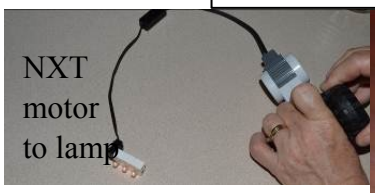
6.7 Investigation - Generating Electricity

Part 1. By Hand.

Aim
To explore hand generated power and compare to other forms of power such as batteries and solar.

Equipment
- Two small DC electric motors with wires attached.
- Small light bulb (2volts) or LED.
- solar cell
- Large electric capacitor 1- 10 farads (LEGO Option: LEGO capacitor or energy meter)
- batteries

LEGO motor generator photos



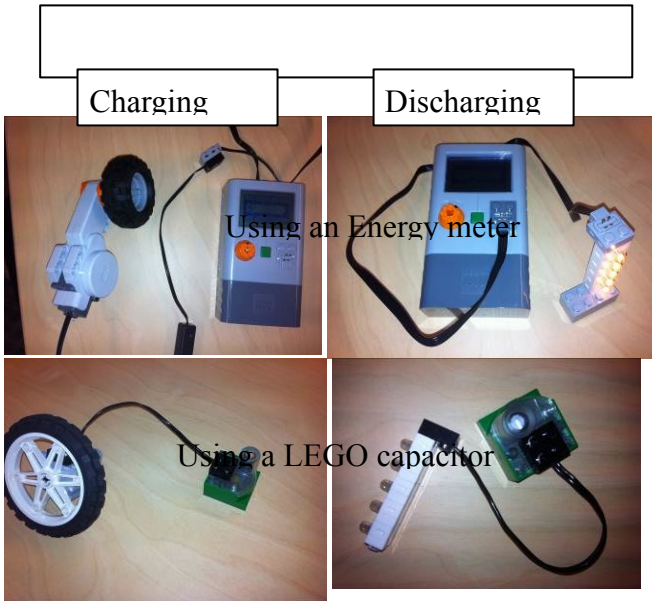
Method 1. Motor to a lamp
Connect up a motor to a lamp.
Rotate the spindle of the motor and observe the lamp

Method 2. Motor to motor
Connect up two Motors to each other.

Rotate the spindle of one motor and observe the other.
Describe what happens:

Method 3 Motor to a capacitor (or rechargeable power device)

Connect up a motor to a capacitor.
Charging the capacitor by rotating the spindle of the motor.
Disconnect the capacitor and connect to a lamp or motor. Observe what happens.
Describe what happens:



Conclusions

Q1. Where does the energy come from for a hand held generator to turn on a lamp?

Answer:

From turning the spindle (kinetic energy is converted to electrical energy inside the generator)

Q2. Why is a generator the opposite of a motor?

Answer:

Generator converts motion to electricity (kinetic to electrical energy)

Motors convert electricity to motion (electrical to kinetic energy)

Q3. How can one motor run another?

Answer: One motor is a generator, the other a motor.

The movement of one wheel turns the coil inside. This generates electricity through the wire which turns on the other motor, making its wheel spin.

Q4. How effective is the hand held generator? So for one turn of the generator, how far does the other motor turn? Is it easy to turn with the other motor connected?

Part 2. Using Energy Sources

Method 1 using a Solar Cell

Connect up a solar cell to a motor outside.

(**Option**: connect the solar cell to a capacitor or energy meter in the sun or under a strong light to charge it. Then use the capacitor to run a motor or lamp inside.)

LEGO Solar Cells
Charging a capacitor and energy meter

Describe what happens:

Method 2 using a battery

Connect a battery to your motor.

LEGO 6V battery and motor

Describe what happens:

Conclusions

1. How reliable was the Solar energy.
   Did it always work?
   Was it powerful?

2. Compare the 3 sources of energy. Hand held generator, solar and battery.

Which was most reliable (always worked)?
Which is the most powerful?
Which would last the longest?

Q3. What advantages are there to storing the energy in a device like a capacitor or rechargeable battery?