

## Conceptual

You will be hooking up an ultrasonic motion sensor and reading its input. An ultrasonic motion sensor uses sound to detect distance to an object. This is very similar to how a bat uses echolocation to determine objects.

- Read [tutorial](#) on connecting the ultrasonic motion sensor.
- Make a sketch of how the ultrasonic motion sensor works. Describe in words how it works.
  - What does the trigger pin do? What does the echo pin do? Why is there a time delay between trigger and echo detection?
  - Write down the equation that converts the signal to a distance.

## Basic Make

- Make a circuit for your ultrasonic sensor.
- Make a [program](#) to read your sensor.
  - Note: the example program uses the serial monitor to display values.

## Advanced/Extended Make

- Make a graph of the signal read from the ultrasonic sensor as a function of distance to an object (like a book). Determine the sensor accuracy and limits (how close and how far away you can detect an object).
- Duplicate diagrams using Fritzing

## Equipment

- Computer with access to Fritzing and Arduino
- Circuit components: Arduino and misc electronic parts
- Ultrasonic motion sensor and associated cable

## Objective

### Physics Concepts

- Voltage divider
- Analog to Digital
  - Resolution and bits
- Digital to Analog
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### Experimental analysis

- Circuit design – voltage divider

### Technology Concepts

- Schematic Symbols
- Programming Syntax – analog read