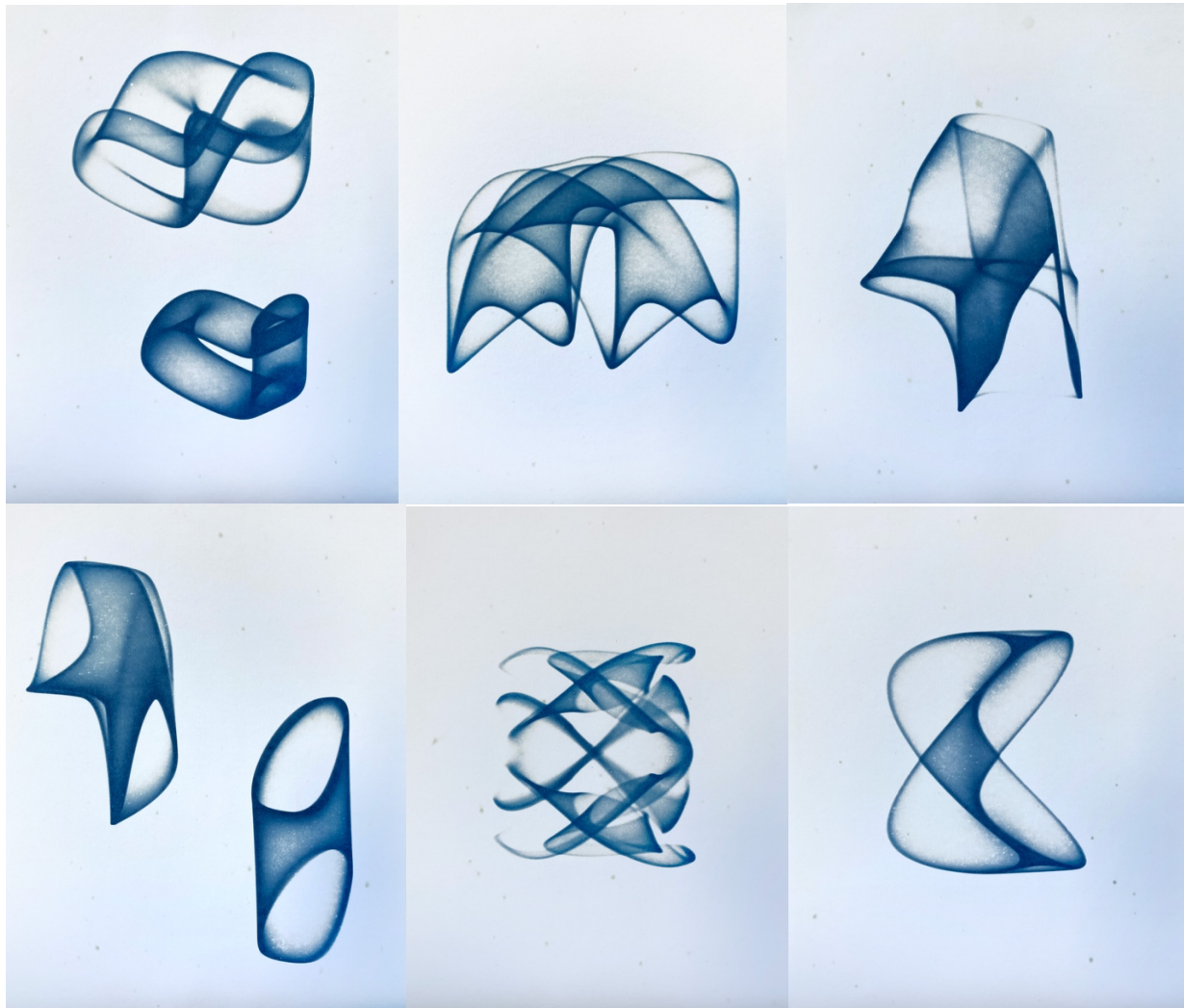


Visualizing Sound through Experimental Cyanotypes



Abstract

Visual art has often focused on providing the documentation to the artist's experience. In his lecture to AA Architecture students "What is Art really for?," Brian Eno aims to answer this question stating the point of art is for world building. If we consider this argument to be true, this presentation is a description of my efforts to build my own world; A world where the invisible property of sound is illuminated using a series of tools designed for music technology and entertainment purpose and reimagining their intentional design to provide a series of experimental cyanotypes. The resulting efforts of this body of work presented in the form people often refer to as "Art."

Introduction

Assigning visual information to audio frequency has been around since the early 16th century with Guiseppe Arcimboldi's study of Pythagorean harmonic proportions of tones and semitones as well as the 18th century with Sir Issac Newton's association's with light and sound frequency. This interest in multi-sensory experiences with light and sound continued through the work of many creative science minded individuals including, but not limited to:

Jules Antonie Lissajous (Lissajous Figures), Ernest Chlandi (Chlandi Plates/Cymatics), Thomas Wilfred (Clavilux), Mary Ellen Bute (Seeing Sound), Walter Ruttmann (Opus 1), Oscar Fischinger (Optical Poem, Fantasia), Jordan Belson, Harry Smith (Early Abstractions (1946-57) Pt. 1), and Stephen Beck (Image Processing and Video Synthesis). The former artists mentioned bring us up through the late 1970's and early 1980's. More current methods of combing visuals and sounds include Resolume, VDMX, Max/Max4Live and MadMapper[1].

Through their methods, I have found my own amusement and wonder in this investigation of visualizing sound as it touches on many subjects of study from mathematics, engineering, computer science, and visual art. By following this intuition towards this body of work, I have work to teach myself more about subjects I've never studied academically to present my artistic world construction. When I left engineering school at 18 to pursue more creative endeavors, I didn't realize I would eventually come back to the world of engineering as it pertains making art.

Methods

Harmonic Relationships

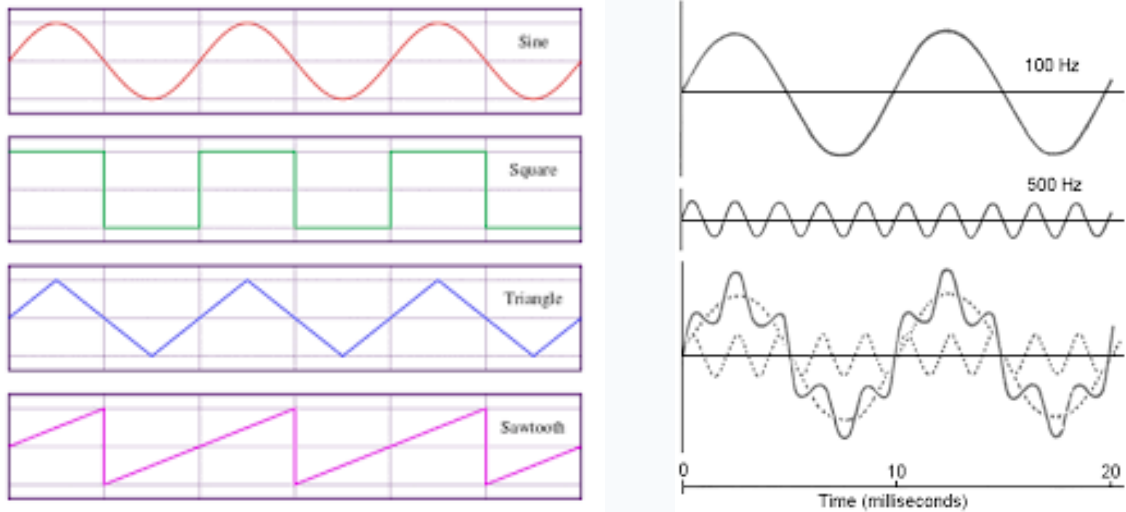
I know what you are thinking: What would Micheal Jackon's "ABC" look through this device. In a word: messy. This isn't because Mr. Jackson's song doesn't provide good vibrations, but more because music contains a LOT of frequencies (drums, bass, guitar, vocals, horns, ect.) all battling for room within the hearing spectrum. What provides interesting and mysterious imagery are more pure tones, such as Sine or Triangle waves.

What provides the structure of the images at the top of this paper is a visual representation of a *relationship* of two or more pure tones, or a harmony/harmonic *relationship* between two or more pure tones.

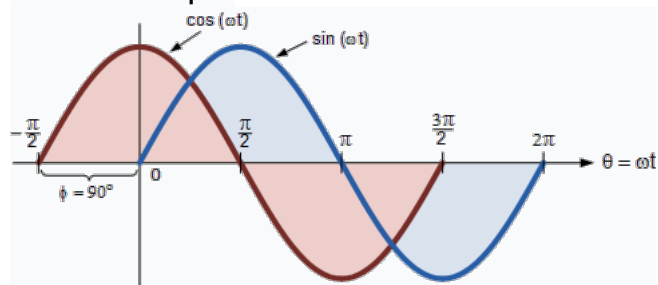
TL;DR version is: Audio Source -> Laser -> Cyanotype Paper

1. Audio Source –

Ableton Live Software Synthesizer, Eurorack Synthesizer, Sine/Triangle Waveform Generator, ect.



Phase Example



2. Laser –

Simple setup: UV Laser Pointed at a Mirror glued to a balloon wrapped around a speaker

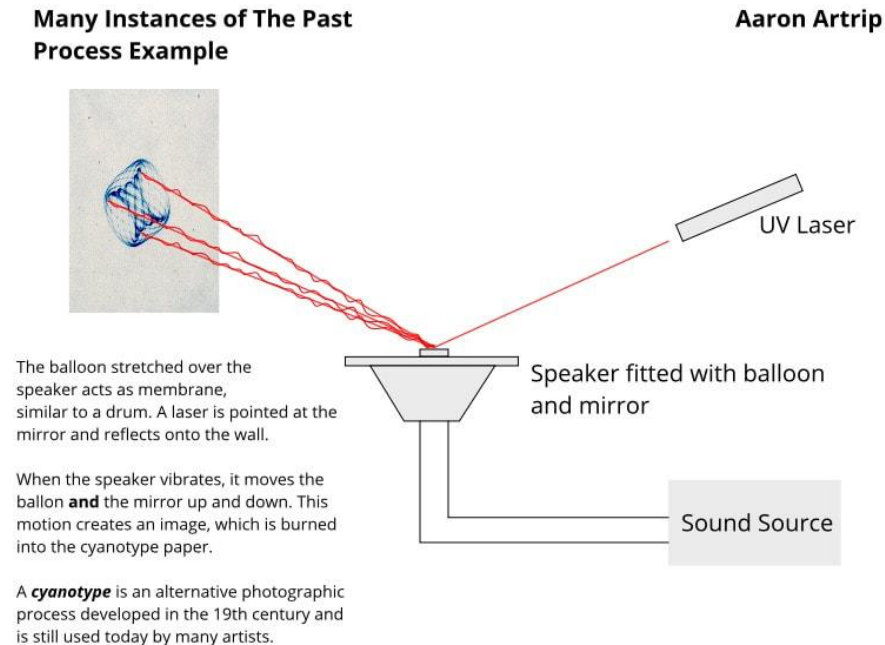
Complex setup: CS-1000 MKiii Club Laser Projector

3. Cyanotype Paper –

Precoated cyanotype Paper from Cyanotypepaperstore.com

To create these images, we first have to discuss cyanotypes and UV wavelengths optimal for Cyanotype production. According to the printmaking lore available, it seems the optimal wavelength is 320 nanometers (nM). In my first series “Many Instances of the Past (2019),” I constructed a crude drawing device seen below:

2019 process



This drawing device is no different to the education-based science project of visualizing sound. It's a simple device: a speaker with a balloon stretched across the side which produces sound and a small piece of reflective mirrored acrylic glued to the center of this stretched balloon membrane. At this point, you would use any red laser pointer and point it towards the mirror while any audio/music plays through the speaker, causing the balloon membrane to react to the speaker pushing air, thus bouncing the mirror (and any collected light) and reflect it onto the wall nearby. At this point, this device is a crude version of a laser show projector galvanometer, a simple vibrating mirror, similar the Jules Antoine Lissajous's creation in 19th century. Once this device was built, I researched and found a Blue UV laser light pointer rated at 405 nM. This wasn't rated at 320 nm, nonetheless I persisted. Considering the advice of Adam Savage: "The only difference between messing around and science is writing it down!"

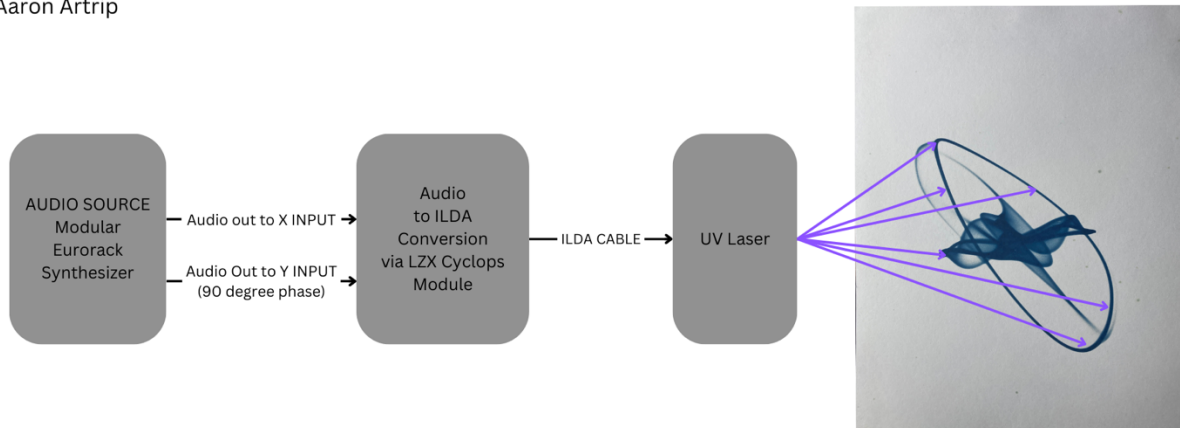
Through research and conversations with other artists, I have upgraded my system to its current iteration: UV Laser Audio Harmonograph.

2023 Current Process

UV Laser Audio Harmonograph System

2023

Aaron Artrip



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As I continue to make these images, I have become more attuned to what types of sounds and laser movements might make interesting images. A current method of helping decide when to expose the laser to the paper is to use UV reactive paint to take a 'snapshot' as I am building the shape. This exposure takes around 3-5 seconds to give me a decent idea of what I might be looking at. Think of it as a temporary long exposure method to determine the laser's *path* and its *overall intensity* in certain areas.

Some findings:

Light Source	Paper Size	Distance From Source	Exposure Time
405nm UV Laser Pointer Class 3B, 200mW	5"x7"	~17"	~6 Min
405nm UV Laser Pointer Class 3B, 200mW	11"x14"	n/a	n/a
Laserworld CS-1000MKIII Class 4, 800mW	5"x7"	~20"	~10-15 Min
Laserworld CS-1000MKIII Class 4, 800mW	11"x14"	~31"	~20-25 Min

Conclusion

The universe is a library and these are the ideas I have checked out.

Wear safety goggles and practice save laser-ing if you decide to venture into this territory. Feel free to reach out with any questions. Thanks for coming along.

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References

1. Paul Harmon, "Brief History of Visual Music," Over Processed Thinking(blog), <https://overprocessedthinking.com/brief-history-of-visual-music/>