

# *Brain Machine kit*

## Assembly Instructions & Programming Instructions



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cornFIELD electronics

# *Brain Machine kit*



## Disclaimer:

Light and Sound Machines, such as this one, can be fun for many of us, but may be seriously dangerous for those prone to seizures or who are photosensitive.

# Learn To Solder

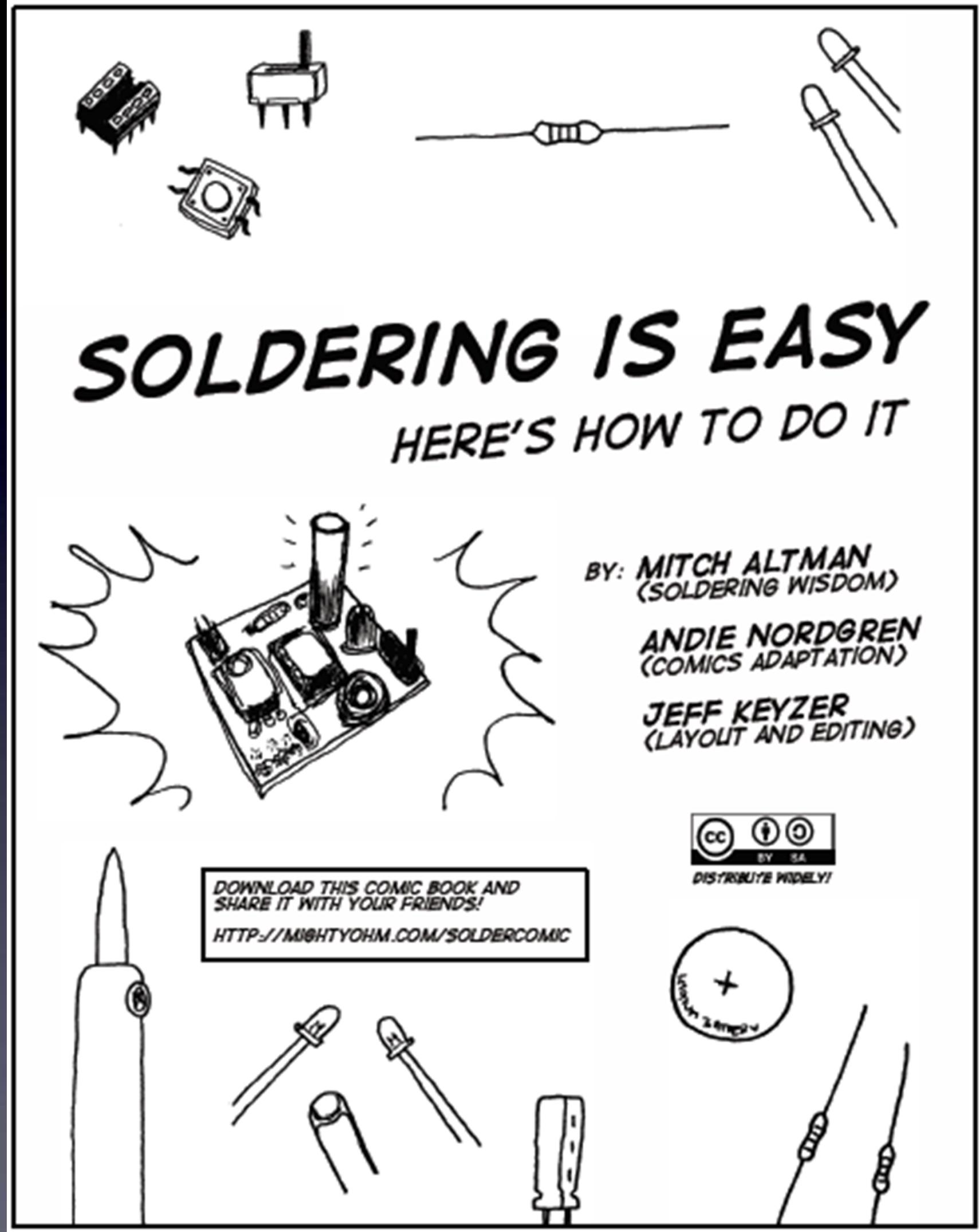


The following photos will show you how to solder.  
But feel free to download the “Soldering Is Easy” comic book for free!

(In many different languages.)

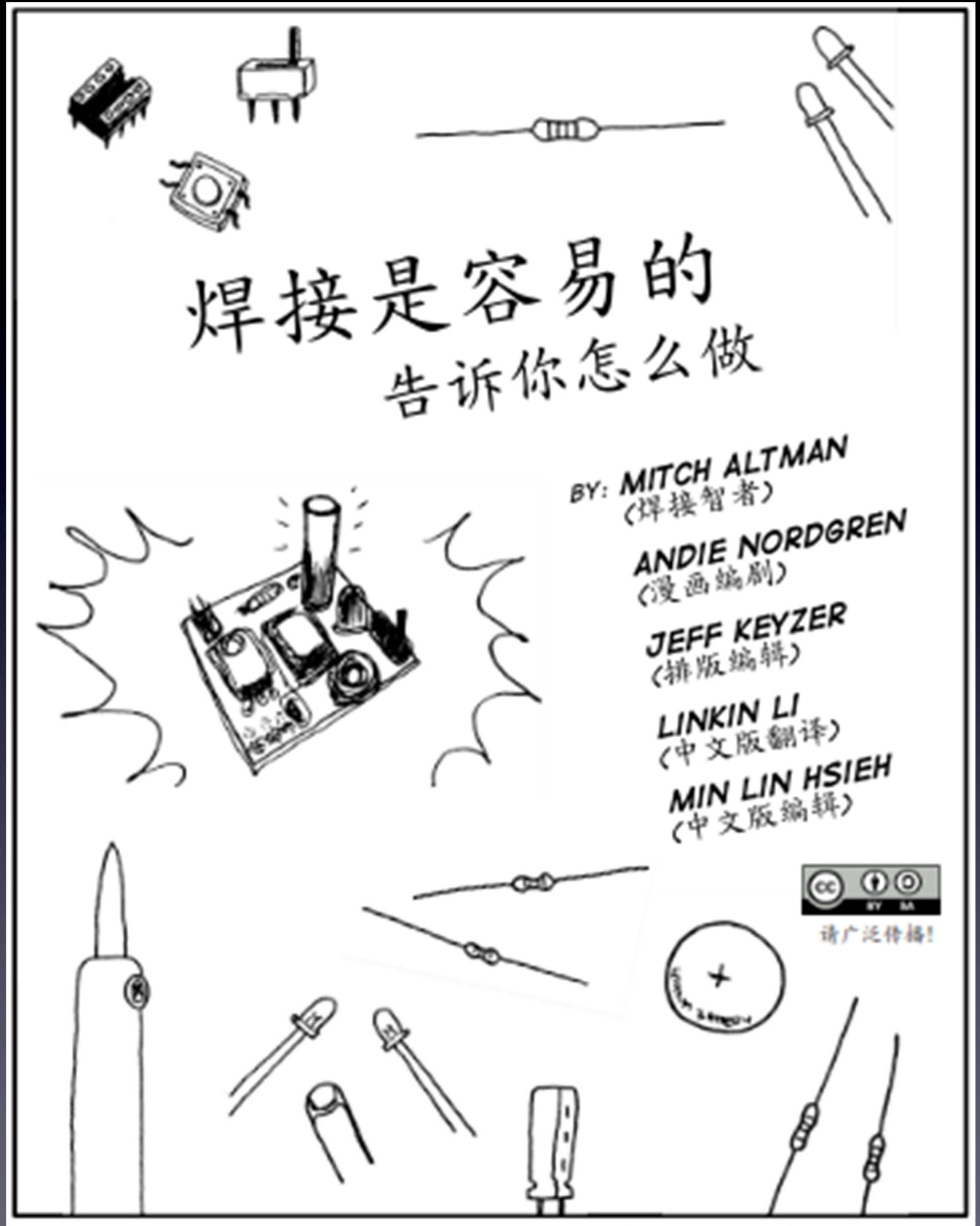
download for free at:  
<http://mightyohm.com/soldercomic>

# Learn To Solder



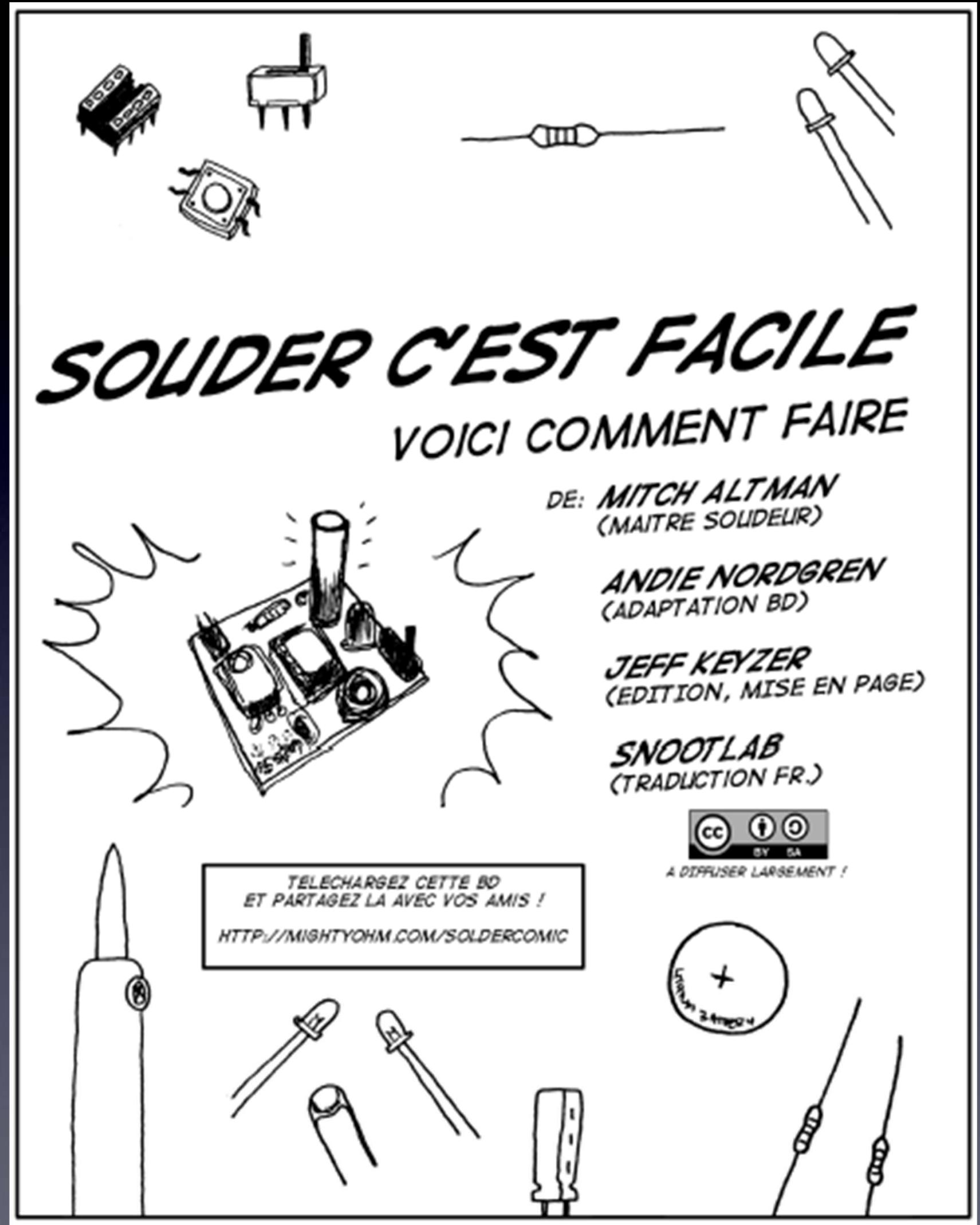
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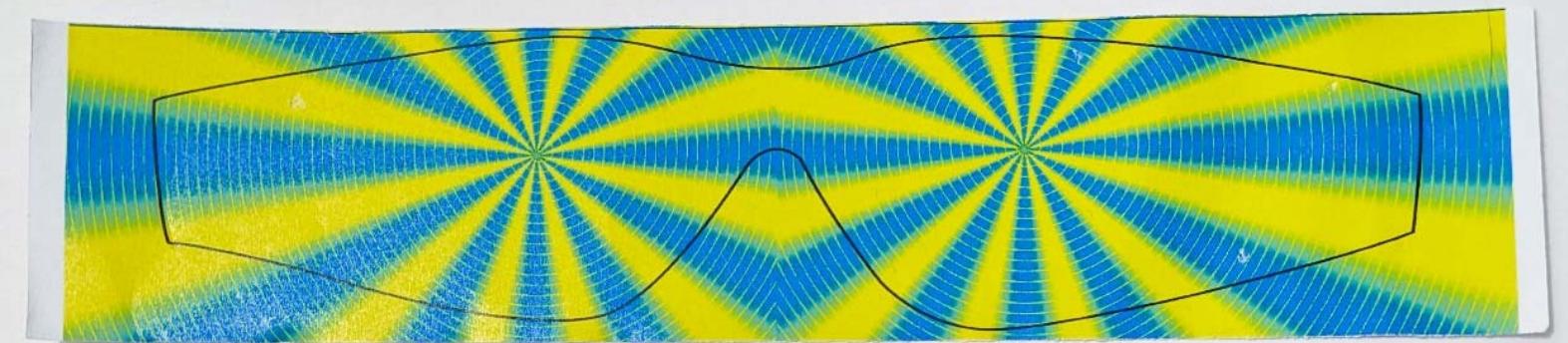
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# Learn To Solder

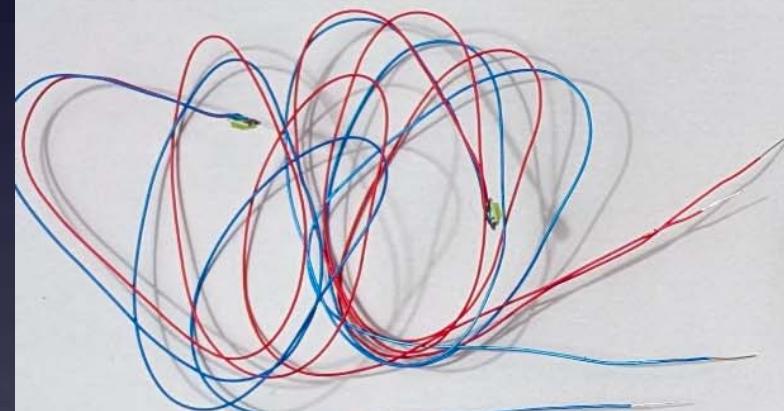


download for free at:  
<http://mightyohm.com/soldercomic>  
(In many different languages.)

Trippy Graphix



LED1, LED2



J1



C1, C2



Header pins

Arduino Nano

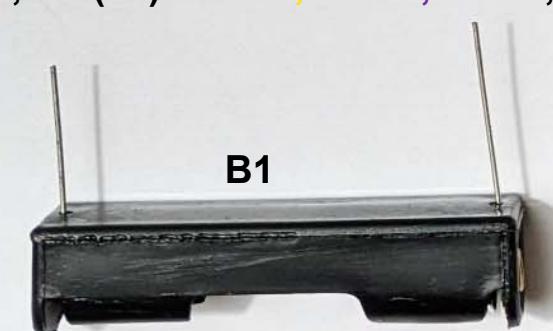


Power Supply

R1, R2 (4.7K) Yellow, Violet, Red, Gold



R3, R4 (47) Yellow, Violet, Black, Gold

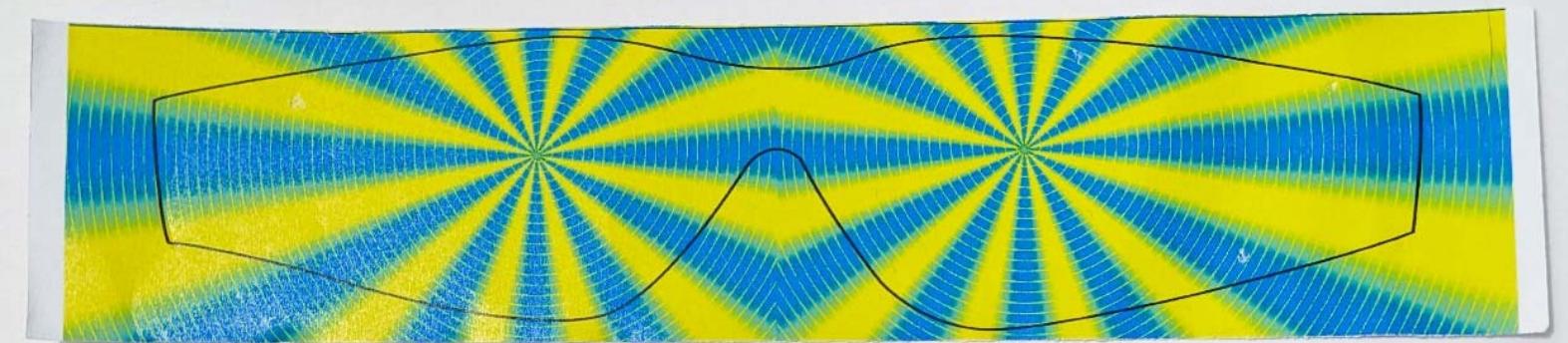


B1



B1

Trippy Graphix



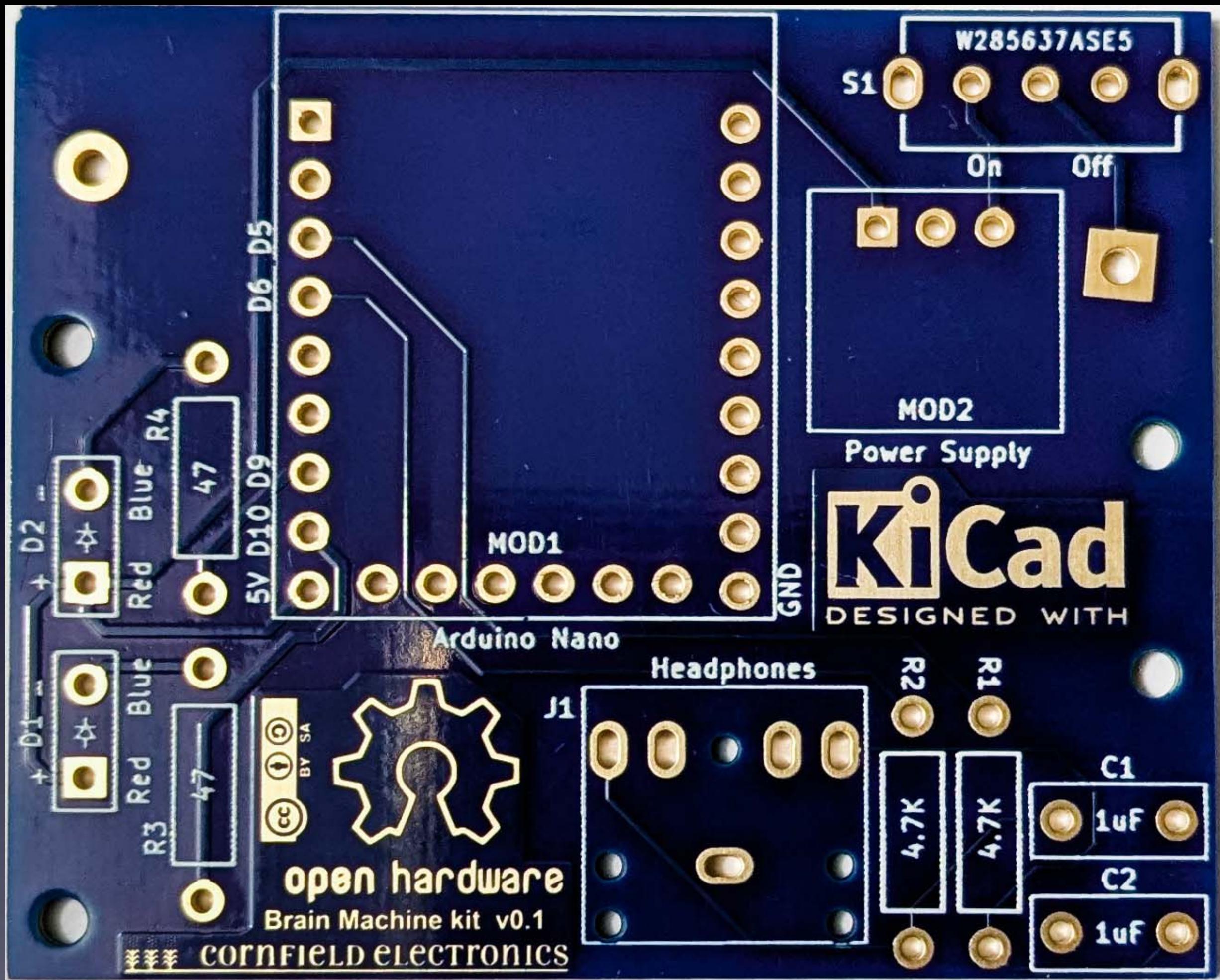
Earbuds



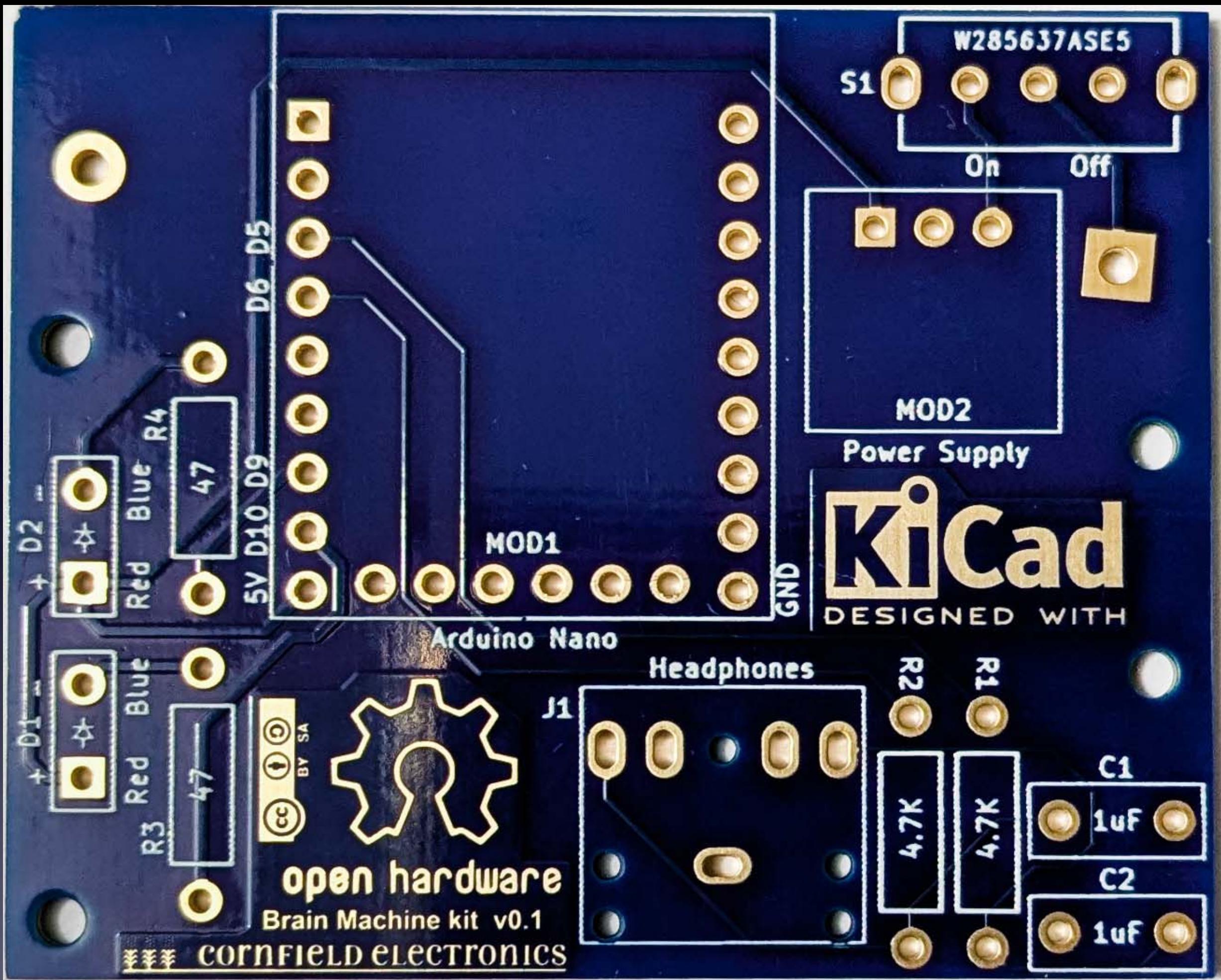
Glasses

Zip ties

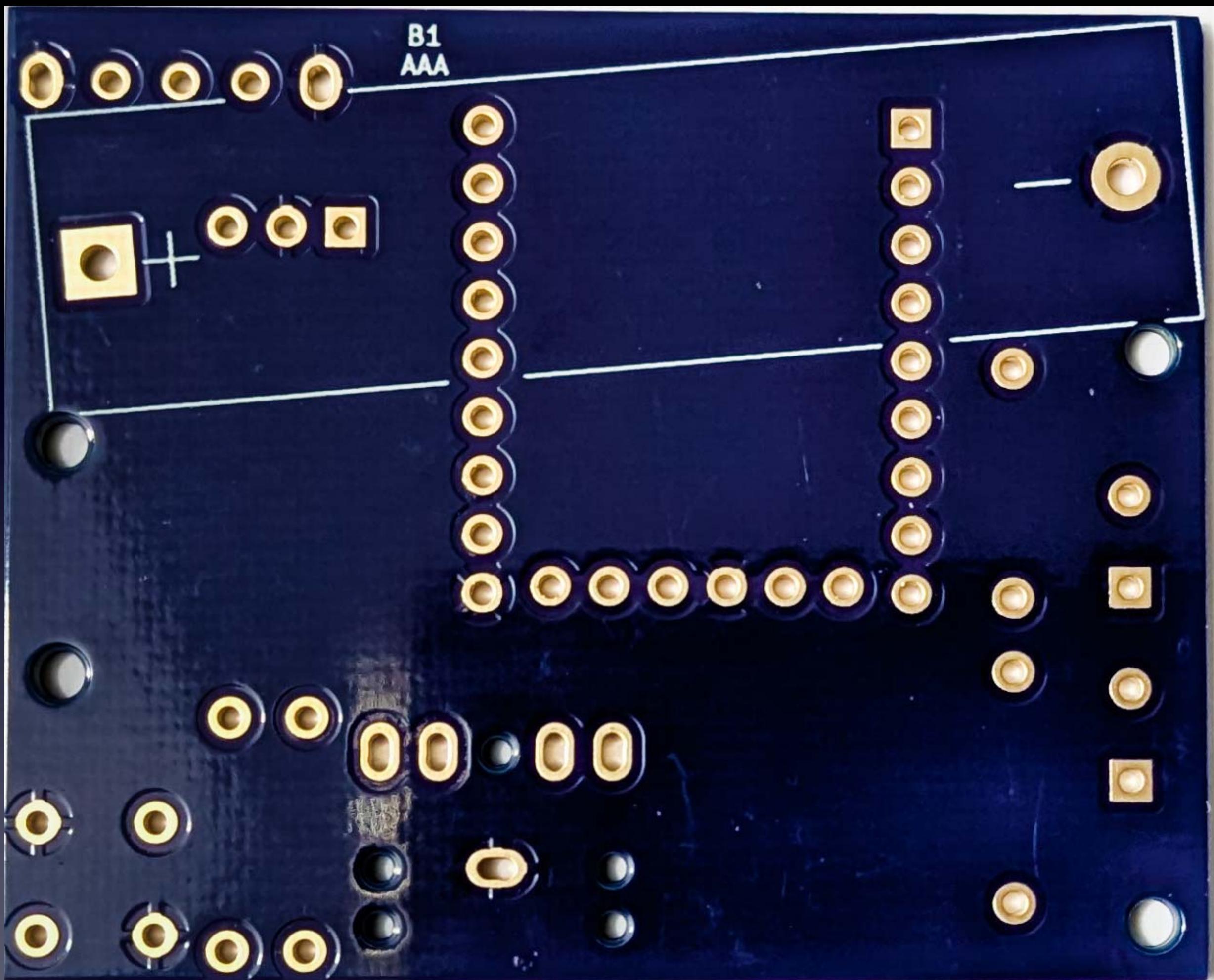
All of the parts



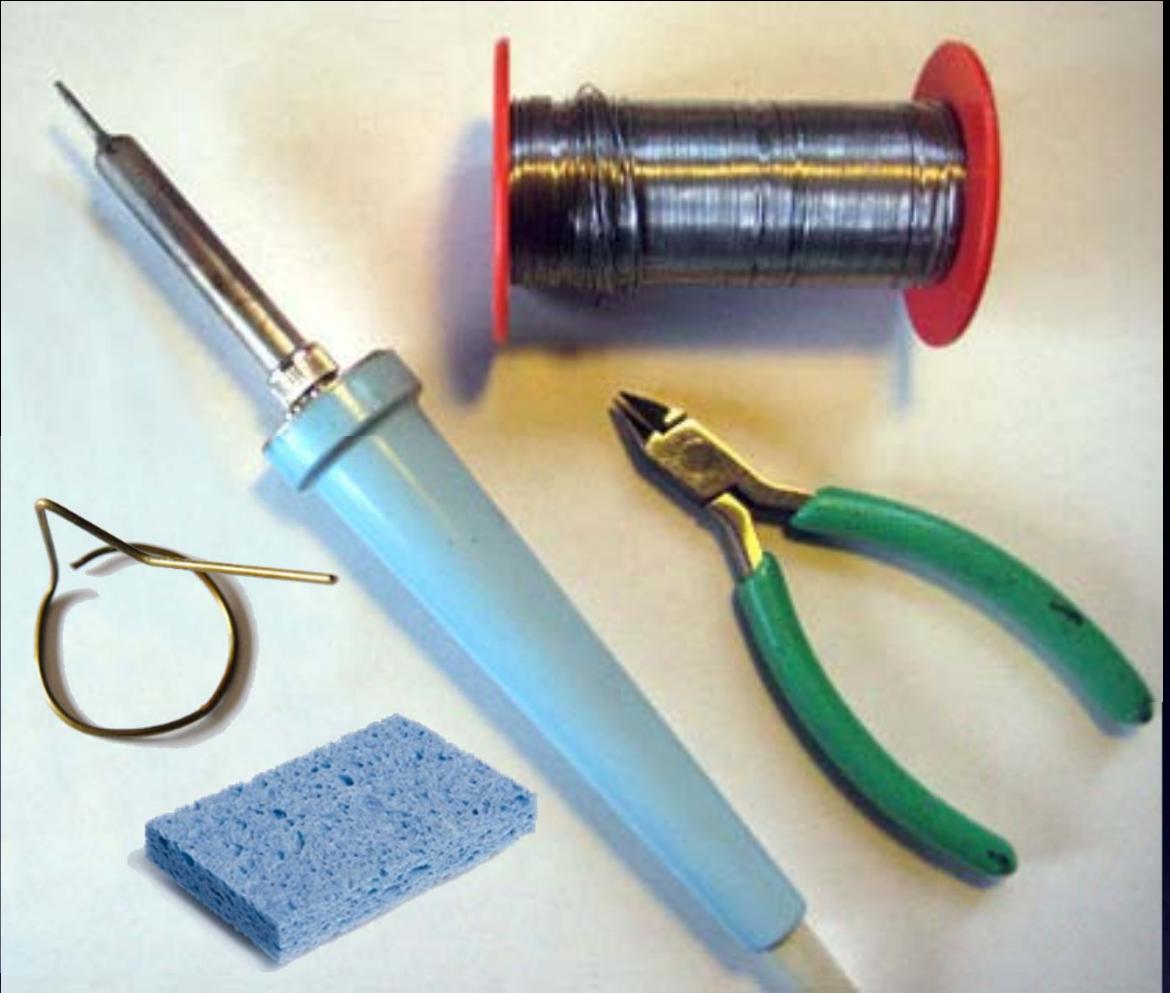
The board we'll solder the parts to



Front/Top of board

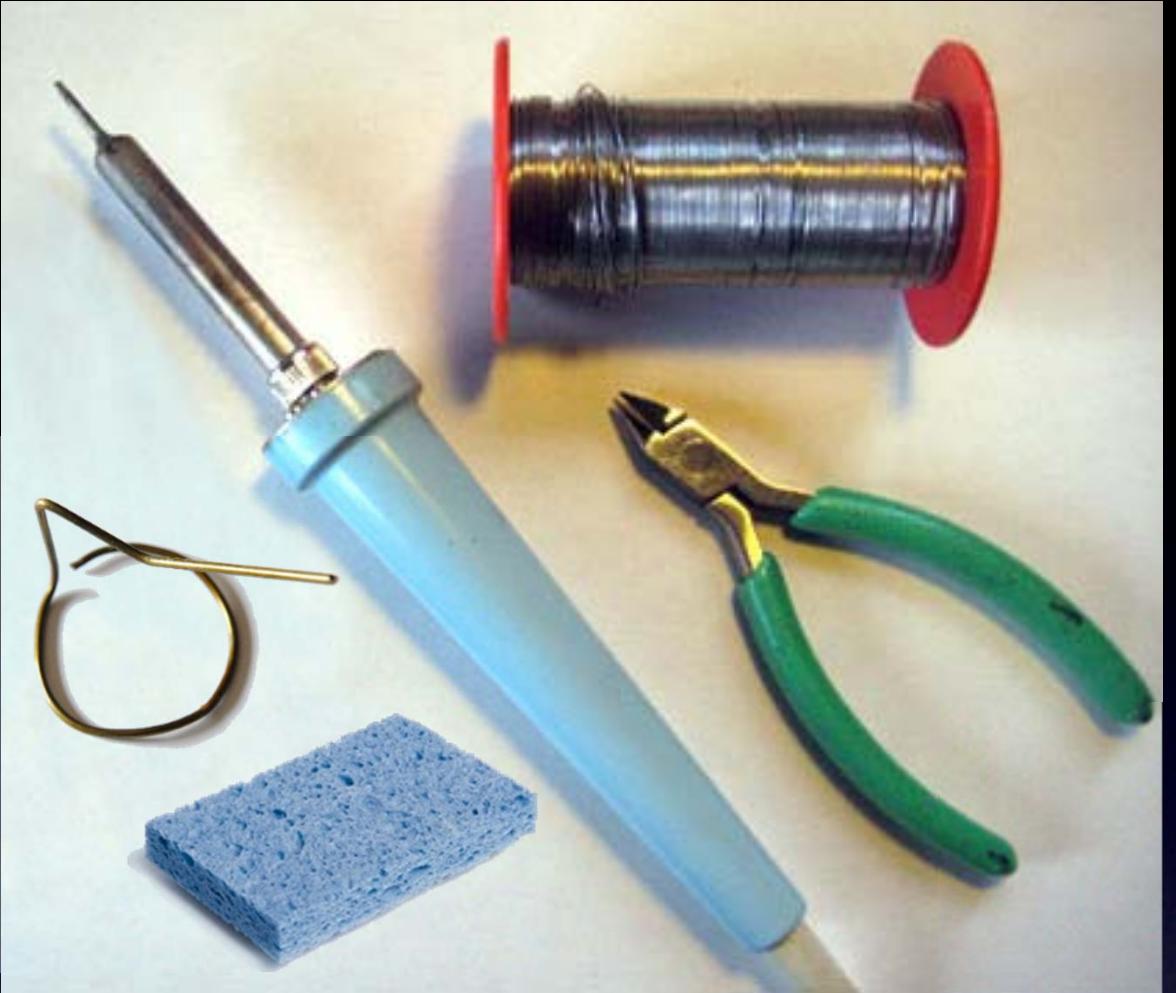


Back/Bottom of board



## The tools you'll need:

- soldering Iron (35W or less)
- solder (*more details coming*)
- soldering iron stand
- cellulose kitchen sponge (*not plastic!*)
- *small* wire cutter
- tape
- felt-tip pen
- scissors



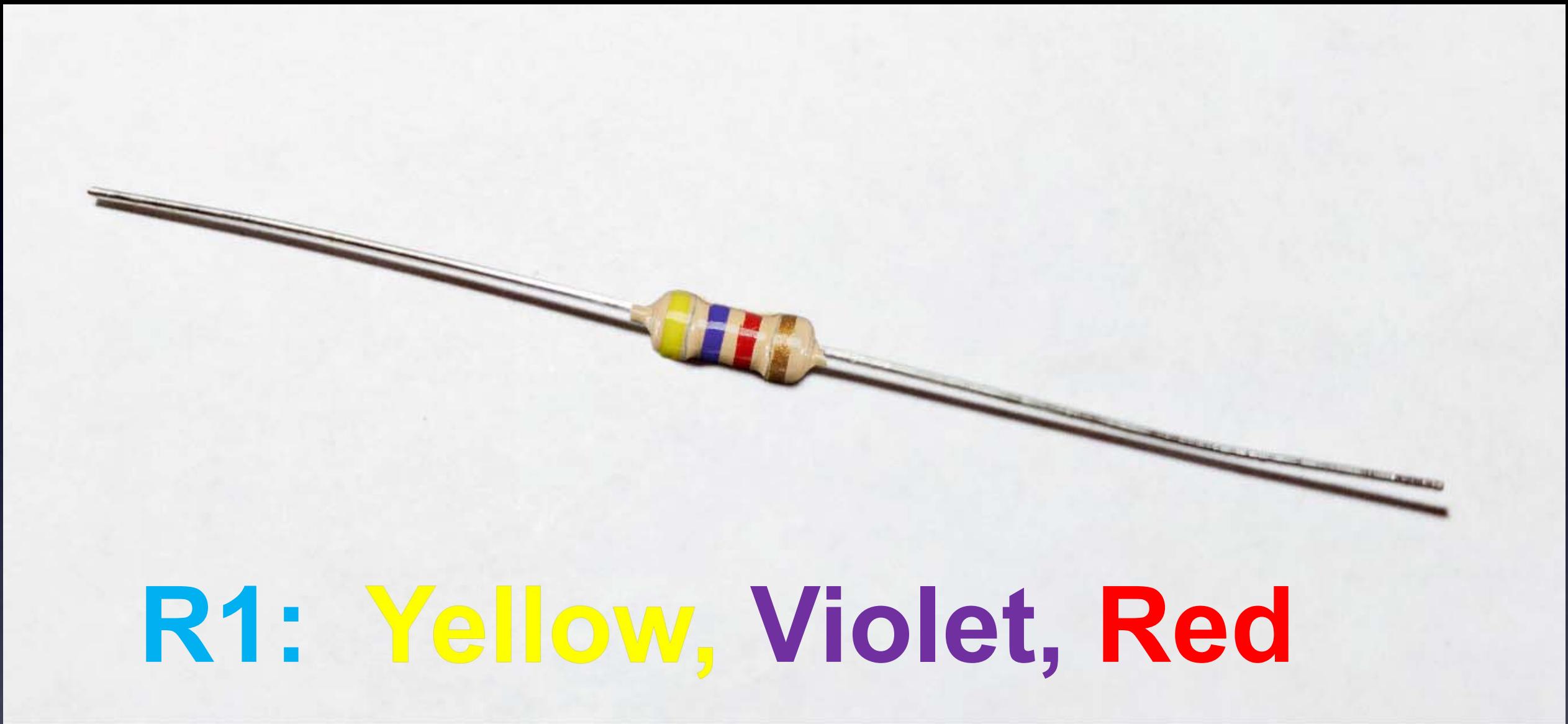
## The tools you'll need:

- soldering Iron (35W or less)
- solder (*more details coming*)
- soldering iron stand
- cellulose kitchen sponge (*not plastic!*)
- *small* wire cutter

If you use Lead-Free solder  
it is very helpful  
to also have  
flux paste in a syringe  
And Isopropyl Alcohol



# Our first part



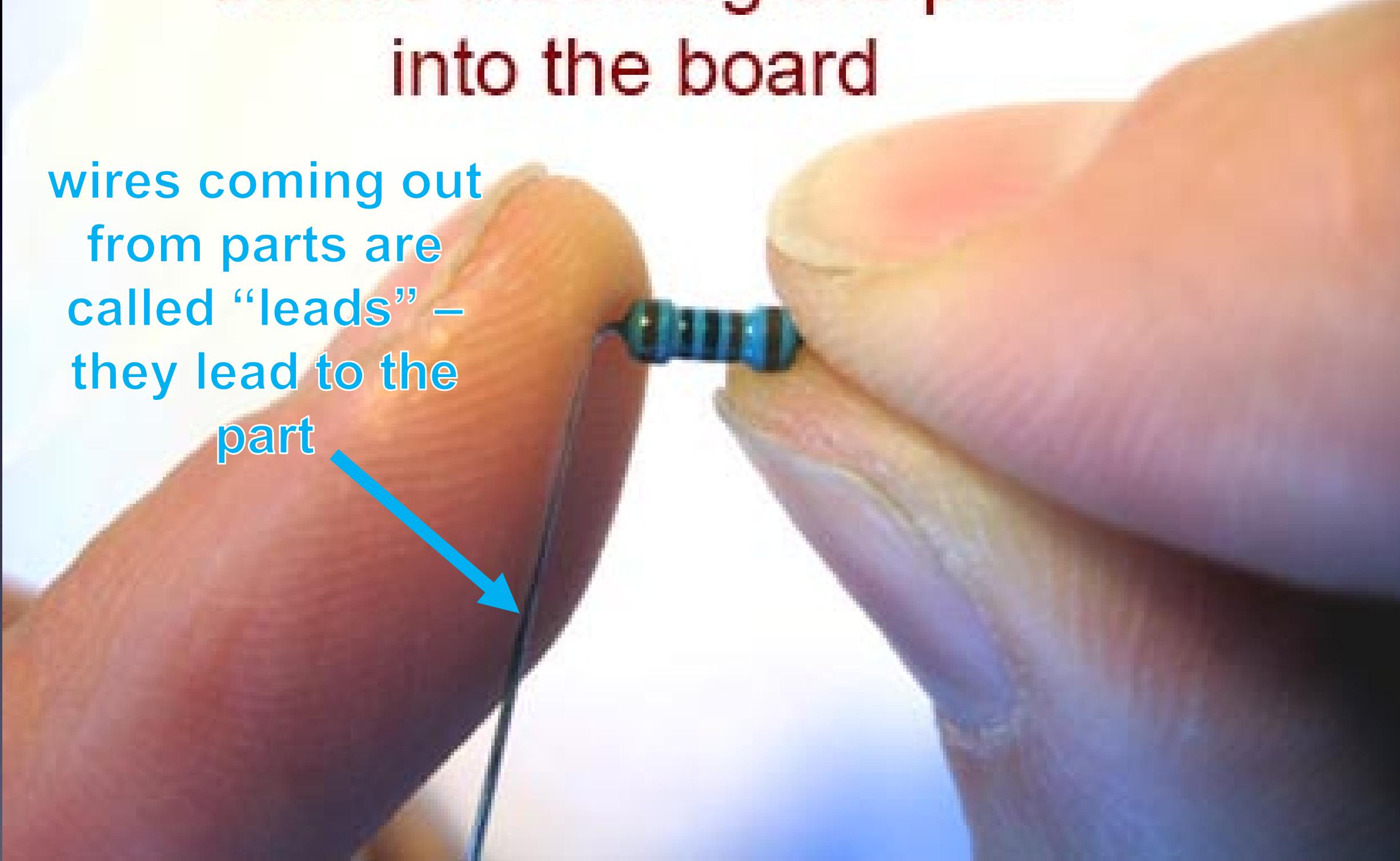
R1: **Yellow, Violet, Red**

(not: **Yellow, Violet, Black**)

**Some parts, such as resistors, need their leads bent first**

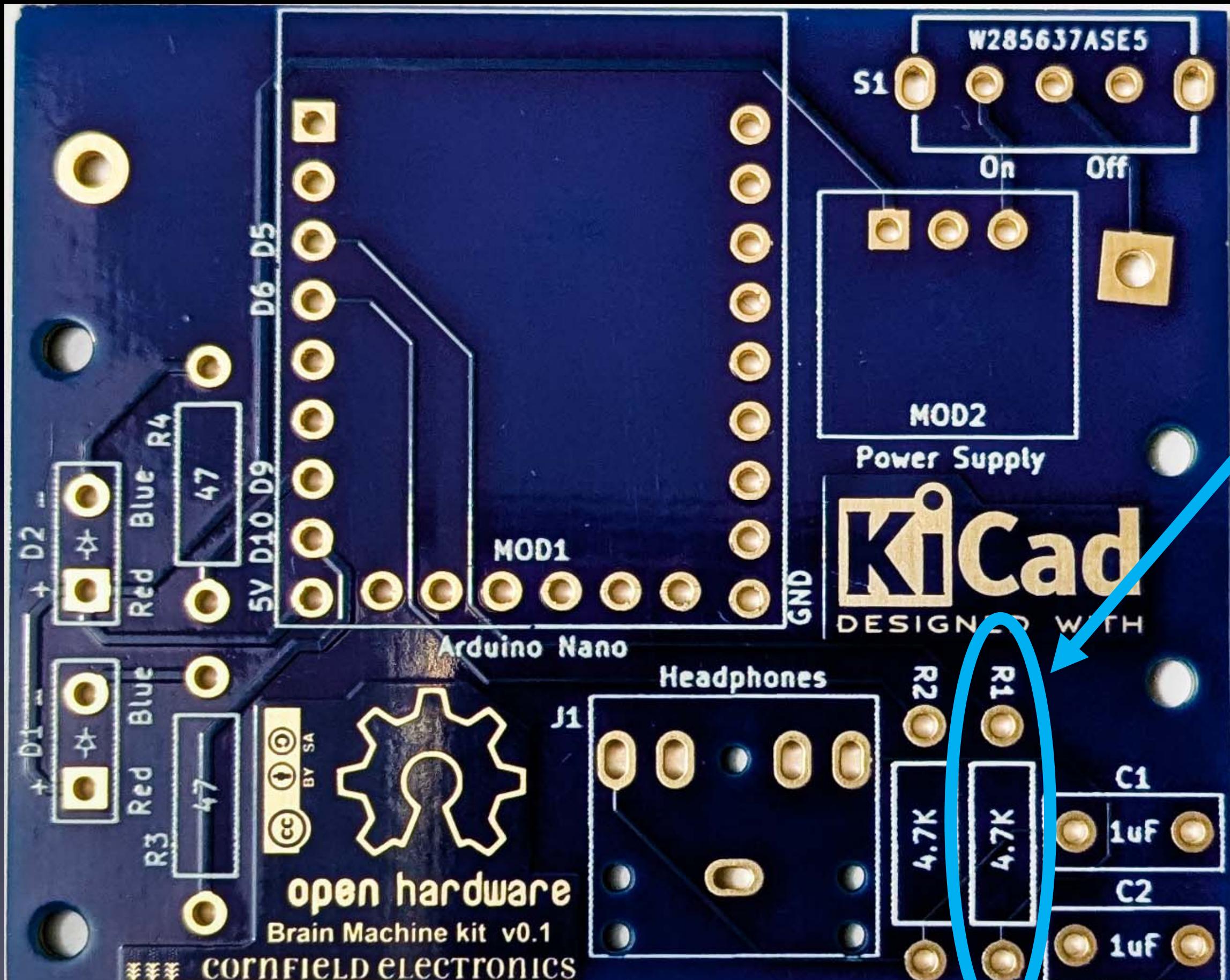
If necessary, Bend leads  
before inserting the part  
into the board

wires coming out  
from parts are  
called “leads” –  
they lead to the  
part





R1 – this is how it will look *before* inserting it into the board

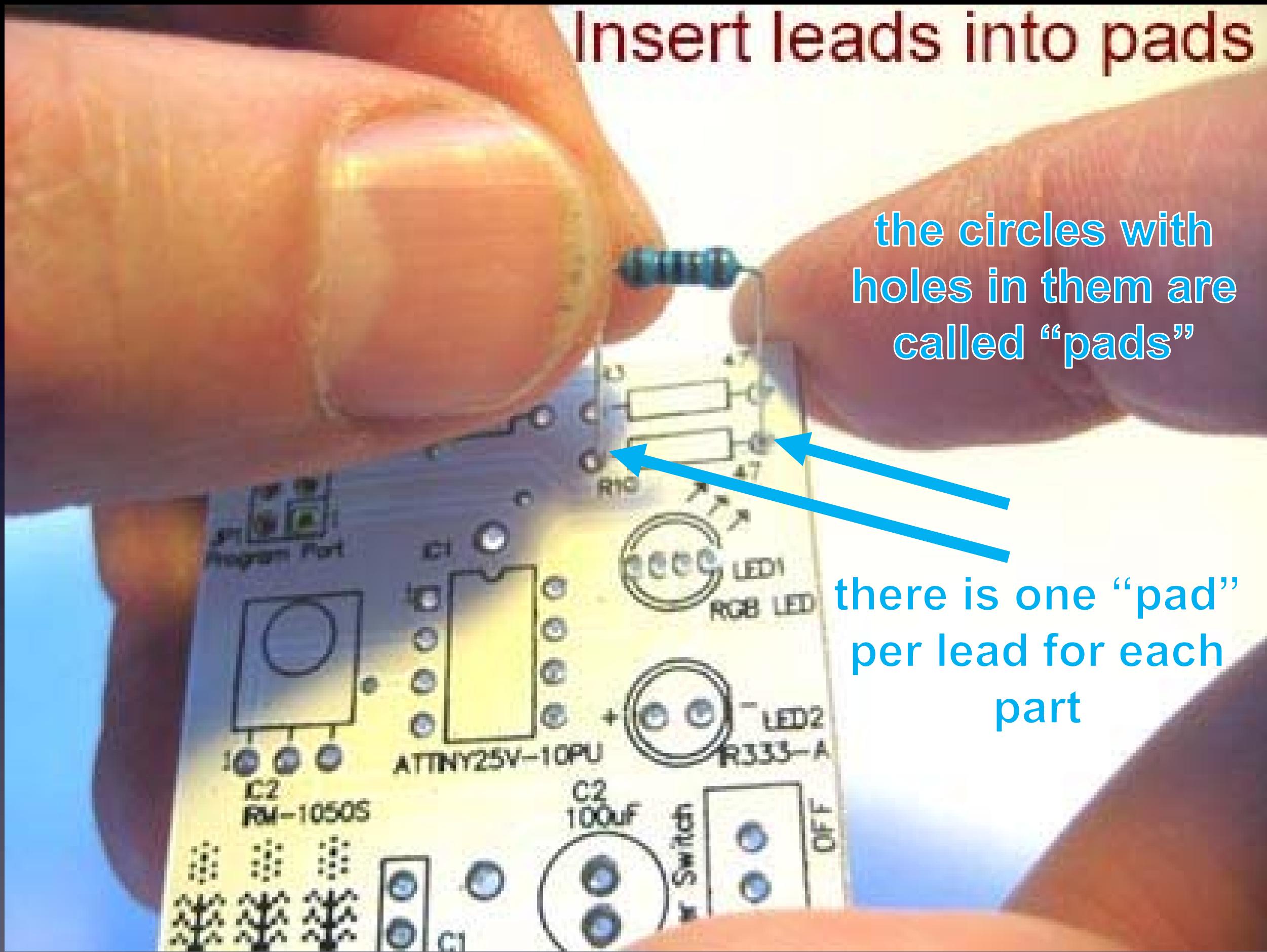


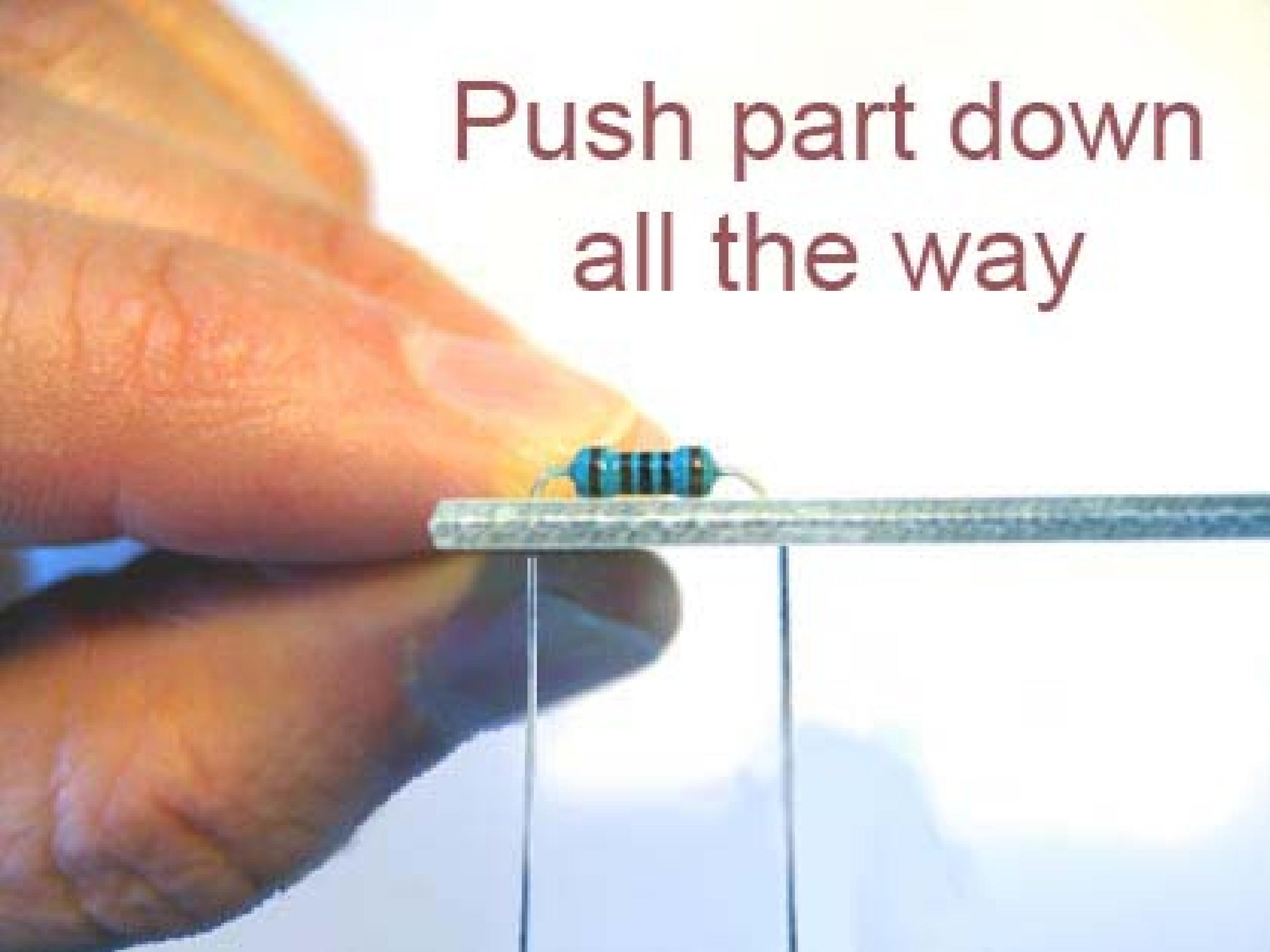
R1 – this is where it goes

# Insert leads into pads

the circles with  
holes in them are  
called “pads”

there is one “pad”  
per lead for each  
part



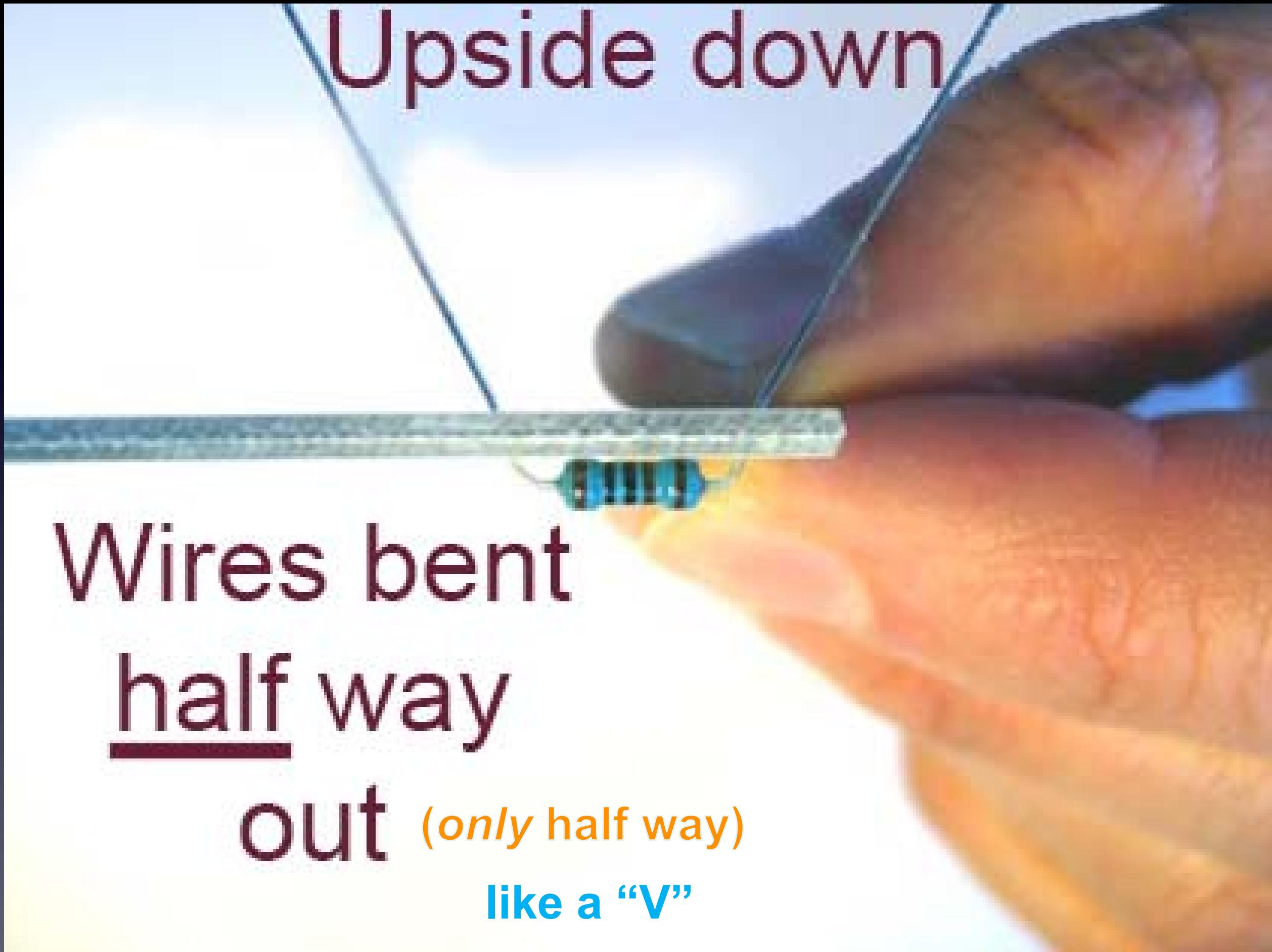


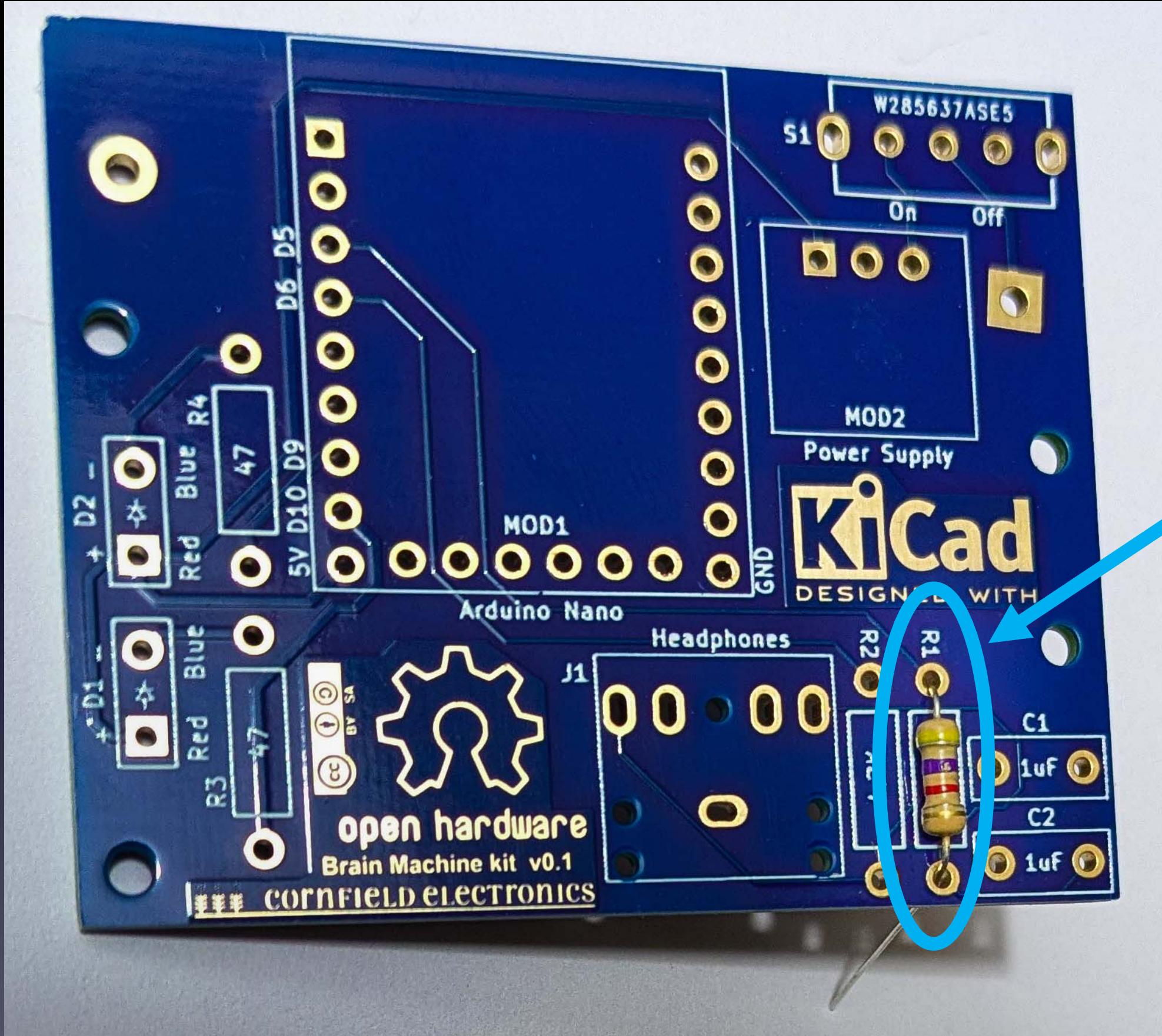
Push part down  
all the way

# Upside down

Wires bent  
half way  
out (only half way)  
like a “V”

so that the part won't fall out while soldering it





R1 – inserted into the board

Direction does not matter



# How to hold a soldering iron

(Like a pencil – held from underneath)

Important

# The best kind of solder for DIY electronics:

(Sn – Tin / Pb – Lead)

63/37 rosin core,  
0.031" (0.8mm) diameter (or smaller)

*(60/40 is also good)*

Note:

Most  
*Lead-Free* solder  
has poisonous fumes!

# A decent kind of solder for DIY electronics:

*This is the only good Lead-Free solder I have found!  
(after years of searching)*



Chip Quik **Germanium-Doped** Solder  
**Sn99/Cu0.7/Ni0.05/Ge0.006**  
0.031" diameter (0.8mm)

# A decent kind of solder for DIY electronics:

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Chip Quik Germanium-Doped Solder  
**Sn99/Cu0.7/Ni0.05/Ge0.006**  
0.031" diameter (0.8mm)

## Note:

If you use **Lead-Free** solder  
it is **very helpful**  
to also have  
**flux paste** in a syringe  
**And Isopropyl Alcohol**



# 3 Safety Tips...

# Safety Tip #1:

Hot !!

(When you touch the tip,  
you *will* let go quickly every time!)

## Safety Tip #2:

Soldering chemicals  
are toxic

But they easily wash off your hands  
with soap and water

# Safety Tip #3:

*(coming soon)*

2 secrets  
to good soldering...

# Secret #1:

## Clean the tip!

(before every solder connection)

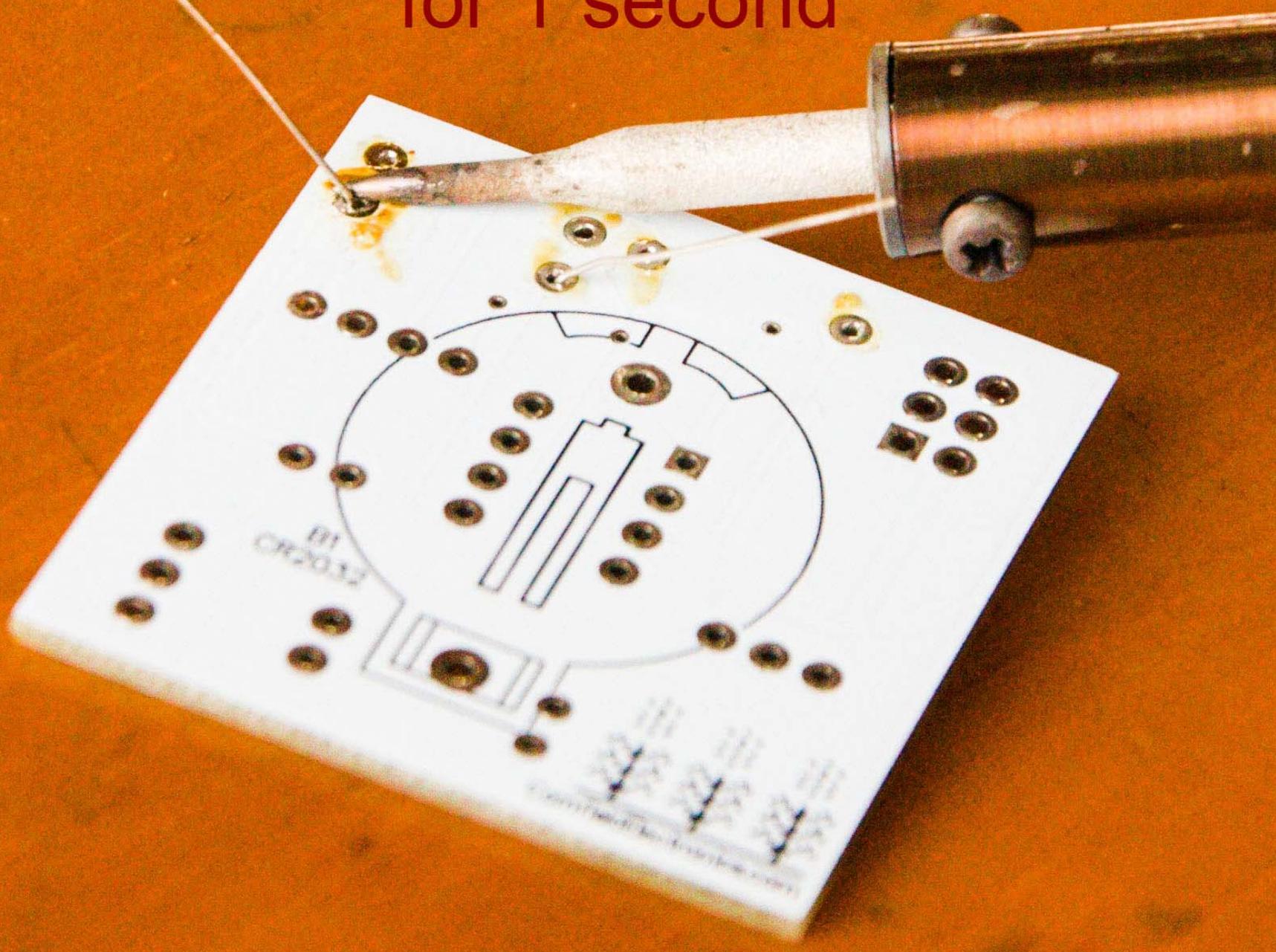
Bang (lightly) 3 times,

Swipe, Rotate, Swipe (on the sponge):

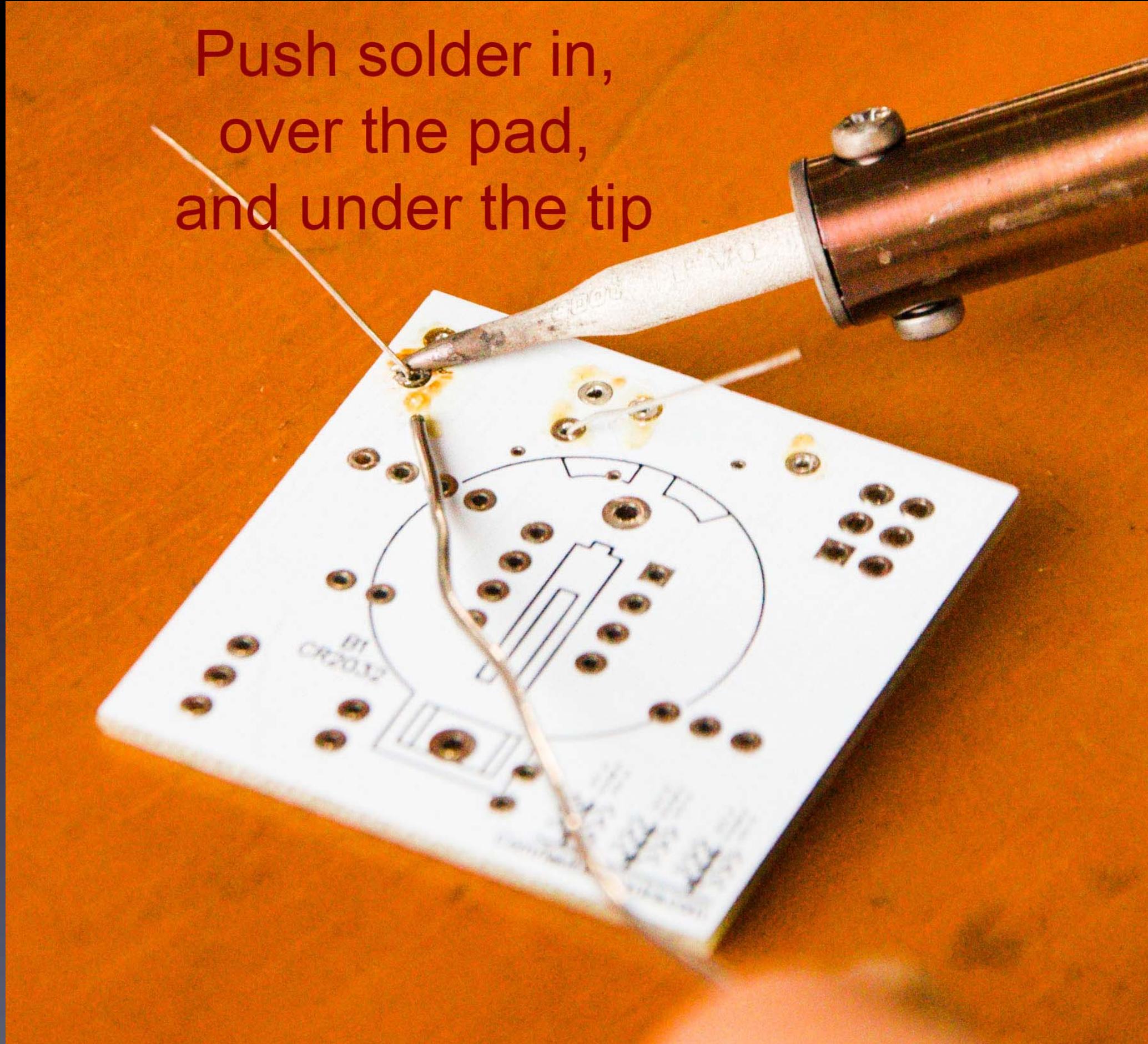
*Keep the tip shiny silver!*

*knock solder off the tip*

Lay clean tip across half of the pad,  
touching the pad and lead  
for 1 second

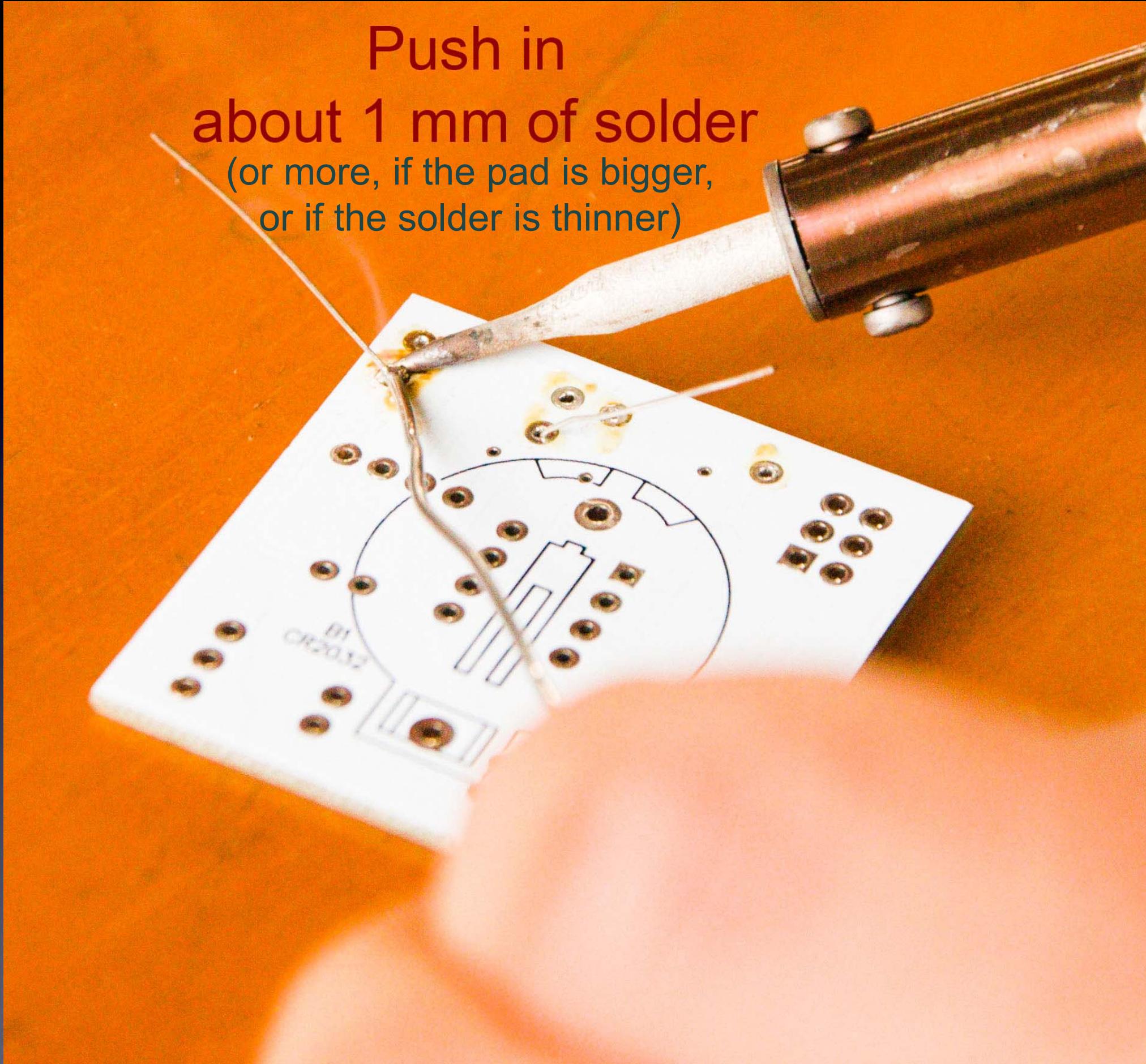


Do this quickly (slowly doesn't work well) – solder in & out in about 1 second

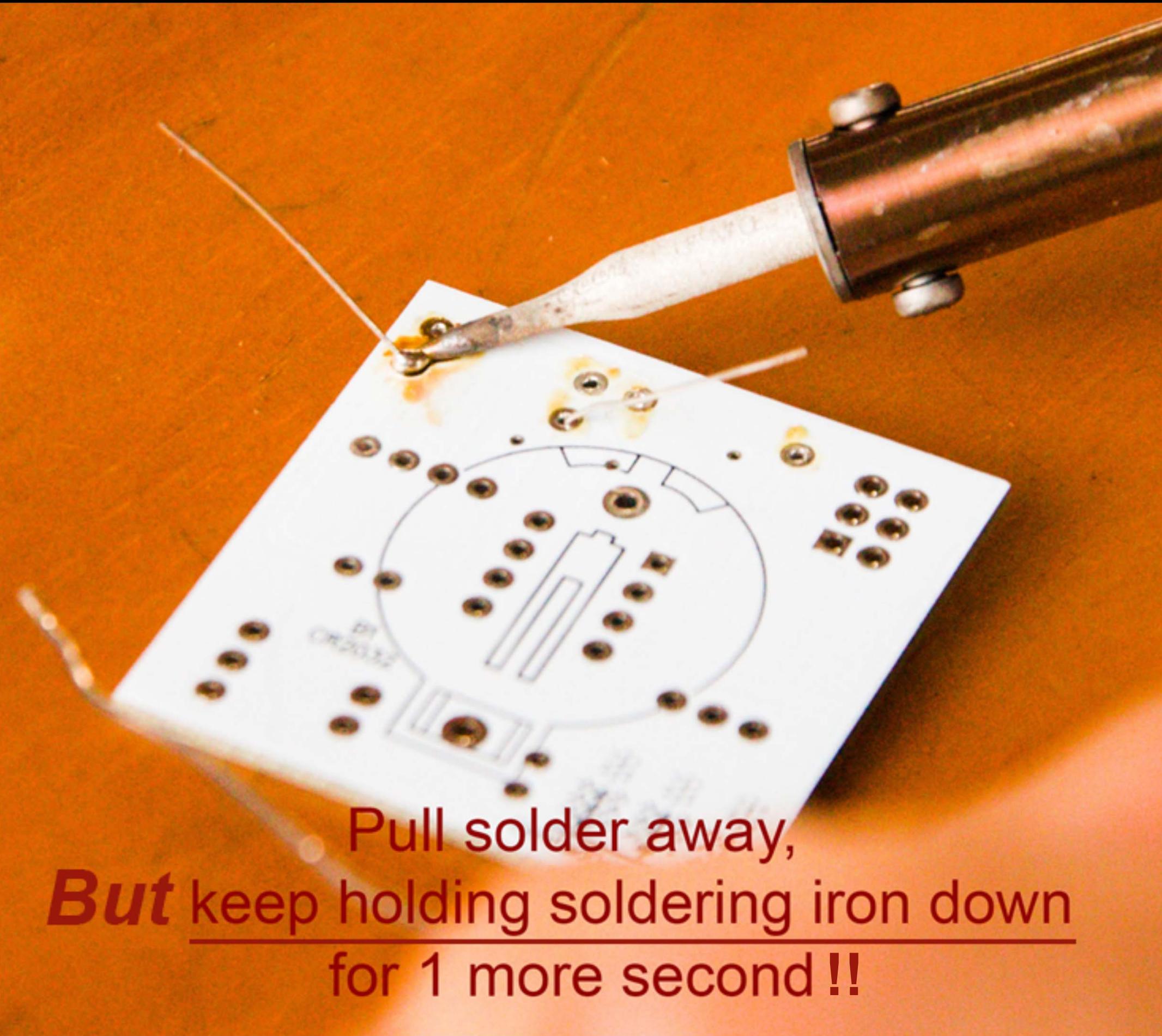


Make sure solder melts on the underside of the soldering iron tip  
(not the side or top of the soldering iron tip)!

Do this quickly (slowly doesn't work well) – solder in & out in about 1 second



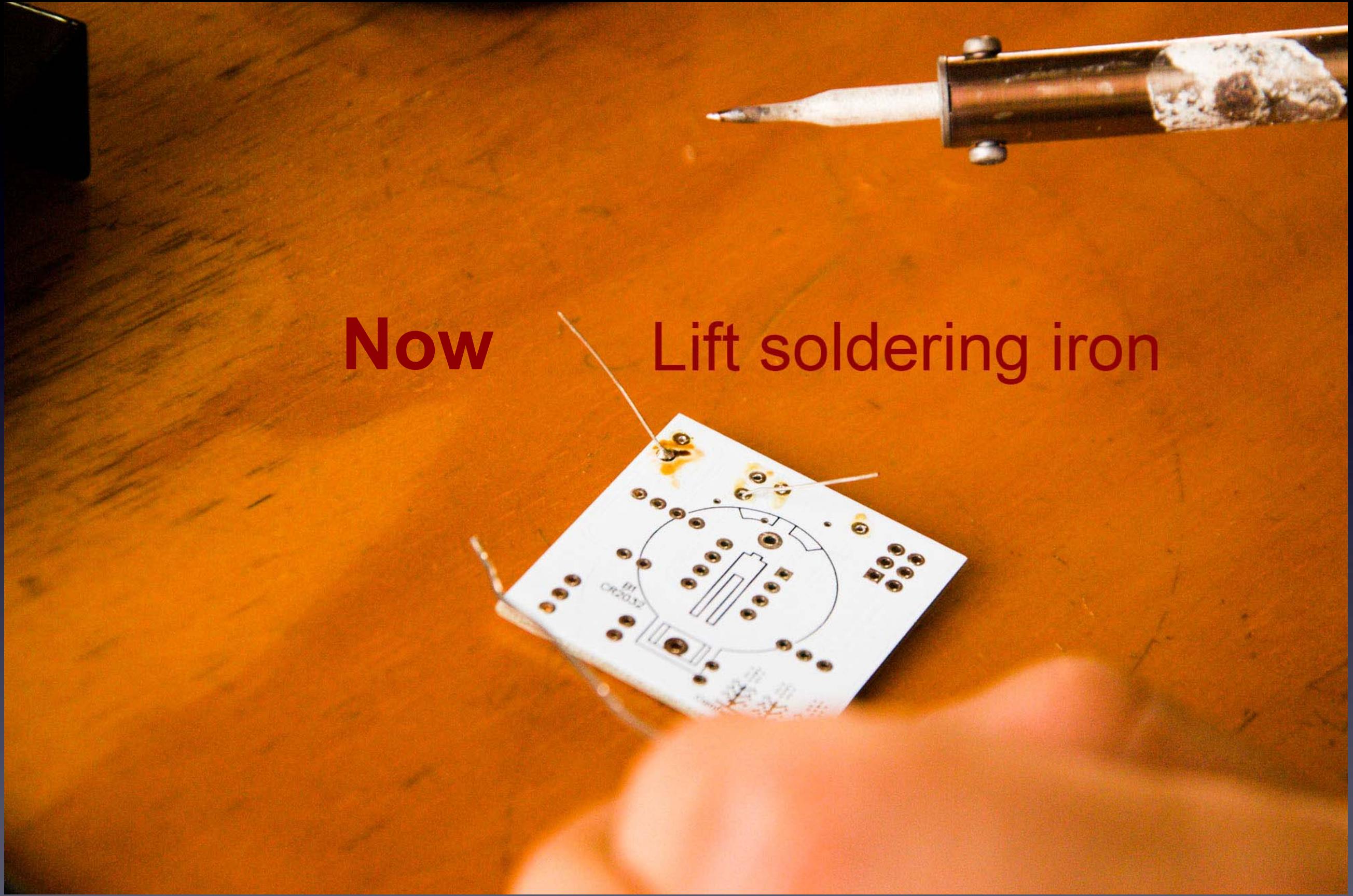
Make sure solder melts on the underside of the soldering iron tip  
(not the side or top of the soldering iron tip)!



Pull solder away,  
**But keep holding soldering iron down**  
for 1 more second !!

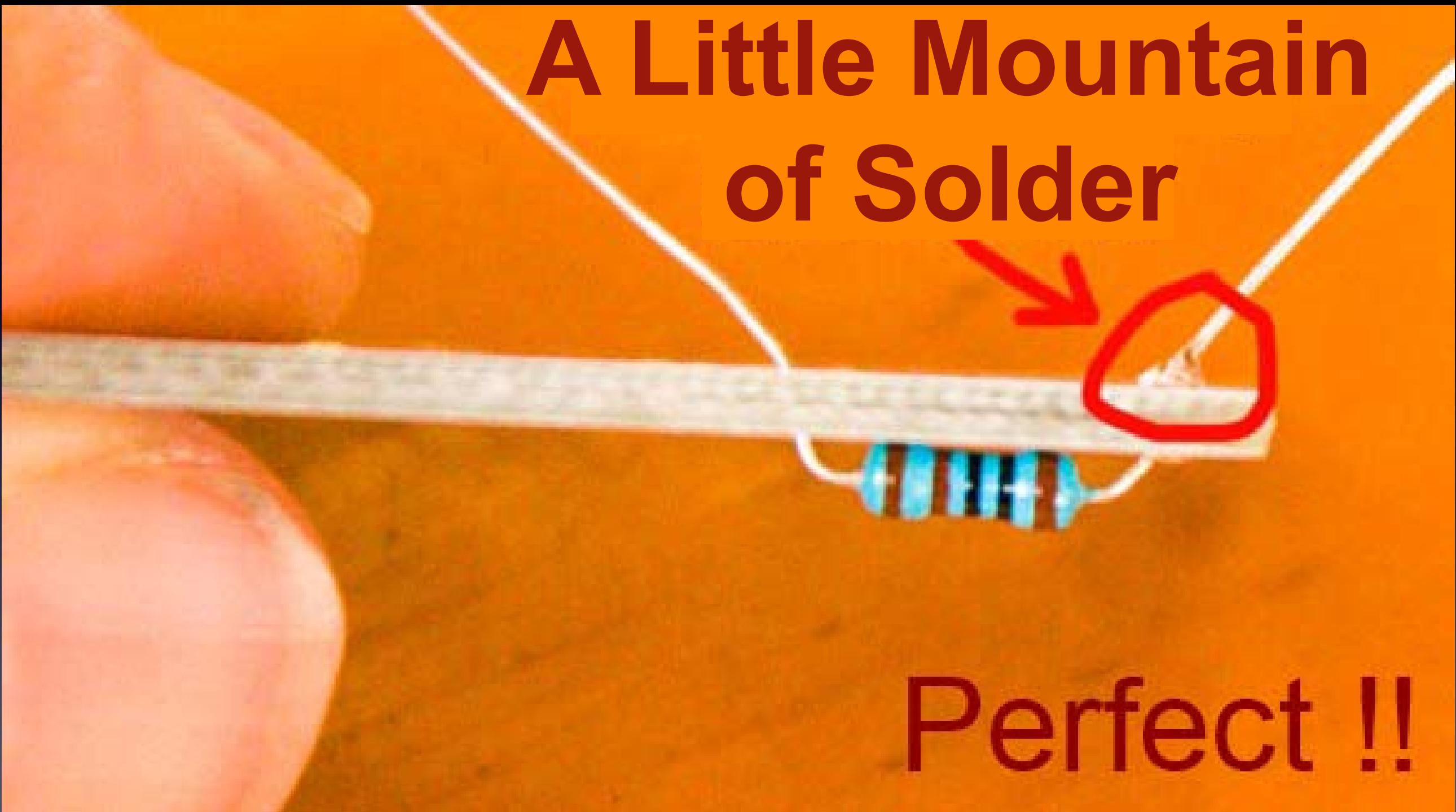
Secret #2:

Keep hot tip down  
1 second  
for solder to flow !!



Now

Lift soldering iron



A Little Mountain  
of Solder

Perfect !!

If you can see any of the pad, or the hole, you need more solder – so, just do all the steps again to make it perfect.

**The Rhythm !**  
is just as important as the preceding steps!

The Rhythm !  
and speed (about 1 second per step)



The Rhythm !  
and speed (about 1 second per step)  
**Clean the tip**



The Rhythm !  
and speed (about 1 second per step)



Tip Down

The Rhythm !  
and speed (about 1 second per step)



Solder In

The Rhythm !  
and speed (about 1 second per step)



Solder Out

**The Rhythm !**  
and speed (about 1 second per step)



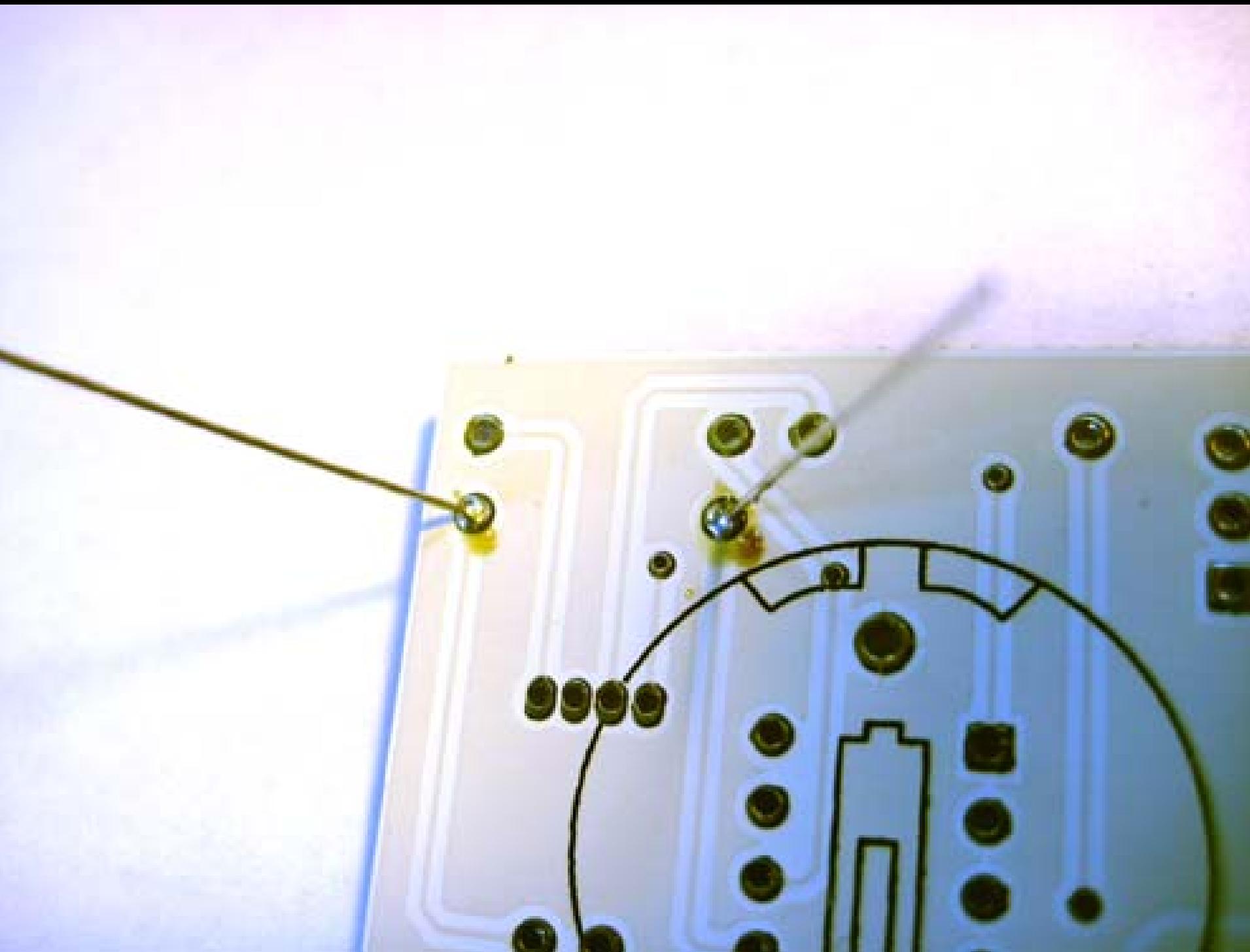
***WAIT !***

The Rhythm !  
and speed (about 1 second per step)



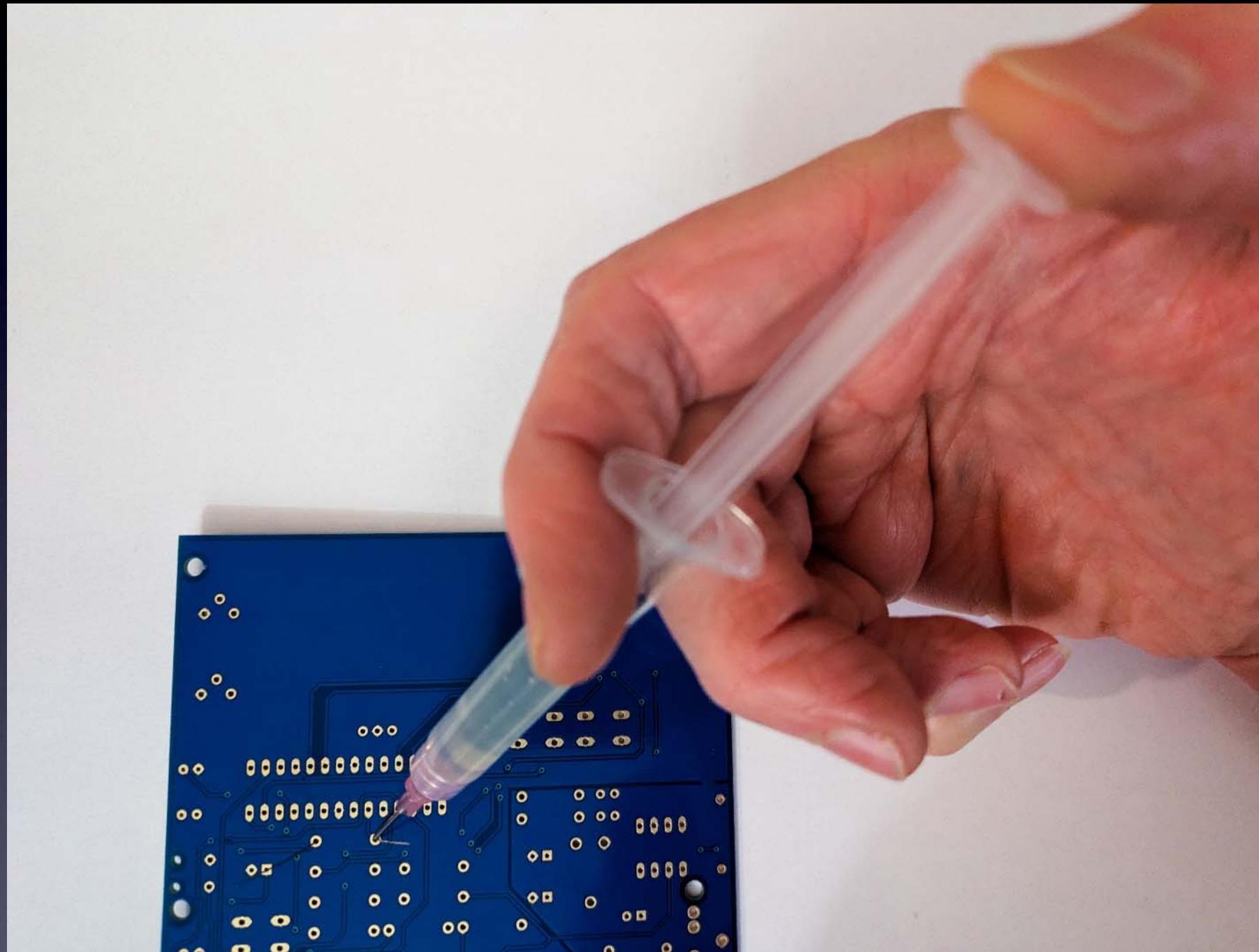
Lift Tip

If you are using solder **WITH** lead (Pb), you can now  
Solder all of the leads of the part to the board



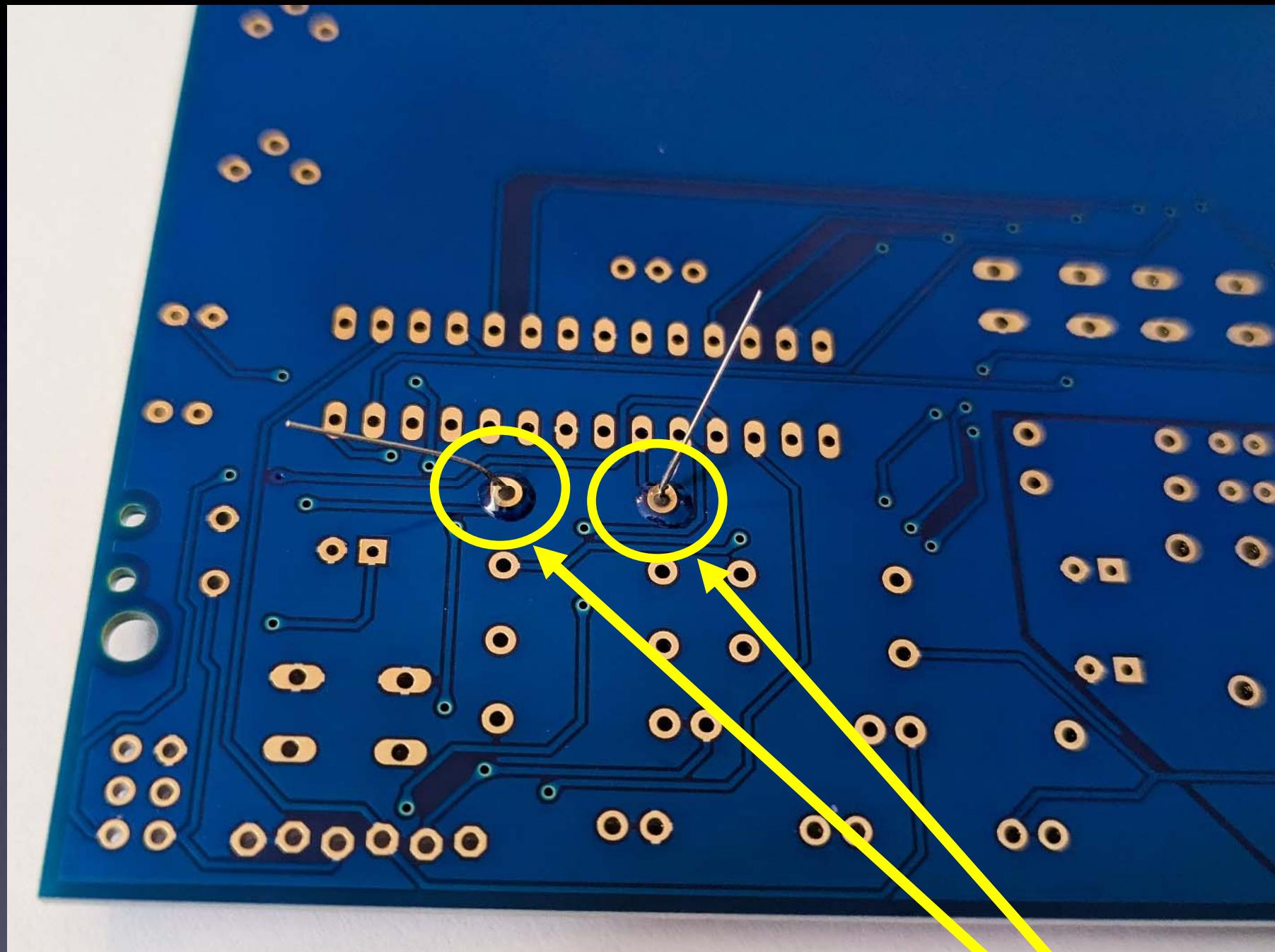
For this part, there are two leads  
Here you can see two good solder connections

BUT – if you are using *Lead-Free* solder:  
**First add flux !**



For *Lead-Free* solder, add flux to each pad before soldering !  
For this part there are two pads

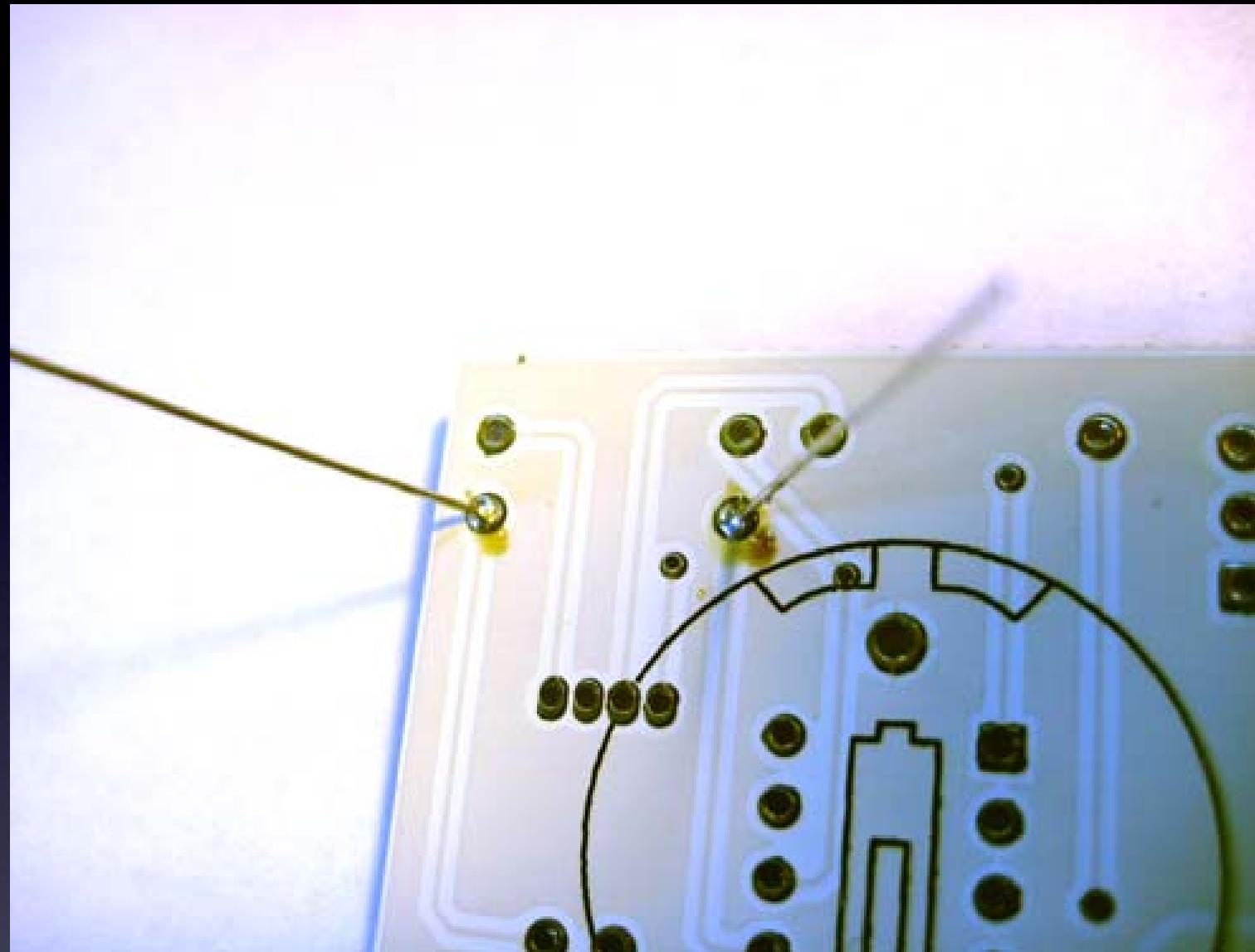
If you are using *Lead-Free* solder:  
Add flux to the pads **before** soldering



Here you can see flux over each of the two pads.

Now these leads are ready to solder with your *Lead-Free* solder.

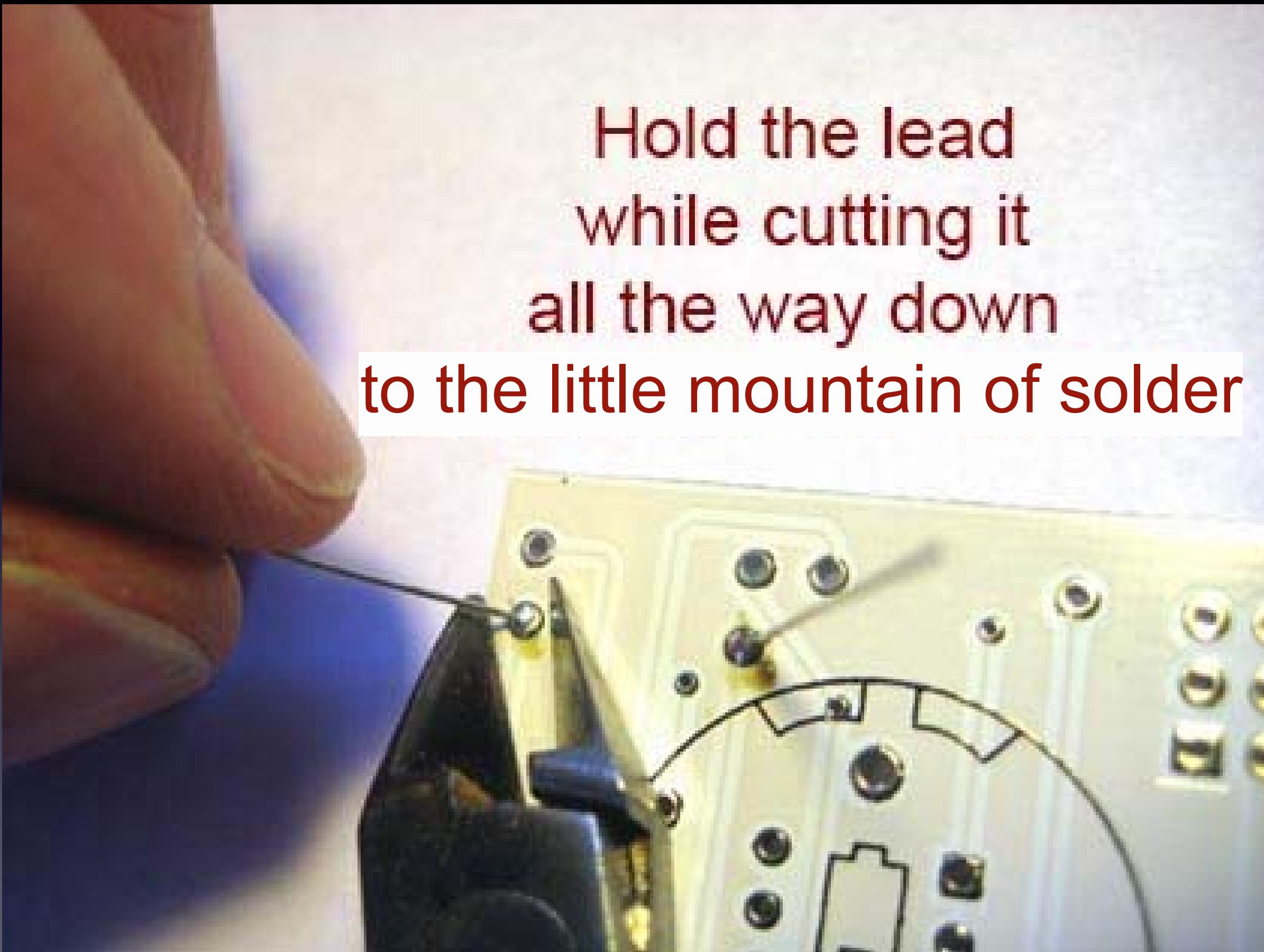
# Two good solder connections



- Little mountains (not flat)
- Pads totally covered in solder
- Can't see the hole
- No connections to other pads

Now cut the leads short

Hold the lead  
while cutting it  
all the way down  
to the little mountain of solder



Cutting with the tip of the wire cutter gives you more control

# Safety Tip #3:

Hold or cover the lead !

(or it will fly into your eye!)

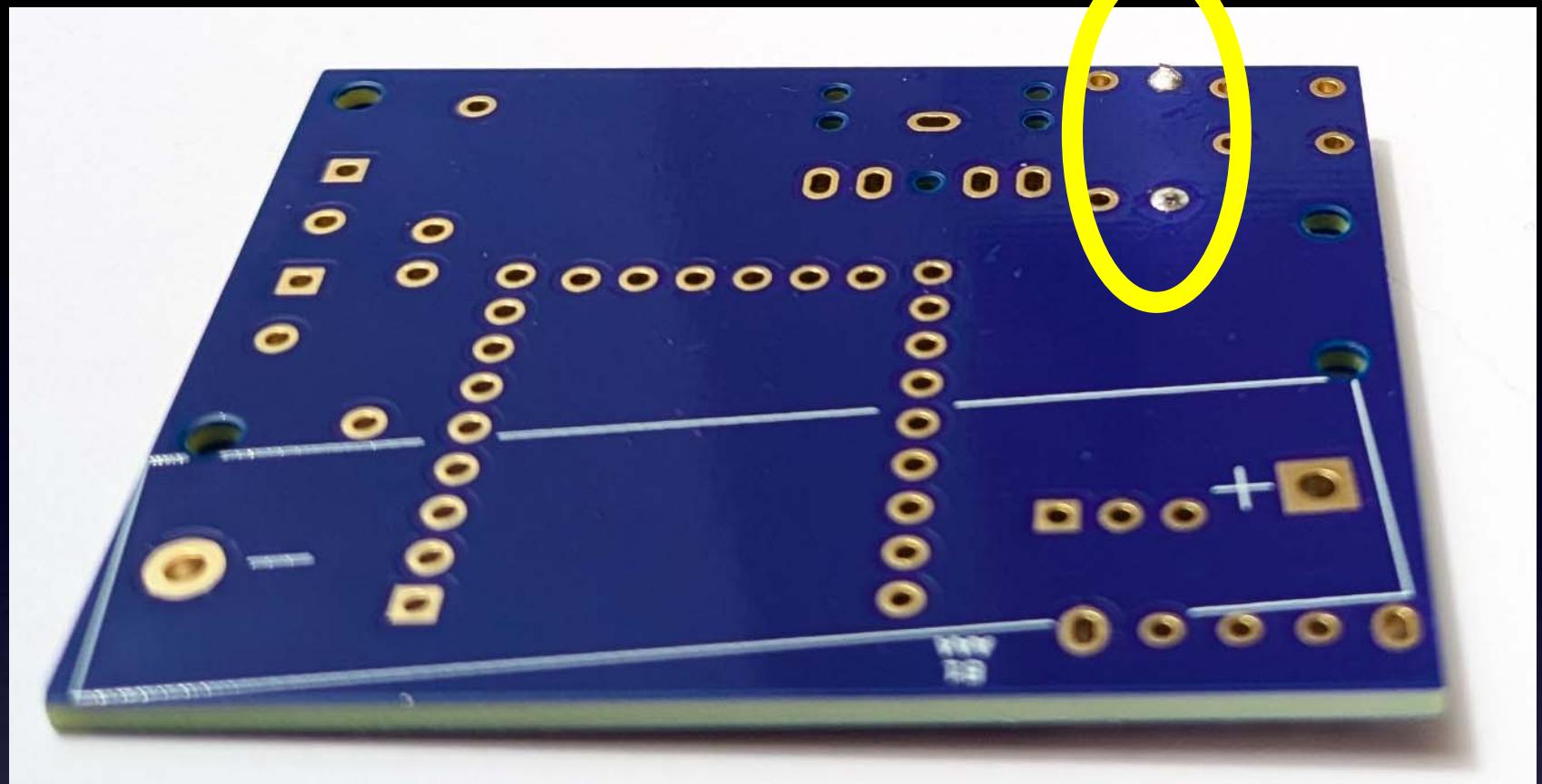
*(They like doing that – so please hold or cover the lead when you cut.)*



All done !

No wires sticking out

# R1 soldered to the board



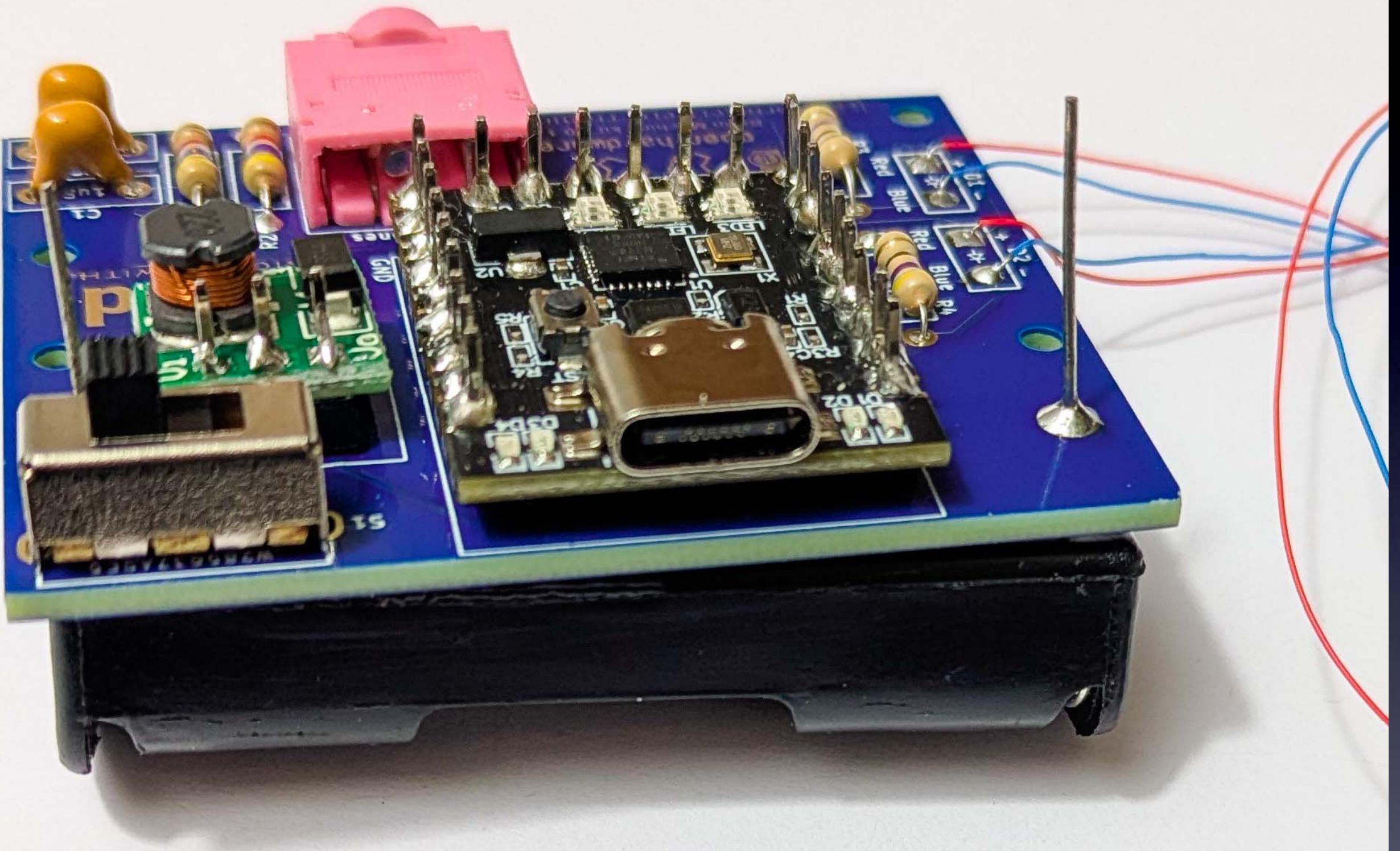
**2 good solder connections**

Notice that:

- Each connection is a small mountain (not flat)
- You cannot see any pad (they're totally covered with solder)
- You cannot see the holes (they're totally covered with solder)
- No connections to other pads

One part at a time

Till all the parts are soldered

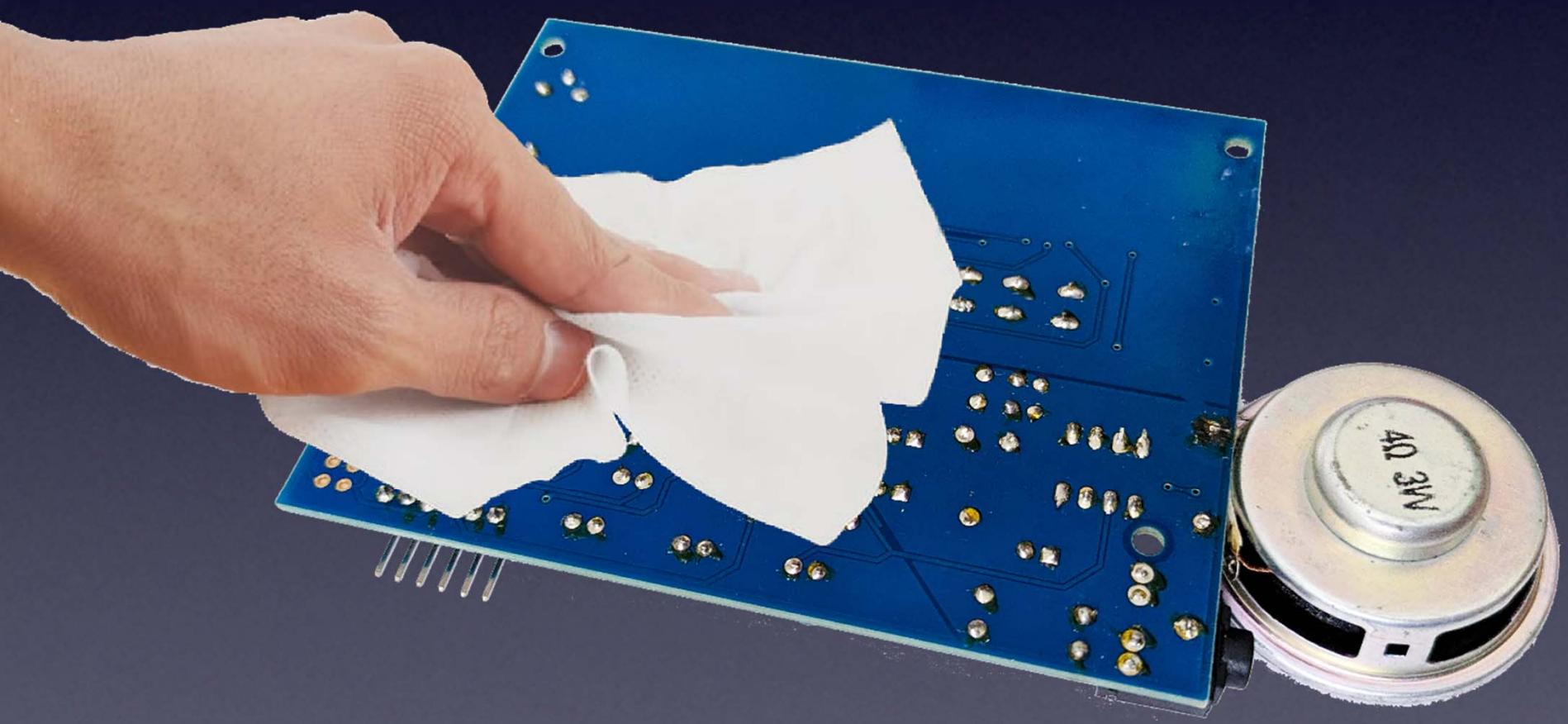


And it will look like this when you're done soldering.

If you used **Lead-Free** solder  
and  
**flux paste** in a syringe



The bottom of the PCB will be sticky from the flux



*You can clean it with a cloth  
wet with Isopropyl Alcohol*

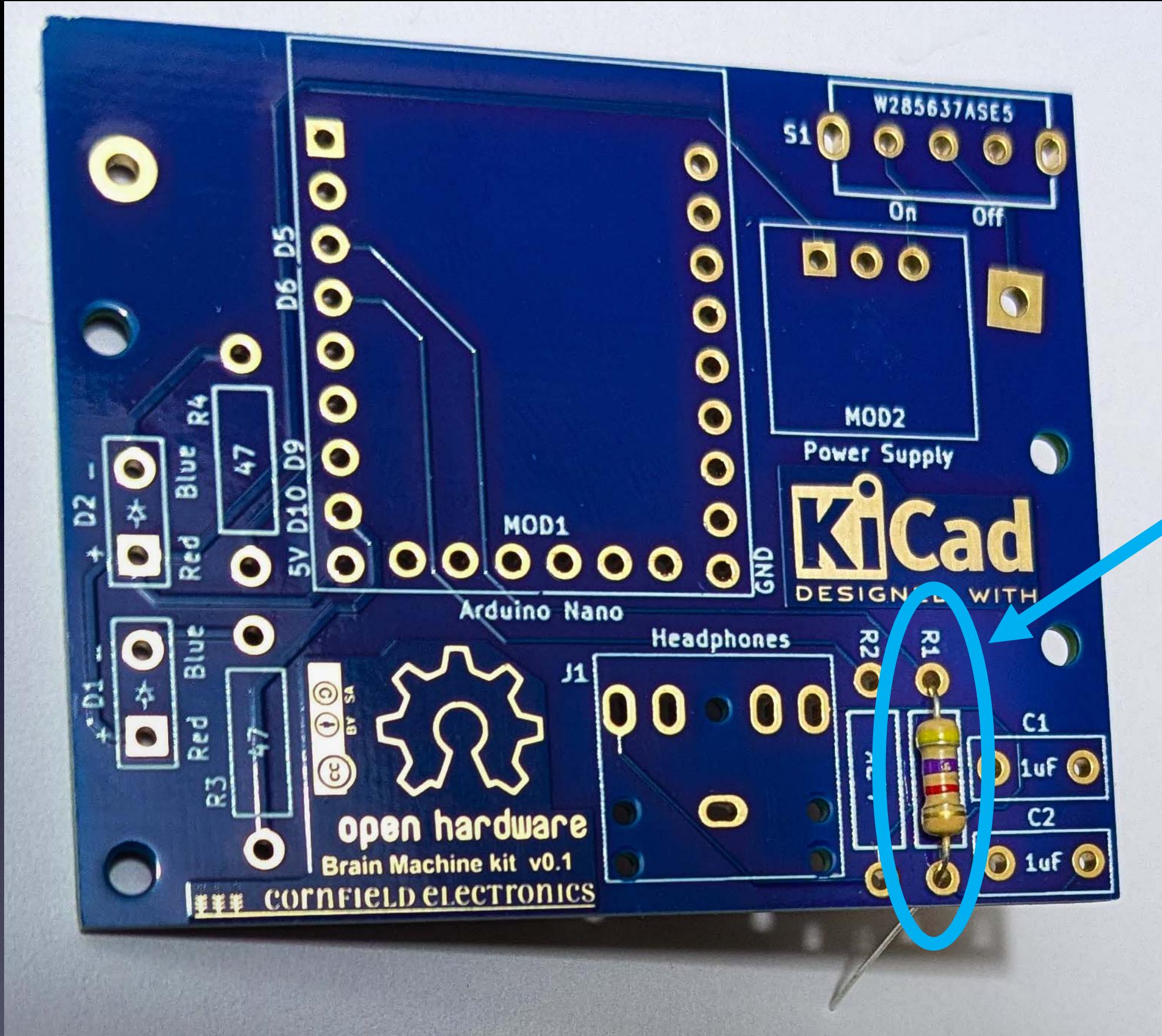
Then put in the battery,

Turn it on,

And it works!

(Or you start debugging.)

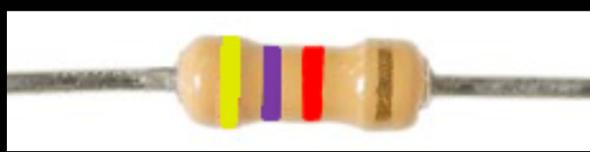
Let's start!



Direction does not matter

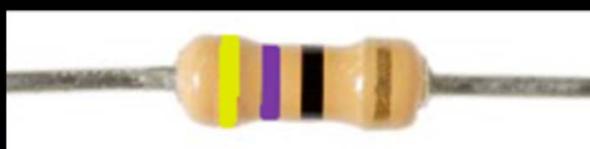
If you haven't done so already, solder R1: Yellow, Violet, Red

R1, R2:

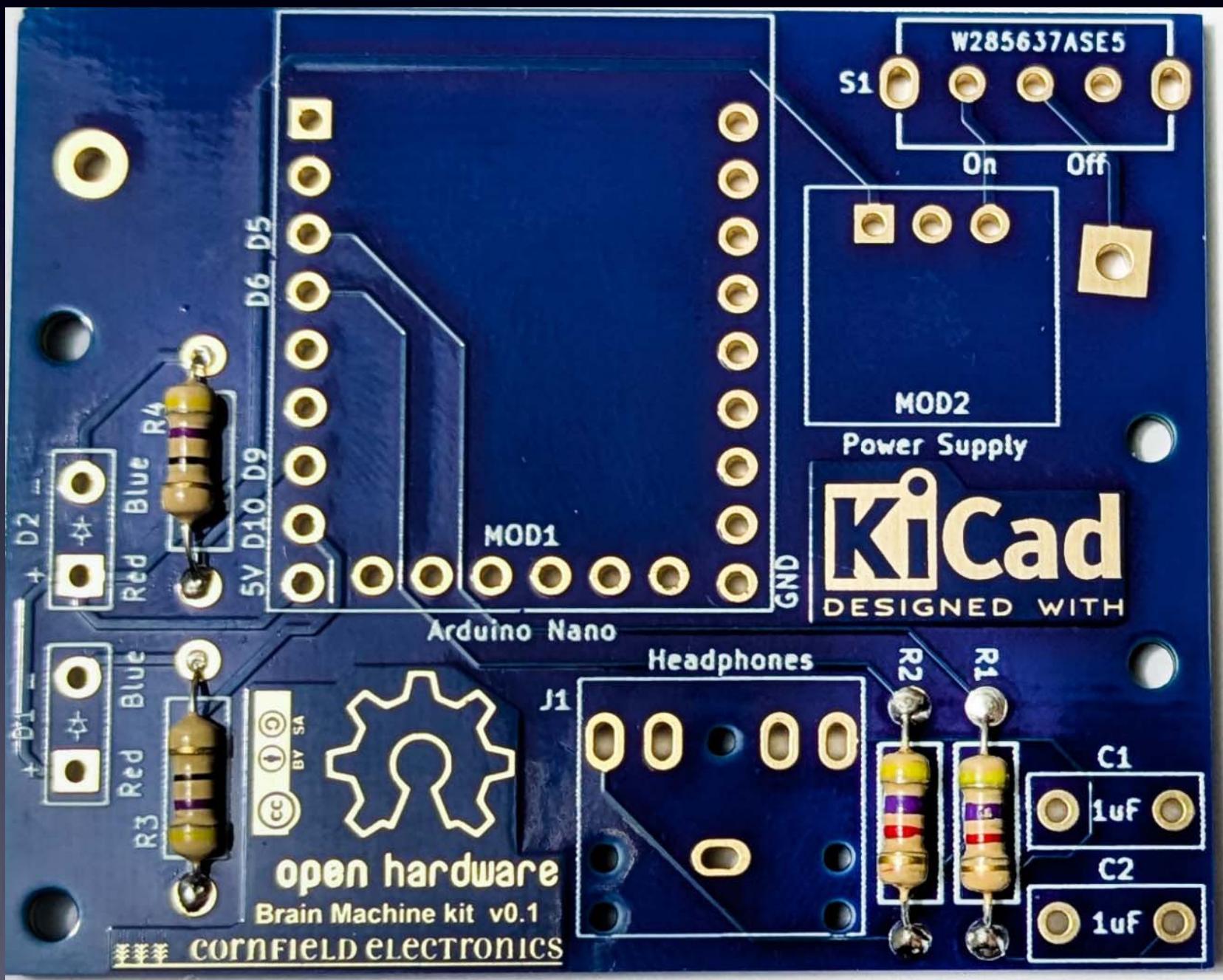


4.7K: Yellow, Violet, Red

R3, R4:



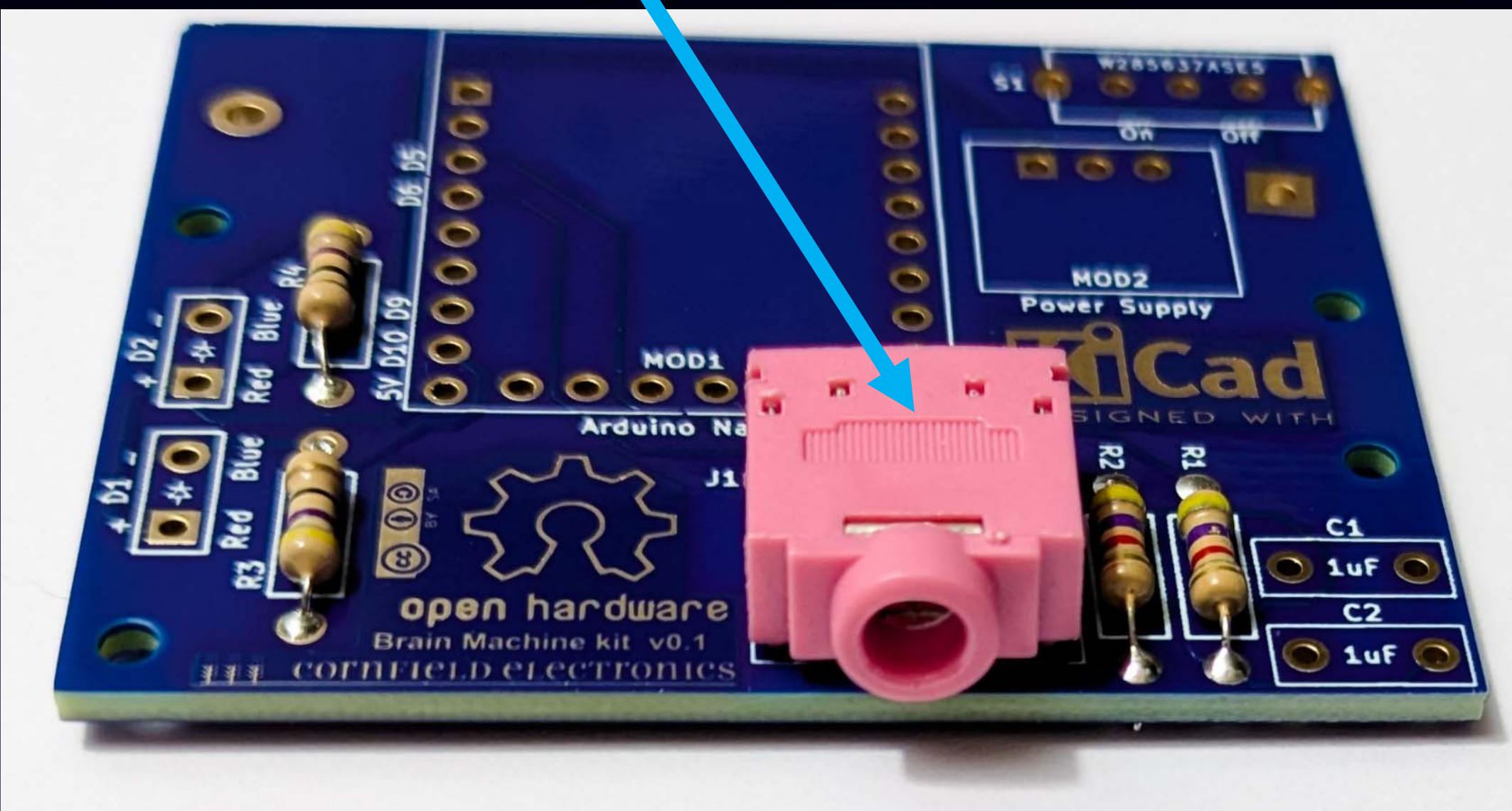
47: Yellow, Violet, Black



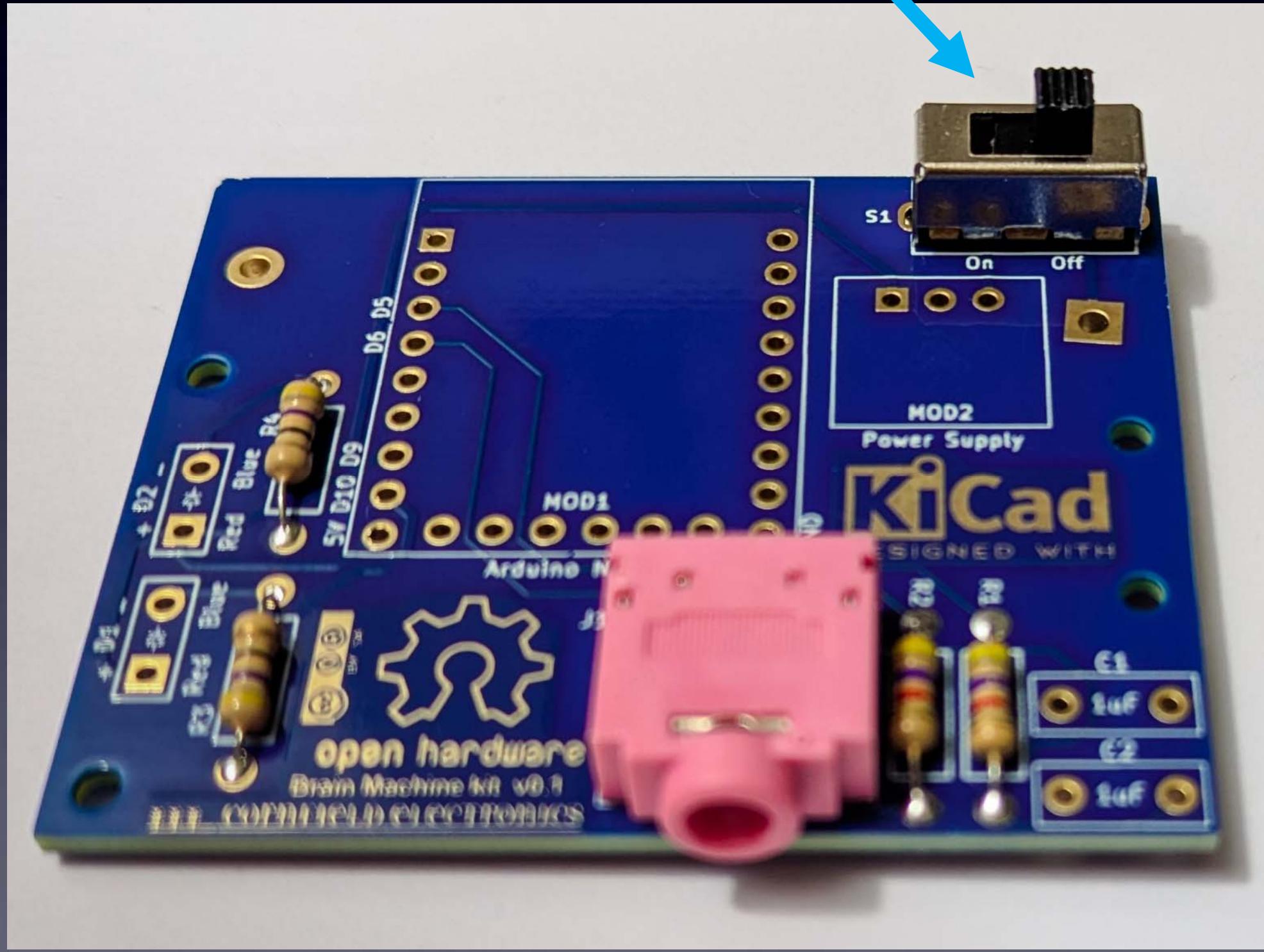
Direction does not matter

All 4 resistors

# J1: Headphone Jack

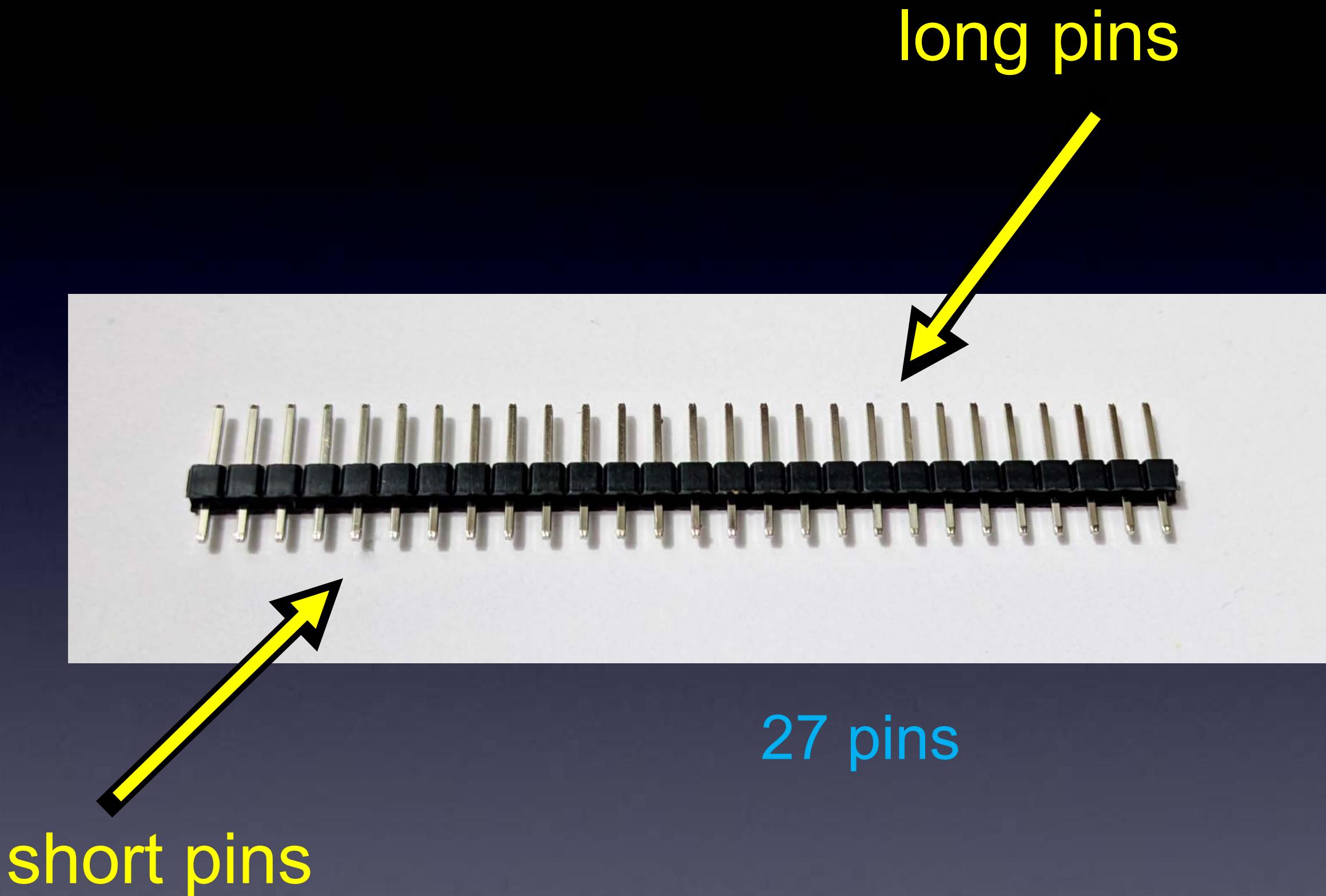


# S1: On/Off switch



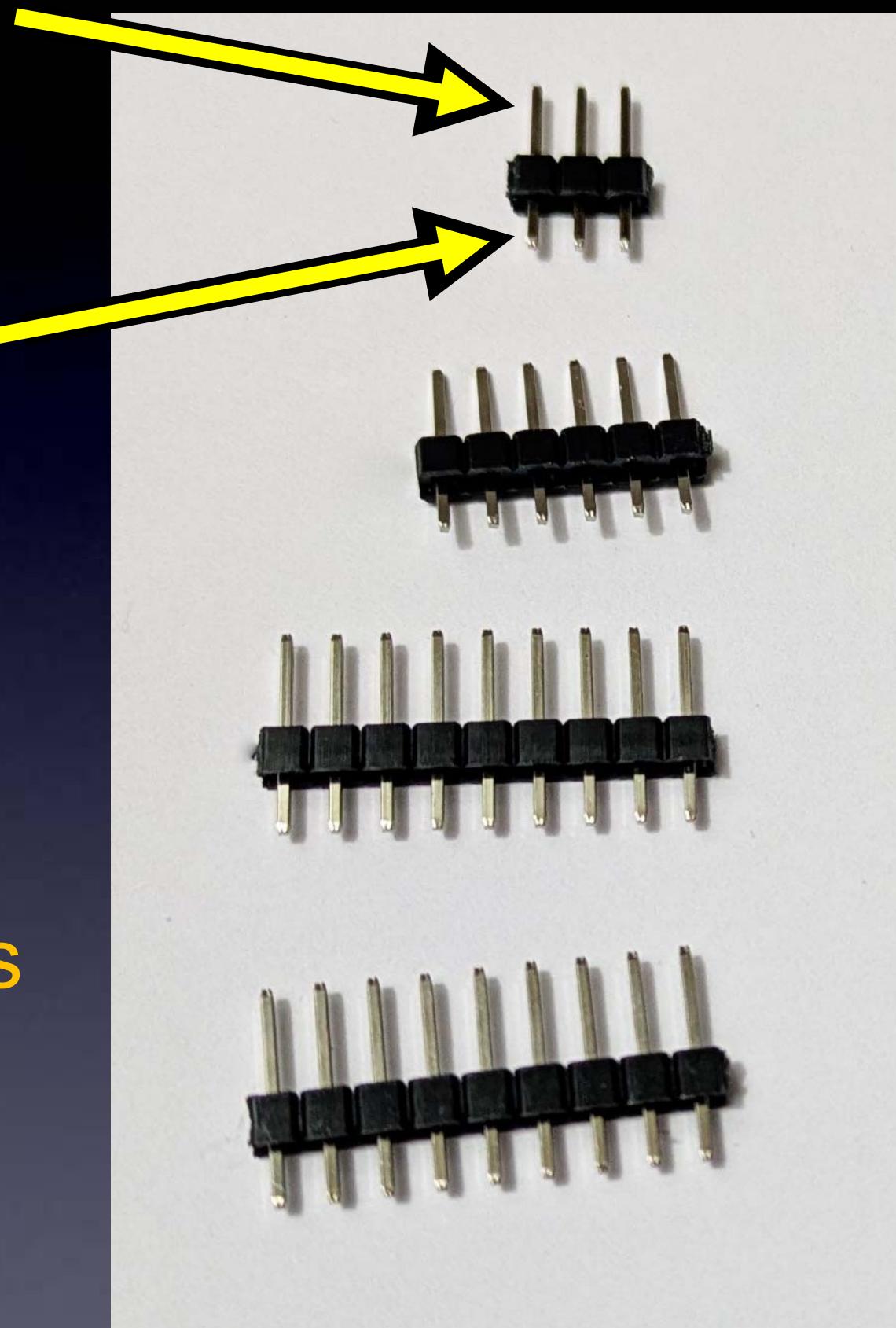
Direction does not matter

# Pin Headers



# Pin Headers

long pins



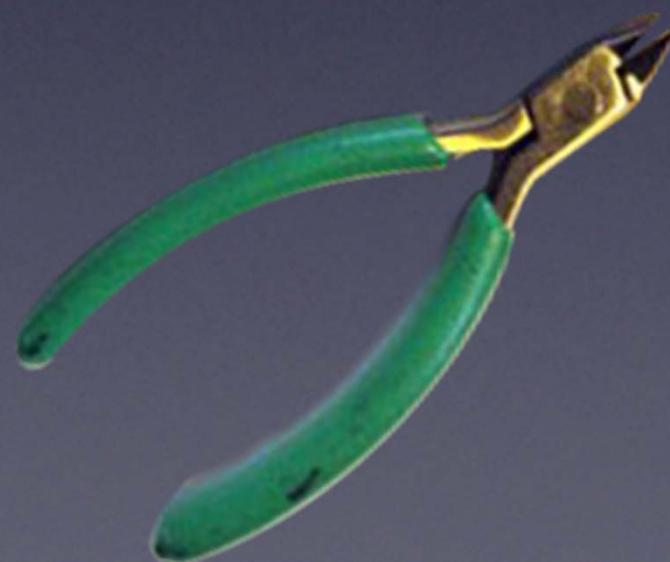
3 pins

6 pins

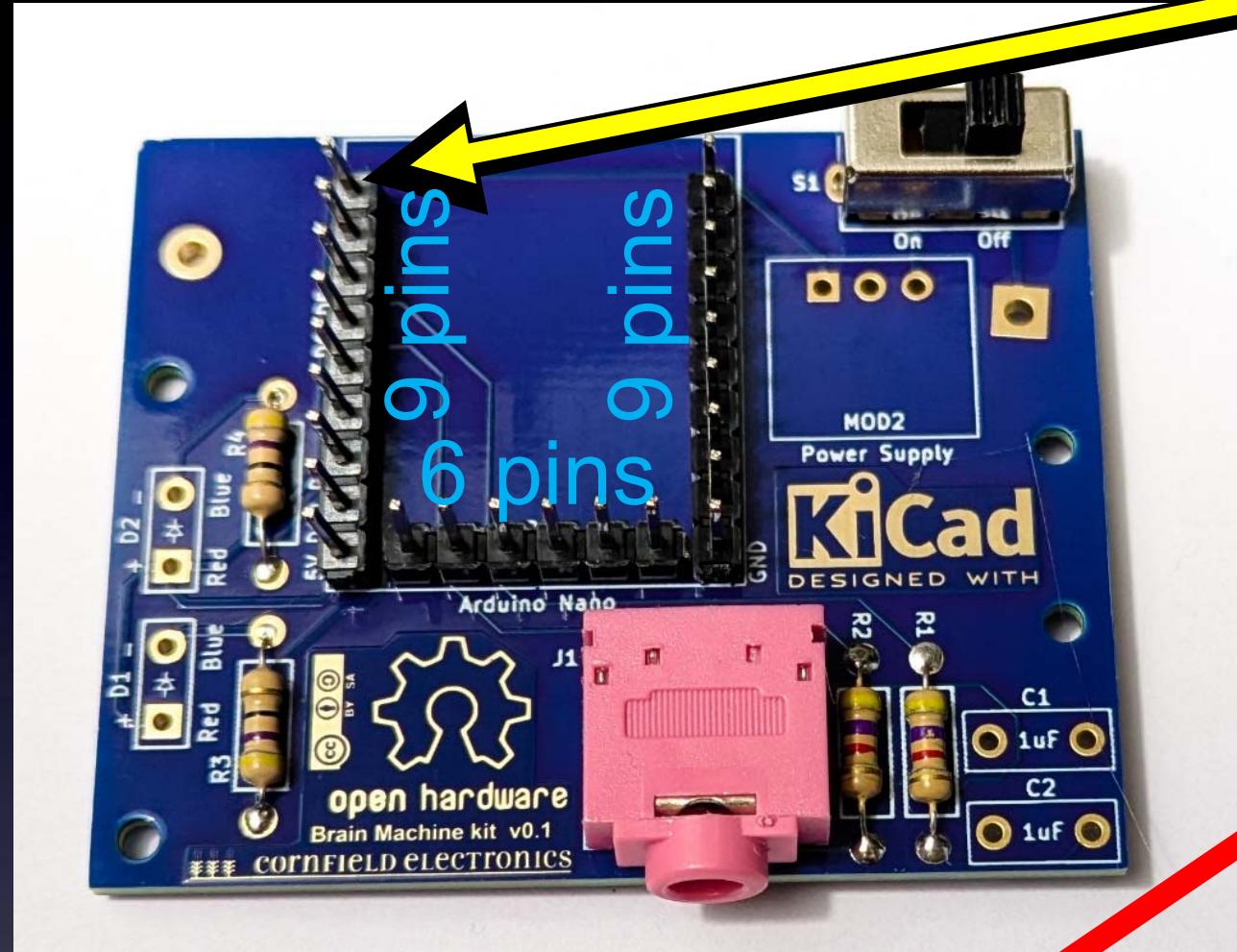
9 pins

9 pins

Use wire cutters



# Pin Headers for Arduino Nano



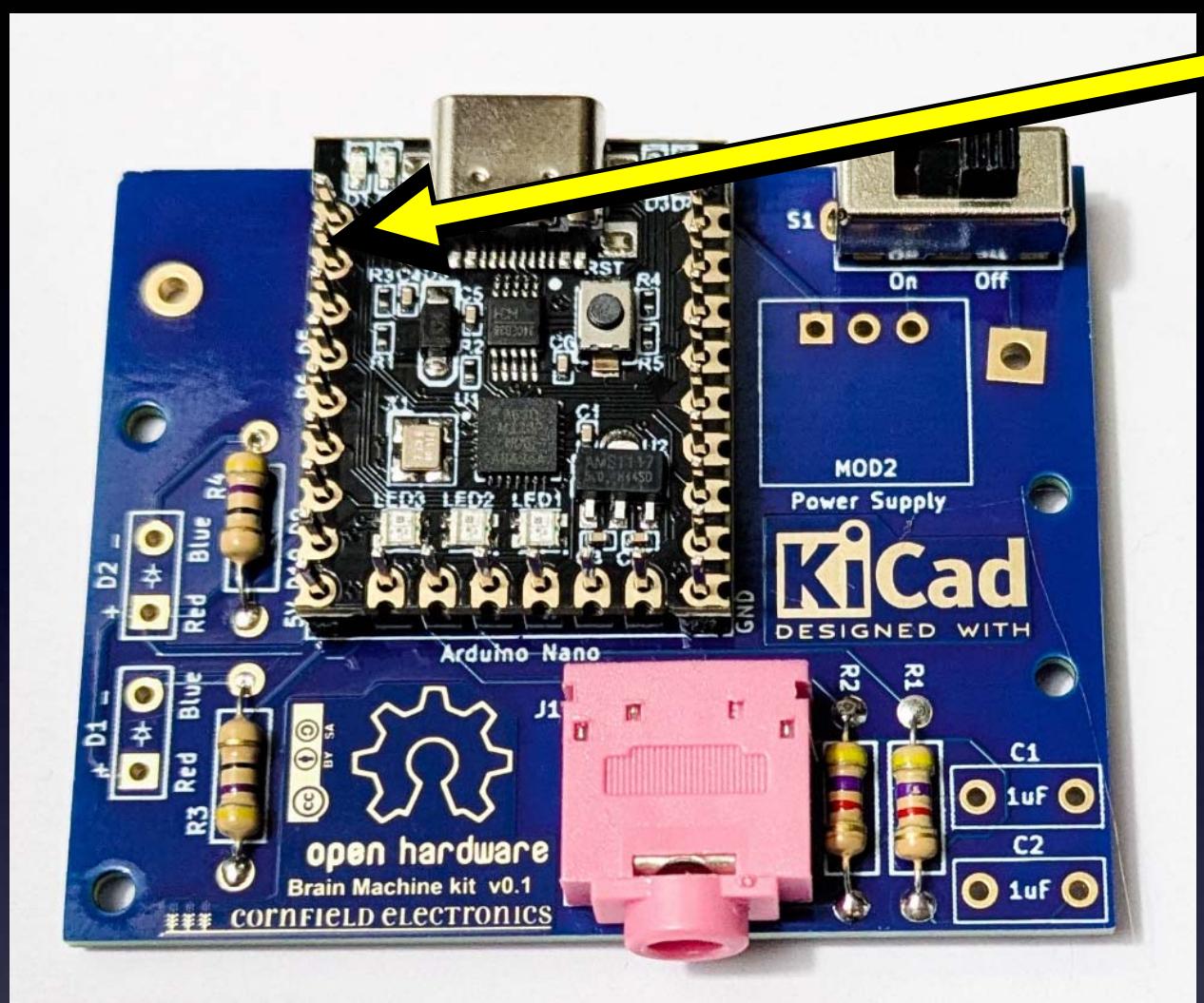
long pins sticking up

**IMPORTANT!**

→ Short pins go into the board ! ←

→ Do Not solder, yet ←

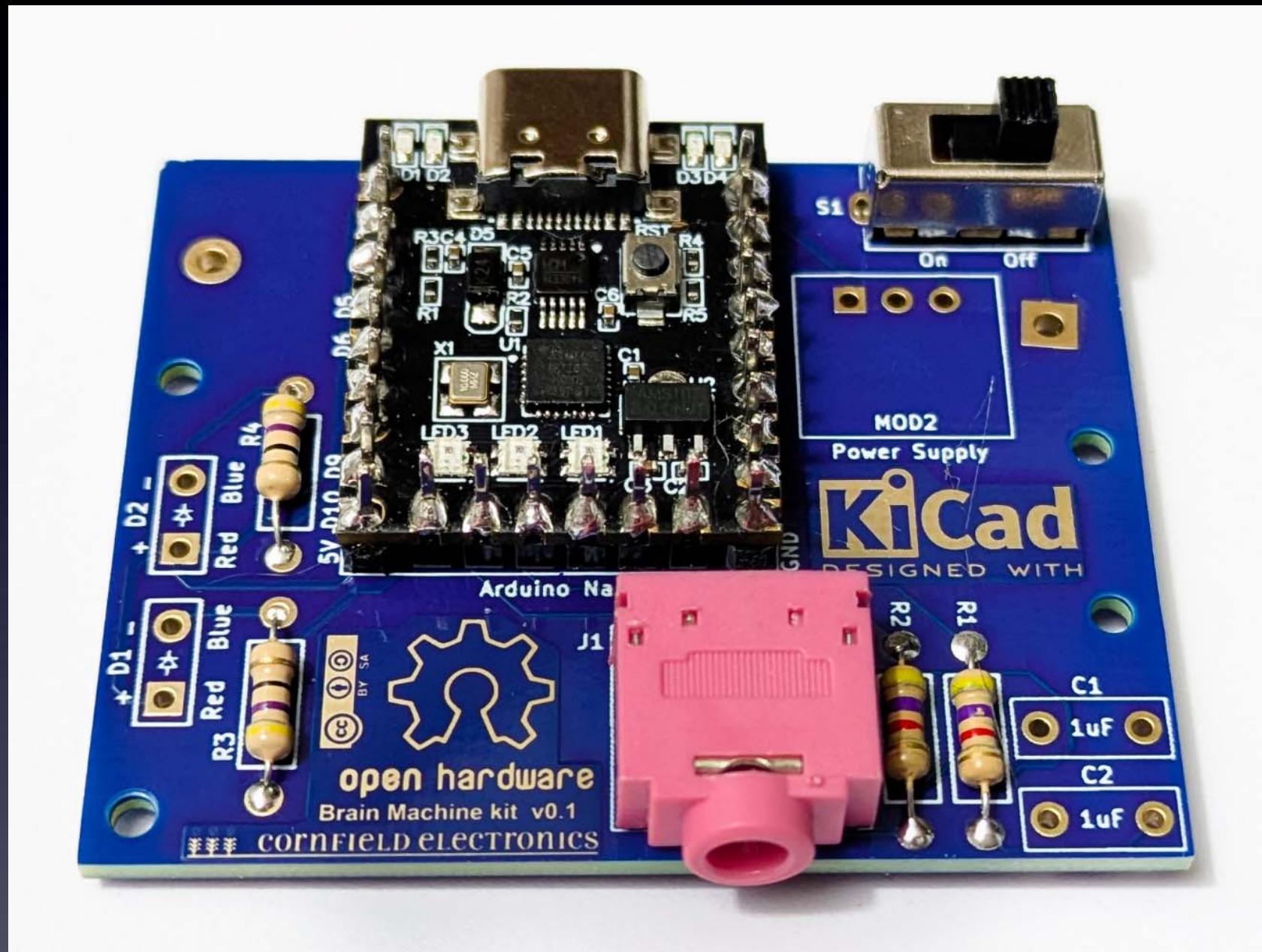
# Arduino Nano placed on its pins



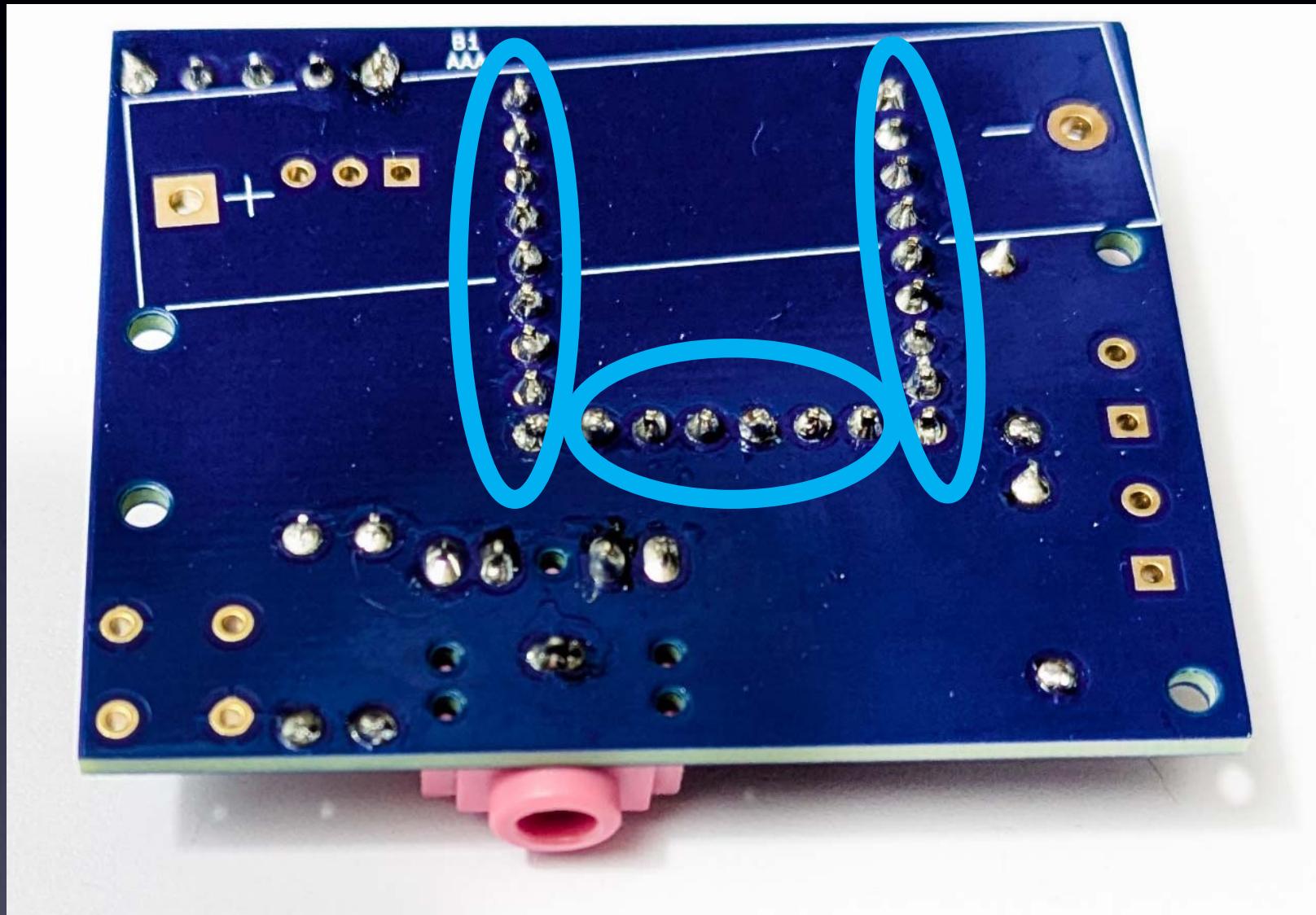
long pins sticking up

→ Short pins go into the board ! ←

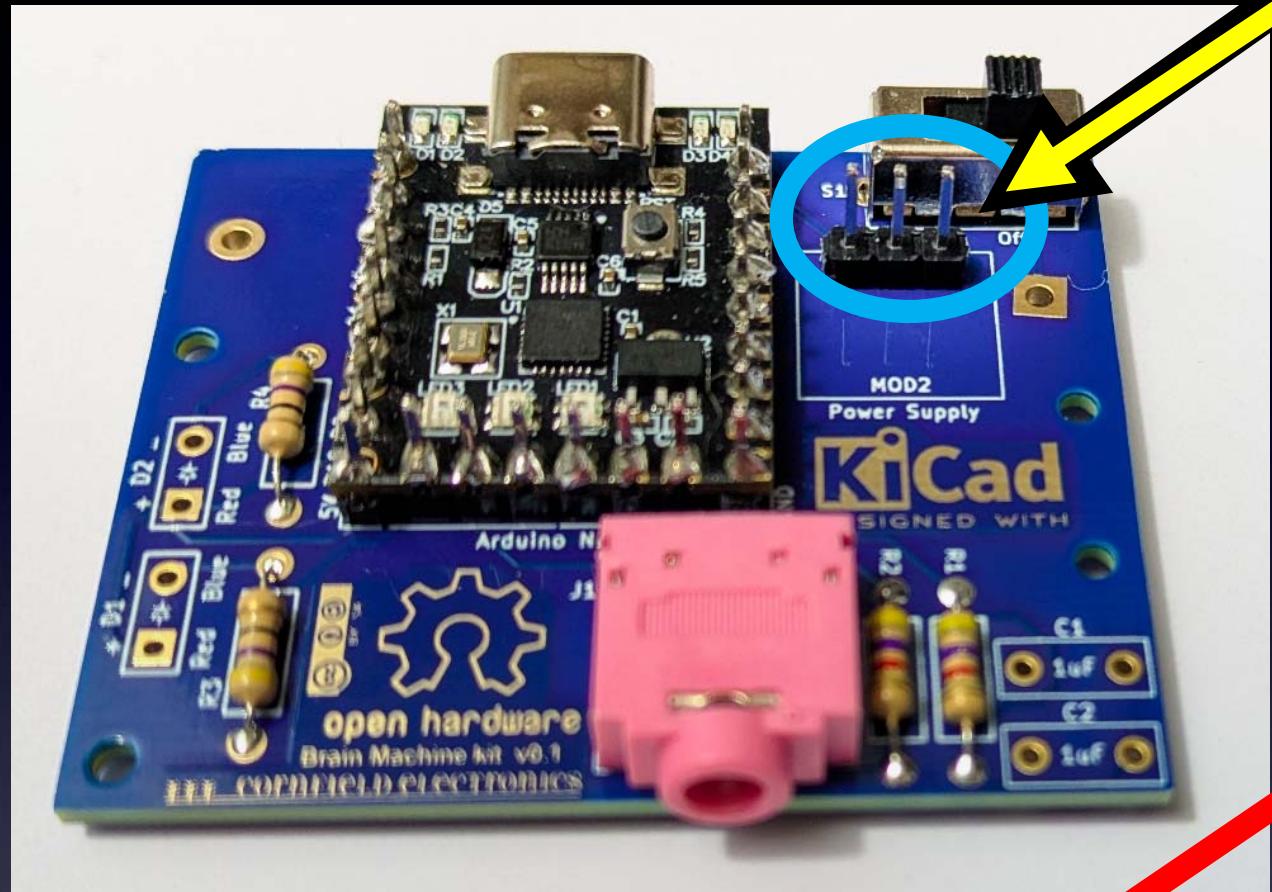
# Arduino Nano soldered to its pins



# Arduino Nano soldered to board



# Pin Headers for Power Supply



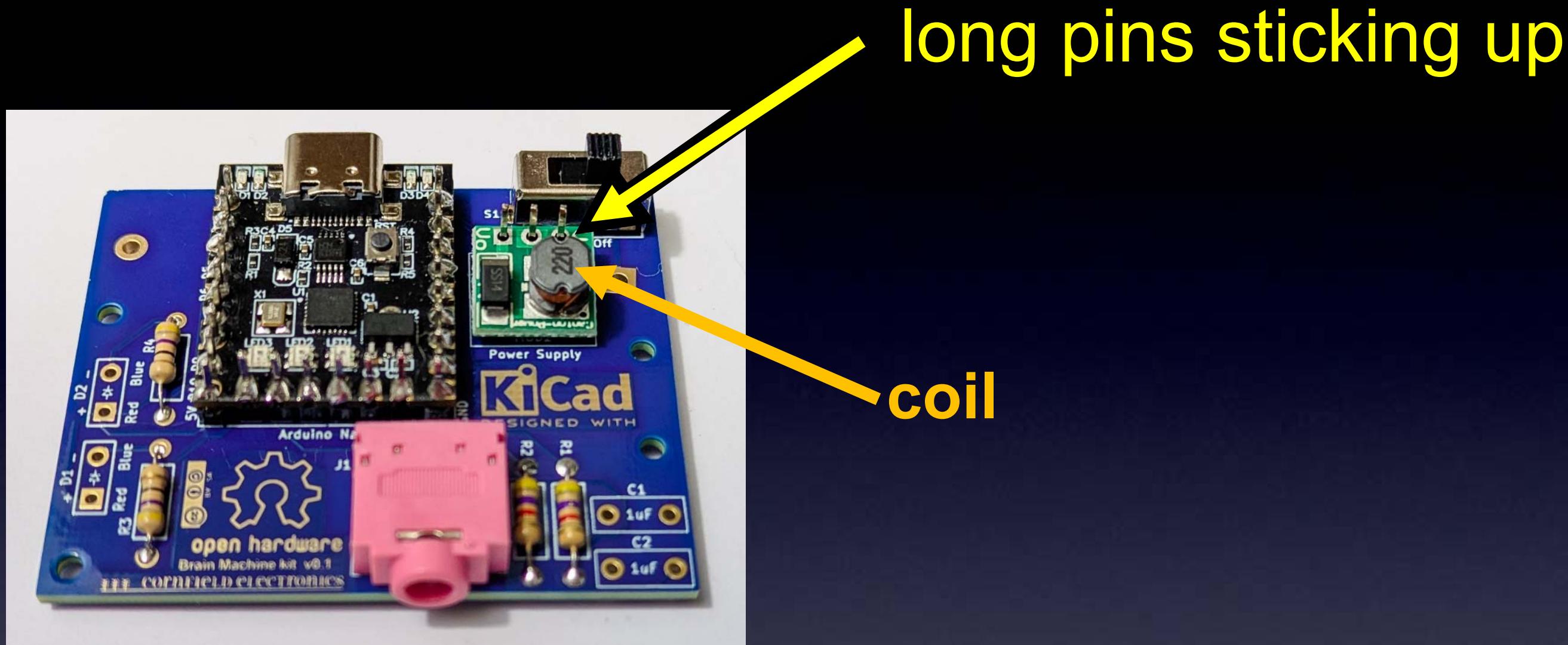
long pins sticking up  
3 pins

**IMPORTANT!**

→ Short pins go into the board ! ←

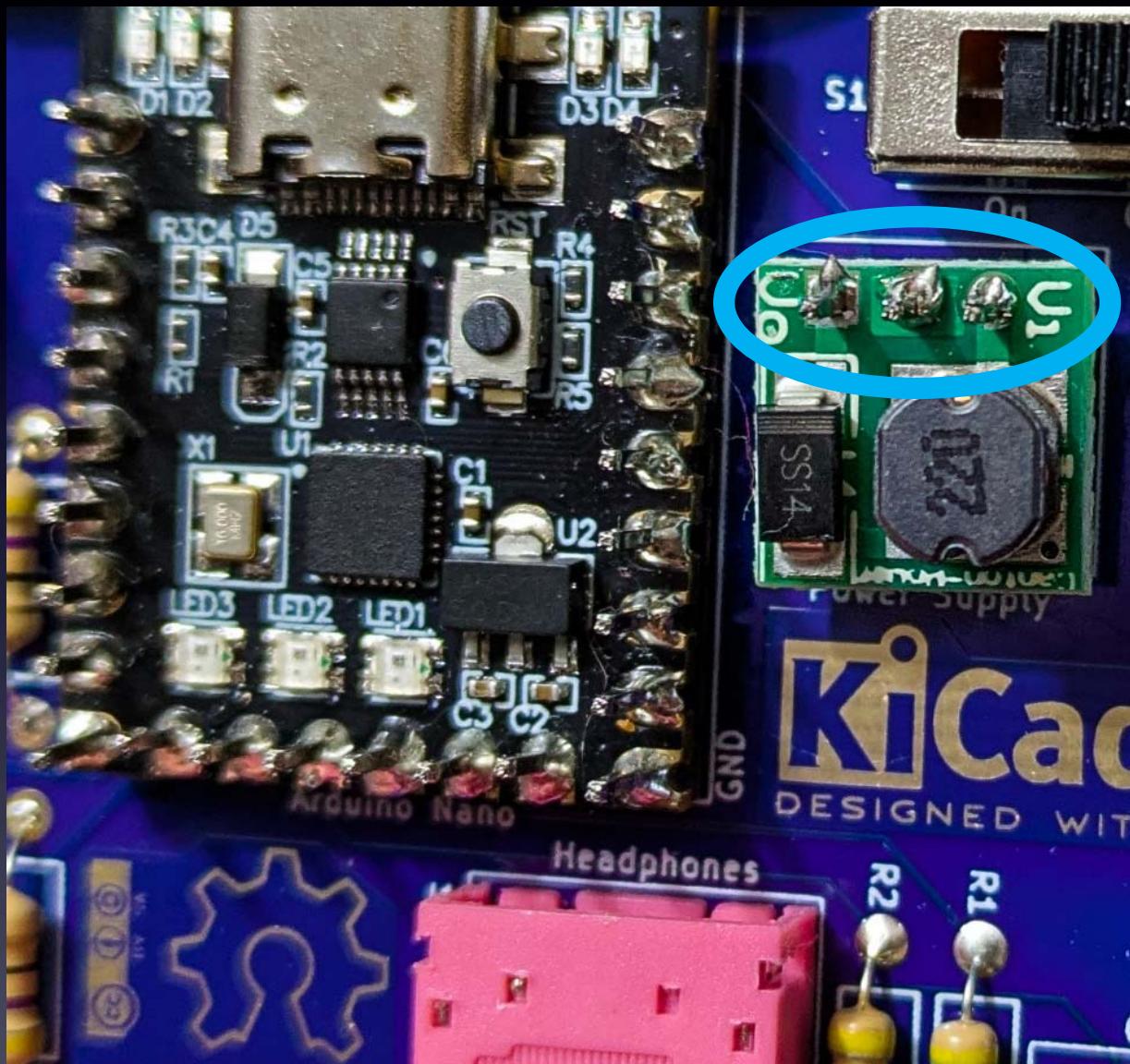
→ Do Not solder, yet ←

# Power Supply placed on its pins

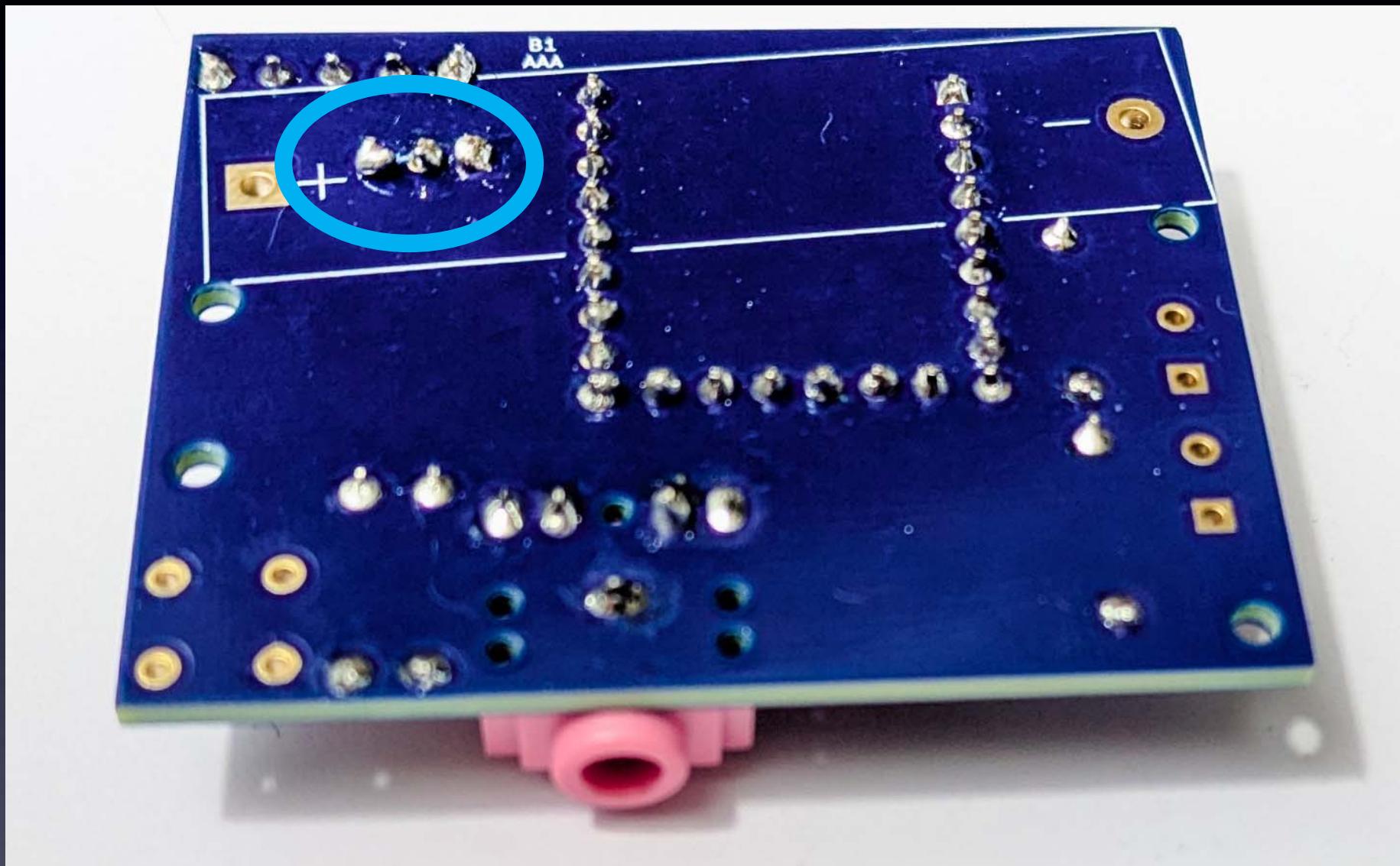


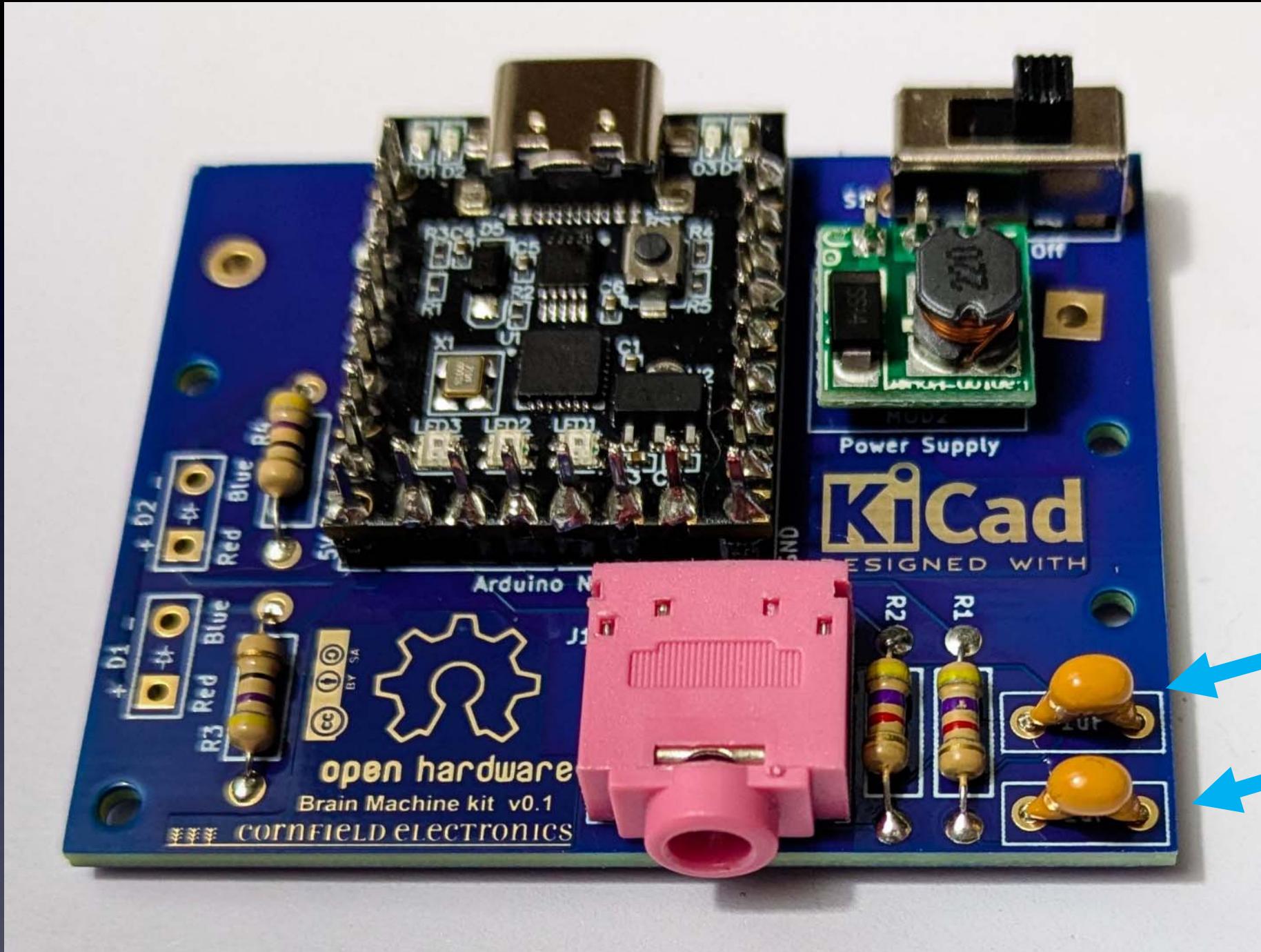
→ IMPORTANT: Power Supply must go in this way ! ←  
**(coil is facing up)**

# Power Supply soldered to its pins



# Power Supply soldered to board

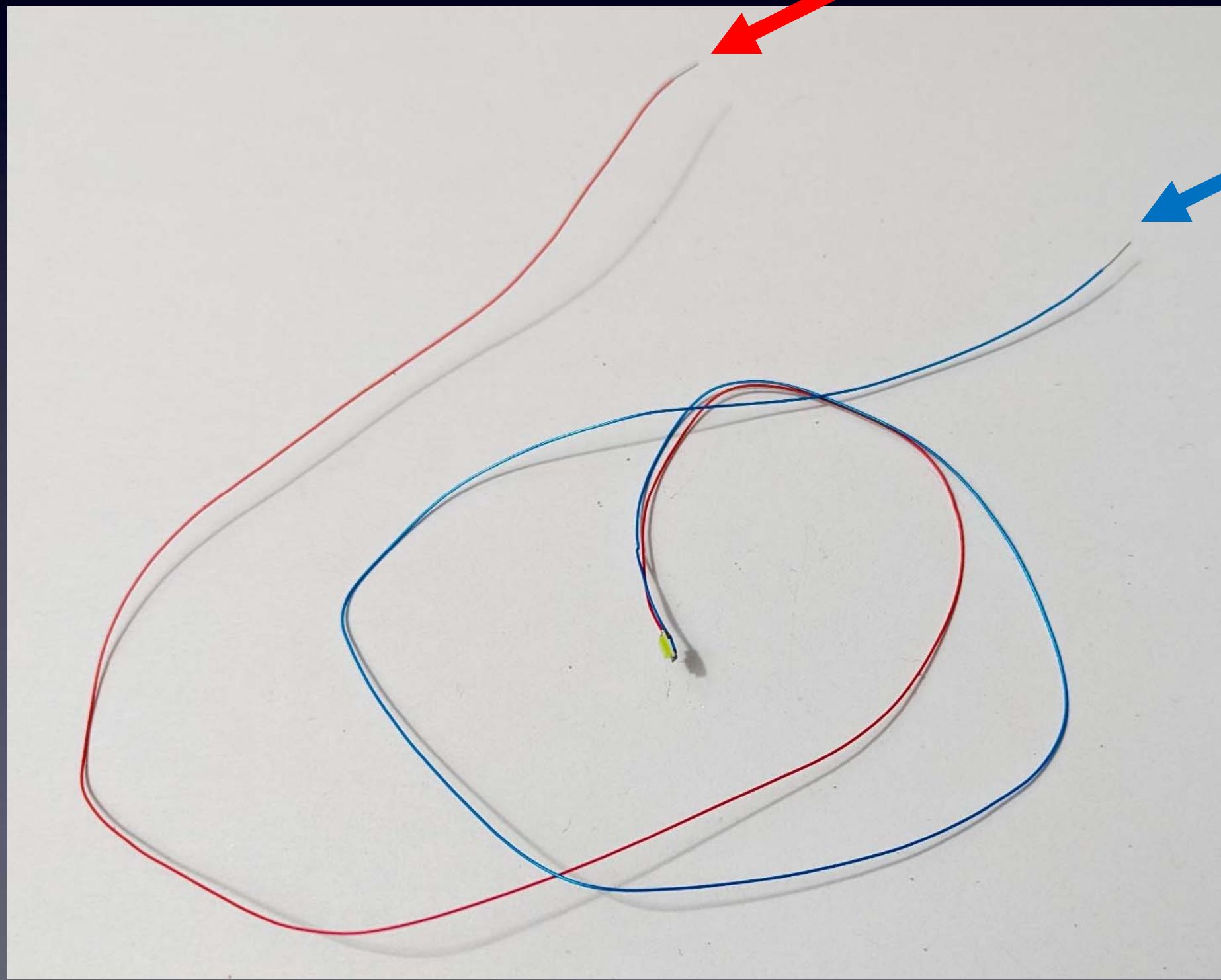




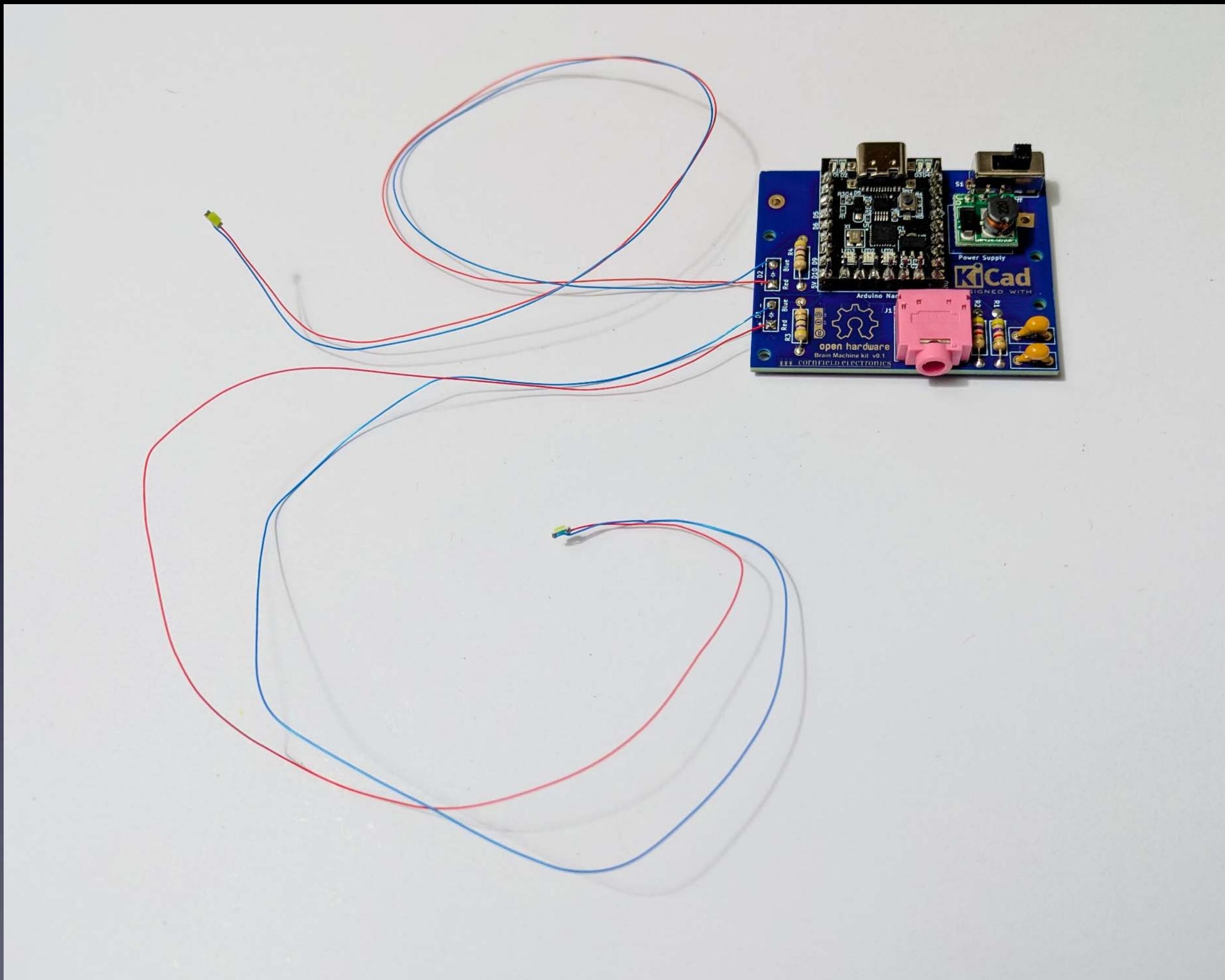
C1, C2

Direction does not matter

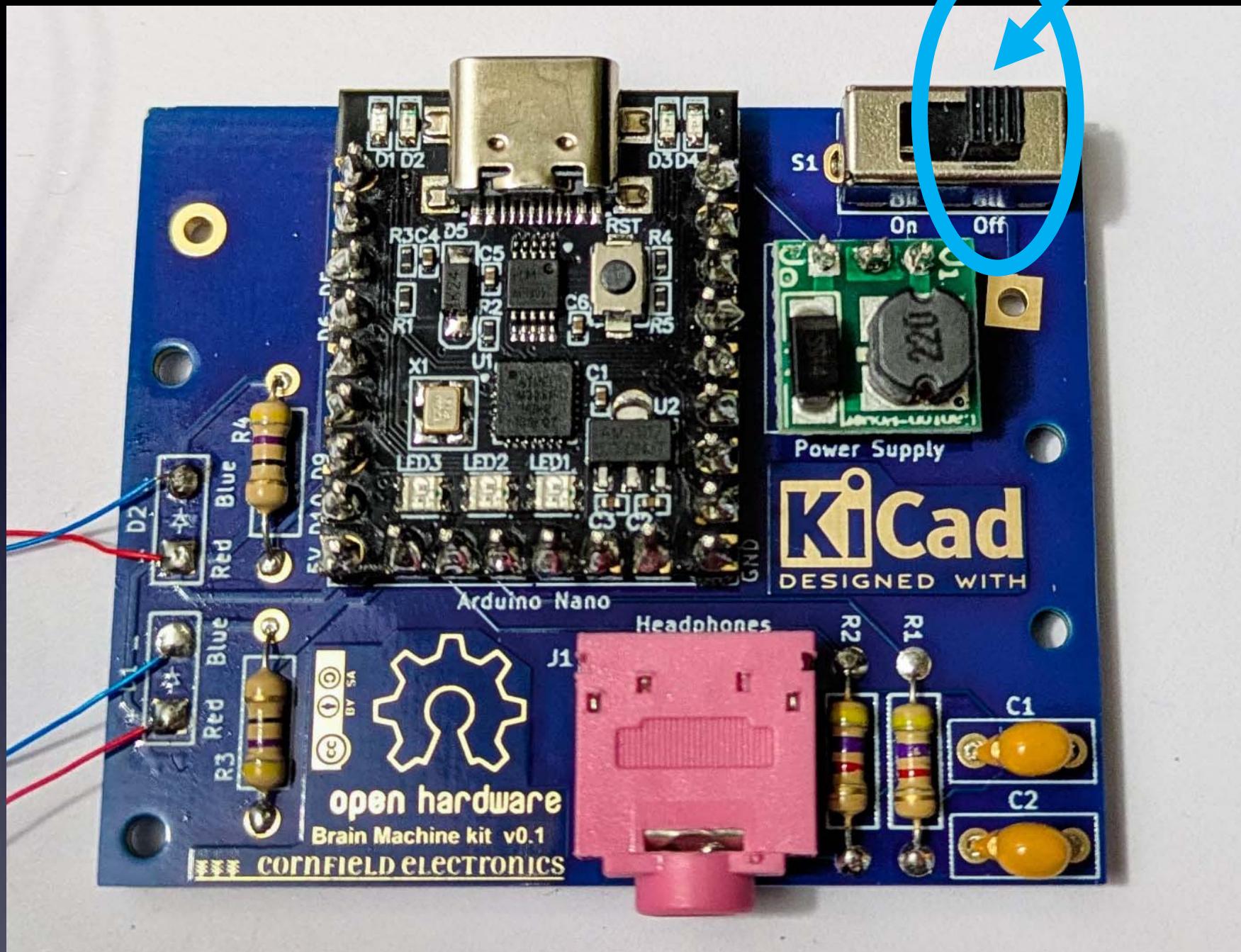
**LED1 and LED2:  
Red wire  
and  
Blue wire**



# LED1, LED2 soldered to board



# Let's Test !



S1 in OFF position

# Let's Test !

“+”

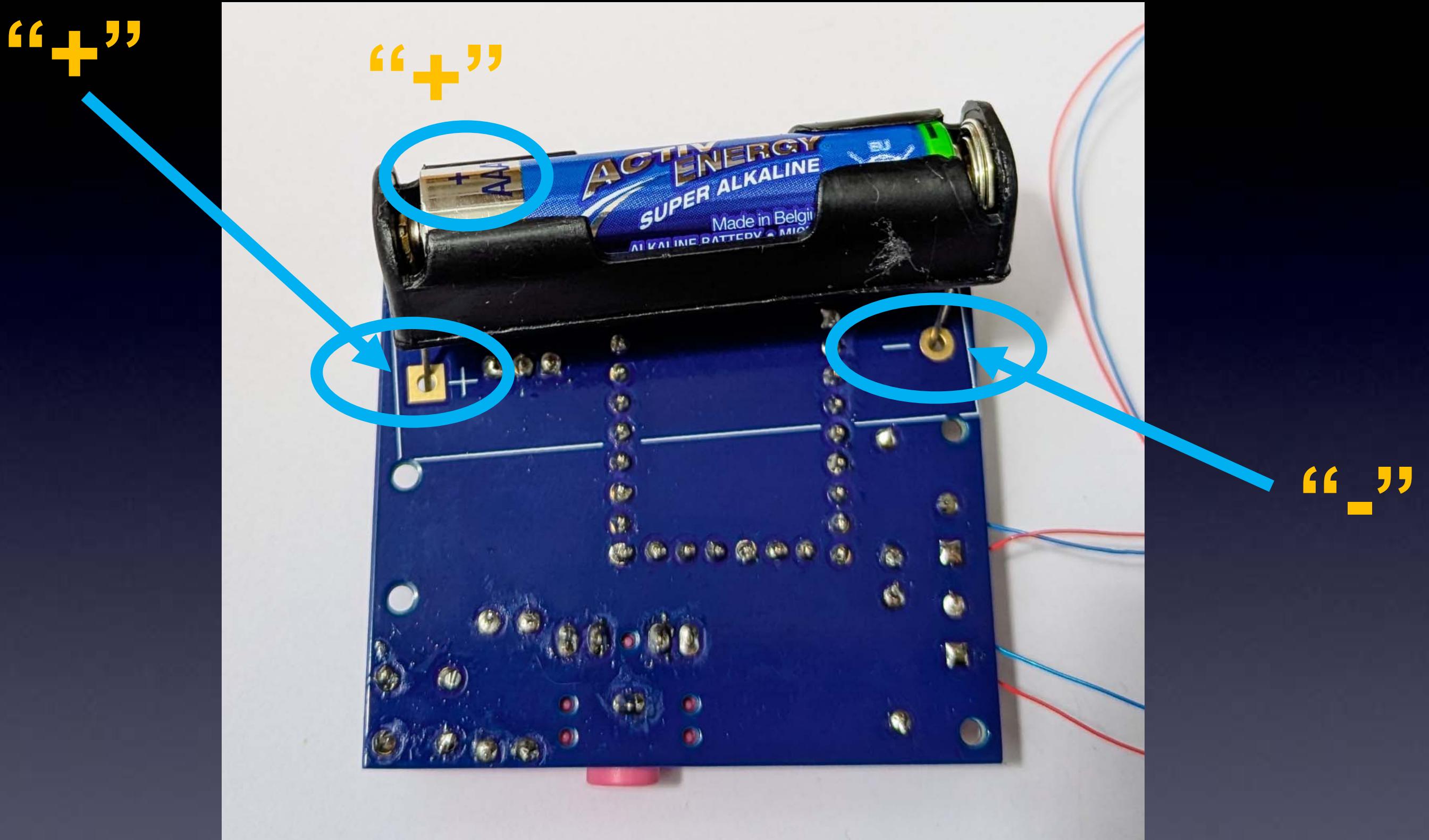
“-”

(spring)



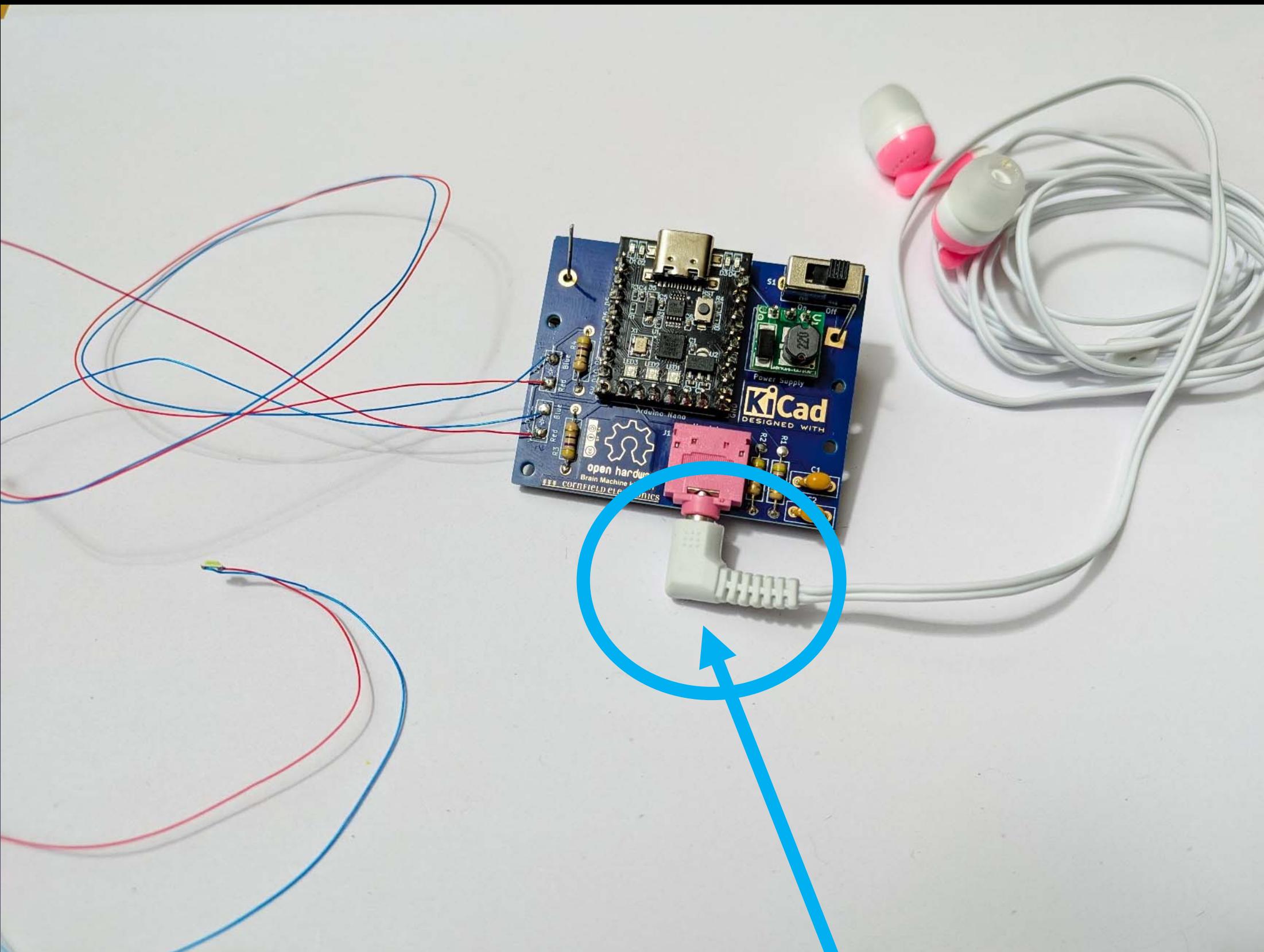
AAA Battery in its holder

# Let's Test !



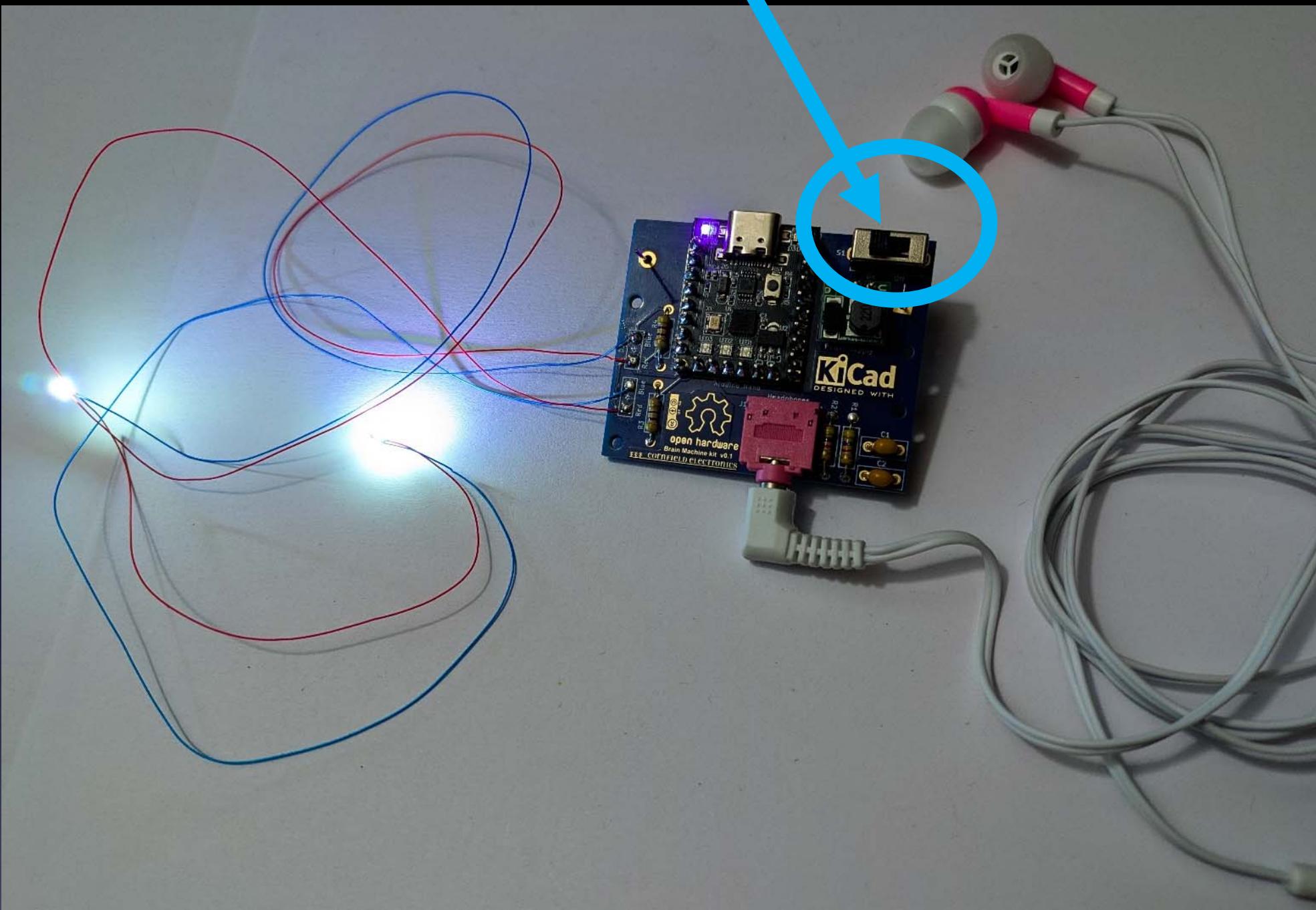
Place AAA Battery holder in place  
→ Do Not solder, yet ←

# Let's Test !



Insert Earbuds

# Let's Test !



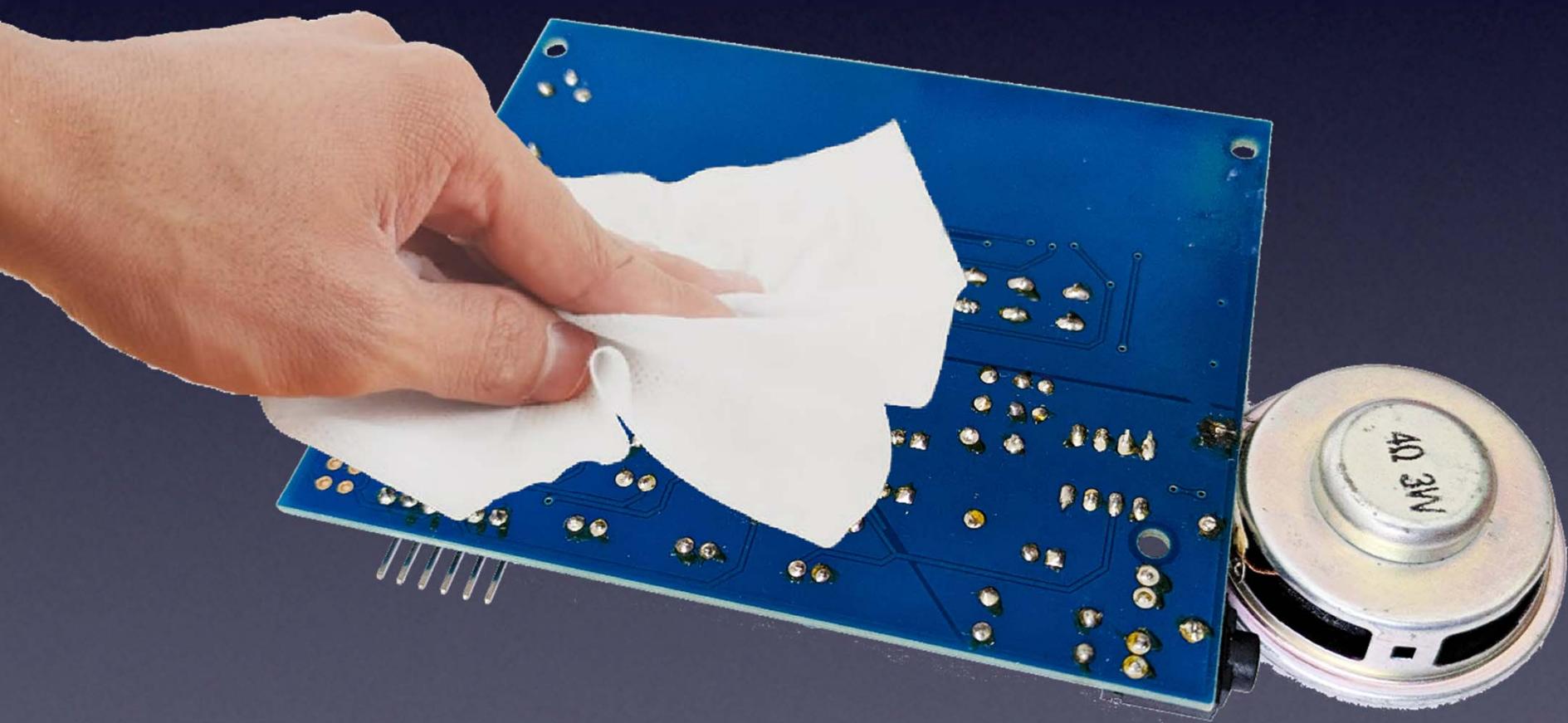
## Turn ON

- ❖ LEDs flicker
- ❖ Each ear has a different pitch

If you used **Lead-Free** solder  
and  
**flux paste** in a syringe

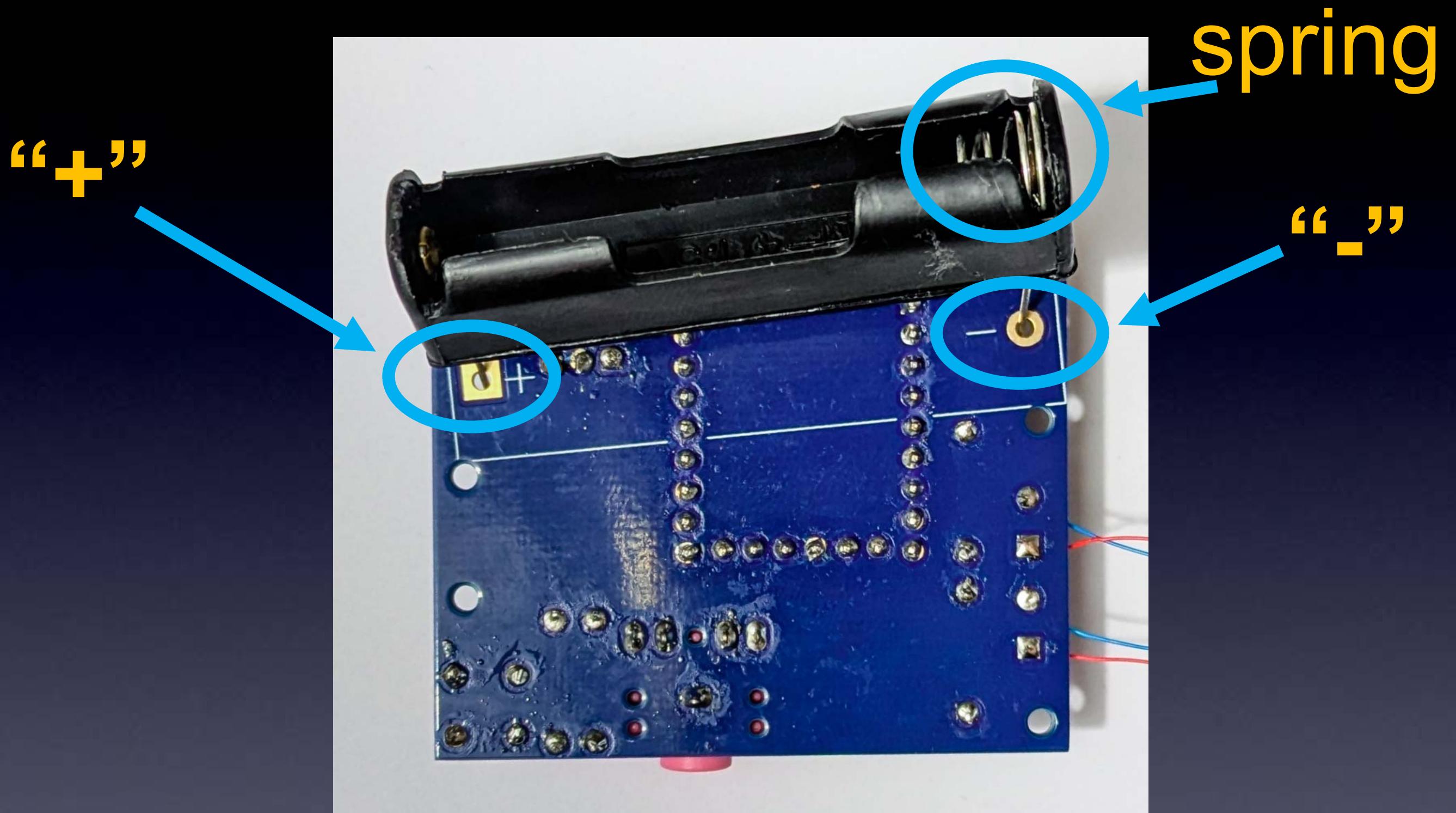


The bottom of the PCB will be sticky from the flux

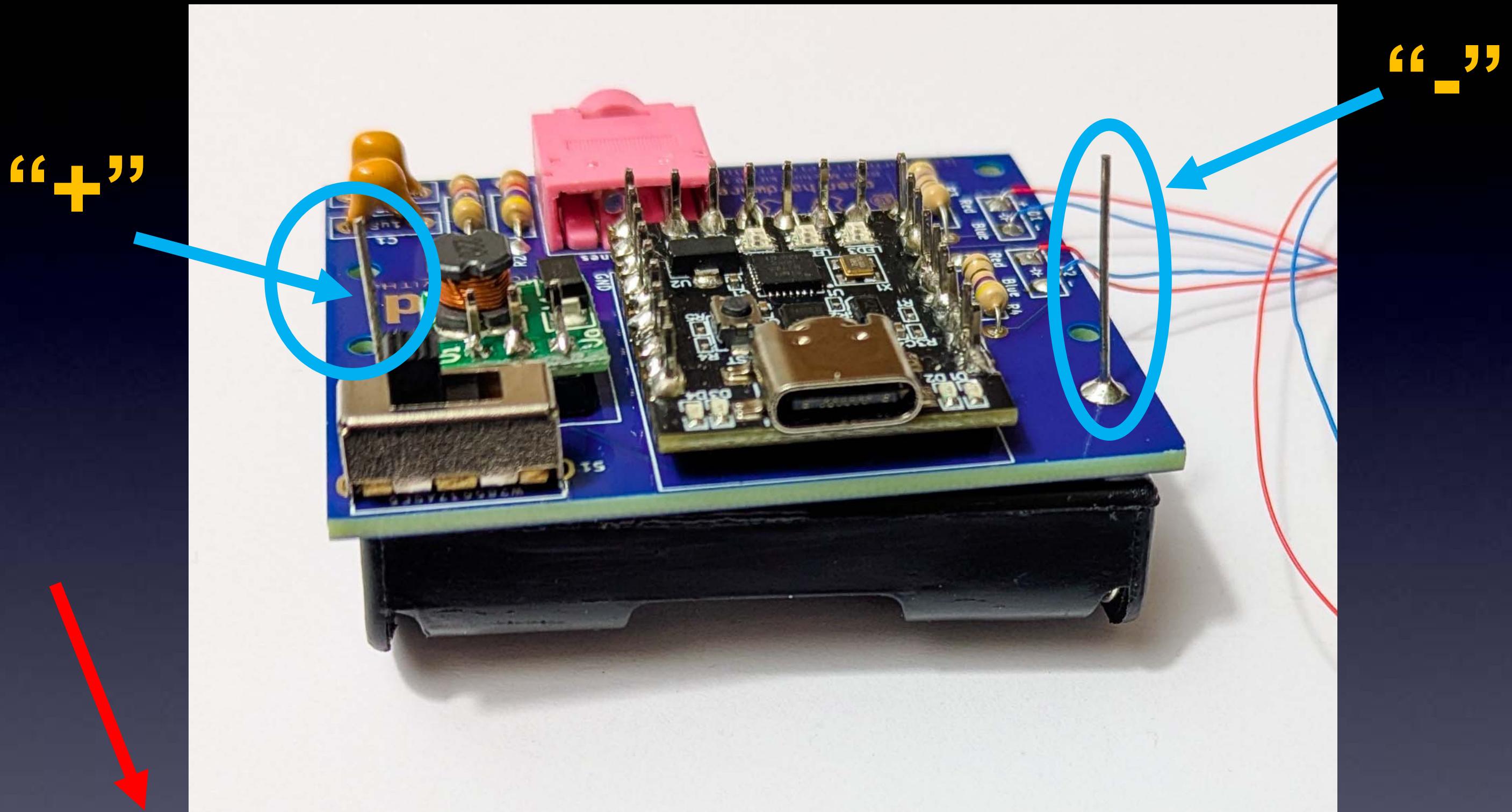


*You can clean it with a cloth  
wet with Isopropyl Alcohol*

# Insert Battery Holder



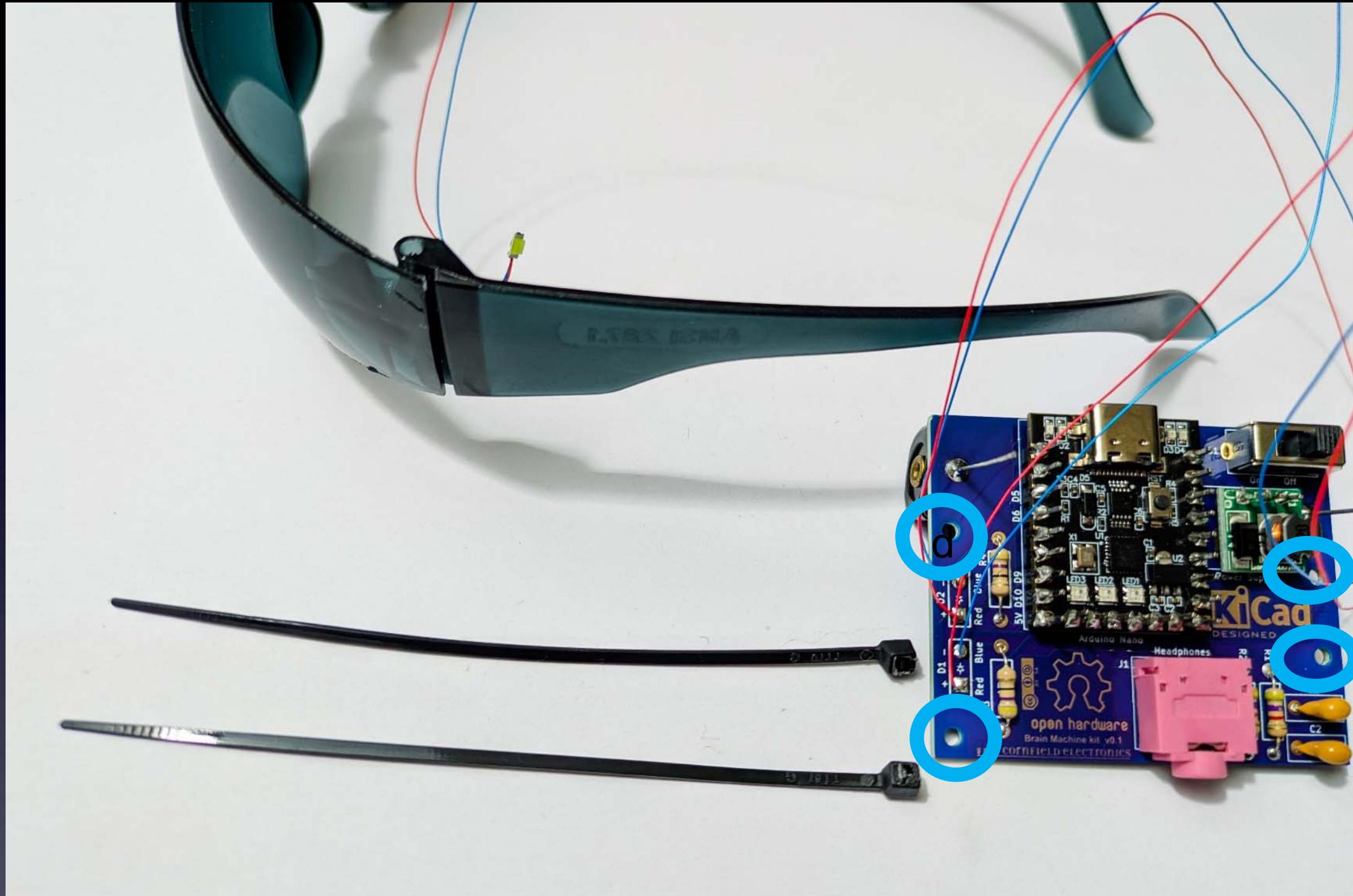
# Battery Holder Soldered



→ ***DO NOT*** cut battery holder leads ! ←

↑ (That will destroy the wire cutters)

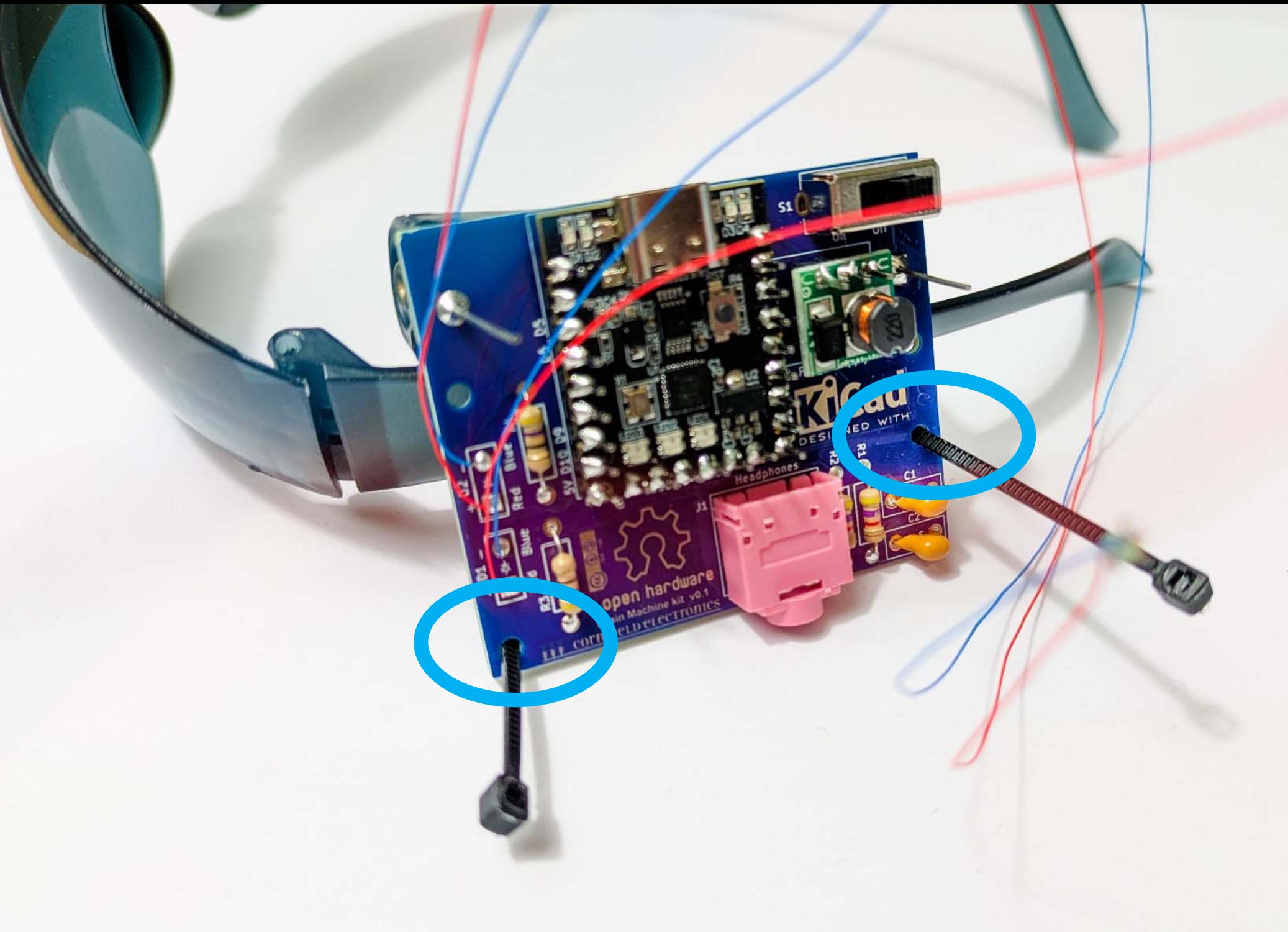
# Attach Board to Glasses



Notice the 4 holes in the board  
for the zip ties

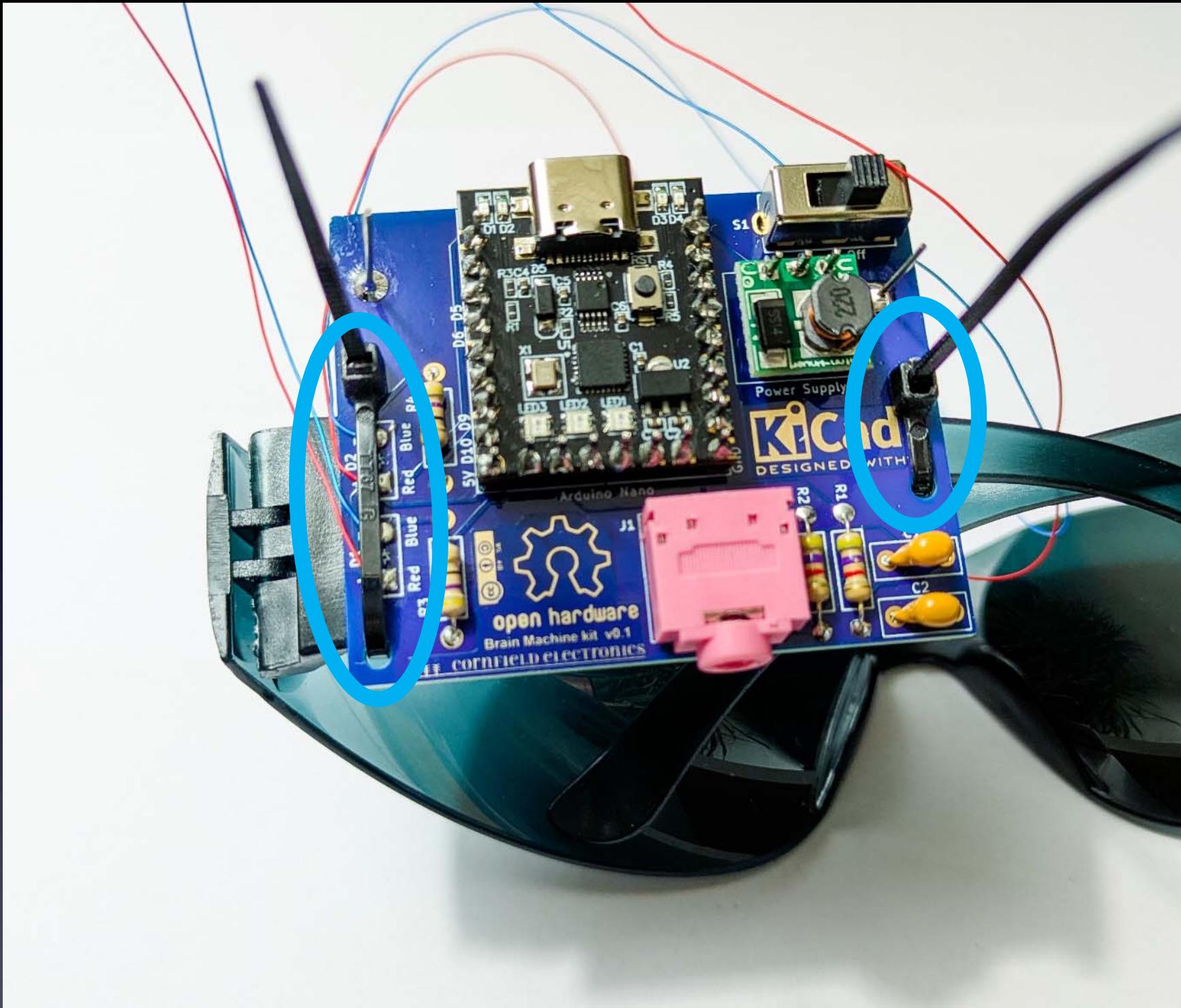
→ Use left side of glasses ←

# Attach Board to Glasses



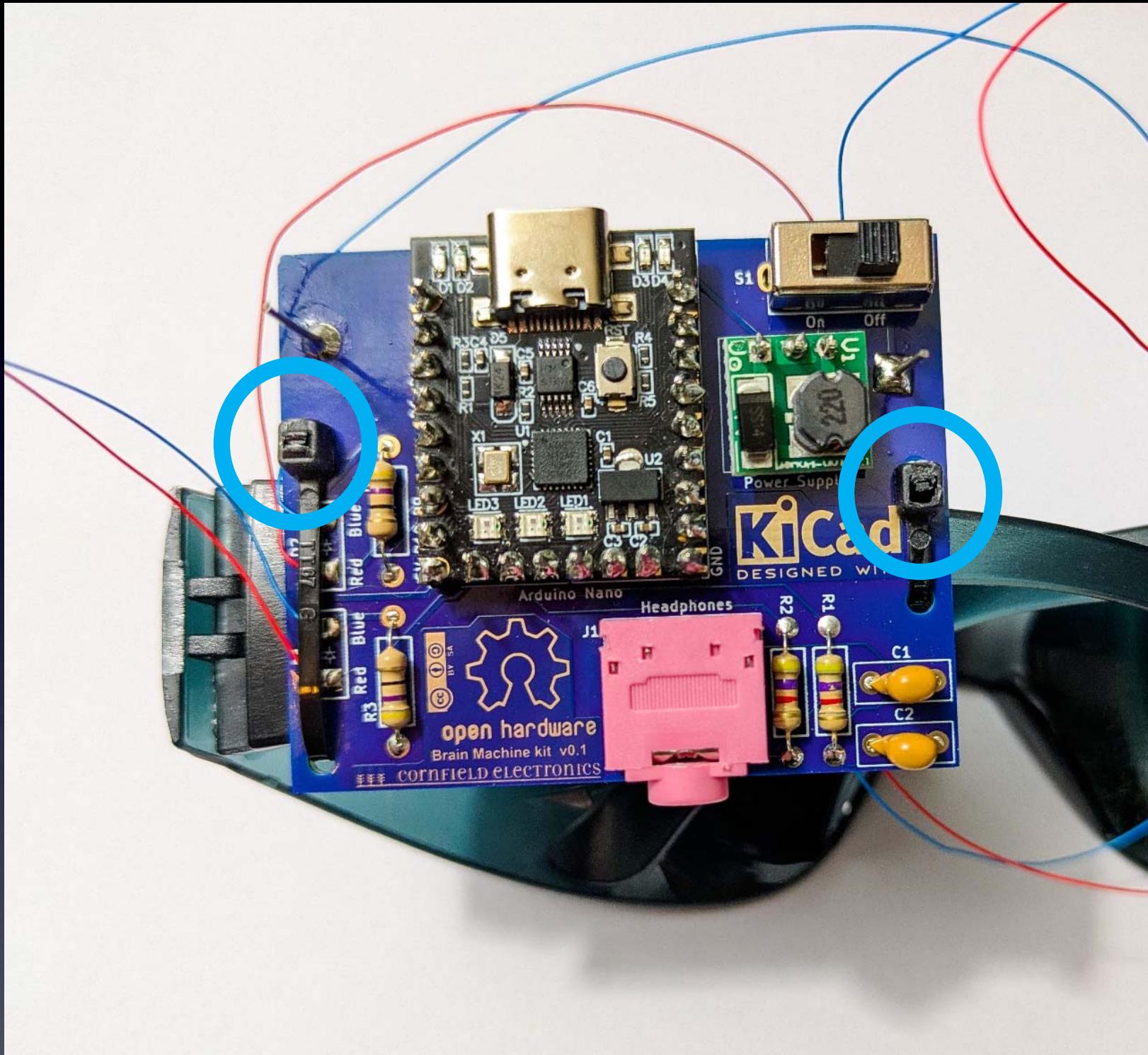
Insert zip-ties into lower mounting holes

# Attach Board to Glasses



Wrap zip-ties around, and secure

# Attach Board to Glasses



Cut zip-ties short

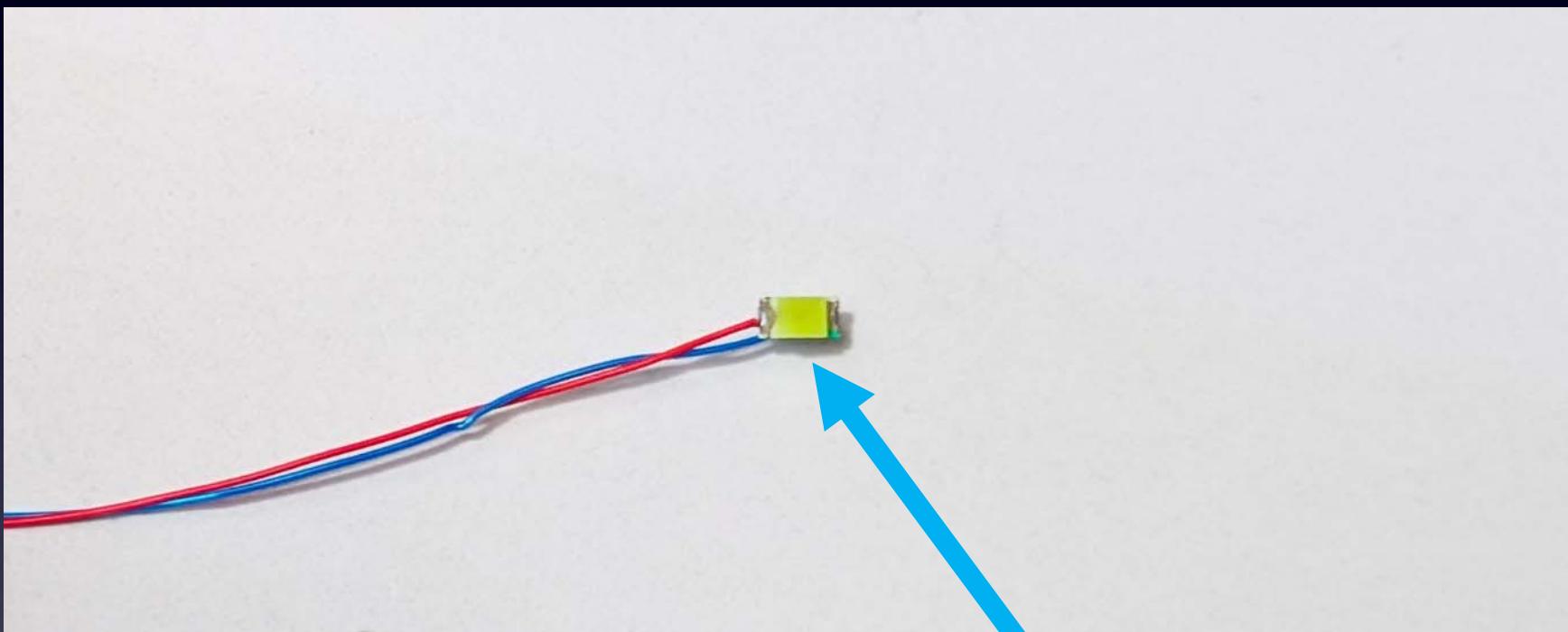
# Mark where LEDs will go



For each eye:

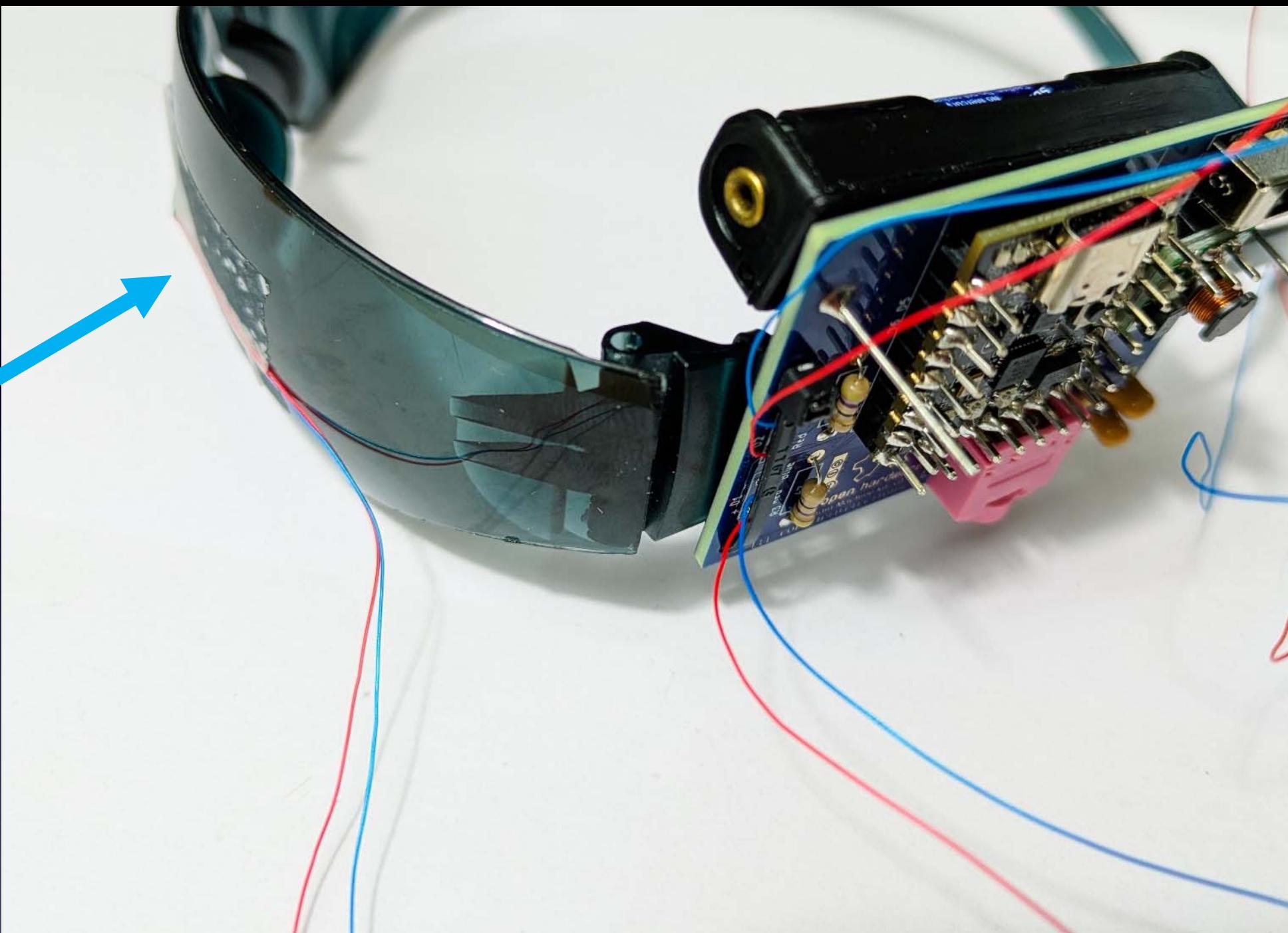
Slowly move the marker toward your eye  
to make a mark directly in front of your eye.

# LEDs light up on one side



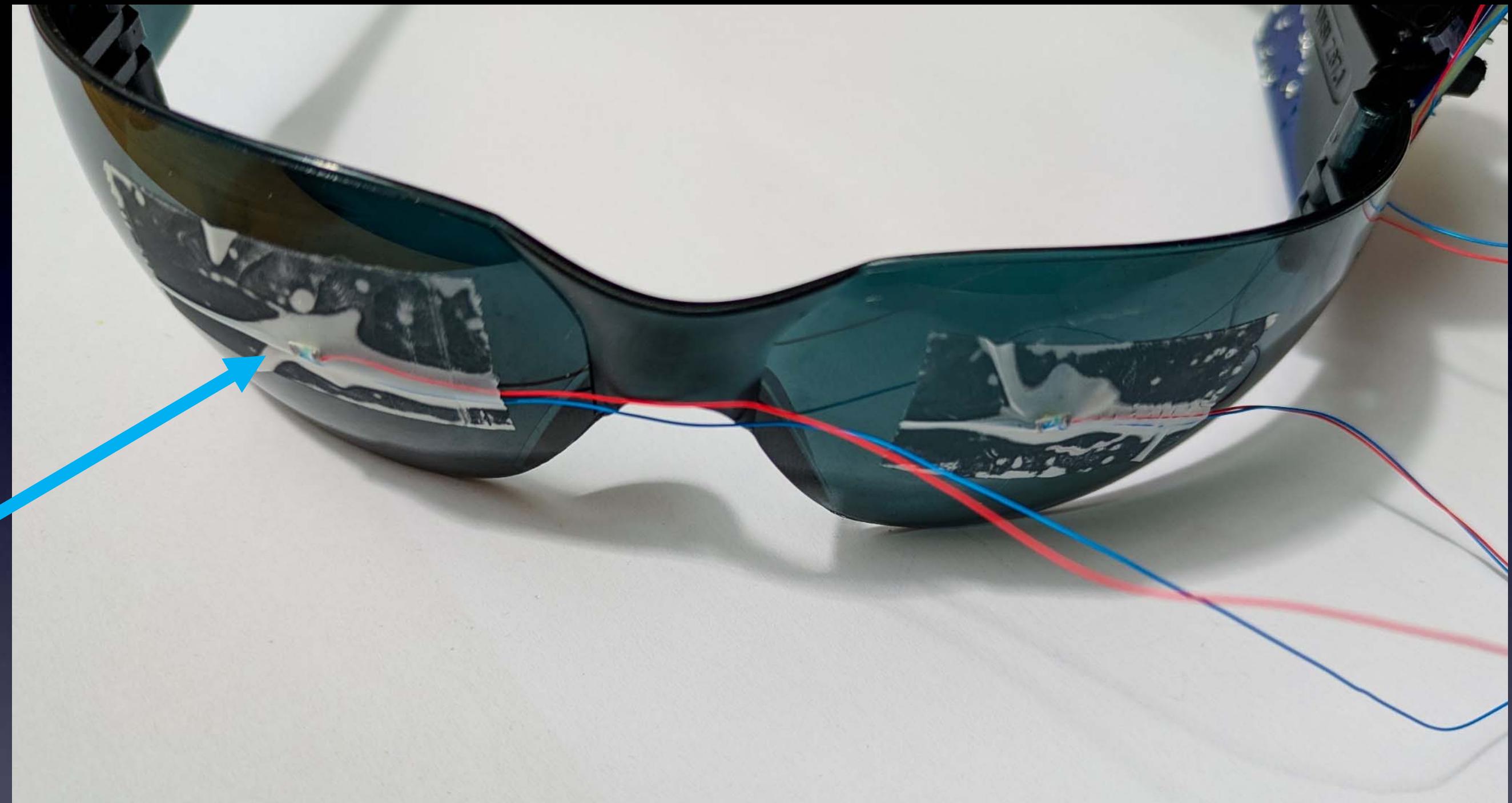
The LEDs light up on the flat white side

# Tape Left LED to Glasses



**Tape the flat white side of D1 over the left mark  
(so the light will shine on your eye)**

# Tape Right LED to Glasses



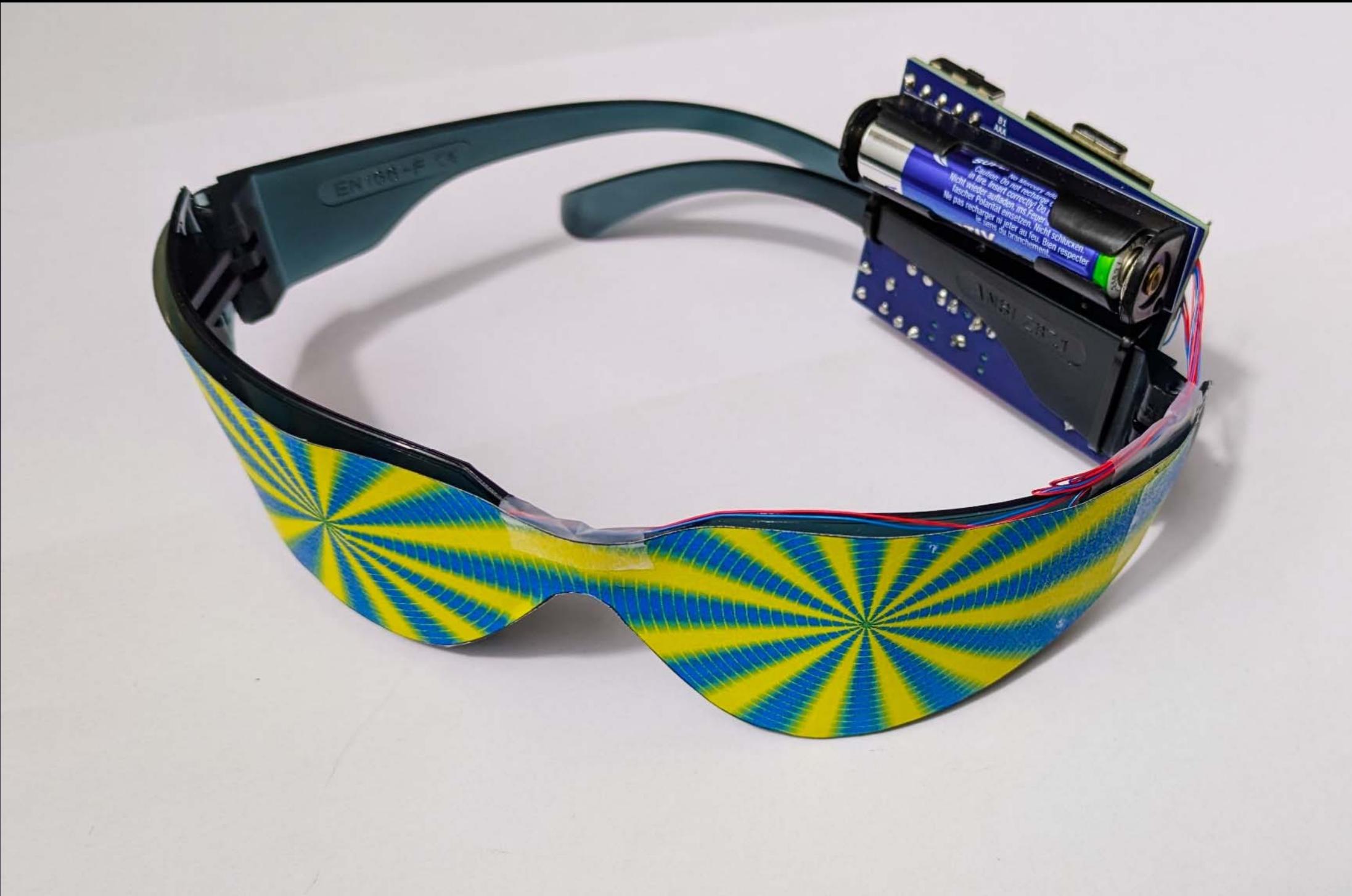
Tape the flat white side of D2 over the right mark  
(so the light will shine on your eye)

# Secure LED wires on Glasses



Use tape to clean up and secure the LED wires

# Add Trippy Graphics !



Cut out the Trippy Graphics  
and tape them over the glasses

# Done!



# Enjoy (with your eyes closed)



Meditate, Hallucinate, Trip Out !

Please Remember:

to

Wash your hands  
after soldering

# Let's Meditate

**Your Brain Machine comes pre-programmed  
with a really nice 14-minute Meditation.**

**And, along the way you will hallucinate beautiful colors and patterns  
from your imagination.**



# Re-Programming

**Your Brain Machine comes pre-programmed  
with a really nice 14-minute Meditation.**

If you are happy with  
this meditation sequence  
then no need to re-program  
your Brain Machine.

But if you want to program  
other brainwave sequences  
the next pages show you how...



# Re-programming the Brain Machine

We have one other sequence ready for you to use.

It is 1 hour of 40 Hz Gamma Waves

The following slides show you  
how to program this sequence into your Brain Machine...



# Re-programming the Brain Machine

We have one other sequence ready for you to use.

**To program in a new sequence into your Brain Machine, you will need:**

- the Arduino software  
[<http://arduino.cc>](http://arduino.cc)
- a USB-C cable
- the “sketch” for the other brainwave sequence  
[<http://cornfieldelectronics.com/cfe/projects.php#brainmachine>](http://cornfieldelectronics.com/cfe/projects.php#brainmachine)

The following slides show you how to do the above, in detail.



# Arduino

**Arduino is a very powerful tool!  
But it is very easy to use.  
It was designed for total beginners to use successfully.**

I won't give a complete tutorial here – just some basics.  
For more info, there are many good Arduino tutorials online.  
A good place to start is:  
[<https://www.arduino.cc/en/Tutorial/HomePage>](https://www.arduino.cc/en/Tutorial/HomePage)



# Arduino

**First:**  
Download and install the Arduino software  
< <http://arduino.cc> >

Any version is OK



# Re-programming the Brain Machine

**Second:**

Download the Brain Machine brainwave sequence sketch  
[<http://cornfieldelectronics.com/cfe/projects.php#brainmachine>](http://cornfieldelectronics.com/cfe/projects.php#brainmachine)

Store it on your computer anywhere you like.

**(details on this soon)**



# Connecting your Brain Machine to your computer

USB-C cable

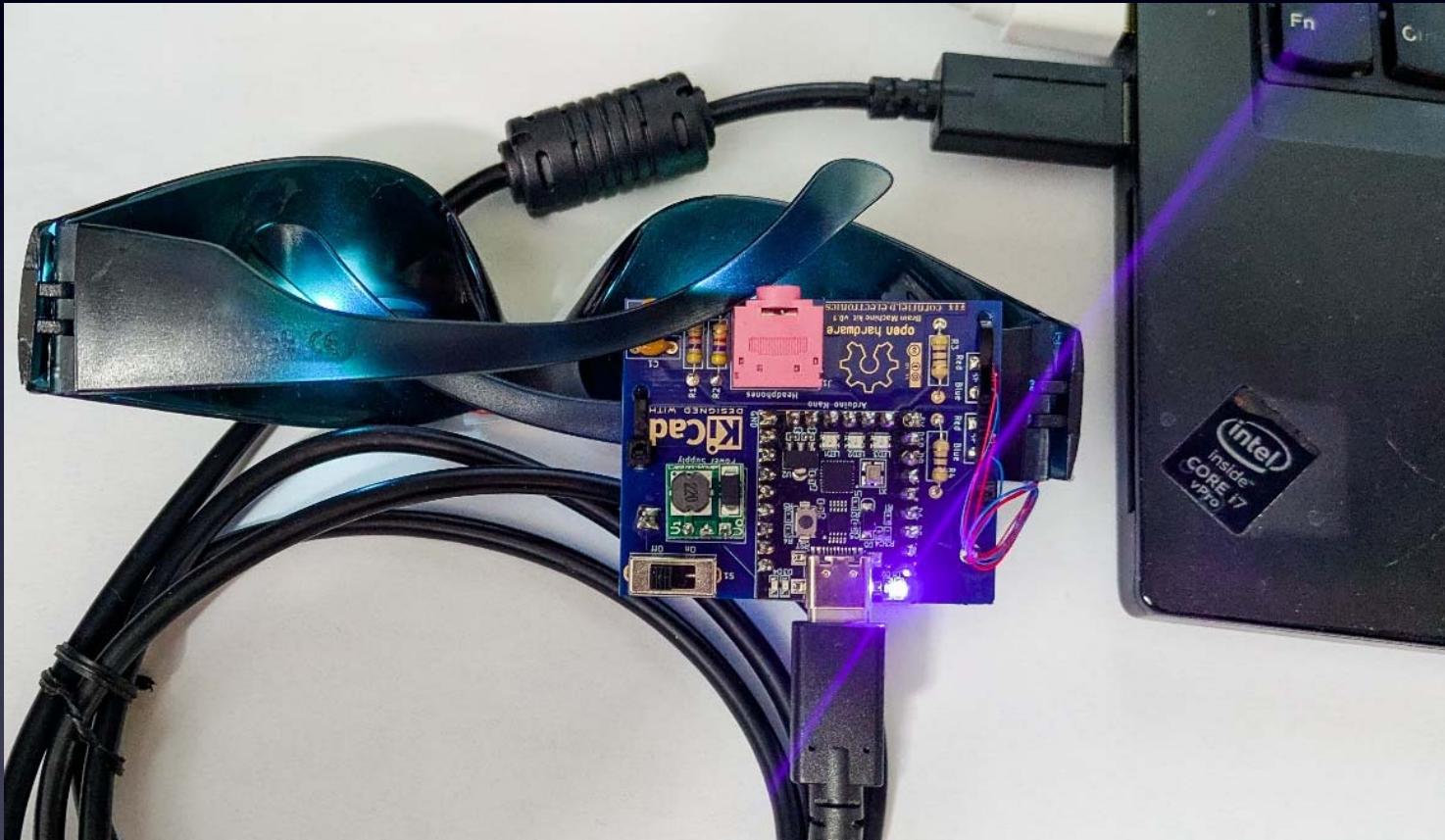


**IMPORTANT:**  
Make sure the  
Switch on your  
Brain Machine  
is *OFF*

to computer's USB

# Connecting your Brain Machine to your computer

**USB-C cable**



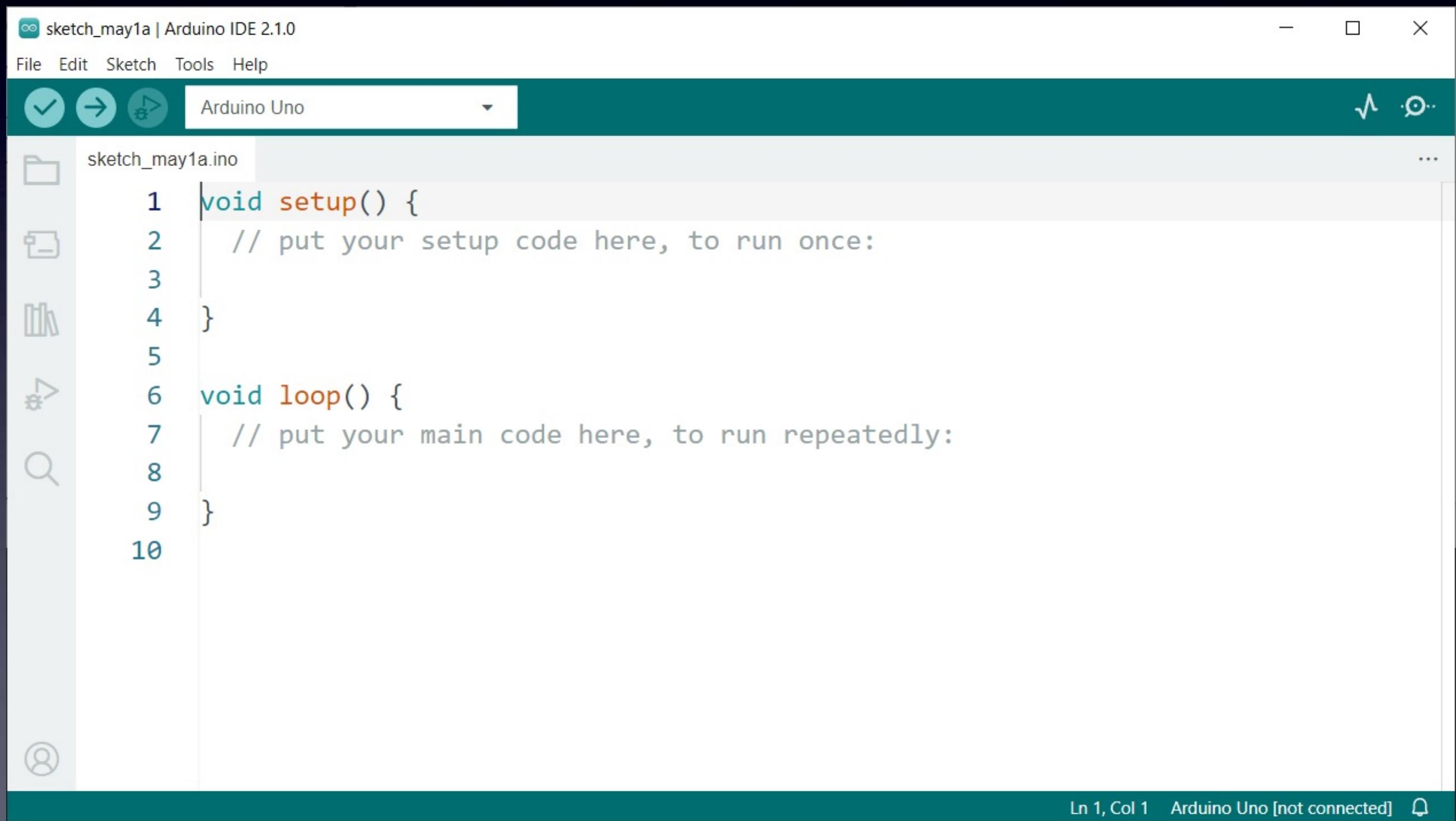
You may need to download and install a driver  
for your Operating System (Windows, MacOS, or Linux):

<<https://learn.sparkfun.com/tutorials/how-to-install-ch340-drivers/all>>

Or search for:  
“CH340 driver”

# Arduino

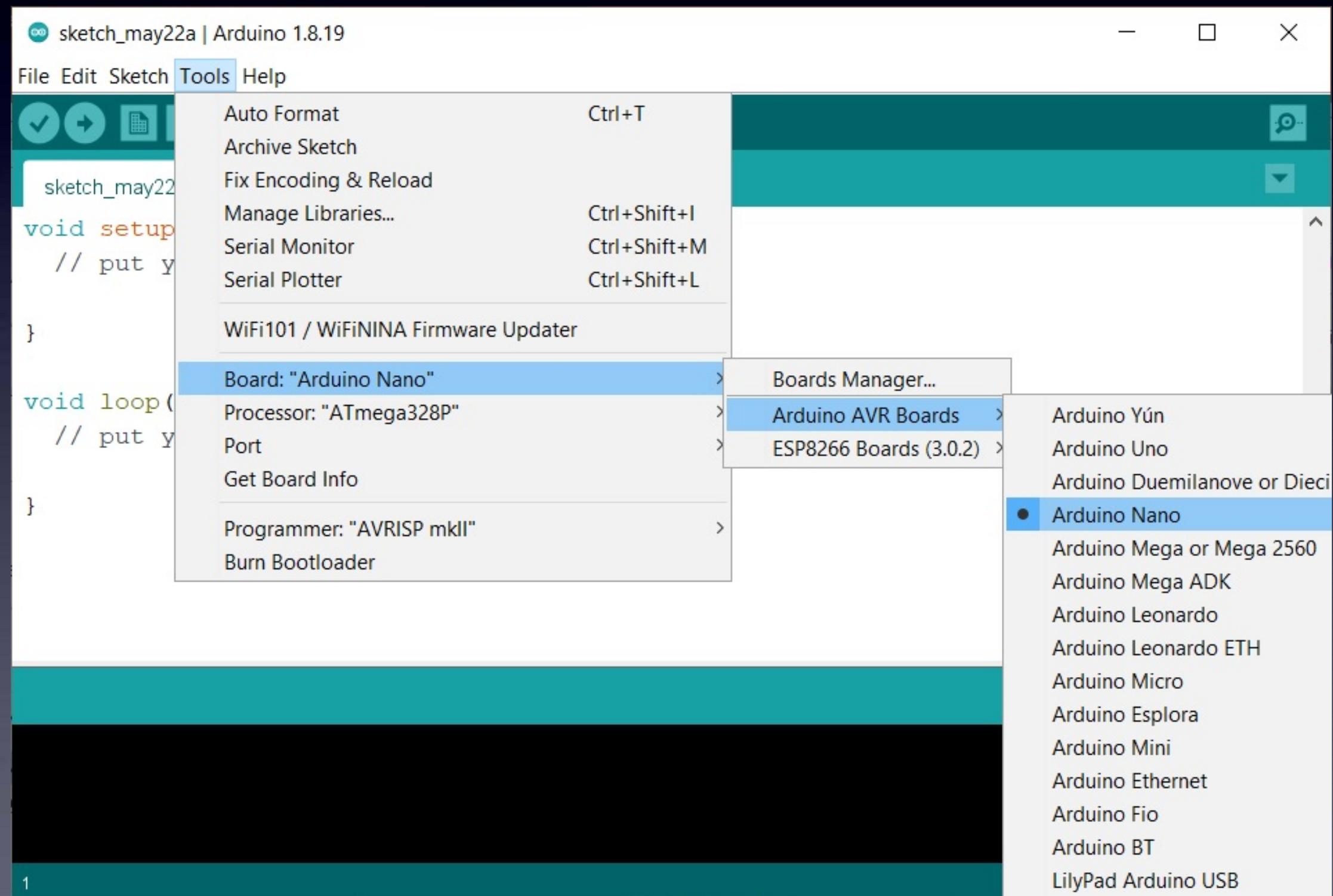
**After you download and install the Arduino software start it, and you will see a screen that looks like this:**



# Arduino

The first time you start your Arduino software  
you need to set things up

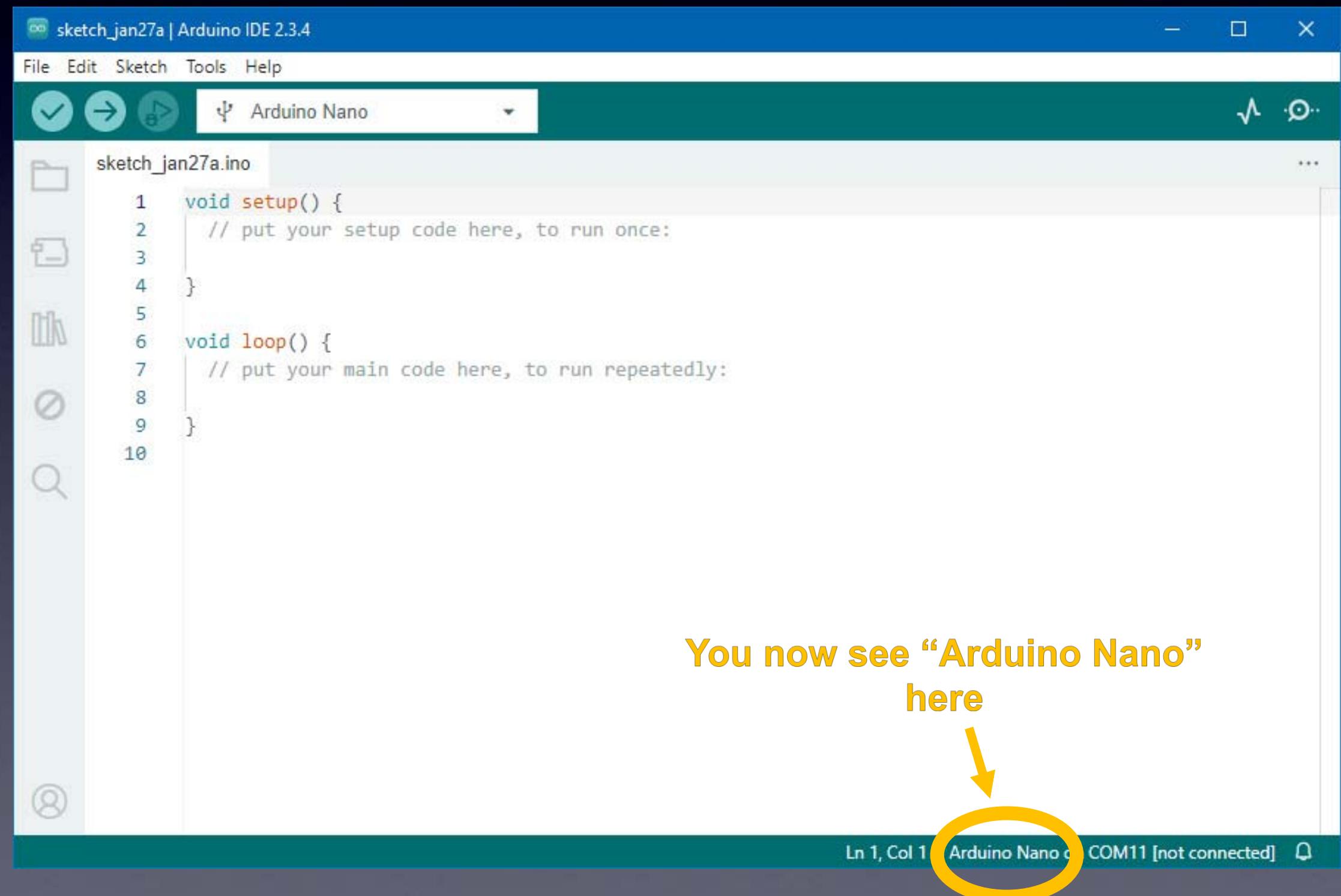
(1)  
Choose  
“Arduino Nano”  
as the Board



# Arduino

The first time you start your Arduino software  
you need to set things up

(1)  
Choose  
“Arduino Nano”  
as the Board



# Arduino

The first time you start your Arduino software  
you need to set things up

(2)  
Choose  
your Processor

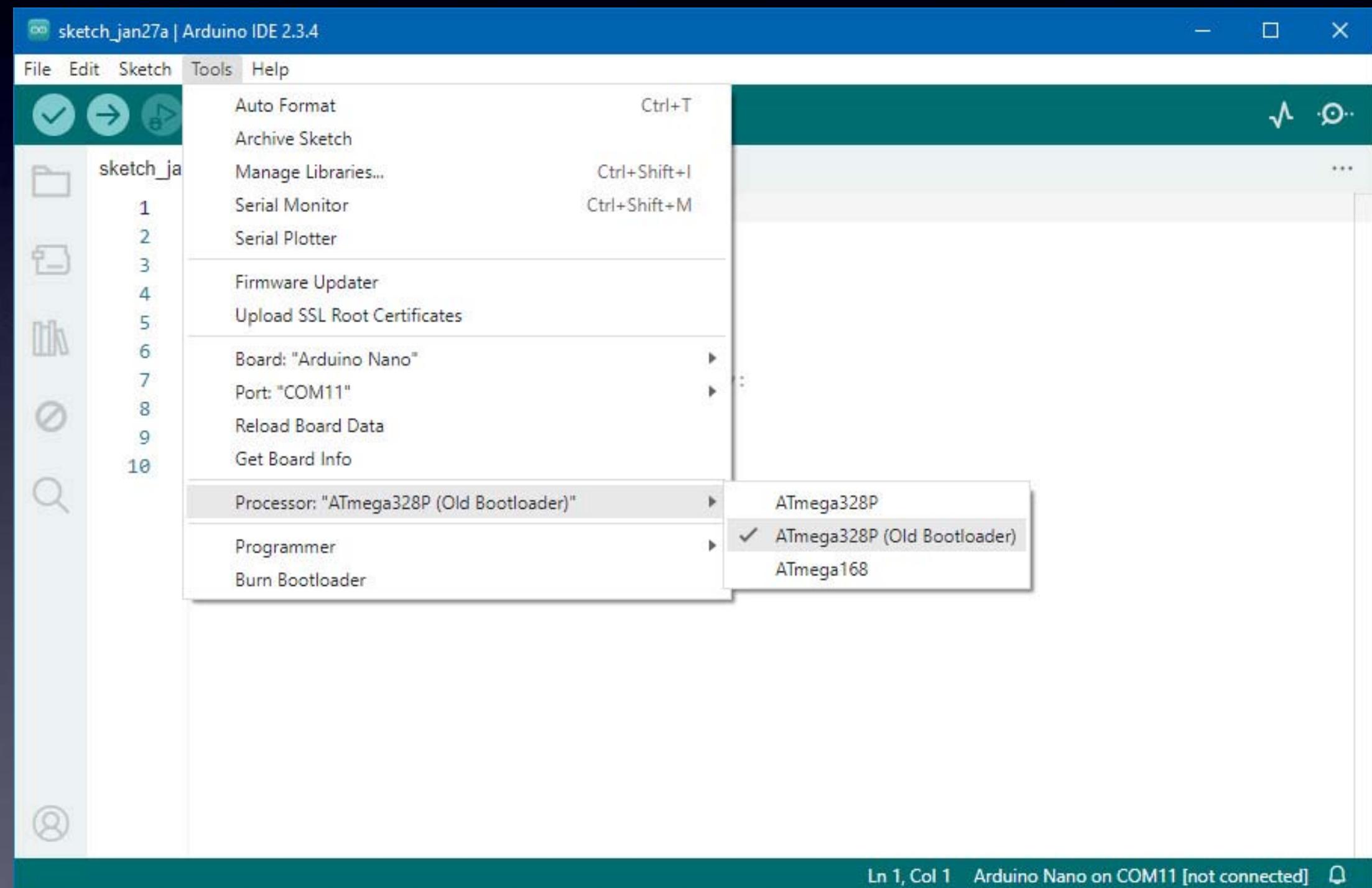
“ATmega328P (Old Bootloader)”



If this one doesn't work,

then  
choose

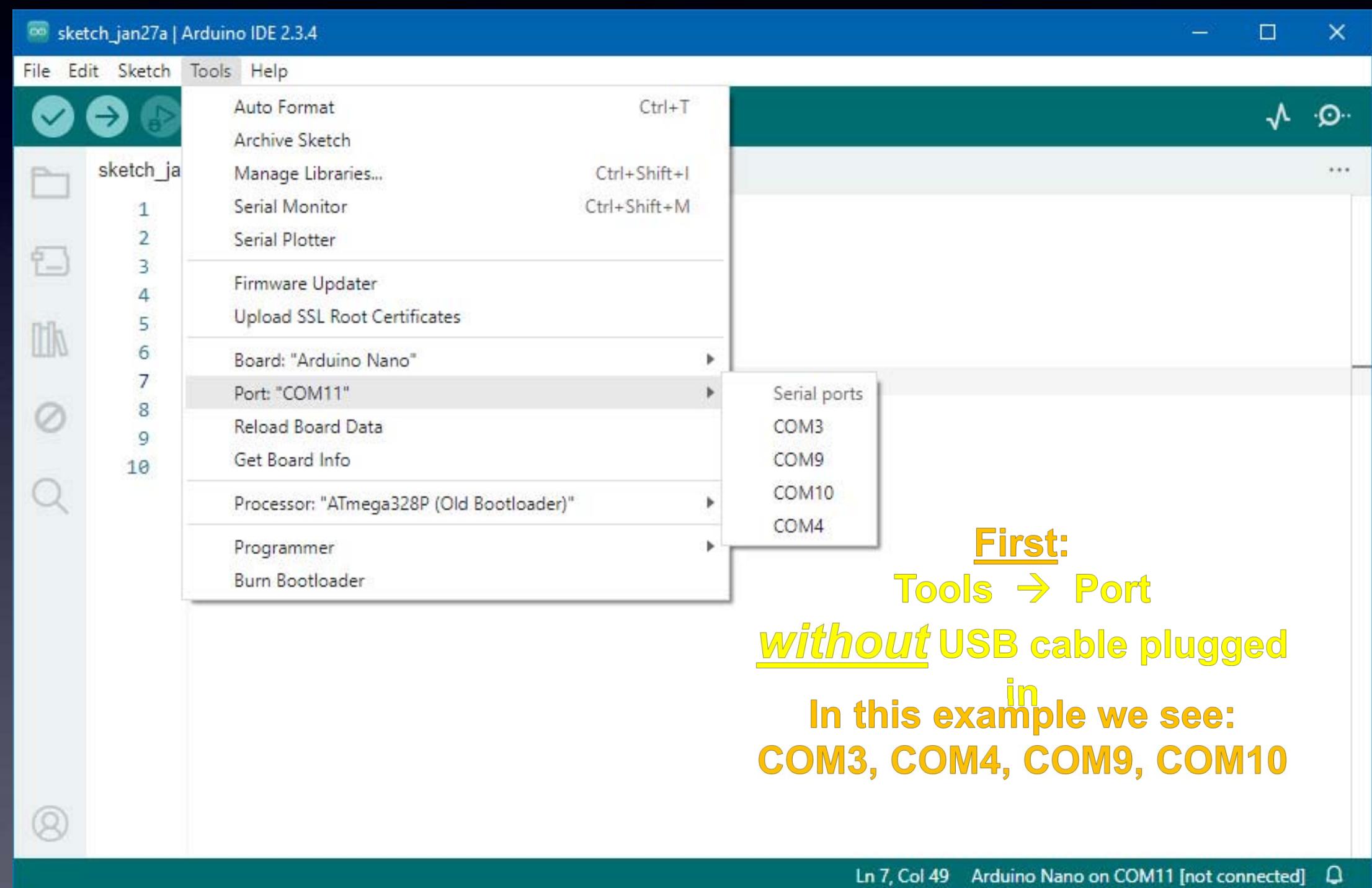
“ATmega328P”



# Arduino

The first time you start your Arduino software  
you need to set things up

(3)  
**Choose  
the Port  
(this will be  
different  
depending on  
your Operating  
System)**

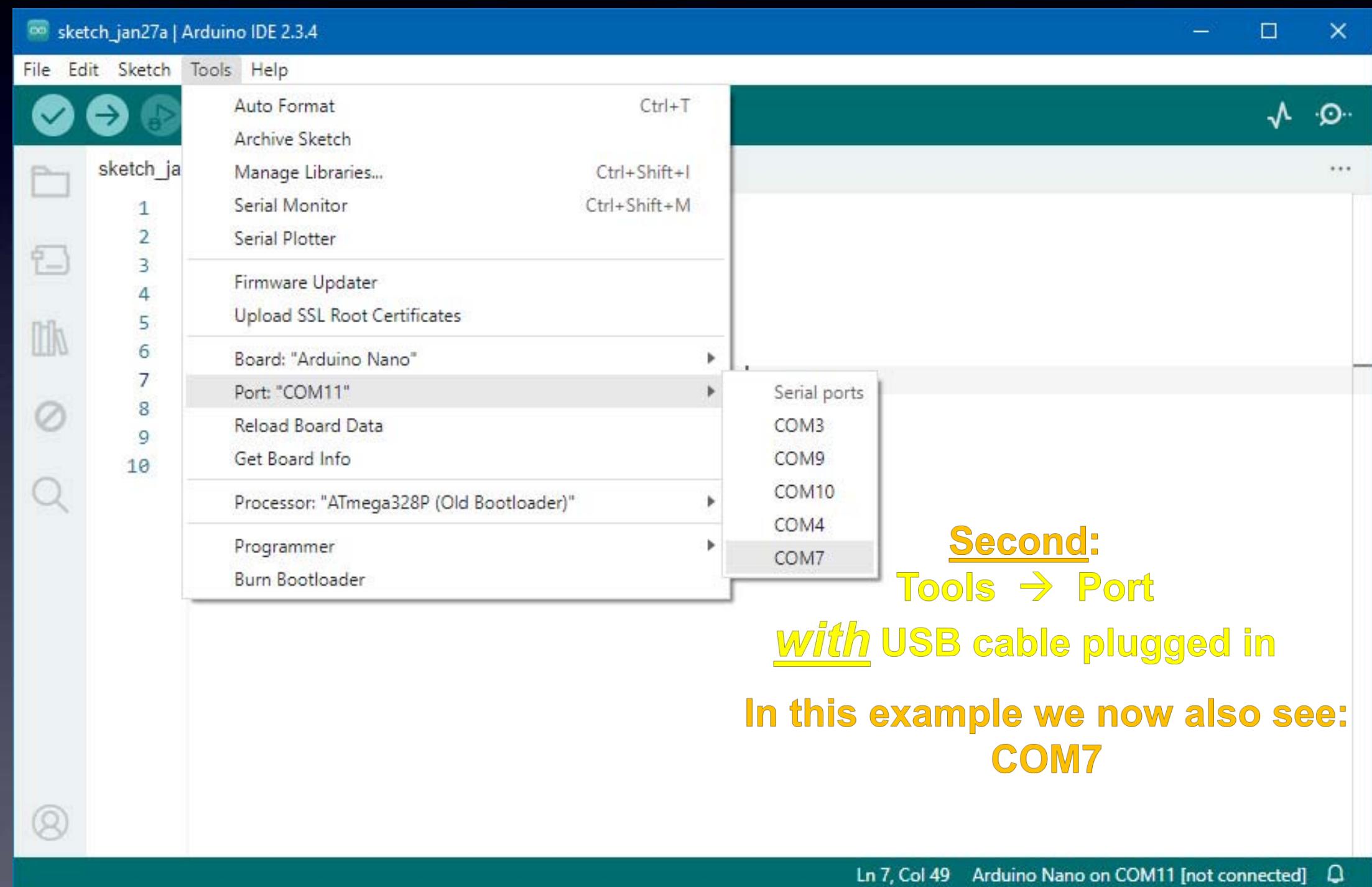


# Arduino

The first time you start your Arduino software  
you need to set things up

(3)  
**Choose  
the Port  
(this will be  
different  
depending on  
your Operating  
System)**

(After installing  
the driver  
for your Arduino  
(USB-Serial adapter),  
with your Arduino  
plugged in,  
your operating system  
will see a serial port  
and it appears here.)

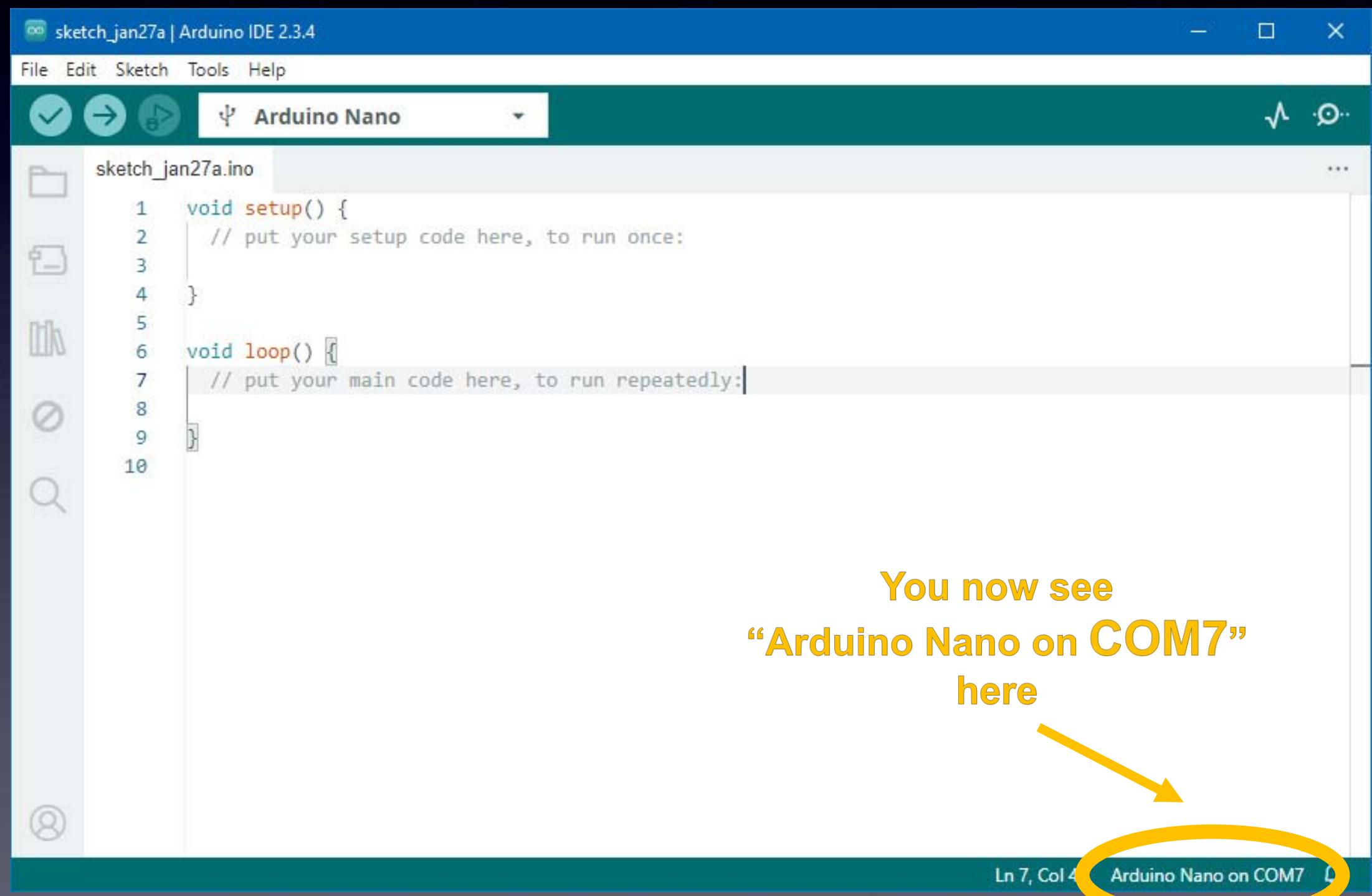


# Arduino

The first time you start your Arduino software  
you need to set things up

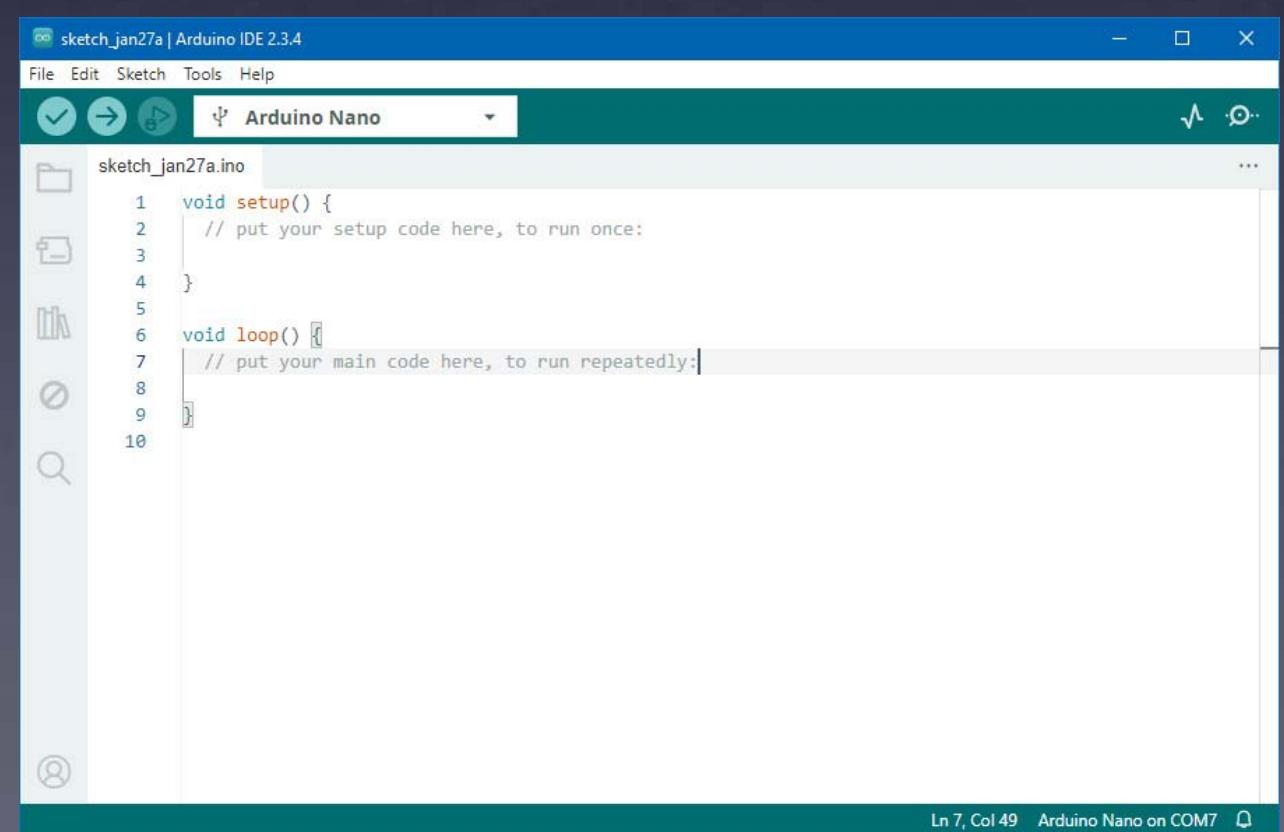
(3)  
**Choose  
the Port  
(this will be  
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depending on  
your Operating  
System)**

(After installing  
the driver  
for your Arduino  
(USB-Serial adapter),  
with your Arduino  
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your operating system  
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and it appears here.)



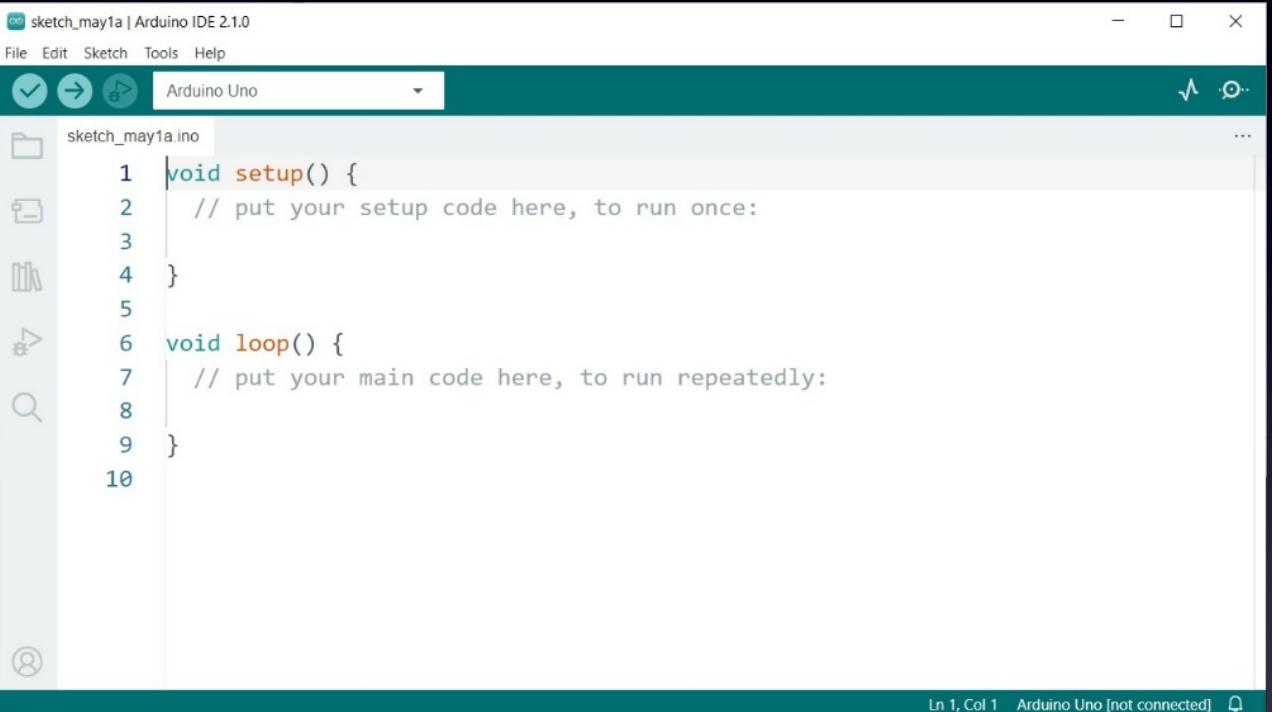
# Arduino

Your Arduino software is now ready  
to program a new brainwave sequence sketch  
into your Brain Machine !



# Arduino

Designed for non-geeky artists



The screenshot shows the Arduino IDE interface with a sketch titled "sketch\_may1a.ino". The code editor displays the following Arduino pseudocode:

```
1 void setup() {
2     // put your setup code here, to run once:
3
4 }
5
6 void loop() {
7     // put your main code here, to run repeatedly:
8
9 }
10
```

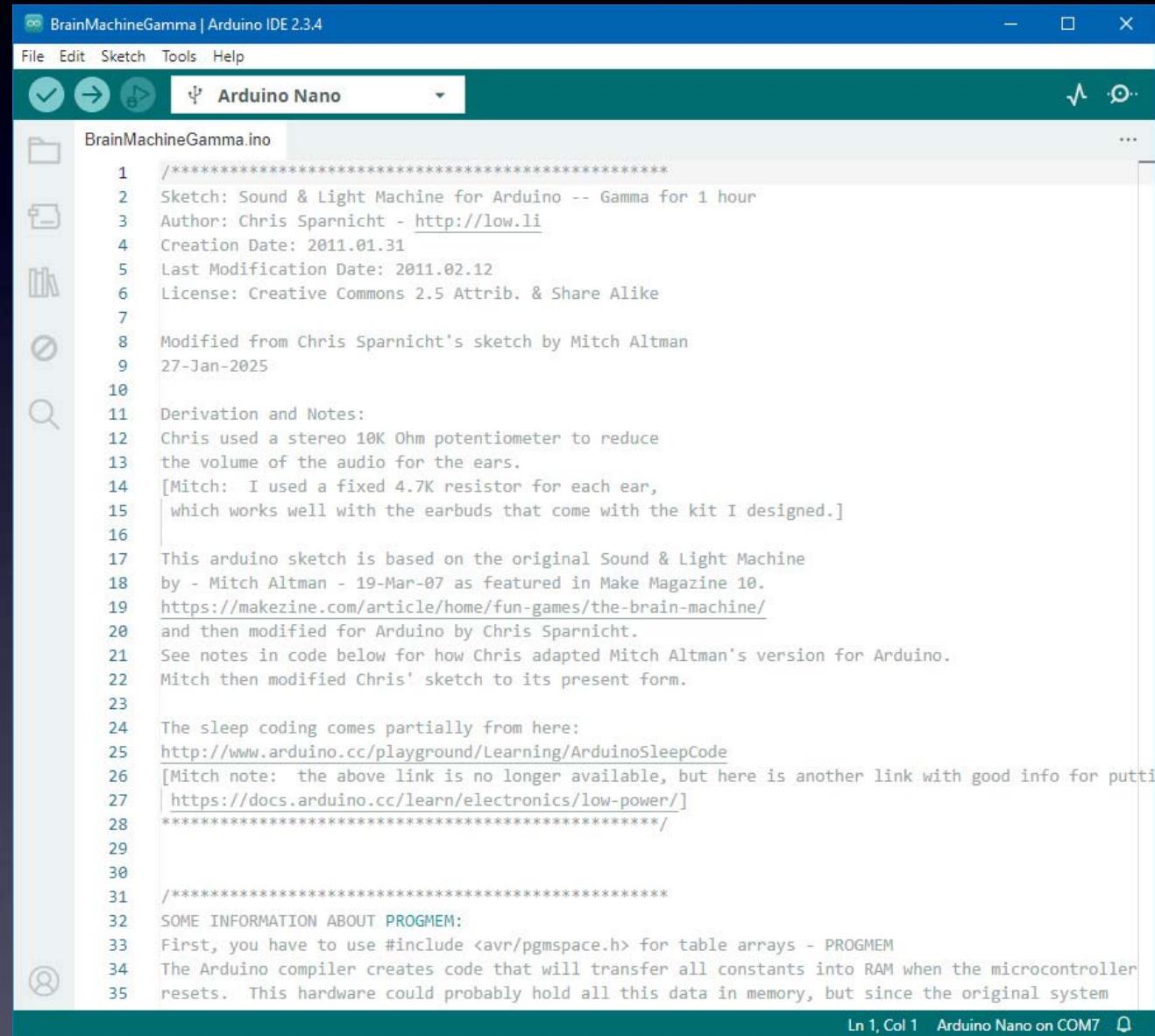
The status bar at the bottom indicates "Ln 1, Col 1" and "Arduino Uno [not connected]".

Definition of  
“Sketch” :  
an Arduino program

# Arduino

Designed for non-geeky artists

Download  
the new  
Gamma  
“sketch”



The screenshot shows the Arduino IDE 2.3.4 interface with the title bar "BrainMachineGamma | Arduino IDE 2.3.4". The central code editor window displays the "BrainMachineGamma.ino" sketch. The code is a multi-line text file containing comments and notes about the sketch's origin and modifications. It includes details about Chris Sparnicht and Mitch Altman, the original source from Make Magazine, and specific notes about sleep coding and PROGMEM usage. The code editor has a dark theme with syntax highlighting.

```
1  ****
2  Sketch: Sound & Light Machine for Arduino -- Gamma for 1 hour
3  Author: Chris Sparnicht - http://low.li
4  Creation Date: 2011.01.31
5  Last Modification Date: 2011.02.12
6  License: Creative Commons 2.5 Attrib. & Share Alike
7
8  Modified from Chris Sparnicht's sketch by Mitch Altman
9  27-Jan-2025
10
11 Derivation and Notes:
12 Chris used a stereo 10K Ohm potentiometer to reduce
13 the volume of the audio for the ears.
14 [Mitch: I used a fixed 4.7K resistor for each ear,
15 which works well with the earbuds that come with the kit I designed.]
16
17 This arduino sketch is based on the original Sound & Light Machine
18 by - Mitch Altman - 19-Mar-07 as featured in Make Magazine 10.
19 https://makezine.com/article/home/fun-games/the-brain-machine/
20 and then modified for Arduino by Chris Sparnicht.
21 See notes in code below for how Chris adapted Mitch Altman's version for Arduino.
22 Mitch then modified Chris' sketch to its present form.
23
24 The sleep coding comes partially from here:
25 http://www.arduino.cc/playground/Learning/ArduinoSleepCode
26 [Mitch note: the above link is no longer available, but here is another link with good info for putting
27 https://docs.arduino.cc/learn/electronics/low-power/]
28 ****
29
30
31 ****
32 SOME INFORMATION ABOUT PROGMEM:
33 First, you have to use #include <avr/pgmspace.h> for table arrays - PROGMEM
34 The Arduino compiler creates code that will transfer all constants into RAM when the microcontroller
resets. This hardware could probably hold all this data in memory, but since the original system
```

Ln 1, Col 1 Arduino Nano on COM7

“Sketch” :  
an Arduino program

The following slides show where to find this sketch...

# Arduino

Download a new brainwave sequence “sketch”

The screenshot shows a web browser window with the URL <https://cornfieldelectronics.com/cfe/cfe.main.php>. The page has a yellow header bar with the text "cornFIELD electronics" and "useful electronics for a better world". Below the header, there are navigation links for "home", "buy", "about us", "press", "distributors", "projects", and "show cart". The main content area features three product images: a blue Arduino-like microcontroller board, a purple "Neuro Dreamer" sleep mask, and a black "TV-B-Gone" universal remote control. To the right, a large headline reads "Take CONTROL". Below it, a paragraph encourages users to explore products and make choices. Further down, sections discuss the TV-B-Gone remote and the NeuroDreamer mask, both described as "personal empowerment inventions". The footer includes links for "legal notices & privacy policy", a CC BY-SA license logo, and the text "2023 cornfield electronics".

At Cornfield Electronics we create devices that give people opportunities for effective choices in their lives. Each of us can decide whether to watch TV monitors, and when to watch. Each of us can decide when to get the rest we want, and how we dream. Everyone can learn to make cool things with our kits. Please explore our [products](#), make your own choices, and see how *your* life can be enhanced.

join our mailing list

Love it or hate it, TV screens are all around us. **TV-B-Gone®** universal remote control is the first fruit of our technical savvy, embodying our belief in empowerment, and sense of humor. This universal remote control fits in your pocket and allows you to discreetly turn TVs off wherever you go. TV-B-Gone fans around the world are using it for a variety of practical, philosophical, and humorous purposes. Imagine the possibilities...

Years in the making **NeuroDreamer** sleep mask is another of our personal empowerment inventions. We all need rest, but we don't always get it in our busy lives. NeuroDreamer sleep mask lets you use your own brainwaves to

bring you the rest you need. And with the **lucid dreaming model**, you can take control of your dreams.

Want to learn electronics? We make way cool, fun, intriguing, educational [kits](#) that **anyone can make!** Our most **POPULAR** kits are: [ArduTouch music synthesizer kit](#) and [TV-B-Gone kit!](#)

We make truly useful technological solutions that put you in charge.

Welcome to our better world!

**NOTE:** As of 14-Feb-2023 Cornfield Electronics is a sole proprietorship of Mitch Altman.

<https://CornfieldElectronics.com>

# Arduino

Download a new brainwave sequence “sketch”

The screenshot shows a web browser window displaying the Cornfield Electronics website at <https://cornfieldelectronics.com/cfe/cfe.main.php>. The browser interface includes a menu bar with File, Edit, View, History, Bookmarks, Tools, and Help. The main content area features a yellow header with the text "cornFIELD electronics" and a sub-header "useful electronics for a better world". Below the header, there are navigation links for home, buy, about us, press, distributors, projects (which is highlighted with a green arrow), and show cart. The central part of the page has a large title "Take control" and a paragraph of text about Cornfield Electronics' mission to empower users through their products. On the left side, there are three product images: a blue Arduino-like microcontroller board, a purple "Neuro Dreamer" sleep mask, and a black "TV-B-Gone" universal remote control. The bottom of the page includes legal notices & privacy policy, a CC BY-SA license logo, and the copyright notice "2023 cornfield electronics".

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We make truly useful technological solutions that put you in charge.

Welcome to our better world!

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“Projects” tab

# Arduino

Download a new brainwave sequence “sketch”

The screenshot shows a web browser window with the following details:

- Header:** File, Edit, View, History, Bookmarks, Tools, Help.
- Title Bar:** Cornfield Electronics :: Projects.
- Address Bar:** https://cornfieldelectronics.com/cfe/projects.php?PHPSESSID=d5d4714nuevrq25drkkoirr1m3
- Page Content:**
  - Cornfield Electronics Logo:** A stylized illustration of four corn stalks.
  - Header Navigation:** home, buy, about us, press, distributors, projects, show cart.
  - Section Header:** DO-IT-YOURSELF PROJECTS by [Mitch Altman](#), and friends. Last modified: 5-Oct-2022
  - Text:** You Can Make Cool Things With Electronics! The projects on this page were all created for total beginners, with no experience, so everyone can complete them successfully at my workshops, or at home, or anywhere!
  - Text:** All you need is: a desire, a handful of parts, a soldering iron (with stand and sponge), a wire-cutter, a wire-stripper, solder, and an afternoon.
  - Image:** A photograph showing a soldering iron, a roll of solder, and some pliers.
  - Text:** [Here](#) is a really nice tutorial on how to solder -- for total beginners! [Soldering Tutorial for total beginners](#)
  - Text:** Open Hardware! Everything on this page (and everything I do) is free and open source! (That's *free* as in *freedom*.) (But everything here is free to download -- and that is *free* as in *beer*.) If you have any questions on anything, please feel free to email me: [\[REDACTED\] AT CornfieldElectronics DOT com](mailto:)

“Projects” tab

# Arduino

Download a new brainwave sequence “sketch”

Click here to  
download the  
Gamma wave  
sequence  
sketch

Project: Brain Machine kit  
-- Make your own Brain Machine!



The Brain Machine is a Sound and Light Machine kit for total beginners to learn to solder. When you are finished, wear them (with your eyes closed), turn it on, and your brain will automatically follow along to the really nice pre-programmed 14-minute-long meditation brainwave sequence, presented through pulsing lights and sound. Oh, and you will also hallucinate really beautiful colors and patterns along the way!

This project is based on my original article in [MAKE Magazine](#). The first Brain Machine kit was a collaboration between Mitch and [Ladyada / Adafruit](#). This new version of the Brain Machine kit makes use of the [Arduino Brain Machine project, created by Chris Sparnicht "LaughterOnWater"](#). All documentation for this new version of the Brain Machine kit is available on my Github: [Brain Machine kit Github page](#).

**DISCLAIMER:** Light and Sound Machines, such as this one, can be fun for many of us, but may be seriously dangerous for those prone to seizures or who are photosensitive.

This kit takes about 60 minutes to complete.

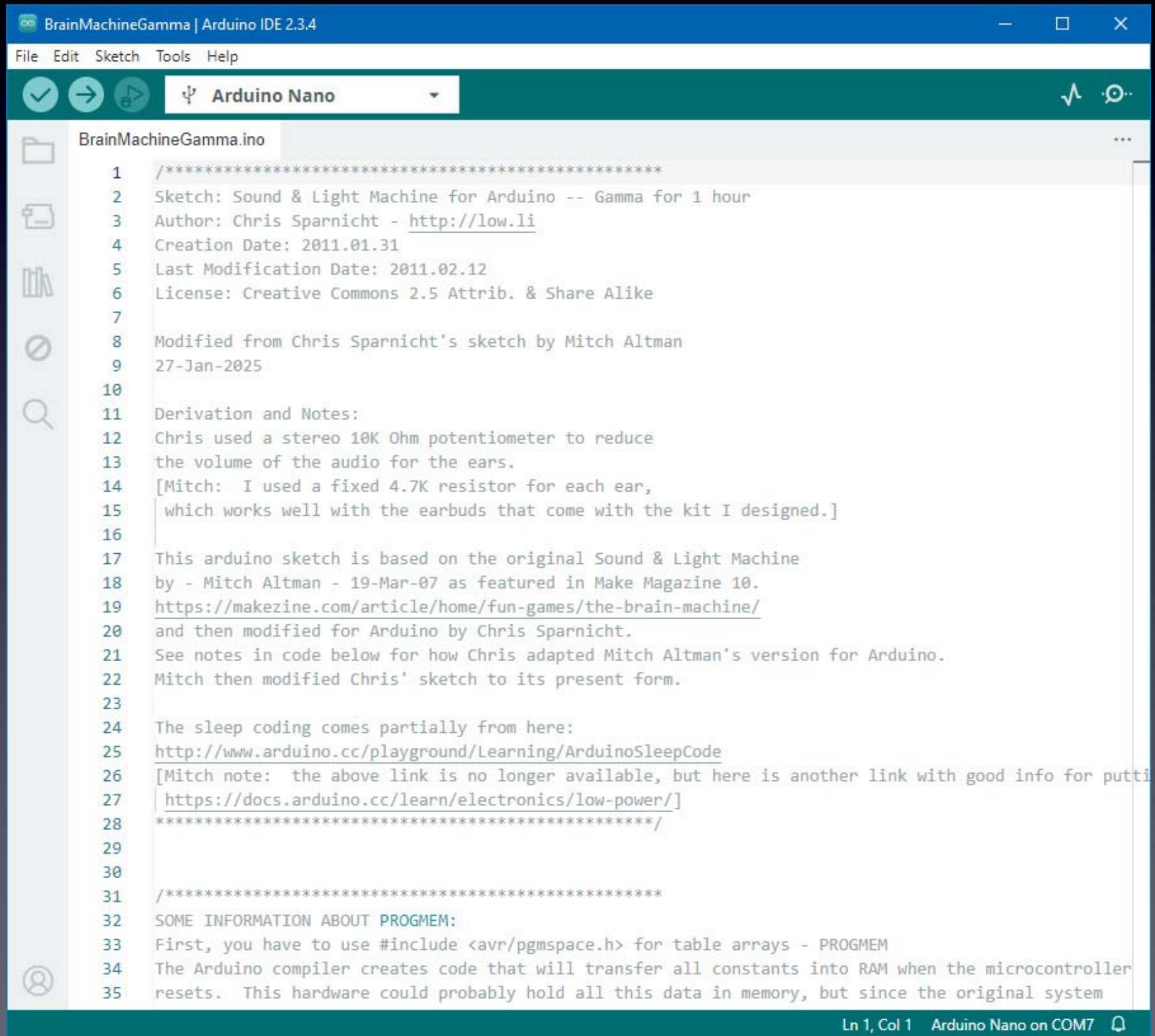
For assembly instructions, please see: [Brain Machine kit assembly instructions](#)

Arduino Sketches for brainwave sequences:  
[Brain Machine Meditation sequence sketch](#) -- to play a nice 14-minute Meditation  
[Brain Machine Gamma sequence sketch](#) -- to play Gama waves (40.0 Hz) for 1 hour

**Early research over the last few years at MIT** and other research labs shows that "plaque" (which is one cause of Alzheimer's pathology) is reduced in mice. Studies are ongoing for helping humans with Alzheimer's pathology. 40 Hz Gamma stimulation may also be helpful for "[chemo brain fog](#)". There may also be some benefit to people with CFS/ME, or people with "brain fog" from long Covid.

# Arduino

You can now open the brainwave sequence sketch:  
File → Open...



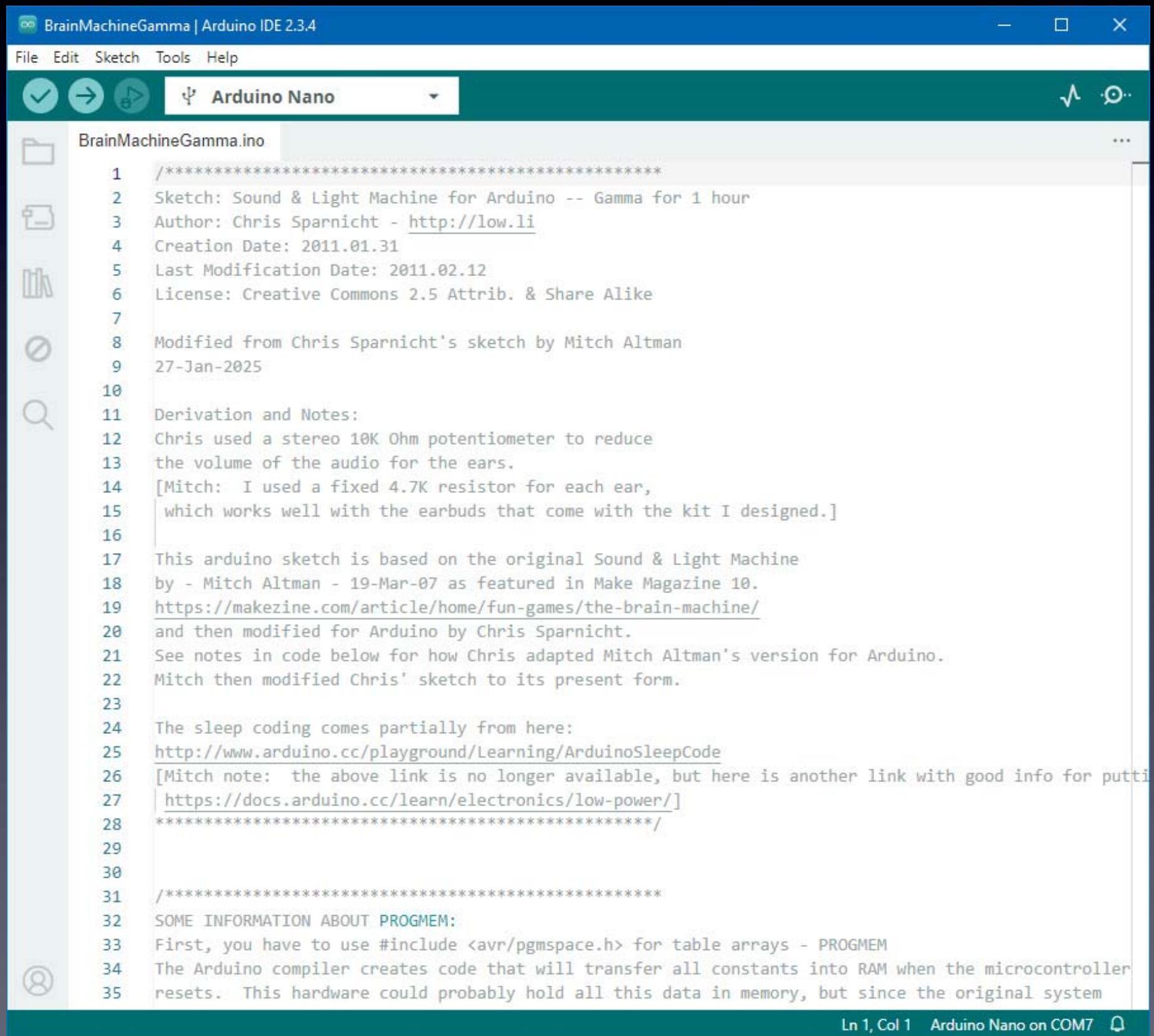
The screenshot shows the Arduino IDE 2.3.4 interface with the title bar "BrainMachineGamma | Arduino IDE 2.3.4". The menu bar includes File, Edit, Sketch, Tools, and Help. The toolbar has icons for file operations and a dropdown set to "Arduino Nano". The main area displays the code for "BrainMachineGamma.ino". The code is a multi-line comment containing metadata and derivation notes. It includes details about the sketch being a sound & light machine for Arduino, credits to Chris Sarnicht and Mitch Altman, and links to the original Make Magazine article and Mitch's notes. The code also mentions sleep coding and information about PROGMEM.

```
1  ****
2  Sketch: Sound & Light Machine for Arduino -- Gamma for 1 hour
3  Author: Chris Sarnicht - http://low.li
4  Creation Date: 2011.01.31
5  Last Modification Date: 2011.02.12
6  License: Creative Commons 2.5 Attrib. & Share Alike
7
8  Modified from Chris Sarnicht's sketch by Mitch Altman
9  27-Jan-2025
10
11 Derivation and Notes:
12 Chris used a stereo 10K Ohm potentiometer to reduce
13 the volume of the audio for the ears.
14 [Mitch: I used a fixed 4.7K resistor for each ear,
15 which works well with the earbuds that come with the kit I designed.]
16
17 This arduino sketch is based on the original Sound & Light Machine
18 by - Mitch Altman - 19-Mar-07 as featured in Make Magazine 10.
19 https://makezine.com/article/home/fun-games/the-brain-machine/
20 and then modified for Arduino by Chris Sarnicht.
21 See notes in code below for how Chris adapted Mitch Altman's version for Arduino.
22 Mitch then modified Chris' sketch to its present form.
23
24 The sleep coding comes partially from here:
25 http://www.arduino.cc/playground/Learning/ArduinoSleepCode
26 [Mitch note: the above link is no longer available, but here is another link with good info for putting
27 https://docs.arduino.cc/learn/electronics/low-power/]
28 ****
29
30
31 ****
32 SOME INFORMATION ABOUT PROGMEM:
33 First, you have to use #include <avr/pgmspace.h> for table arrays - PROGMEM
34 The Arduino compiler creates code that will transfer all constants into RAM when the microcontroller
35 resets. This hardware could probably hold all this data in memory, but since the original system
```

Ln 1, Col 1 Arduino Nano on COM7

# Arduino

You can now program your Brain Machine with a new synth sketch !



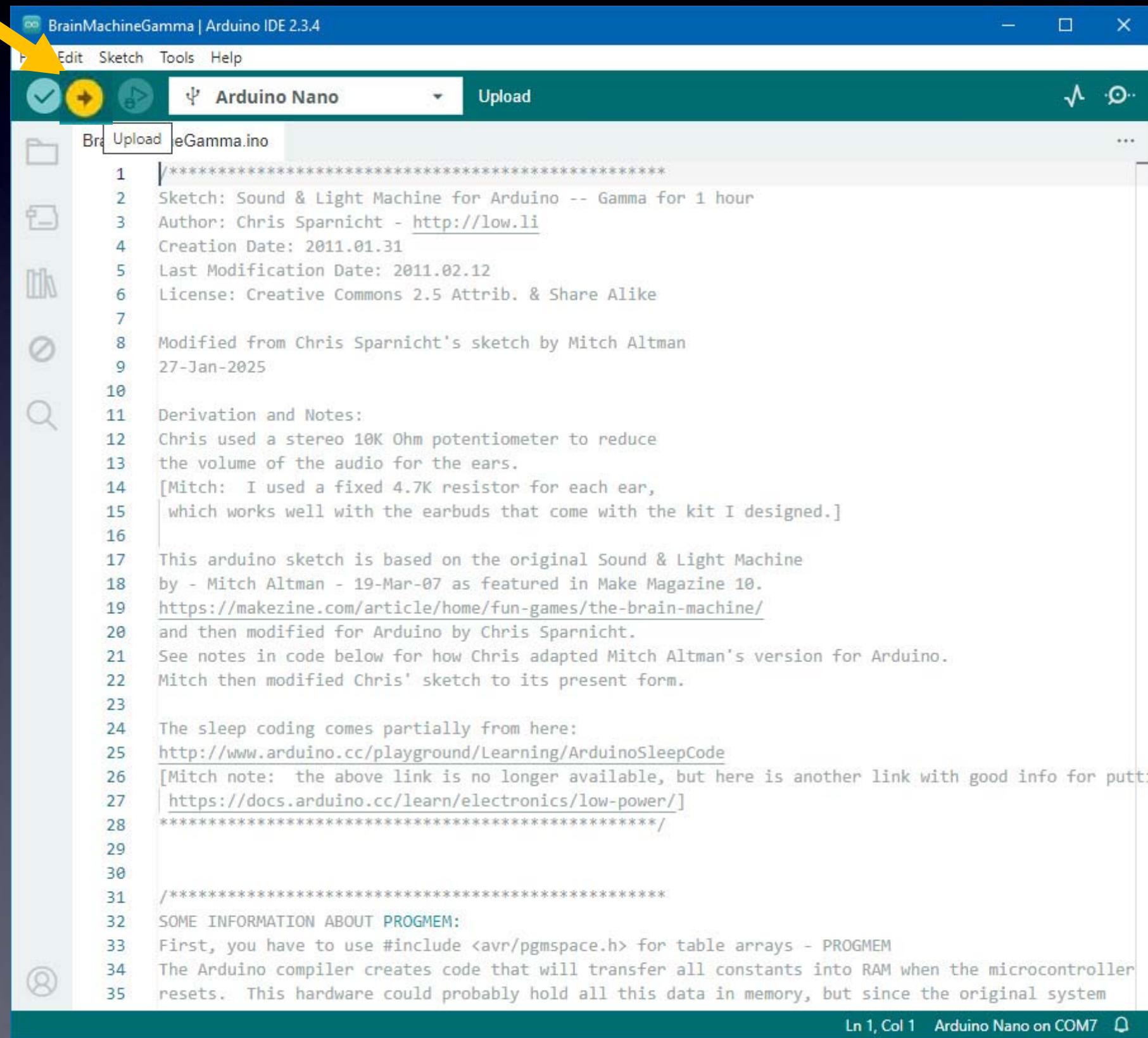
The screenshot shows the Arduino IDE 2.3.4 interface with the title bar "BrainMachineGamma | Arduino IDE 2.3.4". The toolbar includes icons for file operations, a checkmark, a right arrow, a left arrow, a refresh, and a dropdown for the board type "Arduino Nano". The menu bar has options: File, Edit, Sketch, Tools, Help. The main area displays the code for "BrainMachineGamma.ino". The code is a multi-line comment containing metadata and notes about the sketch. It includes details about the author (Chris Sarnicht), creation date (2011.01.31), last modification date (2011.02.12), license (Creative Commons 2.5 Attrib. & Share Alike), and a note about modifications by Mitch Altman. It also references the original "Sound & Light Machine" sketch by Mitch Altman from Make Magazine 10 and notes about sleep coding. The code ends with information about PROGMEM.

```
1  ****
2  Sketch: Sound & Light Machine for Arduino -- Gamma for 1 hour
3  Author: Chris Sarnicht - http://low.li
4  Creation Date: 2011.01.31
5  Last Modification Date: 2011.02.12
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19 https://makezine.com/article/home/fun-games/the-brain-machine/
20 and then modified for Arduino by Chris Sarnicht.
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24 The sleep coding comes partially from here:
25 http://www.arduino.cc/playground/Learning/ArduinoSleepCode
26 [Mitch note: the above link is no longer available, but here is another link with good info for putting
27 https://docs.arduino.cc/learn/electronics/low-power/]
28 ****
29
30
31 ****
32 SOME INFORMATION ABOUT PROGMEM:
33 First, you have to use #include <avr/pgmspace.h> for table arrays - PROGMEM
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Ln 1, Col 1 Arduino Nano on COM7

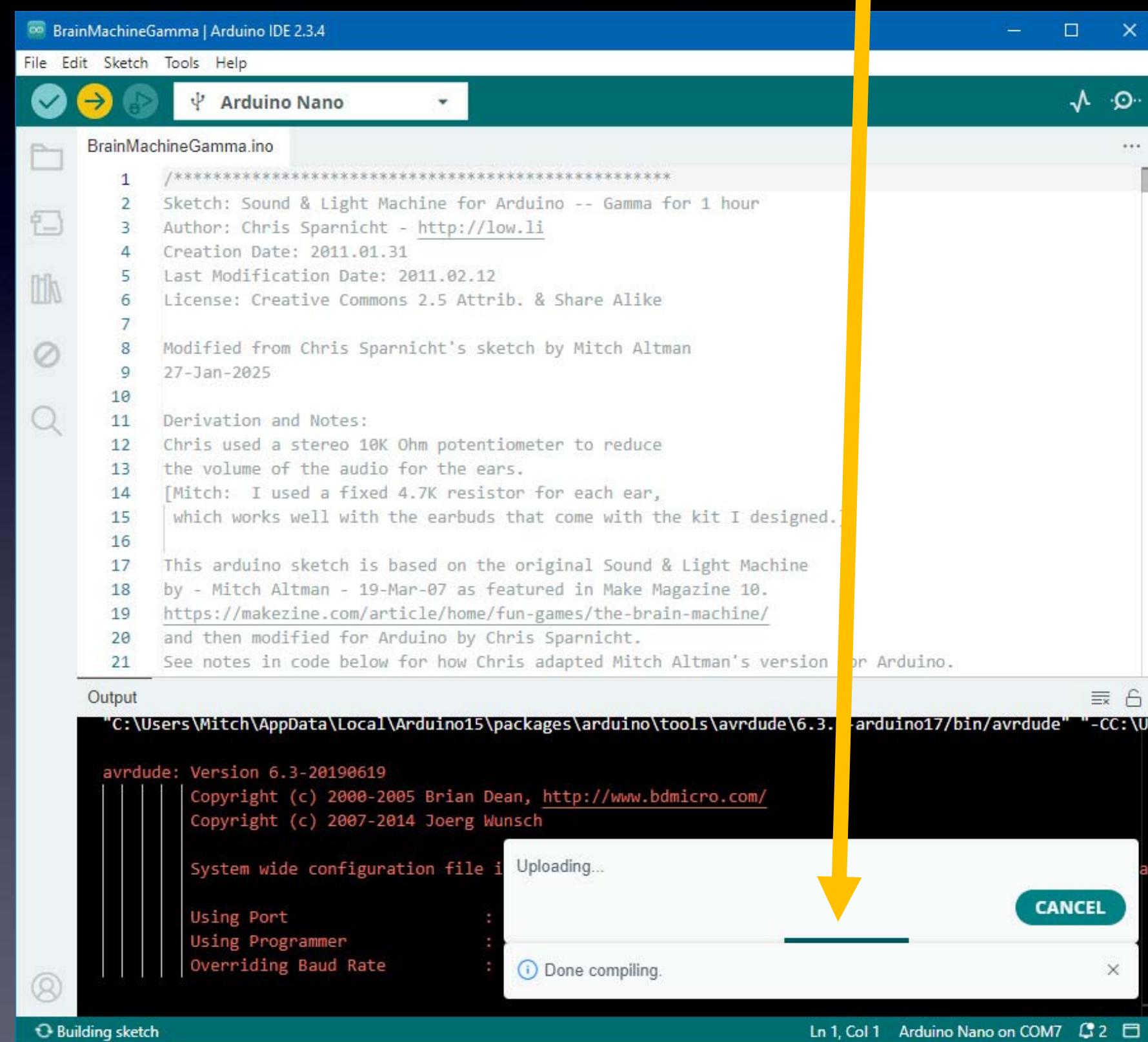
# Arduino

**With the USB-C cable connected to your Brain Machine  
press the “Upload” button**



# Arduino

While uploading, you will see a progress bar...



...and when it's completed successfully, it says: “Upload done”

# **Brain Machine**

**Disconnect your Brain Machine board  
from the USB-C cable,**

**turn on your Brain Machine,**

**And...**

# Let's Trip Out in New Ways !



Please Remember:

to

Wash your hands  
after soldering

# *Brain Machine kit*

## Assembly Instructions & Programming Instructions



CC BY-SA 4.0 © 2025 Mitch Altman



cornFIELD electronics