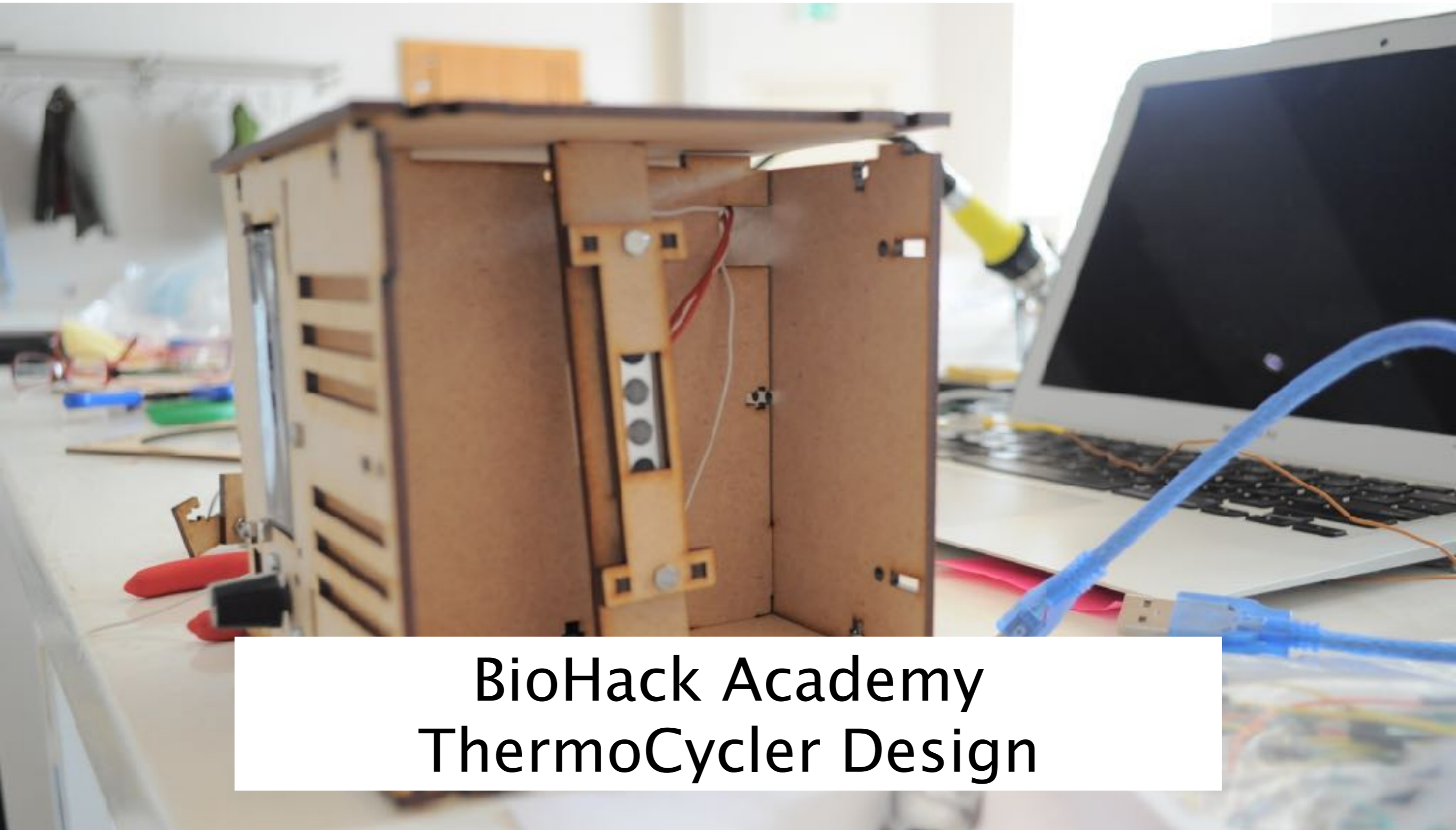




**waag society**

*institute for art, science and technology*



# BioHack Academy ThermoCycler Design



# Why we need a thermocycler

- Multiply DNA
  - Analyse it
  - Clone it



# Industry Standard







# Hacks

## OpenPCR

Picture by MadLab



## OpenerPCR

Picture by DIYBio Groningen



## Wild Open PCR

Picture by GaudiLab



Picture by DailyMail



# Open qPCR

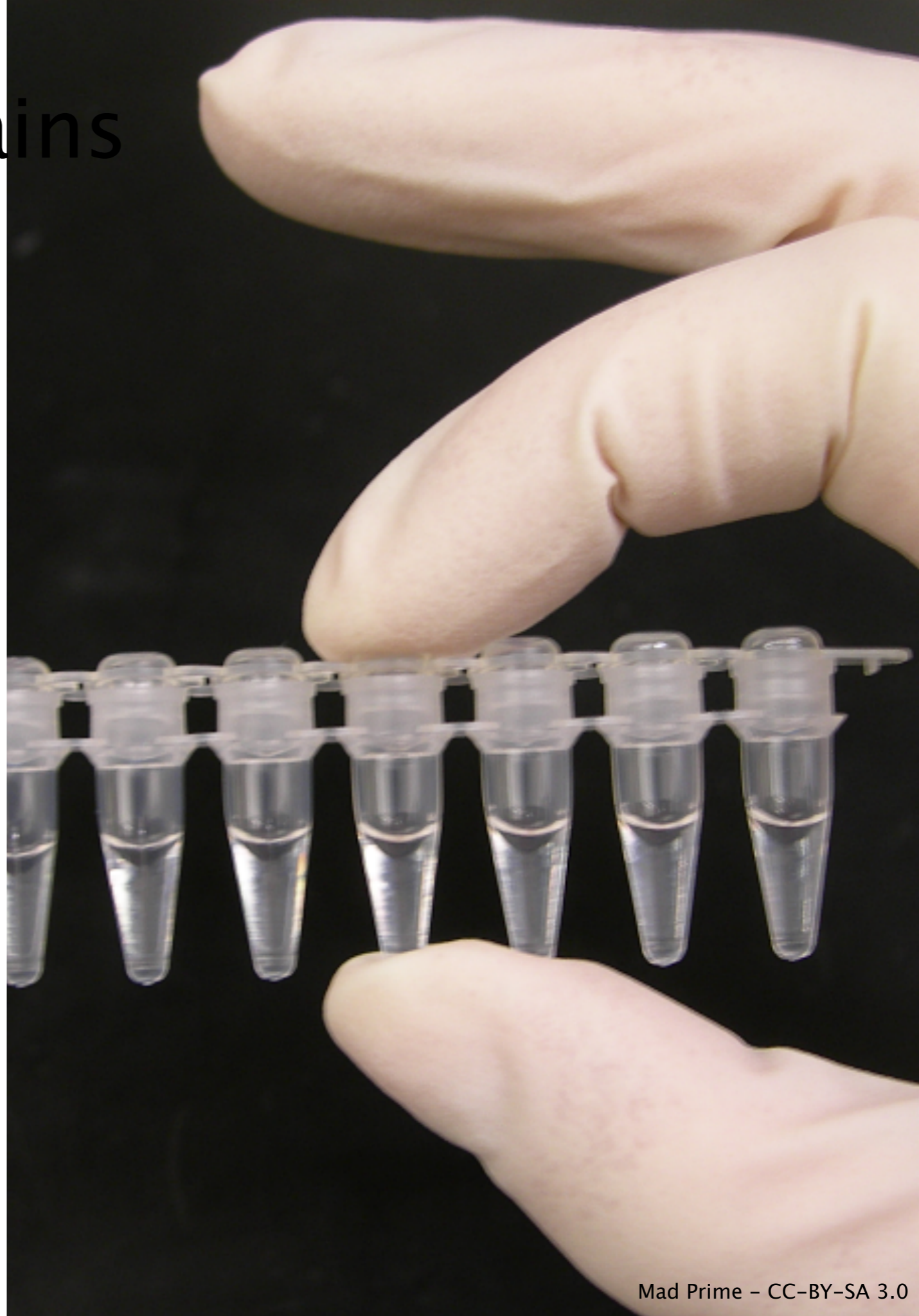






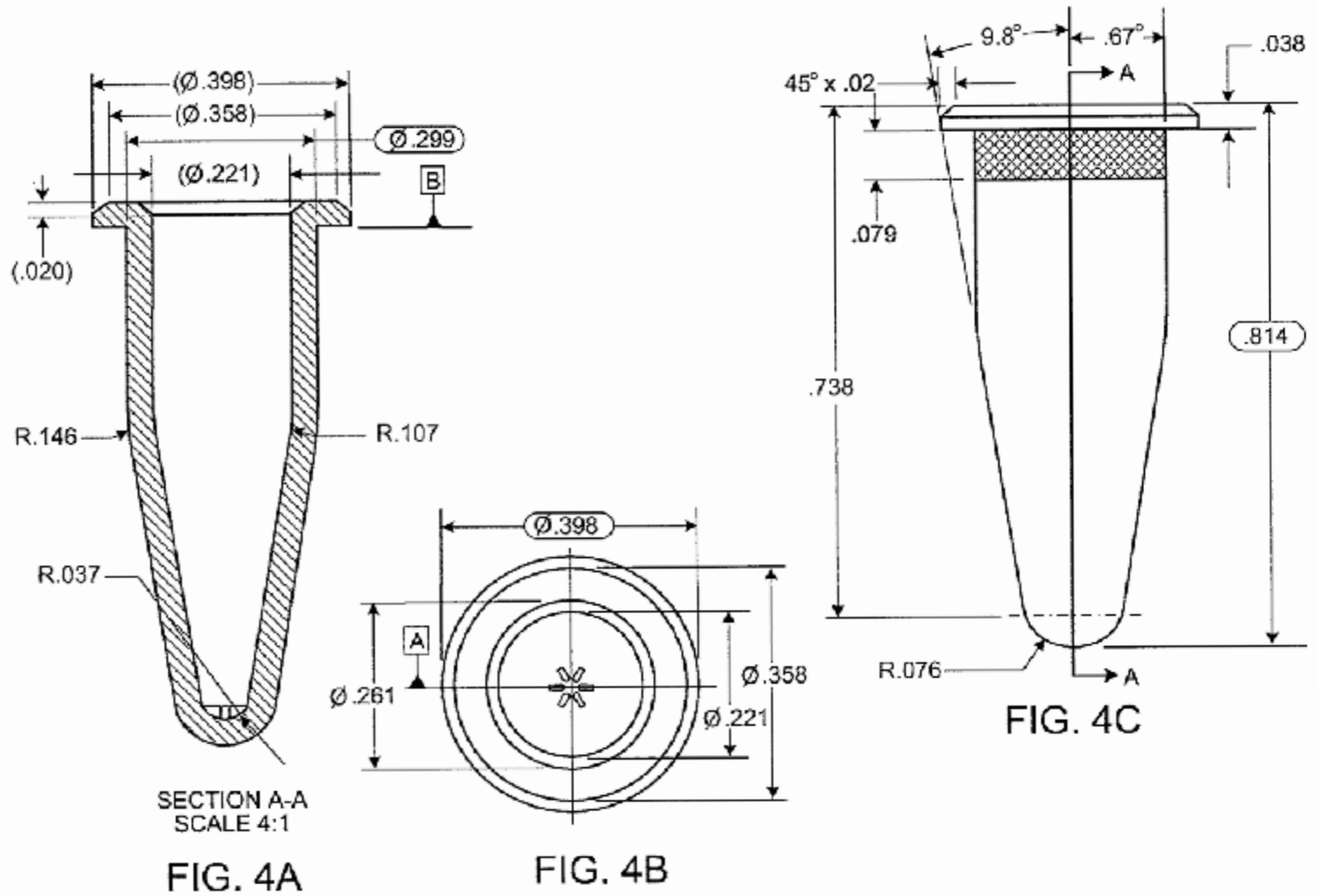
# Design Constrains

- PCR tubes



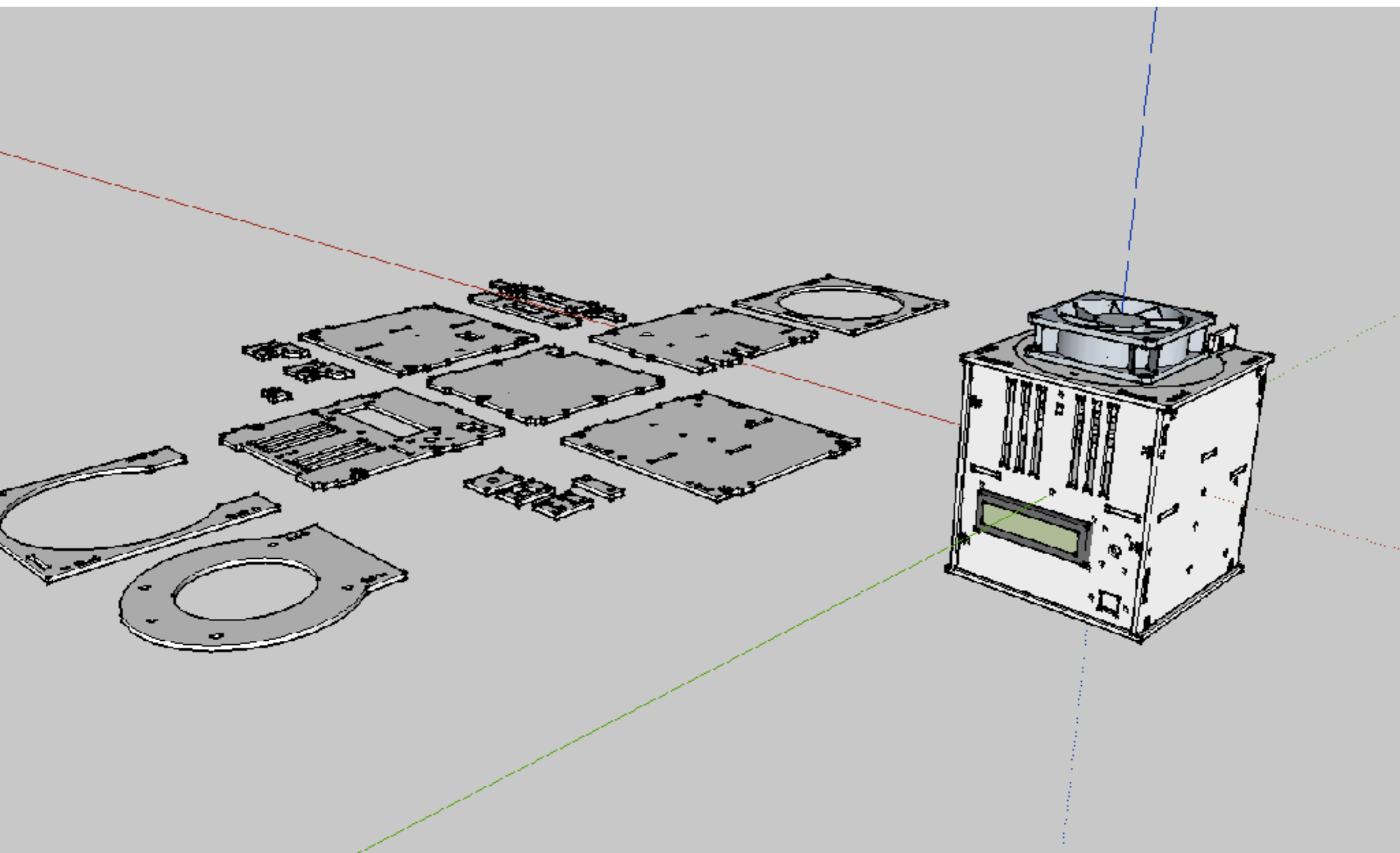


Patent US8216530





# Biohack Academy Thermocycler







# Bill of Materials

No	Amount	Description	Supplier NL	Cost
1	2	Power resistors	<a href="#">Farnell</a>	0.64
2	2	10K NTC thermistor	<a href="#">Farnell</a> , <a href="#">HackerStore</a> , <a href="#">iPrototype</a>	0.27
3	1	Rotary encoder	<a href="#">Farnell</a> , <a href="#">iPrototype</a> , <a href="#">EEO</a>	0.42
4	1	Knob	<a href="#">Farnell</a>	0.23
5	1	Power switch	<a href="#">Farnell</a> , <a href="#">iPrototype</a>	0.71
6	1	DC power jack	<a href="#">Farnell</a> , <a href="#">EEO</a>	0.85
7	1	12V 5A Power supply	<a href="#">Farnell</a> , <a href="#">EEO</a>	38.13
8	1	Push button	<a href="#">Farnell</a> , <a href="#">iPrototype</a> , <a href="#">Sparkfun</a>	0.47
9	4	10K resistor	<a href="#">Farnell</a> , <a href="#">EEO</a>	0.03
10	4	Rubber feet	<a href="#">Conrad</a>	0.08
11	1	I2C LCD display	<a href="#">iPrototype</a> , <a href="#">Hackerstore</a>	8.95
12	3	MOSFET	<a href="#">Farnell</a> , <a href="#">EEO</a>	0.90
13	1	12V 80 mm Axial Fan	<a href="#">Farnell</a> , <a href="#">EEO</a>	3.25
14	1	Diode	<a href="#">Farnell</a> , <a href="#">iPrototype</a> , <a href="#">EEO</a>	0.19
15	1	Breadboard	<a href="#">Farnell</a> , <a href="#">iPrototype</a>	2.56
16	1	Custom milled PCR tube block		



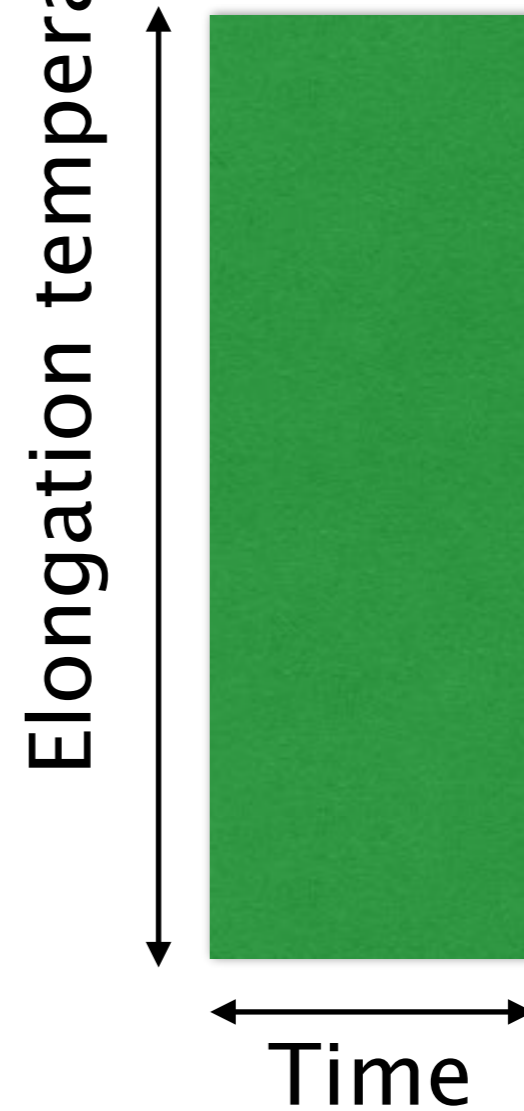
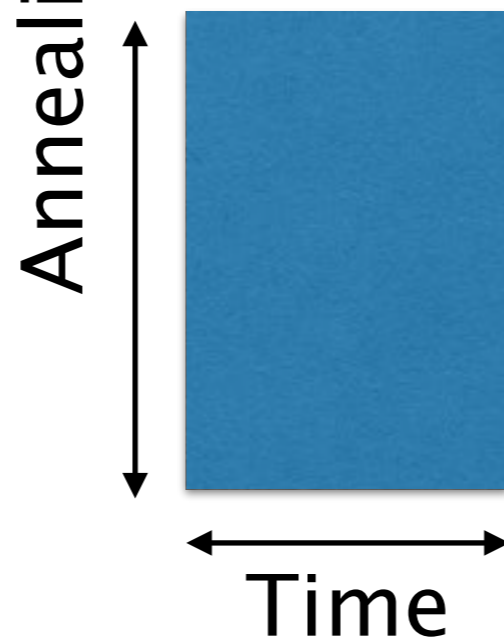
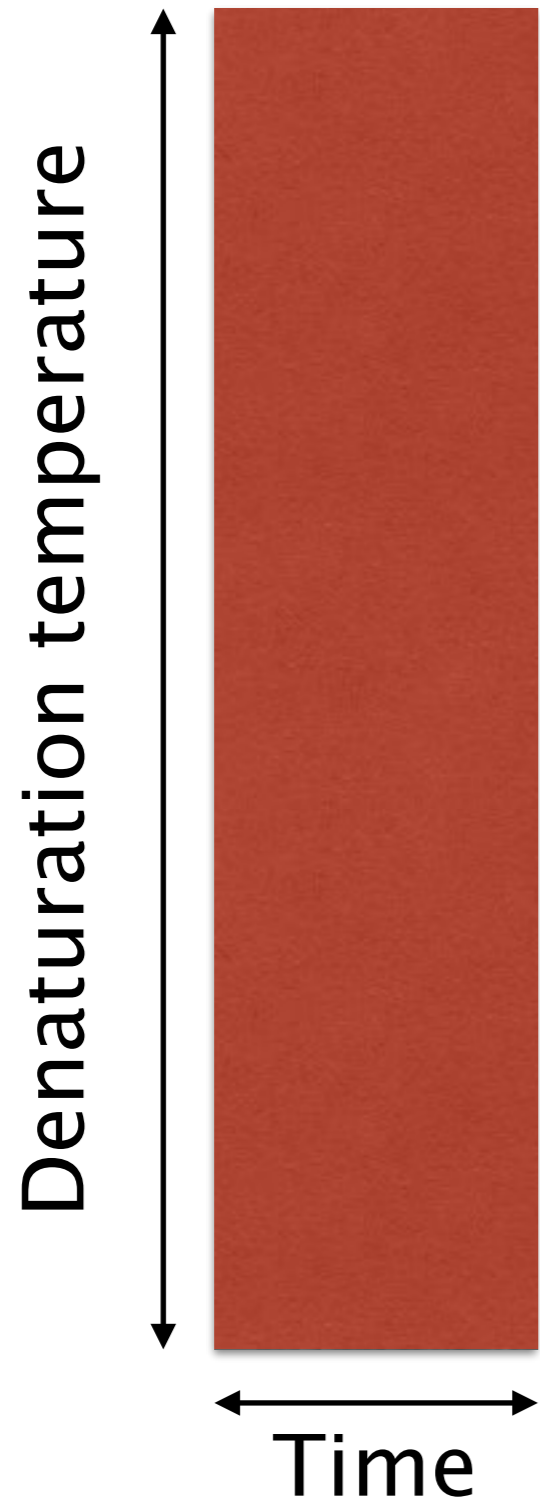
# Custom block





# Settings

# of cycles

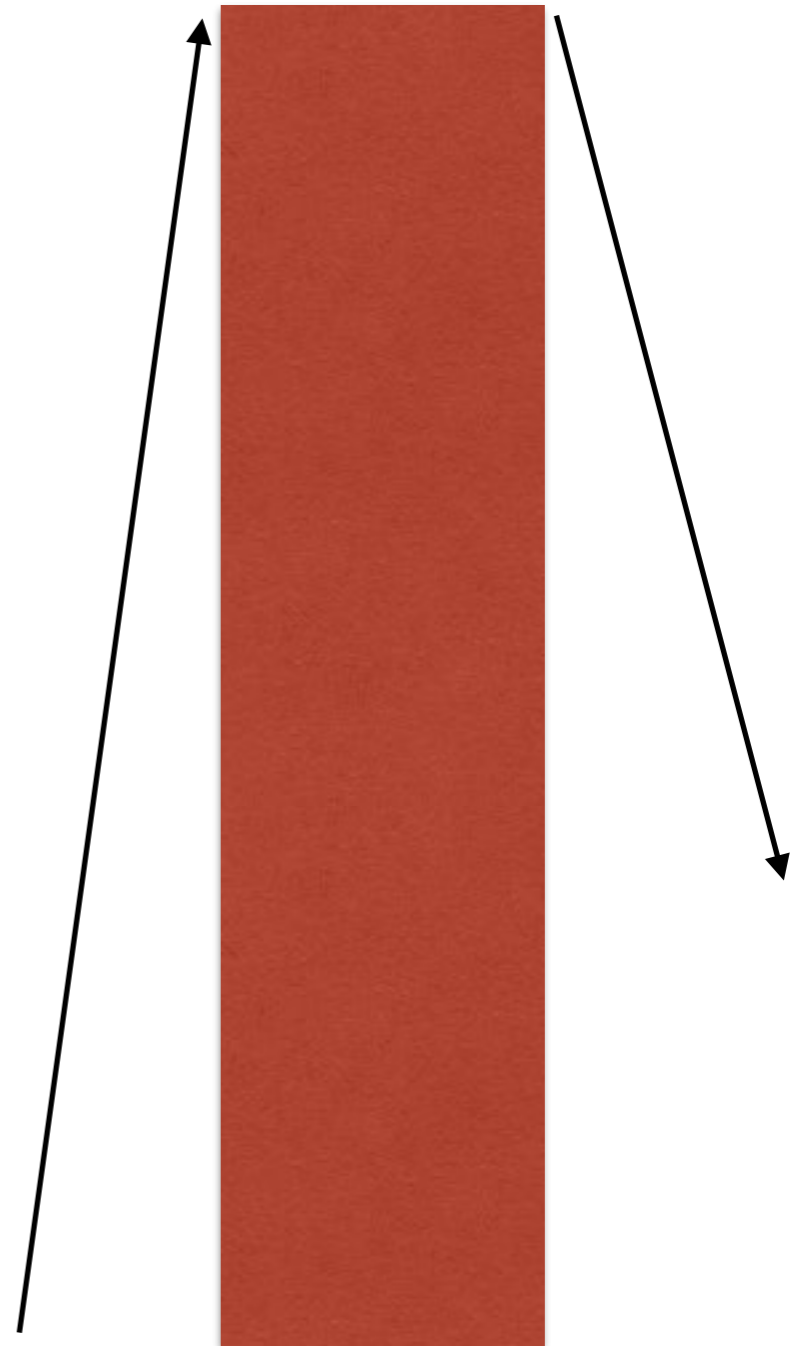






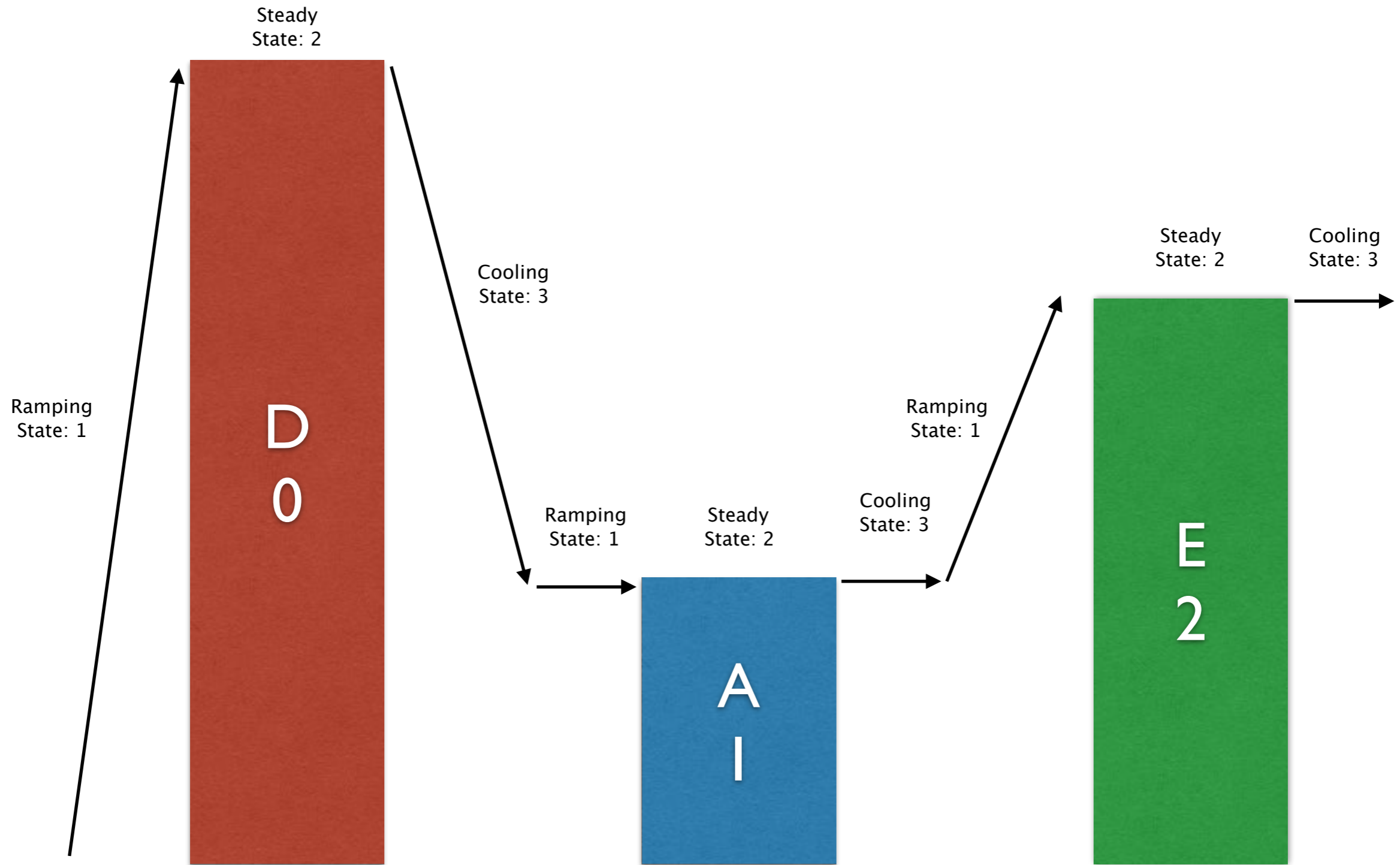
# Program stages

- Each stage goes through 3 states:
  - Ramp up to a set temperature
  - Keep the temperature stable
  - Cool down



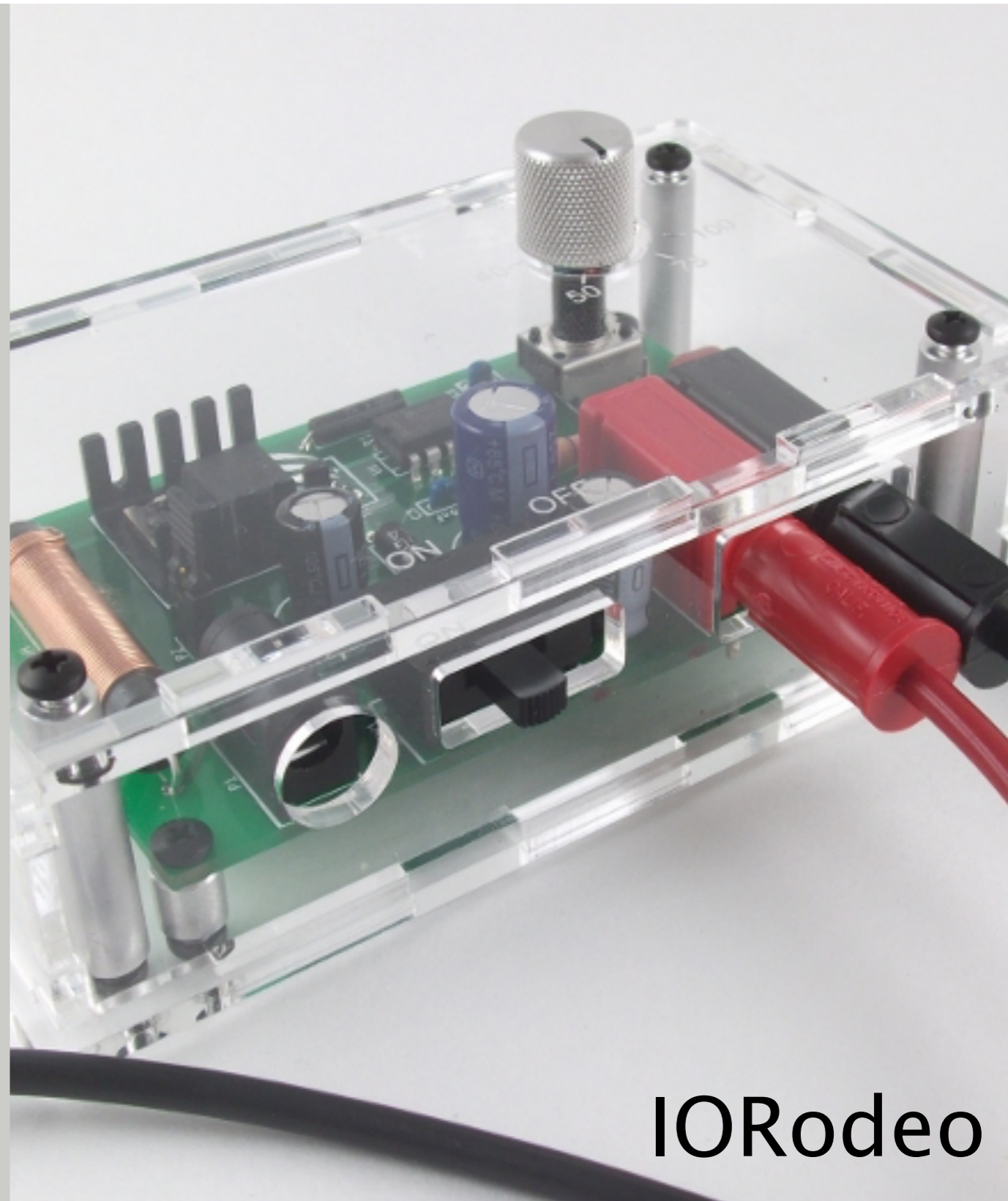
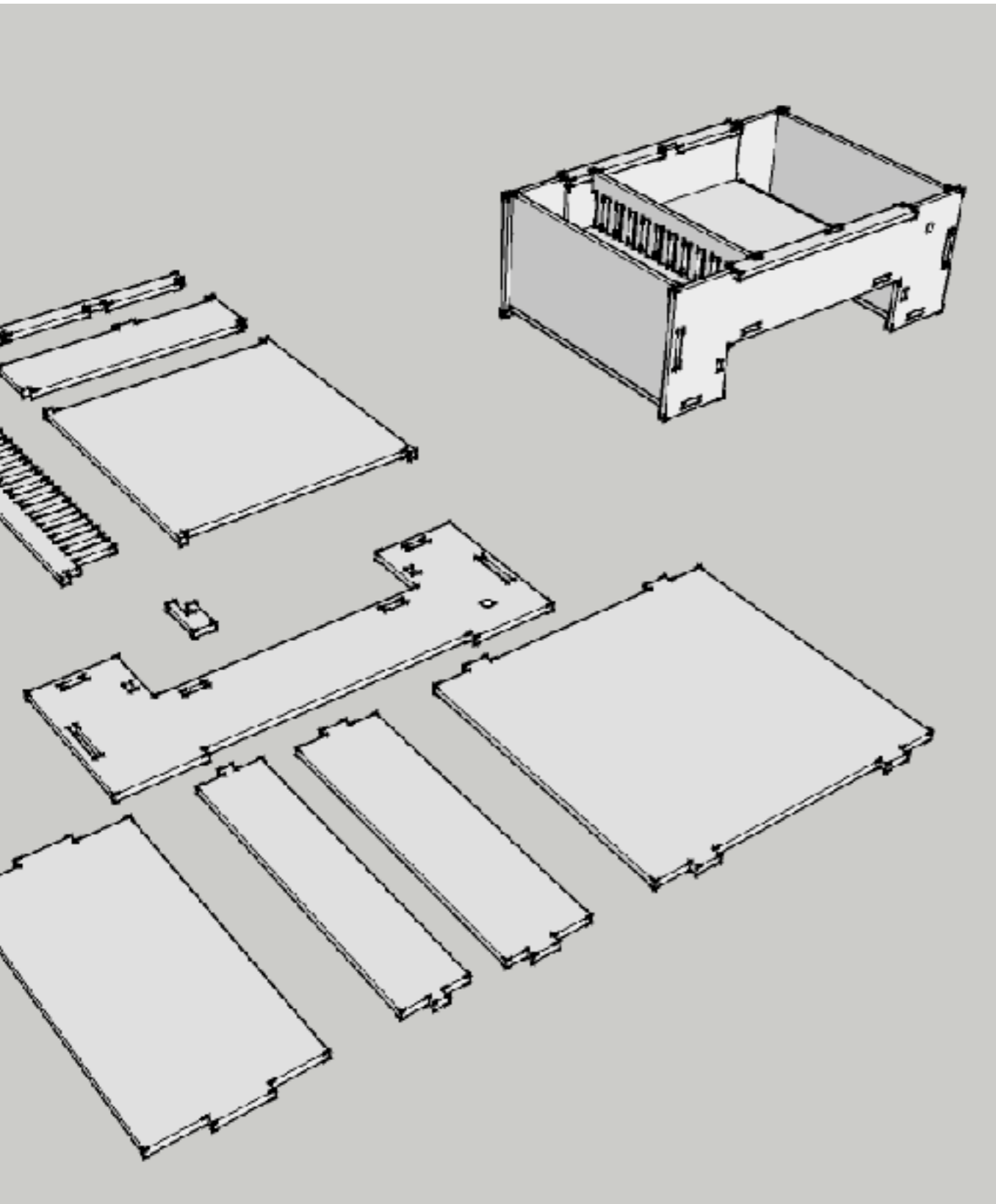


# Stages and States





# Gel rig and power supply



IORodeo





# Bill of Materials Gel Box

No	Amount	Description	Supplier NL	Cost
1	1	Banana adapter (black)	<a href="#">AlleKabels</a>	0.60
2	1	Banana adapter (red)	<a href="#">AlleKabels</a>	0.60
3	1	Banana cable (black)	<a href="#">AlleKabels</a>	3.85
4	1	Banana cable (red)	<a href="#">AlleKabels</a>	3.85
5	1	3mm Acrylic sheet	<a href="#">Plexiglas.nl</a>	
6	1	Acryl glue	DIY shop	
7	1	Platinum Wire	<a href="#">Sigma Aldrich</a>	90.10



# IORodeo kit

<http://www.iorodeo.com/content/electrophoresis-power-supply-kit>

TEAM CONTACT SHIPPING AND RETURNS SEARCH LOGIN



home store hardware software projects blog docs

Home » Store » Gel Imaging » Electrophoresis

## Electrophoresis power supply kit

View Posts

SKU: IMG-08

Kit for making a 25-100 V variable power supply for electrophoresis as described in this [Documentation](#).

Each electrophoresis power supply kit comes with the following parts:

- **Power supply PCB**
- **Electronic components** - 20 through-hole components for soldering onto the PCB
- **Enclosure** - The kit comes with a acrylic enclosure with different color options available. The enclosure is very easy to assemble. We recommend using an enclosure when the power supply is in use. For makers that prefer to design a custom enclosure we have added the option to purchase the kit without the enclosure in the options below
- **Hardware** - All of the hardware for making the power supply including screws, standoffs and mini-screwdriver

Additional accessories you will need:

- 15V, 1.6A power supply with a 2.1mm plug, center +ve
- Banana jack/banana plug cables for connecting to the [mini-gel electrophoresis tank](#)

Price: \$65.00

Select acrylic enclosure color from these options: \*

- Amber
- Blue
- Clear
- Green



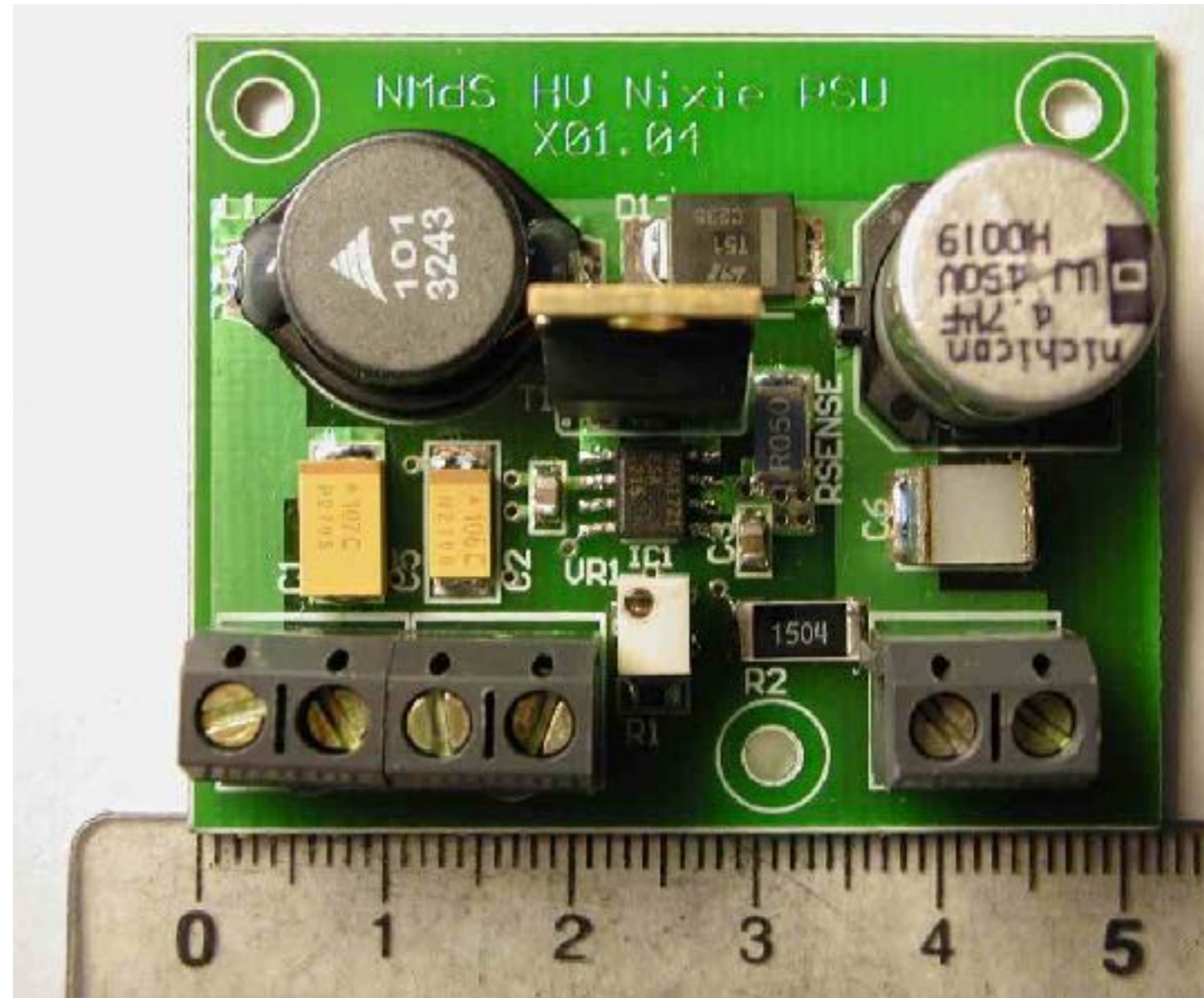
\$65.00



# Nixie Power Supply

Nick De Smith

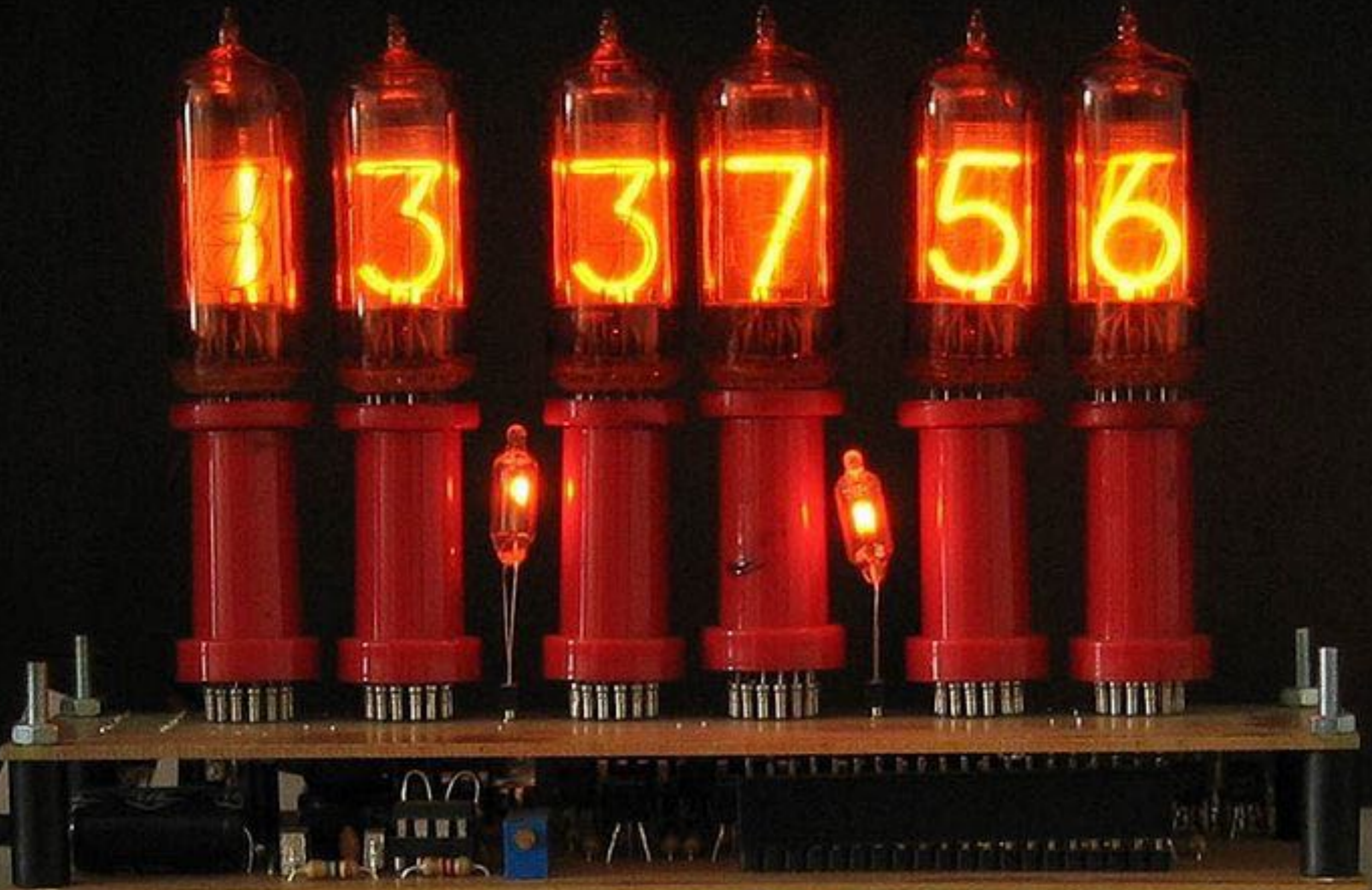
[http://www.desmith.net/  
NMdS/Electronics/  
NixiePSU.html](http://www.desmith.net/NMdS/Electronics/NixiePSU.html)







# What's a Nixie?





# Documentation



BioHack Academy

[Classes](#)

[Discuss](#)

[Organisms](#)

[Participants](#)

[Repos](#)



## Participants

Each participant in the BioHack Academy creates a documentation page to share their experience, designs and results.

Here you may find [the instructions to create your own Github page](#). You are also free to choose any other documentation / blog platform.

Please send [the link to your documentation site](#) as soon as it is setup to [pieter@waag.org](mailto:pieter@waag.org).

- [BioClub Tokyo - Japan](#)
  - [Coordinator page](#)
- [BioHack Western Australia - Perth](#)
  - [Coordinator page](#)
  - [Ziggy Oreilly](#)
- [M-Lab - Lithuania](#)
  -
- [National Museum of Modern and Contemporary Art - South Korea](#)
  -
- [Shenzhen Open Innovation Lab - China](#)
  -
- [The Social Media Workgroup, University of New Mexico - USA](#)
  - [Kaitbryson](#)
  - [Sabrina Islam](#)
- [Waag Society's Open Wetlab - Amsterdam](#)
  - [Maria](#)
  - [Raza](#)



# Next week

- Mid term presentations
  - 5 minutes each
  - What is your idea?
  - How are you planning to do it?
  - How will it be documented?





**some  
rights  
reserved**