Sketching music

A gentle introduction to prototyping interaction with electronics

Andrea Bianchi
make :: lab
KAIST

3Cs event at TCIS on April 16, 2025

Objectives for today

1. Hearing a bit about myself and the design I work on
3. Playing a bit with a new musical instrument
5. Learning about how it works

Andrea Bianchi
Professor
Industrial Design
KAIST

NYU

KAIST

Masters CS
2007

PhD HCI
2012

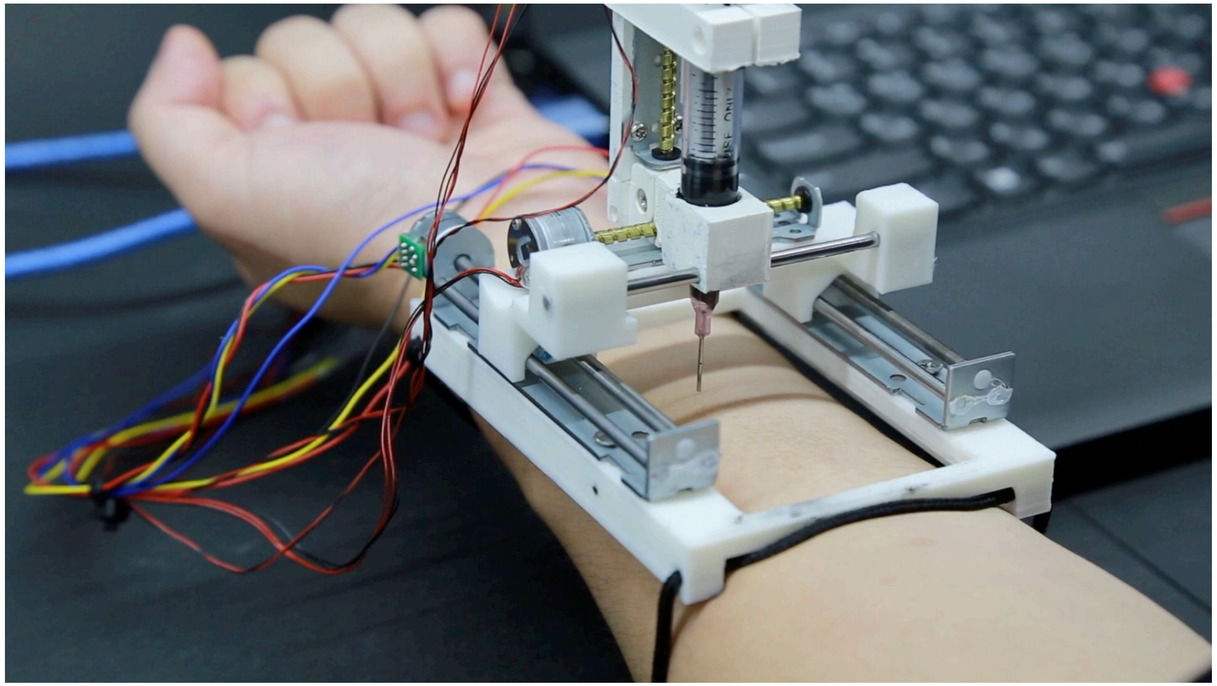
Design

Jungwoo Rhee
Master student

Heeji Kim
Master student

Design

Design
make :: lab
interaction



3D Printed Pyrography

Using Wood Filament and Dynamic Control of Nozzle Temperature
for Embedding Shades of Color in Objects

Kongpyung (Justin) Moon[1], Jaeseong Yi[1], Valkyrie Savage[2], Andrea Bianchi[1]
Department of Industrial Design, KAIST [1], Department of Computer Science, University of Copenhagen [2]

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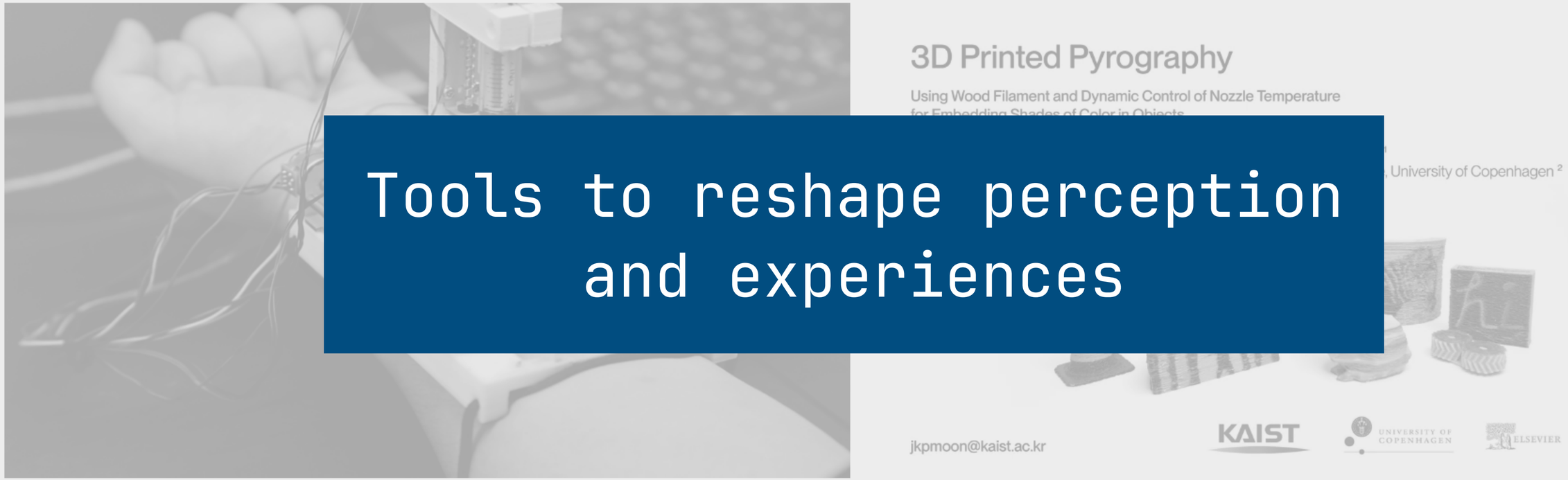
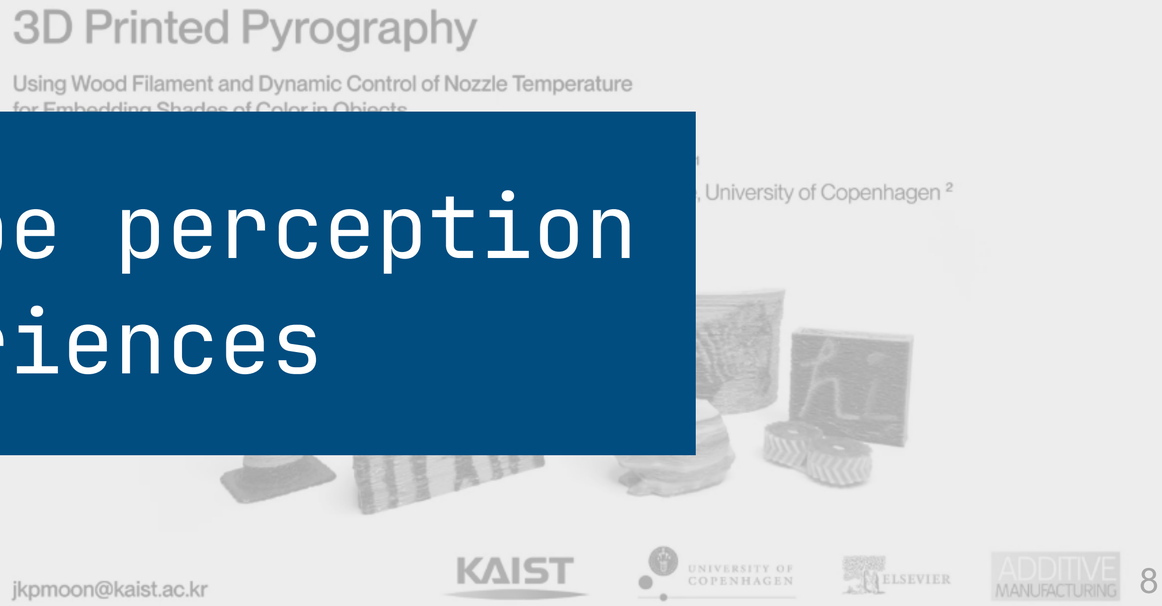
KAIST UNIVERSITY OF COPENHAGEN ELSEVIER ADDITIVE MANUFACTURING

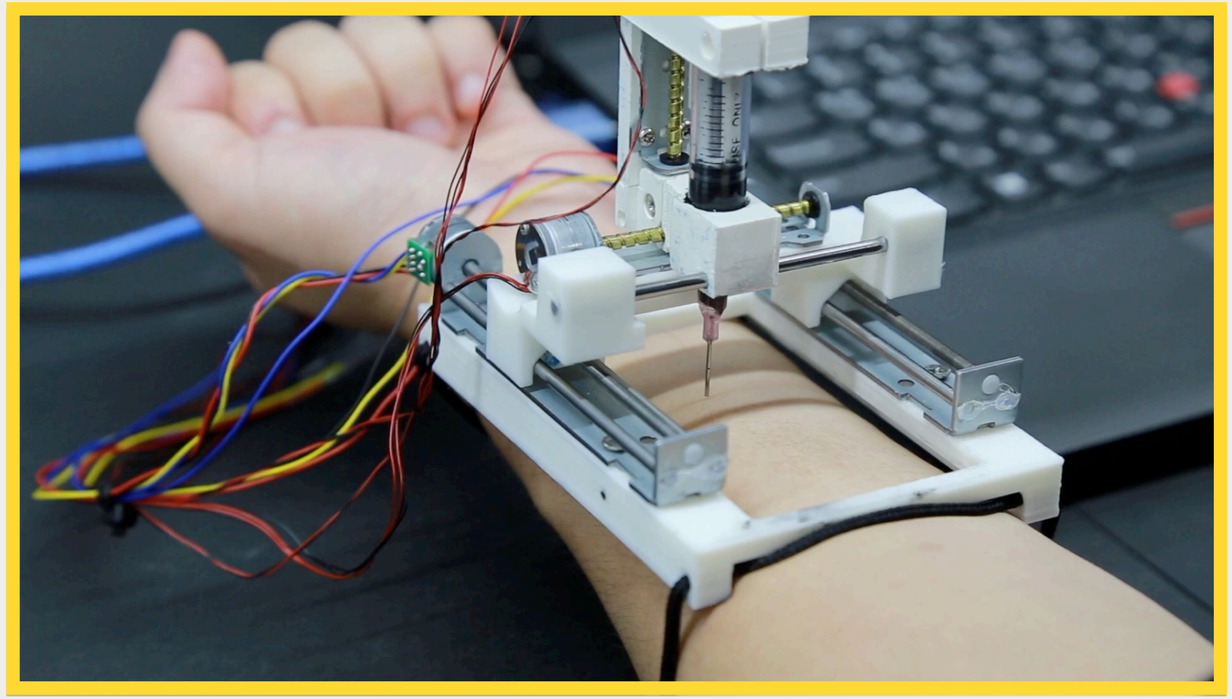


Tools to reshape perception and experiences



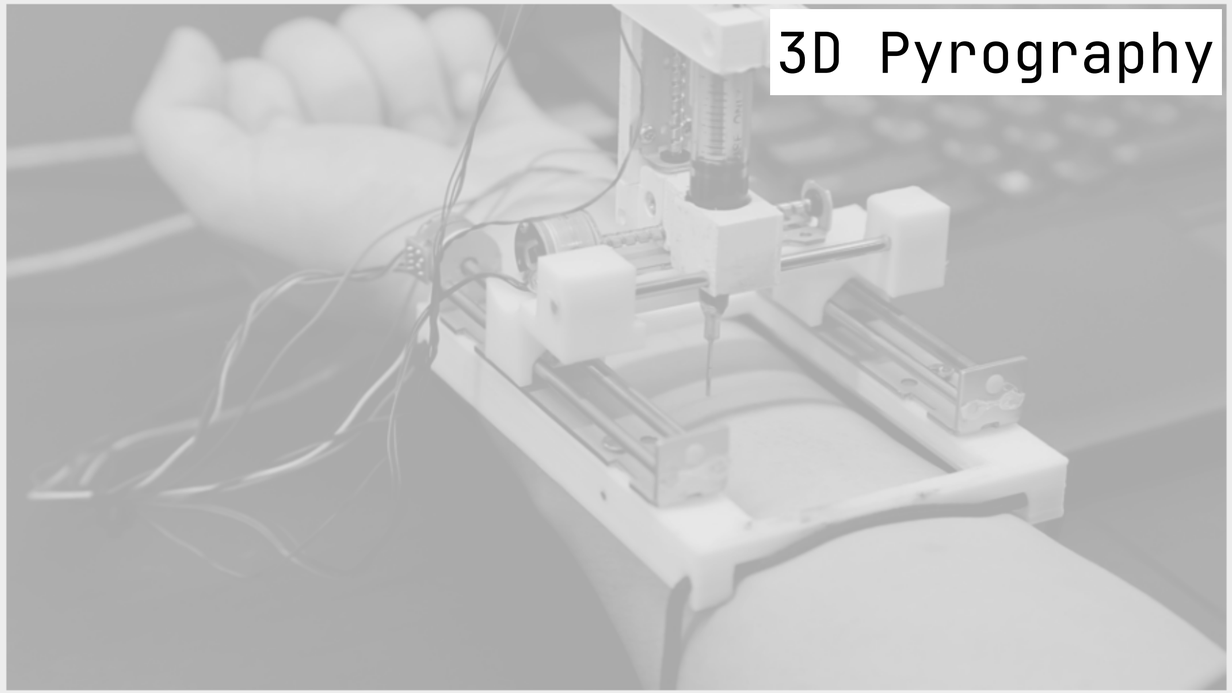
Tools to reshape perception and experiences

Tools for digital fabrication and creativity



Body Printer

Tools for digital fabrication and creativity



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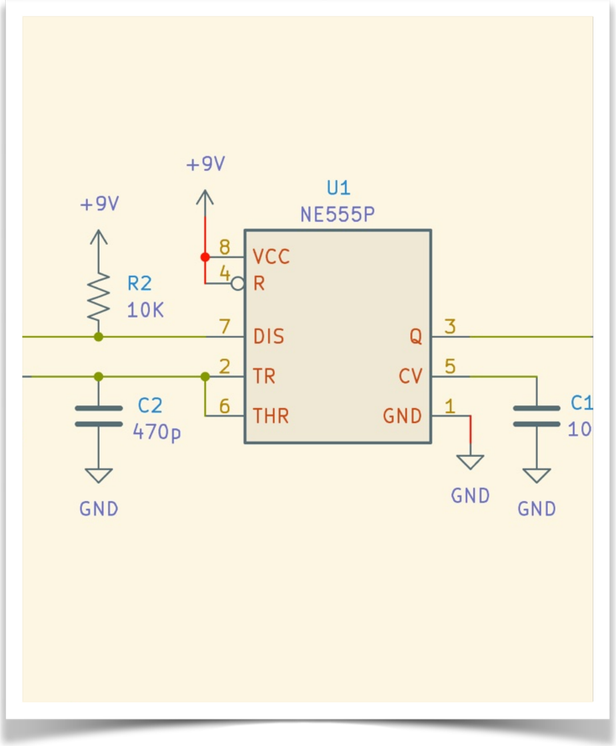
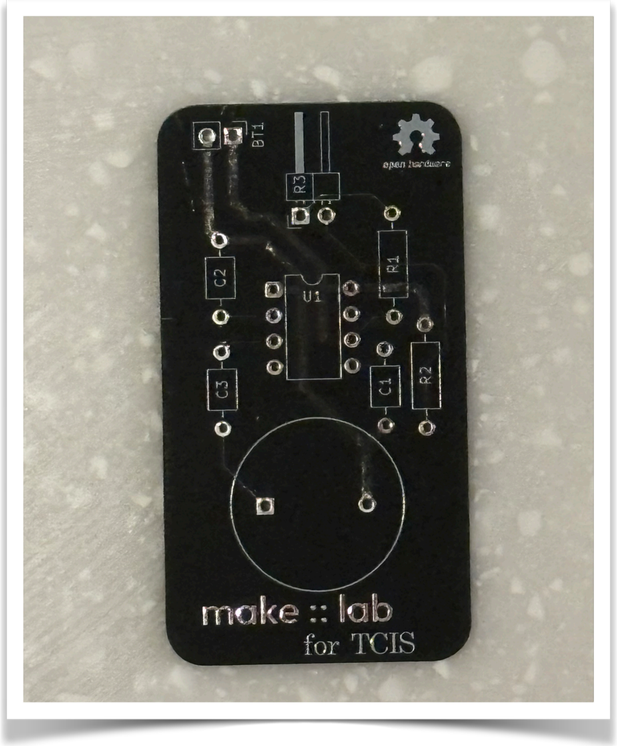
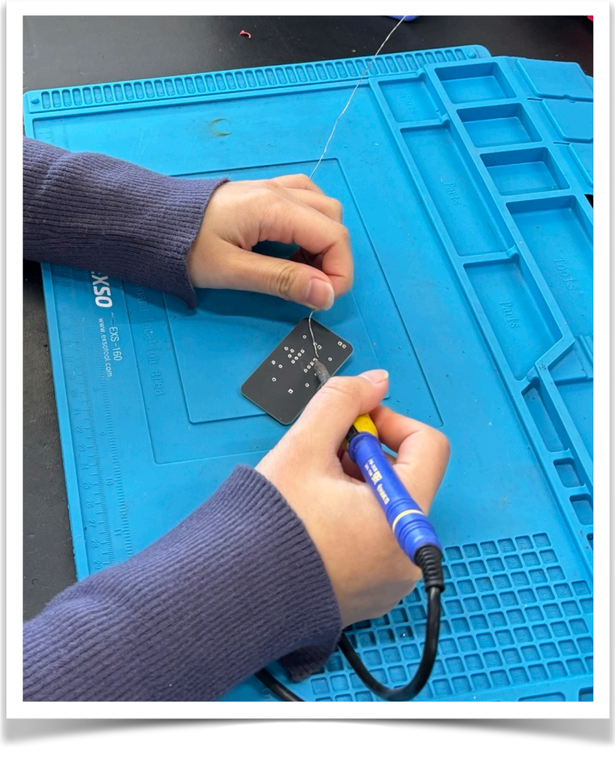
Design as a process



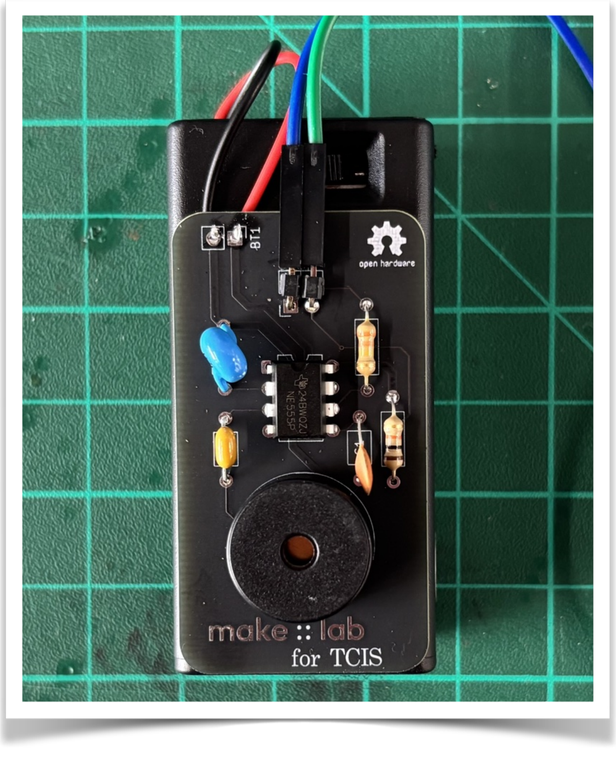
Circuit design



Fabrication



Assembly

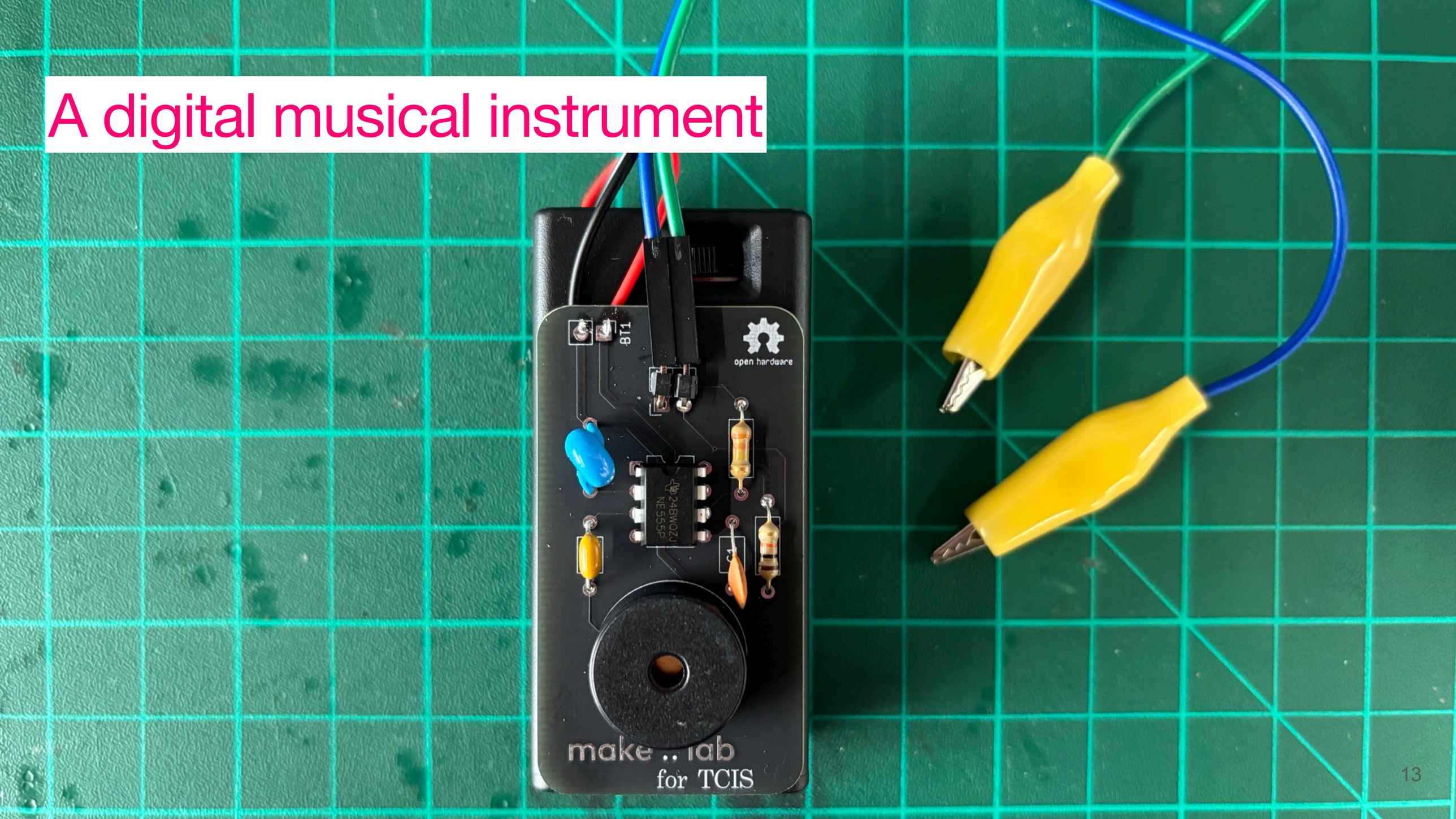


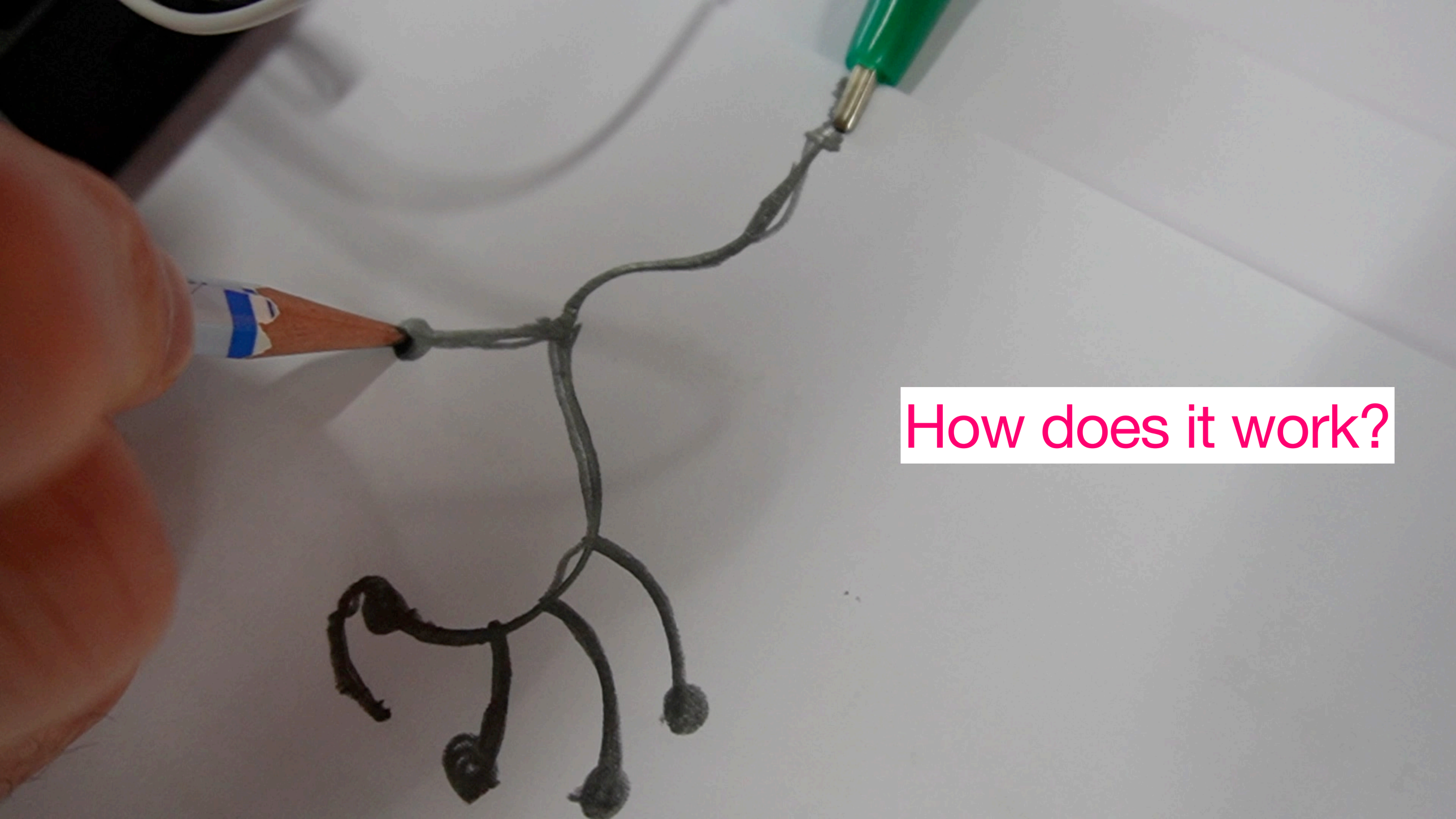
Result

Let's

sketch some music

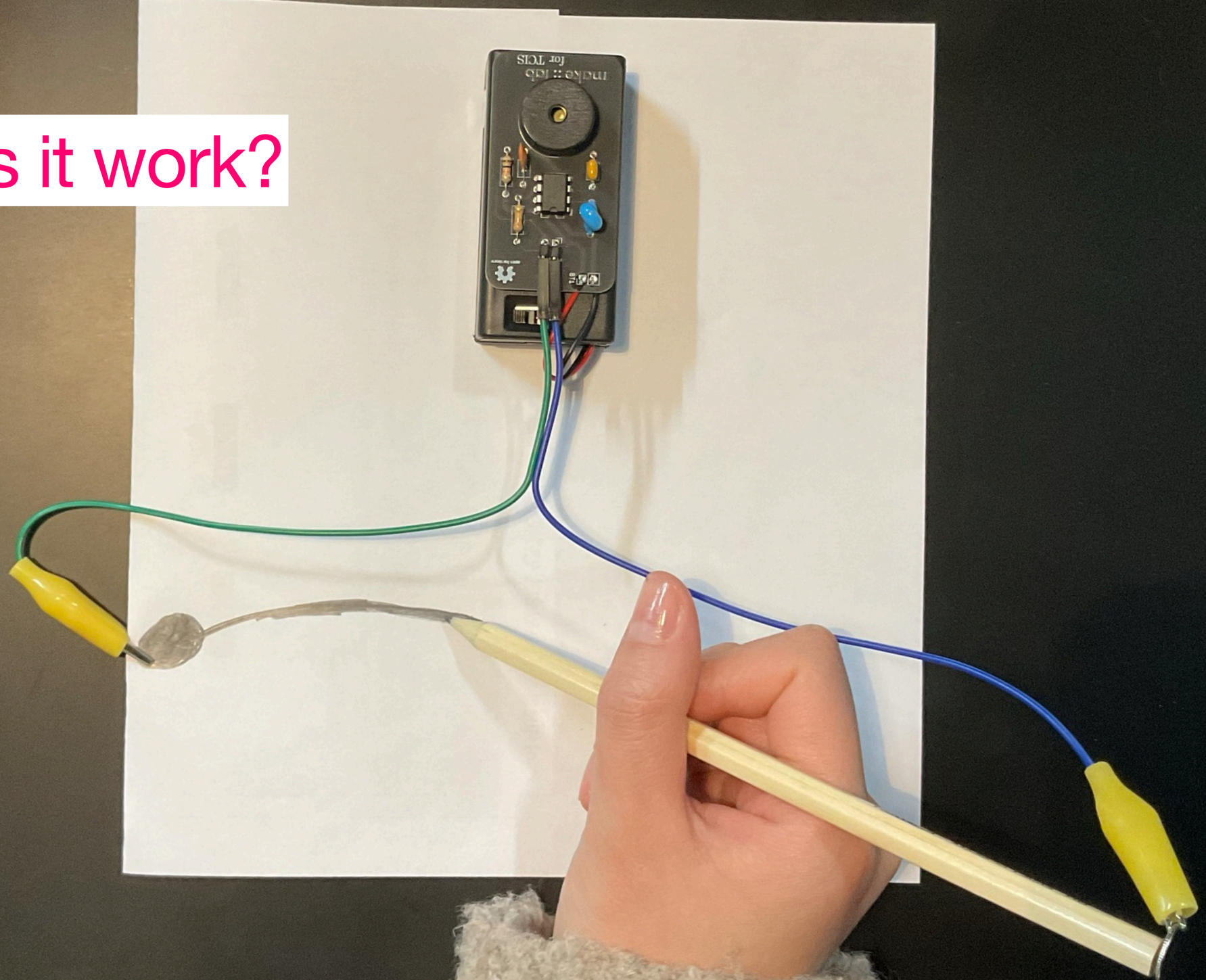
A digital musical instrument



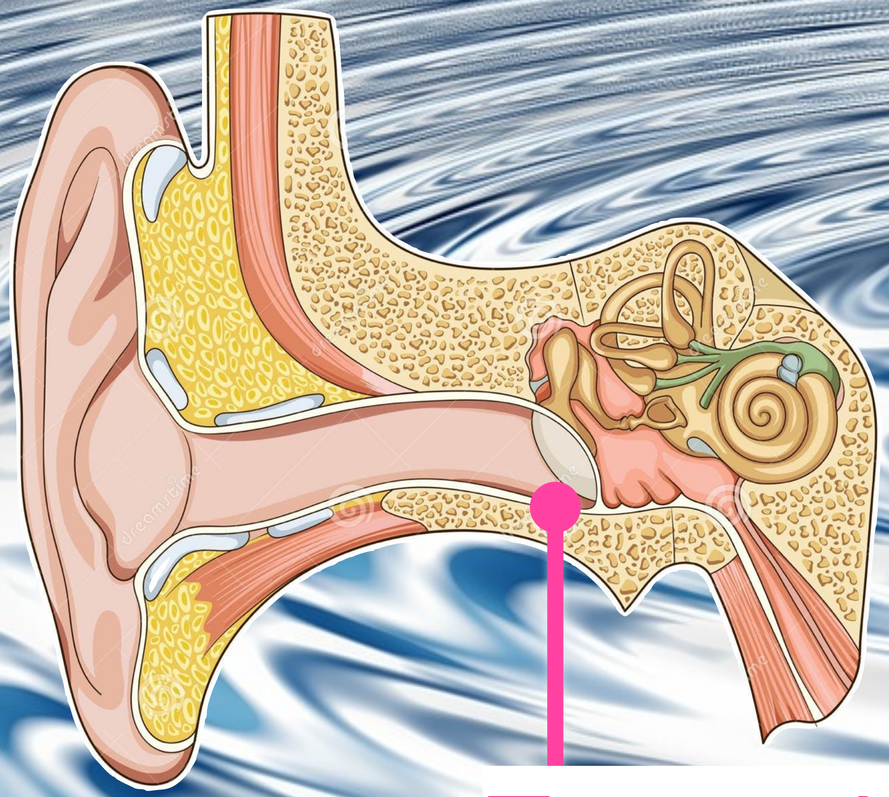


How does it work?

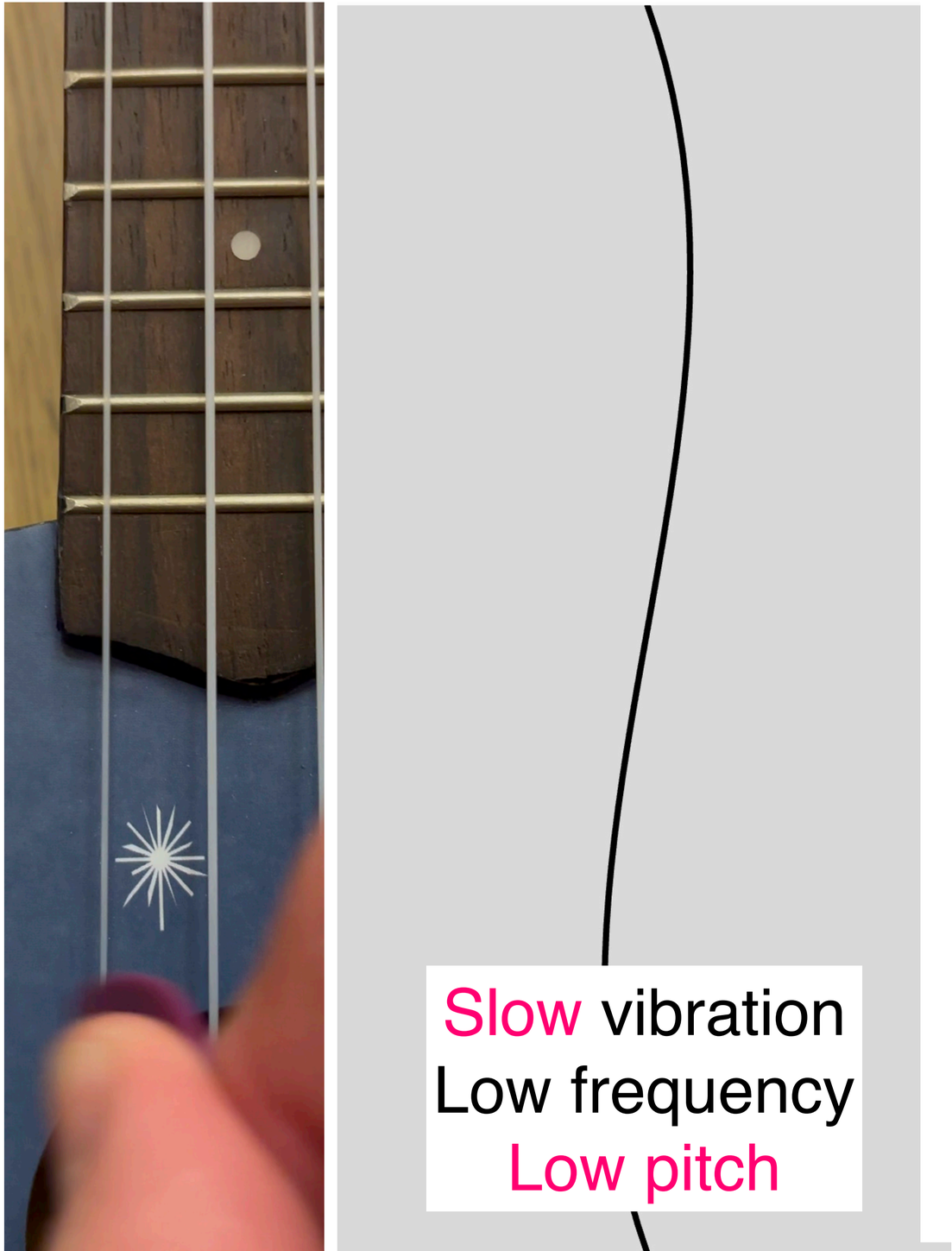
How does it work?

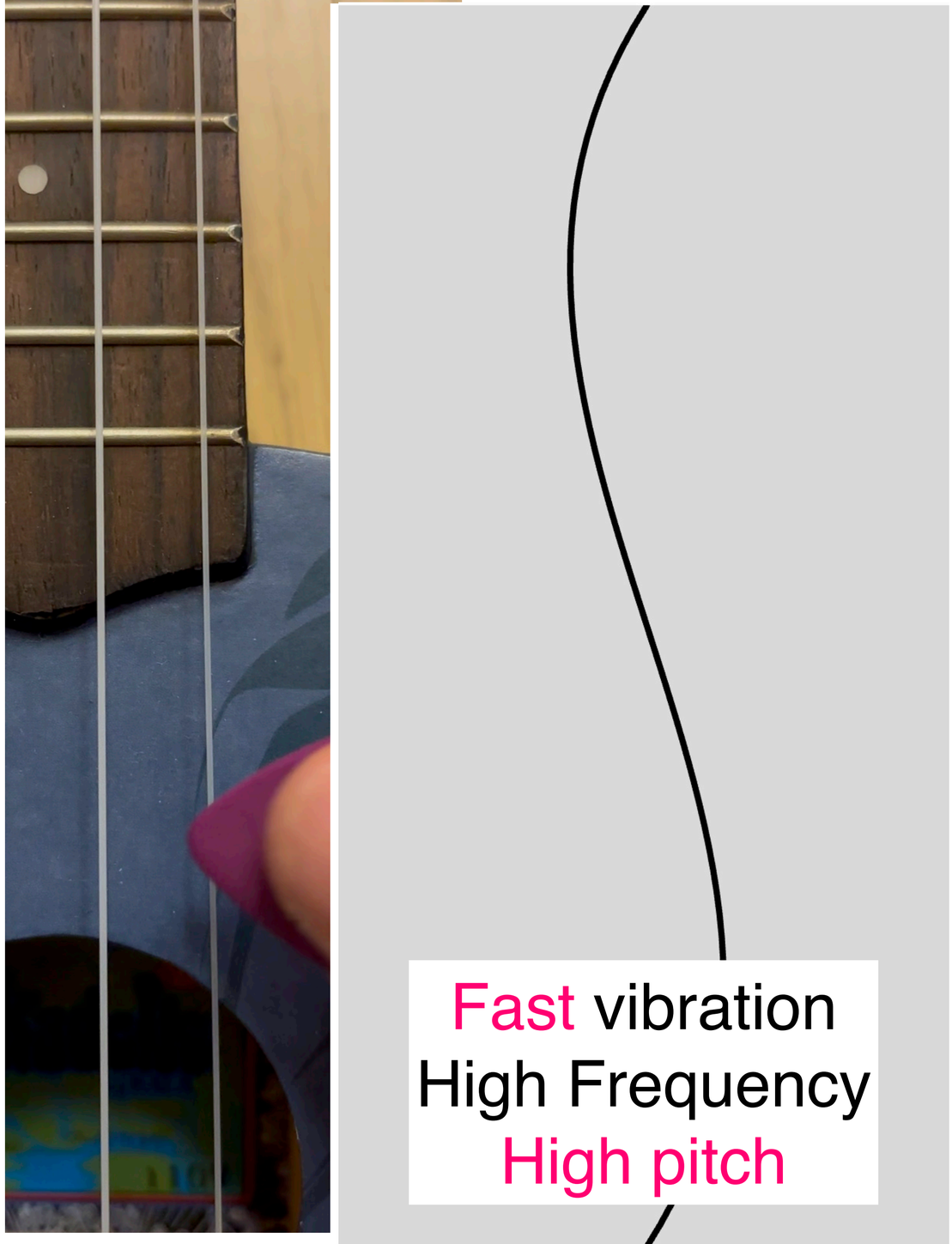


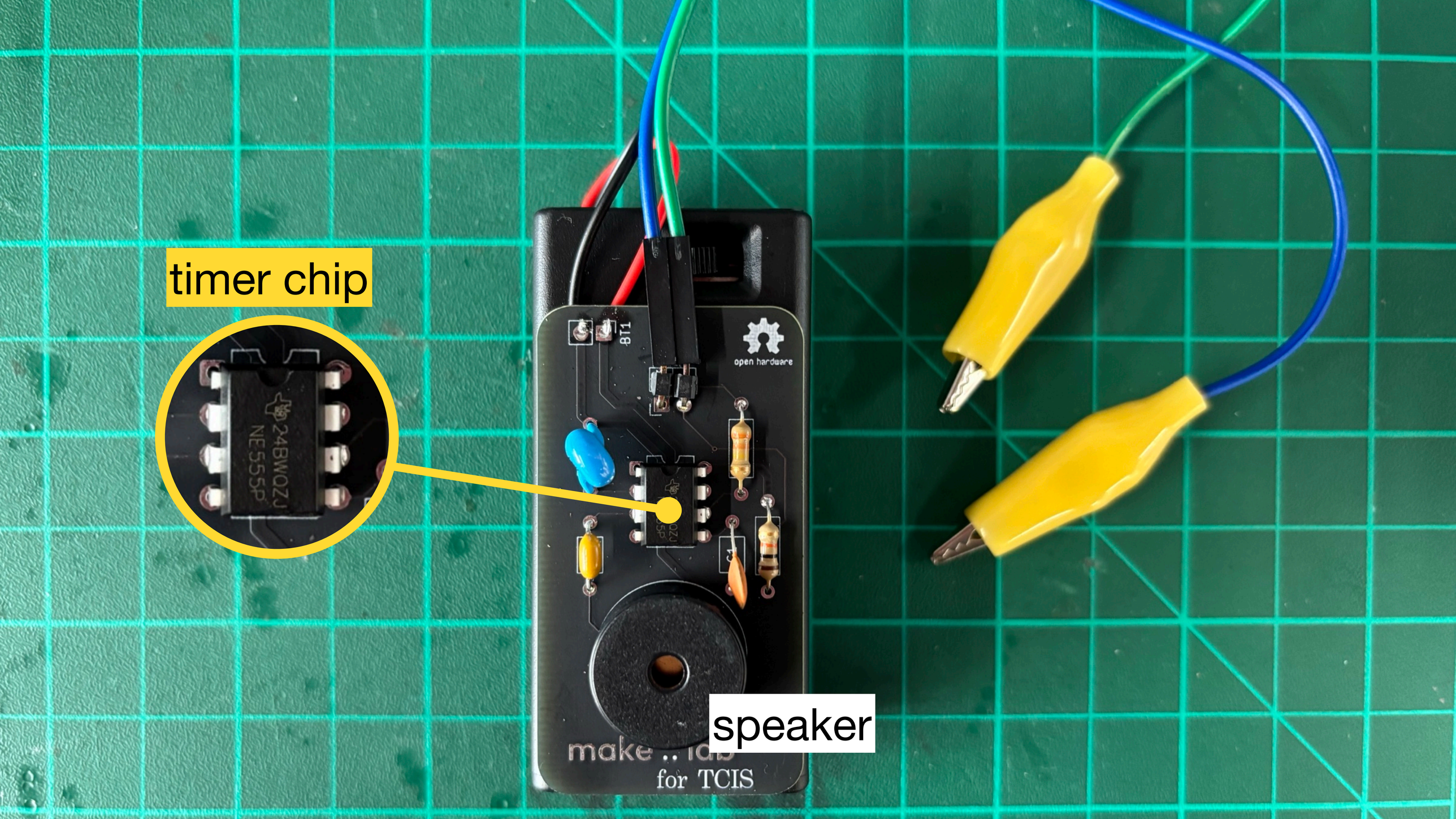
Sound is a vibration that propagates as an acoustic wave in a gas, liquid or solid.

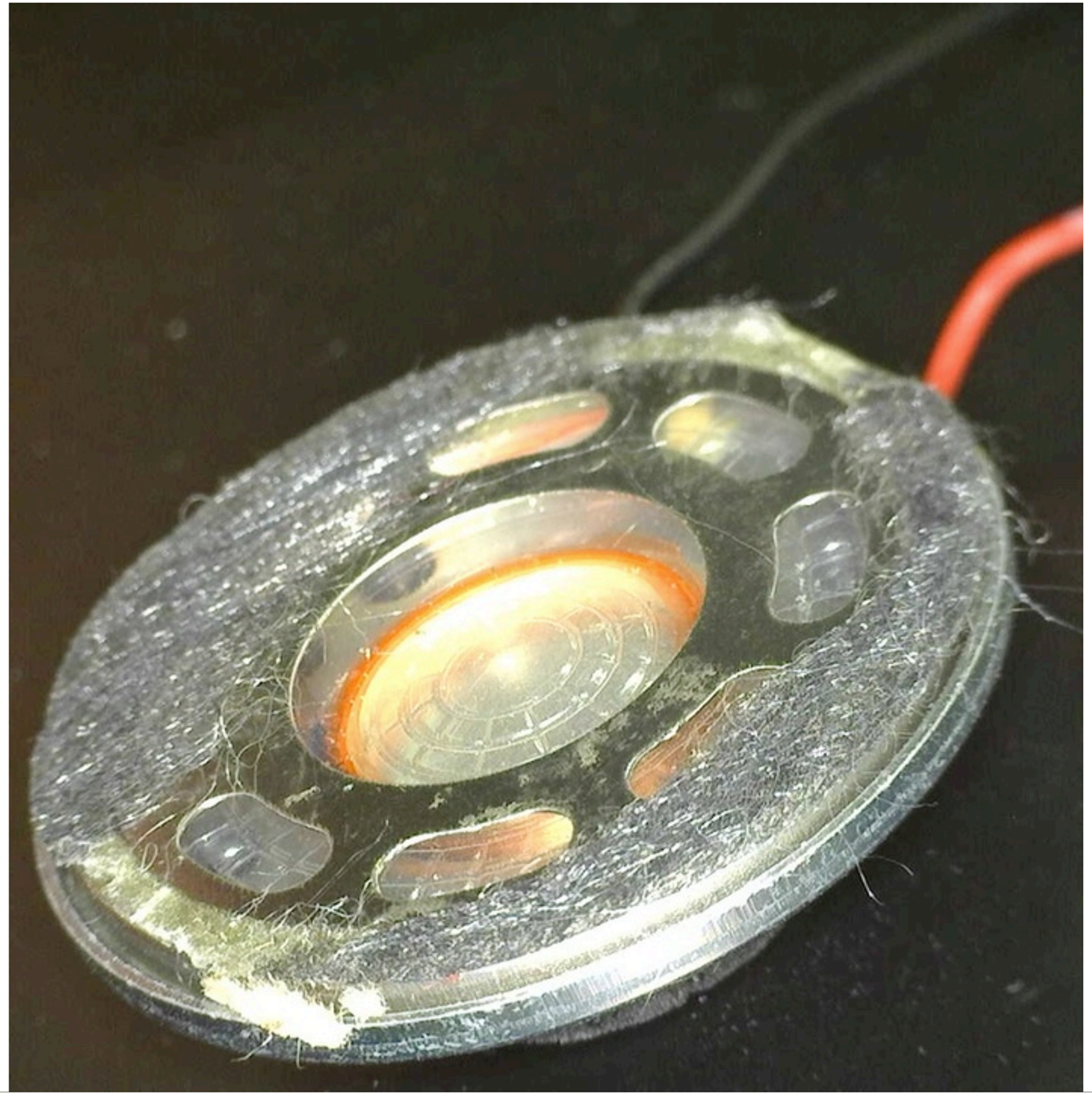


Tympanic membrane

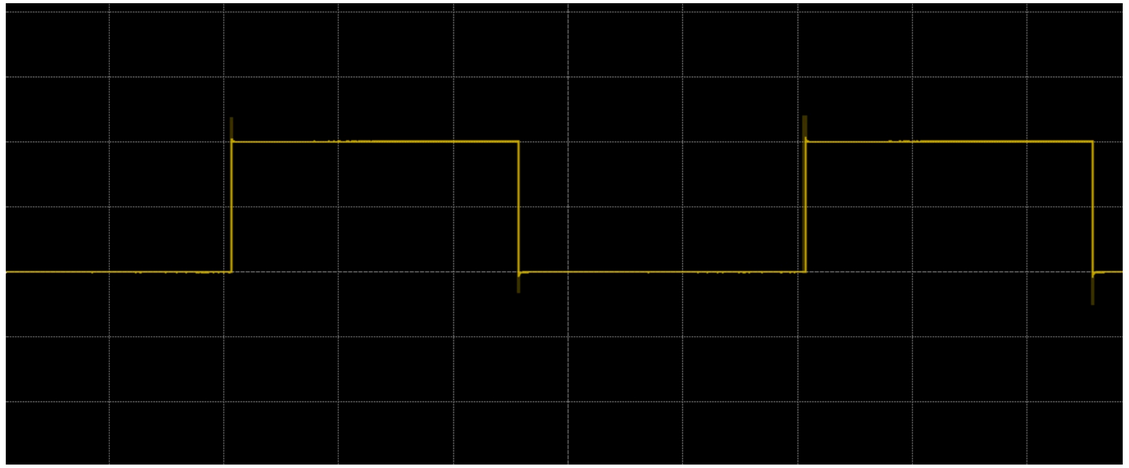

Slow vibration
Low frequency
Low pitch

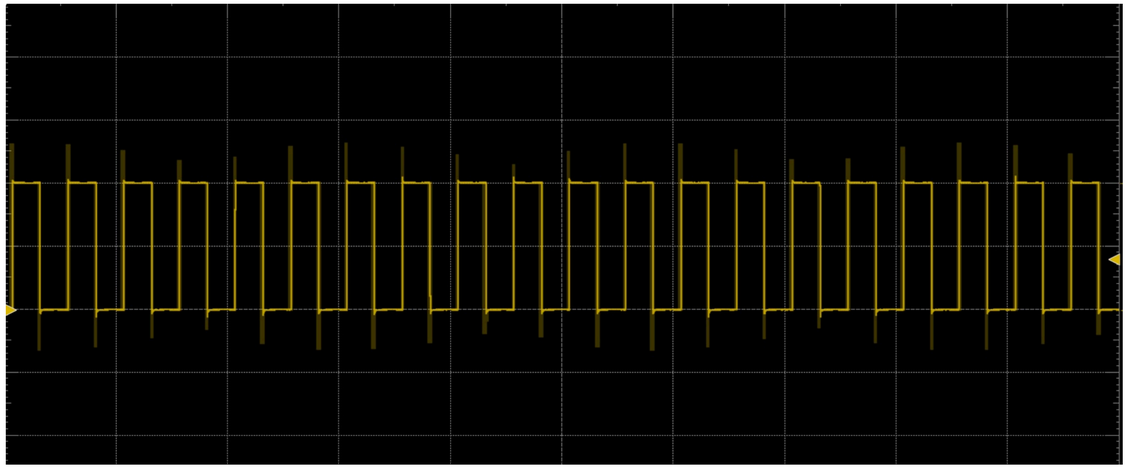

Fast vibration
High Frequency
High pitch


timer chip
24BWQZJ
NE555P
BT1
open hardware
C1
speaker
for TCIS

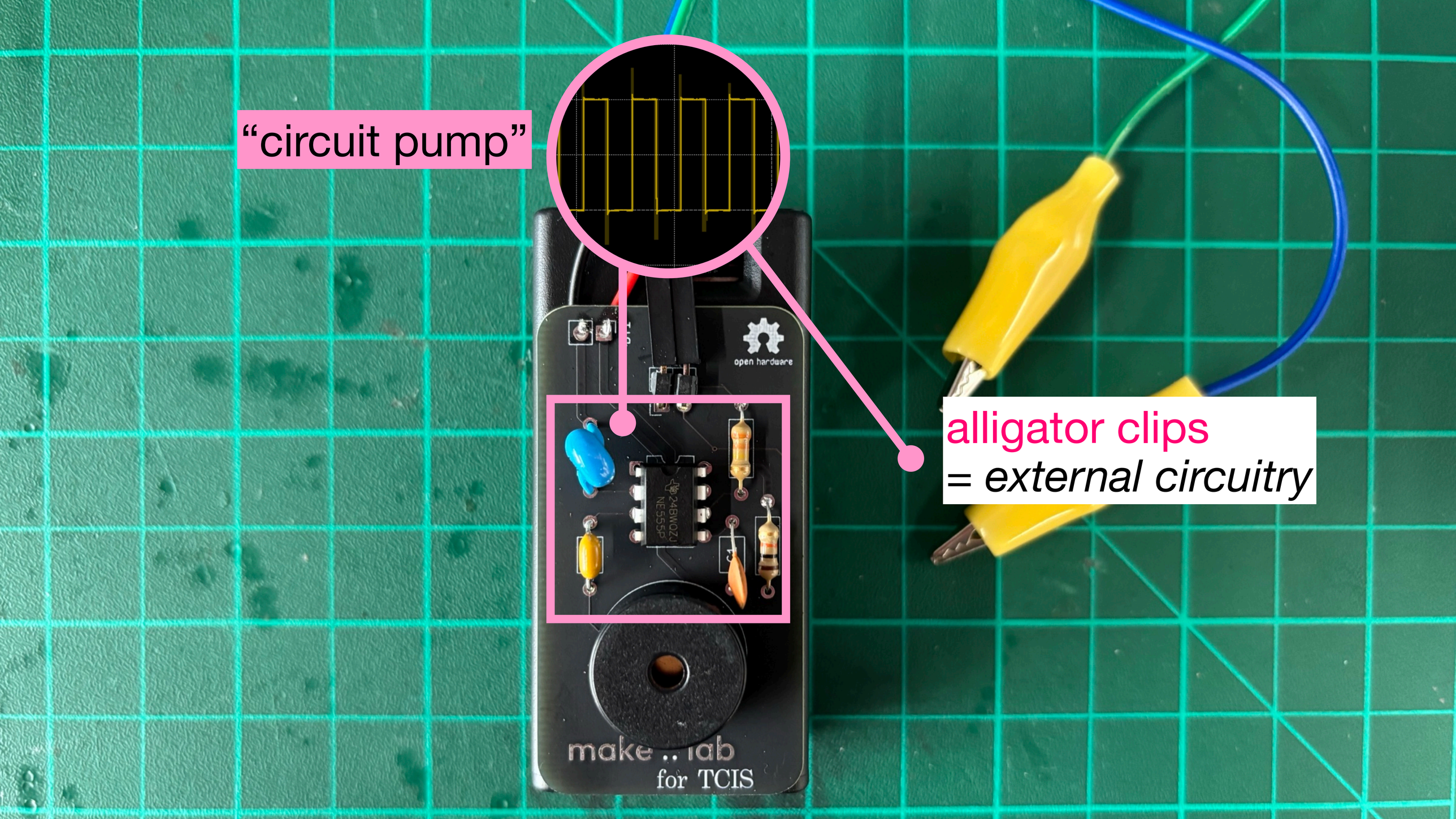


Slow Vibration - Low pitch

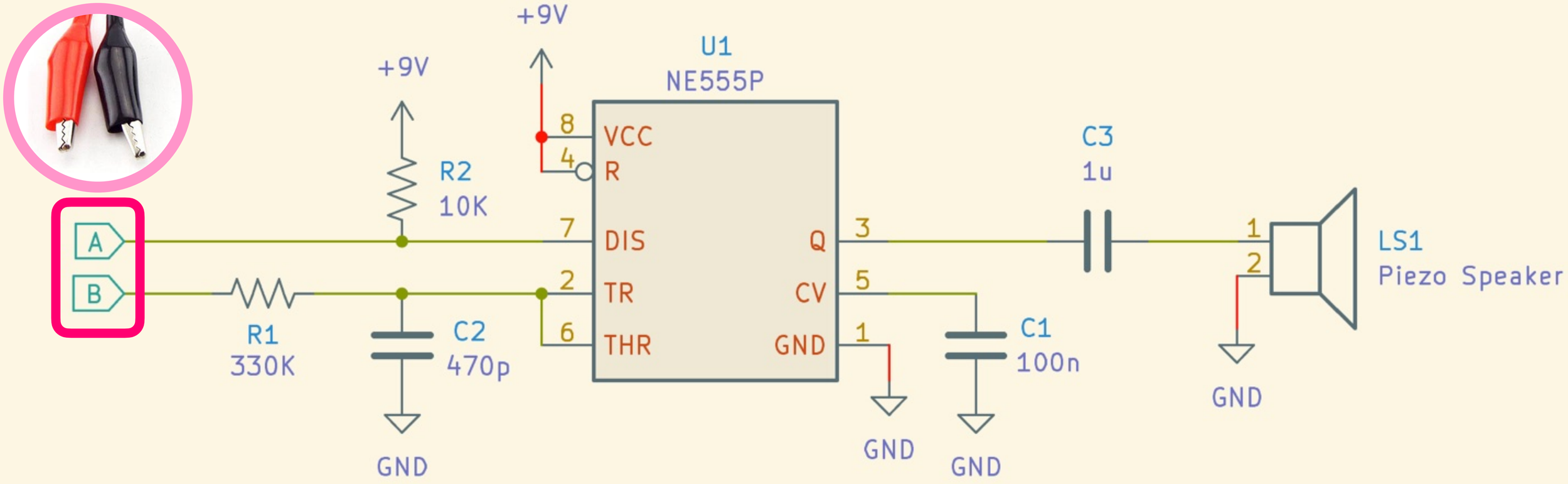




Fast Vibration - High pitch

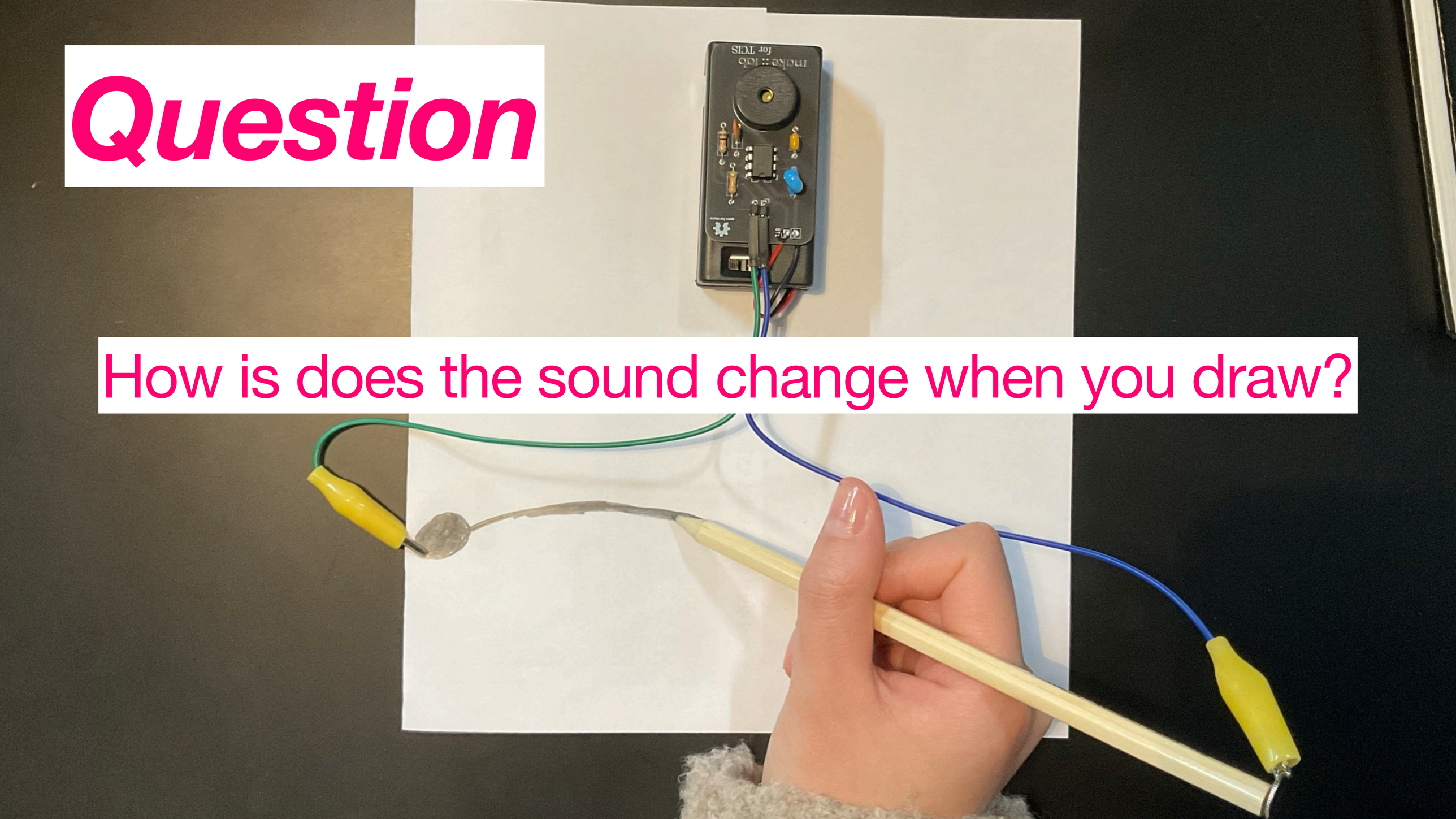

“circuit pump”
alligator clips
= external circuitry
open hardware
NE555P
make .. lab
for TCIS

A diagram of the circuit

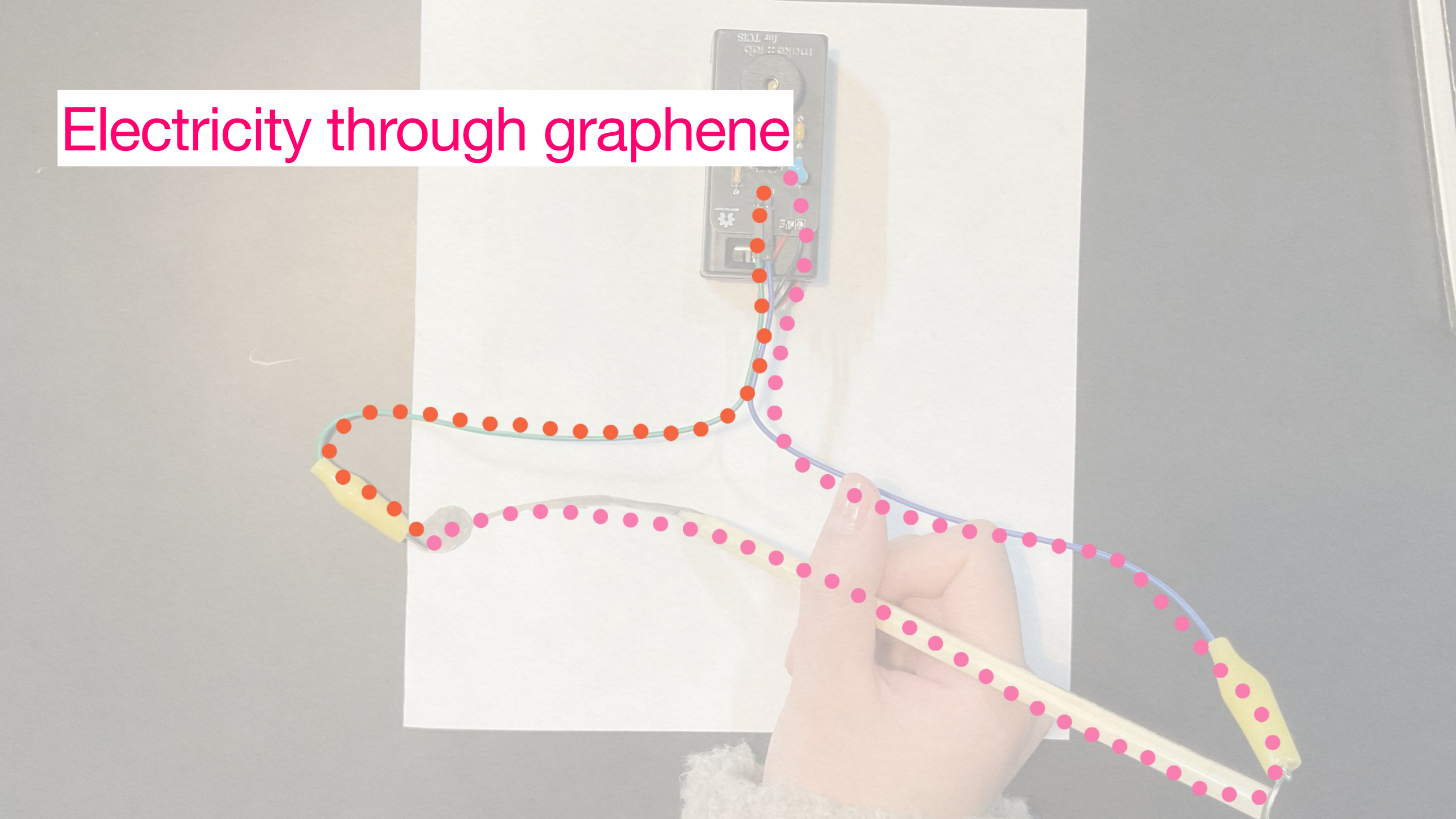


Question

How is does the sound change when you draw?



Electricity through graphene



Intuition

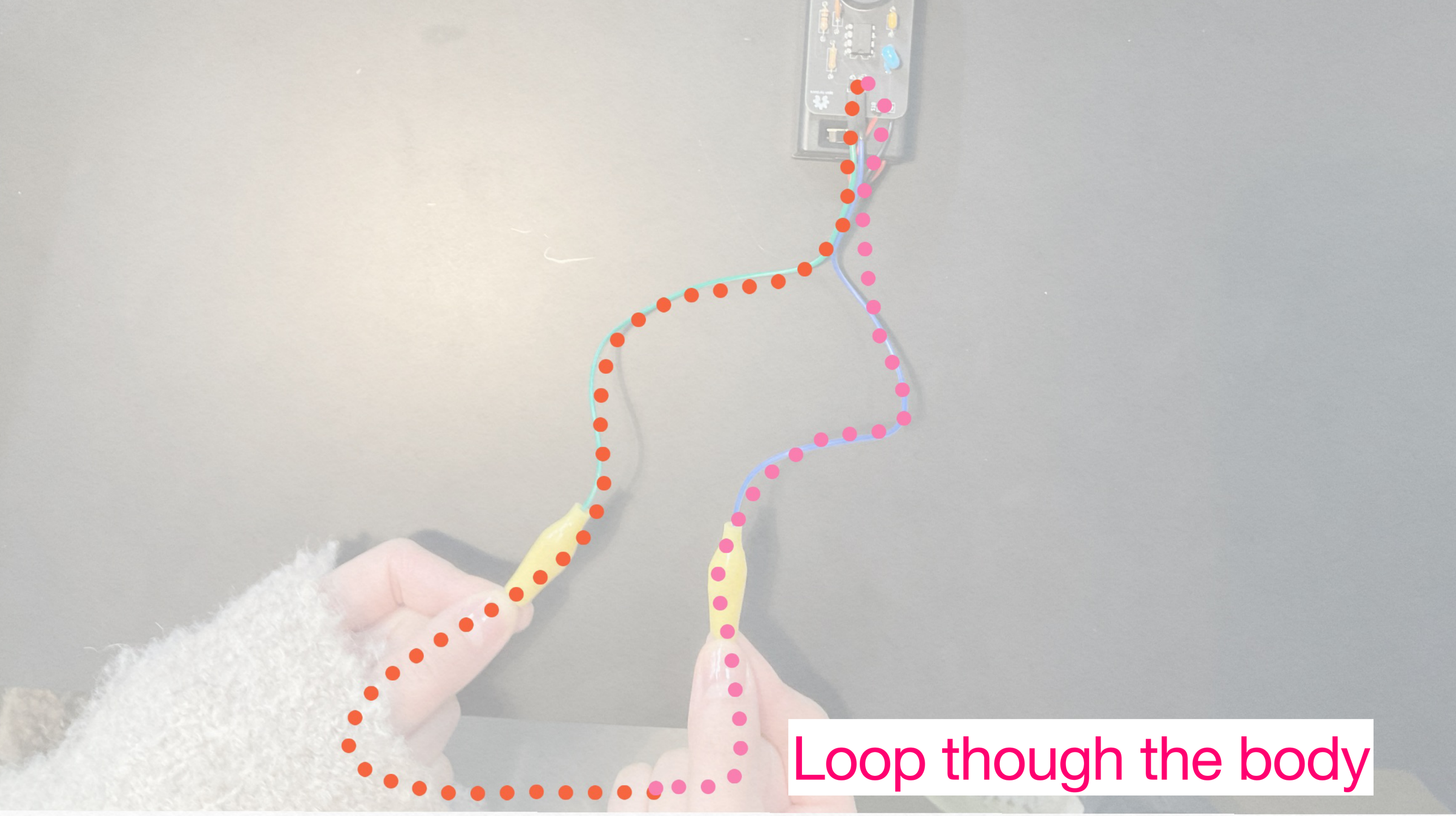
The longer / shorter the path

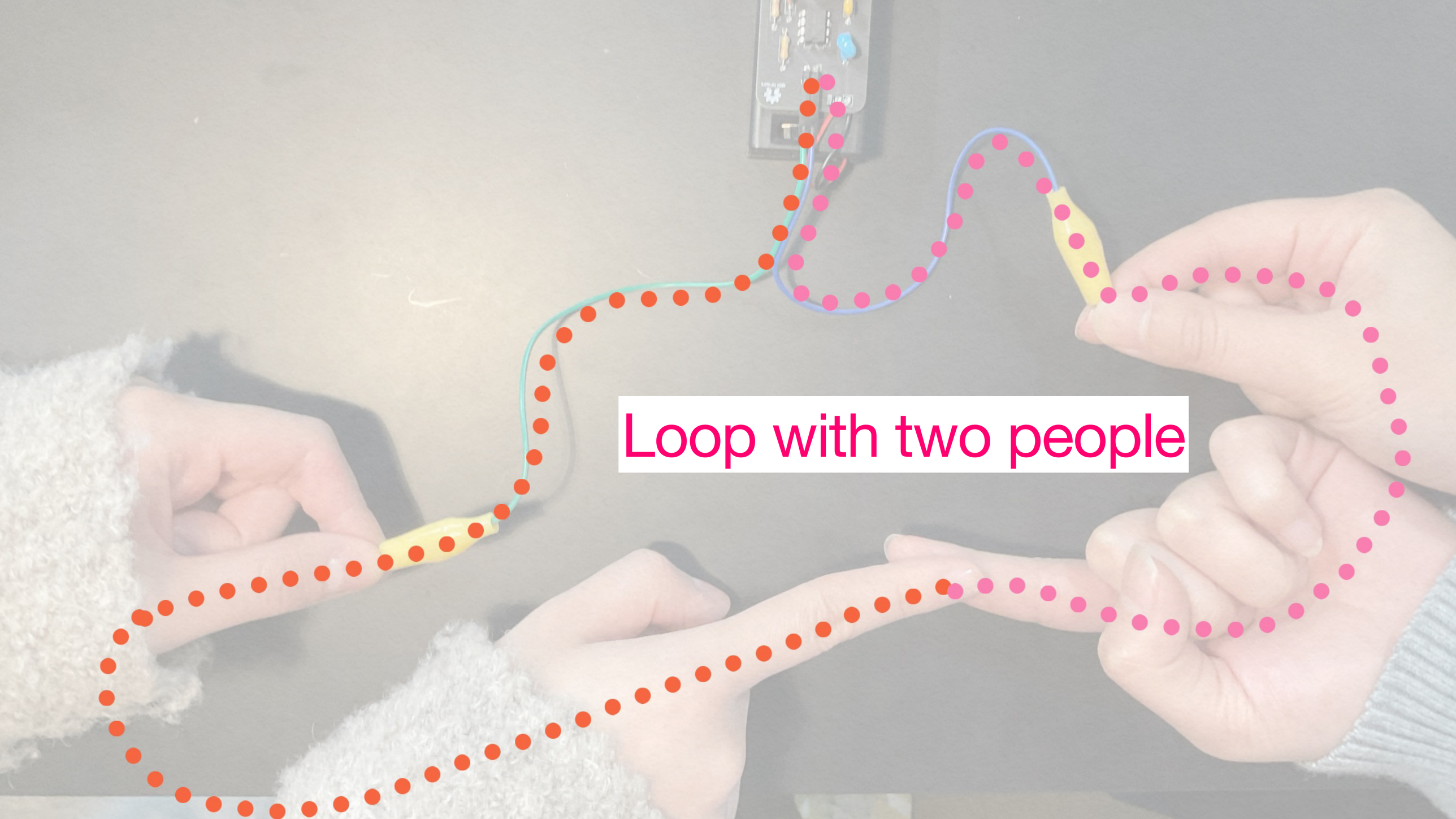
the lower / higher the conductivity

the lower / higher the pitch

Exercise

Beside the pencil what **other things** conduct and generate different sounds? **Try**!


Loop though the body


Loop with two people

What did we learn?

Sounds is a wave - we use a timer to generate it

We **modulate** the pitch (frequency) with **conductance**

- graphene is a conductor
- our body is a conductor

Material

All material is open source.

GitHub

https://github.com/makinteract/TCIS-music-board

Sketching music

A gentle introduction to prototyping interaction with electronics

Thank you

Andrea Bianchi

KAIST

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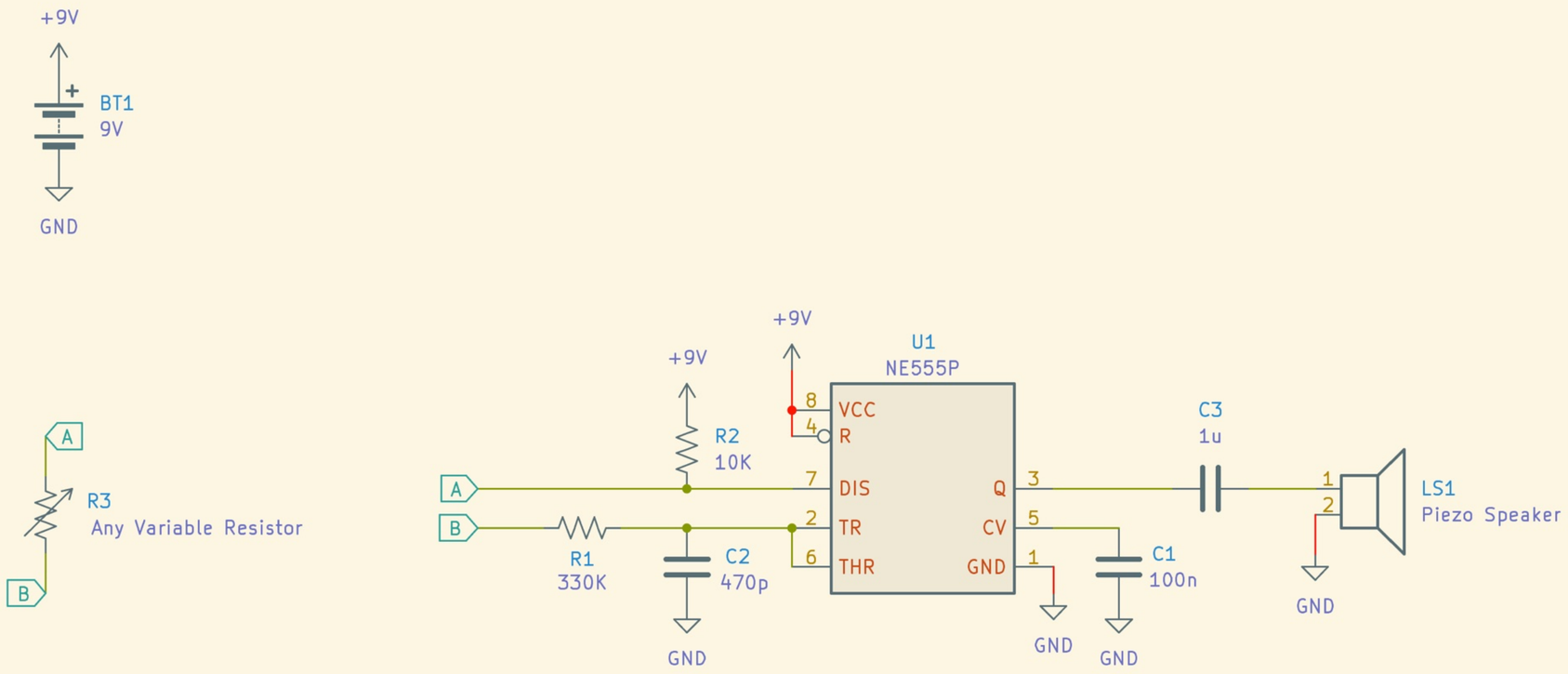
Appendix



Makinteract

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