

# EPPro8 Challenge

Engineer Problem Solve Innovate

## Drum Machine

Carlos – your band’s crazy drummer – has just sent you a text message. He can’t make tonight’s concert because he is going daffodil picking.

Not to worry. You can build a machine that can play the beat.

The drum machine will play each drum at a different beat.

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



### Drum Kit

Criteria	<p>Print and double laminate the five drums (see the Teacher’s Notes that go with this challenge)</p> <p>Construct a frame approximately 1.3m long and 700mm tall. Attach the five drums in a row to the top of the frame.</p> <p>Use drumsticks (aluminium rods) to play a tune.</p>
----------	---

### One Drum Drumming

Criteria	<p>A drumstick is attached to an axle.</p> <p>Rotating a crank handle causes the drumstick to hit the drum.</p>
----------	---



## Illuminate the Drums

Criteria	A light is mounted above the drum set, so that they are illuminated.
----------	--



## Motorised Drumming

Criteria	A push button causes the drumstick to rotate and hit the drum.
----------	--

## Five Drum Drumming

Criteria	An axle runs the entire length of the drum kit. Each drum has its own drumstick attached to the axle. Rotating the crank handle (or driving the motor) causes all the drums to be struck at different times.
----------	--

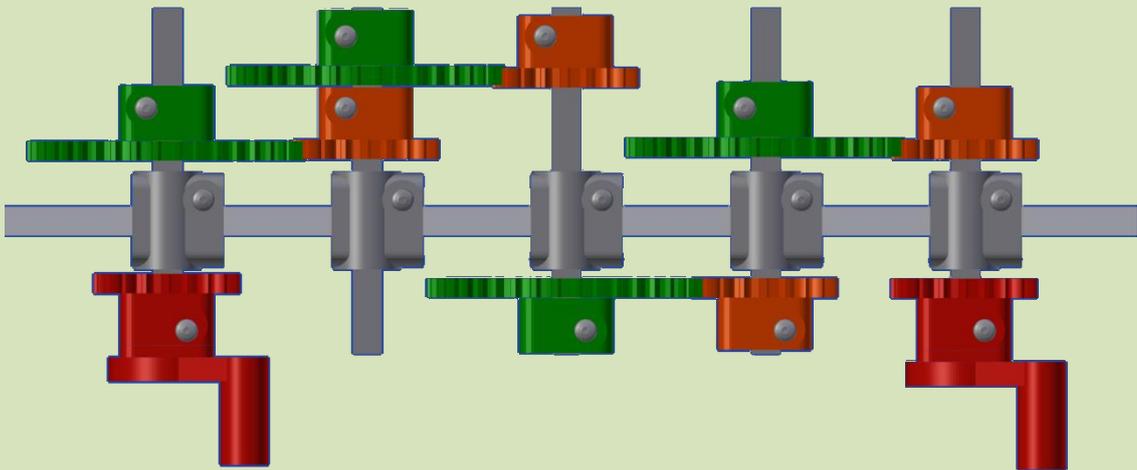
Hint	Mount each drumstick on a different side of the axle, then the drums will all be hit at different times. This is how a timing camshaft in a car's engine works. In a car, instead of playing music, it controls the timing of the engine's internal actions.
------	--

## Four Four Timing

Criteria	Rotating the crank handle (or driving the motor) causes a drum to beat three times and then a cymbal to beat once.
----------	--

Hint	Rearrange the drumsticks attached to the main axle to achieve this timing pattern.
------	--

## Drum Roll Please

Criteria	<p>Rotating the crank handle (or driving the motor) once causes the main axle to rotate eight times, meaning the drums are struck very fast.</p> <p><i>You may find using a motor blows the fuse due to the forces involved. If so, revert to using a crank handle.</i></p>
Hint	<p>Use a gearbox increase speed of the axle.</p> <p><b>There is a separate “Gearbox” activity that describes how to build a gearbox. You should do this activity now.</b></p> <p>This is the gearbox build described in that activity:</p>  <p>You will need one less big gear / small gear combination for this challenge.</p>

## Lead Singer Operated

Criteria	<p>Use the online electronics simulator, code <b>DRUM</b>.</p> <p>The drum machine is motorised.</p> <p>The lead singer can turn the drums on and off using two sensors by her feet.</p>
Hint	<p>Use limit switches to detect where the leader singer is stepping, and an ON/OFF box to control the motor.</p>

Disco Light	
Criteria	A light is mounted above the drums. Every time the cymbal beats, the light flashes as well.
Hint	Use limit switched to detect when the drumstick for the cymbal is pointing upwards.

House Light	
Criteria	A “house light” is mounted on the roof and can be turned on and off by a switch. The drums will only start if the lead singer triggers them AND the lights are off (ie NOT on).
Hint	Connect the output from the switch to a NOT box, and use an AND box to know when the lights are NOT on AND the lead singer has triggered the drums to start.

After you have attempted this challenge watch the tutorial to see our solution at [www.EPro8Challenge.co.nz/Tutorial](http://www.EPro8Challenge.co.nz/Tutorial) and enter the Challenge Code **DRUM**.