4-30-2014

Audio Modulated Tesla Coil

Ben Angel
Indiana University - Purdue University Fort Wayne

Brandon Bodeker
Indiana University - Purdue University Fort Wayne

Corey Delaney
Indiana University - Purdue University Fort Wayne

Audio Modulated Tesla Coil

Final Project Report

4/30/2014

Ben Angel - EET

Brandon Bodeker - EET

Corey Delaney - EET

Professor: Dr. Lin

Project Advisor: Dr. Momoh

Submitted to:

Paul I. Lin, Professor of ECET 491 Senior Design II

Department of Computer, Electrical, and Information Technology

College of Engineering, Technology, and Computer Science

Purdue University Fort Wayne Campus

Abstract

The purpose of this project is to design and construct a Tesla coil to receive an audio input and modulate the power output from the coil with the input audio to create an outputted sound similar to the inputted sound. The project consists of three main parts: The first part is research into the area of Tesla coil theory, secondly comes the design and construction of the project, then thirdly the testing and troubleshooting of the system all of which will provide us with opportunities to learn and really get an idea for how the system operates. Probably the most critical part of the project, the research, is what will provide the group with a foundation both physically, with the hardware and schematics, and mentally, in terms of understanding how the technology works and becoming familiar with the inner workings of the system.

Construction of the coil entails the building of an enclosure as well as the development of both a primary and secondary coil (as per parameters found online). Design of the system will encompass the research performed up to this point and implement it into the development of an overall system design as well as the procurement of parts to satisfy the system parameters. It will be crucial to ensure that the design used be able to perform and meet the standards set at the beginning of the project proposal. When the testing and troubleshooting begins is when the individual team members will be able to really show and use their abilities learned and honed to this point in order to make the overall system operate properly and safely.

The completed Tesla coil shall provide an end product that can accept any audio input via ¼" jack or 3.5mm jack and play the sound through the outputting arcs of electricity from the Tesla coil through the atmosphere. The system shall also have the ability to safely manipulate the input power to directly affect the output signal as well as provide a safe and controlled means of powering the system down; in the end providing a relatively safe and entertaining new way of outputting and experiencing sound.

Keywords

Step-up transformers - the process of taking an input voltage and current and manipulating it to the desired specific values
Traces – small "wires" on a circuit board that connect components
IGBT – "Insulated-gate bipolar transistor" is, essentially, an electronic switch capable of switching extremely fast
MIDI – digital audio file type
IC's – "integrated circuit"; meaning there are quite a few electrical components creating a small circuit all contained within a single small chip, or "microchip"
LCR meter – electrical meter that measures inductance, capacitance, impedance, and resistance
Resonant – electrical signal that varies in amplitude as if it were vibrating naturally
Modulator – something that changes manipulates or varies an electrical frequency/signal
Toroid – Donut shaped metal fixture atop a Tesla coil that serves as a means of capacitance of voltage before it discharges into the atmosphere
Zuesaphone – Term used to refer to a Tesla coil capable of outputting a musical tunes
Primary – Coil of copper in a Tesla coil whose purpose is the amplification of Current
Secondary – Coil of wire whose purpose is the conversion of high current to high voltage

Table of Contents

Table of Contents (Cont.)

List of Illustrations

List of Tables