

Teacher Notes: Follow the Guidelines

Introduction to Mobile Robotics > Follow the Guidelines

Description of the Unit

A useful thing for robots to be able to do is to follow paths that have been laid out for them. They can do this by searching the ground for distinguishing marks and following those marks, or lines, to a goal. This unit will take students through the basics of line tracking, so that they can get their robots from here to there without having to measure the distance.

Unit summary: students will...

- Calculate a threshold value for light levels
- Use sensor thresholds to control the robot's behavior
- Write a program that makes the robot track one side of a line
- Modify the program to track the other side of the line

Prerequisites:

- Set up an area with a black line of electrical tape on a light surface, or have an area ready for students to set up
- Full Speed Ahead Activity (optional)
- Present to class the Follow the Guidelines slideshow from Teacher's Curriculum CD and have class discussion (optional)
- Review/teach calculating thresholds and using View Mode (optional)

Approximate classroom time: 4-5 class periods (45-minute periods)

Note to the teacher

This Activity can be done with either the Taskbot model or the Robot Educator model (REM) robot. This Activity, "Follow the Guidelines" is linked to the Exploration, "Faster Line Tracking," in which lies the bulk of the measurement, design and communication work. *It is highly recommended that both activities be used together*, as they both teach critical skills which students will need in future units.

- The "Follow the Guidelines" activity guides students step-by-step through the process of programming the robot, and running the basic line following program.
- The "Faster Line Tracking" Exploration involves students in a study of the factors involved in line tracking, and explains how to use the Taskbot to line track more efficiently.

There are many reasons why a robot would not be able to track the line. Common problems include an incorrect threshold level, or a threshold level that is correct on one area of the board, but, due to lighting changes, will not work on another side of the board. With the Light Sensor on the front of the robot, it also cannot track the line very quickly, so watch out for students whose line tracking behavior will not work because the motor power levels are set too high.

Students may also find it difficult to understand how the light sensor detects colors as opposed to black and white. To help demonstrate this concept, refer to the Light Sensor page in the Basics > NXT Sensors portion of the student CD, or check out this [useful animation](#).

Students will be able to:

1. Program a robot using the NXT Programming Software and data from the Light Sensor to track a line
2. Understand line tracking behavior as a sum of less-complicated behaviors
3. Understand programming with Loops and Switch blocks