

EPPro8 Challenge

Engineer Problem Solve Innovate

Royal Wave

When the Queen drives through town people line the street to see her give a royal wave.

The problem is – the Queen broke her arm last Week in a snowboarding accident.

To keep her subjects happy she wants you to invent a waving machine that can wave for her.



This challenge contains optional activities using the EPro8 Electronics Starter Kit.



Bentley State Limousine

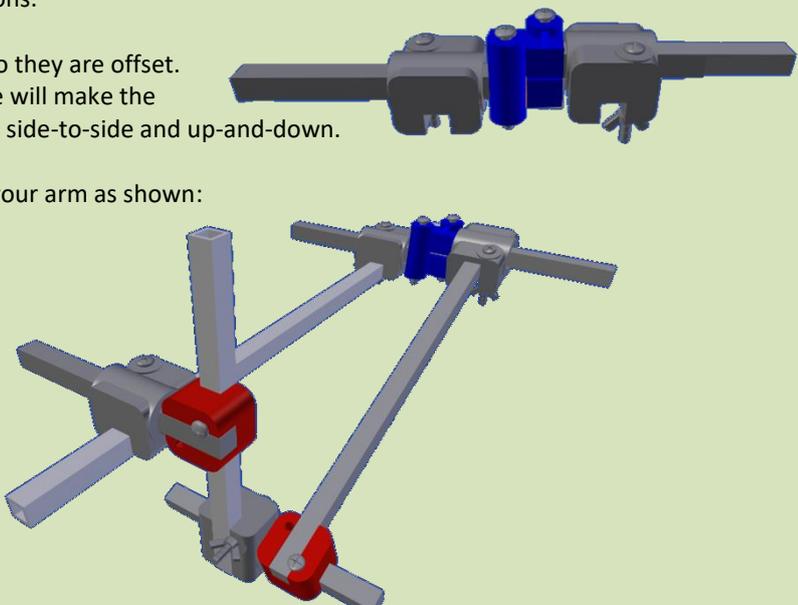
Criteria	A vehicle is at least 1.2m long and 700mm tall. The vehicle can be pulled along the ground.
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Pendulum Wave

Criteria	A 700mm arm has a cardboard hand on the end. The arm is attached to the limousine and points upwards. A weight is attached below the arm so it swings like a pendulum. The arm will wave for at least 10 waves.
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Hint	Attach the arm to the limousine with an axle so some of the arm extends below the axle. Attach a weight to the bottom of the arm. Then it will act as a pendulum (a swing).
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Crank Handle Waving

Criteria	A crank handle is turned continuously in a clockwise direction. This causes the arm to wave from side-to-side.
Hint	<p>The crank handle provides a rotating motion (as does a motor). Machines convert this motion into a range of other motions.</p> <p>Connect two axles so they are offset. Turning the first axle will make the second one to move side-to-side and up-and-down.</p> <p>Link this motion to your arm as shown:</p> 

Push Start

Criteria	The limousine is pushed along the ground. This causes the arm to automatically wave side-to-side
Hint	Replace the crank handle with a gear. Attach a second gear to one of the wheels.



Motorised Waving

Criteria	The limousine is motorised. When a button is pushed the limousine moves forward and the arm waves from side to side.
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Motorised Waving

Criteria	Use the online electronics simulator, code RYWV
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	<p>The limousine is motorised. When a switch is turned on the limousine moves forward.</p> <p>The arm is motorised. When a second switch is triggered the arm waves continuously from side-to-side.</p>
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Wave When Stopped	
Criteria	<p>The limousine is motorised. When a switch is turned on the limousine moves forward.</p> <p>The arm waves whenever the limousine is NOT moving.</p>
Hint	Connect the switch to the NOT box. The output from the NOT will be on whenever the switch is NOT on.

Wave When there is a Crowd	
Criteria	<p>Laser beams detect when the limousine is beside the crowd.</p> <p>Whenever the limousine is beside the crowd the arm automatically waves.</p>
Hint	Use the laser beam being broken to trigger the waving mechanism.

After you have attempted this challenge watch the tutorial to see our solution at www.EPro8Challenge.co.nz/Tutorial and enter the Challenge Code **RYWV**.