Worksheet 4
Roundup

1.1 Synthesis of Devices seen

Let's review the investigations into the Monster Truck, the Maglev, the PIE and the Multi-PIE devices. You could first create a summary table. Here's suggestions for headings.

Device	max Displ	Frequ Range	Power	HPBW	Q_H

The **maxDisp** is the maximum displacement you observed as you varied the forcing frequency.

The **Frequ Range** is an estimate of the useful range of frequencies (Hz) where the device could be used.

The **Power** is some indication of the power (Watts, milli-Watts or micro-Watts) the device produces.

The Half Power Bandwidth **HPBW** is the difference between the upper f_U and lower frequency f_L at the point on the frequency response curve where the power is half the maximum power.

The Harvesting Quality Q_H is defined as

$$Q_H = \frac{(f_U - f_L)}{0.5(f_U + f_L)}$$

Use your values to make a critical comparison of the devices using the Monster Truck as a baseline reference. You could also suggest where each device could find an application, see the section below.

1.3 Applications

A literature trawl revealed some potential applications with the associated power requirements. These are very much ball-park figures.

Application	Power needed
Highway bridge monitoring	1-3 milli-Watts
Railway track monitoring	around 1 – 2 Watts
Railway signal LEDs	10 Watts
Railway axle counter	100 Watts
IoT Device (sensors)	10 micro-Watts
IoT Device (comms)	100 micro-Watts
Wearable sensors	2 – 3 milli-Watts
Car (not electric)	300 Watts