watch during work time and during rounds

Recommended Setup

Centralized Timer

2 Judges / Competition Field

2 Judges / Competition Field

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

should be blocked and supervised at all times;

Impound area

Charging is not allowed
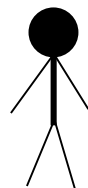
Chief Judge

Score Keeper with Laptop/Excel

Field and Pit Access Restricted

- Site Hosts will receive Playing Field Initial Setup document with dimensions for each division

- If multiple fields are used (8+ teams), Site Host should set up all playing fields in the same direction, numbering each field clearly with enough distance for teams to stand 1m away from the field

- Practice fields should also be set up before teams arrive

- Confidential items (such as site host setup documents) should be kept secure

- Impound Table –Team Placemats –Assign impound proctor to watch table at all times

- Pit Area –Team Signs on tables –Assign proctors to watch during work time and during rounds

Unveiling UTF and Work Time

- At the start of the work time, teams are given an "Unknown Task and Factors" data sheet

- Includes unveiled dimensions and "How to End"

Work Time

- 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.

- Proctor Responsibilities List and Violation Report are available for Site Hosts to use.

Impound Procedure

- 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.

- All work should stop and teams must be lined up at the impound area when the work time

- 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.

Impound Procedure

- Robot will be checked for legal parts (number of controllers for Jr. Teams)

- A label indicating "Front" is required

- A label with Robofest Team ID and Team Name on top of the robot is required

- Measure robot for Starting size and expanding size if applicable: Max starting width, length and height - including any parts that are attached during a run are each 50cm **after any expansion.** Ask team to expand during measurement.

- Measure the putter for length (25cm-28cm)
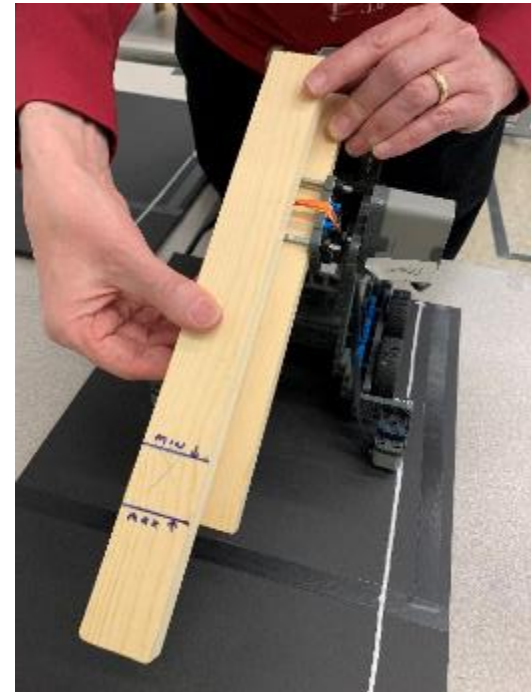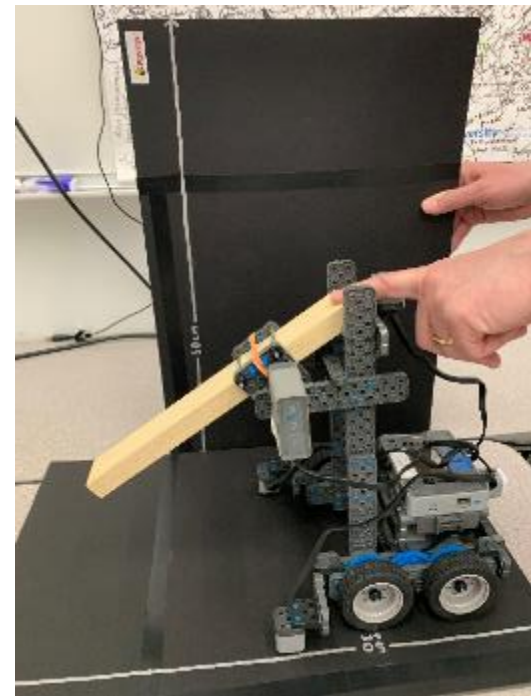
Impound Procedure

- The robot or part of the robot may not use the game elements (Ex- do not use golf ball as part of the robot)

- If robot passes inspection, it is placed on the "Team Placemat" on the Impound Table. If not passed, teams may come back before the end of impounding time.

- 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.

- Teams are NOT allowed to charge their robots during impound.

- Robots not impounded at the end of announced impounding period are automatically disqualified for the round.

- Participants are not to touch/remove robots from the impound table for any reason once the robot has been impounded.

GolfBowl Judge Training

Proctoring the Pit

- Watch for violations in the Pit Area, Practice Fields and Official Game Fields
- Monitor Robot Impound Area
- If a violation occurs, mark the Team Sign (either on the team table or impound table) and report the violation to the Chief Proctor using the form provided.
- The team ID will be displayed on the screen.
- Chief Proctor and Chief Judge will determine if further action is required

Scorekeeping

- An Excel file will be provided to the Site Host to record scores

- Scorekeeper should carefully enter score AND time remaining (if applicable) for each round

- Second person (Chief Judge or designee) should verify calculation and data entry

- If possible, project on the screen
  to validate data after each round. Do not display rank.

- Spreadsheet calculates tie breakers

- Reruns are only required to determine Trophy winners

Scorekeeping

		Round 1 Score	R1 Time Left*	Round 2 Score	R2 Time Left*	Average Score	(1) Best Score	(2) Time for best Score	(3) Rerun (if needed)	Rank	Trophy?
Team ID	Team Name										
		0		0		0	0.00	0		1	
		0		0		0	0.00	0		1	
		0		0		0	0.00	0		1	
		0		0		0	0.00	0		1	
		0		0		0	0.00	0		1	
		0		0		0	0.00	0		1	
		0		0		0	0.00	0		1	
		0		0		0	0.00	0		1	
		0		0		0	0.00	0		1	
		0		0		0	0.00	0		1	
		0		0		0	0.00	0		1	
		0		0		0	0.00	0		1	
		0		0		0	0.00	0		1	

Judging Exercises Today

- Ex1: https://youtu.be/Vovs6k2fYkw

- Ex2: https://youtu.be/3z_6YPai_Qc

2020 Game "GolfBowl" Official Rules and Related Documents:

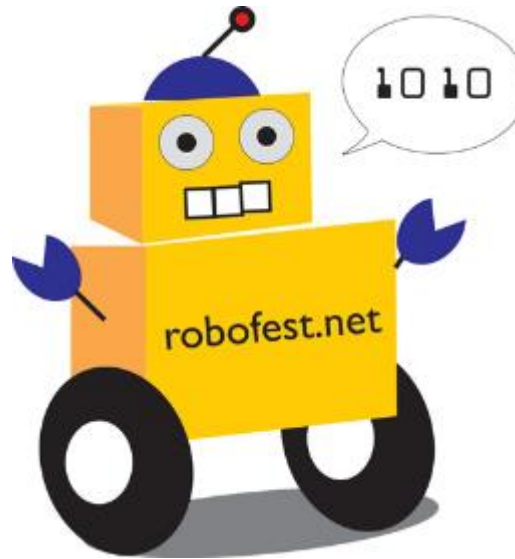GolfBowl Final Rules - Released 1/11/2020 (PDF | PPTX)

Demonstration Videos: Demo 1 | Demo 2 | Demo 3 | Demo 4 | Demo 5

GolfBowl US Kickoff Score Sheet - Released 10/25/19 (PDF | Word)

Bottle Locator Template - Letter Size: Left, Center, and Right (PDF*)

Questions?

Thank you!

- Read **2020 Game Rules** and FAQ's
- Send questions, comments, corrections, and suggestions to robofest@LTU.edu