

# "Sonar" (echo sounding)



**Sensor:** Motion sensor

## Overview:

An echo is a sound which is reflected off a surface and is heard after the original sound. Echoes are used to locate objects and determine their exact position. This is done by timing how long the echo takes to get back to the original position. Sonar uses this technique and the term SONAR is derived from 'SOund Navigation and Ranging'.

Sonar is used in marine exploration to detect objects under the ocean but 'echo sounding' is a similar technique which is used by ships to measure the depth of the ocean.

This experiment tries to get pupils to identify objects in relation to the resultant graph which is produced by passing boxes of different size in front of a motion sensor.

**Equipment required:** LogIT Explorer  
1 Motion sensor  
1 sensor extension cable (optional)  
1 clamp stand  
Large tray  
Various boxes of different size to try and identify

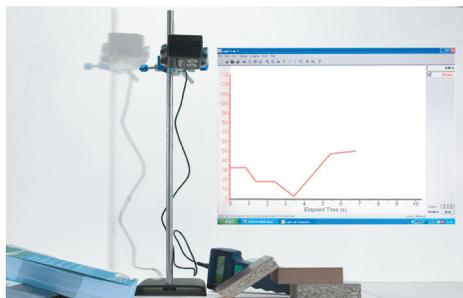
## Hazards:

Take care if using clamp stands that they cannot fall off the bench.

This experiment can be done on the floor if space allows.

Always check your local regulations or the school advisory service such as CLEAPSS or SSERC for guidance on the use of any hazardous material or procedure.

## Setup:



1. Arrange the boxes in a line on the tray as shown.
2. Connect the Motion sensor to channel 1 of Explorer.
3. Mount the sensor in a clamp stand or similar at least 200 mm above the highest box.
4. Connect the Explorer to the computer and start the datalogging software. If using LogIT Lab select 'Autolog' when prompted from the 'Select New Activity' screen.

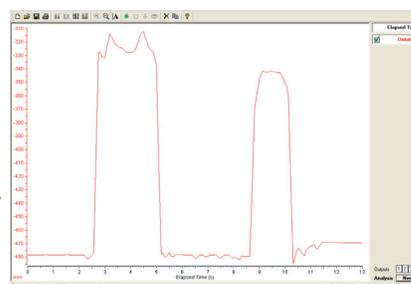
Note: You don't have to use a clamp stand as the idea is to keep the motion sensor at the same distance from the sea bed. A tall box with the sensor held onto a ruler with an elastic band may suffice. Use square edged boxes to prevent signals being reflected away from the detector as incorrect readings may result.

## Method:

1. Place the mounted motion sensor at one end of the 'sea bed'
2. Start the logging software.
3. Slide the tray at a constant speed under the sensor.
4. Stop the logging software and click on the magnifying glass.

## Results:

To get the graph to plot the correct way round, right click the 'Distance' field on the right of the screen under 'Elapsed Time' and select 'Invert'. It is also a good idea to select 'Smooth' to smooth the graph plot. Pupils should be asked to try and identify the graph plot which corresponds to each box.



## Going further:

Try moving the boxes through at different speeds and use the 'overlay' feature. What effect might this have on the resultant graph?