Line Maze

Object

Each robot gets three tries to find the end of a maze using line following techniques. The robot that solves the maze in the shortest time is the winner.

Rules

The Maze

The maze will consist of a series of black, intersecting, 1/4-inch lines on a white arena. The white space will be relatively glossy and the black space will be relatively flat. No line will be closer than 6 inches to any other (parallel) line and there will always be a minimum of six inches between any two intersections. A solid, black, six-inch diameter circle marks the finish point. Dead ends are not marked; the line simply terminates. During this year's run, the lines will either terminate (come to an end), branch to other lines (i.e. "T" or "+" intersections), lead to the finish, or double back on itself (i.e. a loop). Because the lines can loop back onto itself, the robot would need to know if it has already visited an intersection. Traditional right-hand or left hand rules for maze solving may not work with this type of a maze because the robot could get stuck in a loop. All intersections will be at right angles, although, in the future, more complicated intersections and lines may be added. The maze will be no larger than 8 feet by 8 feet and no line will be closer than 6 inches from the edge of the maze. There is no guarantee that intersections will be exactly six inches apart, however. Although every effort will be made to keep the maze as flat and level as possible, contestants must be prepared for irregularities in the surface such as where two sections of the maze intersect.

The maze layout will not be known until after all robots have been registered and presented to the contest judge. However, a small sample maze will be available before the contest for calibration and testing. The test maze will be made of the same materials as the full-size maze and will be placed in the same lighting conditions. There will also be two tiles, made from the same materials as the maze, to help calibrate sensors. One will be black and one will be white. Each tile will be six inches by six inches in size.

An example maze is presented at the end of these instructions. In the example, the maze starts in the lower left corner and ends in the upper right corner. An actual maze may start and end anywhere. Also in the example, the solution is shown in red. In the actual maze, the solution will be the same color (black) as the rest of the maze.

The Robot

The robot can be no larger than six inches in any dimension (ie: must fit inside a 6 inch square box). There is no weight restriction. The robot cannot expand beyond these dimensions at any time during the event. The robot is permitted to sense lines other than the one it is travelling on as long as those sensors do not extend beyond the

above-mentioned dimensions. In other words, a camera arrangement can be used to glean information about the maze, as long as the camera is mounted wholly on the robot itself. The robot must be completely autonomous and self contained; external computers are not allowed. Robots may not leave any trail or markings. They also may not split into separate robots. The robot may not leave the maze at anytime. If it does, the attempt will be terminated and the robot will receive no score for that attempt. The robot is considered to have left the maze if some part of the body is no longer touching the line it was travelling along.

Operation

Each robot is given three minutes to find its way to the termination point of the maze. Timing starts when the robot starts moving and ends when any part of the robot touches the finish circle. The robot may continue to explore the maze after it finds the termination point but must shut itself down prior to three minutes after the run begins. If a robot continues to operate past the three-minute point, it will be disqualified. If any part of the robot is touching the finish circle when the three minutes are up, a ten second bonus will be subtracted from the score (calculated from the first time the robot touched the finish circle).

The robot will be given three attempts to solve the maze. The fastest time of the three will be recorded as the final score for the robot, plus any penalties and minus any bonus. No modifications of any type may be made to the robot between attempts. The robot will remain under the supervision of the contest judge between attempts and the judge will be the one who controls the robot during each attempt. In other words, the contestant will relinquish the robot to the judge before the maze is presented and will not regain control of the robot until after the contest is over. However, the contestant may assist the judge with the robot at any time.