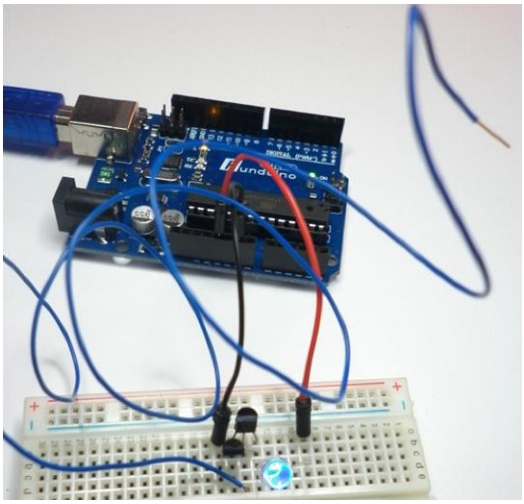
# The Super Amplifier

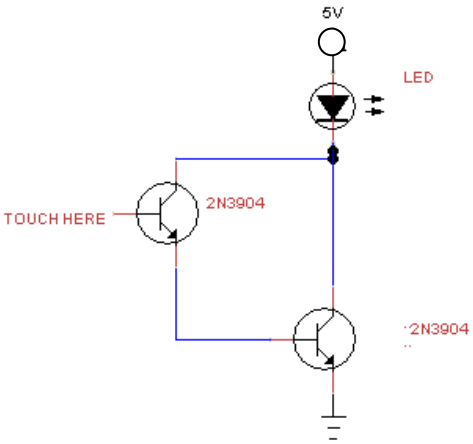


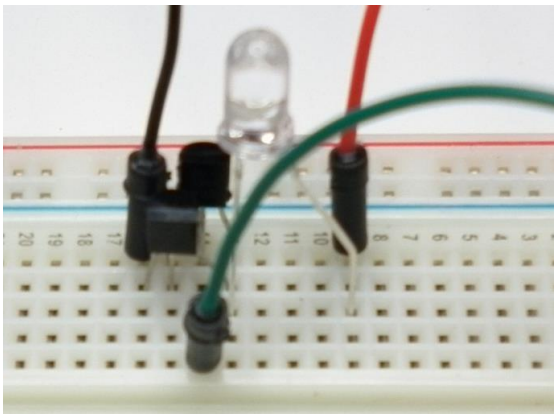
## What is it?

It is a very simple device that does something truly amazing, it amplifies a current 1600 times. This means that the tiny currents flowing in your skin can be used to light an LED

## How to make it?

*Components:*
breadboard, breadboard wire, LED, 2N3904 transistor X 2, transistor info card.



Arrange the LED and two transistors in the arrangement pictured in the above schematic and breadboard picture. Be sure to reference the transistor info sheet which will tell you how the schematic image of a transistor on the left relates to the transistor components on the right

## How does it work?

The 2N3904 transistor has a gain of 40. This means that it will amplify the current at its base (labeled TOUCH HERE) by 40. So 1 unit of current applied at the base will become40 units at the emitter (the arrow labeled element)

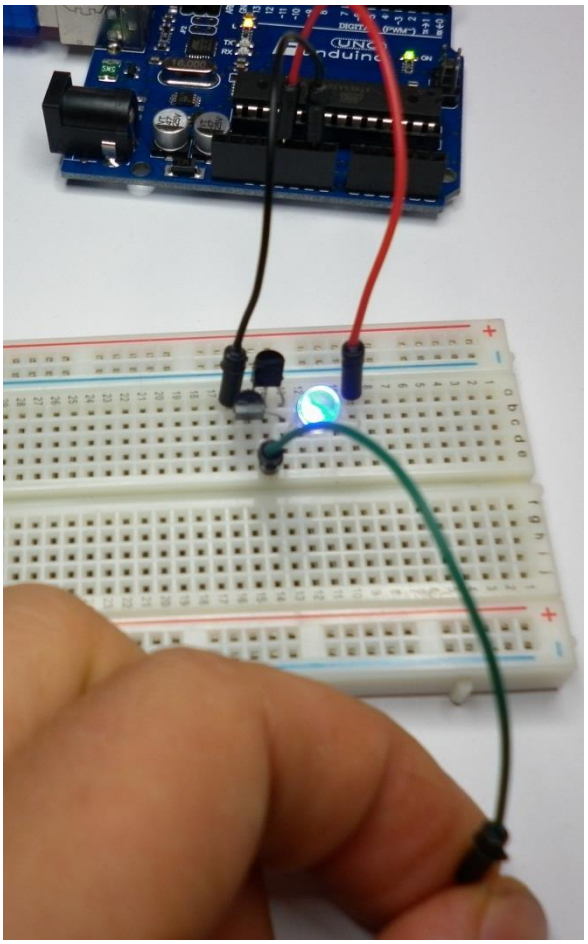
Now to successfully light an LED we need a current of at least 10mA, our skin emits on average 0.01mA, this is so tiny it cannot hurt a microbe. So if we multiplied it by 40 it would be 0.4mA, still not enough to light an LED. But if we multiplied it by 40 again then we would have 16mA and presto.

The Schematic pictured does exactly that takes a current and amplifies it twice through two transistors making out output 40 X 40 =1600 times greater than our input.

**Circuit in action**

If the circuit is connected correctly you should be able to light your LED with just a touch of your finger

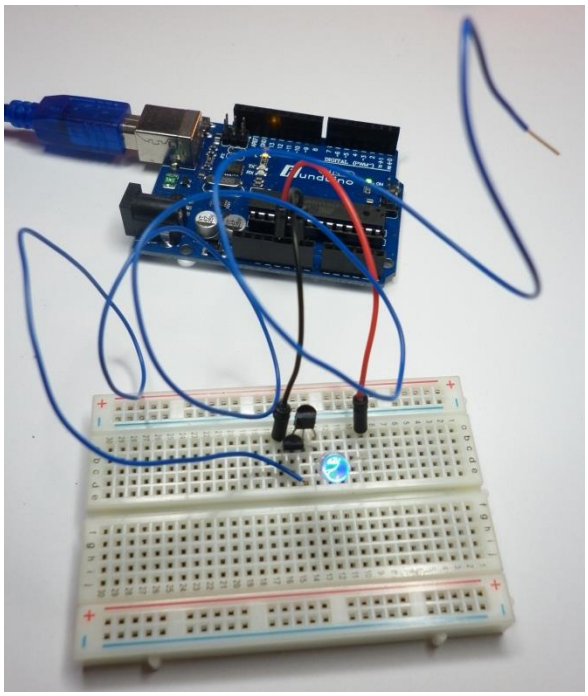
However you will soon begin to realize that everyone in the room is lighting their LED to a slightly different amount. Yes we all hold different amounts of charge in our bodies at different times of the day and the thing that makes the biggest difference in this regard may surprise you: its your shoes!!



Another thing that will surprise you is that if you are able to place the green wire into the ground the LED would shine really brightly, this is because the planet earth has a slight surplus of free electrons, and can provide us with a tiny amount of free electricity all day long!!..

**Antennas!**

The amazing thing about 1600 times amplifier is that it can find and amplify some invisible electromagnetic waves that are in the air. If you build a very basic antenna which consists of half a meter of coiled breadboard wire you should be able to capture some of these waves and use them to light our LED.



The way this works is that these invisible waves push the electrons that are In the wire to flow into the transistor. They are much like waves in the sea, they flow forward and backward and the LED comes on and off but this happens too fast for you to notice.