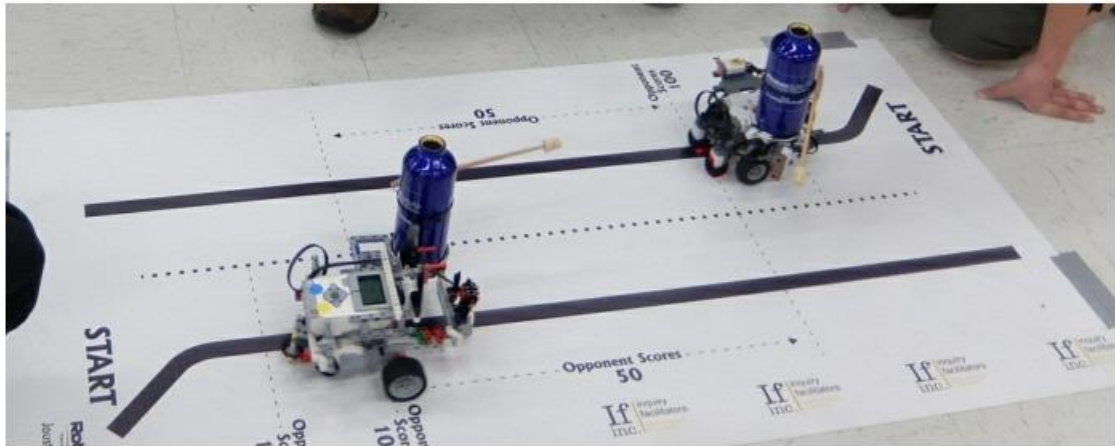


1. JOUSTING CHALLENGE

1.1 GOAL

To design, build, and program a line following robot that can carry a knight that will knock off your opponent's knight by using its lance only.



1.2 DIVISION

- Teams in this challenge compete in separate divisions:
 - Elementary School (ES)
 - Middle School (MS)
- Teams of 2 to 4 players

1.3 ROBOT AND LID

- Autonomous robot, any platform, costing \$1,500 USD or less, that meets the following design constraints, which will be verified during Check-In:

Type	Specifics
Platform	Not limited
Robot	Autonomous robot
Volume	Not exceed 65030 cubic centimeters Robot can be expanded after leaving start position (less than or equal to 65030 cubic centimeters)
Multiple Controller	Not limited
Sensor Type	Not limited
Sensor Number	Not limited
Motor type	Not limited
Motor / # of Servos	Not limited

- A metal lid (approximately 84 mm in diameter) will be provided to the participating teams at the reception-desk and attached to the robot.

- Knight’s connecting structure is no than 10.2 cm in front of the robot, and no more than 10.2 cm above the track.

- The method of attachment the lid cannot provide any support to the knight.



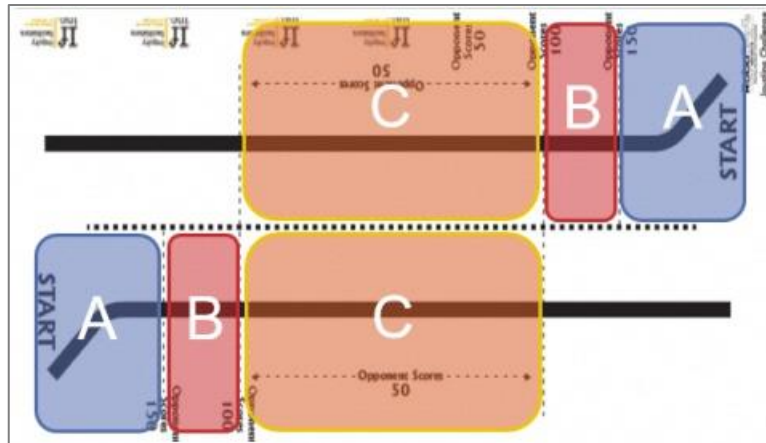
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- Be sure to CHECK IN before starting the challenge After attaching the lid.

2.4 KNIGHT , LANCE AND TRACK

- At the track, a standard knight and lance set will be provided.
- No extra magnets or materials are allowed inside, outside or attached to the Knight’s body to increase the “attraction” between the knight and the lid.
- The length of the lance is about 27 cm. Cork (about 12 mm in diameter) is attached to the tip of the lance. There is no limit on the height of the lance.
- The white or black background PVC vinyl track dimensions are 76.2 cm x 152.4 cm

- Tracks shown as below (scoring zones are colored for clarification on this track image; the real track is NOT colored in zones A, B, or C):



- Track and line color may be changed (black or white), two parallels, 2.7 cm wide, 140cm long black lines on a white or black background colored PVC vinyl track.
- Distance between two lines is approximately 25.7 cm. In the middle of two black lines there is a dotted line.
- Each line has a slight curve at the start, where the radius of the curve may be changed – purpose: detecting a line following program is in use.

1.5 RULES AND SCORING

- you will get 20 official scored runs challenge scoring period.(First ay; You can challenge up to 10 times.Second day;Remaining)
- The total of your 5 highest official scores are used to determine tournament selection. The top 8 teams will move on into the challenge tournament.
- Two teams facing each other start at the same time by the signal of the judge. The team who beats the opponent's knight while tracing the line gets points.
- Only the lance may cross the mid-line (dashed line between bold lines) of the track.
- The robot,knight,lance cannot be touched after starting.
- **Teams from the same school / organization cannot match in seeding.**
- The highest score will be used IF multiple scores against the same opponent are submitted. Joust MANY teams, from OTHER places.

- Scoring zones
 - 150 points – 0 cm to 15 cm from start (A)
 - 100 points – 15 cm to 30 cm from start (B)
 - 50 points – 30 cm to 90 cm from start (C)
- Additional score
 - Play with a team with 8 wins records and win — 50 points
 - Play with a team with 9 wins records and win — 100 points
 - Play with a team with 10 wins records and win — 150 points
- Up to 5 passes may be made during a match. A pass is defined as an attempt made by both robots to knock each other off. Scores decrease by 10% for each pass after the 1st run.
- Scoring Matrix is shown below.

IF a knight is knocked off, IF and ONLY IF, by the opponent's lance, THEN, circle the winner's score Definition: Pass - an attempt is made by both robots to knock each other off, but NO ONE does Each team has 5 Passes to knock their opponent OFF.							
Points per pass		1st Pass (100%)	2nd Pass (90%)	3rd Pass (80%)	4th Pass (70%)	5th Pass (60%)	5 Passes, No Winner? <i>Draw: Each Team gets 5 points</i>
P O I N T S	Lands in the "150 point" zone	150	135	120	105	90	
	Lands in the "100 point" zone	100	90	80	70	60	
	Lands in the "50 point" zone	50	45	40	35	30	
Loser gets 0 Points							

Scoring Possibilities:

- Only the lance can knock the knight off; if the knight is knocked off by something other than the lance then that pass is concluded and a new pass is attempted (except on the 5th pass).
- If the knight (not the lance) is lying within two point areas, the higher point value is awarded.
- If the knight is dragged by the robot after falling off, score will awarded by the final lying area. But Judge may require the team to remove any structure that might drag the knight. If needed, a REDO is always allowed, if called by the judge.
- If both knights fall on the track AND the judge CAN NOT determine who landed 1st on the track, THEN REDO without penalty of using a run.

- If the pass becomes impossible due to line trace team's failure:
 Team with trace failure — 0 points and 1 scored run is used.
 Team with trace success — 0 points and no runs
- If all 5 passes are used and no knight is knocked off, the joust will be considered a draw. Both teams will receive 5 points and relinquish the track to the teams waiting to joust.

1.6 TOURNAMENT SCORING

- The top 8 teams from each division will compete in the final tournament.
- Teams got same score in the top 8, decision match will be.
- Advancing teams will be seeded into the tournament bracket according to their aggregate score (see bracket below).

"RoboRAVE Kaga Japan 2019" 8 Team Tournament Bracket

Tournament Placing	
•	The losing teams from Round 1 will place 5th through 8th in accordance with their aggregate score coming into the tournament.
•	The losing teams from Round 2 will face each other in Round 3 to determine the 3rd and 4th place winners respectively.
•	The winning teams from Round 2 will face each other in the Championship Round (which may be run at the same time as Round 3) to determine the 2nd place winner, and the Tournament Champion.

