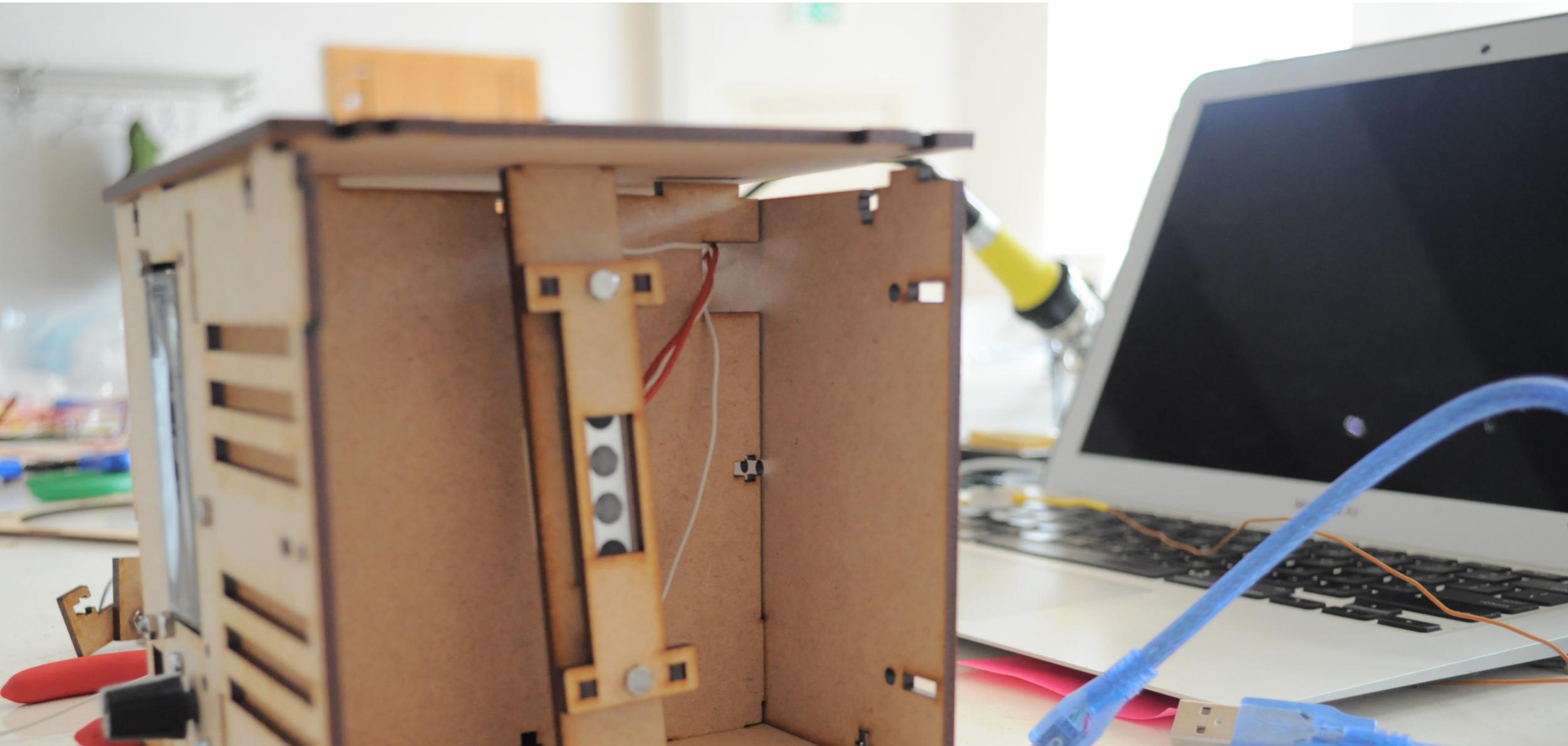




waag society

institute for art, science and technology



BioHack Academy
ThermoCycler Design



Why we need a thermocycler

- Multiply DNA
 - Analyse it
 - Clone it



Industry Standard





Hacks

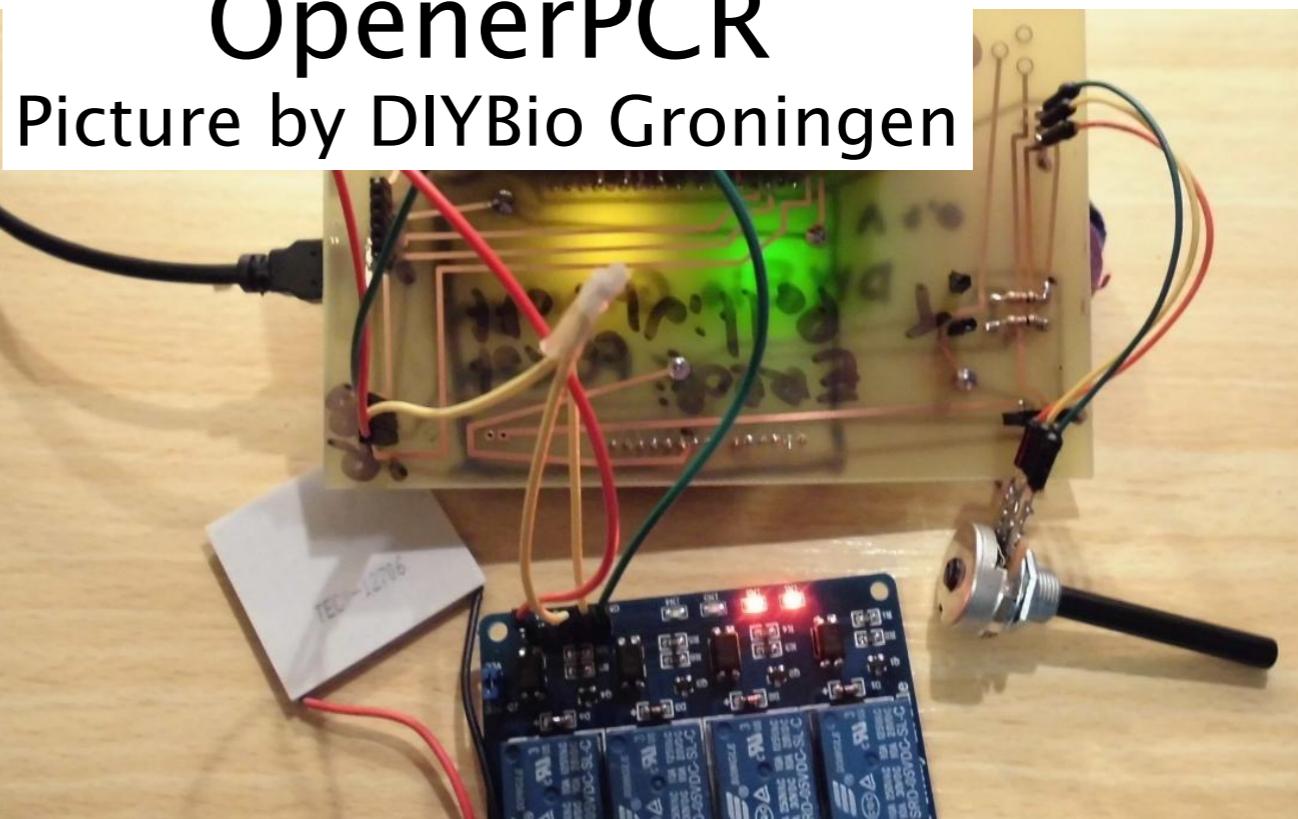
OpenPCR

Picture by MadLab



OpenerPCR

Picture by DIYBio Groningen



Wild Open PCR

Picture by GaudiLab



Picture by DailyMail



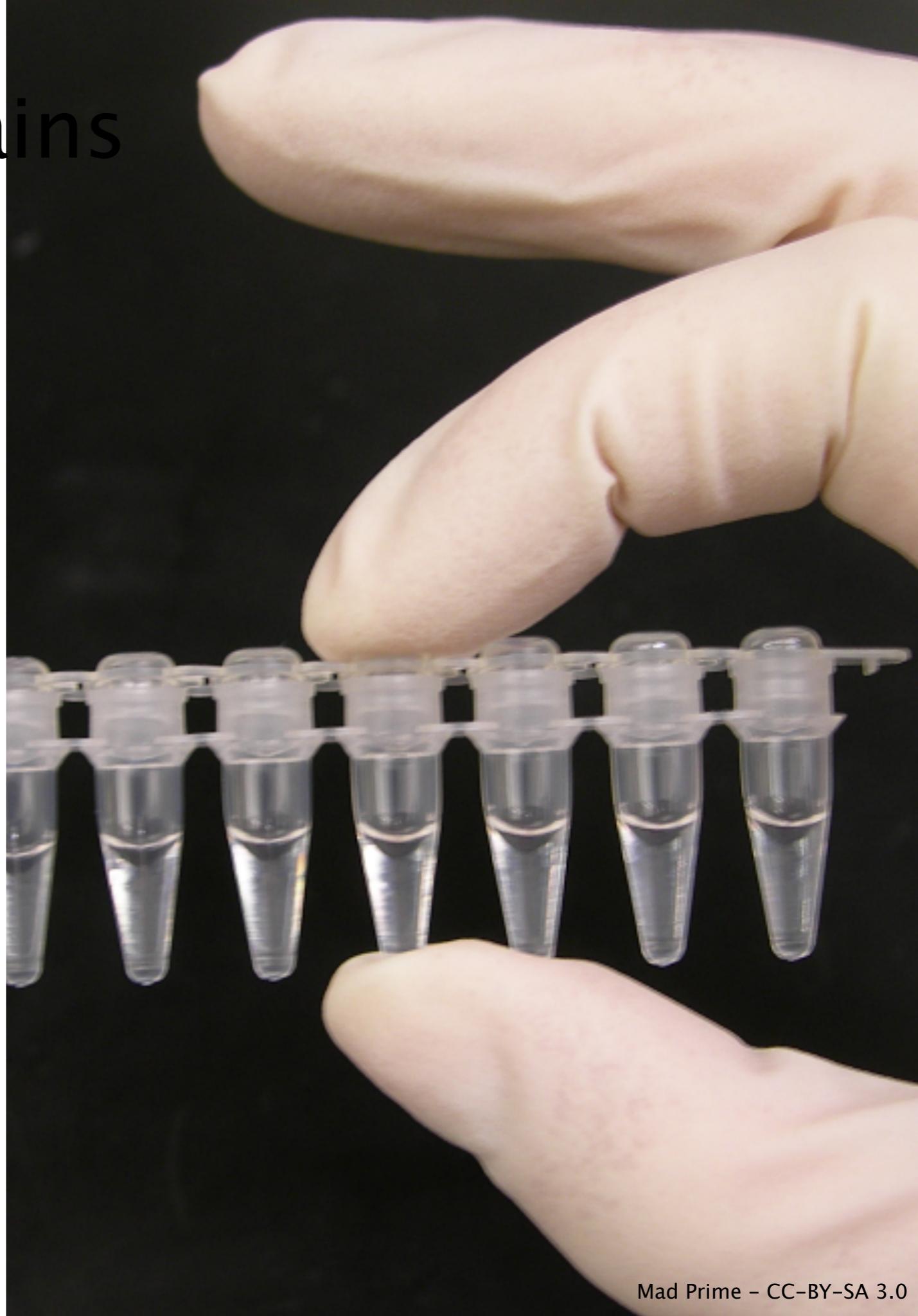
Open qPCR





Design Constraints

- PCR tubes





Patent US8216530

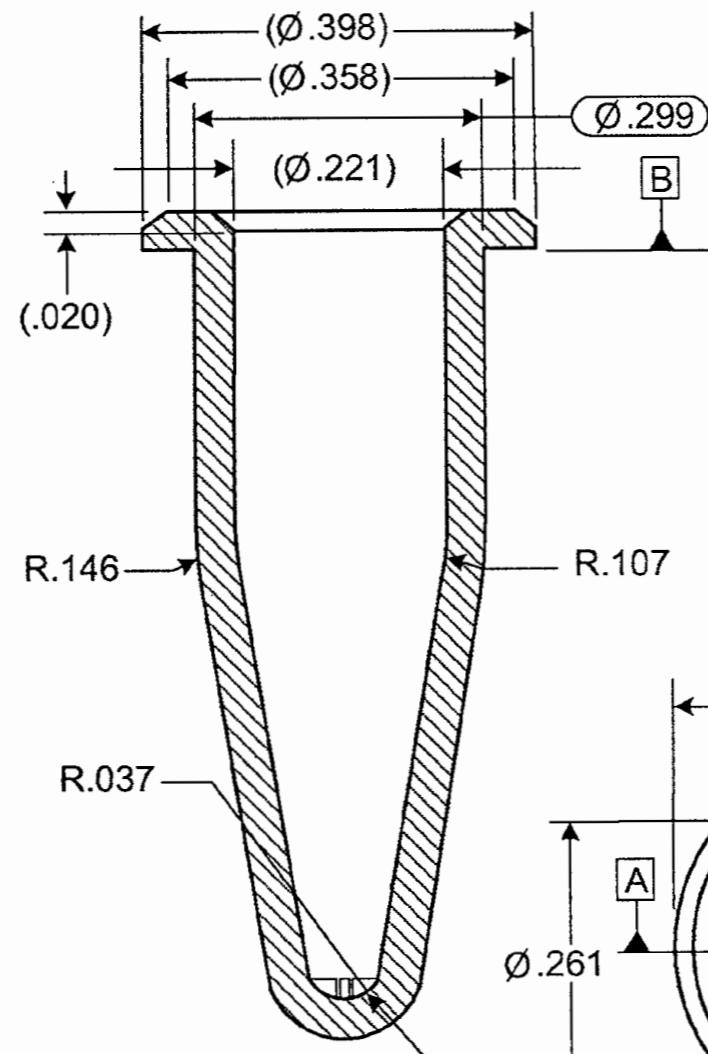


FIG. 4A

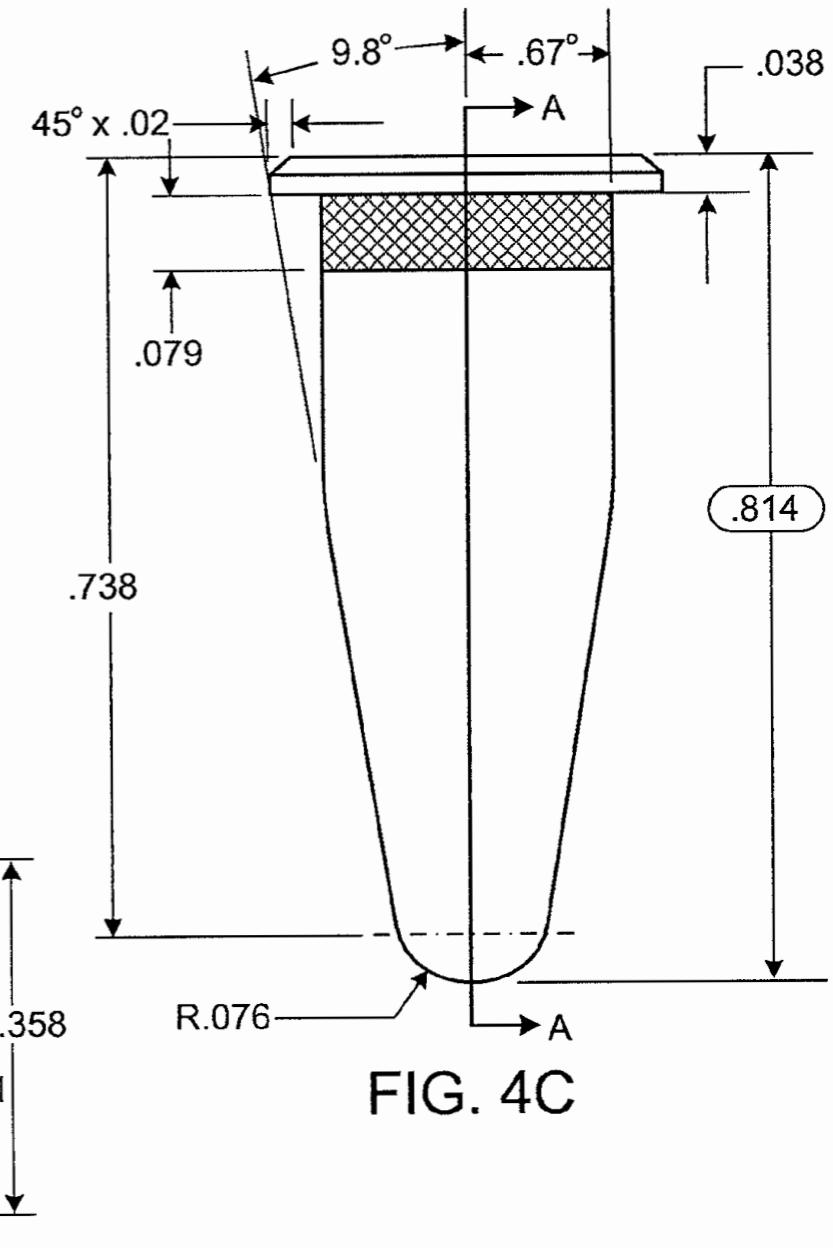
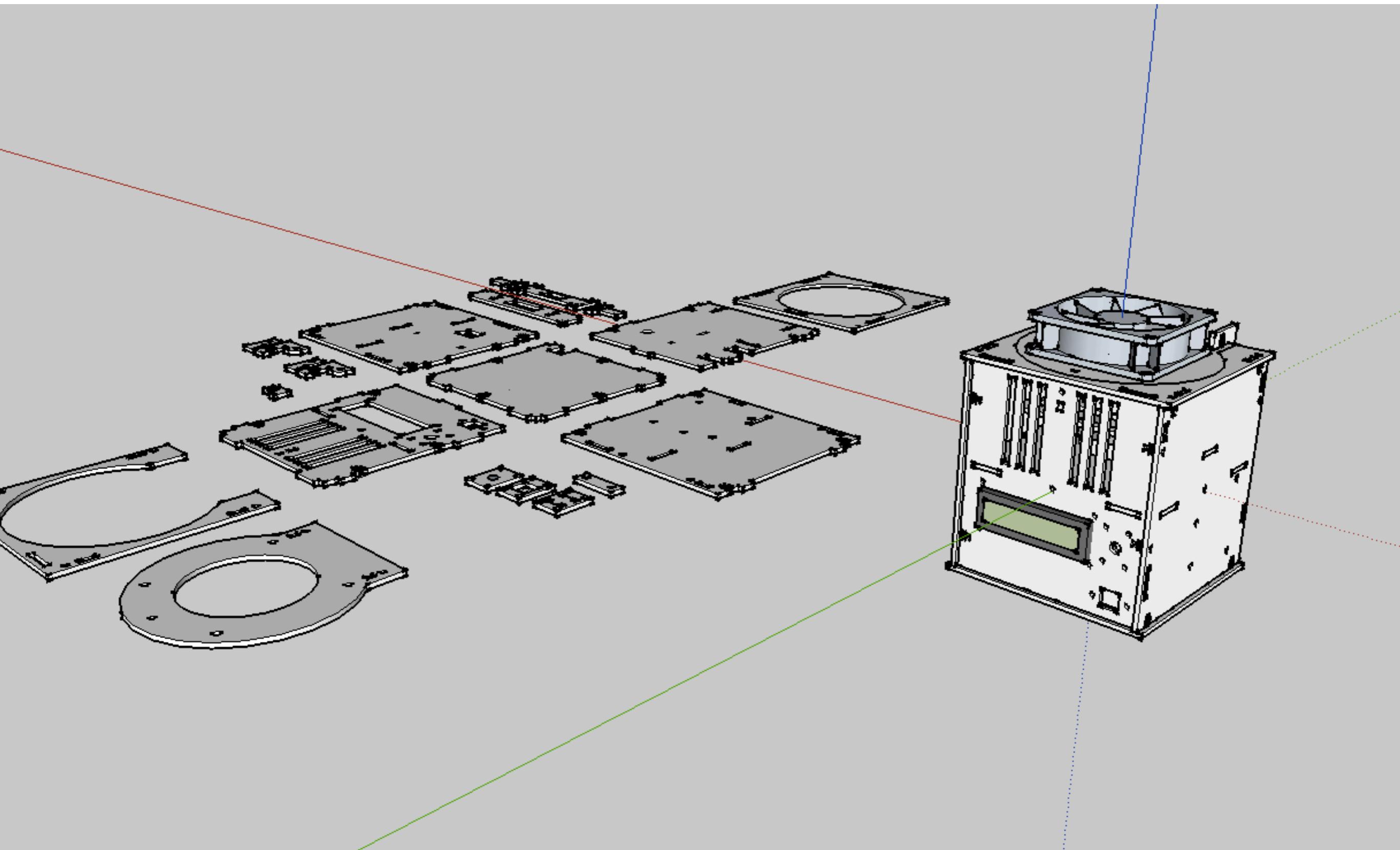


FIG. 4B



Biohack Academy Thermocycler





Bill of Materials

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



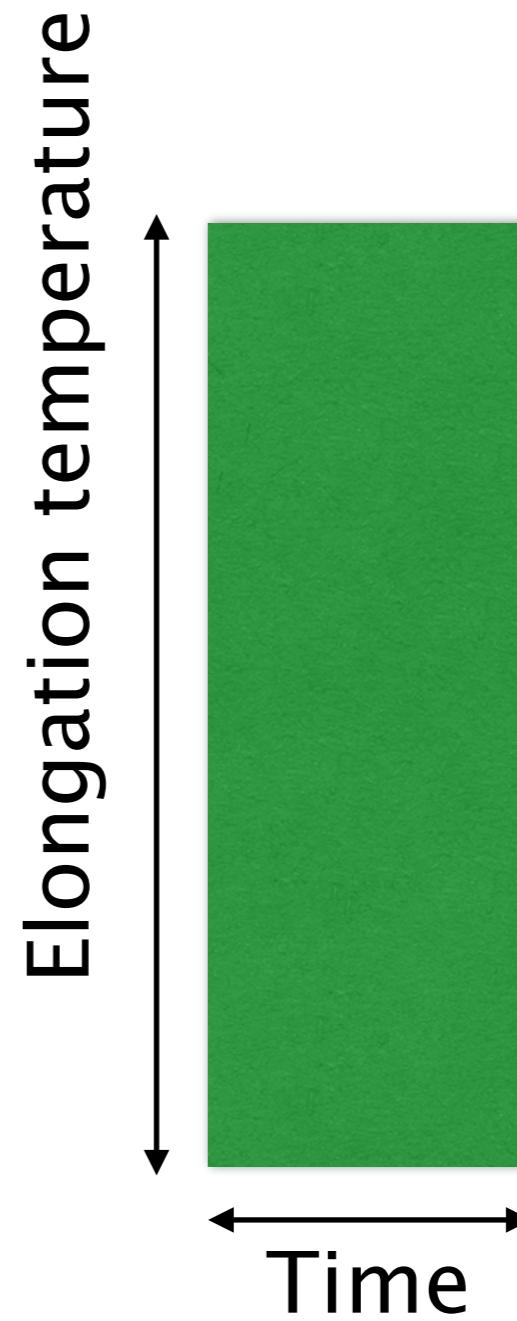
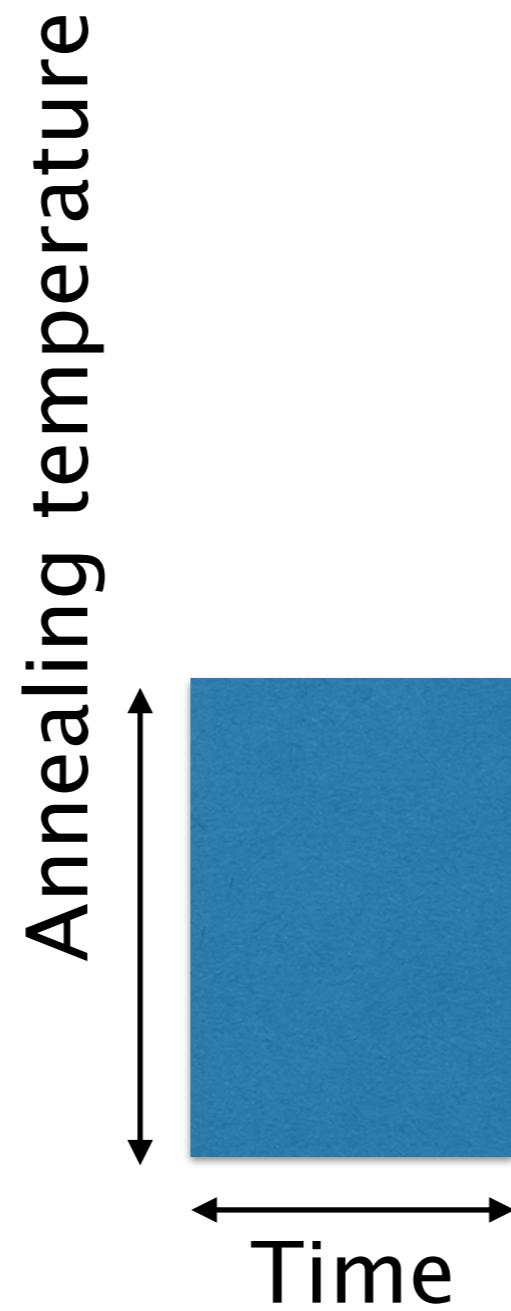
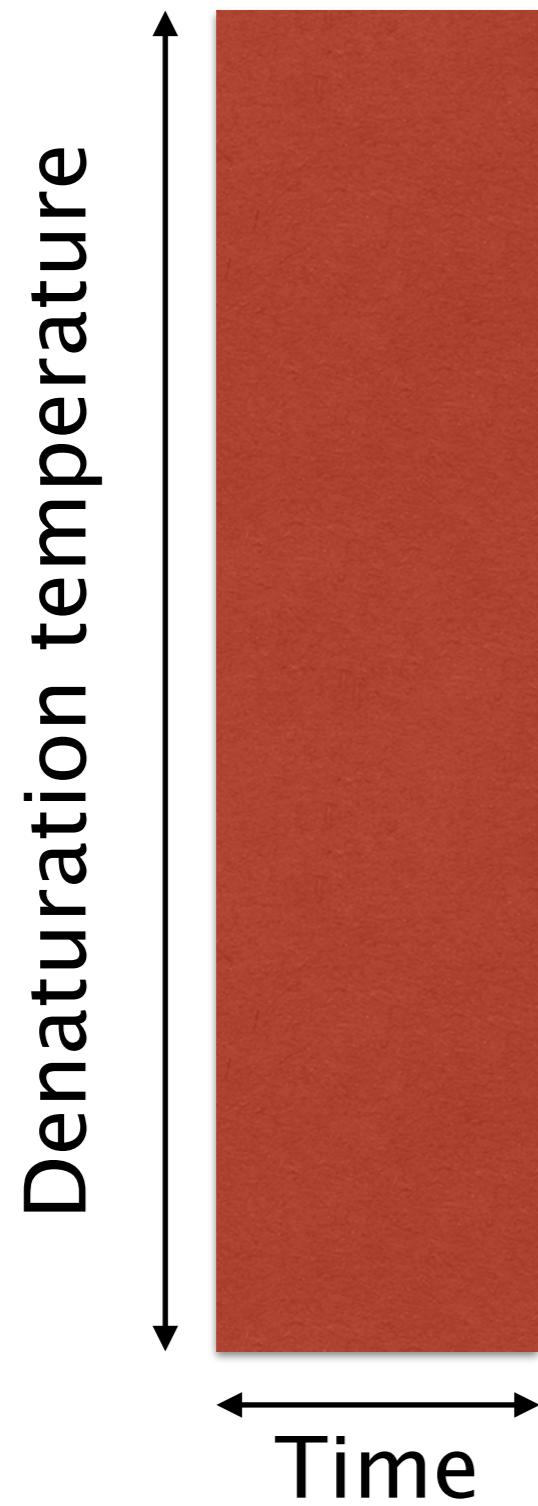
Custom block





Settings

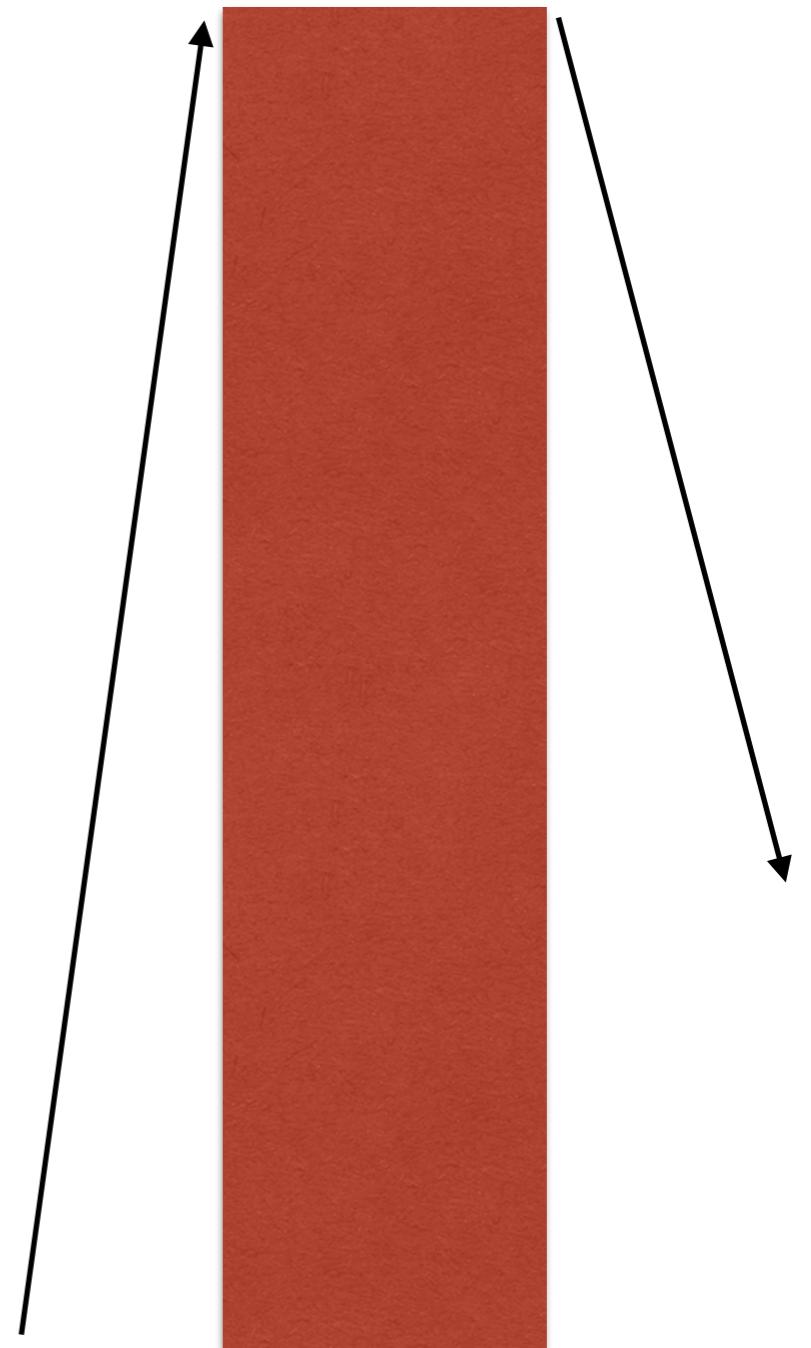
of cycles





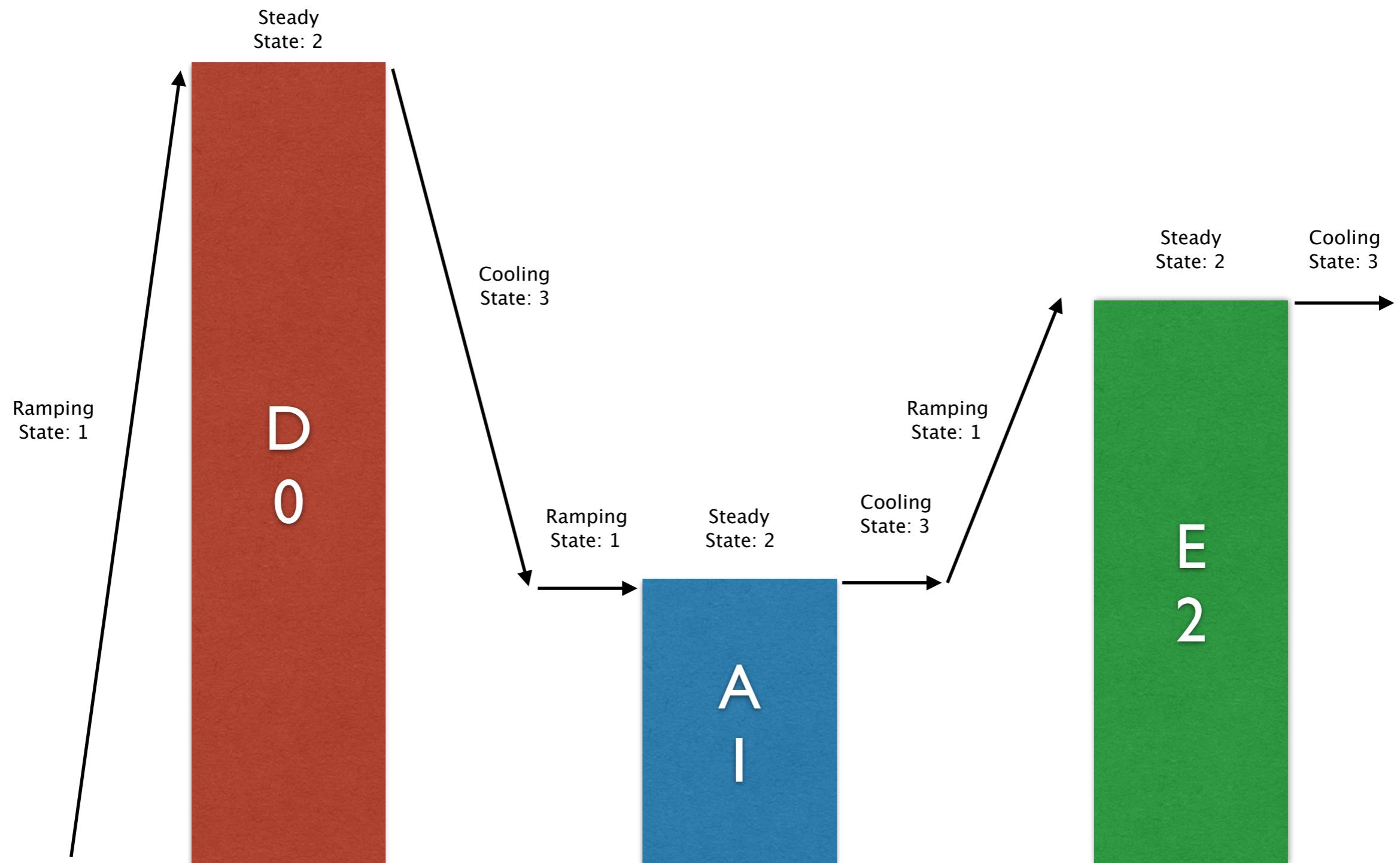
Program stages

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



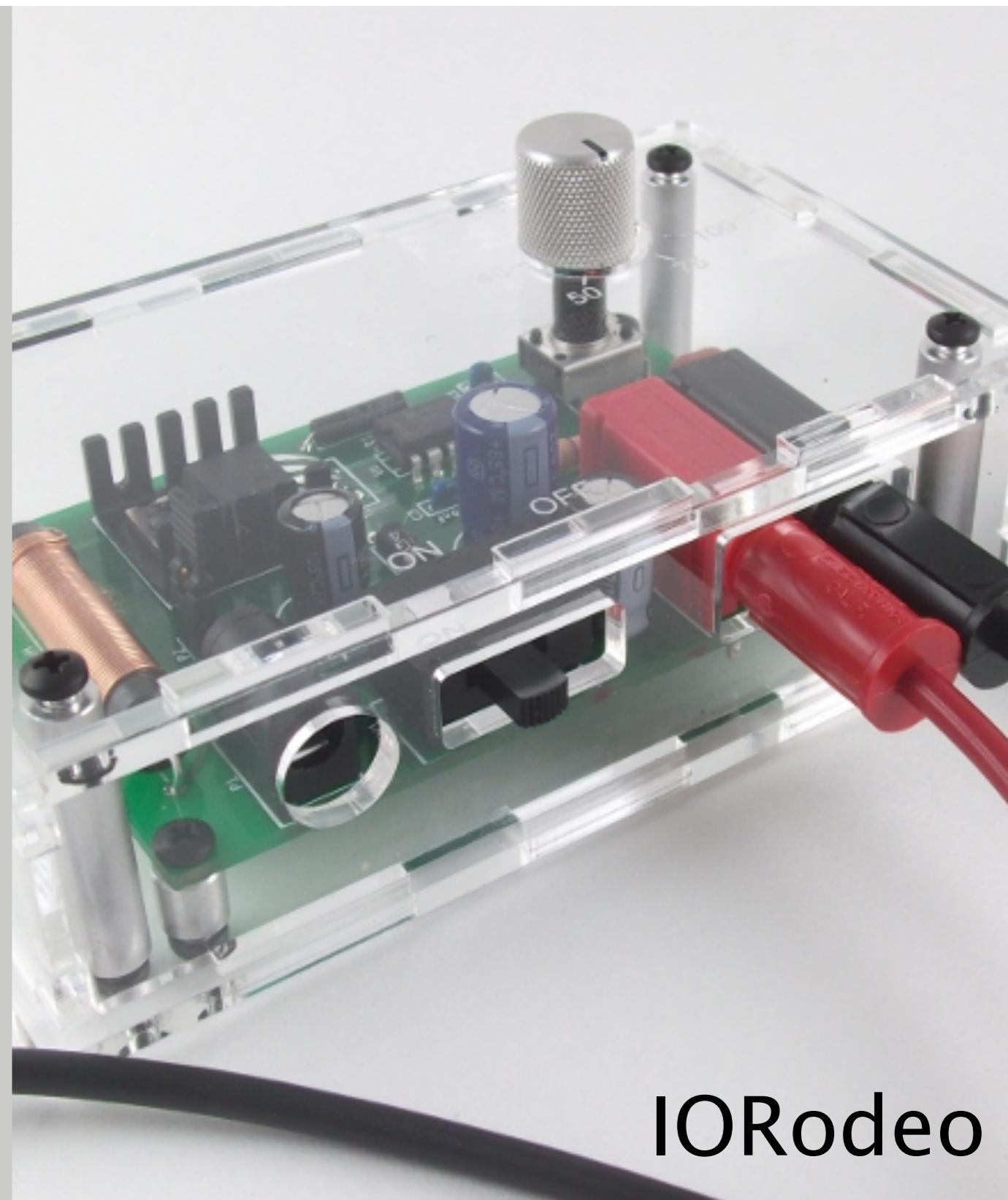
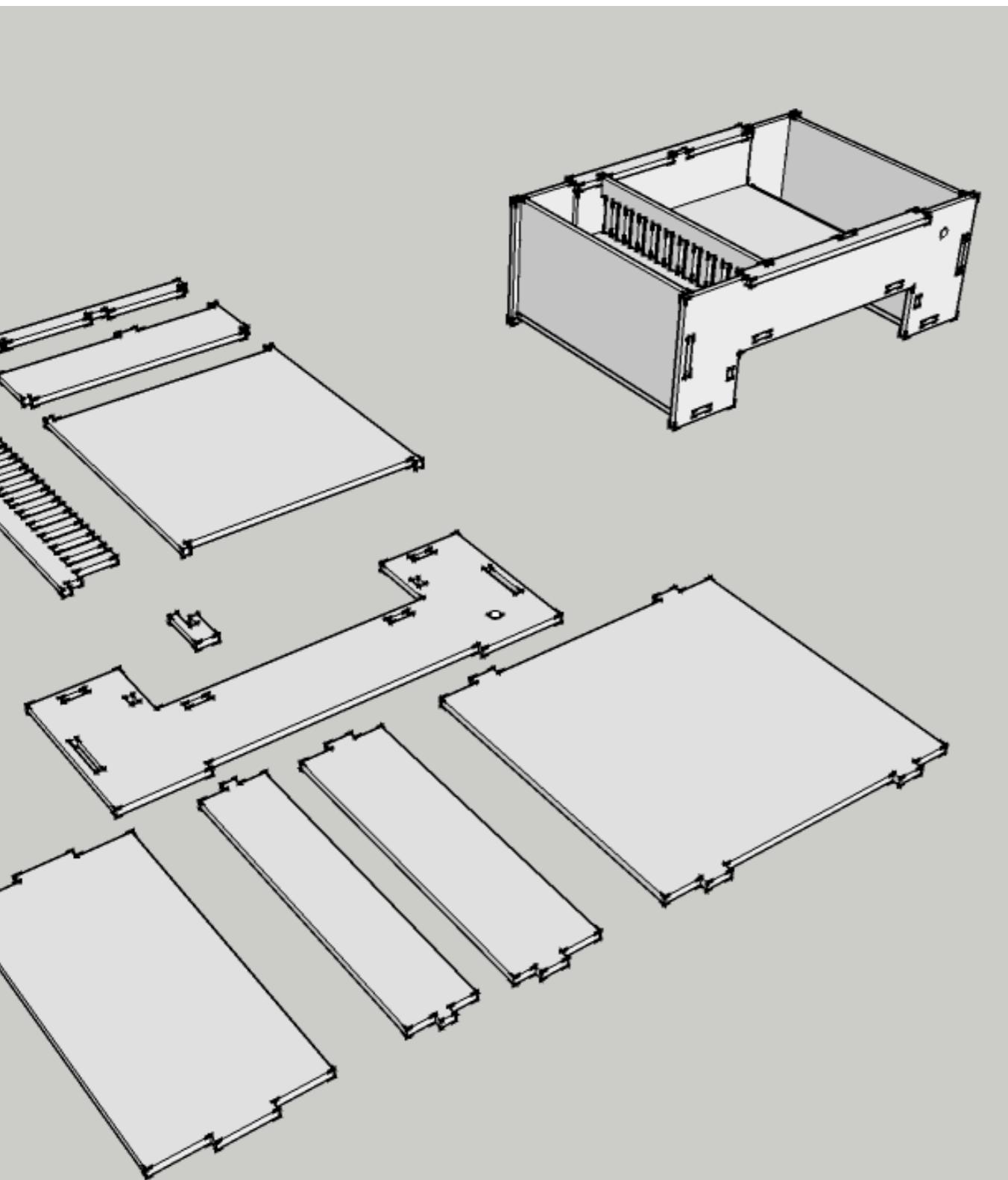


Stages and States





Gel rig and power supply



IORodeo



Bill of Materials Gel Box

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



IORodeo kit

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

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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



\$65.00

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: *

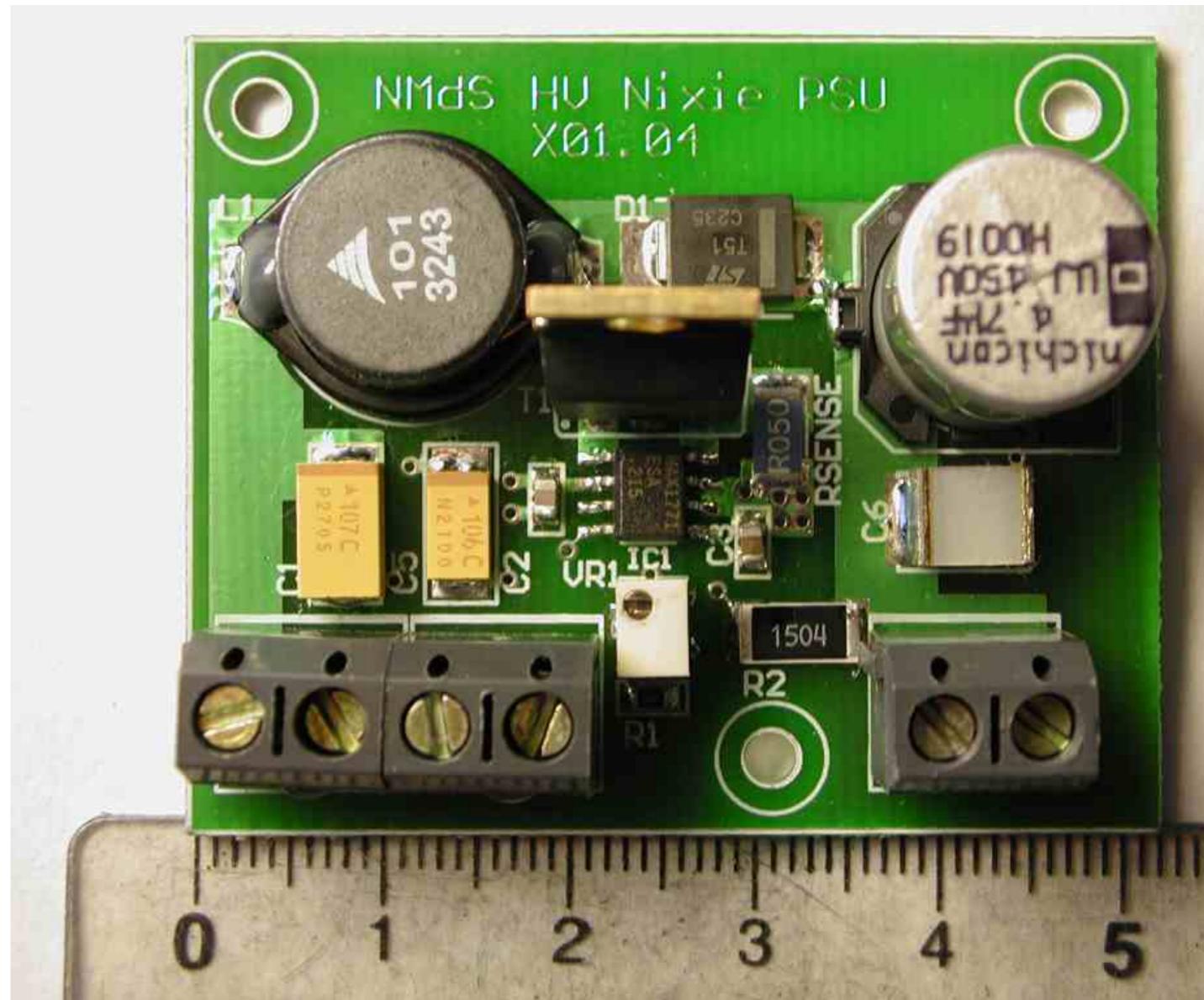
- Amber
- Blue
- Clear
- Green



Nixie Power Supply

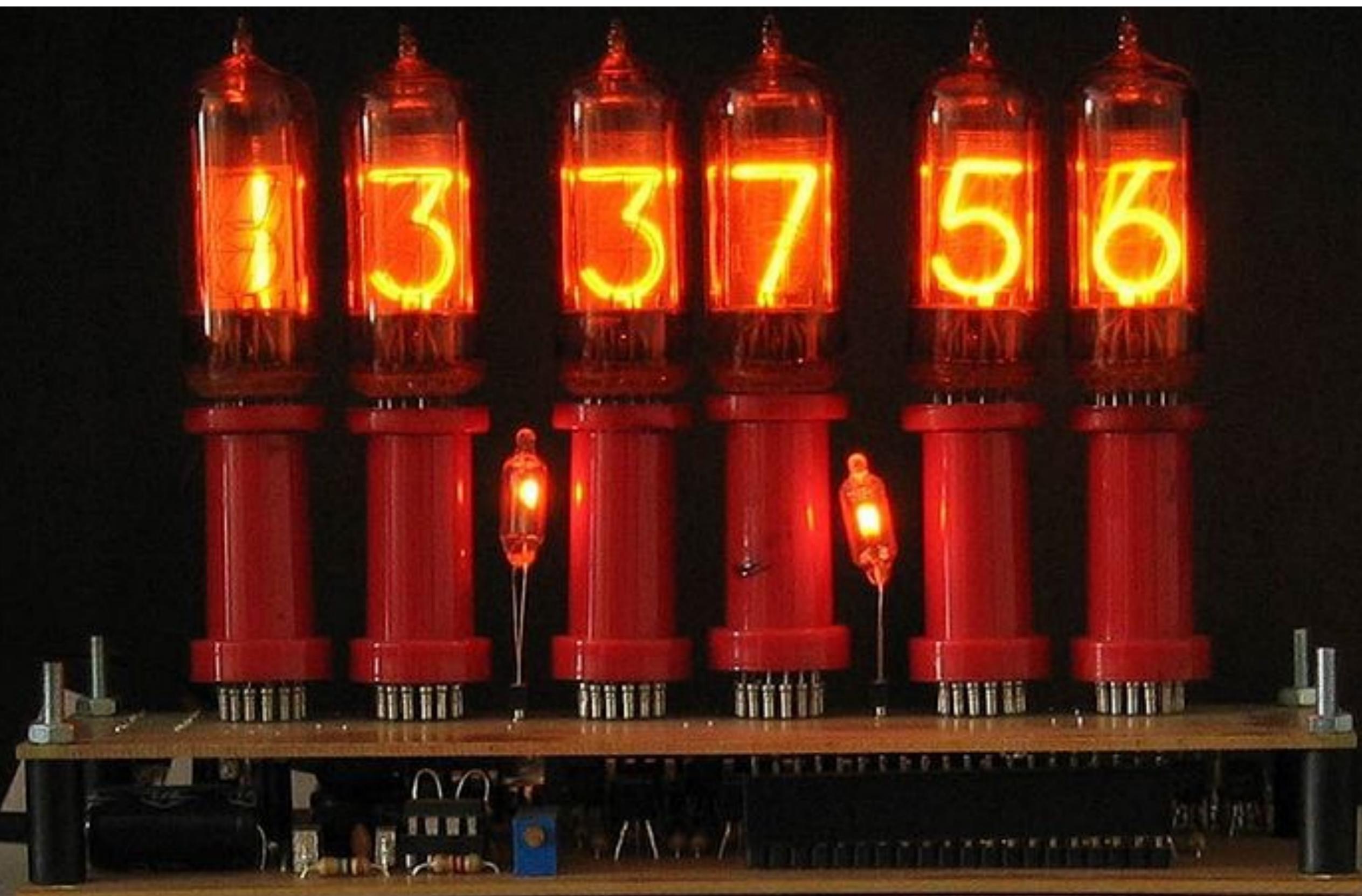
Nick De Smith

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





What's a Nixie?





Documentation



BioHack Academy

Classes Participants Discuss Organisms Repos



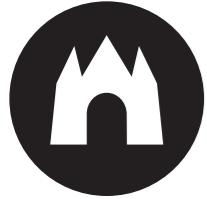
Participants

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 roland@waag.org.

- [BioClub Tokyo - Japan](#)
- [The Social Media Workgroup, University of New Mexico - USA](#)
- [Waag Society's Open Wetlab - Amsterdam](#)



Next week

- Mid term presentations
 - 5 minutes each
 - What is your idea?
 - How are you planning to do it?
 - How will it be documented?
- Send title + 1 sentence description to roland@waag.org
- And put it on your documentation page



**some
rights
reserved**