



Fully autonomous robot floats follow an indoor parade route

V 1.0 – Initial Version for 2024 Season and World Championship

This file can be found under the **Get Involved / RoboParade** page on the website

Each country may clarify/adapt/change rules for each country's qualifying competitions

Coaches are responsible for communicating rules updates to participants

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1. RoboParade Overview

Learning Objectives:

- STEAM learning with Arts and Design
- Artistic creativity
- Autonomous navigation
- Basic computer programming logic
- Line following
- Object detection
- Autonomous stopping and restarting
- Adjusting to environmental conditions
- Problem solving
- Teamwork skills

Synopsis:

- **An Open Category competition**, which will take place at the World Robofest Championship
- Local events may also host RoboParade (Teams must re-register for World Championship event)
- Fully autonomous robot floats constructed and programmed by student participants
- Programmed to follow an indoor parade route while detecting other robots in front of them. Robot must stop and start without human help
- A great STEAM learning opportunity for students
- An ideal event for beginners in autonomous robotics

2. RoboParade Theme

Robofest World Championship 2024 event theme:

ON THE FARM

The *On the Farm* theme refers to agriculture, animal care, machinery, soil, water, commerce or other elements of farming

Other local hosts may choose their own theme

3. Age Division and Team Size

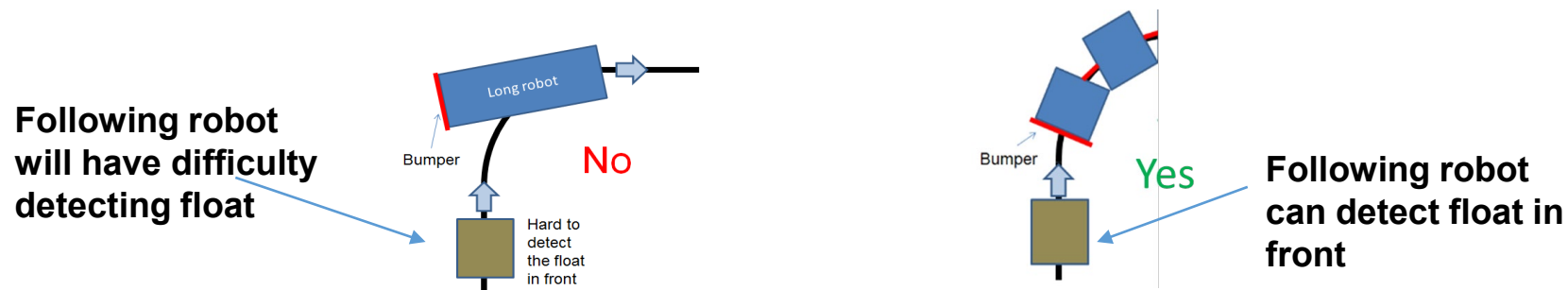
- One Age Division: Grades 4~8
- Team Size: Maximum five (5) members
- A team can enter only one robot float
- Team Registration Fee: \$75 at the Robofest World Championship (Registration fee at local events may be different)
- Related important document: [Robofest 2024 General Rules](#) on the robofest.net website
- Each team member must bring the signed [Robofest Consent and Release Form](#) on the day of the event, if not completed on-line

4. Robot Requirements (1/2)

- Number of robot controllers, sensors (any type), or motors: unlimited
- Each robot is required to carry a small flag with a number, which will be given once the robot passes the Test Parade
- Each robot may have its own sponsor logos
- Wireless interaction between the robot and team players using sound, ultrasonic, vision, or light sensors is encouraged
- Robot speed **must** be between 9 cm/sec and 18 cm/sec. The robot **must** display the current speed. Recommended the display interval is 1 second
 - Additional data may be displayed. Examples: distance (traveled in cm, for example), trip distance, elapsed time, average speed, max speed, distance to object, etc.
 - Robots that do not display data will be penalized See Judging Rubric
- No overall height or weight limitations
- Maximum width 35cm (13.78 in); maximum length 60cm (23.62 in)

4. Robot Requirements (2/2)

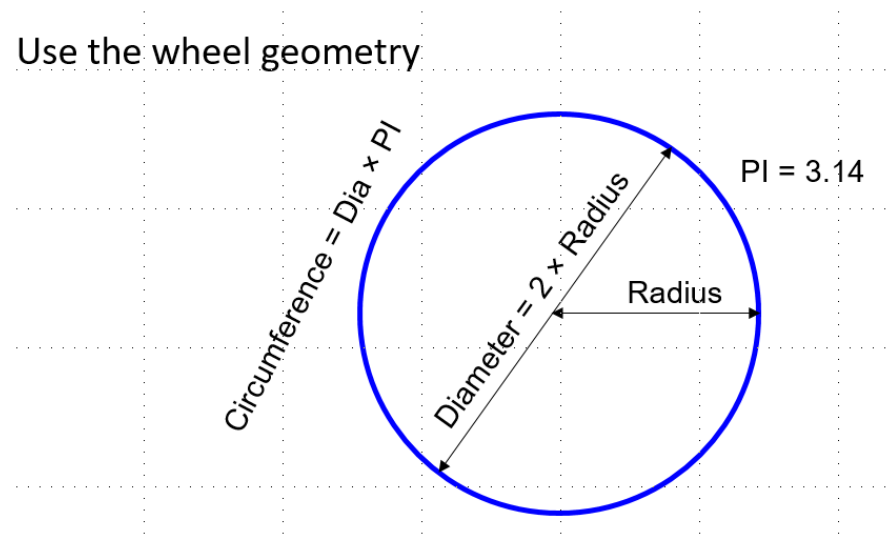
- The rear of the float must have a flat bumper at least 10cm (3.9”) tall and 28 cm (11”) wide and be 2.54cm (1 inch) off the ground so that the robot behind is able to sense your robot using its distance sensors
- Maximum overall length is 60cm (robot plus float). If a float is longer than 35cm (13.78 in), it must have separate sections so it can bend at curves as shown:



- Robot must have a reliable program to follow a black line on a bright surface
- Robot must be able to follow both clockwise or counter-clockwise parade routes
- Robot must have the ability to detect a vehicle in front of it without touching it and stop. Robot then must automatically restart when the vehicle in front has cleared

5. Measuring Speed

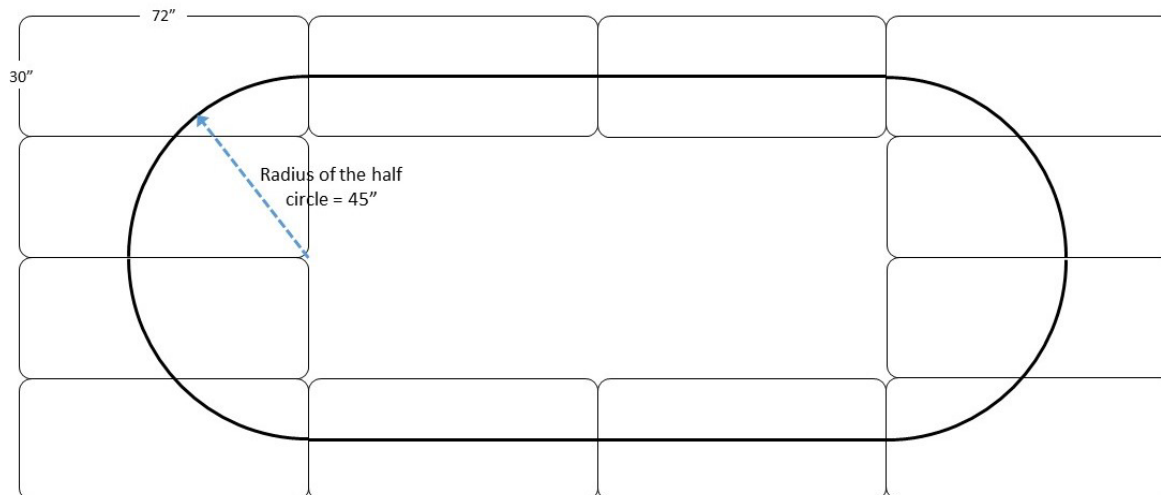
- Speed= Distance/Time
- For each rotation of the wheel, the robot travels
 - **Distance = (Wheel Diameter) x π x (# Rotations)**
 - **Distance = (Wheel Diameter) x (3.14) x (# Rotations)**
- For more information, see parade workshop material on [eAcademy](#) page



6. RoboParade Route Tables (1/2)

- Parade route is made from plastic folding tables 30in x 72in (75cm x 182 cm)
- Recommended brand is “Lifetime” <https://www.lifetime.com/lifetime-2901g-6-foot-folding-table-commercial>
- Can be placed on the floor using the table legs, or on a crate with the table legs folded in. Alternatively, a table covered with white paper or white vinyl table cover can be used
- Standard black electrical tape can be used to make a closed rectangular shape with 4 rounded corners

Example of a possible official parade route configuration



6. RoboParade Route Tables (2/2)

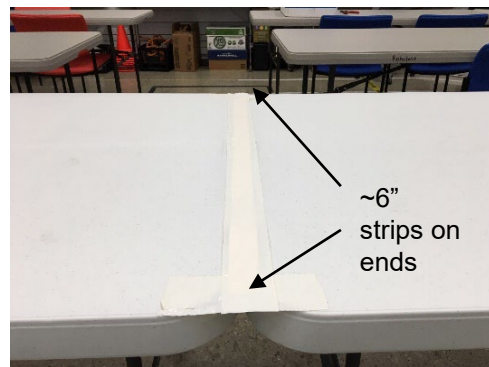
- A thin strip of poster paper is used to cover the joints formed by the table edges
- 2 inch wide tape (colored duct tape, masking tape, or similar) can be used to connect and hold tables together. The tape should have a color that matches the table
- Standard black electrical tape is then applied to the tables and over the joints



a) table joint with gap



b) with poster paper filler (~1" wide)



c) with 2" tape



d) Finished connections with 2" tape and black line from electrical tape

7. RoboParade Competition Procedure

- Each team must pass a [Test Parade](#) to ensure that all robot vehicles meet the specifications and functional requirements
 - World Championship Qualifying will be available the day before the competition date
- Early qualification is encouraged. This gives a team early feedback on whether they are ready or what they need to improve
- The parade route will be made available for practice before the qualification period begins
- No limit to the number of qualifying attempts
- Upon passing the Test Parade, the float ID (flag) will be given which allows the robot to participate in the official parade
- Teams that do not fully meet requirements may still be given a flag and allowed to compete, though ability to meet requirements will be considered in the judges' evaluations

8.1 RoboParade Test Parade Checklist

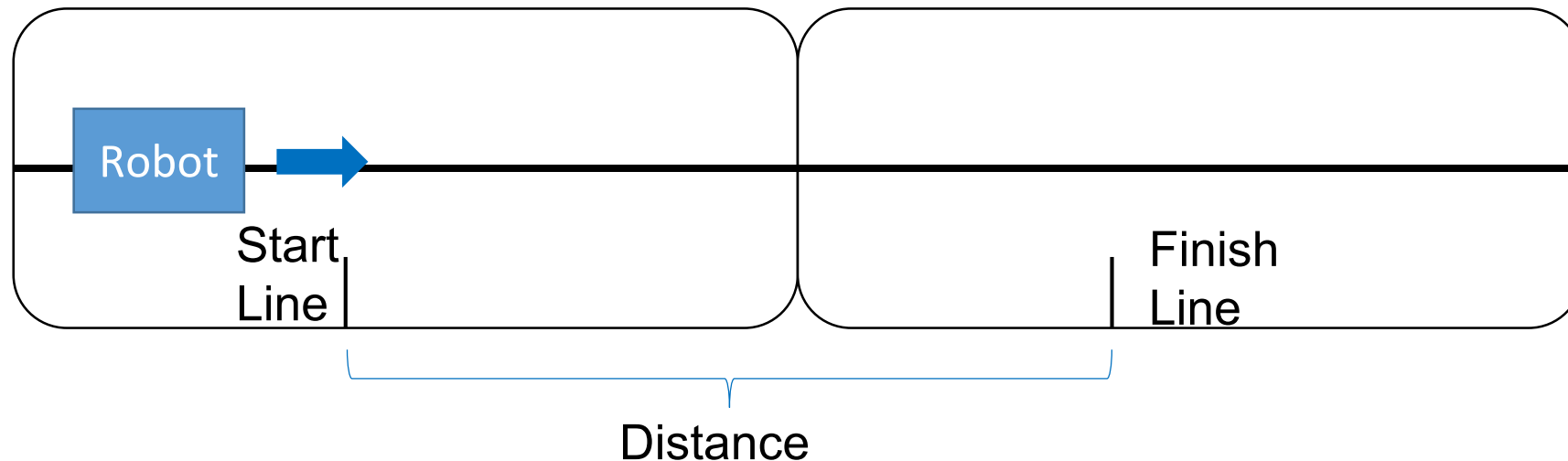
Test Item	Details	Pass/No Pass	Notes
Line Following	Clockwise, counter clockwise		
Object Detection	Wait and Restart		
Speed limit	9 cm/sec ~ 18 cm/sec		
Speed Display	Accurate to +/- 1.5 cm/sec		
Rear Bumper	At least 10cm tall and 28 cm wide 2.54 cm off the ground		
Length	Maximum 60 cm		For floats greater than 35 cm, must have multiple sections

8.2 How Speed is Tested

- Robot will be timed from a start line to a finish line
- Speed Calculation:

$$\text{Speed} = \frac{\text{Distance Between Lines}}{\text{Time}}$$

- The measured speed will be compared to the speed displayed on the robot (must be within +/- 1.5 cm/sec)



8.3 RoboParade Judging Rubric

<https://www.robofest.net/images/2324/RoboParade24Rubric.pdf>

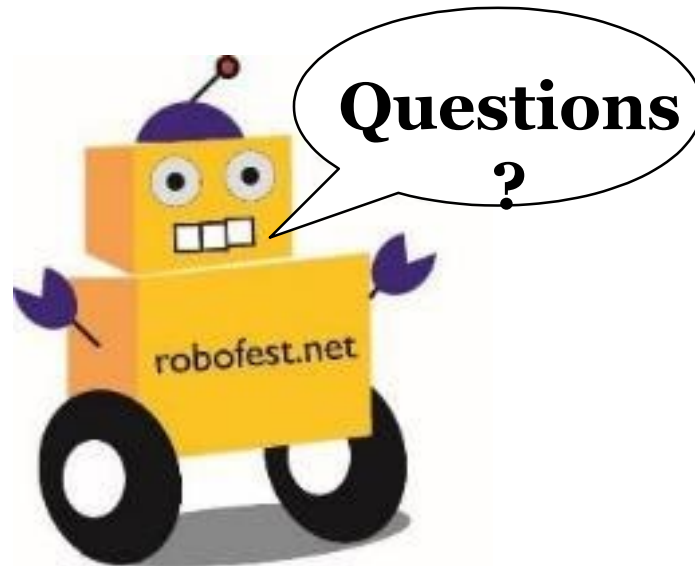
Judging Category	Sub Categories	Weight	Score*
1. Artistic creativity	Robot float is unique, artistically appealing, and aligned with theme.	15%	
2. Technical creativity	Students applied unique technically creative and innovative elements to the robotics project.	15%	
3. Interactions	There are elements of wireless interaction between the robot and the team players using sensors or other communication technologies.	10%	
4. Robot design and performance	Robot mechanical design is creative, user-friendly, and sturdy. Robot reliably and successfully negotiates the official parade route. No human touch is required. Robot meets all qualifying requirements.	20%	
5. Teamwork	Teamwork and team spirit are evident. Division of labor (who did what) explained <i>Note: If the team only has one member, the score should be 1.</i>	10%	
6. Robot display	Useful data (speed, trip length, average speed, max speed, time, distance to object, etc.) is displayed in clear manner. (1 if no display)	10%	
	Students are able to demonstrate and explain display and data (math, physics, and coding concepts).	10%	
7. Team independence	I believe the project was mostly designed, developed, and programmed by the students, not by adult coaches, parents, or mentors.	10%	
			100%

Rubric link

9. RoboParade Judging

- Each team member who participates in the official RoboParade will receive a medal
- A panel of Judges will score the team's performance using the RoboParade Judging Rubric by observing teams all day and especially during the official parade times
- Judges will deduct points from robots that have difficulty with the RoboParade
- Judges will interview teams
- Winner trophies will be awarded based on the overall scores
- Special award trophies may be given to recognize an extraordinary aspect of a parade float

Little Robots, Big Missions



RoboParade Committee Members

Pam Sparks*

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