Looking at vibrations

Overview:
When engineers design structures, it is very important that the behaviour of the design is thoroughly investigated. This is to prevent the structure not being fit for it's designed purpose and possibly failing. Using electronic sensors, you can look at how structures react when they are being used. Here we will look at the vibrations which occur when a gym bench is walked accross using a force sensor.

Aim:
To investigate oscillations through a structure such as a gym bench.

Equipment required: LogIT uLog sensor adapter
LogIT Force sensor and a gym bench
Mass to place on the force sensor (we used 200g)
Modelling clay

Hazards:
Always check your local regulations or the school advisory service for guidance on the use of laboratory equipment. Students should be supervised at all times.

Method:
1. Connect the uLog sensor adapter to the computer and connect the force sensor to the uLog sensor adapter.

2. Place a small amount of modelling clay to the bottom of the mass and place the mass on the force sensor as shown.
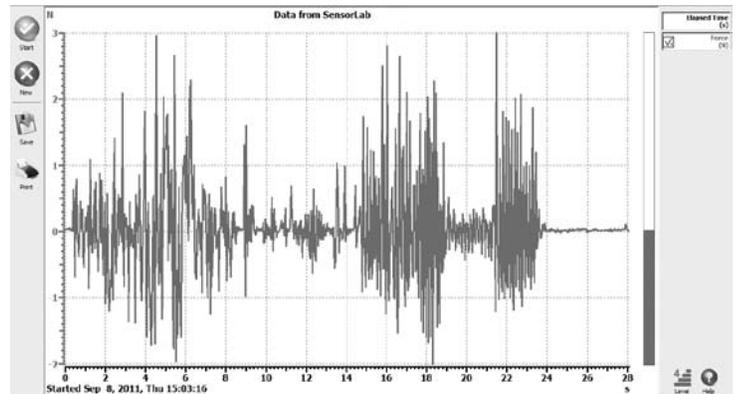
Looking at vibrations - continued

3. With the mass on the force sensor, press the zero button to set the force reading to zero again.

4. Position the force sensor either on the edge of a gym bench or on the bottom rung (if it has one), press the uLog button to start logging and then walk across the bench.

Results:

    Does the graph follow the movements of the force sensor?
    What do the results show?
    Is the bench designed well? If so, how can you tell from the data?

Going further:

    How would you improve your experiment?
    What else could you test? For example, would different gym shoes yield different data patterns?

    This experiment measures transverse waves. These travel up and down. How could you adapt your experiment to measure longitudinal waves which travel froward and backward's?
    Transverse and longitudinal waves make up seismic activity within the earths crust causing earthquakes. How could you design a self contained seismic monitoring station using this sensor? What would you like to include?