terrario elettronico

Concrète Electric @Habitat,
Ca` de Monti, Tredozio (FC) ↘
17th August 2025

DIY workshop for photosensitive drone synths. A day dedicated to building your own primitive drone machine: theory, details, practice, experimentation, micro-welding and macro sounds. A small box with photosensitive antennas that communicate with each other, with bonfires, candles and fireflies.

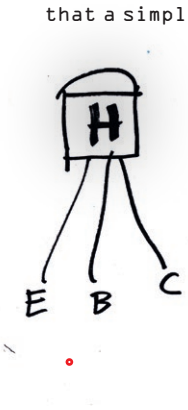
BILL OF MATERIALS

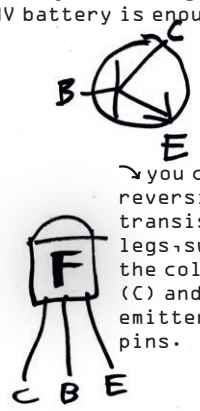
- 2x S9018H (S9018F works as well)
- 2x LDR 5K/220K (light/dark)
- 2X LED 5mm white
- 2X switch DPDT on/off/o
- 1X 2u2 16V electrolytic capacitor
- 1X 2.2uF 16V electrolytic capacitor
- 2X 33uF 16V electrolytic capacitor
- 1X 4.7uF 16V electrolytic capacitor
- 1X 220nF capacitor
- 1X 10K 1/4W resistor
- 1X 1K 1/4W resistor
- 1X B10K potentiometer angled PCB pins
- 1X mono jack female ¼ inch
- 1X 6x12 rows stripboard
- 1X 9V battery plug
- 1X enclosure
- 1X knob 6mm shaft
- 1X 6 pin line socket
- 1X 9V battery
- 80cm bipolar wire
- 50cm single core wire

Estimated cost as of 2025: 15/30€

BASIC THEORY ON ELECTRONIC COMPONENTS

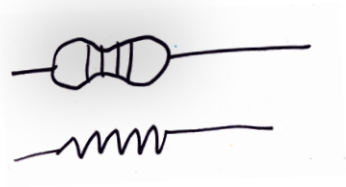
TRANSISTOR: the heart of the synth and semiconductor electronics in general. It usually amplifies a small signal thanks to a supply of DC current, but this time it has been forced to work in its avalanche breakdown region, emitting current pulses at rhythmic intervals. We use S9018 transistors for their ability to oscillate at very low voltages so that a simple 9V battery is enough.



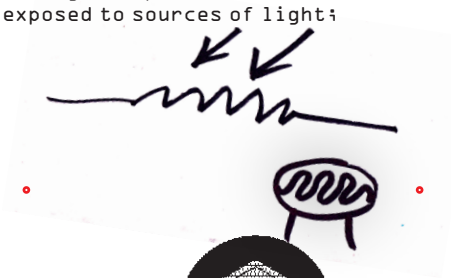


↘you can try reversing the transistor legs, swapping the collector (C) and emitter (E) pins.

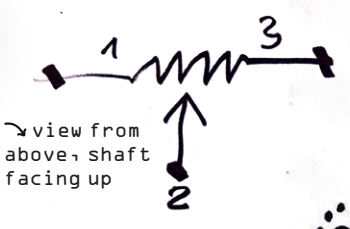
RESISTOR: a passive component that resist the flow of the current – it can have different forms:
FIXED RESISTOR, with a set value expressed in Ohms;



LDR or PHOTOCELL, a sensor that features more or less resistance through its path whether it is exposed to sources of light;



POTENTIOMETER, a variable resistor controllable by turning a knob – it can be wired in different ways to achieve different results.

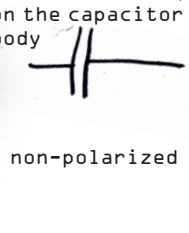


↘view from above, shaft facing up

CAPACITOR: a sort of small battery that can store electricity and discharge at a set rate. It can also be used to block DC current and let AC pass through. There are many different types of capacitors, but pay special attention to electrolytic ones: they are polarized components that need to be oriented in a specific way (negative pole towards the lower potential side).

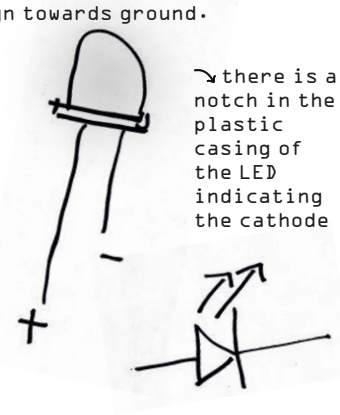
electrolytic

↘cathode aka negative pole features a shorter and a white strip on the capacitor body

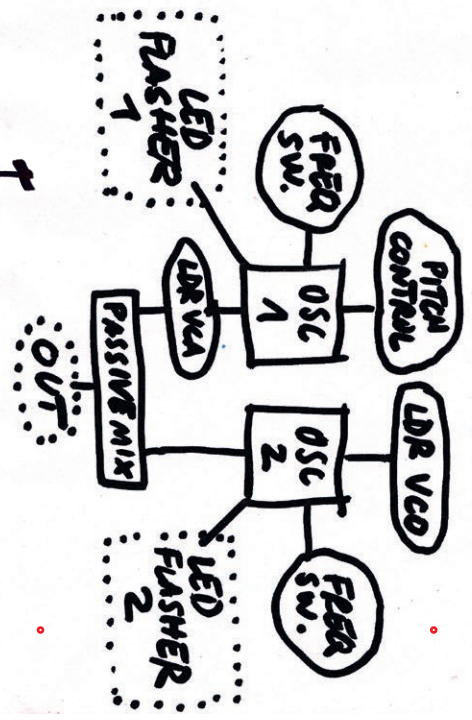


non-polarized

LED: a light emitting diode, used in this context as a load for the circuit: each time the transistor emits an audible pulse, the LED flashes in sync. LEDs are polarized components: always orient the cathode aka shorter leg aka minus sign towards ground.



↘there is a notch in the plastic casing of the LED indicating the cathode



EXTRA RESOURCES

http://www.kerrywong.com/2014/03/19/bjt-in-reverse-avalanche-mode/

https://en.wikipedia.org/wiki/Avalanche_transistor

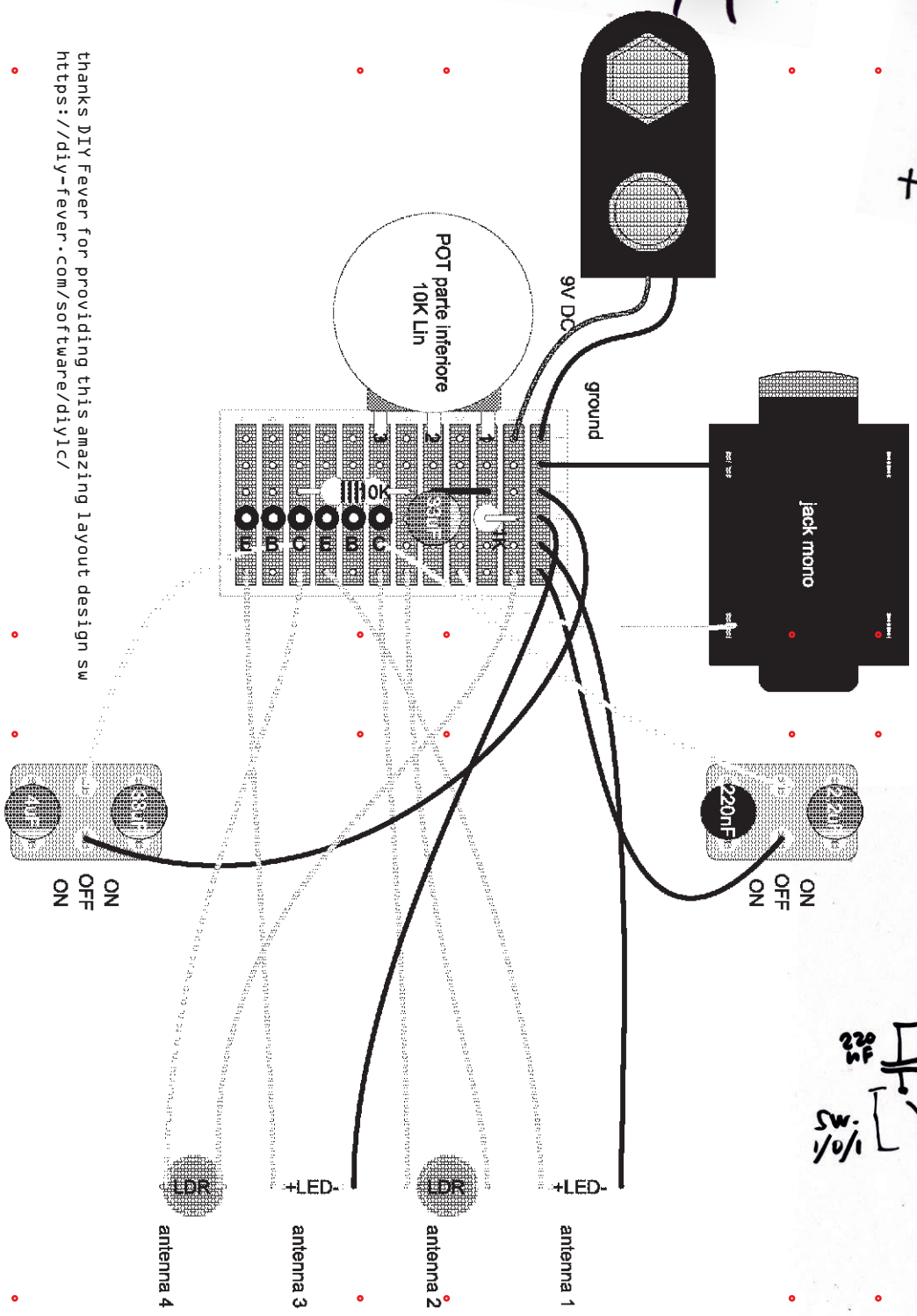
HOW THE CIRCUIT WORKS

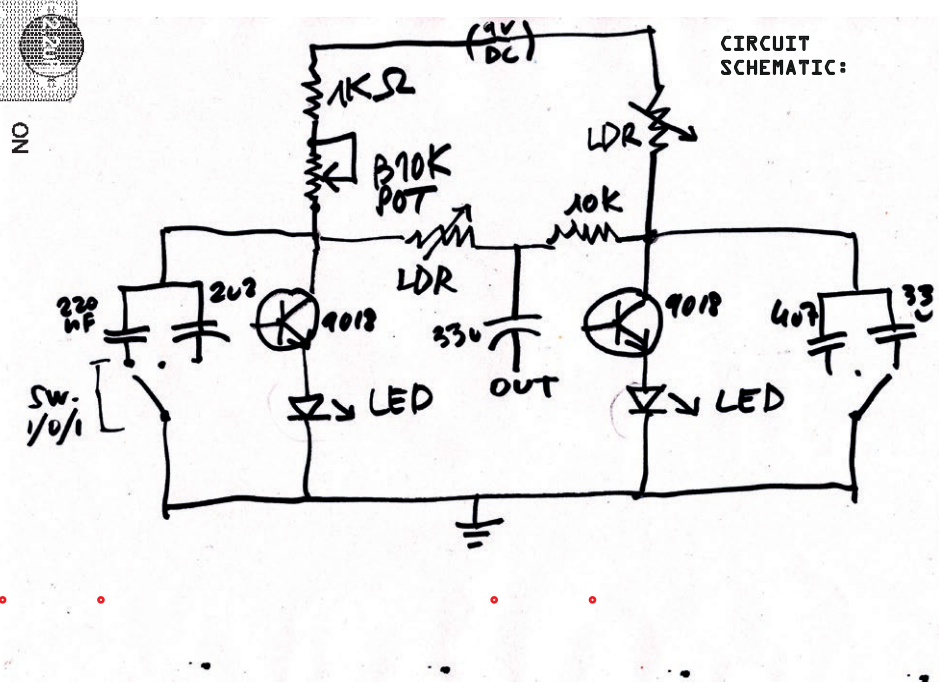
The synth is based upon 2 oscillators wired in parallel that emit pulses at various frequencies, from percussive and rythmic ones all the way to the audible range. We can tweak and mix and contaminate the relations between these 2 oscillators, making them interact with light.

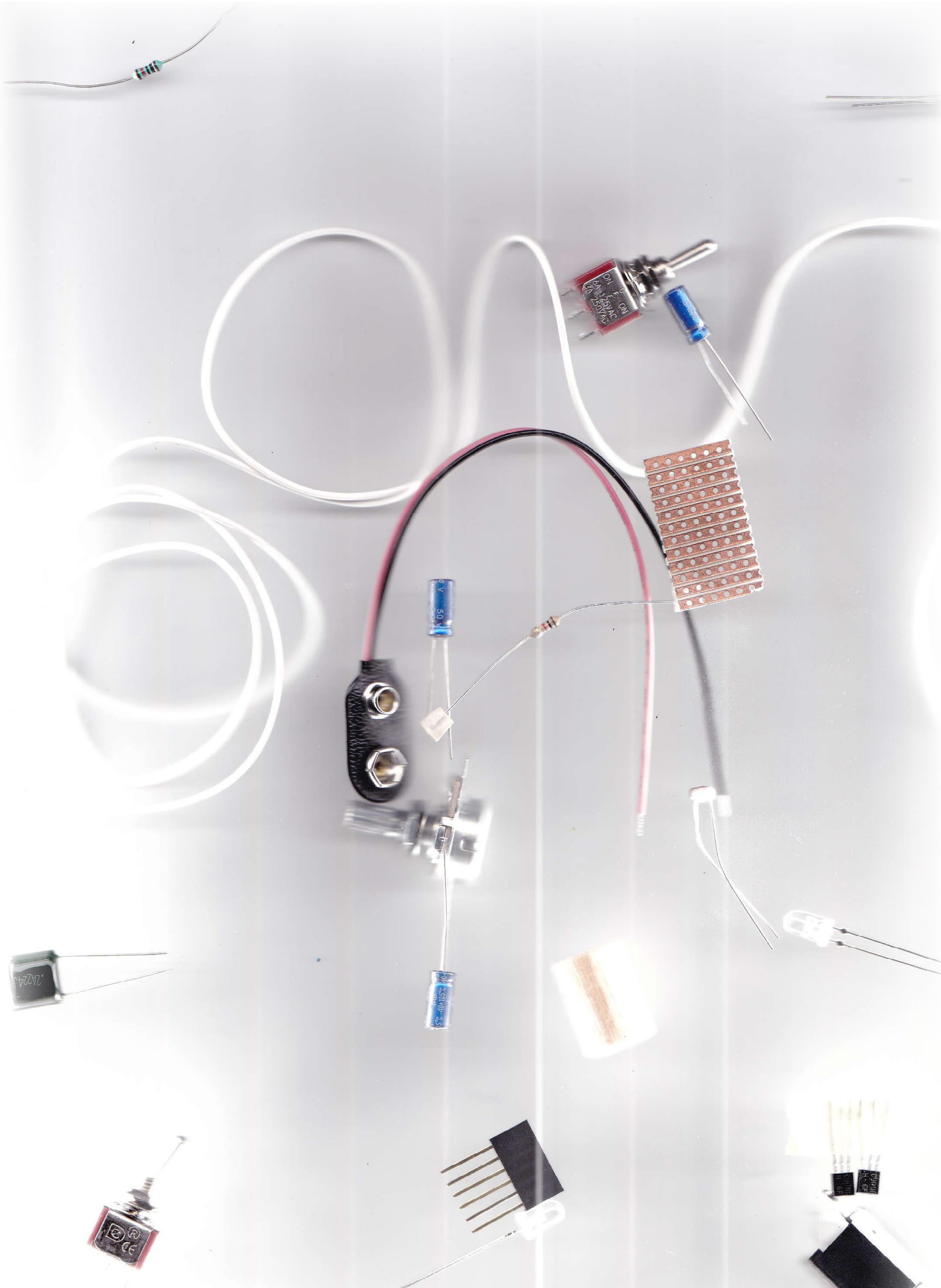
We have a series of interfaces to achieve this:

- OSC1 pitch control via a potentiometer
- OSC2 pitch control via a LDR (making it a crude VCO, not reliable in terms of Hz/V but dependent on light exposure)
- OSC1+OSC2 frequency switch with a toggle: it switches between different capacitor sizes, that translates to different pitch ranges
- OSC1+OSC2 LED flashers, useful for interactions with the LDRs
- OSC1 output volume control via LDR (the effect is a kind of VCA, you can get interesting side-chaining/sagging effects combining OSC1 LDR with OSC2 LED) LED and LDR are mounted onto long antennas so that they can be moved, held in hand, wiggled and so on.

thanks DIY Fever for providing this amazing layout design sw
https://diy-fever.com/software/diylc/






ON
6A 125VAC
3A 250VAC
50 V