Wireless electricity transmission circuit

by **argha halder** on April 7, 2015

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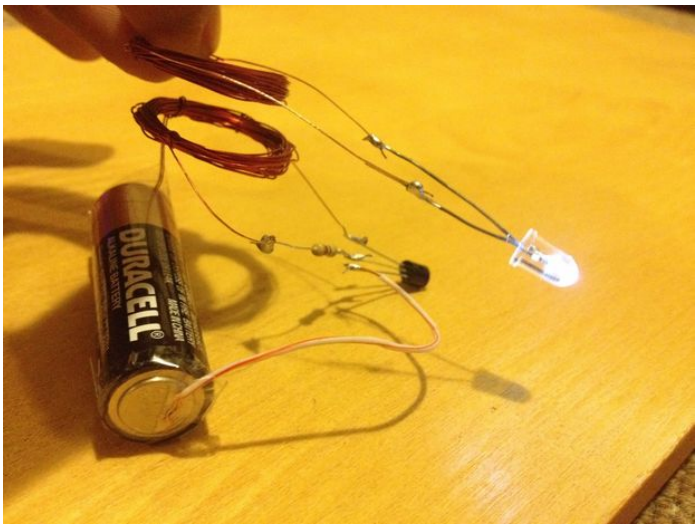
Intro: Wireless electricity transmission circuit

This is a simple circuit that can power a light bulb without any wires, at a distance of almost 1 inch! This circuit acts as both, step up Voltage converter and also wireless electricity transmitter and receiver. This is a really easy project to do, and could be used in many ways if improved. So lets get to it!



Step 1: Materials and tools necessary for the project

So to make this circuit you will need:

1) NPN Transistor. I used 2N3904 but you could use any NPN transistor. Most commonly you could find BC 337, BC547 etc. (Any PNP transistor would work, just reverse the polarity of the connections.)

2) Magnet wire or insulated wire. About 3-4 feet of wire or less should be enough. (Magnet wires are just copper wires with very thin enamel insulation) You could find wires from most electronics, like transformers inside CFC Bulbs, inside speakers, inside motors, inside relays etc.

3)Resistor 1 Kilo Ohm. This resistor would be used to protect the transistor from burning out in case of overload or excess usage ad heat. You could use higher values upto 4-5 Kilo OHM. You could even decide not to use a resistor, but that would draw in more amps, thus draining your battery faster.

4) L.E.D light . I used a 2 mm Ultra Bright White L.E.D. You could use any L.E.D (Light Emitting Diode). For this circuit, the L.E.D only shows the circuit in action.

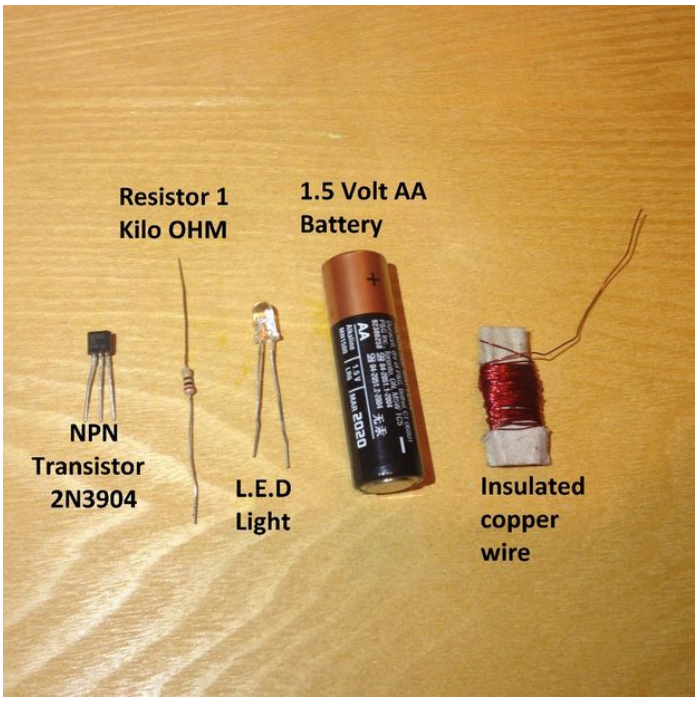
5) A 1.5 Volt AA Battery . (Do not use batteries of higher voltage unless you want to damage your transistor.)

Tools needed:

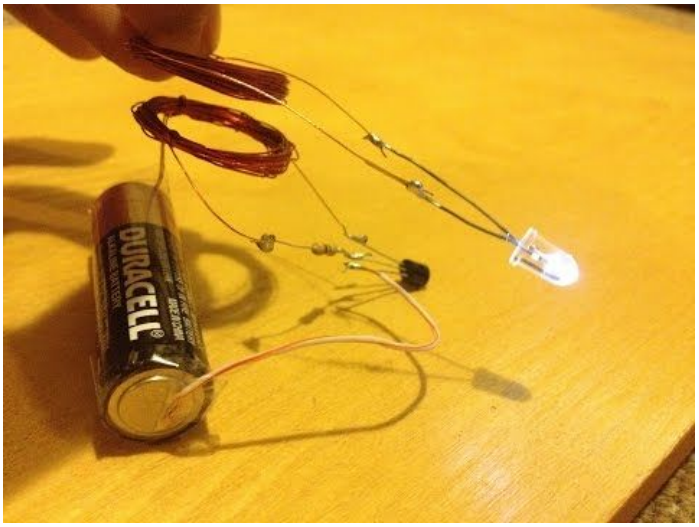
1) Scissors or knife.

2) Soldering Iron (**Optional).** If you don't have a soldering iron, you could just twist the wires and leads for connection. That's what I used to do when I didn't have soldering iron. If you want to try the circuit on solderless breadboard, you are good to go.

3) Lighter (**Optional).** We will be using lighter to burn off the insulation from the wire, then just use a scissor or a knife to scrape off the insulation.



Step 2: Watch the video to learn how to make it!!



Step 3: Recap of the steps

So first of all you need to take the wires, and make a coil of 30 turns around a round object. Name this coil A. With the same round object, start coiling again. This time when you make your 15th turn with the wire, create a tap, and then coil another 15 turns. So now you have a coil with two ends and one tap. Name this coil B. Tie knots on the ends of the wires, so that it doesn't uncoil by itself. Burn the ends and the tap in order to take off the insulation from both the coils. If you don't want to use a lighter, use a scissor to scrape off the insulation from the ends of the wires and the tap. **Make sure, the Diameter and number of turns on the coils are equal!!**

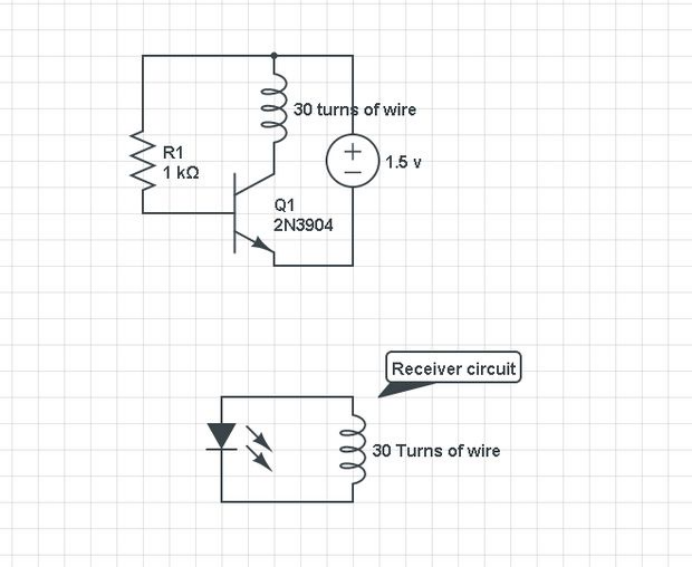
Making the transmitter: Take the transistor, and place it so that the flat side is facing up and the leads are facing towards you. The lead on the left is the Emitter, the lead in the middle is Base, and the lead in right is the Collector. Take the resistor and connect one of its ends to the base of the transistor. Take the other end of the resistor and connect it one of the ends (not the tap) from Coil B. Take the other end from Coil B and connect it to the Collector of the transistor. If you want you could connect a small piece of wire to the Emitter of the transistor (It would work as an extension of the Emitter.)

Making the receiver: To make the receiver, just take Coil A and connect its ends to the leads from the L.E.D.

You are done making the circuit!!

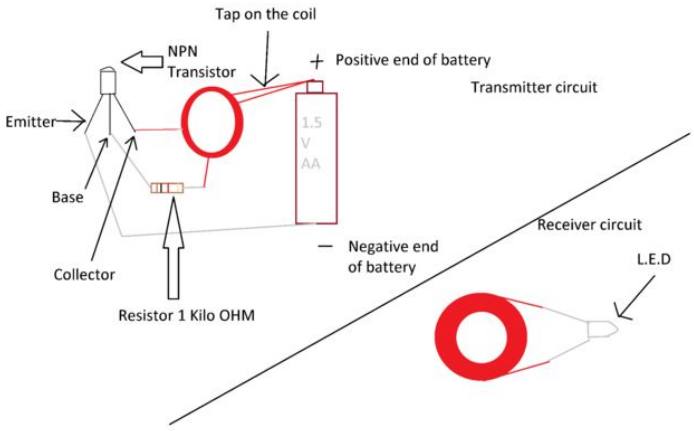
Step 4: Circuit schematic

Here is the schematic of the circuit. If you don't know anything about schematics, don't worry. In the next steps a diagram is provided.



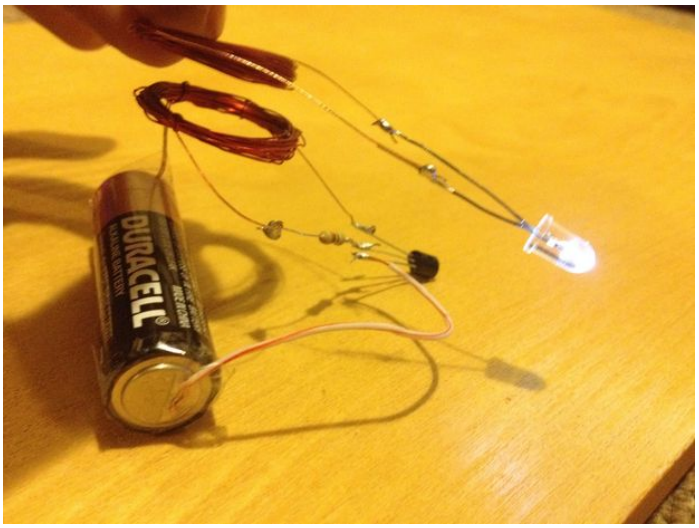
Step 5: Circuit Diagram

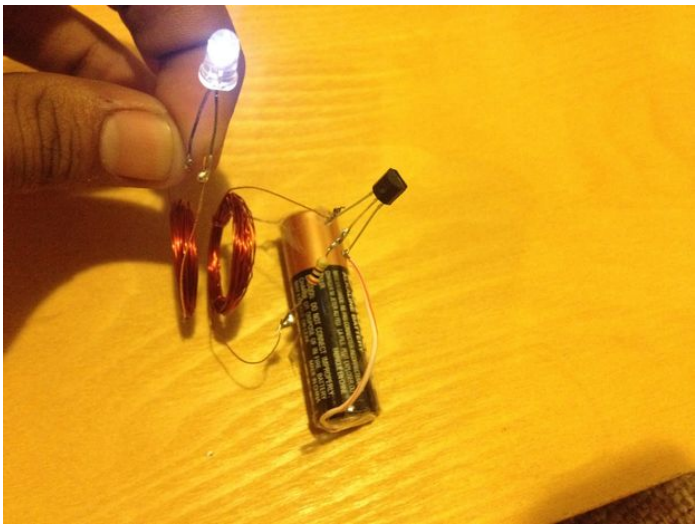
So here is the diagram of the circuit.

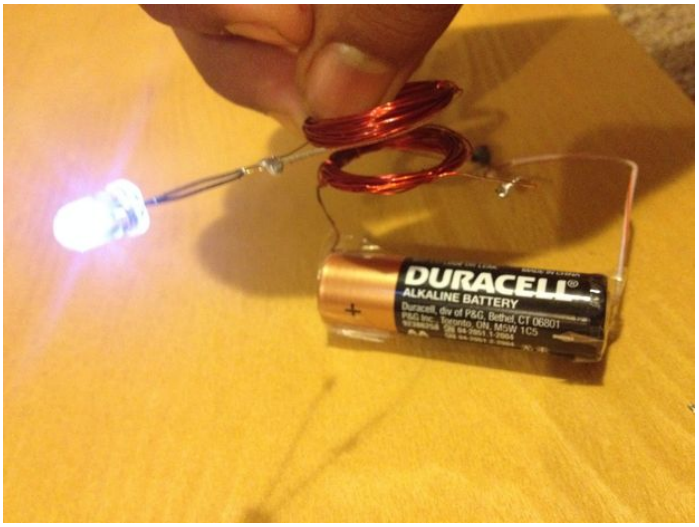


Step 6: Using the circuit

Just take the tap from coil B and connect it to the positive end of the battery. Connect the negative end of the battery to the Emitter of the transistor. Now if you bring coil A with the L.E.D close to Coil B, the L.E.D lights up!







Step 7: What is the science behind this?

(I am just trying to explain the science behind this in simple words and analogies, and I know I am going to make mistakes. In order to provide the correct explanations I need to go into details, which I am unable to , so I am just gonna use common analogies for explaining the circuit).

The transmitter circuit that we just created is an Oscillator circuit. You may or may not have heard about the Joule thief circuit which has striking resemblance to this circuit. A joule thief circuit, takes electricity from a 1.5 Volt battery, outputs electricity at a higher voltage but with thousands of intervals in between. A L.E.D requires 3 volts to light up, but a joule thief circuit could light up the L.E.D with 1.5 volt battery. So the Joule Thief circuit is known as a step up converter and also an oscillator. The circuit that we created is also an oscillator and step up converter. But the question might be, "How does it light up the L.E.D at a distance?" This happens due to induction. Lets use transformer for example. A normal transformer has a core with wires on either side. Lets suppose the wire on each side of the transformer is equal in amount. When electricity is passed through one coil, the coil becomes an electromagnet. If the electricity is oscillating voltage, that means the voltage would keep rising and dropping. So when an oscillating electricity is passed through the coil, the wire gains properties of electromagnet and then again loses electromagnetism when the voltage drops. A coil of wire becoming electromagnet and then losing its electromagnetic characteristics really fast is just like a magnet moving really fast in and out of the second coil. And when you pass a magnet really fast through coil of wires, you produce electricity, so the oscillating voltage in one coil on the transformer, induces electricity in the other coil of wire, and thus wirelessly electricity is transferred from one coil to the other. In our circuit, the air is the core, and there is oscillating voltage going through the first coil, so you induce A.C electricity in the second coil and light up the bulb!

Step 8: Uses and tips for improvements!

So for our circuit we just used a L.E.D to show the output. But we could do more than that! The receiver circuit receives A.C electricity, so we could use Large step up converter to use the output from the receiver coil to light up CFC bulbs! Also it is great for some cool magic tricks, fun gifts,and science projects for class. Also you could change the diameter of the coils and number of turns on the coils to maximize the results. Also you could try making pancake coils, and see how it goes! The possibilities are endless!!

Step 9: Troubleshooting

So this are the variations of problems you may face, and how to fix them:

1) Problem: The transistor becomes too hot!

Solution: Did you use a resistor of the right value? I didn't use a resistor the first time, and it started to smoke. If it does not solve the problem, then try using a heat shrink or using a transistor with higher amp rating.

2)Problem: The light does not light up!!

Solution: The problem is too broad. There could be many reasons behind the problem. But first check the connections. I accidentally swapped the Base and Collector connections, which caused a big problem for me. So check you connection first. If you have a multimeter check to see if you have continuity between your connections. Also make sure that the coils are of the same diameter. Also be careful there no shorting in the circuit.

I don't know about any more problems. But if you are facing some other problems, let me know! I will try to help as much as I can. Also I am a 9th grader, so my scientific knowledge is extremely limited, and so if I make any mistakes, help me find it out. Suggestions for improvements are more than welcome. Good Luck with your project!!!

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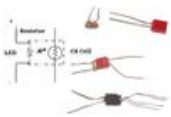
Easy Wireless LEDs by electro18



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Comments

4 comments **Add Comment**

louisc2 says: Apr 8, 2015. 12:27 AM **REPLY**

A standard LED runs on 3 volts minimum how are you powering one with 1.5v doesn't make sense do I need a special kind of led?

peabody1929 says: Apr 7, 2015. 11:11 PM **REPLY**

Schematic does not match wiring diagram. The coil in the schematic has no tap.

miah77 says: Apr 7, 2015. 8:42 PM **REPLY**

I am so inspired by this! I'm going to try it out this week. If it works well I may use it in a treasure hunting game. Who knows, that may be my first ible (I'll give you credit). Thanks for sharing this.

argha halder says: Apr 7, 2015. 8:46 PM **REPLY**

You are welcome!! Good luck on your project!!!