

RCX Drag Racing Competition

Official Rules

Objective:

Competitors will build drag-racing robots prior to the competition. Robots are meant to watch for a visual signal for when to start, and race twenty feet along their lane to the finishing line, stopping within inches of that line.

Scoring:

A successful racer's time will be its score. The time is measured from the moment the starting light goes off until they cross the finish line. A race will be considered successful if the robot isn't disqualified.

Disqualifying:

A racer may be disqualified for leaving the starting line too soon, failing to stop in the allotted space, leaving the lane boundary (either by crossing the centerline, falling off the edge, or striking a track fixture such as the christmas tree or IR detectors), or failing a post-run inspection.

Track Description:

The track will be two side-by-side lanes on a black rubber 'runner'. (*1) Each lane will be a foot wide, and will have a two-inch wide strip of beige masking tape down the entire length (the lane-tape). The centerline will be visible to humans.

The starting line will be indicated with a dark line, but an infrared emitter/detector pair will be the primary determination of where the starting line is. Robots are to be placed on the track as close as they like to the starting line, without blocking the IR beam. Also at the starting end of the track will be a pair of christmas trees - similar to standard drag racing lights, except that there will only be a stack of three lights. The tree will be equivalent to a six-high stack of bricks with three ultrabright LED lightbricks (*2) on top, each a brick-and-a-plate tall. The top light will be yellow, the next one down green, and the bottom one red. These christmas trees will be placed on the center-line of the track, six inches past the starting line, one angled towards each racer. The RCX racer is meant to watch these lights for the starting signal. The yellow LED will go off first, and half a second later, the green LED will light. This is the start of the race. The red LED will only light if the racer has a foul start - crossing the IR beam before the green light was lit.

Six feet before the finish line will be a 4-inch wide strip of retro-reflective tape. This strip will be on top of the 2-inch wide

lane-tape. This will serve to warn robots that the finish line is coming. The finish line will be an identical 4-inch wide strip of tape. Two inches past the end of the strip will be the end of the track. This gives racers six inches in total for stopping. (*3) The entire track will likely be elevated from the floor on a set of tables. The edge of the table will be very close to the end of the track! It is highly suggested that your robot be capable of stopping in the required distance!

Building Rules:

You may use any or any number of LEGO computing devices, but the design must be autonomous. Only unmodified Lego, using standard building techniques (no gluing, etc.) is allowed. Custom sensors are allowed, (ones you create yourself, or ones you might purchase from places such as <http://www.hitechnic.com>) as long as their computing capacity is negligible.

Only wheels are allowed to touch the track at any time. If you wish to build physical brakes (i.e.: not just rely on electrically stopping or reversing the drive motors) you are not allowed to drop anchors, or spikes onto the ground!

Racers must be less than 9" wide, and may be at most 18" long.

Racers will be placed on the track, and five to ten seconds before the start of the race, the competitor will press the "RUN" button on their robots. They may not touch or communicate with their robot again until the end of the race. The robots must watch the christmas tree for the starting signal. The yellow LED will light first, and half a second later, the green LED will light. The green LED lighting is the starting signal.

Competition Order:

Competitors will be written down in a list, the first two competing against each other, then the next pair, etc. Should a robot leave their lane during a race, their name will be written down for a second chance at the bottom of the list.

The winner of each race will be written down on a new list, which will be used after all the races on the first list are completed.

This process will be repeated until there is a grand champion.

Notes:

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*1 - This is the kind of thing you'll see in entry ways of buildings. A rubber mat, with ridges along its length - though for the competition the

mat will be placed upside down, to provide a smoother surface, and more contact area.

*2 - These light bricks are from Hitech Products, and look like this:
<http://www.hitech.com/Lightbrick.htm>

*3 - A sketch of the track can be found here:
<http://www.brickshelf.com/gallery/David/Misc/Competition/dragracingschematic.gif>

Building Hints:

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- 1) While just having a single axle for both wheels will keep you going pretty straight, some steering will likely be necessary over a 20 foot race to not leave the track.
- 2) Longer racers will generally be easier to keep going straight.
- 3) Use one or more light sensors watching the lane-tape to keep your robot traveling in a straight line.
- 4) To detect the christmas tree lights, have a shielded light sensor near the front of your drag racer that can be turned 45 degrees left or right, depending on which lane you're assigned. In your program watch for a change in brightness, followed by a second increase in brightness a half-second later.
- 5) It is possible you will not be able to stop in time by just turning the motors off. One solution is to try reversing the motor for a moment before turning it off. Another suggestion is to build some brakes. You're not allowed to have anything but the wheels touching the ground, so you'll have to come up with another solution.
- 6) Make sure your racer is sufficiently well put together that it won't fall to pieces, should it come out of its lane, or fail to stop in time, and end up falling on the floor. Don't rely on simply brick clutching power. Use cross bracing with technic beams to build stronger structures.