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Musical Tesla Coils - Meeting 6

Agenda

- Updates on progress
- Other subsystems
- Future plans
- Future plans cont...
- Board

Updates:

Everything has either arrived or is in transit (besides through hole, solder breadboard).

The bulk of the secondary coil (actual Tesla coil) has been built, with $N = 1750$ turns for an expected resonant frequency of 151 kHz. We then applied two coats of varnish to the secondary coil wiring in order to prevent current traveling from wire to wire instead of through the wire. We are going to build the toroid in the next few days, which should take no more than an hour total (this is the easy part of the secondary construction) involving an aluminum pie plate, aluminum ducting, and some solder. Then we will attach the toroid to the secondary coil and have a single, completed coil system.



Other subsystems:

Since a majority of our circuitry hardware has not yet arrived, we have not been able to begin construction on other subsystems. We will begin with the power supply and control circuitry as soon as the necessary hardware arrives from mouser and digikey. Since we have all of this designed already, high quality construction is our focus here.

Future plans:

By next meeting, we will have a full, completed secondary coil. We will then test the inductance and capacitance of the secondary in order to determine its actual resonant frequency. After this, we will tweak our primary design in order to match these resonant frequencies and begin construction on the primary. The primary will not be much work, since it has significantly less turns and there is no toroid to construct. We will basically coil the copper tubing on the order of ~8 or so times and then secure it at the base of the secondary. We will then test the resonant frequency of the primary and ensure that it is 90% of the value of the secondary to ensure optimal operation. If it is not, we will tweak (changing by partial turn increments) and retesting until we get our desired value.

Future plans after primary and secondary are both built, tested, and complete:

After coil components are built, tested, and complete we will have two main components of our project left: circuitry and programming. The circuitry will encompass power supply circuitry, control (switching) circuitry, and low power circuitry. The programming is where we actually tell the raspberry pi how to control the control/switching circuitry in order to play music on our coil.

We will also create a testing safety plan in the coming weeks (complete before we ever test the coils with wall voltage) to ensure safe operation. We have purchased a grounding rod as well as insulated, electrical workman gloves and devising a thorough, written safety plan that will help to ensure maximum safety.

Board:

Since we are not building/ordering a PCB, we do not have a board design. We have a raspberry pi which we are going to use to control the coils. The essential connections to/from the raspberry pi are as follows:

- Power
- GND
- Digital output pin that goes to IGBTs

This is very simple because other than receiving power to operate, the only thing that the raspberry pi is doing is sending our signal to the coils (via IGBTs) and allowing wireless communication (built in functionality).