

RoboRacing Rules

Vehicle Requirements

- **Weight:** There are no weight limitations or requirements for your vehicle.
- **Size:** There are no size restrictions for your vehicle. That said, the course the vehicle must navigate may be as narrow as 18 inches.
- **Power Source:** Vehicles must be electrically powered. Gas-powered cars are not allowed. Teams that are new to working with lithium-ion polymer (LiPo) batteries should familiarize themselves with LiPo safety practices.
 - **LiPo Safety Guide:**
<https://www.icharger.co.nz/buying/resources-faq/lipo-lithium-battery-safety-guide>
- **Locomotion Style:** Vehicles must use ground-based locomotion. This includes wheels, treads, legs, etc. Planes, quadcopters, and other flying robots are not allowed.
- **E-Stop:** Vehicles weighing more than 15 pounds must include an emergency stop button. This button should be red, located on the top exterior of the robot, and cause the robot to come to a complete stop within 5 seconds.

Course Description

- **Color Definitions:** The following colors will be used throughout the course description.
 - BLUE Behr P490-7 "Mayan Treasure"
 - RED Behr P170-7 "100 MPH"
 - GREEN Behr P390-7 "Park Picnic"
 - BLACK Behr "Black BLACK"
- **Course Boundaries:** The primary boundaries of the race course will be 3.5 inches tall walls. In the direction of travel, walls on the right will be painted RED and walls on the left will be painted BLUE.
- **Road Surface:** The course will take place on a surface of oriented strand board (OSB).
- **Starting Line:** The starting line will be 6 inches thick, stretching across the whole width of the track. It will be painted GREEN.
See the *Competition Protocol* section for bonuses associated with this part of the course.
- **Starting Signal:** The start of the race will be indicated by the starting signal: a circular sign that will flip from red to green. The starting circle will be a 6 inch diameter circle. This signal will be positioned 8 inches above the road surface, directly over the left wall

of the course, and 24 inches in front of the starting line. One side will be painted RED and the other side GREEN. During race setup, the starting signal will show the RED side to the vehicle. When the race starts, the signal will rotate to show the GREEN side to the vehicle and will remain in this orientation for the duration of the race.

See the *Competition Protocol* section for bonuses associated with this part of the course.

- **Cone Slalom:** This section of the course will feature a line of cones through which the vehicle must execute a traditional slalom path without touching the cones. The cones will be spaced a minimum of 18 inches and a maximum of 24 inches apart, center to center. This challenge will be positioned on a double-wide section of the course. The left half of this section will be empty, the normal challenge-free course. The right half of this section will feature the row of slalom cones. The start and end of this section of the course will be marked by 3 inch thick BLACK lines across the width of the track.

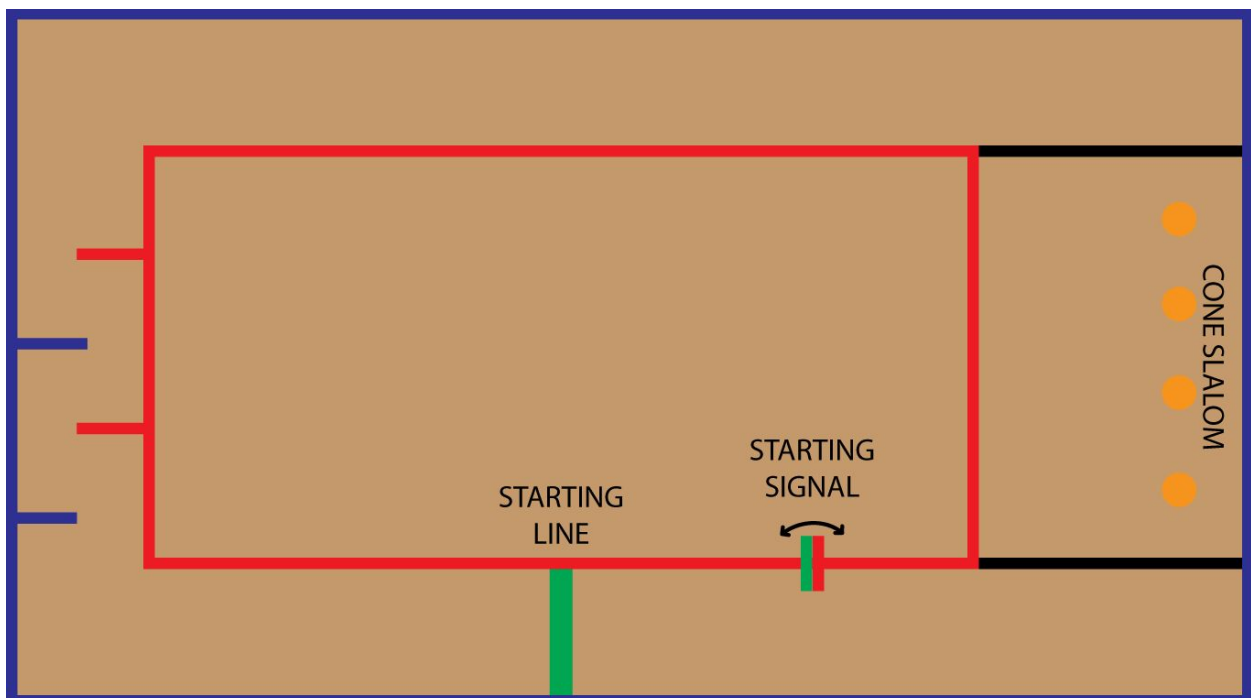
See the *Competition Protocol* section for bonuses associated with this part of the course.

- **Cone product:**

Trademark Innovations Plastic Cone Sports Training Gear, 9-Inch

<https://www.amazon.com/Plastic-Cone-Sports-Training-9-Inch/dp/B008891WWA>

- **Example Course Layout:** The following diagram shows an example course layout. This diagram is not to scale and not exactly what the course will look like, but it is included to give a visual example of the overall course layout described by this section



Competition Protocol

- **Format:** Each vehicle will have the opportunity to attempt at least three time trial runs of the course. Additional heats may be run if time permits. Each run consists of two laps through the course.
- **Scoring:** Teams will be ranked based on their fastest time through the course. The timer will start as soon as the starting signal is flipped and end when the vehicle touches the starting line at the end of its second lap.
- **Bonus Challenges:** Some challenges on the course are optional for a bonus! Bonuses are implemented by deducting from the time of the run during which the bonus challenge was accomplished.
 - **Autonomous Start (-10s):** Vehicles which can autonomously detect this signal and begin racing without human intervention will be awarded a 10 second bonus. Vehicles which cannot accomplish this challenge and require human intervention to start will not receive a Human Interference penalty for this starting intervention. During race setup, the starting signal will show the RED side to the vehicle. When the race starts, the signal will rotate to show the GREEN side to the vehicle and will remain in this orientation for the duration of the race.
 - **Cone Slalom (-30s):** Vehicles that autonomously navigate an optional slalom section of the course will receive a 30 second bonus. This section of the course will feature a line of cones through which the vehicle must execute a traditional slalom path without touching the cones.
 - **Autonomous Stop (-10s):** Vehicles that autonomously stop within 3 feet after crossing the starting line earn a 10 second bonus. (Don't forget to finish both laps around the course!)
- **Penalties:** Penalties will be implemented by adding to the team's time through the course. Penalties apply only to the score for the heat during which the infraction occurred.
 - **Human Interference (+5s):** If a team's vehicle becomes stuck, disabled, confused, or otherwise unable to proceed, the team is allowed to interact with the robot at the cost of 5 seconds added to their time for each instance of human interference. Interactions must take place without changing the vehicles progress along the course.

- **Demolition Derby (+30s):** If a team's vehicle collides with a course boundary element and the element moves, a 30 second penalty will be levied for that run. The spirit of this rule is to avoid reckless vehicle behavior that would require the course boundary to be repaired or reset after the race. Contact with the course boundary that does not move the boundary (such as a physical bump sensor on the vehicle) will not be penalized.

Revision History

Version	Date	Change Summary
1.0	2018/12/29	Initial Release
1.1	2018/12/30	<ul style="list-style-type: none"> - Adds information about Autonomous Start challenge. - Adds example course diagram. - Collects color definitions into their own rule. - Adds details about timing. - Puts Bonus Challenge content where appropriate in Competition Protocol and Course Description