



Fully autonomous robot floats follow an indoor parade route

V 2.1 – Final Version for 2024 Season and World Championship

This file can be found on the **RoboParade** page on the website

International hosts 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 start, navigate, and stop without human contact
- 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

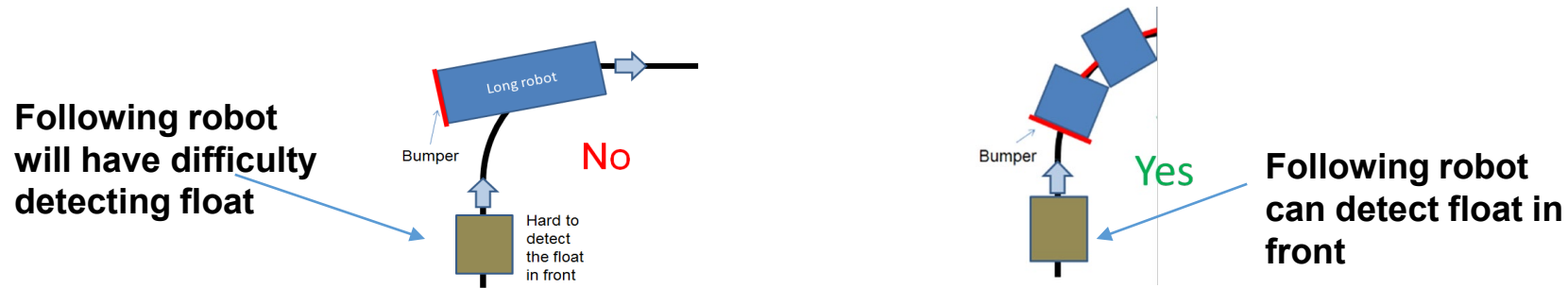
- One Age Division: Grades 4~8
- Team Size: Maximum five (5) members
- Teams of 1 allowed, but will receive the lowest possible score for teamwork
- A team can enter only one robot float
- Team Registration Fee: \$75 at the Robofest World Championship (Registration fee at local events may be different)
- 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 parade ID, which will be assigned once the robot completes the Test Parade Checklist
- 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.
- Robot **must** display the current speed to pass the Test Parade Checklist. Recommended display interval is 1 second
 - Additional data may be displayed for a higher score. Examples: distance traveled in cm, elapsed time, average speed, max speed, distance to object, country, team name, etc.
 - See Judging Rubric 6a
- No overall height or weight limitations
- Maximum width 35cm (13.78 in); maximum length 60cm (23.62 in)

4. Robot Requirements (2/2)

- Maximum overall length of all sections of robot plus float(s) is 60cm. Maximum length of any individual float section is 35cm (13.78 in):

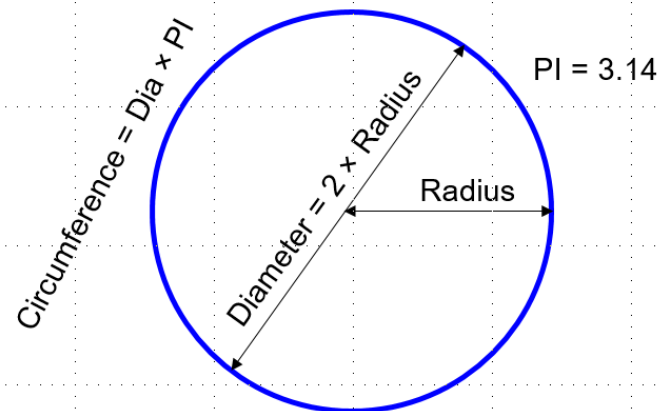


- The rear of the float must have a flat bumper at least 10cm (3.9”) tall and 28 cm (11”) wide and be 2.54cm (1 inch) off the ground so that the robot behind is able to sense your robot using its distance sensors
- Robot must have a reliable program to consistently and efficiently follow a black line 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 RoboParade workshop material on [eAcademy](#) page

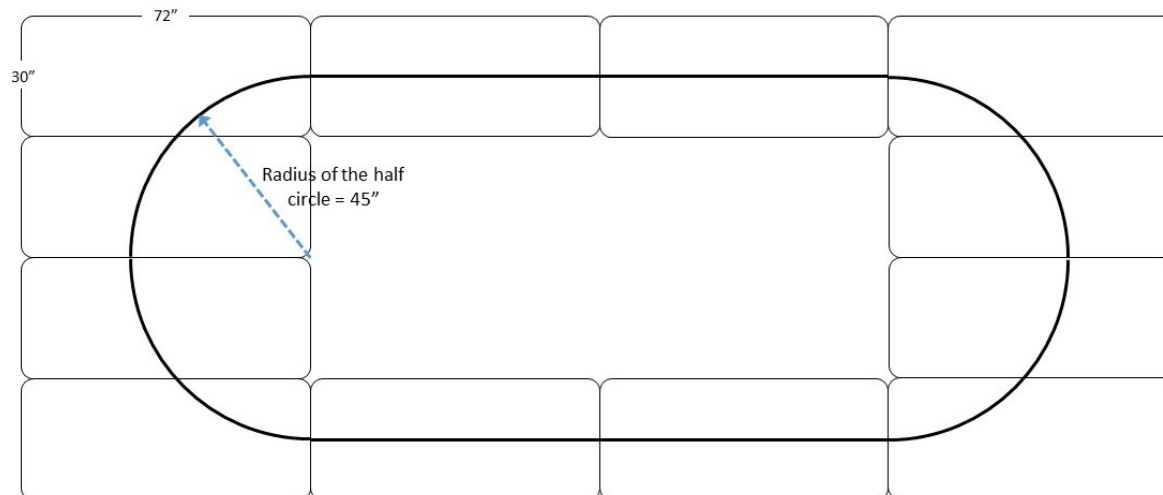
Use the wheel geometry



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, white paper or white vinyl can be used on a table or on the floor
- Black electrical or painters tape approximately 19mm wide 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)

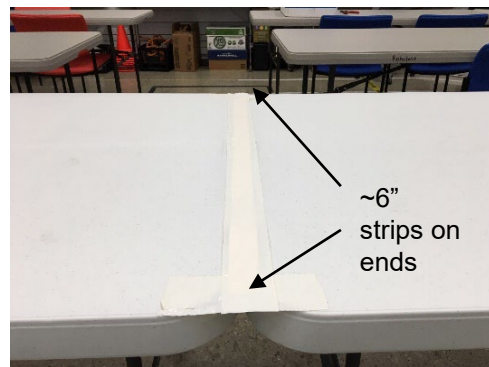
- A thin strip of poster paper is used to cover the joints formed by the table edges
- 2" wide (5.08cm) colored duct tape, masking tape, or similar can be used to connect and hold tables together. Color should closely match the tables
- 19mm black tape is then applied to the tables and over the joints



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

7.1 RoboParade Competition Procedure

- Each team must complete a Test Parade Checklist to ensure that all robot vehicles meet the specifications and functional requirements
- World Championship Qualifying will be available the day before the competition date
- 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 Checklist, a numbered flag will be given
- Teams that do not fully meet requirements of the Test Parade Checklist will be given a lettered flag and allowed to compete, though ability to meet requirements will be considered in the judges' evaluations

7.2 RoboParade Judging

- A panel of Judges will score the team's performance using the RoboParade Judging Rubric by observing teams during the following:
 - Test Parade Checklist process
 - Pre-Parade informal interview(s)
 - During the official parade
- Teams will introduce themselves and their robot for up to 1-minute during the opening before the official parades begin
- 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

7.3 RoboParade Judging - Official Parade Procedure

- Two official 12-minute parades will be run during the competition
- Official judging of Robot Performance (Rubric category 4b) takes place during final 2 minutes of each round
- All robots will be placed on the parade route and started simultaneously (3-2-1-Go)
- Participants must move away from the parade route after starting robot program
- Any robot that goes off course during the 12-minute parade will be removed by a judge and placed aside
 - Before final 2-minute judging time: teams may retrieve the robot, make adjustments and 1 team member may restart the robot in the parade with judge's assistance
 - During official 2-minute judging time: robot remains off the table
- Teams will have time between rounds to make adjustments to the robot

8.1 RoboParade Test Parade Checklist

<https://www.robofest.net/images/2324/RoboParade2024Checklist.pdf>

Team-ID: _____

Team Name: _____

Teams must pass the Test Parade Checklist to ensure that all robot vehicles meet the specifications and functional requirements. No limit to the number of qualifying attempts.

- Upon fully passing the Test Parade Checklist, a **numbered** flag will be given.
- Teams that do not fully meet requirements will be given a **lettered** flag, though ability to meet requirements will be considered in the judges' evaluations.

Test Item	Details	Pass/ No Pass	Notes
Line Following	Clockwise and counter clockwise on straights and curves		
Object Detection	Waits and restarts on straights and curves		
Autonomous Performance	Negotiates the official parade route without human touch		Robots that require human touch during an official round will be removed from the parade
Speed limit	9cm/sec ~ 18cm/sec		
Speed Display	Accurate to +/- 1.5cm/sec		
Rear Bumper	At least 10cm tall and 28 cm wide 2.54 cm off the ground		
Overall Length	Maximum 60cm		No robot or float section can be greater than 35cm

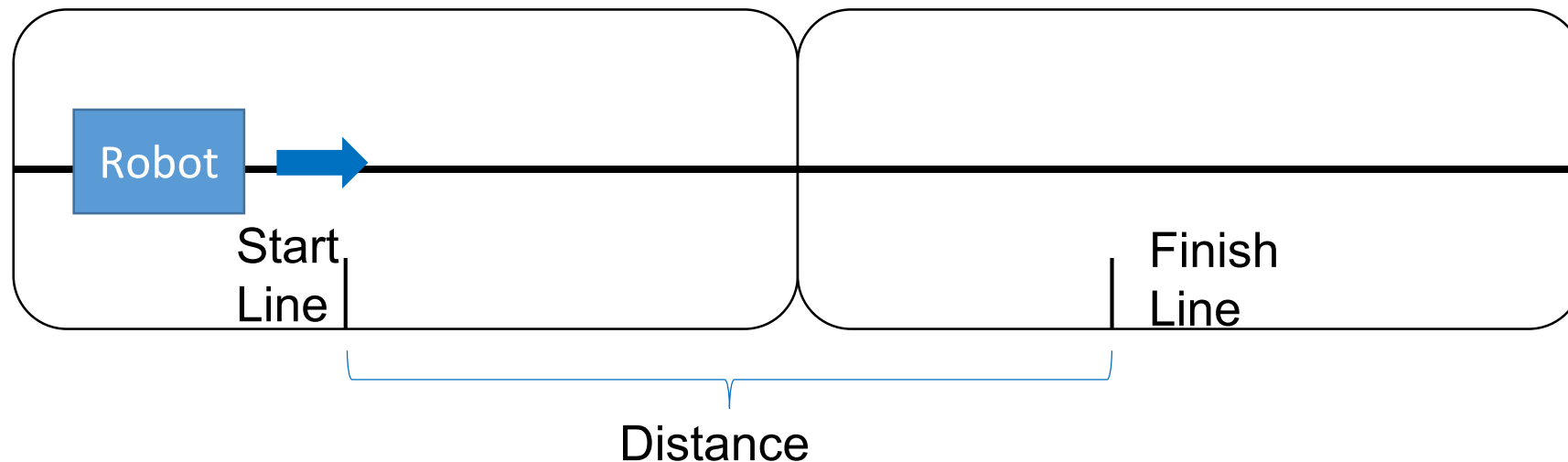
Flag Assigned: _____ Judge Signature: _____

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/RoboParade2024Rubric.pdf>

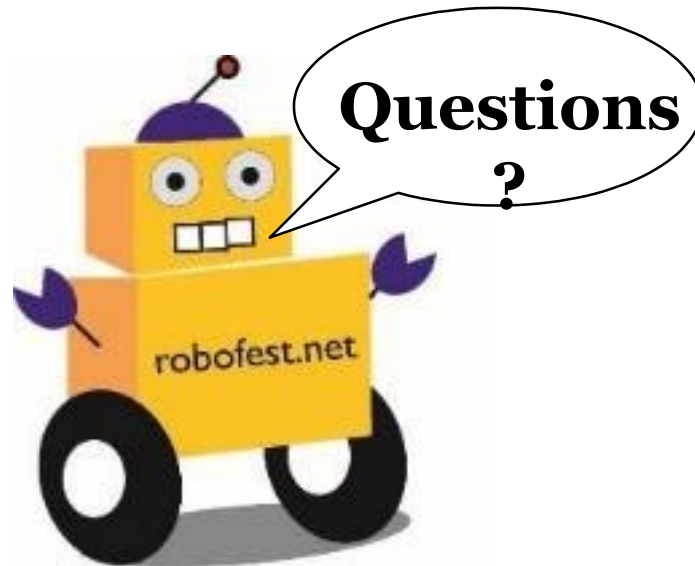
(*) Judging Score

5: Strongly Agree	excellent, outstanding, advanced, exemplary, or amazing
4: Agree	good, accomplished, or proficient
3: Neutral	average, intermediate level, or acceptable
2: Somewhat Disagree	attempted but needs work
1: Disagree	little attempted or needs lots of help

1 - 5

Judging Category	Sub Categories	Weight	Score*
1. Artistic Creativity	Robot float is unique, artistically appealing, and aligned with theme.	15%	
2. Robot Design	Students applied unique technically creative and innovative elements to the robotics project. Robot mechanical design is creative, user-friendly, and sturdy.	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 Performance	Robot meets all Pre-Parade Checklist requirements. Y___ N___	10%	
	Robot reliably and successfully negotiates 2 official parade rounds autonomously (without human touch). R1___ R2___	10%	
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	Data is displayed in clear manner (speed, trip length, average speed, max speed, time, distance to object, etc.) speed is displayed = 1 speed + 1 data point = 2 speed + 2 data points = 3 speed + 3 data points = 4 speed + 4 or more data points = 5	10%	
	Students are able to explain displayed data through 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%			

Little Robots, Big Missions



RoboParade Committee Members

Pam Sparks*

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