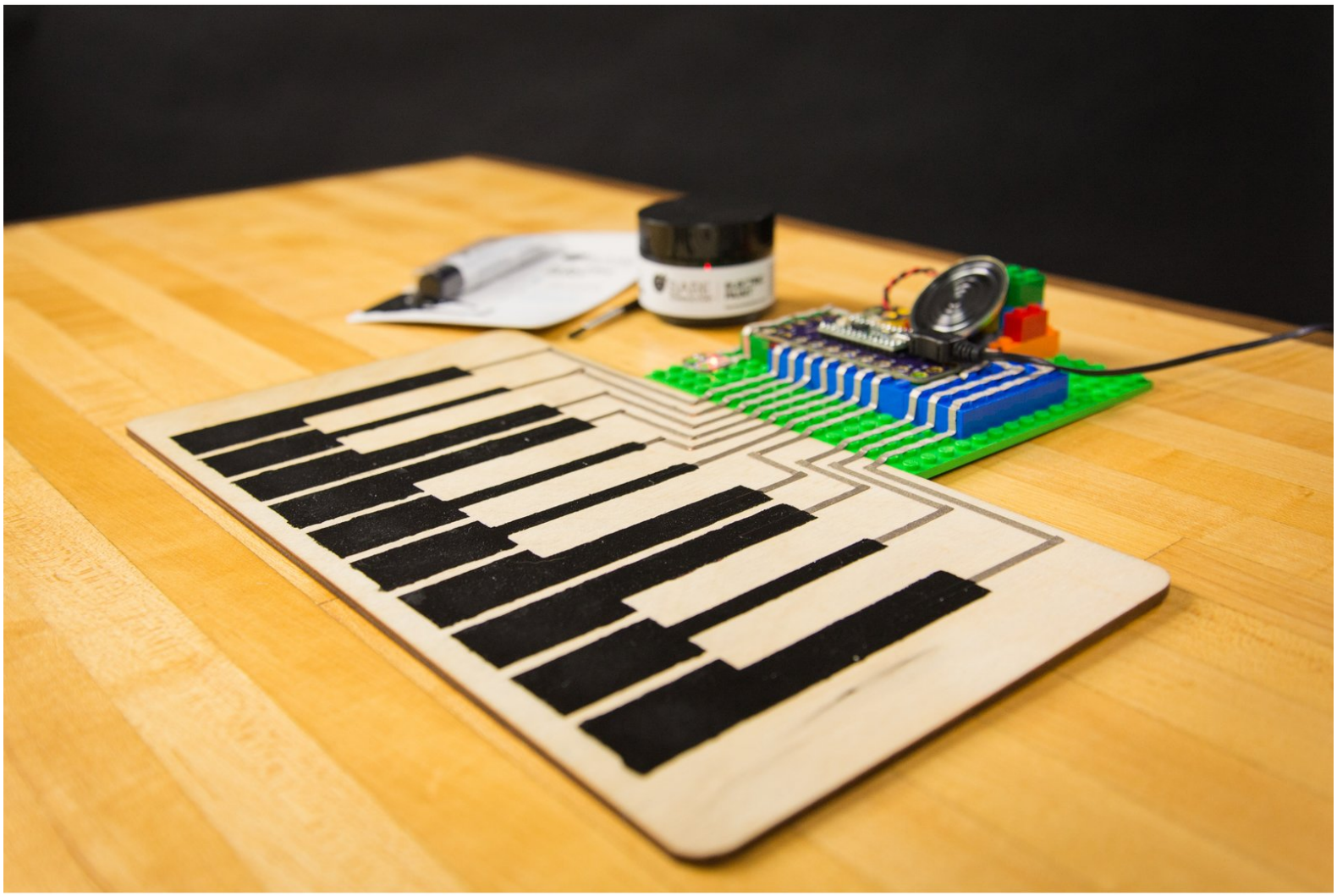
Conductive Paint Piano

Build your own capacitive touch based piano or synth using Crazy Circuits. Works great with conductive paint or Squishy Circuits dough.

Written By: Joshua



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INTRODUCTION

Expanding on the Simple Programable Touch Piano project, this Piano/Synth uses Bare Conductive Paint as interactive Touch Points. This is a great example how to create a large scale or wall Piano for a library or classroom. Overall the project is no more difficult than the Simple Touch Piano, it just requires a paint brush.

TOOLS:

- Scissors (1)
- Computer (1)

PARTS:

- Crazy Circuits Invention Board (1)
- Crazy Circuits with Bare Conductive Paint Kit (1)
- Crazy Circuits Piezo Speaker Chip (1)
- Bare Conductive Paint (1)

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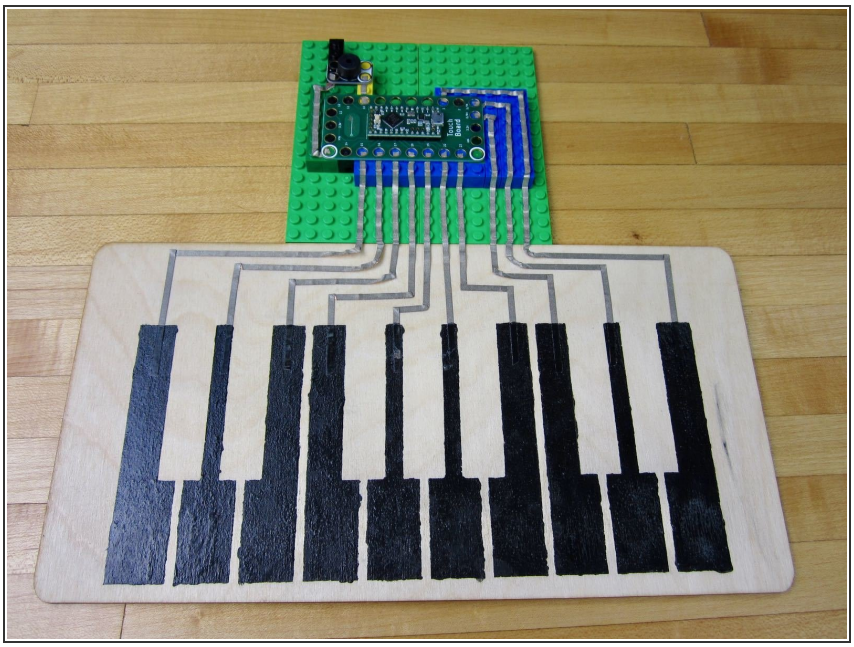
Step 1 — Tips for Using Conductive Paint



- Print off the Piano Key Stencil. (Also found at the end of this guide.)
- Use some fancy paper cutting skills and turn that print out into a stencil.
- Tape the stencil to your work area and use Bare Conductive Paint to paint piano keys.
- Let dry. Then run conductive tape from your Invention Board and over each key.

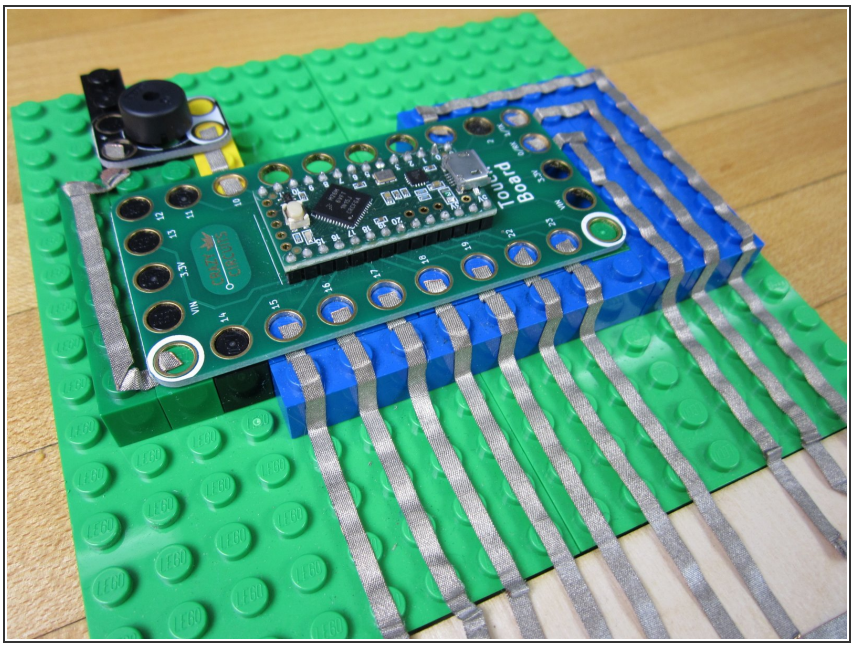
ⓘ While you don't need to, you can then over the parts of your tape that go over the paint.

⚠ Bare Conductive Paint is water soluble. That means that any moisture on your hands will start to melt the paint. To protect it, apply a clear coat spray paint over the top of it. This won't cause any issues with the Capacitive Touch.

⚠ No, seriously. Throw on a quick coat of spray paint. Otherwise just use some aluminum tape from the hardware store to make keys.

ⓘ It should go without saying that you don't NEED to make Piano keys. Giant dots or stenciled letters (that align to the note thats being played) work beautifully in a classroom or library.

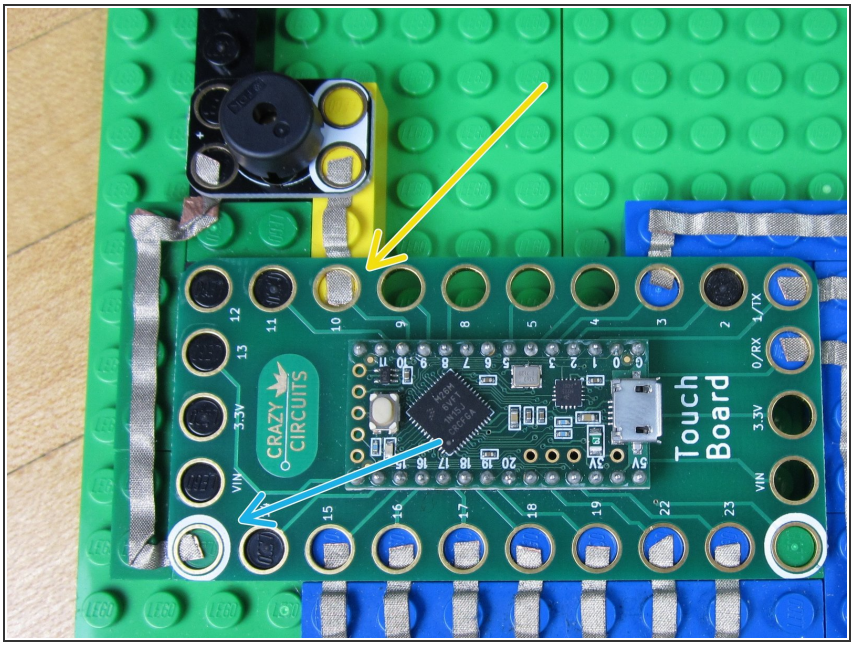
Step 2 — Create a Platform



- Start with an 8x16 sized brick plate.
- Create a raised platform for your Invention Board to sit on. Use either thin brick plates or larger brick blocks.

ⓘ Creating a platform is necessary because there are only holes around the *outside* of the Invention Board.

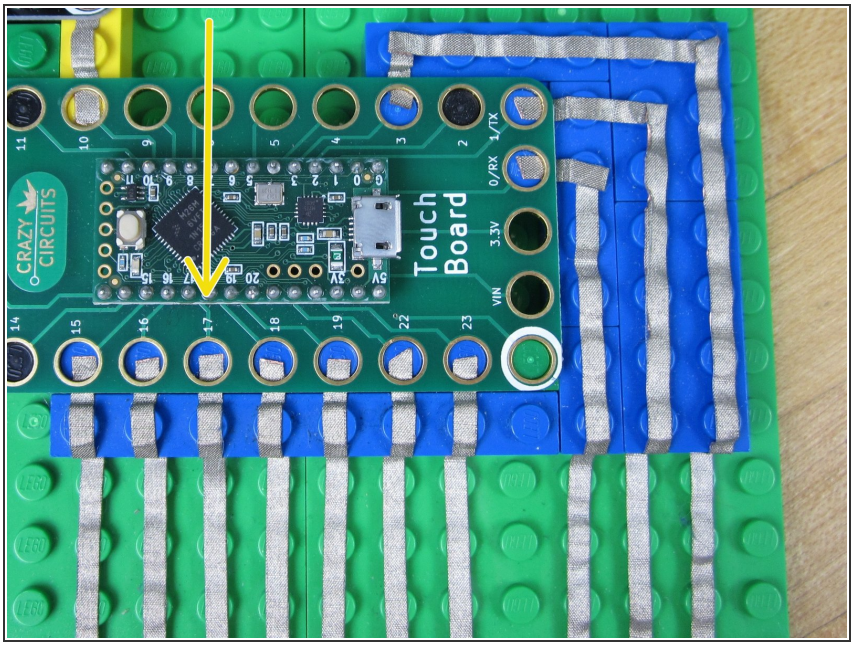
Step 3 — Connect the Piezo Speaker



- Connect Pin 10 to one side of the Piezo Speaker.
- Connect the other side to Ground.

ⓘ Our Piezo Speaker has a White and a Colored side, however it doesn't matter which side you use for the Pin 10 connection and Ground connection.

Step 4 — Connect the Invention Board to the Paint



- There are 11 Touch Pins that can be used for this project. We used 10 Touch Points in our example, but you can use all 11 or fewer.
- Run your tape from a Conductive Paint Touch Point to a Pin on the Invention Board. The Conductive Tape should overlap your Conductive Paint area for half an inch or more.
- Pins 15, 16, 17, 18, 19, 22, 23, 0, 1, 3, and 4 are all Touch Points and are set up to play notes with our code.
- While you typically don't need to, you can always paint over the overlap area of your Tape and Paint.

Step 5 — Programing the Invention Board

TeensyPiano

```
/*
 * TeensyPiano.ino
 *
 * Brown Dog Gadgets
 *
 * Pete Prodoehl <pete@2xlnetworks.com>
 *
 * 2017-03-11
 *
 * https://www.arduino.cc/en/Tutorial/ToneMelody
 *
 */


int touchPinA = 15;
int touchPinB = 16;
int touchPinC = 17;
int touchPinD = 18;
int touchPinE = 19;
int touchPinF = 22;
int touchPinG = 23;
int touchPinH = 0;
int touchPinI = 1;
int touchPinJ = 3;
int touchPinK = 4;

int restA;
int restB;
int restC;
int restD;
int restE;
int restF;
int restG;
int restH;
int restI;
int restJ;
int restK;

int speakerPin = 10; // output pin

int ledPinCal = 13;

int pinLevel = 200; // may need adjusting

```

If you've not used your Invention Board before you should read the Invention Board User Guide. Practice uploading code before doing this project.

- Open up your Arduino Software.
- Download the Teensie Piano code file. (Found at that link.)
- Copy and paste that code into your Arduino software window.

If you're not changing anything, just upload the code. Otherwise go to the next step to see how we change things up!

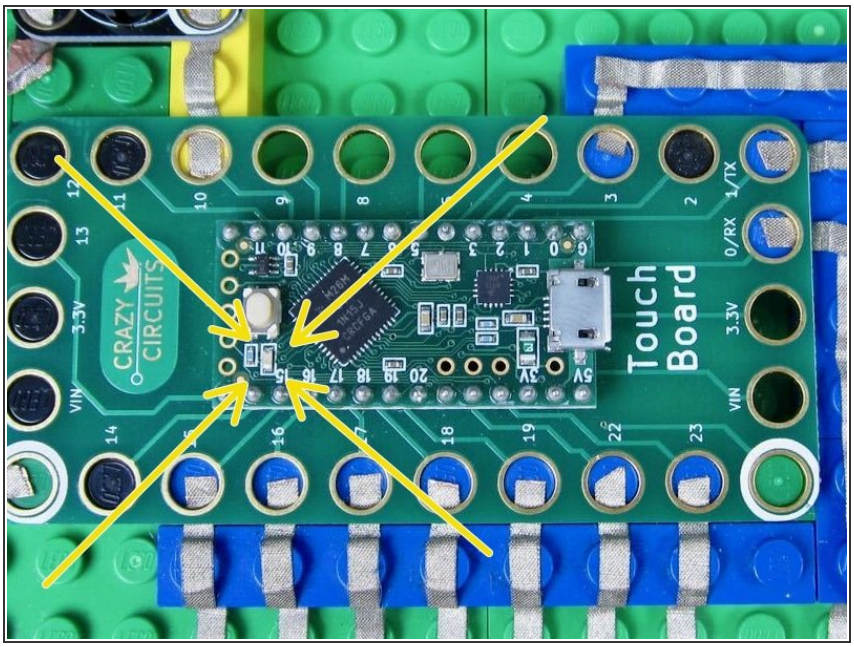
Step 6 — Changing the Notes

```
66
67  if (valA > (restA + pinLevel)) {
68    // Serial.println(valA);
69    tone(speakerPin, 523);
70  }
71
72  if (valB > (restB + pinLevel)) {
73    // Serial.println(valB);
74    tone(speakerPin, 587);
75  }
76
77  if (valC > (restC + pinLevel)) {
78    // Serial.println(valC);
79    tone(speakerPin, 659);
80  }
81
82  if (valD > (restD + pinLevel)) {
83    // Serial.println(valD);
84    tone(speakerPin, 698);
85  }
86
```

```
#define NOTE_AS3 233
#define NOTE_B3  247
#define NOTE_C4  262
#define NOTE_CS4 277
#define NOTE_D4  294
#define NOTE_DS4 311
#define NOTE_E4  330
#define NOTE_F4  349
#define NOTE_FS4 370
#define NOTE_G4  392
#define NOTE_GS4 415
#define NOTE_A4  440
#define NOTE_AS4 466
#define NOTE_B4  494
#define NOTE_C5  523
#define NOTE_CS5 554
#define NOTE_D5  587
#define NOTE_DS5 622
#define NOTE_E5  659
#define NOTE_F5  698
#define NOTE_FS5 740
#define NOTE_G5  784
#define NOTE_GS5 831
#define NOTE_A5  880
#define NOTE_AS5 932
#define NOTE_B5  988
#define NOTE_C6  1047
#define NOTE_CS6 1109
#define NOTE_D6  1175
#define NOTE_DS6 1245
#define NOTE_E6  1319
#define NOTE_F6  1397
#define NOTE_FS6 1480
```

- You can change the type of tone (note) that each Touch Point makes by changing number values in the code.
- For example, the code that determines the sound that Pin 15 makes is controlled by the code between lines 67 - 69. (Line 15 says that Pin 15 gets called **touchPinA** in the rest of the code.)
- Specifically: **tone(speakerPin, 523);**
- What this code says is that when the Touch Point of pin 15 is activated, the Piezo Speaker will play a tone at a value of 523 Hertz, or what a musician would call a C note.
- To change the value just change that number. You can find a full list of what musical note corresponds to what Hertz value on this website.
- Once you're done, upload the code.

Step 7 — Invention Board Auto-Calibration



- Once the code has been uploaded it will run automatically whenever the Invention Board is powered on. This can be from a computer or from a wall USB port.
- When it first turns on it will take 3-5 seconds to **Calibrate**. This means the board is sensing what is attached to the various Touch Points. During this time you should not touch anything.
- The Invention Board shows when it's Calibrating by turning on a small LED in the middle of the Invention Board. Once that LED turns off, you can start to use the piano.

Step 8 — Trouble Shooting

- Did you let your Invention Board Calibrate for 4-5 seconds when you first plugged it in?
- Did your code upload properly? (Refer to the Invention Board User Guide)
- Is your Piezo Speaker hooked up to the correct pin? Make sure that whatever pin it's physically hooked up to is the same as the pin designated in the code. (Step 6)

This project is a great crowd pleaser and easy to expand into many formats. Paint, dough, aluminum tape, conductive fabric, cups of water, or even people can be used as Touch Points. Experiment with different materials and find what works best for you.