



SOLUTIONS TO
**ACCESSIBILITY IN
ART & DESIGN**

A MULTI-SENSORY ART INSTALLATION

OLIVE ROBERTSON | SENIOR PROJECT | GRC SPRING 2022

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ABOUT ME



Olive Robertson

I'm Olive Robertson, a graduating Graphic Communication student concentrating in Design and Reproduction Technology.

I'm inspired by creatives such as Jim Carrey, Wes Anderson, and Kermit the Frog. I love everything creative and am extremely passionate about all things Art & Design.

ABSTRACT

For my Senior Project, I wanted to explore possible solutions to accessibility in Art & Design while narrowing my focus specifically towards visual impairments by applying techniques commonly used in printed electronics methodology. I wanted to further showcase the impact of how designers enhance the overall user experience when they choose to center their focus on designing for accessibility.

To tackle accessibility challenges in Art & Design when it comes to visual impairments, I would have to extend Art's visual impairments to include senses other than sight- tactile and auditory. The final product would then be an interactive art piece that not only is visually appealing to the user, but functions as a sensory board and musical instrument.

PROBLEM STATEMENT

When we fail to consider accessibility in Art and Design in addition to its visual-centric foundation, the experience of enjoying art becomes completely exclusionary to an entire group of individuals with visual impairments and forms of blindness. In order to allow everyone to have the opportunity to experience art, we must expand our preconceptions of the typical artwork to include senses other than sight.

This project will tackle these accessibility challenges in Art and Design by creating an interactive art piece that appeals to multiple senses— visual, tactile, and auditory. In addition to aiding a more narrow subgroup of individuals with visual impairments and forms of blindness, it presents an opportunity for an enhanced user experience and aesthetic value to the general user.

This will be achieved by first creating what we consider to be a typical visual-centric art piece and then adding textiles, textures, capacitive touch sensors, and a partnering auditory element that will play when triggered by the sensor.



1 billion people globally live with a moderate or severe form of visual impairment or form of blindness.



Art & Design communicates through **Visual Language**, therefore, groups who can't rely on sight become excluded.



In order to allow everyone to have the opportunity to experience art we must expand our preconceptions of art's visual foundation and **appeal to senses other than sight – such as tactile & auditory.**



In addition to aiding a more narrow subgroup of individuals with visual impairments and forms of blindness, it presents an opportunity for **an enhanced user experience and aesthetic value to the general user.**

PROJECT OBJECTIVES



**Find Solutions to
Accessibility in Art & Design**



**Create a Visually Appealing
and Technically Executed
Large Scale Painting**



**Expand Preconceptions of a
Typical Art Piece to appeal to
senses other than sight such
as Tactile & Auditory**



**Use Printed Electronics
Applications to Create a
Painting that Functions as
an Fully Interactive, User
Friendly Musical Instrument**

SUCCESS CRITERIA



Find Solutions to Accessibility in Art & Design

Does the project apply inclusive practices and accessibility for groups that classify with visual impairments and forms of blindness?

Do the interactive elements enhance the experience of the art piece for the general user?



Create a Visually Appealing and Technically Executed Large Scale Painting

Is the piece aesthetically pleasing and offer deeper introspection for the viewer?

Is the artistic quality and electronics component neat and technically executed?



Expand Preconceptions of a Typical Art Piece to appeal to senses other than sight

Does the piece challenge preconceptions of what users consider to be a typical art piece?

Does the piece appeal to multiple senses?

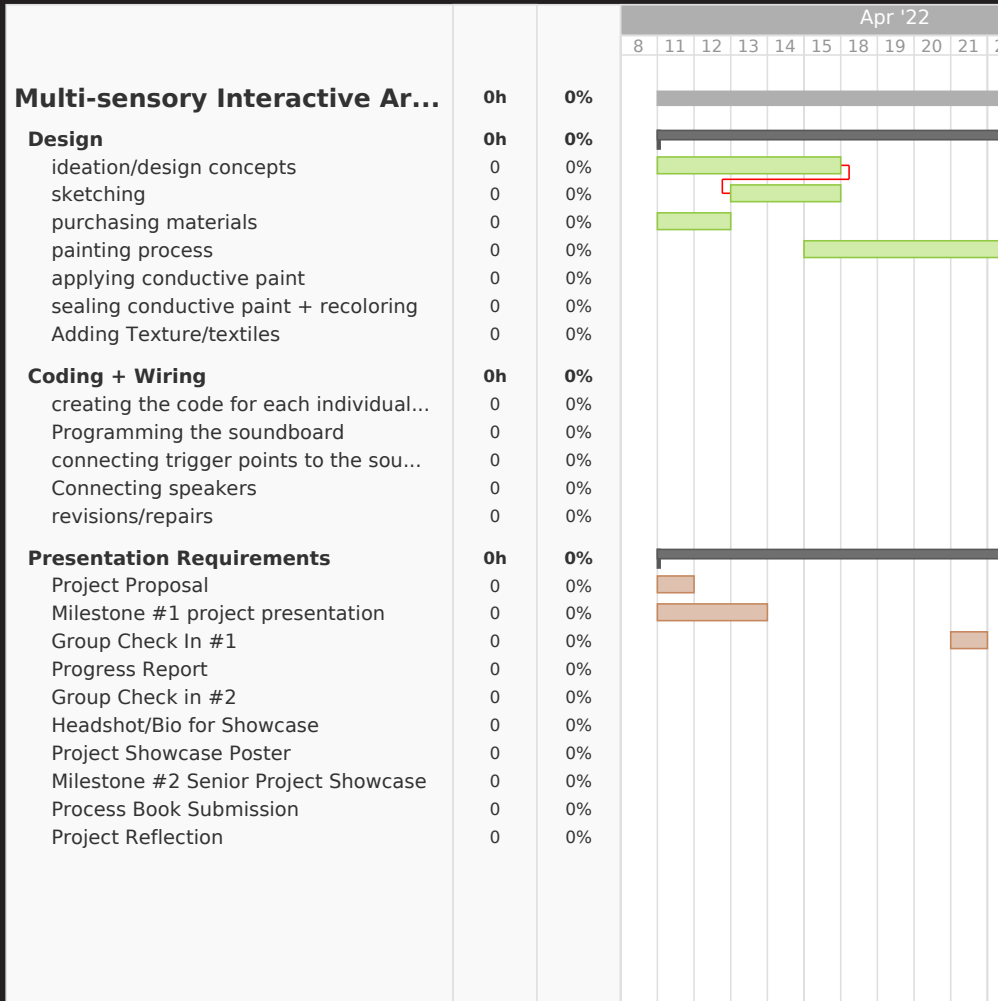


Use Printed Electronics Applications to Create a Painting that Functions as a Musical Instrument

Would the viewer consider the piece to meet the criteria of both an art piece and an instrument?

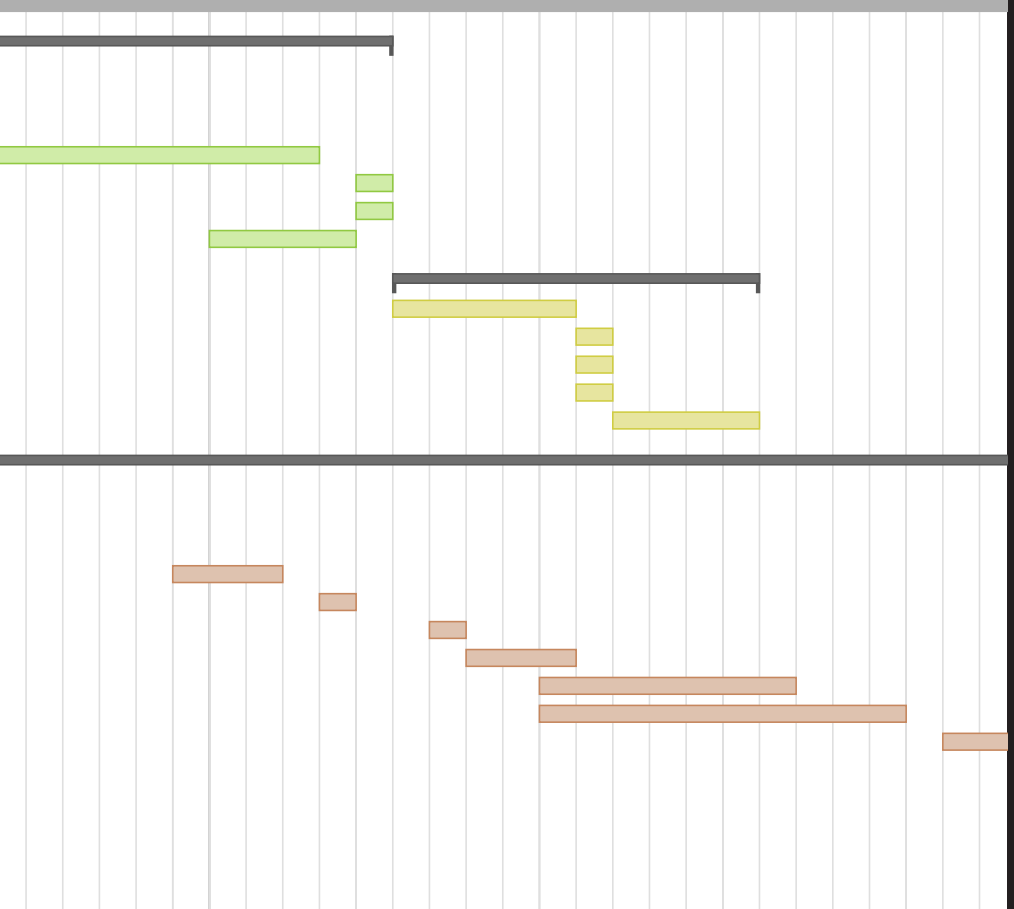
Does the audio/printed electronics element of the piece function fluidly, consistently, and without flaws?

TIMELINE



May '22

22 25 26 27 28 29 2 3 4 5 6 9 10 11 12 13 16 17 18 19 20 23 24 25 26 27 30 31



RESEARCH

1

Visual Impairments

World Health Organization. (2021, October 14).

Vision Impairment and blindness.

World Health Organization. Retrieved April 4, 2022, from <https://www.who.int/en/news-room/fact-sheets/detail/blindness-and-visual-impairment>

Beete, P. (2015).

Touch and See.

Retrieved April 4, 2022, from <https://www.arts.gov/stories/magazine/2015/1/challenging-notions-accessibility-and-arts/touch-and-see>

2

Accessibility in Design Related to Visual Impairments

Coates, C. (2019, December 8).

Best practice in making museums more accessible to visually impaired visitors.

MuseumNext. Retrieved April 5, 2022, from <https://www.museumnext.com/article/making-museums-accessible-to-visually-impaired-visitors/>

Graham, T., & Gonçalves, A. (2017, October 23).

Stop designing for only 85% of users: Nailing accessibility in Design.

Smashing Magazine. Retrieved April 5, 2022, from <https://www.smashingmagazine.com/2017/10/nailing-accessibility-design/>

Haribbison, N. (2012, June).

I Listen to Color [Video].

TEDGlobal 2012. https://www.ted.com/talks/heil_haribisson_i_listen_to_color/transcript?language=en

Downey, C. (2013, October).

Design with the Blind in Mind [Video].

TEDCity2.0. https://www.ted.com/talks/chris_downey_design_with_the_blind_in_mind?referrer=playlistdesigning_for_disability&autoplay=true

My research was broken down into four parts; Visual Impairments & Forms of Blindness, Accessibility Techniques in Design Related to Visual Impairments, Printed Electronics Applications, and Electrical Paint & Bare Conductive.

I needed to start my research by exploring the different types of visual impairments, statistics on the population effected, and then I could begin to research best practices and other solutions for how Museums, Artist, and others apply multi-sensory applications for accessibility.

3

Printed Electronics Applications

Patel, N. (2021, May 13).

Humanthesizer turns 15 bikini models into a live dancing synth.

Engadget. Retrieved April 6, 2022, from <https://www.engadget.com/2009-08-11-humanthesizer-turns-15-bikini-models-into-a-live-dancing-synth.html>

Stone, K. (2013, February).

DJ decks made of ... paper [Video].

Ted Conferences. https://www.ted.com/talks/kate_stone_dj_decks_made_of_paper?language=en

Loose, P. (2021, July 15).

Art and decibels - interactive paintings with the Touch Board.

Bare Conductive. Retrieved April 5, 2022, from <https://www.bareconductive.com/blogs/community/art-and-decibels-interactive-painting-with-the-touch-board>

Bare Conductive. (2021, June 2).

Create an interactive poster and tell a story with your own sounds.

Bare Conductive. Retrieved April 5, 2022, from <https://www.bareconductive.com/blogs/resources/create-an-interactive-poster>

I could then take my findings and find intersections between accessibility as it relates to previous printed electronics applications.

4

Electrical Paint & Bare Conductive

What is electric paint: The composition and application of conductive paints.

Bare Conductive. (2021, February 9). Retrieved April 6, 2022, from <https://www.bareconductive.com/blogs/blog/what-is-electric-paint-the-composition-and-application-of-conductive-paints>

TEDx Talks. (2013, February 7).

Paint Your Circuits With Ink: A New Revolution In Electronics | Matt Johnson at TEDxGateway [Video].

Youtube. https://www.youtube.com/watch?v=R0xH0_qaqVw

Taking inspiration from previous printed electronics techniques, I then had to learn about electrical paint and the company Bare Conductive whom specializes in this material in order to start creating my project.

MOOD BOARD



My mood board takes inspiration from the intersection of the modern day house music scene and the 1970's club scene. I aspired to celebrate themes, cultures, and figures from music while including elements that would work to include various textures.



Using Photoshop, I collaged various pictures from my mood board in addition to playing with various color themes which I could use as a reference for my final painting.

PAINTING PROCESS



FINAL PAINTING

“Boiler Room”

Mixed Media on Canvas

36x48 in.

TEXTURES



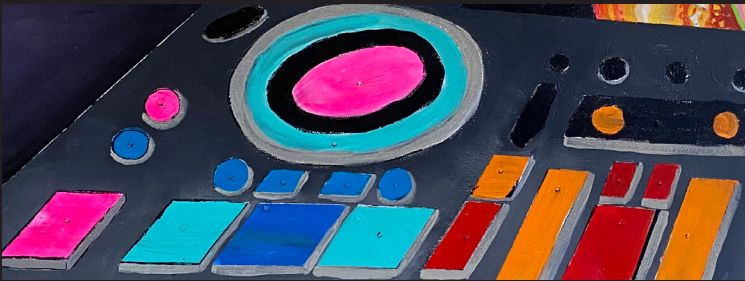
Adding textures allows it to function as a **sensory board** and users are **encouraged to touch all parts of the painting**.

The added textures make the painting look more **realistic**, give it a **3D quality**, and **enhance the overall sensory elements**.

CONDUCTIVE PAINT



Conductive paint uncolored



Conductive paint recolored



The buttons on the bottom of the painting use electrical paint. When touched, it triggers a signal to the soundboard and plays the audio.

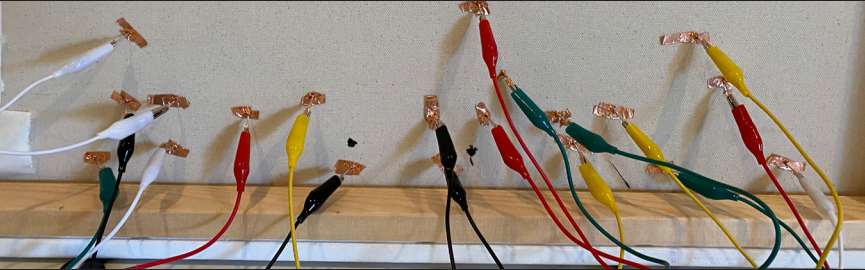
In order to create sensors, I used **Electric Paint**, a black water-based, non-toxic paint that **conducts electricity** when it has dried from Bare Conductive.

I painted 20 sensors in total, to make 20 different **sounds** when **triggered by touch**.

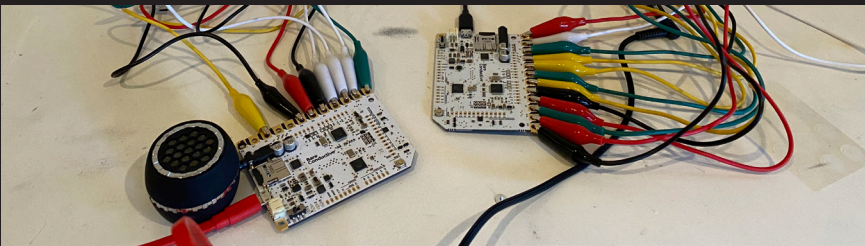
WIRING & SET UP



Front of Painting; Conductive paint recolored with nails through the center.

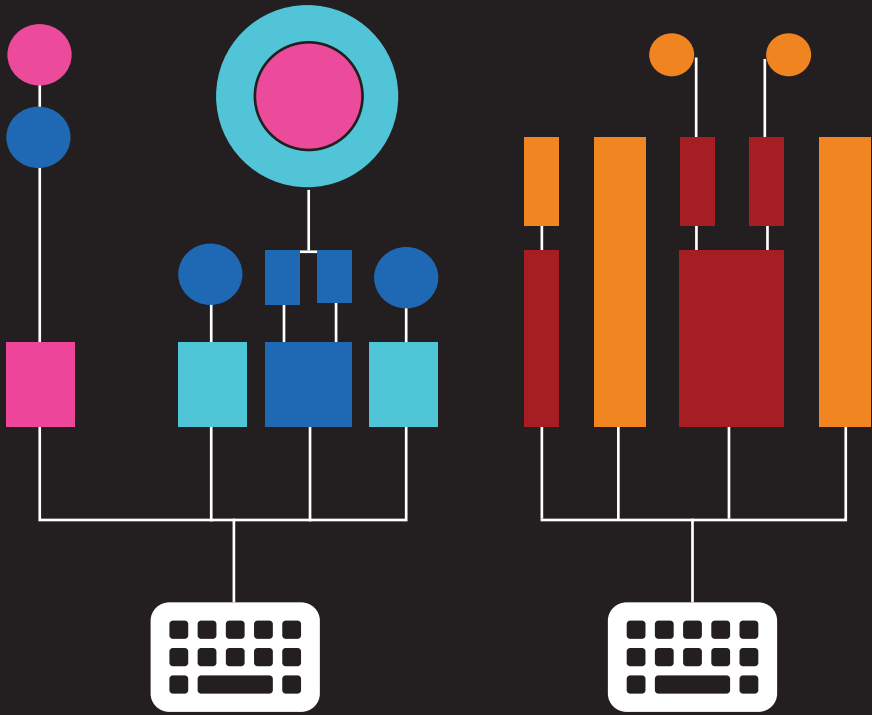


Back of painting; Alligator Clips Attached to nails and copper tape



Connected to soundboards and speaker

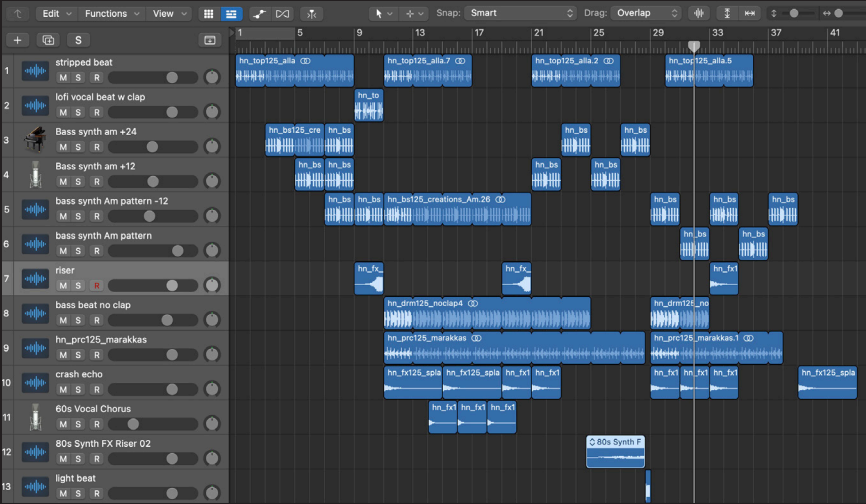
CODE



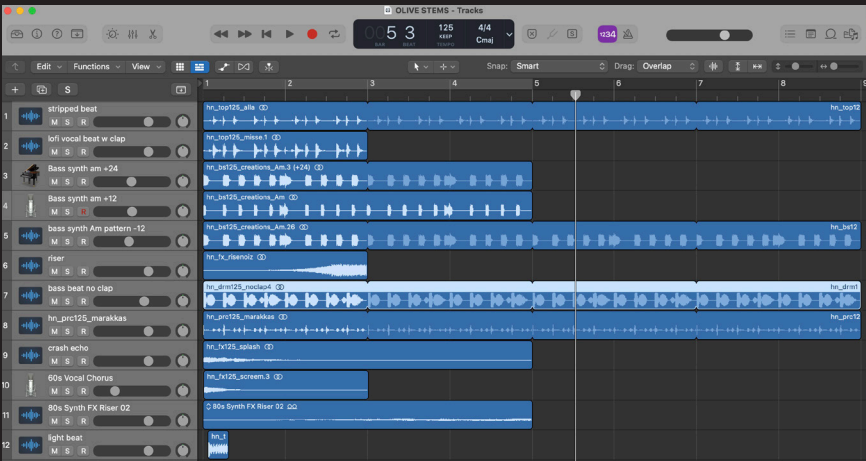
The blue and pink sensors are connected to a soundboard programmed with a **HID keyboard** Arduino code, connected to **Soundplant 50** application.

This allows live loops to be played **Polyphonic**, or multiple buttons to be pressed and played at the same time. I uploaded 12 tracks to parallel different keys on my keyboard.

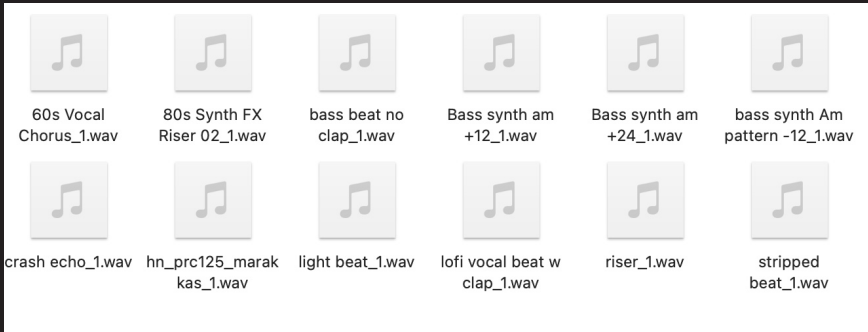
AUDIO



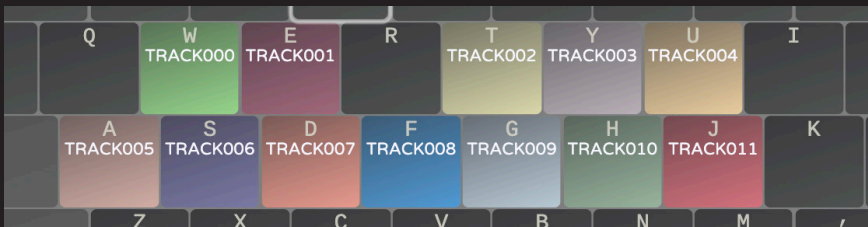
Full Beat made on Logic Pro application



Beat modified to be individual stems for the user



Stems exported to twelve individual .wav files to be uploaded to Soundplant 50 application.



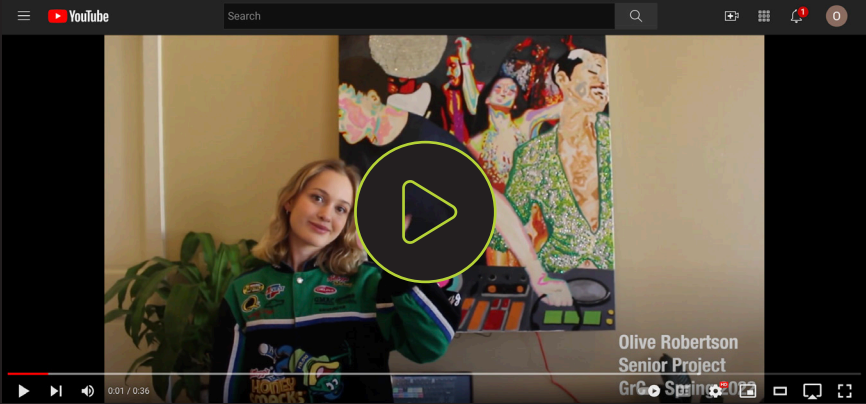
Because the blue and pink sensor's audio functions without a Midi code, I made a full beat using **Logic** for reference of what music can be played using the painting.

I then changed the tracks to be **individual stems**, making sure to trim the time-frames to work in sync with all stems.

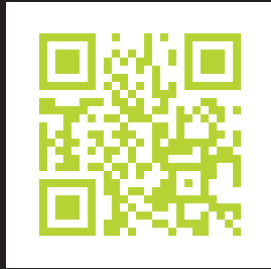
The tracks were the exported individually as 12 separate stems and renamed **TRACK000 – 011** to be read by the **soundboard**.

Using **Soundplant 50**, each stem was programmed to be triggered by **W, E, T, Y, U, A, S, D, F, G, and H** on my keyboard.

LINKS



WATCH A VIDEO
OF THE PAINTING
IN ACTION **HERE**





LISTEN TO THE
FULL SONG ON
SOUNDCLOUD
HERE

