Dynamo effect

Apparatus

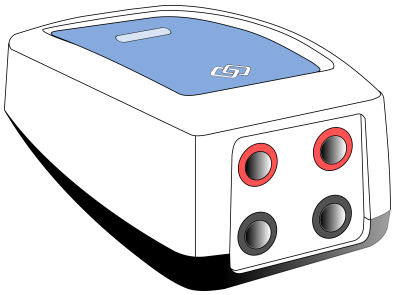
Smart wireless Voltage and Current sensor

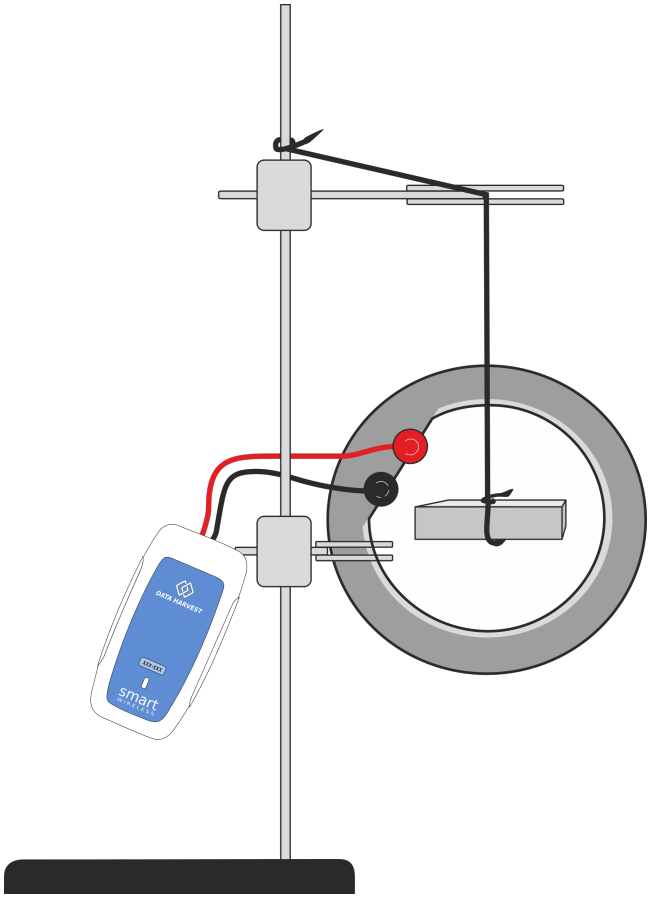
Large coil.

Powerful bar magnet (e.g. AlNiCo type)

Piece of string or rubber bands

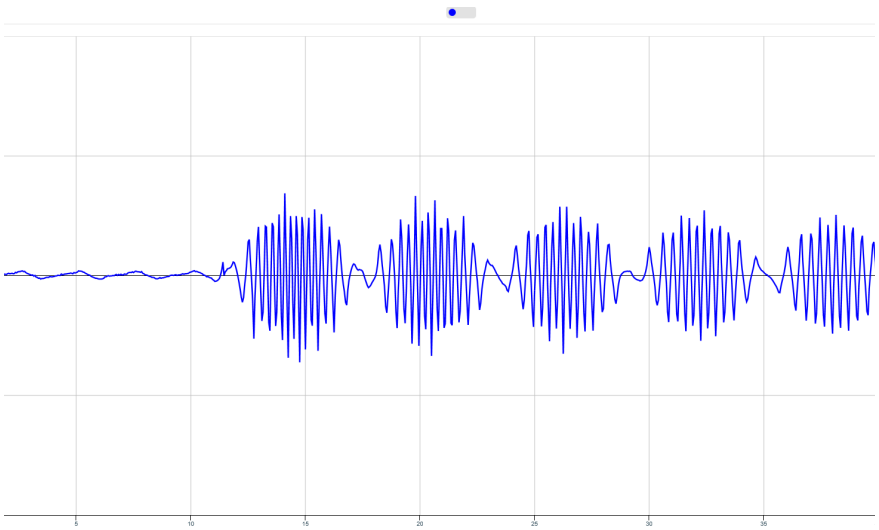
At least 2 x 4mm plugged patch leads





Method

1. Assemble the apparatus as shown in the diagram. Use string or rubber bands to suspend the magnet in the centre of the coil. Touch the string loosely against the top vertical face of the coil to position the magnet as close to the centre of the coil in all dimensions.
2. Connect the leads from the coil to the Voltage terminals of the sensor.
3. Open the software and connect the sensor to your Bluetooth enabled device.
4. Click start and record about 20 seconds of data, then twist the string that suspends the magnet. If you are using an elastic band to support the magnet you can “wind it up” and release to get multiple twirls.
5. Repeat to get several bursts of activity on the chart, then click stop.



Example graph of a magnet spinning in a coil.

You can see that any movement of the magnet creates (induces) a voltage that the sensor can measure.

For the observer there is a good correlation between the seen event and the graphed event.

Why do this practical.

The practical is envisaged as part of a sequence of simple practicals to introduce the idea of induced current / voltage in a conductor wire.

It gives excellent visual linkage between the movement of a magnet near a conductor and the creation of a current.

It can also explain why electricity generation produces an alternating current - it is a result of the magnet rotating in coil. The choice of Alternating current over direct current in electricity supply is not explained.

This is a good example of where a data logger can make the unseen visible.

Extensions.

Use different strength / sized magnets.

Use different speeds of rotation.

Explore the movement of both the coil around the magnet and the magnet around the coil.

Practical advice

We indicate the use of a Helmholtz coil, this is a description of the type of coil to use - a large diameter flat coil. The type used for demonstrating transformers will not produce the same connection between what is seen and what is shown.

Voltage is often simpler to show as the output, to show current correctly you need a load across the coil terminals, this can create a confusion. As described the apparatus is very “clean” and obviously not been rigged.

With the combine Voltage and current sensor you can collect voltage and current at the same time. Using calculation tools you can then show power and resistance.