Teacher Notes: Field of View

Introduction to Mobile Robotics > Field of View

Description of the Unit

In this Exploration, students will investigate the area in which the Ultrasonic Sensor can detect an object. They will do this by marking the points where the sensor is just able to detect the object, and then transferring the markings to paper by scaling down the pattern.

Unit summary: students will…

- Use View Mode to investigate the limits of the Ultrasonic Sensor's detection capacity for a given object
- Set up their work area, including marking in 10cm increments along a length of tape
- Scale down their findings to fit on a single sheet of paper

Prerequisites:

- Have a clear area approx. 1m x 2m for each group to set up an experiment
- Obstacle Detection Activity
- Present to class the Field of View slideshow from Teacher's Curriculum CD and have class discussion (optional)
- Review/teach using View Mode, accurate data collection techniques, scaling (optional)

Central Concepts

Math • Graphs and Plotting • Patterns • Scaling and Scale Models • Error	**Science** • Experimental Design • Ultrasonic Waves • Data Analysis & Acquisition • Spatial Graph Model
Technology • Electrical Switches • Performance Boundaries • Design Tradeoffs	**Communication** • Explanatory Composition • Comparing Varying Designs • Documenting Processes

Approximate classroom time: 3-5 class periods (45-minute periods)d
Approximate homework time: Up to 2 hours (Conclusions section)

Note to the teacher

This Exploration can only be performed with the Taskbot model.

Each group will need their own flat, smooth area approximately 1m wide and 2m long in which to perform their experiment. This area cannot be disturbed between the time the data collection has begun and the time it is scaled down to fit on a sheet of paper, so try to put it in areas that are low traffic. Alternatively, you can have multiple groups share the same area (over several classes) by assigning each group a different color of tape to use to mark their points. Or, do the data collection as a class, so that you only need to preserve one area between class periods. If resources allow, once a group has finished marking the points of their detection outline, lay several metersticks across the area (to show scale) and then take a photograph of the data. The important thing is for the data to be somehow preserved until the time at which the students are able to transfer it to a sheet of paper.

Note also that the NXT is set by default to shut down after 15 minutes of inactivity, which includes giving readings in View Mode, and may shut itself down during the course of this Exploration. You can change this by going into the “Settings” menu on the NXT and then selecting the “Sleep” option and resetting as necessary.

Students will be able to:

1. Use View Mode to take readings from the Ultrasonic Sensor
2. Create an outline of the area in which the Ultrasonic Sensor can detect a certain object
3. Apply and describe the various points of experimental procedure:
   a. Measurement technique
   b. Multiple trials
   c. Data organization
4. Make a scale model of the data on a sheet of paper
5. Write a conclusion that summarizes the lessons learned in the Exploration