Windmill Lab

Theme: Motors

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Purpose

Motors and generators work on very similar principles. The two devices are similar enough that one device can be used as the other. This lab explores that property using the Lego motors as both motors and generators.

Constructing the Windmill

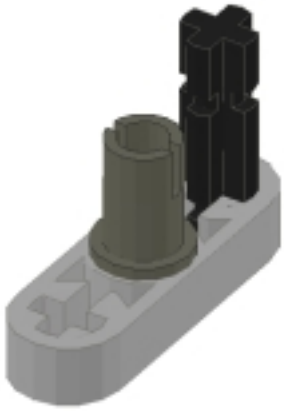
Parts:

1: Wire
2: Electric 9v Technic Mini-Motors
1: 1 x 2 Plate
2: 1 x 2 Plates with Door Rails
2: 1 x 6 Plates
3: 2 x 2 Plates
1: 3 x 6 Plate without Corners
2: Technic Angle Connectors
6: Technic Axles length 2
1: Technic Axle length 4
1: Technic Axle length 6
2: Technic Axles length 10
2: Technic Axle Joiners
1: Technic Brick 1 x 8 with Holes
1: Technic Brick 1 x 12 with Holes
1: Technic 1 x 16 Brick with Holes
2: Technic Smooth ½ Bushes
1: Technic 8 Tooth Gear
1: Technic 24 Tooth Crown Gear
2: 1 x 3 Technic Lift arms
1: 1 x 4 Technic Lift arm
2: Technic ¾ Pins
4: Technic Ribbed Hoses

Instructions:

1	2
	
Place two motors side by side as shown. Wire them to each other.	Attach to one of the motors an 1 x 4 technic lift arm. Attach to the other end of the lift arm an length 4

	axle to form a crank.
3 	4 
Attach two length 10 axles together with an axle joiner. Attach these axles to the other motor with a second axle joiner.	Attach 2 units from the end of an 1 x 16 technic brick with holes two 1 x 2 plates with door rails. Attach to the top 1 x 2 plate with door rails an 1 x 2 plate. Slide it into the motor as shown.
5 	6 
Secure the beam in place by attaching it on top with a 2 x 2 plate.	Line up an 1 x 8 brick with holes on top of the 1 x 12 block. Attach it by placing an 1 x 6 plate on both the top and bottom as indicated.
7 	8 
Slide the length 10 axle through the second hole in an 1 x 8 brick with holes. Secure it six units down with two 2 x 2 plates. Place a 3 x 6 plate without corners on the end of the brick. Slide a 24 tooth crown gear onto the axle.	Place an 8 tooth gear so it meshes with the 24 tooth gear from the previous example. Slide a length 6 axle through the vertical beam into the gear as shown.

9 	10 
Slide a smooth ½ brush onto the axle. Slip on two of the indicated angle connectors as shown. Make sure they are secured in place well with another smooth ½ brush.	Place a length 2 axle into each of the four ends of the connectors from the previous step.
11 	
Attach a ribbed hose to each side of the angle connector.	Take a 1 x 3 lift arm and attach a length 2 axle to one end. Attach a technic ¾ pin to the center hole. Construct a second copy of this device.
12 	
Connect one of the devices from the previous step to opposite ribbed hoses on the length 2 axles.	Connect the remaining hoses to the ¾ pins as shown above in the picture above.

Questions

1. Turn the crank. How does one motor turn another?

2. How could this be used when testing robots?