

**biohack academy**  
**waag society**

**BioHack Academy**  
**Magnetic Stirrer Design**



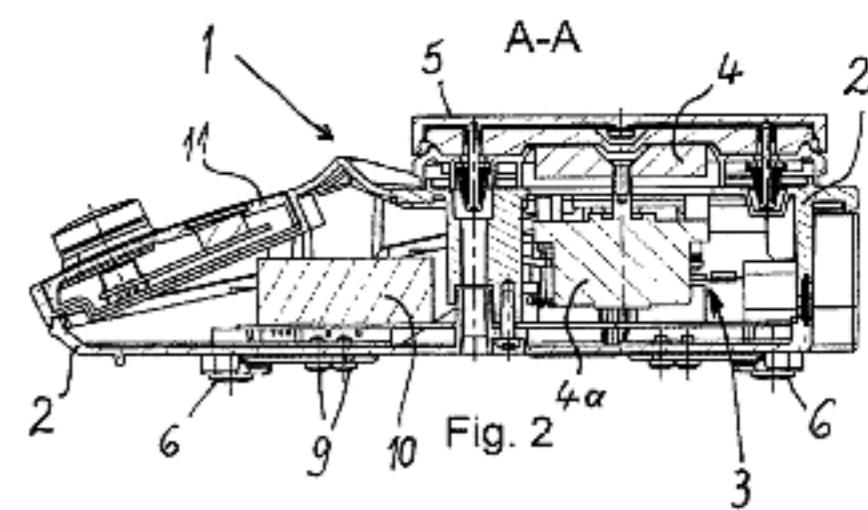
# Magnetic stirrer use

- Mixing reactor content
- Nice to have:
  - Heat the liquid



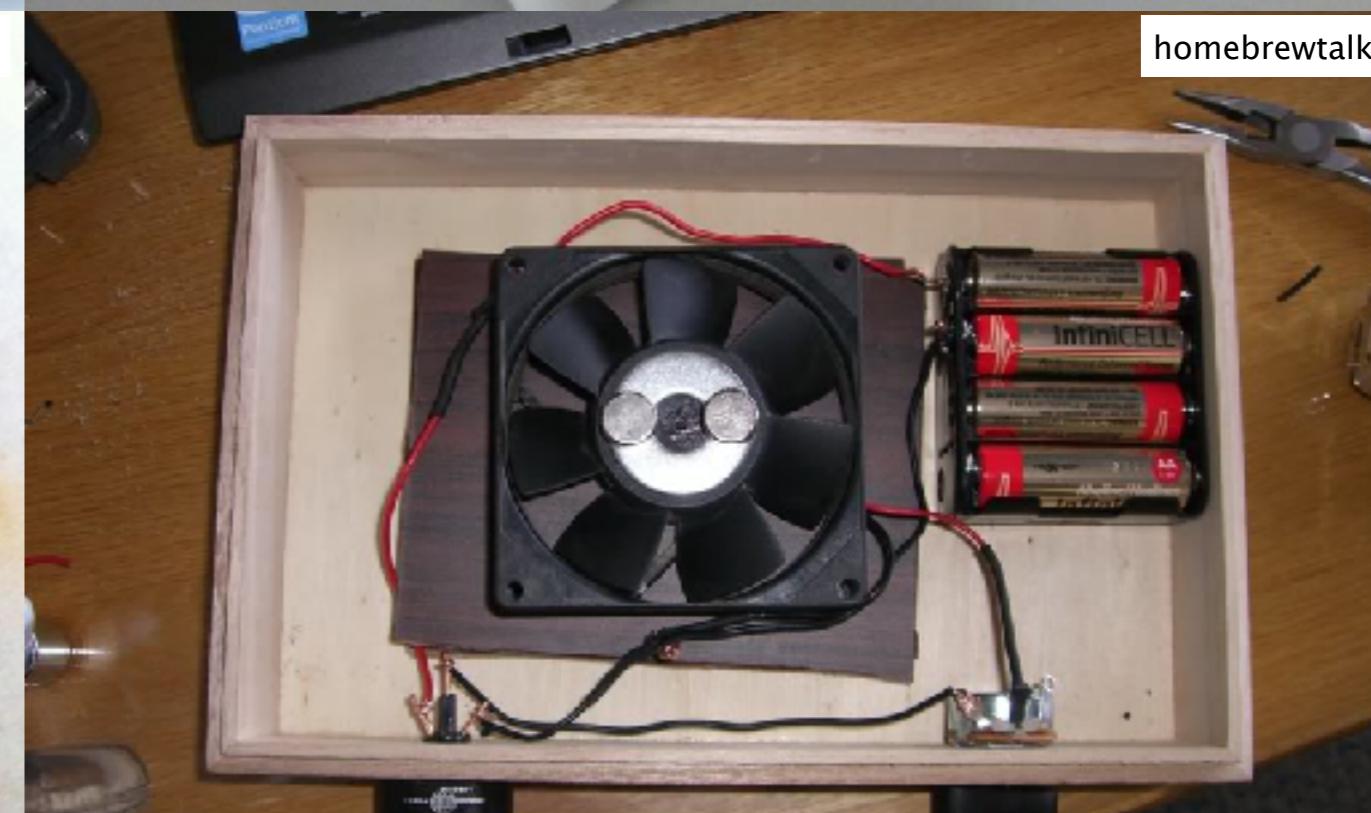
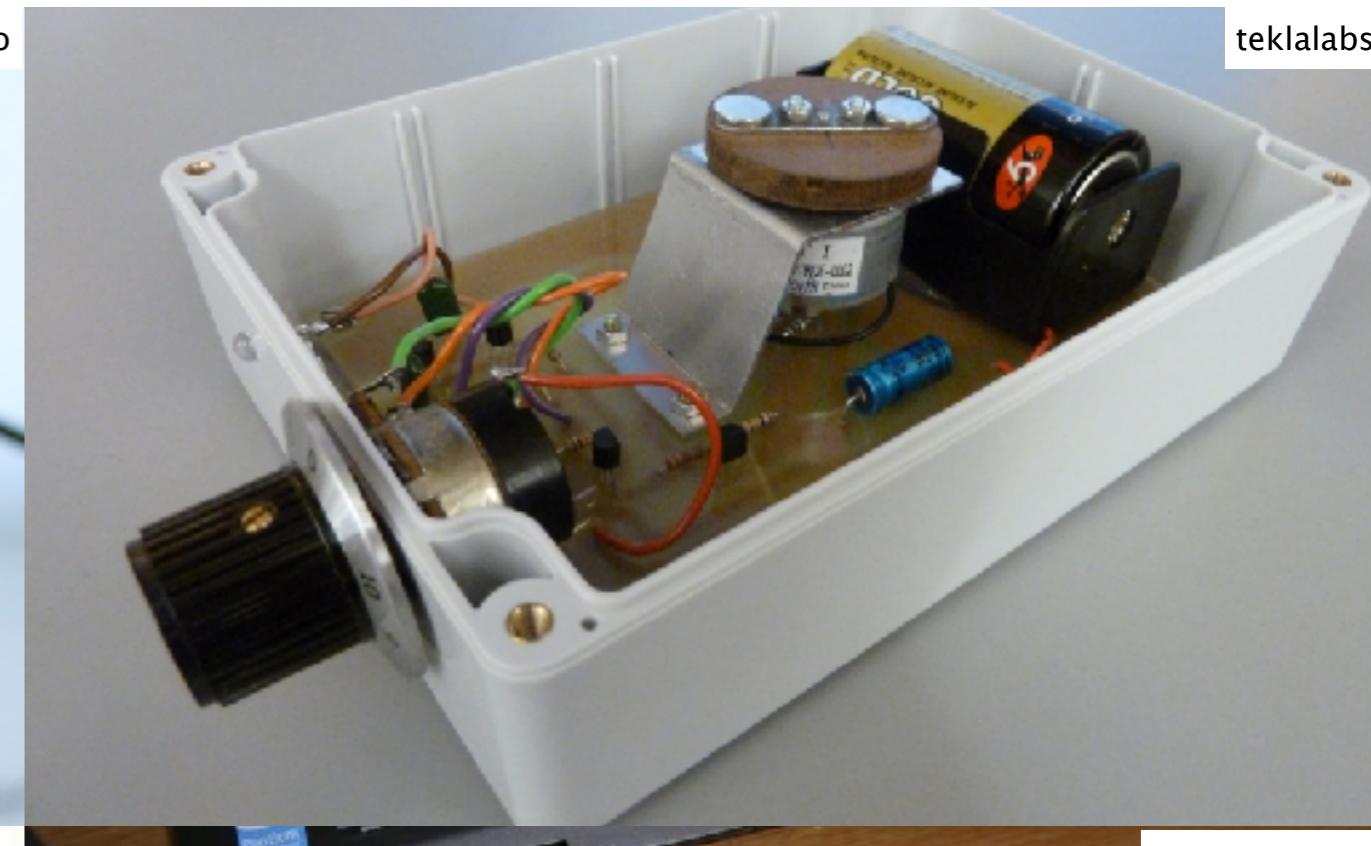
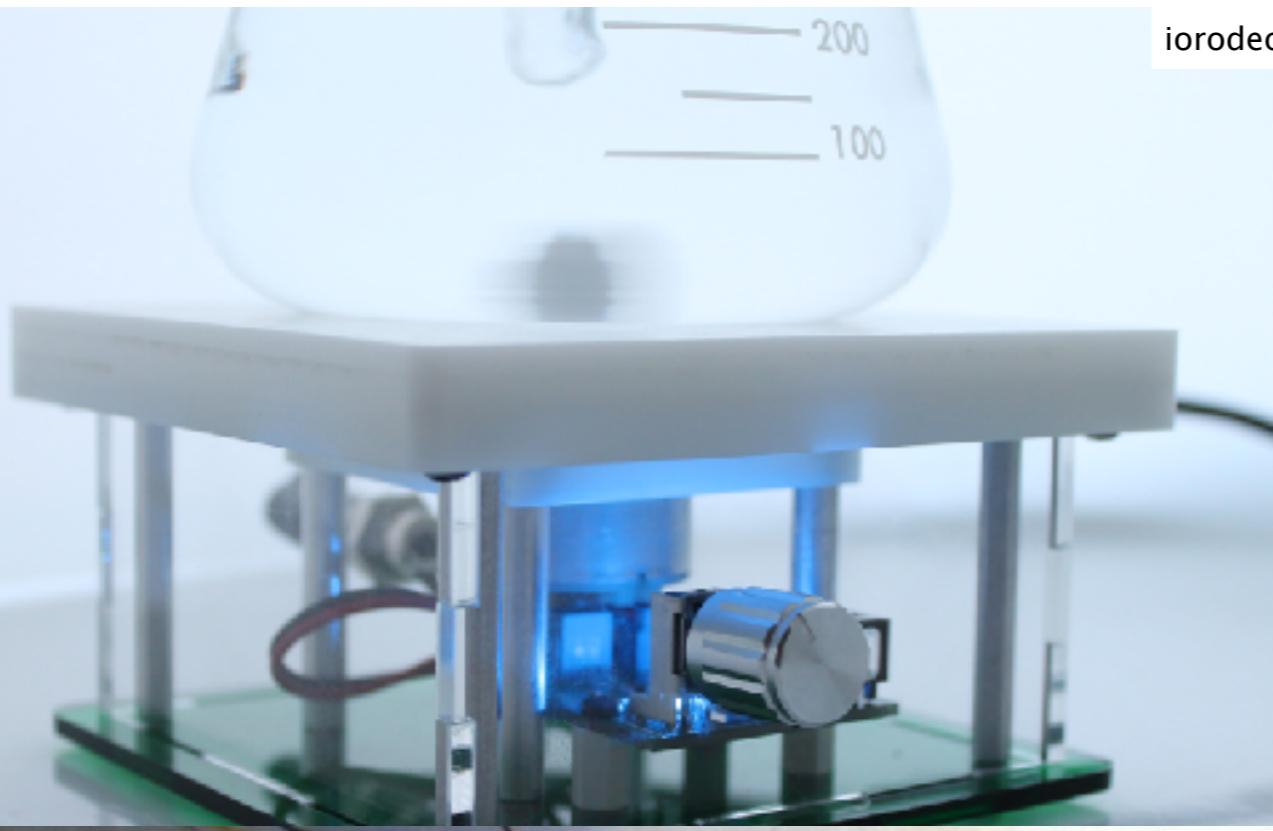


# Industry standard



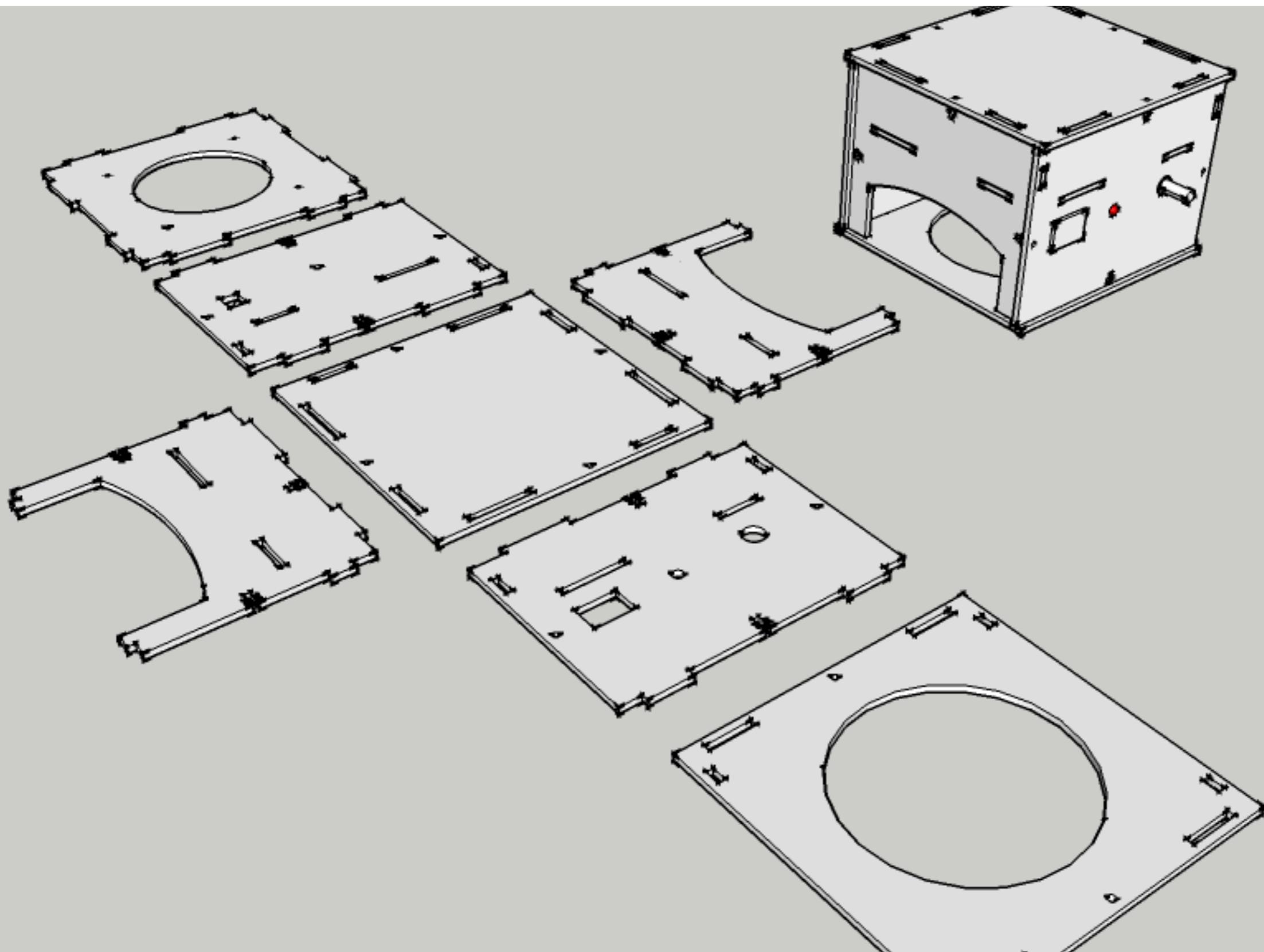


# Stirrer hacks



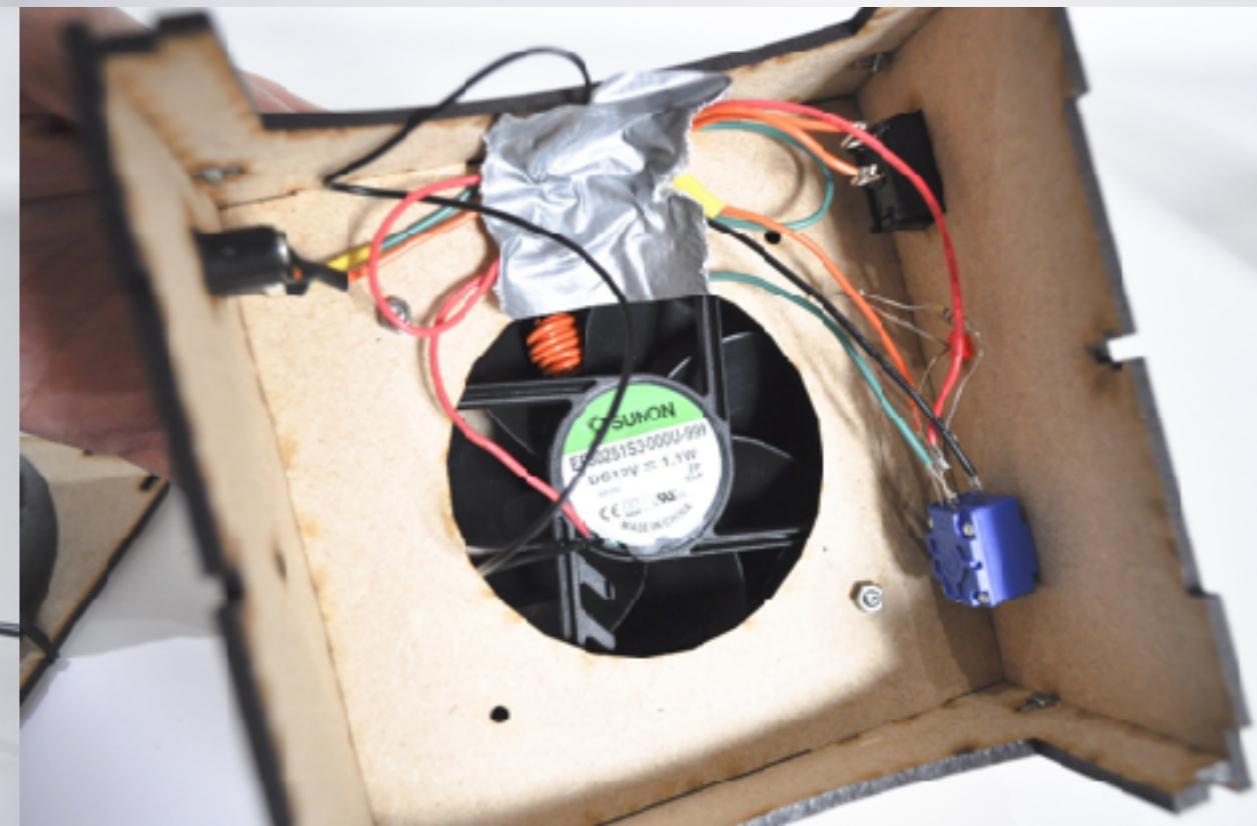
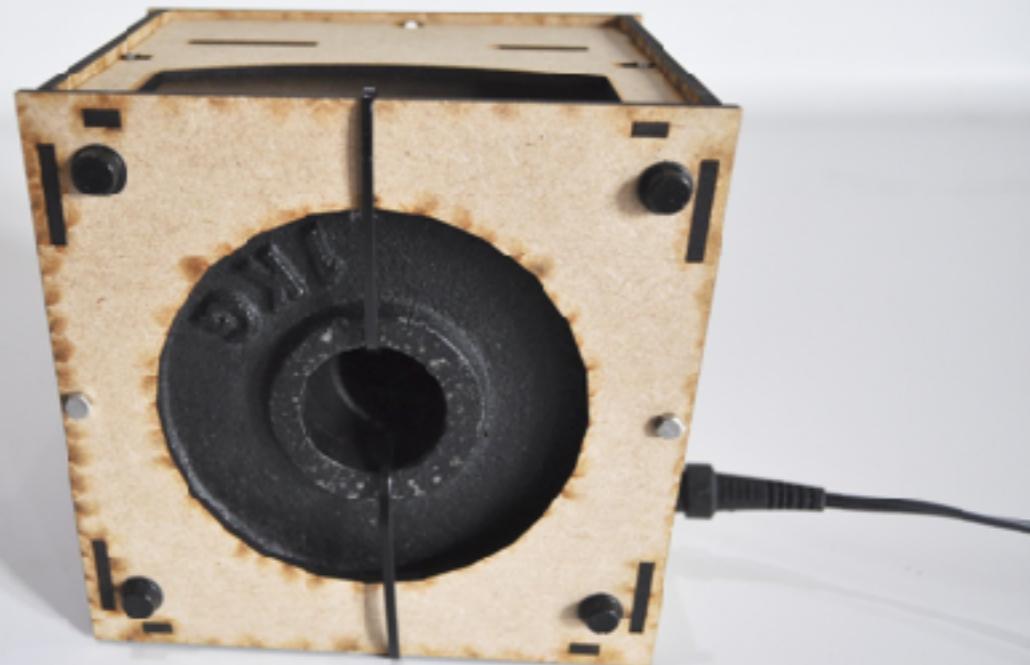


# BioHack Academy 1 Design



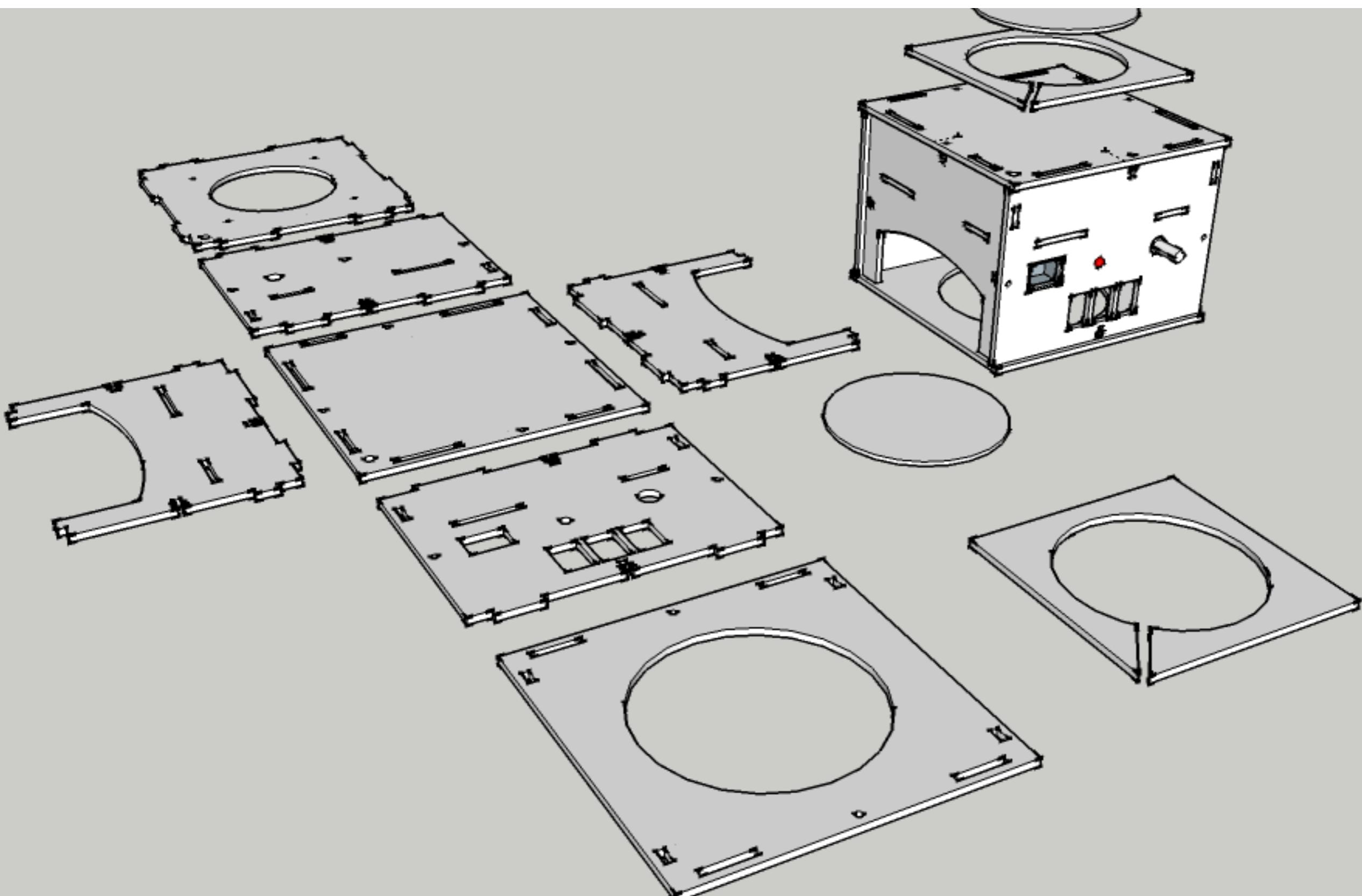


# Some pictures





# BHA 2 Design





# Some pictures



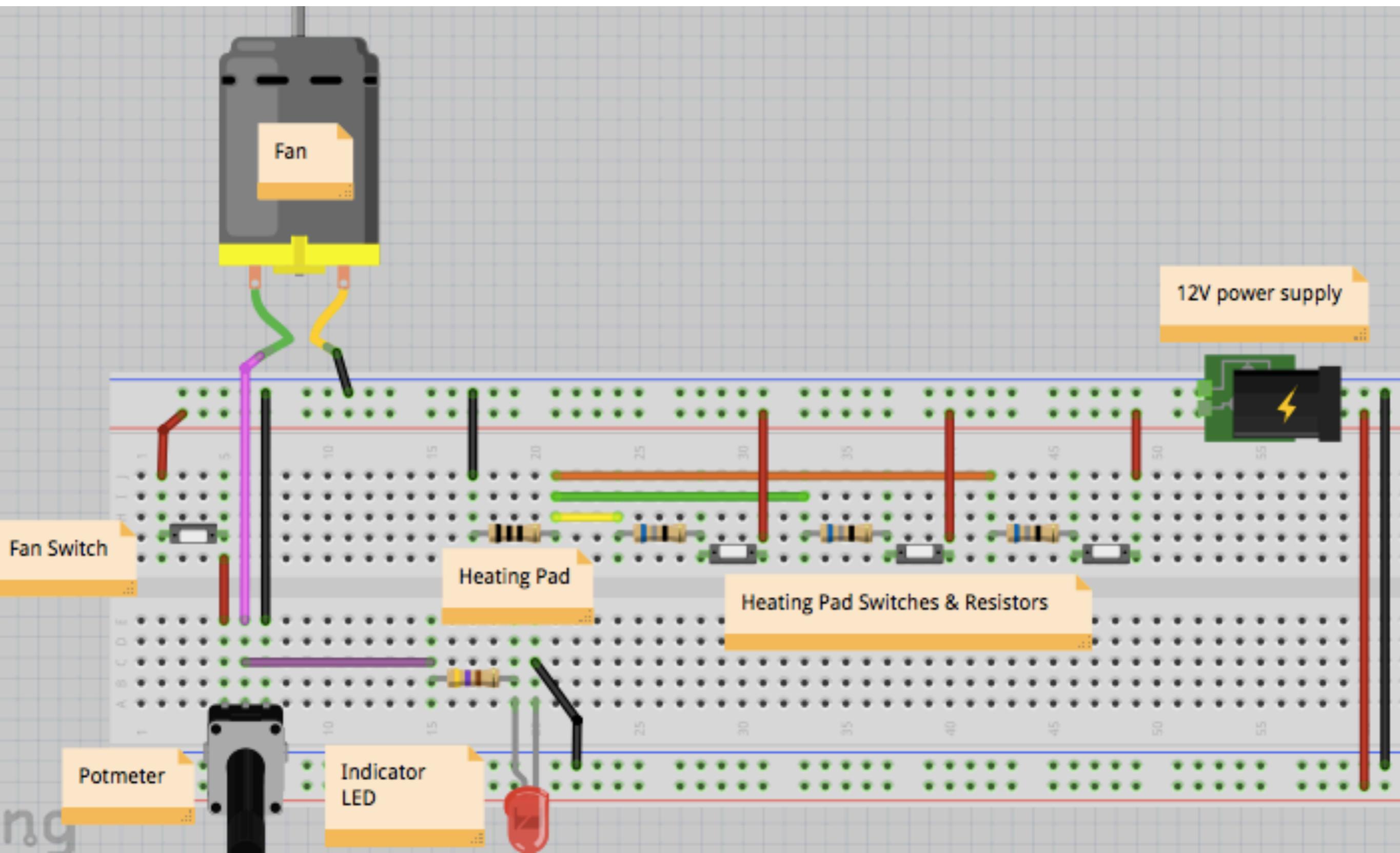


# Bill of Materials

#	Amount	Description
1	1	Fan
2	2	Permanent magnets
3	1	Potentiometer 100 ohm 2W
4	1	Knob
5	4	Power switch
6	1	Power jack
7	1	Power supply
8	1	Red LED
9	1	470 ohm resistor
10	1	Magnetic stirring rod
11	1	Heating foil
12	4	Rubber feet
13	3	68 Ohm 5W power resistors

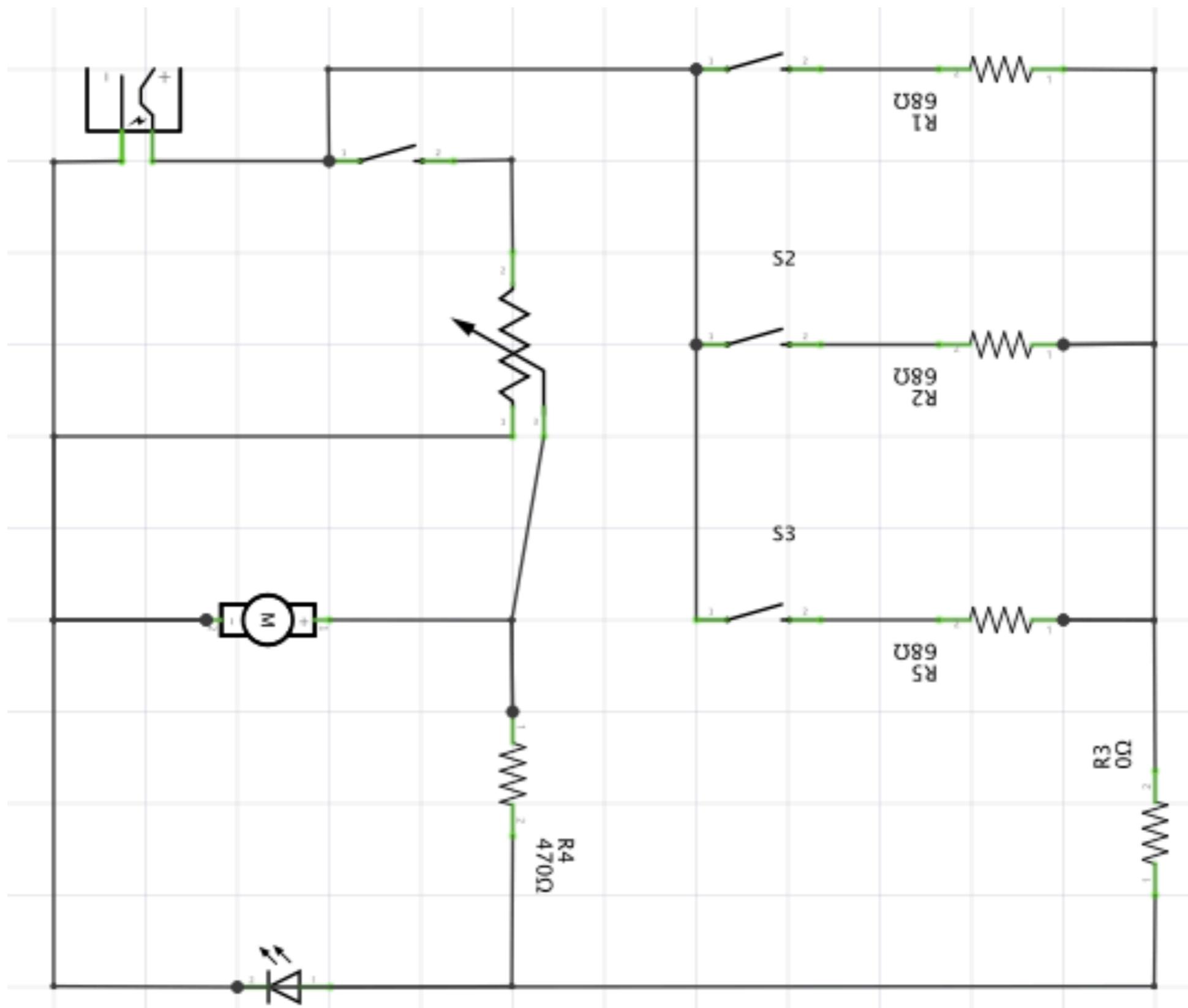


# Wiring of the stirrer





# Wiring scheme of the stirrer





# Choosing a potmeter

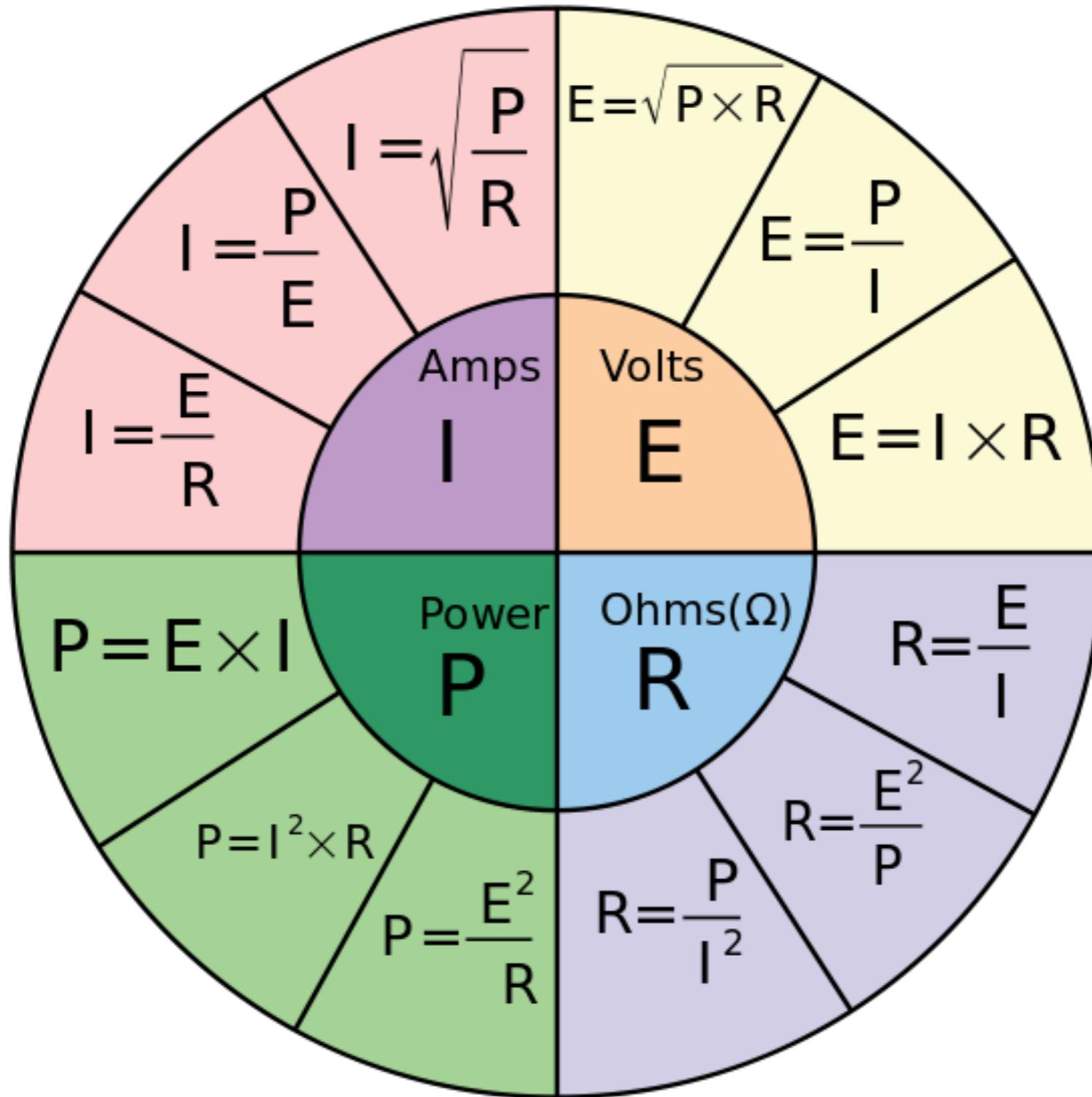
- 0.15 Ampere fan
- Resistance Fan = Voltage / Current
- Resistance Fan =  
 $12 / 0.15 =$   
80 Ohm
- So 100 Ohm to be sure



Farnell



# Ohm's Law





# Choosing LED resistor

- LED forward voltage = 2.4
- Max current = 20 mA
- $R = V / I$
- $R = (12 - 2.4) / 0.02 = 480 \text{ ohm}$
- 470 ohm will be fine too



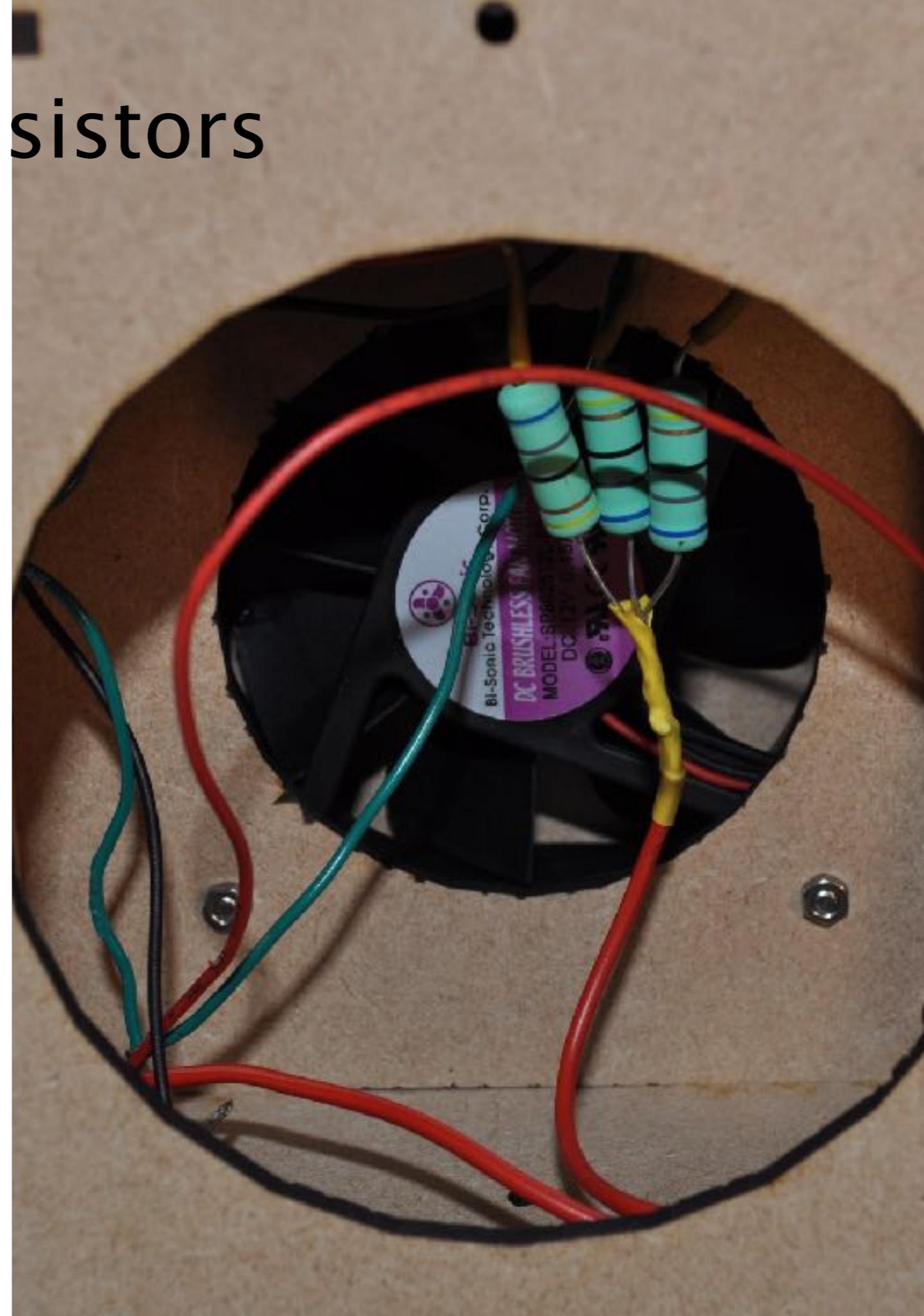
Magnus Manske – CC-BY-SA 2.0



# Heating Pad Resistors

- 68 Ohm
- 5 W
- 12 V

Current = Power /  
Voltage =  $5 / 12 = 0.41$   
Amps





# Heating Pad

- 12 Volts
- 22 Watts
- 0.41 Amps
- Power = Voltage x Current = 4.9 Watts



Conrad



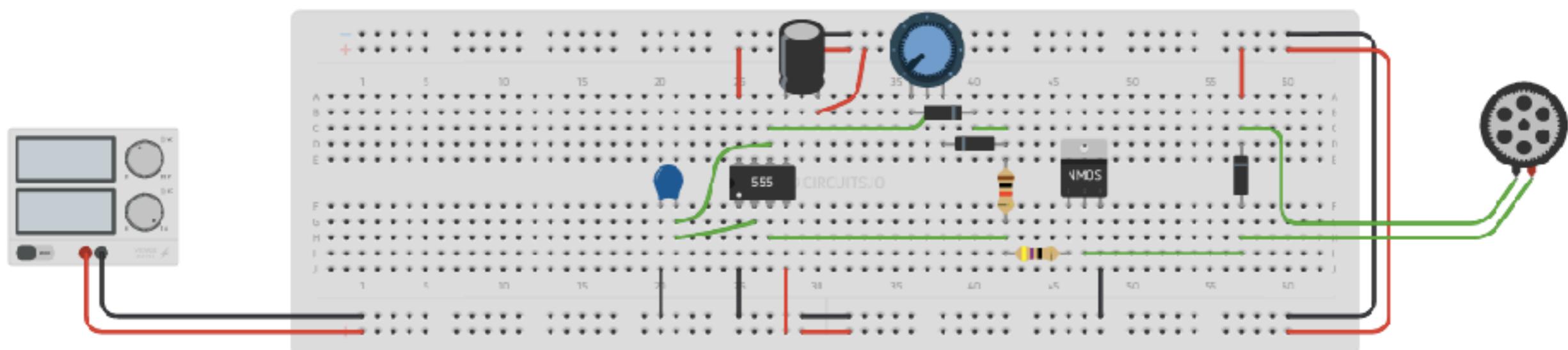
# Alternative design

<https://circuits.io/circuits/3608973-dc-fan-controller-555#schematic>

DC Fan Controller 555 | Electronics Lab

▶ Start Simulation

Code Editor





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