WIRELESS POWER

BY
DONALD NGUYEN
H1

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Technologies have a huge impact on everyday life. Many electronics cater individual's needs: to be entertain, to study, to learn, to communicate, or to stay connected. A modern day example is a cellphone. It is almost necessity to carry a cellphone. People depend on its ease of usage to stay connected with friends and families. At home, technologies such as TV and computer have revolutionize the ways we stay entertain with our friends and families. Different types of entertainment can be discover with a few click throughout the world wide web. In the work place, technologies serve a vital role for businesses to gain an advantage against their competitions. Using innovative technologies in a work place, it helps companies to communicate efficiently with their own employees and customers. Everywhere around the world, technologies progressively begin to grow to be a huge part in life.

Cords are inevitable when it comes to using technology. As technology continues to advance, electronics like personal computers and phones are going wireless. With the many types of features available on these wireless devices, the battery life drains quickly. To combat this from happening, people tend to carry chargers or bulky batteries to sustain their electronics from dying. A modern household contain many electronics such as TVs, laptops, game systems, dvd player, cd players, and so forth. Each heavily relies on a wall socket to be plug into. When all of these electronics are in one spot say a living room, wires tend to overlap one another. Soon, these wires would be tangled and twisted. Unwinding these cords can sometime be a hassle and a pain. This is even worse when there is a smaller space like dorms. The sole purpose of technology is to make life easier not harder. A possible solution to solve all of this mess is by wireless power.

The physics concept that makes this all possible is called electromagnetic induction. It is an electromotive force or EMF, which is the voltage generated, when there is a change in

magnetic flux[1]. This allows wireless power to be possible by using alternating current to induce a current from a distance. For this to occur, a primary coil has alternating current running throughout its system. This alternating current produces a magnetic field because of the current and a secondary coil. And the secondary coil at some reasonable distance is able to pick up the magnetic field. By picking up the magnetic field, a current induces in the secondary due to the changing current in the primary coil. This equation for magnetic flux is defined as:

$$\Phi m = NBA$$

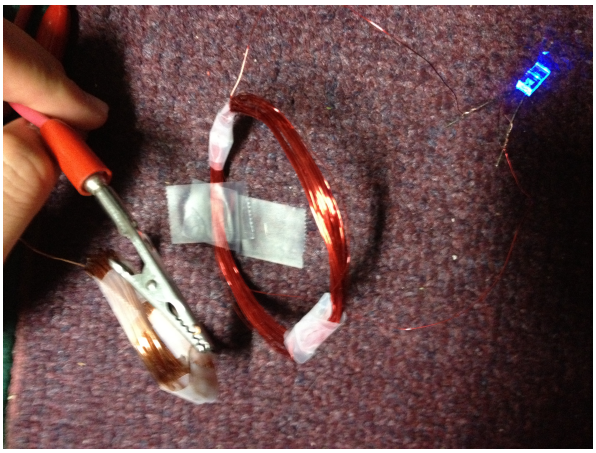
The N is the number of turns for a coil, the B is the magnetic field which the primary coil creates, and A is the area of that coil. This relates to the Faraday's EMF equation:

$$emf = \frac{-d\phi_m}{dt}$$

For EMF to exist, the magnetic flux must be changing over time by the following way: one is changing the number loops, two the magnetic field like changing the current, and three by changing the area. By using these methods, it will generate an induce current by the production of EMF. Since Len's Laws states "An electromagnetic field interacting with a conductor will generate electrical current that induces a counter magnetic field that opposes the magnetic field generating the current[2]."

In my experiment, I created a simple wireless power between a primary coil and secondary over a short distance. The material I used were: AC sine wave generator, 30-gauge wire, 26- gauge wire, and an 2.4 blue LED light. I made a primary coil out of the 30-gauge wire with 30 loops. Then I made two secondary coils out of the 26-gauge wire. The two secondary coils have the same area, but one has twice the loop. Then I started to sand down the the tips of each coil so there would be better conductivity between the LED and the wires.

Afterward, I wrapped the leggings of the LED to the one the secondary coil. Using alligator clips, I clipped the primary coil to the AC generator. Then turned the AC wave generator until I saw a frequency that produces light. The light brights up because of the alternating current produced by the primary coil that creates a changing magnetic field. Then an induce current is created in the secondary coil which lights up the LED light. In both cases of the two secondary coils, the brightest frequency occurs at 539kHz.



Demonstration

As the reliance on technology continues to grow, wireless power may make its way into household. The applications of wireless power are limitless. Wireless power can be applied to real life situations, and it can be used as an efficient power source. In this modern day, an abundance of technological devices exist in the work environment and at home. These devices' wires become overlapped, twisted, and tangled. Eventually, the process of finding out which device is a difficult process. Wireless power would completely eliminate these scenarios from ever occurring.

Wireless power could stop the need to carry bulky batteries and chargers for wireless devices such as cellphones, laptops, and tablets. It would be an efficient solution to wirelessly charge devices. In medical emergencies, doctors and paramedics would be able to work more efficiently than ever before with wireless power. They would not have to worry about what the current battery percentages on their life-saving equipment. So, they could allocate their time and energy on helping the patients more than checking their devices. This application could be applied to wirelessly power devices miles away. When duties call, wireless power would give the military a boost in aerodynamic productivity and efficiency. For instance, military drones would be able to stay stationary in the air longer than before if being charged by wireless power. In military operations, the drones would be able to gather critical intel about the enemy and unwary civilians for the duration of the military's needs. The drones would be wirelessly powered and would not be dependent on the capacity of their power source. The capabilities to wirelessly transmit power thousands of miles across the world could reduce the money spent on connecting

long expensive wires along the ocean floors as well as reaching up to high mountain cities. Power could wirelessly transmit to third-world countries and to remote jungles and islands. It would be possible for the whole world to be powered with wireless power. Everyone could have access to wireless power for his or her personal needs.

As with many great ideas and inventions, many drawbacks to wireless power applications exist. Wireless power can be compared to any other wireless concepts like Wifi, GPS, or cellphone signals. These other wireless concepts experience drops in signal strength based on many environmental factors like location, obstacles, natural weather, and so forth. If it is possible for these wireless signals to drop in strength, then it may be possible for wireless power signal's to drop as well. Take for instance a city that is wirelessly powered; the drop in signal strength may cause lights to flicker, resulting in a potential blackout. Many customers would be angry around the world if this were to happen. It would also be tedious and awkward moving devices around to reach a certain location that has a stronger signal strength.

In many technological advances, it is important to keep customers' safety first. If wirelessly power were to be transmitted throughout the air, then it may be possible for it to electrocute someone wirelessly. Someone might have metal plates as a replacement limb or some metal screws wedged between bones. The big question is would these metal objects conduct power because of the wireless power? This concern may determine if wireless power would ever be widely accepted by the public.

Wireless power has such a great potential for the whole world. Before the wireless technology is ready, a few tweaks and issues need to be resolved. It is the issue of public safety

that may hinder wireless power from ever existing in mass market consumerism. If these issues are dealt with, then maybe the wireless technology may become a reality.

Work Cited

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