



Techsplorers™

Engineers of Tomorrow™

Line-Following Robots Annual Competition Official Rules

Version 1.2

If you have suggestions for additional rules or rule changes, please share your ideas with us by sending an email to info@techsplorers.com.

STANDARD COMPETITION RULES (Applies To Both Classes)

1. LFR must not be dangerous to people or cause damage to the track surface.
2. Good sportsmanship and respectful behavior at all times.
3. LFR must have a single 9V battery for power. Techsplorers does not provide batteries. Bring your own 9V and keep a fresh spare on-hand.
4. The track will not be perfect. See *Track Specifications* below.
5. You may use whatever motors and chassis you want. It's okay to take a remote-control car apart and put your own controller board on it.
6. The robot must operate autonomously. No form of remote control or assistance is allowed. Once the instructor starts the stopwatch you can't touch it.
7. The lap is disqualified if the LFR runs off the boards or cuts the track. It is okay for both wheels to go outside the tapeline, but if both wheels go inside the inner edge of the tapeline the lap is disqualified.
8. Judges decisions are final. We want you to be creative with your solutions and car design, but if the judges rule that something is not okay then their ruling stands even if the item wasn't originally listed in the rules.
9. We are considering size and weight limits, but this may not be needed, as things tend to be self-regulating (large cars tend to fall off the boards and heavy cars are slow).
10. Techsplorers employees are allowed to participate in the competition but are not eligible for awards.
11. You may use a more complex optical sensor head. No restriction is placed on the number of sensors or their location.
12. Parents are allowed to help their kids build the LFR. Building an LFR for the competition is a great way for parents and kids to spend time together working on a super cool project!

ALPHA CLASS RULES

The Alpha Class is for the real show offs who know how to design circuits. If you're clever you can get all the same key functions from analog and discrete circuits as you can from the Arduino. It takes more design skill to be the Alpha Class Champion.

In addition to the Standard rules the Alpha Class has the following additional restrictions:

1. No form of software control is allowed. Microcontrollers, microprocessors, and complex FPGAs are banned in this class.
2. LFR must be controlled using only discrete analog and digital circuits. You may use discrete digital logic gates, counters, 555/556 Timers, op-amp circuits, transistor circuits, and things of that nature to construct the control system for your Alpha Class LFR car.
3. No limit is placed on circuit complexity or IC count at this time.

OMEGA CLASS RULES

The Omega Class is virtually unlimited. How fast can your robot get around the track without flying off the boards?

Currently the Omega Class does not have any additional restrictions. You are free to build your robot however you want as long as you don't violate the standard rules. If you worry that your design idea is so great that it might be disqualified, you can contact us via email to obtain a ruling in advance on whether or not your idea is legal.

Conceptually the rules are simple: limited power (9V only), it must be safe, and it cannot damage the track. Other than that you are free to get as sophisticated as you want! Try sensing the edge of the boards, go infrared and/or modulate the sensors, switching power supply, etc. Whatever you want!

TRACK SPECIFICATIONS

It is easy to build your own track at home. Click the following link for step-by-step instructions:
<http://www.techsplorers.com/courses/lfr/track.html>.

1. Track boards are made from 43" square sections of thin white hardboard panel.
2. Black lines are created from electrical tape on the white board for maximum contrast.
3. Lines are a minimum of 3 inches wide and at least 4 inches away from the edge of the track board.
4. Lines make turns at approximate 45-degree angles; 90-degree turns are forbidden. This allows the sensor head to easily discern which direction the turn is going.
5. There will inevitably be imperfections in the construction of the track. LFRs must be designed to handle these without malfunctioning:
 - a. Height mismatch at the junction between track boards.
 - b. Alignment mismatch between lines at the junction between track boards.
 - c. Nicks, scratches, other issues that cause the reflectivity of the line to vary.
 - d. Imperfect coverage of the black paint surrounding the lines.