Worksheet: Obstacle Detection
Introduction to Mobile Robotics > Obstacle Detection

This worksheet is provided for reference only. Be sure that you follow the steps in the online directions, and answer the questions at the appropriate times. Fill out all your answers on a separate sheet of paper.
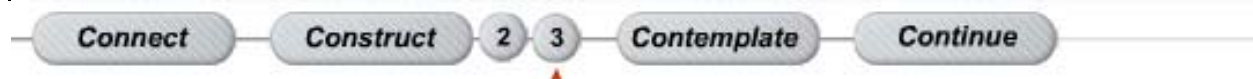
Construct: Touch Sensor

Connect — Construct — 2 3 — Contemplate — Continue

Observations:

1. What did the robot do?

2. What caused the robot to stop?

3. Do you think it's a good idea for the robot to run into obstacles and stop?

4. What are the benefits and drawbacks of this behavior?

Construct: Ultrasonic Sensor

Connect — Construct — 2 3 — Contemplate — Continue

Observations:

5. What did the robot do?

6. What caused the robot to stop?

7. How far away from the obstacle did the robot stop?

8. What are the benefits and drawbacks of this behavior?

9. How reliable is this sensor as opposed to the touch sensor?

Contemplate

Connect — Construct — Contemplate — Continue

10. Think about the Construct Phase that you just completed and compare using the touch and ultrasonic sensors.

    i.   What is the main difference between the two programs?

    ii.   What is the main difference in the robot's behavior when you use each of the different sensors?

11. The ultrasonic sensor allows you to stop before you reach an object, rather than after you've run into it. What are the benefits and drawbacks of this behavior?

12. The touch sensor only has two settings, pressed and not pressed. The ultrasonic sensor, on the other hand, can sense any distance between 0 and 200 centimeters.
- i. Why do you need to set a threshold level for the ultrasonic sensor, but not for the touch sensor?

- ii. What happens to the robot's behavior as you change that threshold level for the ultrasonic sensor?

13. There are many reasons to use and not to use the touch sensor when creating a robot for the real world.
- i. List three reasons why you would want to use a touch sensor on a real world robot to detect obstacles.

- ii. What kind of robots could use touch sensors in this way? Describe at least two.

- iii. Describe at least one situation where a touch sensor could NOT be acceptably used as an obstacle detector.

14. There are many reasons to use and not to use the ultrasonic sensor when creating a robot for the real world.
- i. List three reasons why you would want to use an ultrasonic sensor on a real world robot to detect obstacles.

- ii. Does the ultrasonic sensor provide reliable detection for every type of possible obstacle?

- iii. Describe at least one situation where an ultrasonic rangefinder could be acceptably used as an obstacle detector.

- iv. Describe at least one situation where an ultrasonic rangefinder cannot be acceptably used as an obstacle detector.

15. What other kinds of sensors could be used to detect obstacles, and how would you use them?

Continue: Detecting Everyday Objects

Connect — Construct — Contemplate — Continue

Observations:

16. What does the sensor show when it has difficulty detecting anything?

17. Does the shape or curvature of an object make a difference?

18. Does the sensor detect soft or hard objects better? Why do you think this is?

19. What is the smallest object detected?

20. Does the sensor detect thin objects well?

21. Turn the sensor 90 degrees on its side so it is positioned "upright." Does it detect thin objects better now?