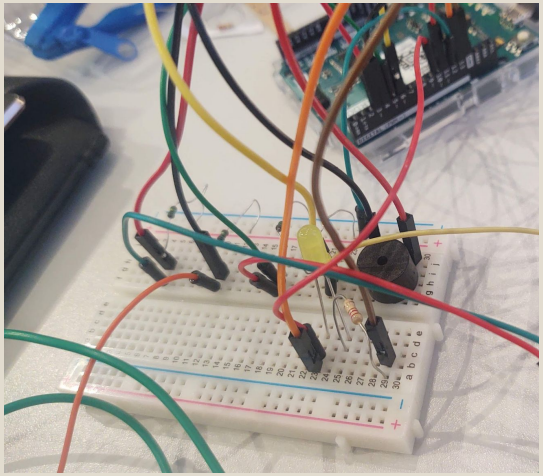
Physical Computing Project

Shaan Rehsi

ABOUT MY PROJECT

To summarise my project - I made an interactive painting, that plays musical notes when touching the conductive paint and LEDs light up in different colours to corresponding notes



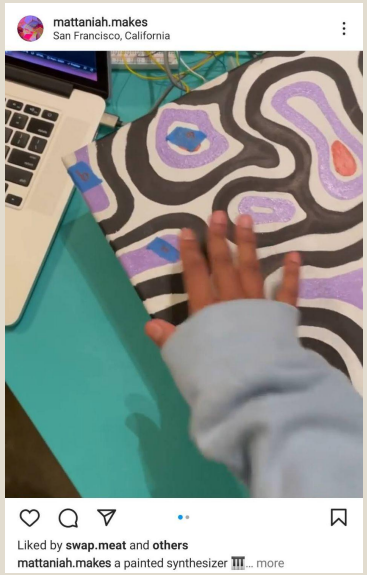
I think immersive and interactive art is becoming the more popular way of exhibiting art and is a a potential career I would like to pursue

I wanted to give my project a demographic to work towards - I thought making an art piece children would interact with would be interesting to help with sensory development

I enjoy painting and I'm very interested in these new exhibitions so I wanted to create a small project of my own to test both my coding abilities and design skills

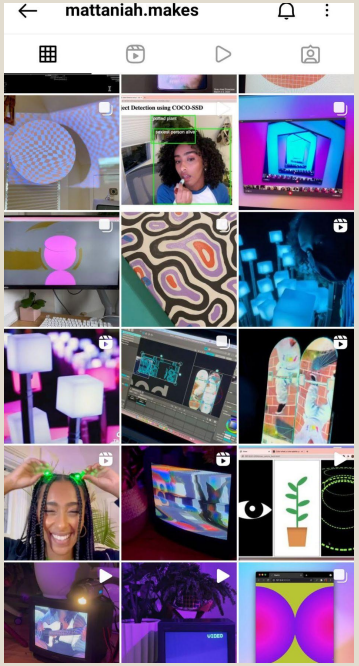
INSPIRATION

I have always wanted to combine art and code together
I follow some artists on social media that work with combining the two subjects and was looking into the work they produced.



She creates a synthesizer use the BareConductive paint and the Tone library to create a full octave of different sounds on the painting.

I really enjoyed that concept and thought it would be a good first project to try and emulate



I came across this art piece that uses arduino as the language

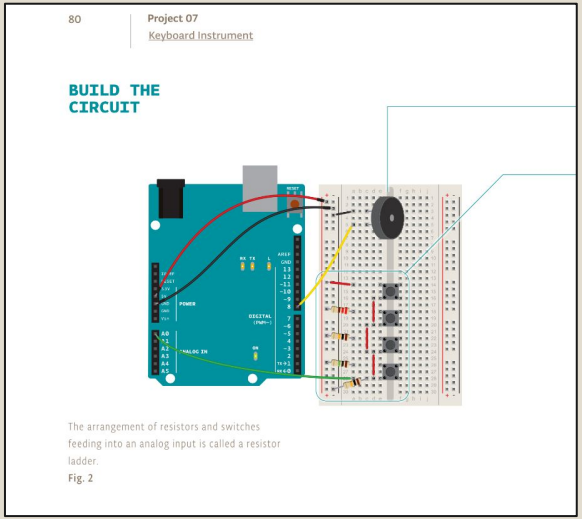
However I wanted to challenge myself to have two outputs and add light into my project so there would be a visual output too.

07/08/2022

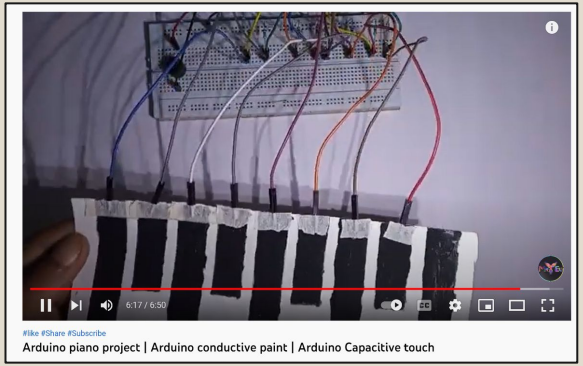
RESEARCH

I was looking into ways to start with this project, originally, I thought about using buttons to make sounds come out of

I originally was going to use project 7 as a starting point to emulate this idea but decided I would rather everything was touch sensored.



I moved on to looking into youtube tutorials and projects on the arduino site



I learnt about the CapacitiveSensor library that I would need to download for the paint to react to touch as well as the AdaFruit Neopixel library for the LED strip

RESEARCH

I thought it would be a good challenge to create two outputs by adding light, and meet my target audience as well

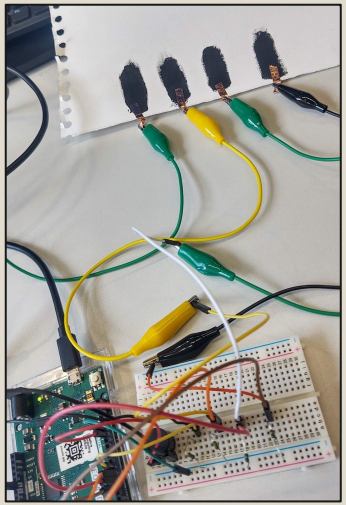
My original project was only going to be sound, but whilst researching installations for kids, many involved lots of colour and lights

I took some inspiration from this arduino project on the website

I gained inspiration from this project I found during research and thought etching would be a better option instead of a traditional fine art painting.

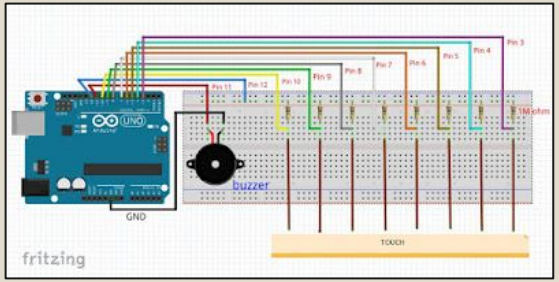
15/06/2022

DEVELOPMENT



I began creating a piano like circuit to test the conductive paint and manage to produce different sounds.

I found a tutorial that had a similar concept to this experiment and used some of the code to begin my experiment.



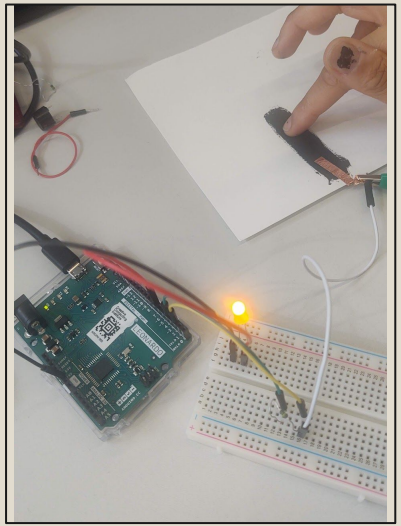
The corresponding diagram also helped me wire up the circuit

Code

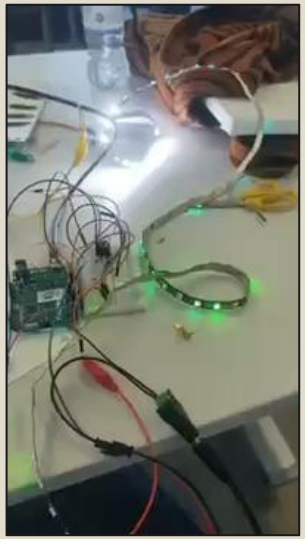
```
#include <CapacitiveSensor.h>
#define buzzer 11

// Set the Send Pin & Receive Pin.
CapacitiveSensor   cs_12_3 = CapacitiveSensor(12,3);
CapacitiveSensor   cs_12_4 = CapacitiveSensor(12,4);
CapacitiveSensor   cs_12_5 = CapacitiveSensor(12,5);
CapacitiveSensor   cs_12_6 =
void setup()
{
  // turn off autocalibrate on channel 1 - just as an example
  cs_12_3.set_CS_AutocaL_Millis(0xFFFFFFFF);
  cs_12_4.set_CS_AutocaL_Millis(0xFFFFFFFF);


void loop()
{
  // Set the sensitivity of the sensors.
  long touch1 =  cs_12_3.capacitiveSensor(1000);
  long touch2 =  cs_12_4.capacitiveSensor(1000);
  long touch3 =  cs_12_5.capacitiveSensor(1000);
  long touch4 =
  // When we touched the sensor, the buzzer will produce a tone.
  if (touch1 > 1000){
    tone(buzzer,400);
    }
  if (touch2 > 1000){
    tone(buzzer,270);
    }
  if (touch3 > 1000){
    tone(buzzer,650);
  }
```

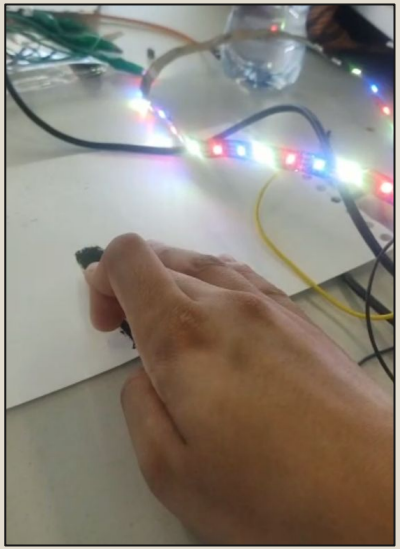
DEVELOPMENT

```
light_test | Arduino 1.8.19
File Edit Sketch Tools Help
light_test §
#include <CapacitiveSensor.h>


#define buzzer 11

CapacitiveSensor cs_12_2 = CapacitiveSensor(12, 2);

void setup() {
  // put your setup code here, to run once:
  cs_12_2.set_CS_Autocal_Millis(0xFFFFFFFF);
  Serial.begin(9600);
  pinMode(7, OUTPUT);
}

void loop() {
  // put your main code here, to run repeatedly:
  long total =  cs_12_2.capacitiveSensor(1000);
  Serial.println(total);

  if (total >= 1000){
    tone(buzzer,270);
  }
    digitalWrite(7,HIGH);
  }else{
    digitalWrite(7, LOW);
    }


  if (total<=1000)
    noTone(buzzer);
  delay(5);
}
```



Once I had the LED working, I moved onto trying to program the LED strip which was more challenging In the code I used NUMPIXELS to count each LED and a for loop to program each one to light up





Following on, I added more paint keys and changed the sound to musical note tones and the each key had its own corresponding colour.

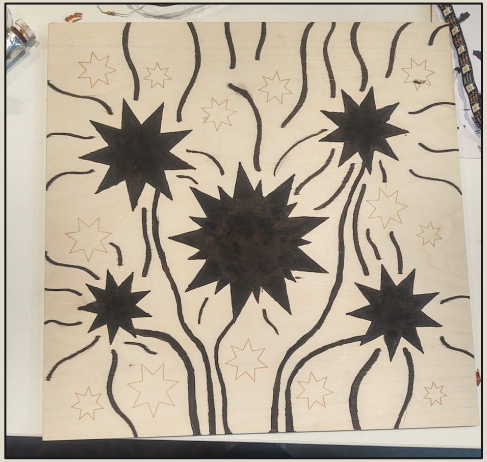
The next step was to add light, with the previous code I had, I simplified it to one, painted key and added an LED pin to test if light would be outputted

DESIGN

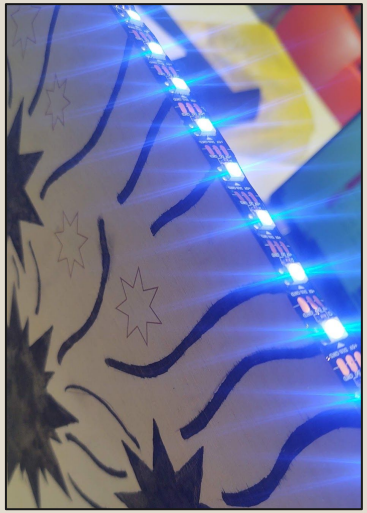
I painted my design and connected the interactive elements to the bottom of the plywood, I added regular black paint to distract from the conductive paint

I then stuck the LED strip all around the edge of the plywood, I used a think plywood to ensure there was space.

I etched my design onto plywood using a laser cutter, the elements to be painted were fully etched out to allow for easy design



I connected the pain to the back of the plywood with conductive copper tape, the wires if the circuit were then connected to this.



FINAL PRODUCT & DEMONSTRATION

EVALUATION

Overall I am incredibly happy with this project as I achieved everything I wanted to do even though I found it challenging.

Areas I believe I did well in include:

- The LED lights - I found this incredibly difficult at first but I like how the feature works and that it surrounds the art.
- I like the execution of my project as it is exactly how I envisioned it to work, which I believe shows I planned my project well.

However, there are areas I can improve on if were to do this project again.

I believe these are:

- I would like to increase the complexity of this project, for example, add some more interactive notes and the LED lights would have more features.
- I would like to work out a way that the connection to the circuit board could be more discreet to allow for more of an unexpected interaction.