

Line Follower Simulator Competition

(rule version 20201020.00)

Objective: The competition objective is for user supplied robot models to compete against each other by successfully completing one lap around a virtual line following course. The competition uses the Line Following Simulator (LFS) authored by Ron Grant. The competitors provide robot controller and initialization files for use on LFS. A judge inserts the files into the simulator and runs the robot.

Competition: The competition will be live streamed at a date and time published on DPRG's website and Meetup page.

Robot: The "robot" consists of a robot controller file and several initialization files. The robot controller file contains the robot's algorithms. The initialization files contain the robot's sensor definitions, representation, and other configurable parameters. The controller file must be named UserCon.pde. The initialization files must be named: UserDraw.pde, UserDrawPanel.pde, UserInit.pde, UserKey.pde, and UserReset.pde. It is suggested that the UserKey and UserReset files be left unmodified from the example supplied by LFS's author. Additional files may be added to support these files. All files must be in a directory named <competitor's first name><competitor's upper-case last initial><_course name>. Course names are, Novice, Advanced, and Challenge. Additionally, a file with the same name as the directory must be included in the directory. This file should be a renamed copy of the file named LFS_SimpleBot.pde from the LFS_SimpleBot example. This file can be modified, but it is suggested that it be left unmodified.

For example, if the competitor's name were "Bob Smith" attempting the advanced course, the competitor's files would be in a directory named "BobS_Advanced". The directory would include the files BobS_Advanced.pde (renamed copy of LFS_SimpleBot.pde), UserDraw.pde, UserDrawPanel.pde, UserInit.pde, UserKey.pde, UserReset.pde, and any additional support files

Sensors: Two types of sensors are allowed: spot and line.

A spot sensor is a rectangular array of pixels. A suggested maximum size of a spot sensor is 225 pixels (i.e., 15 x 15, if square). Other size spot sensors are allowed. The robot can use multiple spot sensors.

A line sensor samples a linear array of cells which are adjacent with no space between them or overlap. A suggested cell size in a line sensor is 5 x 5 pixels (i.e., 25 pixels per cell). The maximum length of line sensor is 64 cells or 320 pixels. The robot can use multiple line sensors.

Simulator: The competition uses LFS version 1.3.1 or later. LFS can be found on the author's GitHub at <https://github.com/ron-grant/LFS>. Additional instructions are also available at the link above. LFS is written in Processing, which must be downloaded from <https://processing.org/download/> to run the simulator. The simulator has two example robots: LFS_SimpleBot and LFS_TrikeDemo.

Run Definition: A run starts when the robot is placed in the simulator and moves. If the robot fails to move, the competitor can remove the robot and try again at the end of the round. If the robot does not

move when given this 2nd chance, its run is forfeited. The run ends whenever the robot completes the objectives, or malfunctions after moving, or stops advancing for a period of 15 seconds, or the time limit has elapsed, or the user's robot files crash the simulator. Each robot is allowed 1 run per contest round.

Run Time Limit: The run time limit is 5 minutes.

Round Definition: A round consists of a single run by each competing robot. The competition consists of **2** rounds.

Play: At the start of the competition, the robot's directory of files will be loaded into the simulator. A judge will place the robot on the course and start the simulator. The robot's objective is to complete one lap of the course. The starting location of the robot is selected by the judge and will be the same for all robots.

Courses: There are 3 levels of courses available in the competition: beginner, advanced, and the Challenge-2011 course. The courses are in the simulator's data directory.

Level	Course Name
Beginner (1)	Novice_LF_course-Fall_2018_64DPI.jpg
Advanced (2)	Advanced_LF_course_Fall-2018_64DPI.jpg
Challenge-2011 (3)	DPRG_Challenge_2011_64DPI.jpg

Scoring: A robot's run score is the number of successful **quarter** lap segments (i.e., 0.25 of lap) that the robot travels within the run time limit or when the run is terminated.

A perfect score is **4**. If multiple robots have the same score than they are ranked by speed. The robot's best run is used for ranking.

No place or prize will be awarded to a robot that does not at least have a score of 1 in a run during the competition (i.e., travel 1/4 of a lap around the course).

An example scoring: Four robots run the course. Two successful complete a full lap with times of 90 secs and 280 secs. The next robot travels 0.5 lap before running out of time, however, is still on course. The last robot goes off course at 0.75 lap within the time limit. The rankings are 1st place goes to the robot with the 90 sec time, 2nd place goes to the robot with the 280 sec time, 3rd place goes to the robot which travelled 0.75 laps.

Judging: One or more judges will referee the contest. They will ensure the rules are followed. The decisions of the judges are final.