

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

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



# Magnetic stirrer use

- Mixing reactor content
- Mix solutions
- speeding up reactions
  
- Nice to have:
  - Heat the liquid





# Mixing / stirring



CC SA-BY 3.0 Lilly M



CC-BY 3.0 Karel Schmiedberger



CC BY-SA Zephyris





# Magnetic stirrer turned 100!

1,242,493.

APPLICATION FILED JAN. 12, 1917.

Patented Oct. 9, 1917.  
2 SHEETS—SHEET 2.

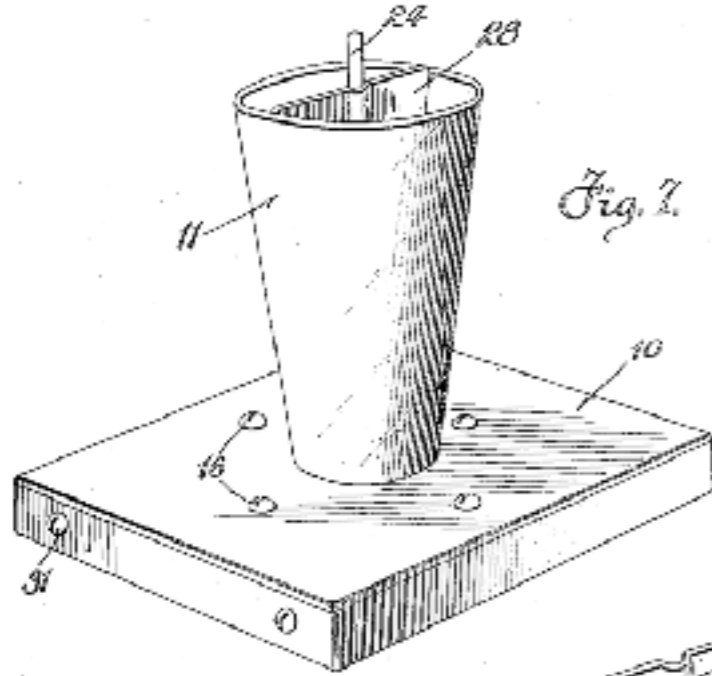


Fig. 2.

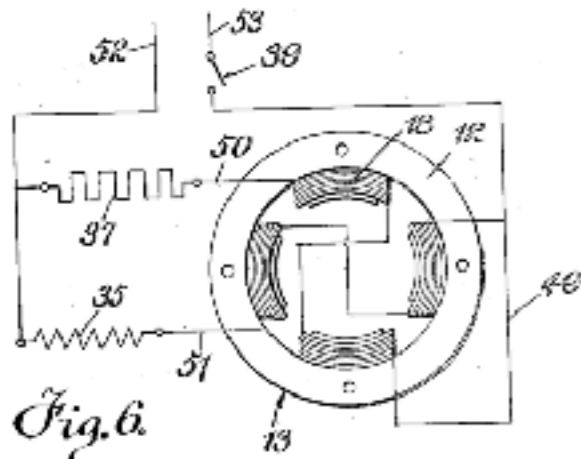


Fig. 6.

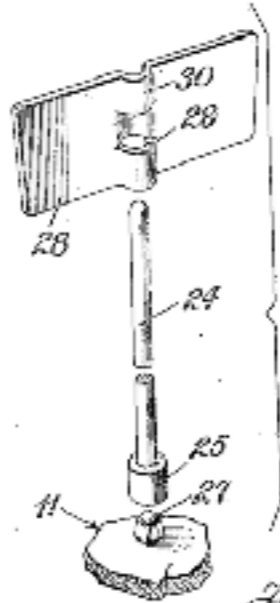


Fig. 3.

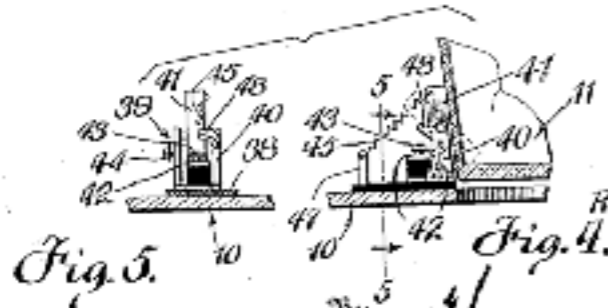


Fig. 5.

Fig. 4.

Inventor  
R. H. Stringham

1,242,493.

R. H. STRINGHAM,  
ELECTRICAL DRINK MIXER,  
APPLICATION FILED JAN. 12, 1917.

Patented Oct. 9, 1917.  
2 SHEETS—SHEET 1.

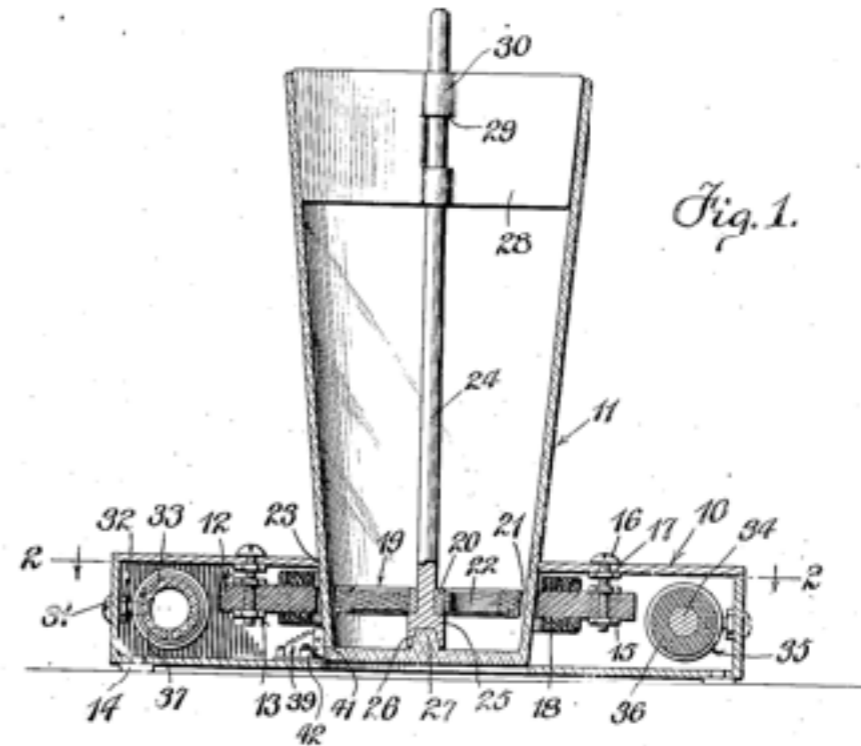


Fig. 1.

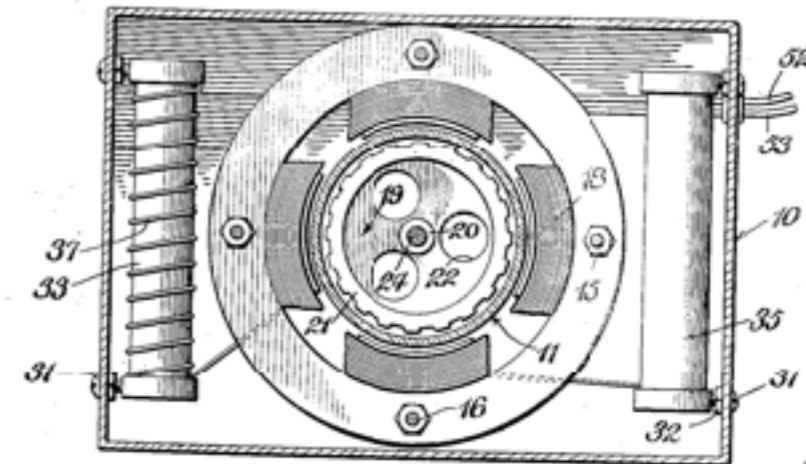
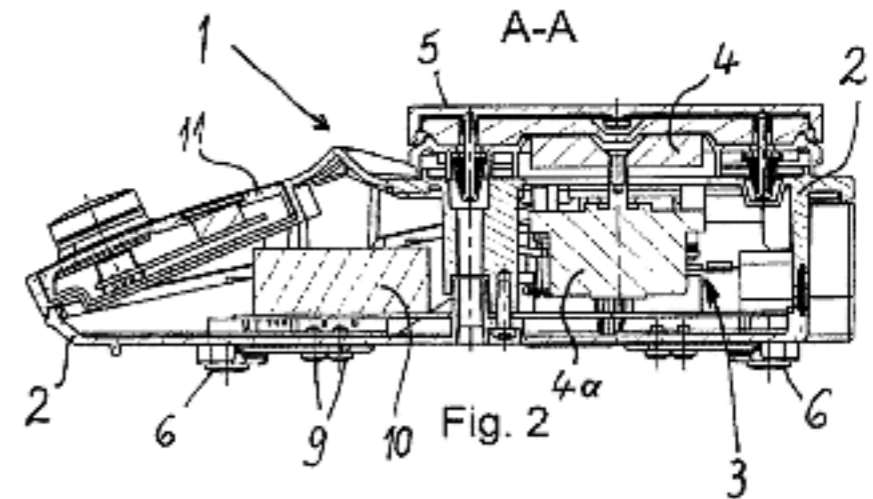


Fig. 2.

Inventor  
R. H. Stringham

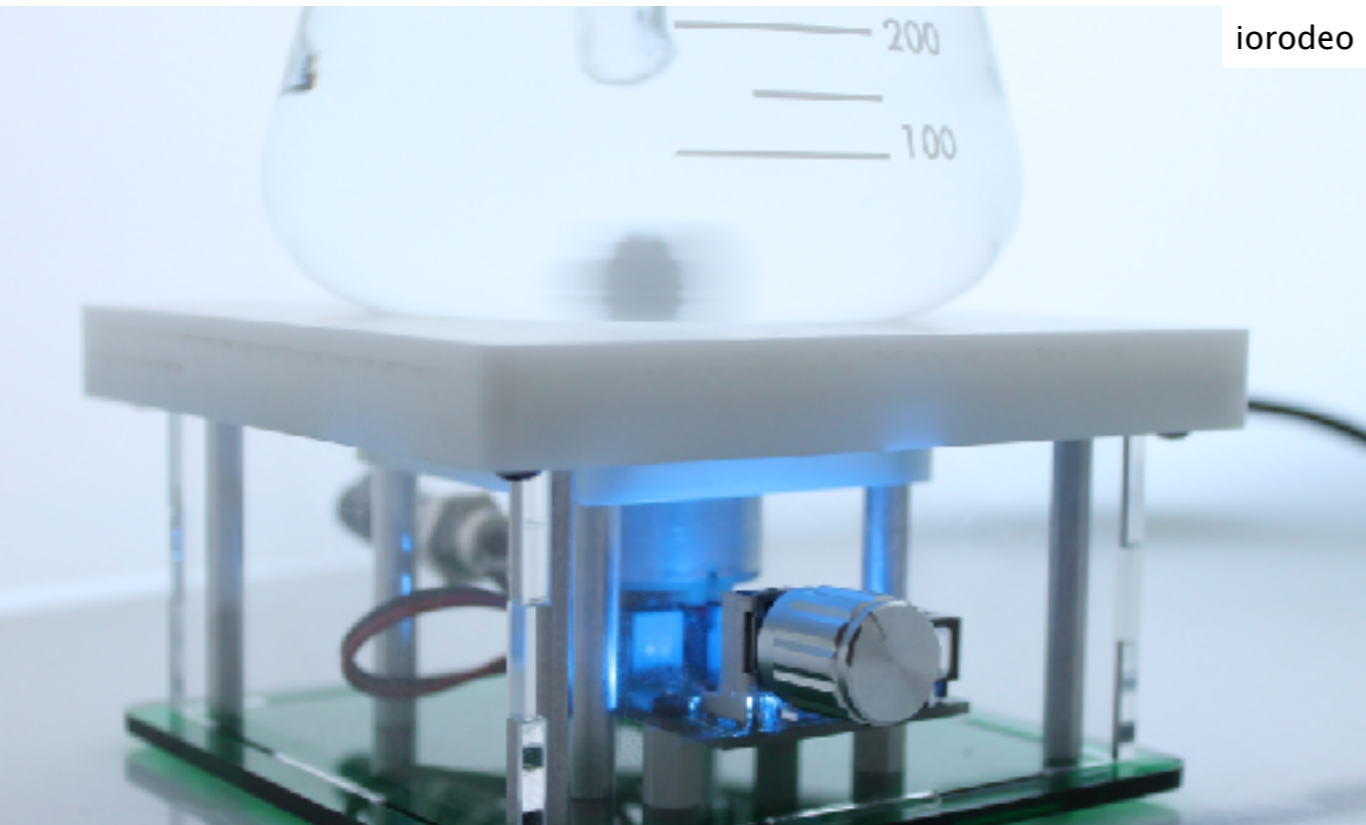


# Industry standard

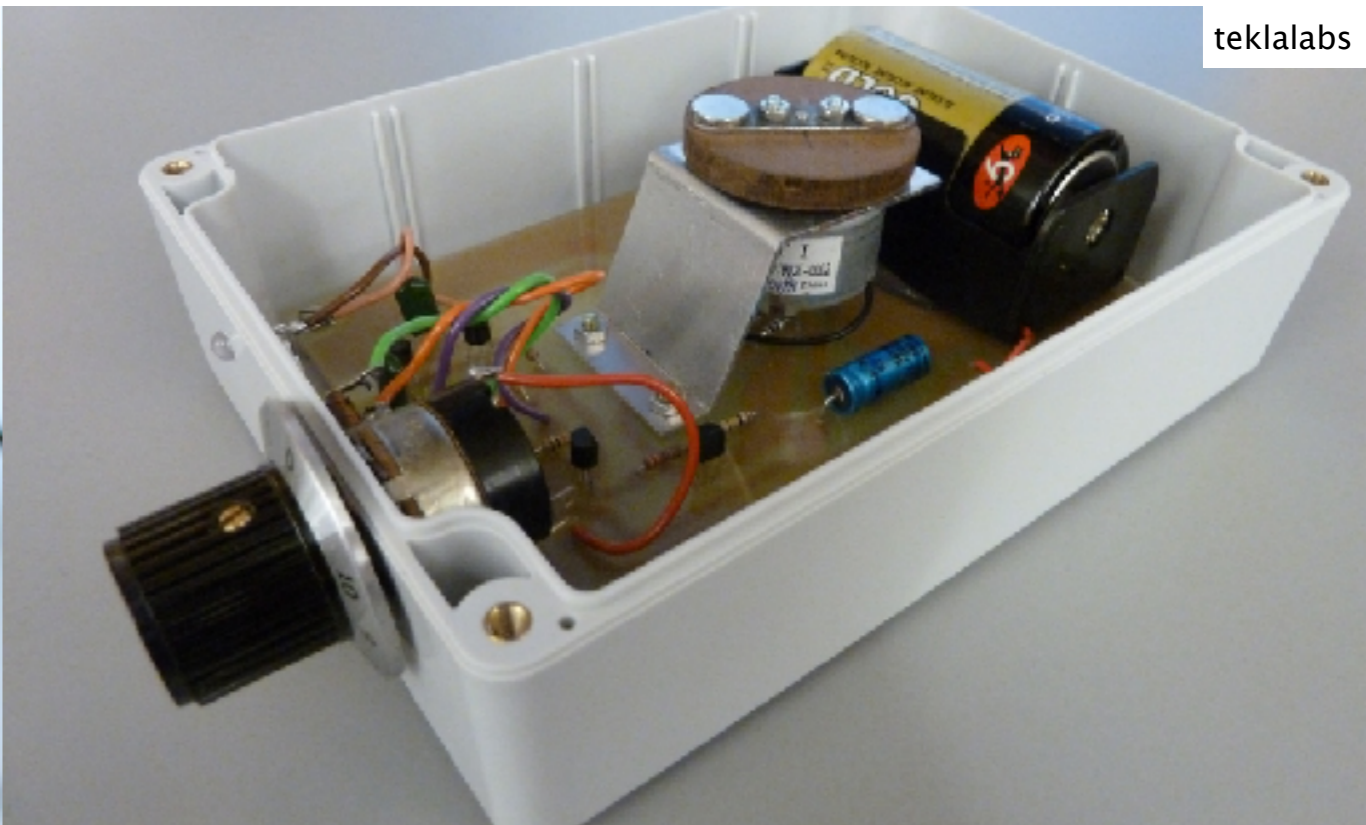




# Stirrer hacks



iorodeo



teklalabs



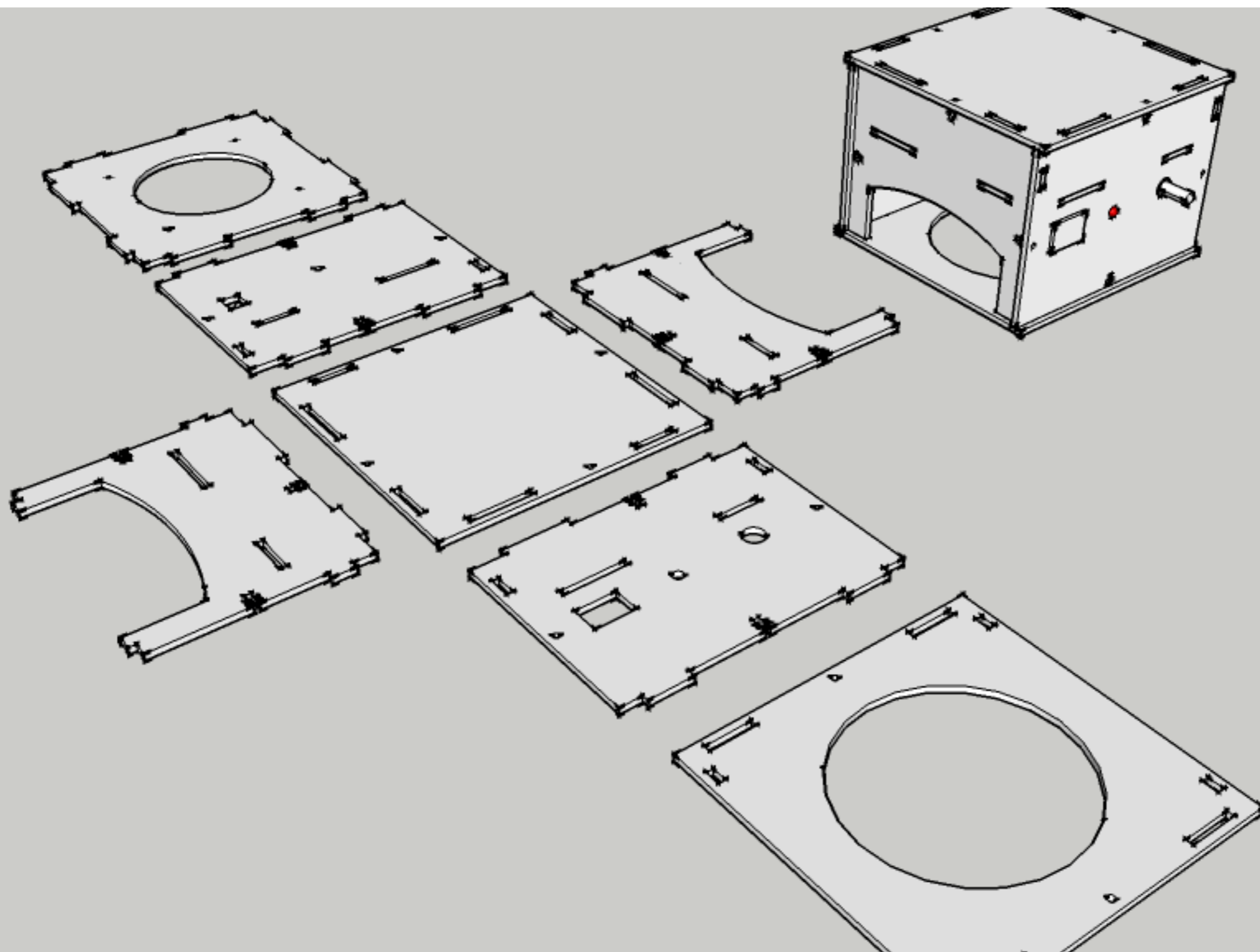
azoox



homebrewtalk

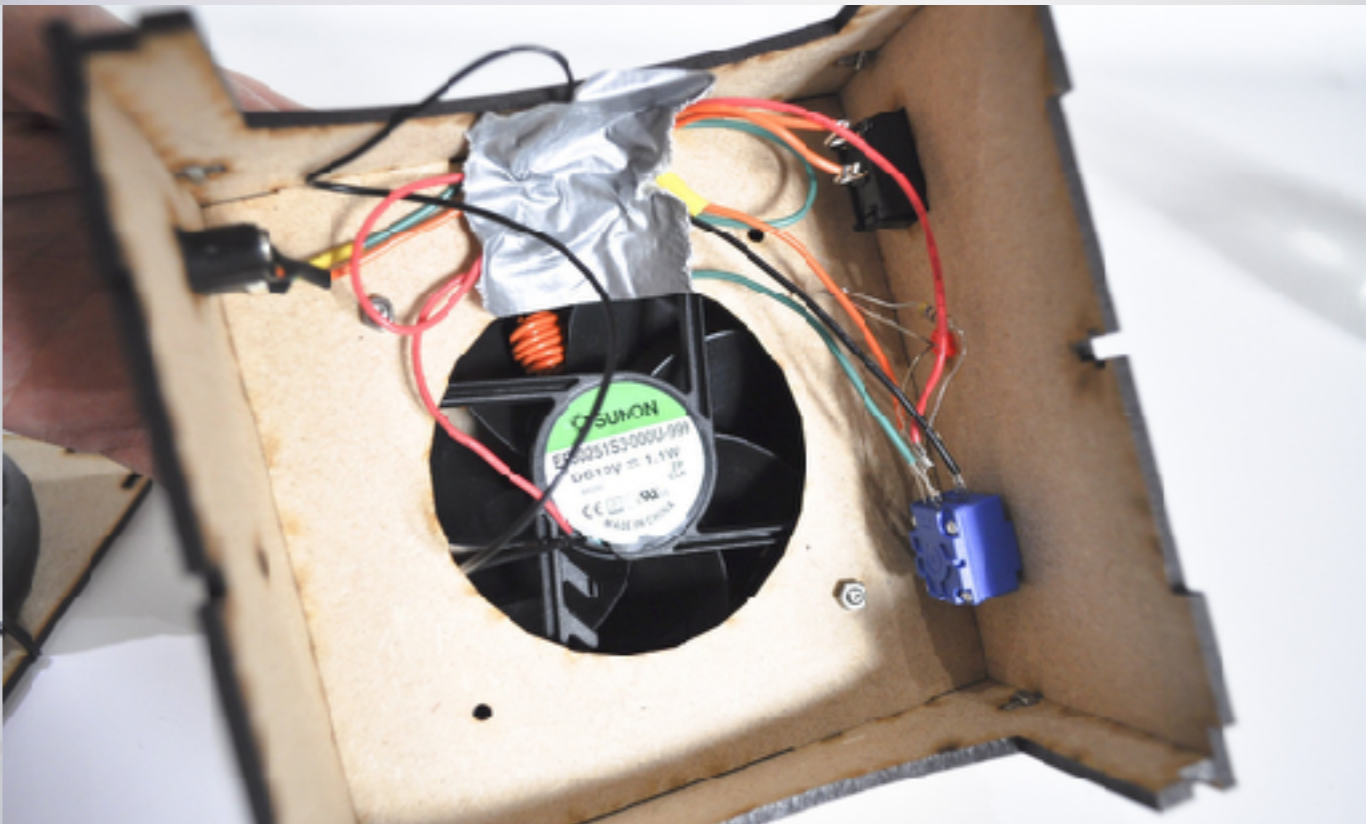


# BioHack Academy 1 Design





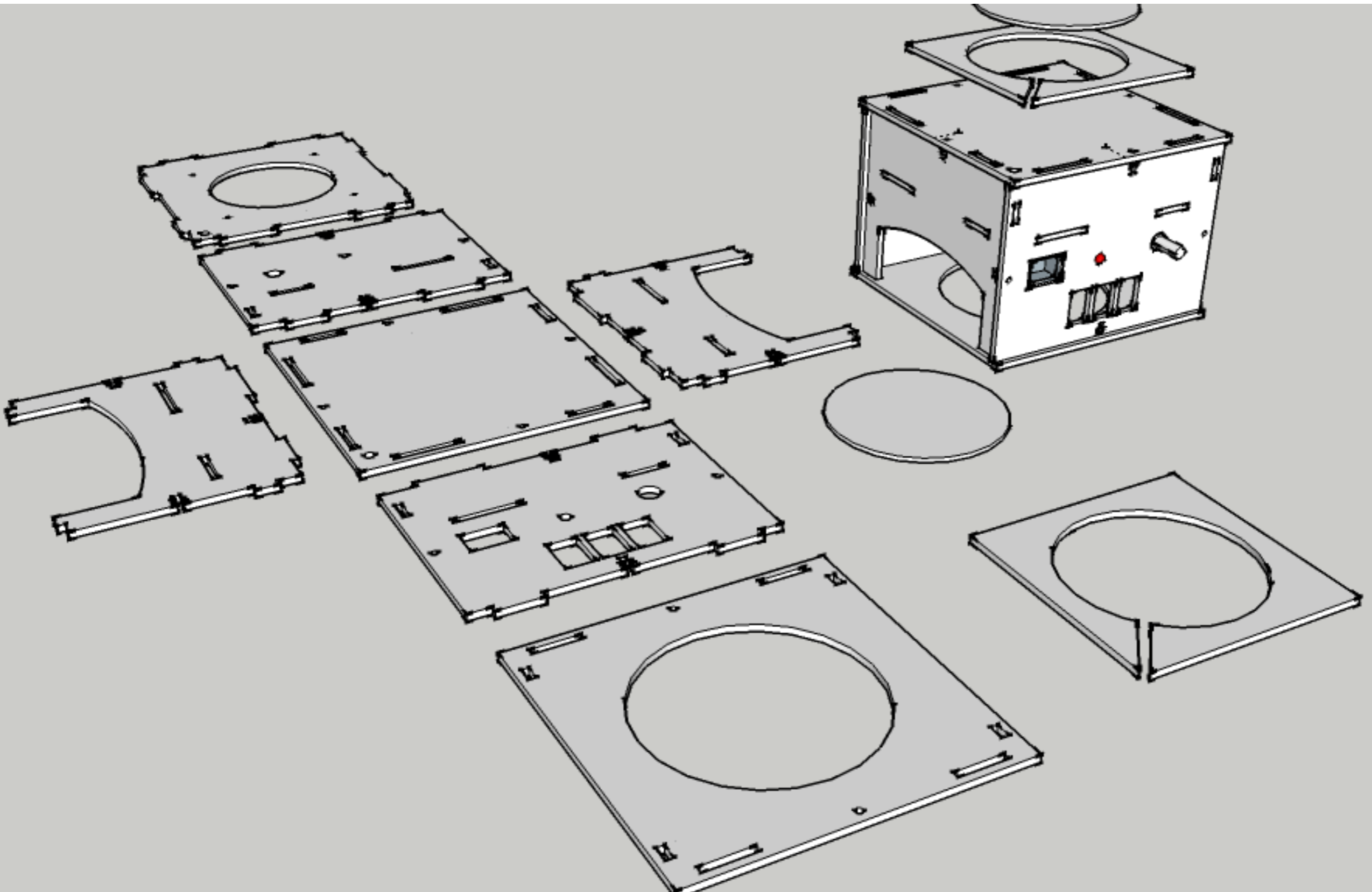
# Some pictures





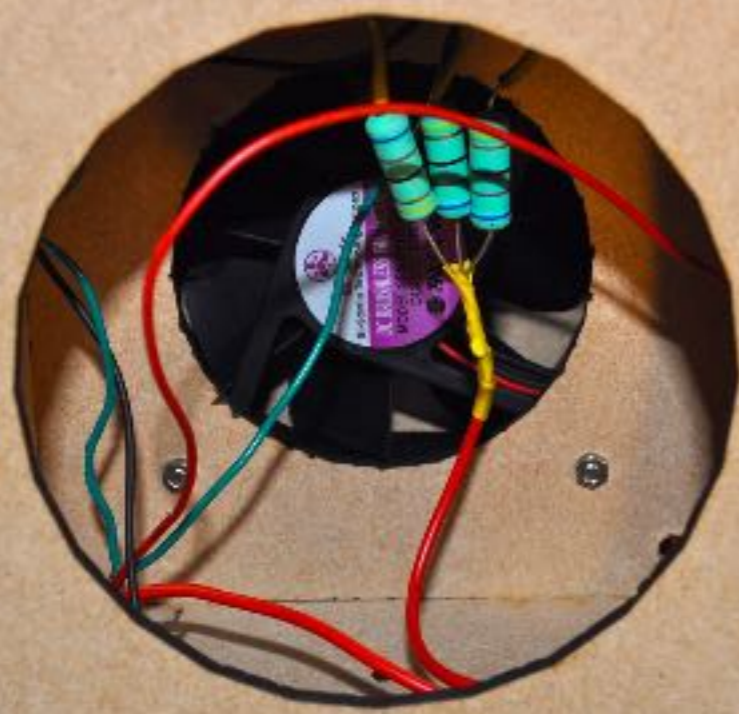


# BHA 2 Design





# Some pictures



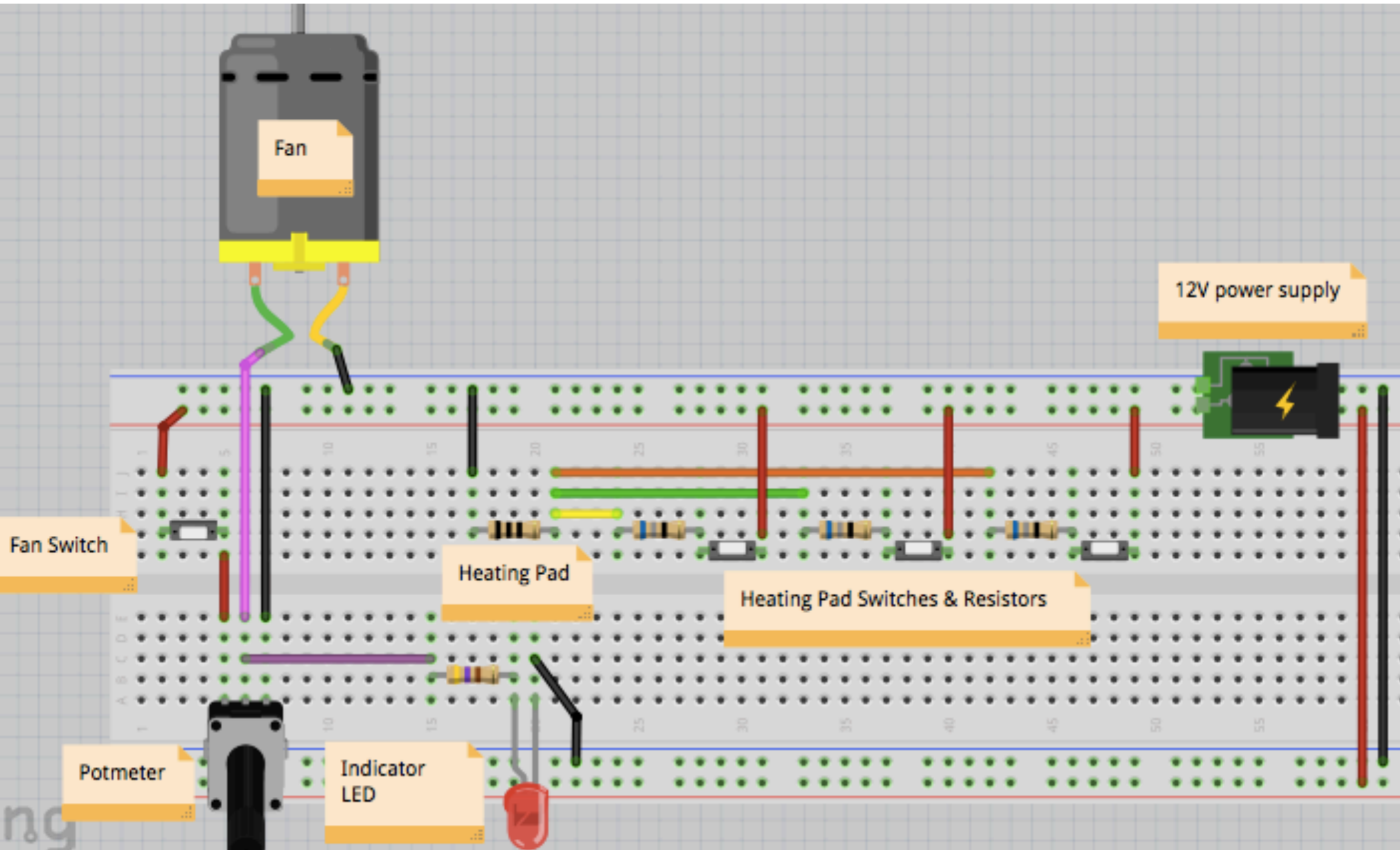


# Bill of Materials

#	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

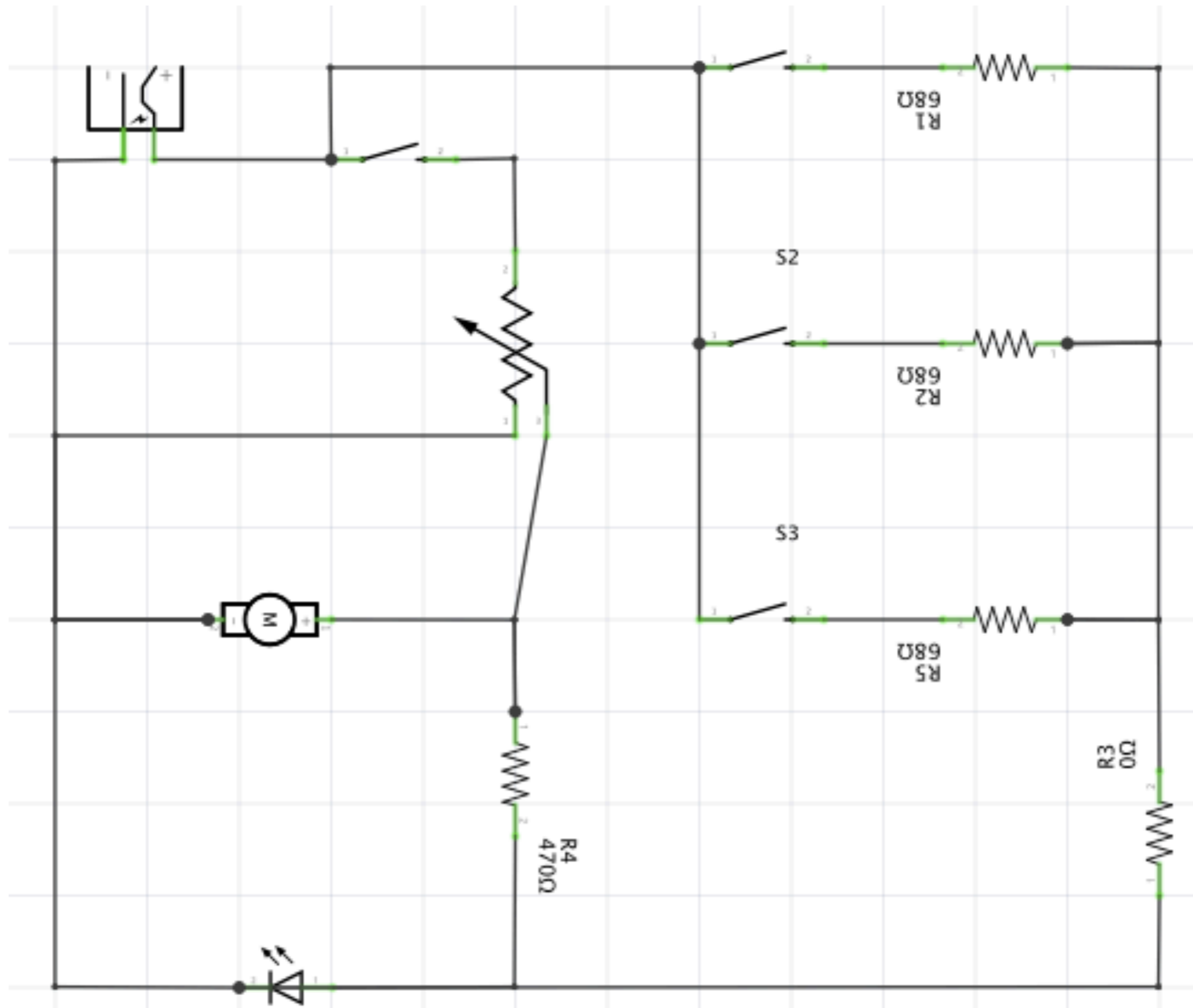


# Wiring of the stirrer





# Wiring scheme of the stirrer





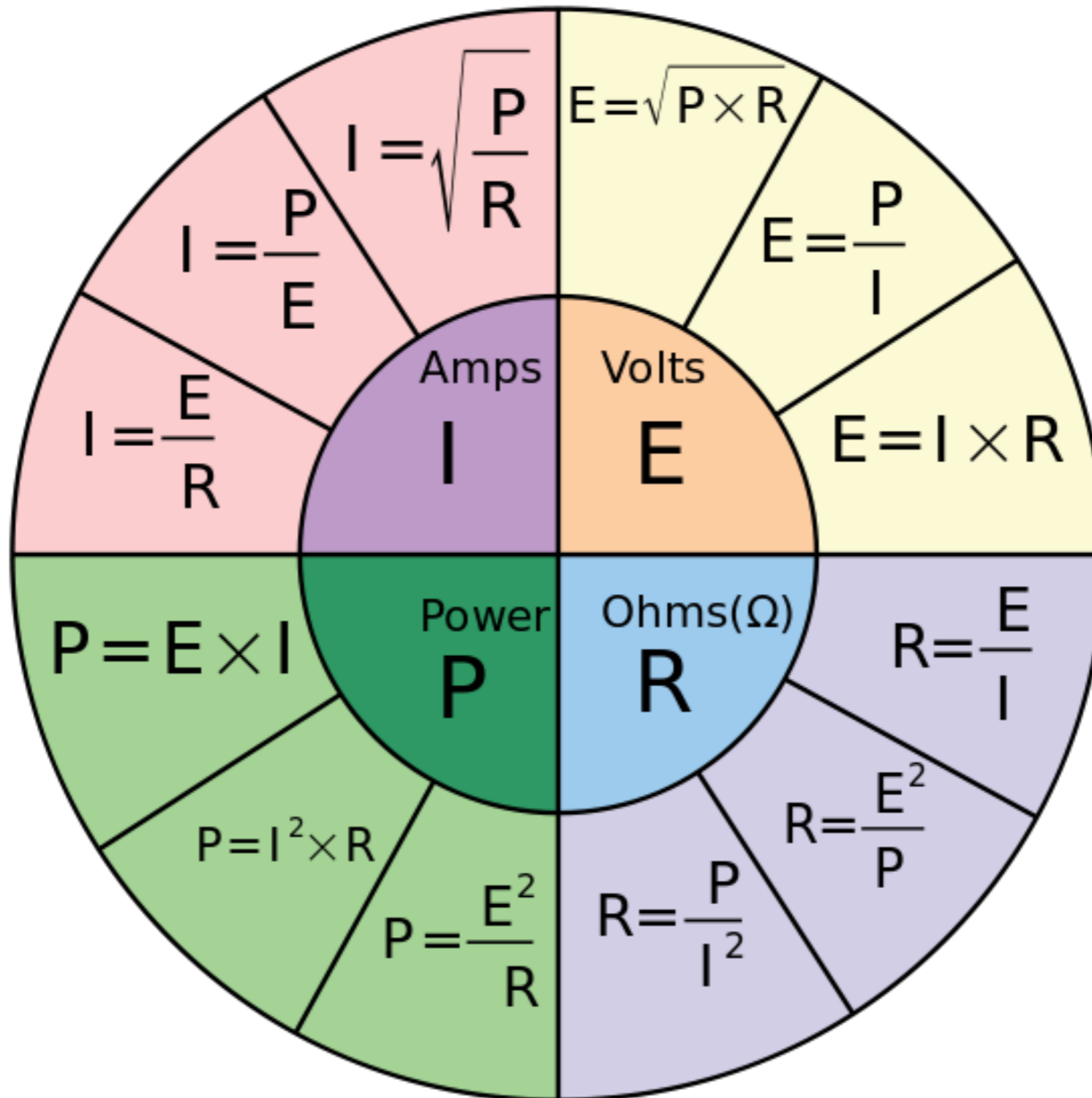
# Choosing a potmeter

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





# Ohm's Law





# Ohm's Law

$$V = R * I$$





# 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

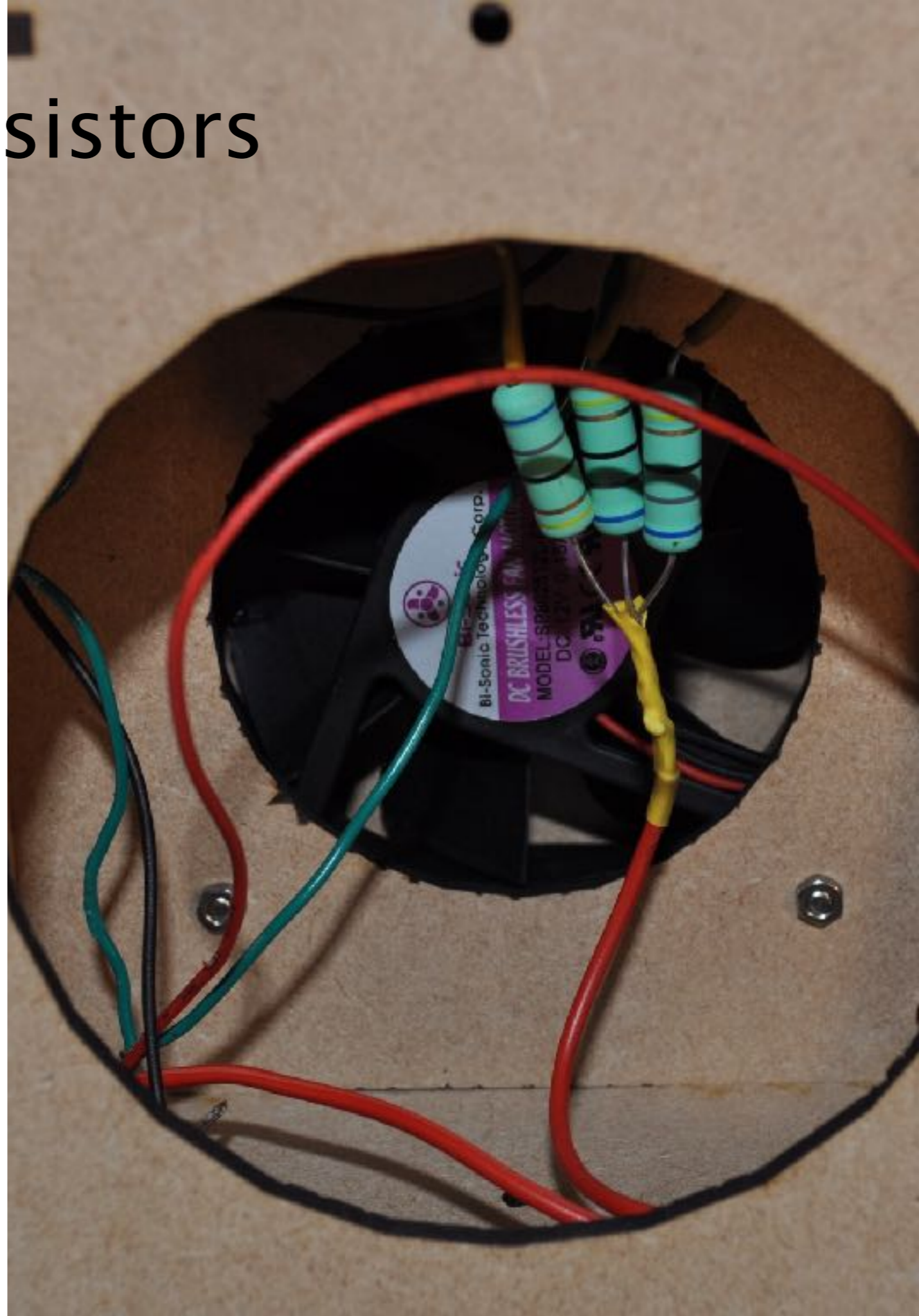




# Heating Pad Resistors

- 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





**some**

**rights**

**reserved**