

TESLA COIL

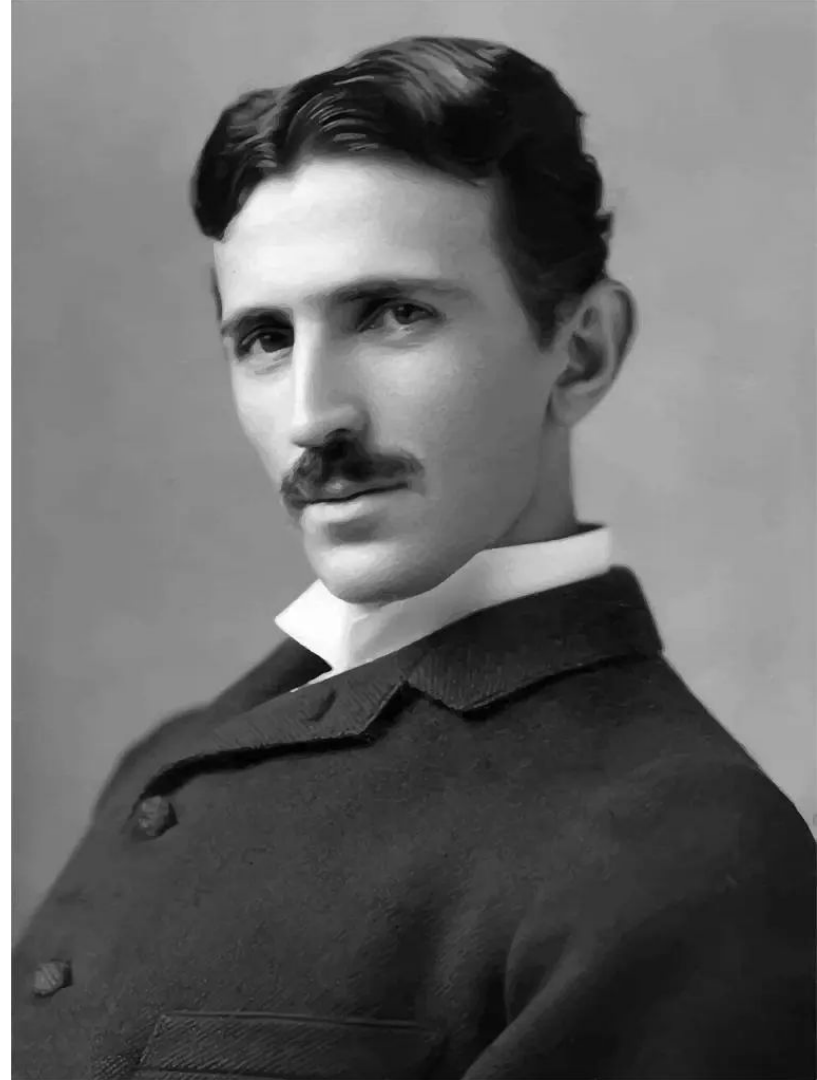
WHAT IS A TESLA COIL?

A Tesla coil is an amazing device that can create very high voltages. It's original purpose was wireless power transmission, but now it is mostly used for entertaining purposes.



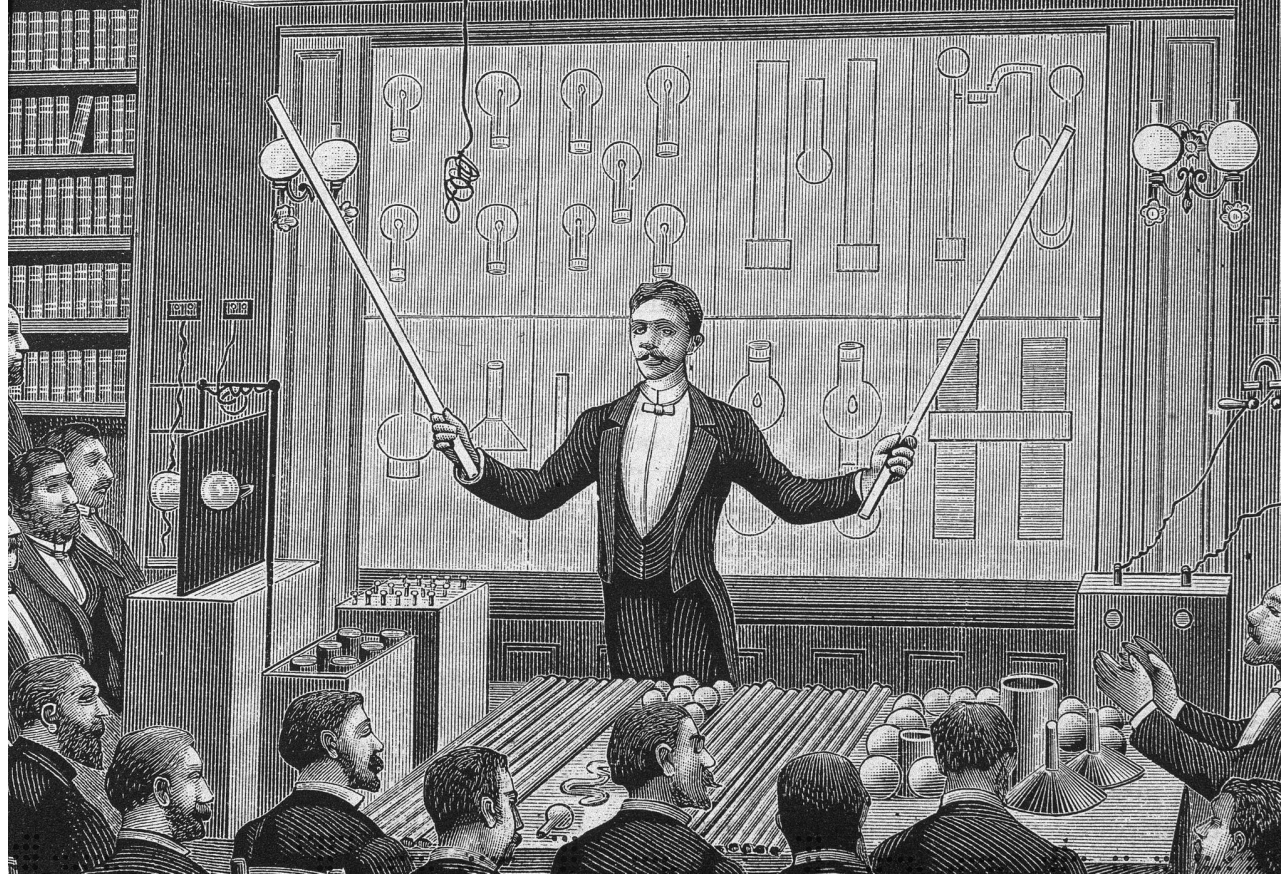
HISTORY

Nikola Tesla patented the Tesla coil circuit on April 25, 1891. Although Tesla patented many similar circuits during this period, this was the first that contained all the elements of the Tesla coil: high voltage primary transformer, capacitor, spark gap, and air core "oscillation transformer".



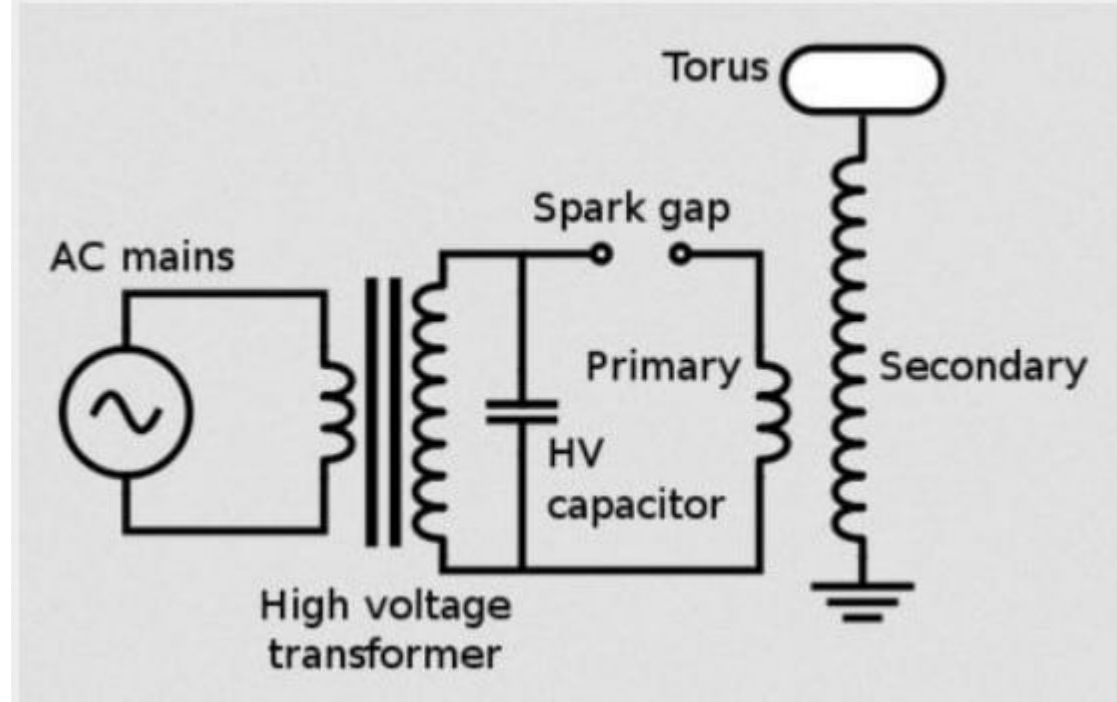
DEMONSTRATIONS

Tesla used the Tesla coil in dramatic public lectures demonstrating the new science of high voltage, high frequency electricity. The radio frequency AC electric currents produced by a Tesla coil did not behave like the DC or low frequency AC people were familiar with. He demonstrated that high frequency currents often did not cause the sensation of electric shock, applying hundreds of thousands of volts to his own body, causing his body to light up with corona discharge.



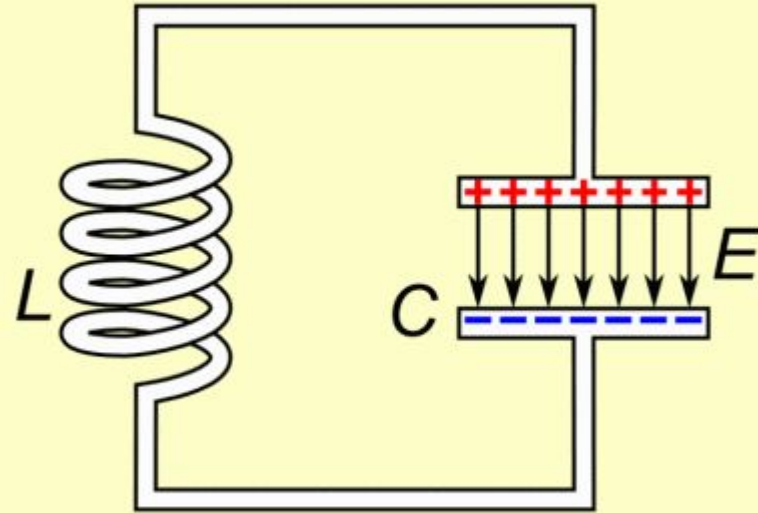
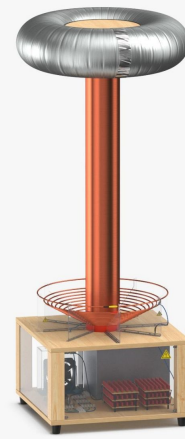
DRIVER

Nikola Tesla used this driver. Resonance frequency of capacitors and primary matches frequency of Tesla coil resonance.



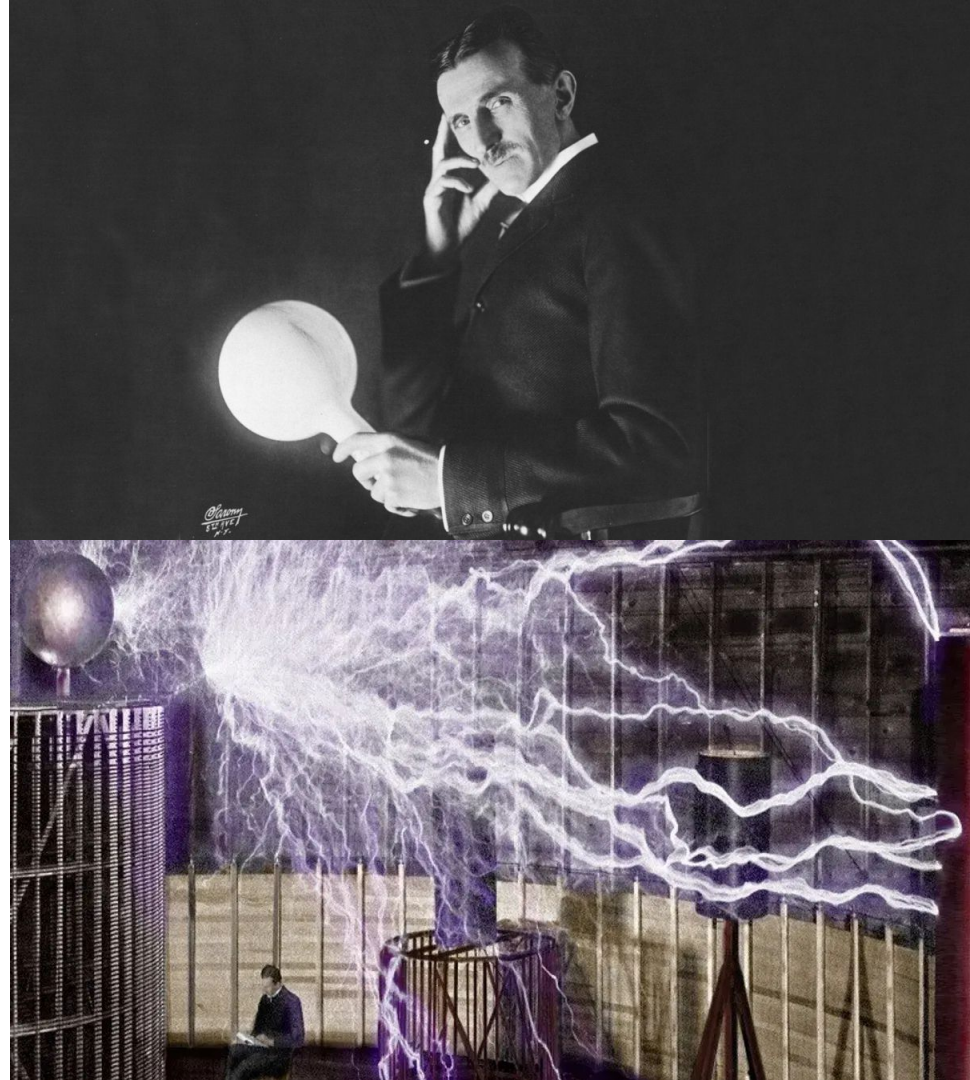
HOW IT WORKS?

Tesla coil produces high voltages using resonance. Top load is a capacitor to ground. Frequency of a primary matches the resonance frequency.



ABOUT NIKOLA TESLA

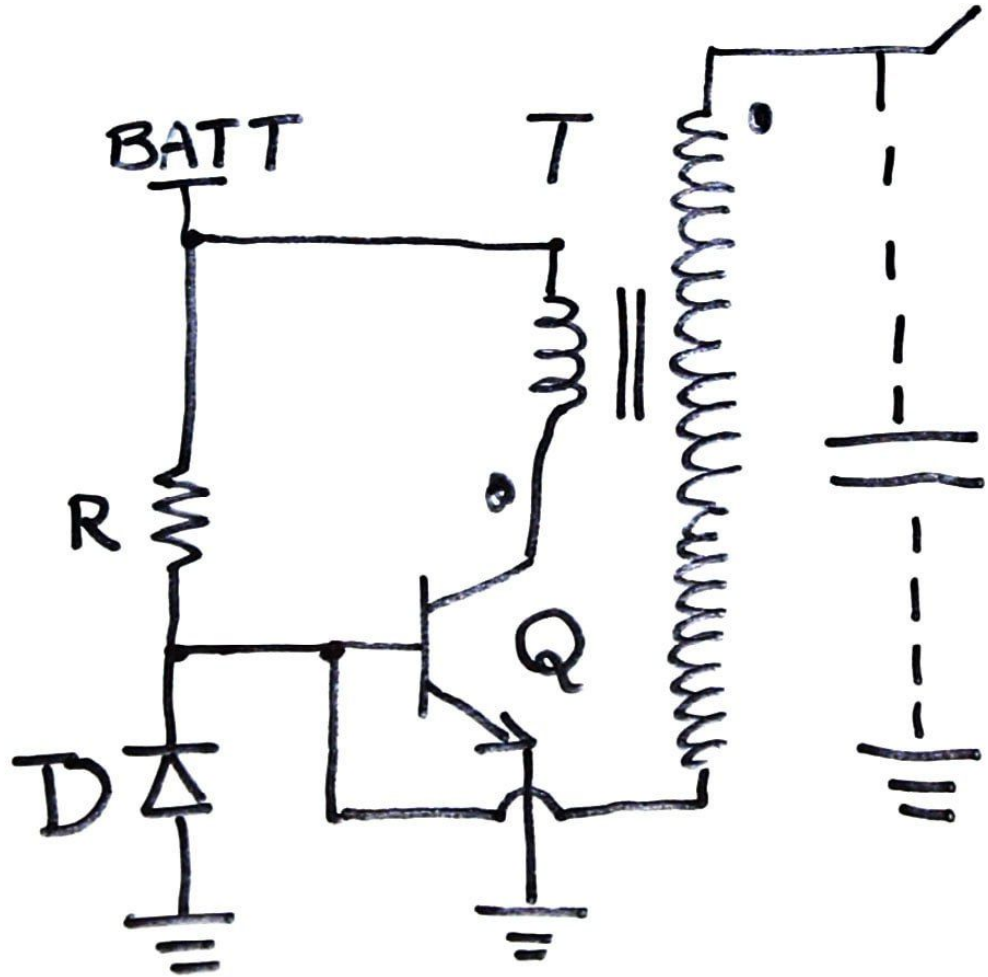
- Once received signals from space
- He never finished education
- Mark Twain was in his lab
- He was ill with cholera in childhood.



DRIVER

This is a driver,
that is used in
most small and
low-power tesla
coils.

It is called
“slayer exciter
circuit”

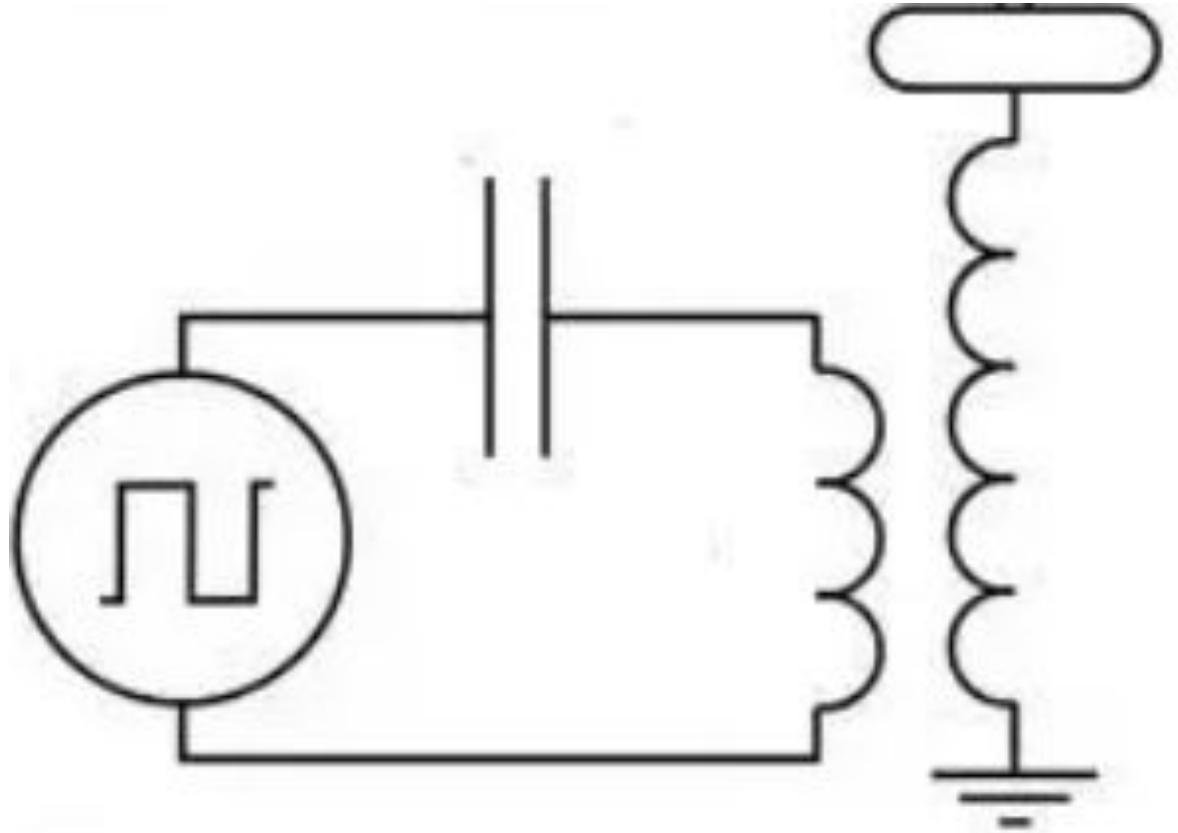


DRSSTC DRIVER

Dual Resonant Solid State Tesla Coil.

Most of modern high power tesla coils use it.

Primary coil current is sinusoidal because of oscillations.

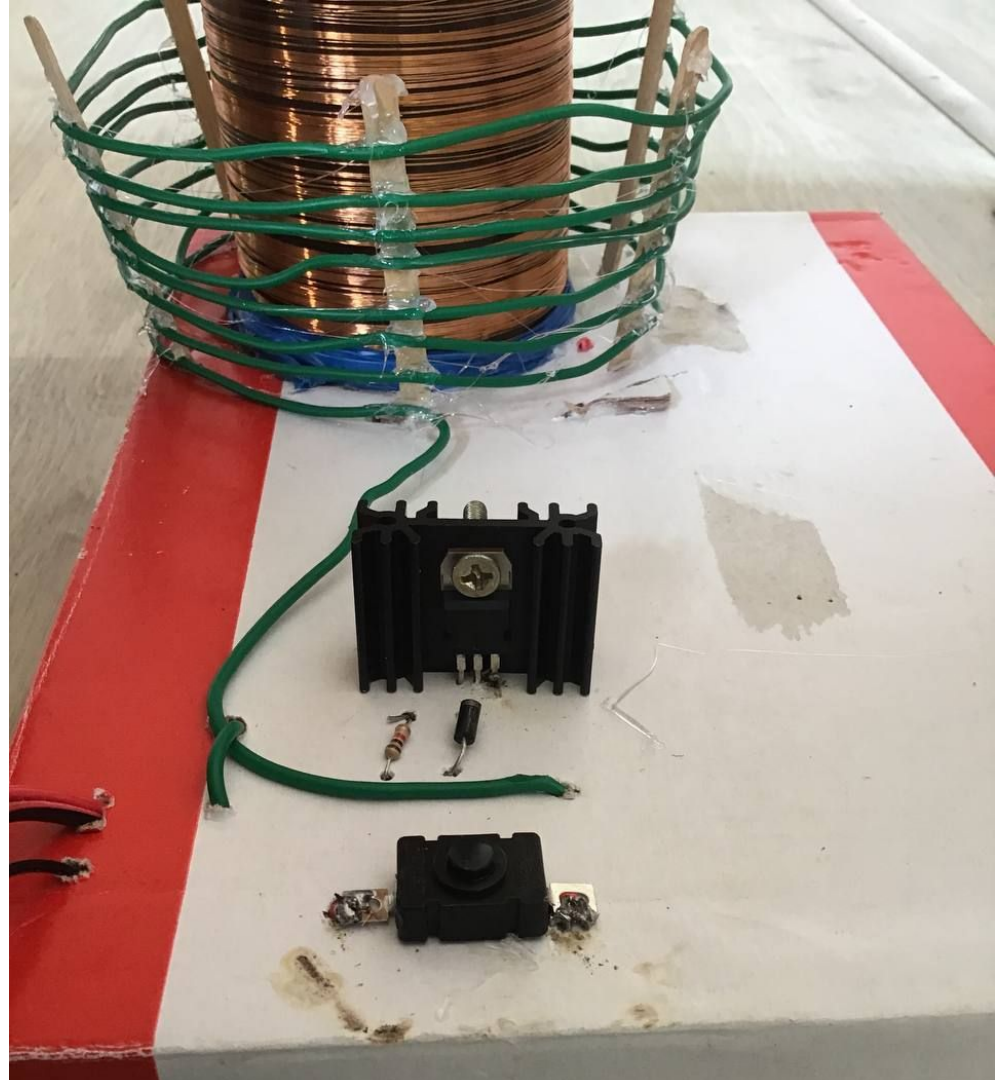


MY TESLA COIL



MY TESLA COIL

It uses slayer exciter circuit driver. It was first time I made Tesla coil? So it doesn't look beautiful, but it works. It's power is near 4 Watt.



EM FIELD

Tesla coils create strong EM field that makes wireless energy transfer possible.



ARCS AND OTHER DISCHARGES



ARCS

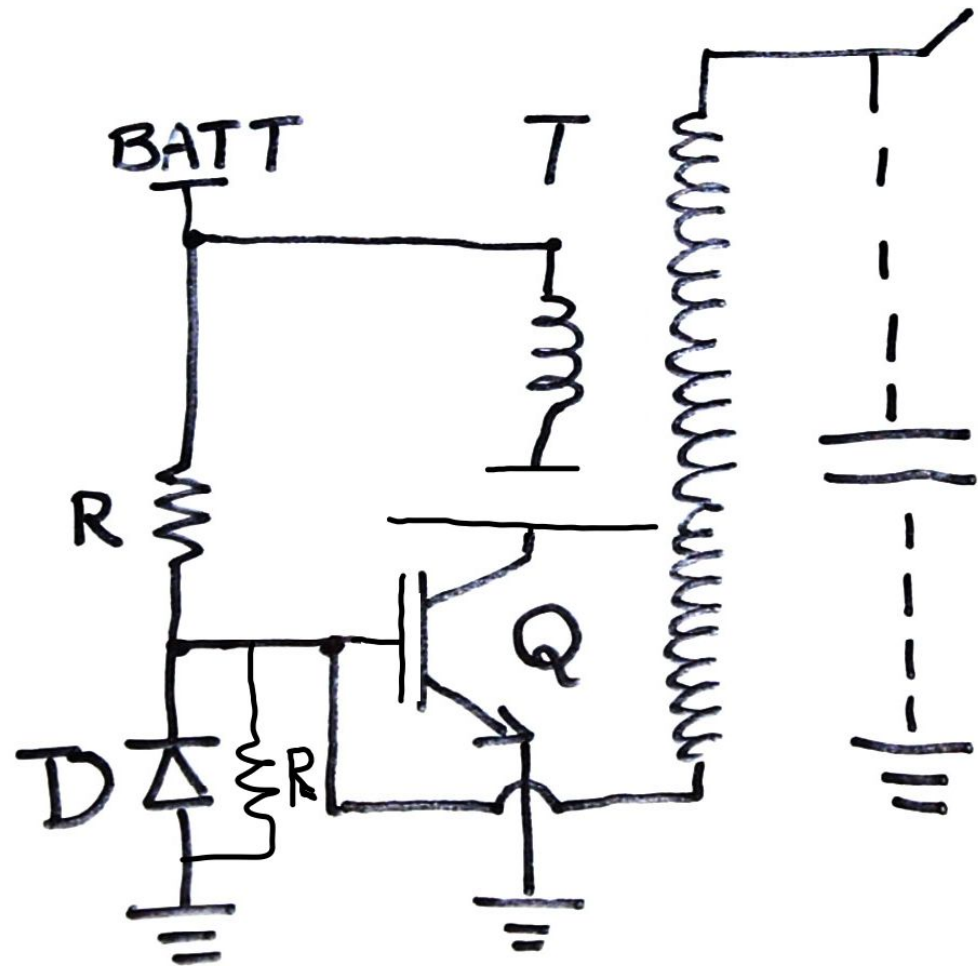
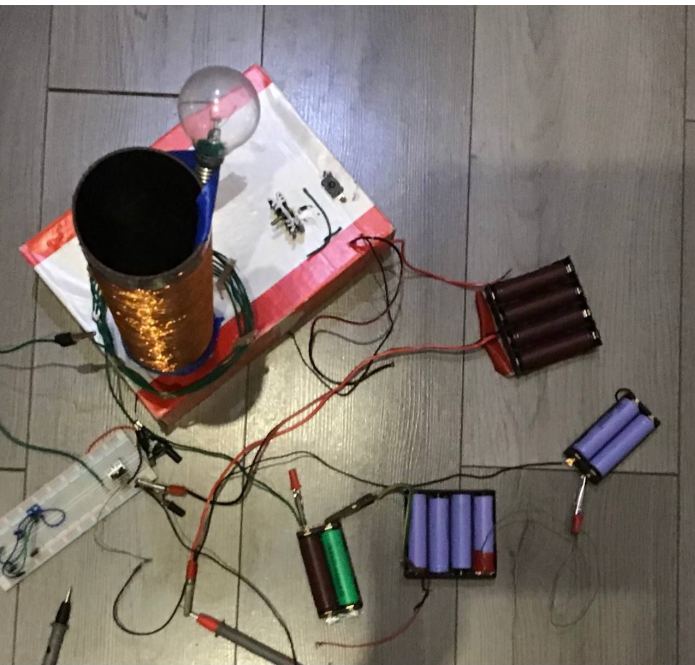


CORONA
AND GLOW
DISCHARGE



MY TESLA COIL 2.0

It uses slightly modified slayer exciter circuit.



SAFETY

Tesla coils this size are completely safe unless you have some serious health issues. The bigger Tesla coil is, the higher is its inductance, the lower its frequency is, the more dangerous it is.

$$f_R = \frac{1}{2\pi\sqrt{LC}}$$



Resonant frequency of this tesla coil is 40kHz, that makes it more dangerous. Also arcs this size can cause serious burns.

SAFETY

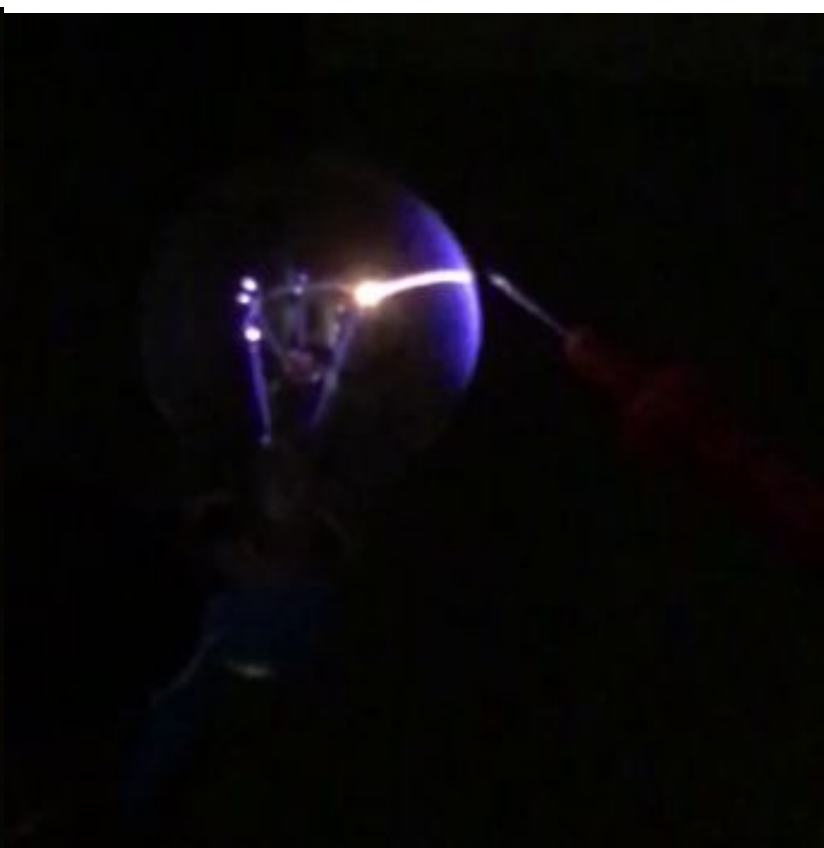
There are 2 things that make it safe to touch Tesla coil's arcs:

- 1) Skin effect: my Tesla coil's frequency is 350kHz. So "skin" depth is 0.1mm. This are just 3 cells of skin.
- 2) Neurons of nervous system don't see frequencies higher than 30 kHz (You may be able to feel something a little bit, but it won't be an electric shock)

Those arcs are near 5000K, so they can still burn you.

LOW-PRESSURE ARCS





THANK YOU!