# Line Following (version: 20171111)

In this competition, robots follow a line on courses with different levels of track complexity depending on the competition level (Novice, Advanced, Challenge level). The course for each level competition is constructed of elements allowed for that level. Each competitor is allowed three runs. A run is defined as an attempt where the robot advances along the course beyond one foot. Competing robots that successfully complete a level competition's requirements are eligible for prizes. The fastest successful robot for each level wins the top prize. At each level, prizes are also rewarded for the second and third fastest robots. If no robot successfully completes a competition, a single prize will be rewarded to the robot that came closest to successfully completing the requirements. This prize is considered a third place finish.

Novice:

Purpose: This level Provide a competition for novice and beginning roboticists. **Advanced roboticists should not compete at this level of the competition.** If time is available at the competition as determined by the competition judge, advanced roboticists may demonstrate non-competing robots (Please no 3PI robots or robots with canned programs). Robots that display unique characteristics (ex. walking, balancing, vision system line sensing, etc) are especially encouraged to demonstrate.

- Age limit: No restriction (young and old are encouraged).
- Allowed Elements:

Straight   Curve   Double Curve
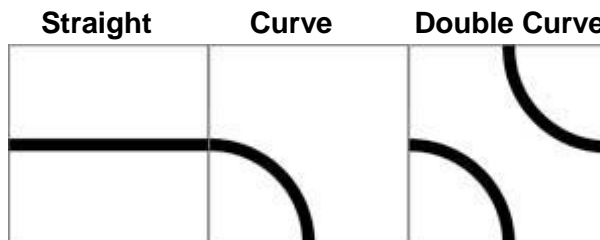
Note: Curve radius is 6 inches
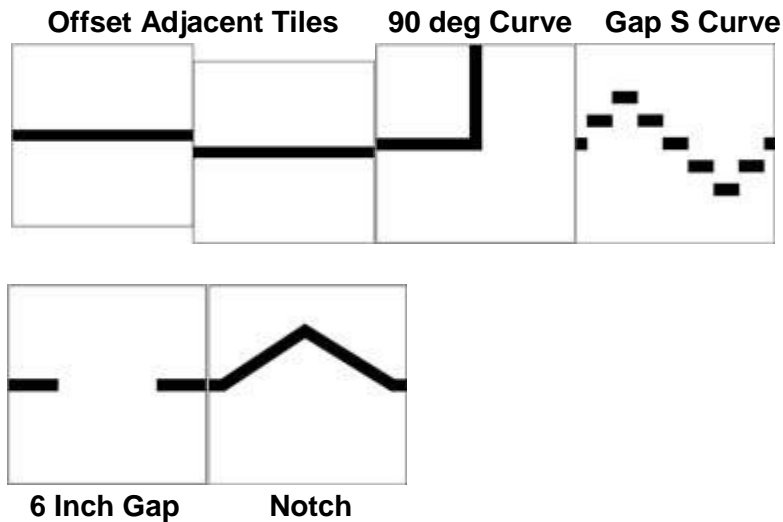
- Element material: Utility grade vinyl tile (off white with gray speckles) or vinyl banner.
- Element size: 12 x 12 inches
- Line: ¾ inch Black electrical tape
- Course Length: Approximately 300 inches
- Required Number of Laps: 2
- Max Run Time: 3 minutes
- Restrictions: No 3PI robots are allowed to compete in the Novice competition

Advanced:

Purpose: The purpose of this level is to provide a competition for more advanced roboticists. Novices are also encouraged to compete.

Age limit: No restriction

Elements: All elements of the Novice event, plus

Offset Adjacent Tiles   90 deg Curve   Gap S Curve

6 Inch Gap   Notch

Notes:

- Any adjacent tiles (all element combinations) may be offset.
◦ Maximum offset between adjacent tiles is 1.5 inches.
- Offsets in Gap S Curve tile are 1.5 inches.
- Segments lengths are 1.5 inches except for first and last segments.
- Element material: Utility grade vinyl tile (off white with gray speckles) or vinyl banner.
- Element size: 12 x 12 inches
- Line: ¾ inch Black electrical tape
- Course Length: Approximately 400 inches
- Required Number of Laps: 2
- Max Run Time: 3 Minutes

Challenge:

In 2011 DPRG created a Challenge level Line Following course. This course was never successfully completed by a robot. If a competitor wishes to attempt the Challenge level course, they must preregister.

Purpose: This competition is meant to be a challenge. All competitors are encouraged to try the course and see what their robots can do.

Age limit: No restriction.

Elements: All elements of Novice and advanced, plus the following:

Acute Angle	Bumps	Intersection	Gate
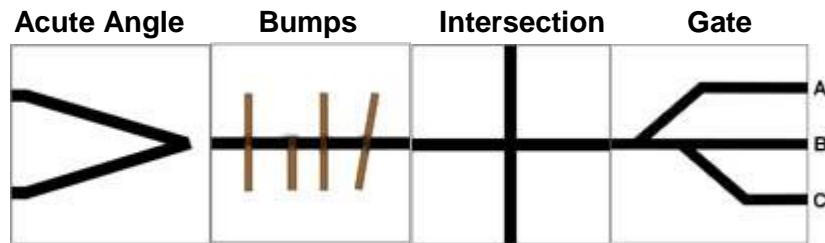
Notes:

•   Bumps are made with craft sticks (height = ~0.1 inches). The line area will be painted the proper line color. Bumps may cross line at an angle of 45 degrees or greater. They may also extend either on one side or both sides of the line. All bumps will cover line area. Distance between bumps will vary and be greater or equal to 2 inches. Maximum length of   stick making bump is 4.75 inches

•   Intersections may cross with angles of 70 - 90 degrees. Course always crosses intersections (i.e., never turns).

•   Gate branch angles are ~45 degrees. The gate lines are made with black ¾ inch electrical tape. Minimum distance between branch decision points is 4 inches. The robot should leave gate on branch C.

Condition Changes:

Line Color Chg	Stains	Line Width
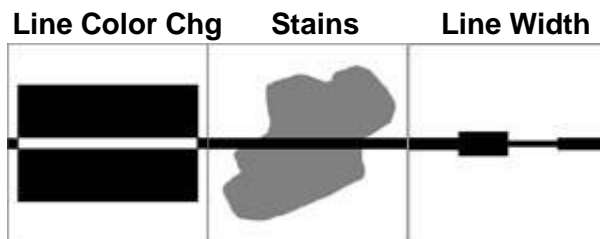
Notes:

1. All condition changes can occur in any element.

2.   In a line color change, the line changes from black to white or from white to black color. Nominal line color (majority of course) is black.

3.   Stains can have four values: 20%, 40%, 60%, 80% of black. Stains may or may not cross line (picture shows a stain crossing line).

4.   Line widths are 3/8, 3/4, and 1.5 inch. Nominal line width (majority of course) is 3/4 inches.

●   Element material: paper - white (may have backing for strength) or vinyl banner.
●   Element size: Between 12 x 12 inches and 24 x 24 inches

- Line: ⅜ to 1.5 inch Black or white painted or tape line
- Course Length: Approximately 70 feet
- Required Number of Laps: 1
- Max Run Time: 5 minutes

Additional Information (all levels of competition):

The front and rear of a competing robot must enter and exit every element of the course. If a robot overshoots or loses the line and recovers, its recovery course must take it through the adjacent element. Under-shooting an element or taking a wrong turn at an intersection disqualifies the robot's run. A robot that does not follow the curvature of the line or the implied curvature of the line where the line is not continuous in an element is undershooting, which is not allowed. An example of deviating from the curvature of the line would be following the stain outline instead of the line in a stain element. Robots can overshoot the line if they recover as described above. An example of an overshot would be leaving the line at a 90 degree turn and swinging back to the line.

Challenge Level Course Layout:

The Challenge level course layout will not change until it has been successfully completed by a competitor. The current course layout was introduced at the Roborama 2011b competition. The Challenge level course layout is at https://www.dprg.org/wp-content/uploads/2017/11/DPRG-Roborama-2011b-Challenge-Level-LF-Course.pdf (added 10/18/11, link changed 11/11/2017)