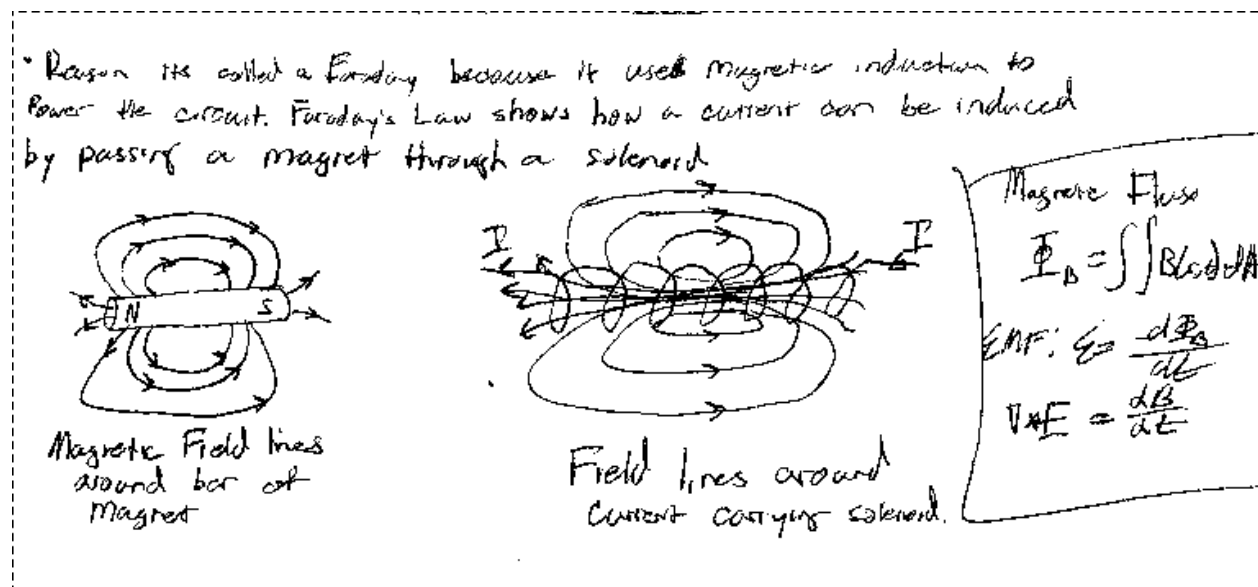


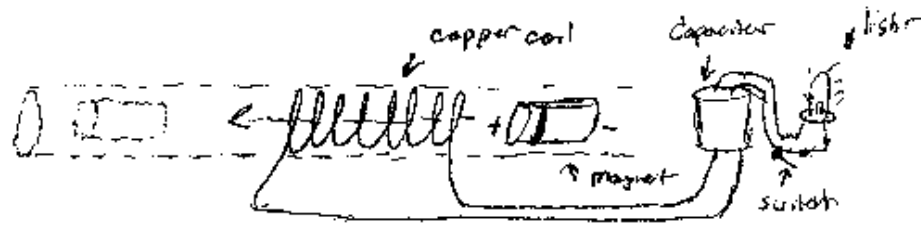
Power generation is the most important function when it comes to electronics. However today we live in a world where people desire a more portable and convenient way to power up their electronic devices. Whether it is using solar power up a calculator, or kinetic charging to keep your watch running, or using a crank to start up a generator, by straying away from the generic wall outlet is a great advancement in technology as well as appeal to consumers.

One of the more common technologies seen today use mechanical energy and converts it into electrical energy. Mechanical energy comes in all different forms such as rotation or vibration. Faraday's law is one of the heavily used concept to produce portable power generation. More specifically induction became popular in powering small devices such as flashlights and radios which require lesser voltages. Induction devices use a magnet and coil, and based on faraday's law of induction when a magnet passes through the coils, the change of magnetic fields induce current.



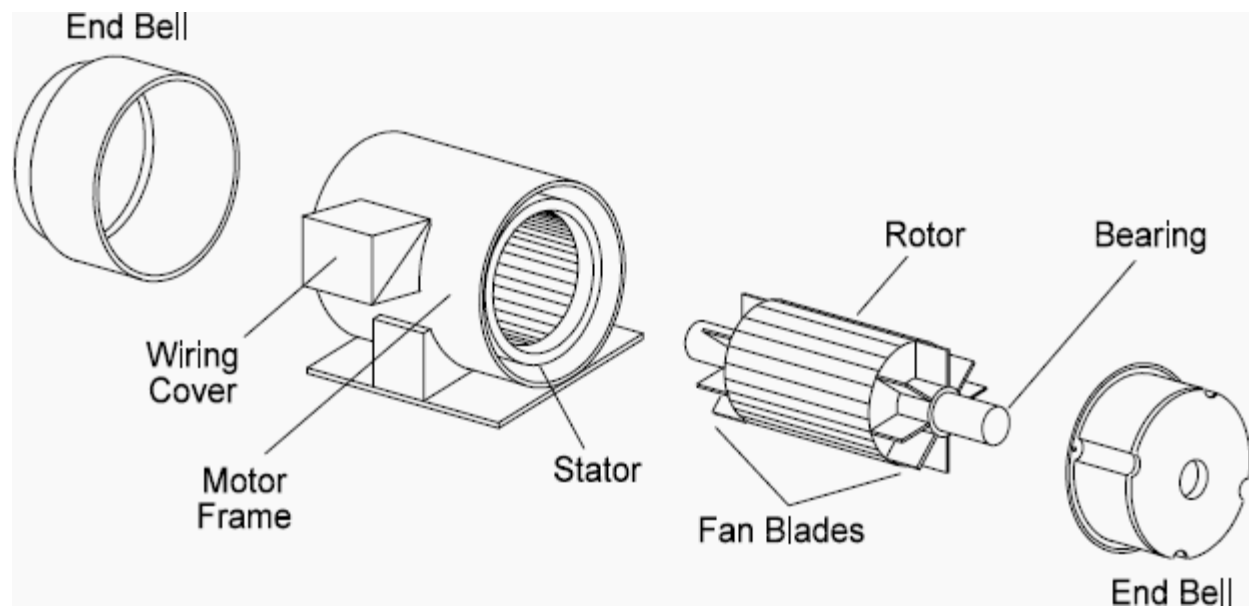
Shake flashlights use this method to act as emergency flashlights that do not need a battery. A induction flashlight with quality parts can produce up to 30 minutes of light with one minute of shaking. By containing a magnet in a tube, and wrapping magnetic copper wire around it, every time the magnet passes through the coil, current and voltage is induces and sent to a capacitor that stores it. Then whenever the user wishes to power on the device, a switch relays the power to the light. Below is an illustration to help visualize the process.

How the unit works in a flashlight



Powering the device simply requires a lateral motion that allows the magnet to slide freely and frequently.

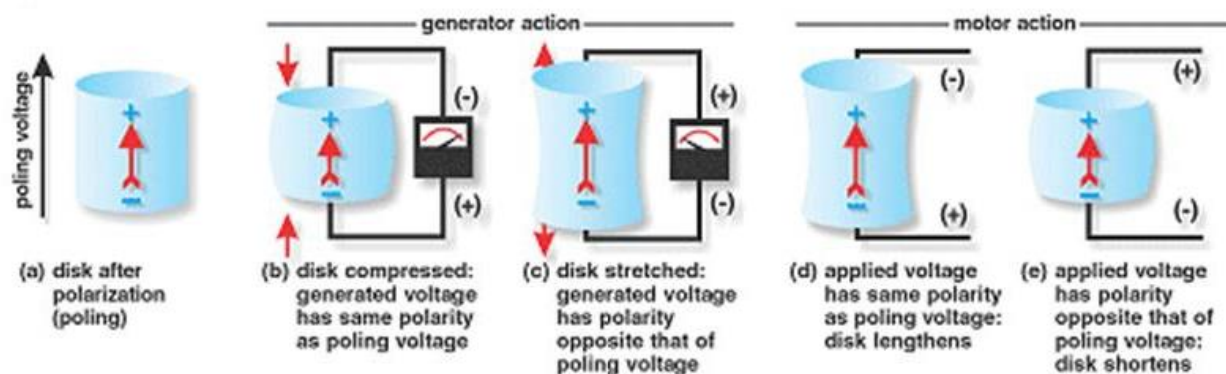
Further elaborating on the process of induction, Motors produce a more efficient and cost efficient way to power more demanding devices. Motors can be found in all sizes ranging, like the small ones we can find in remote control cars to the large one found in portable generators. The convenient thing with motors is that they can act as a generator by converting mechanical energy to electrical.



The two main components of a motor/generator are a stator and a rotor. The stator is the stationary part of the motor and acts as a field magnet which regulates the magnetic waves. The rotor is the component that is usually composed of copper wire and spins to induce current to the device. If current is supplied to the device, the stator spins and can provide mechanical energy in the form of torque. If mechanical energy is applied to spin the rotor, it provides electrical energy that is output from the rotor.

and stator, which is common in crank generators. If an electric device produces a rotational motion as a byproduct, a generator can be used to utilize such motion to act as a secondary power source. For example, a small generator hooked up to the tires on a car can provide energy back to the battery or power different units of the car when it's running. Or using the rotation of a dryer's drum to power sensors wirelessly.

One of the more recent methods in self powering electric devices is piezoelectricity, which is essentially taking force and converting it into energy. Piezoelectric devices require pressure plates, and a piezoelectric element that creates voltage based on stress or vibration.



Although piezoelectricity only produces spikes of energy, a capacitor is usually required to store the voltage produced through the vibrations.

There are many forms of power generation each with its own advantages and disadvantages. These methods may sound complicated however most can be easily constructed with components found at a local hardware store. By straying away the need of a wall outlet, self-sustaining electrical devices help contribute to a more energy efficient future as well as endless possibilities to advance our current technologies.

Further references:

<http://www.electrical4u.com/induction-motor-types-of-induction-motor/>

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<http://hyperphysics.phy-astr.gsu.edu/hbase/solids/piezo.html>

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Self-Power Generation Application

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