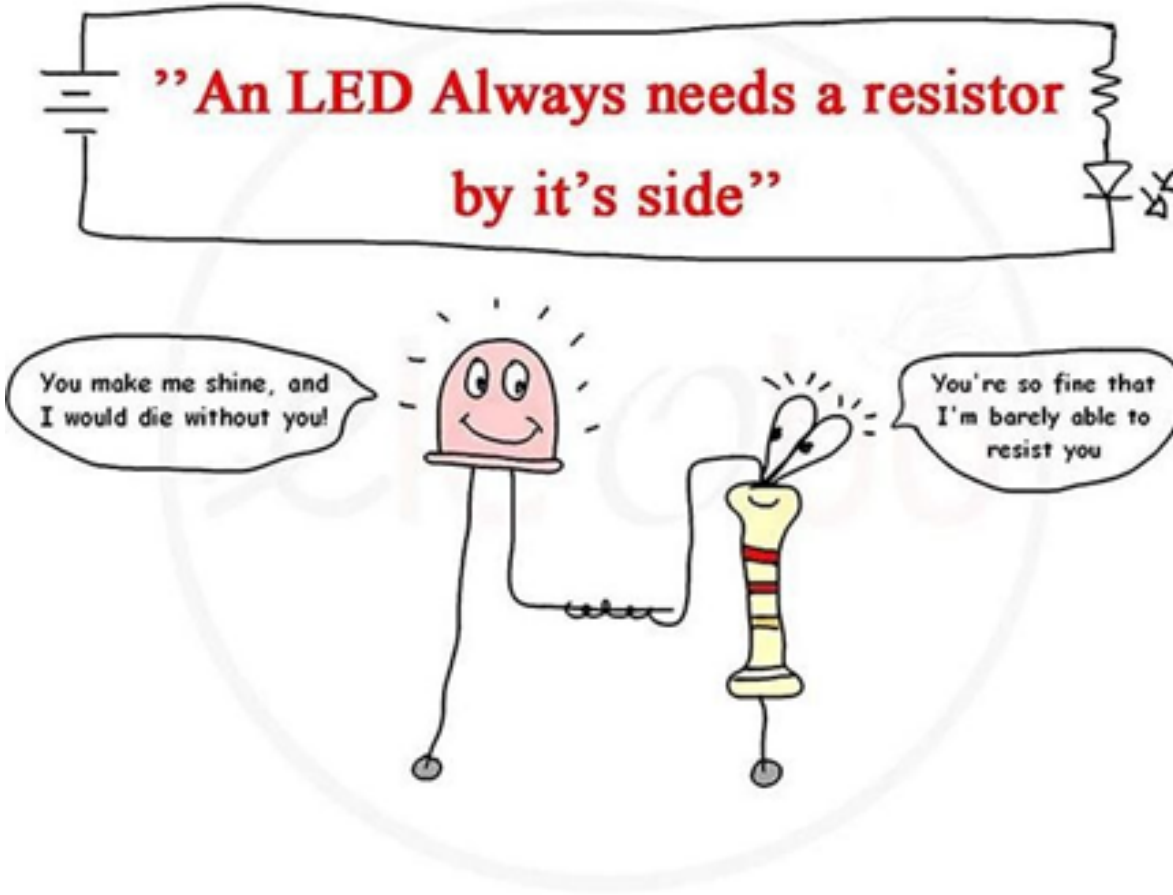
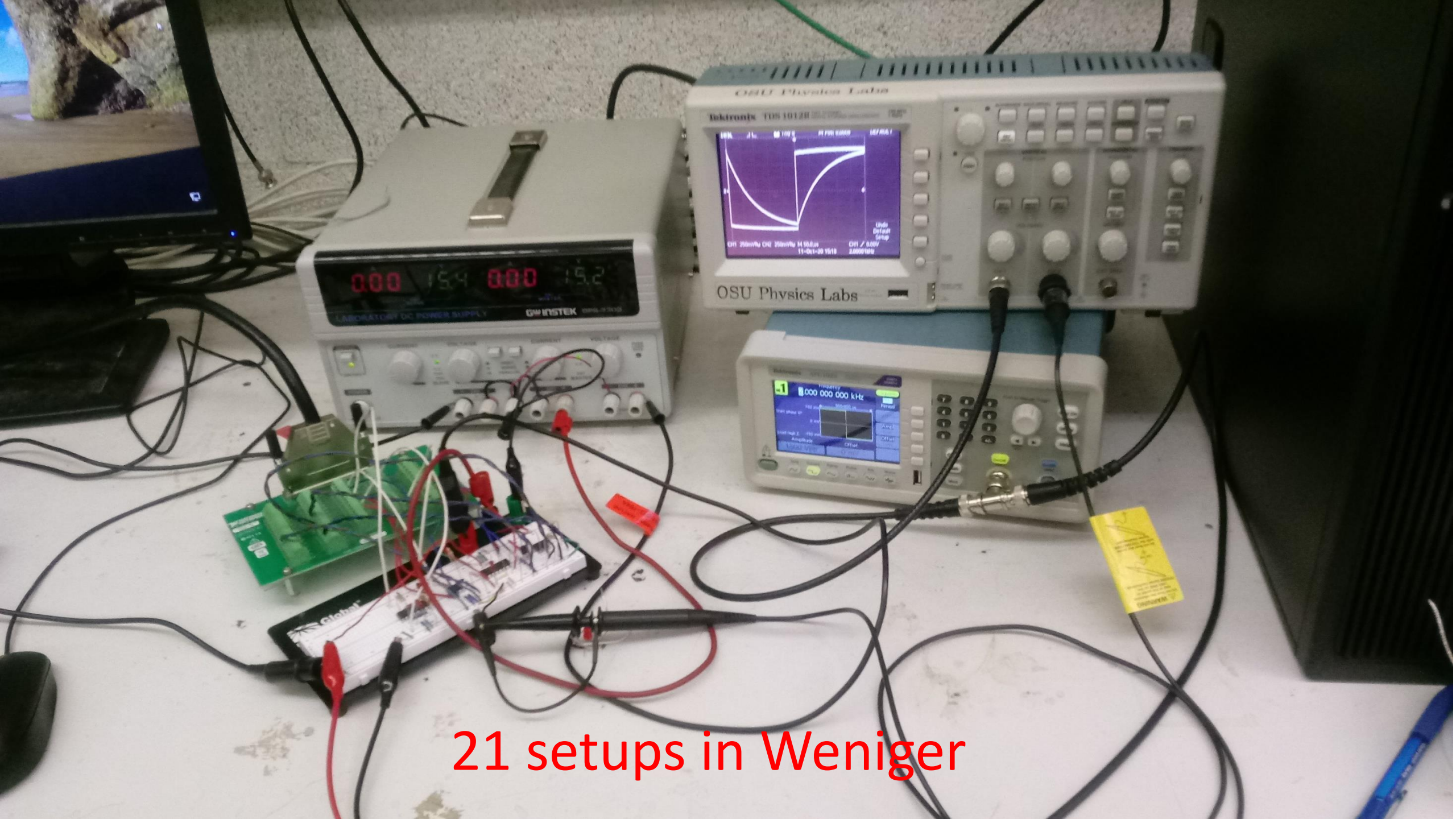
PH 411- Lab 0

Instructor: M. W. Graham
TA: Maans Mattsson
LAs: Madalyn Gragg
Vincent Vaughn

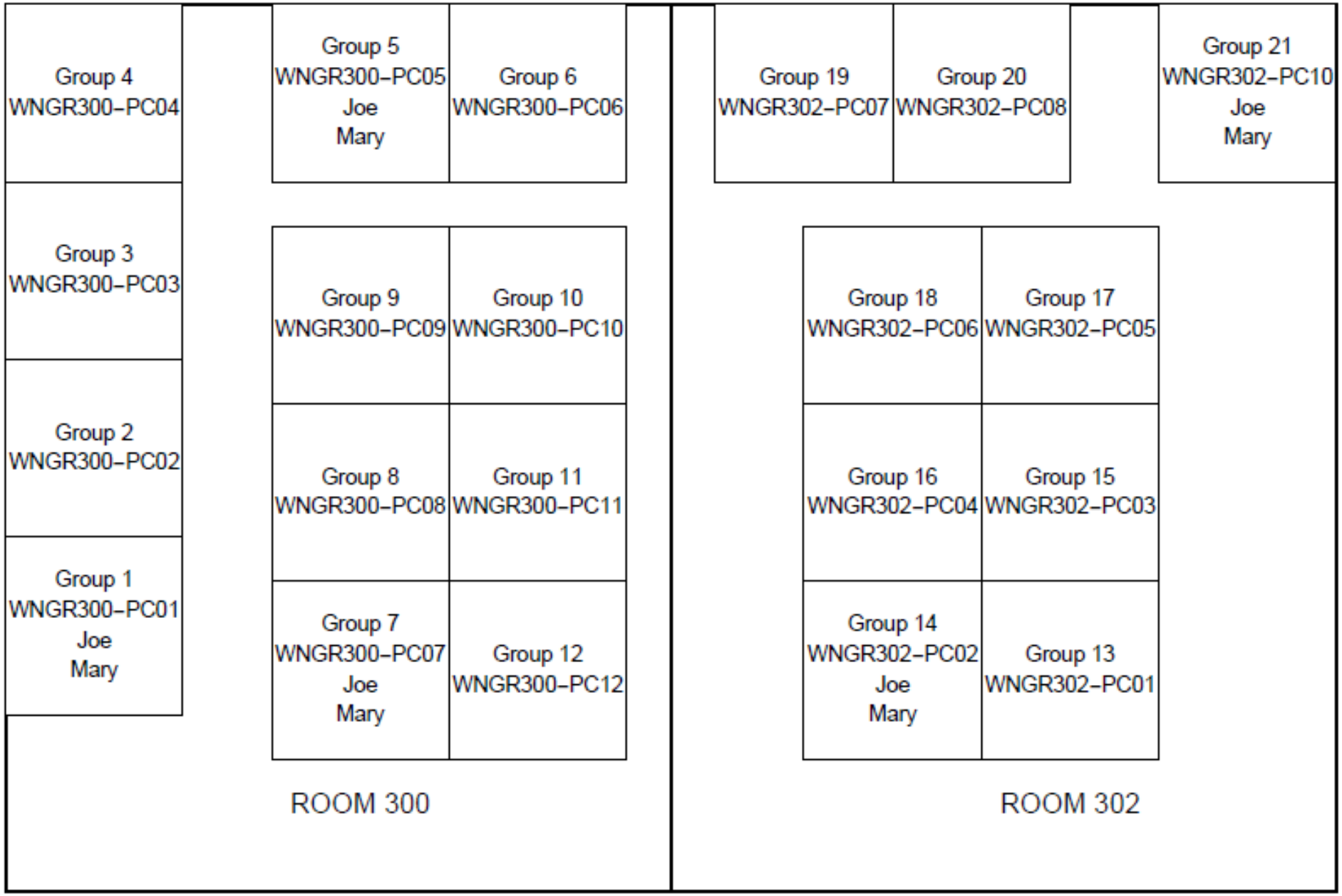
Lab 0 Learning Objectives:

- Discover your electronics kits and components
- Demonstrate to TA and LAs that you understand how a breadboard works
- Build a simple, safe circuit (LED or light switch)
- Understand non-ohmic diode behavior




OSU Physics Labs
21 setups in Weniger

YOU'LL BE ASSIGNED TO A LAB GROUP BY MONDAY ON CANVAS

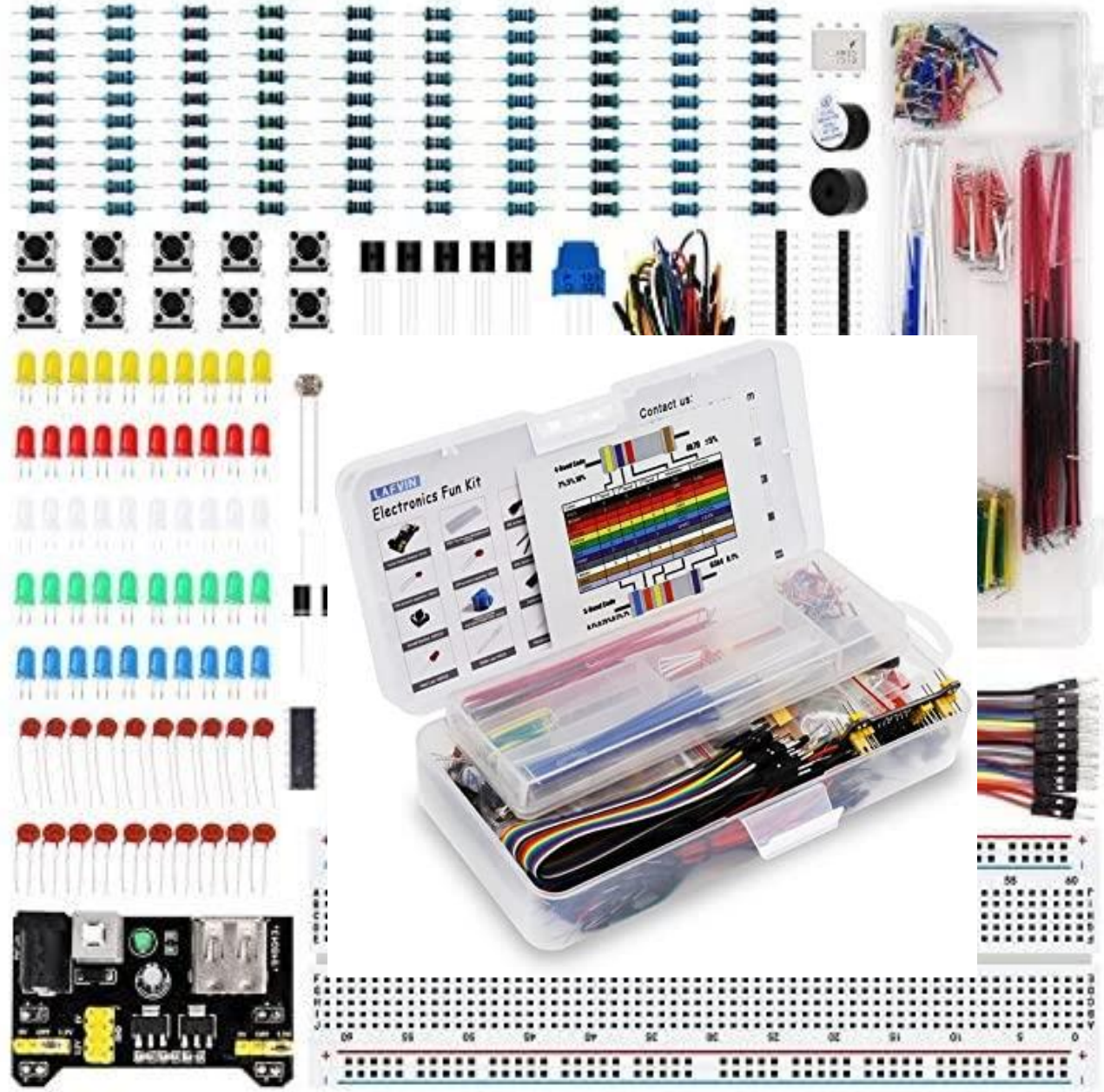


YOU'LL NEED A DIGITAL MULTIMETER EVERY CLASS (SOMETIMES TWO)

We provide them in lab, but you may also consider buying your own. See syllabus for rec. model ($18-$30)

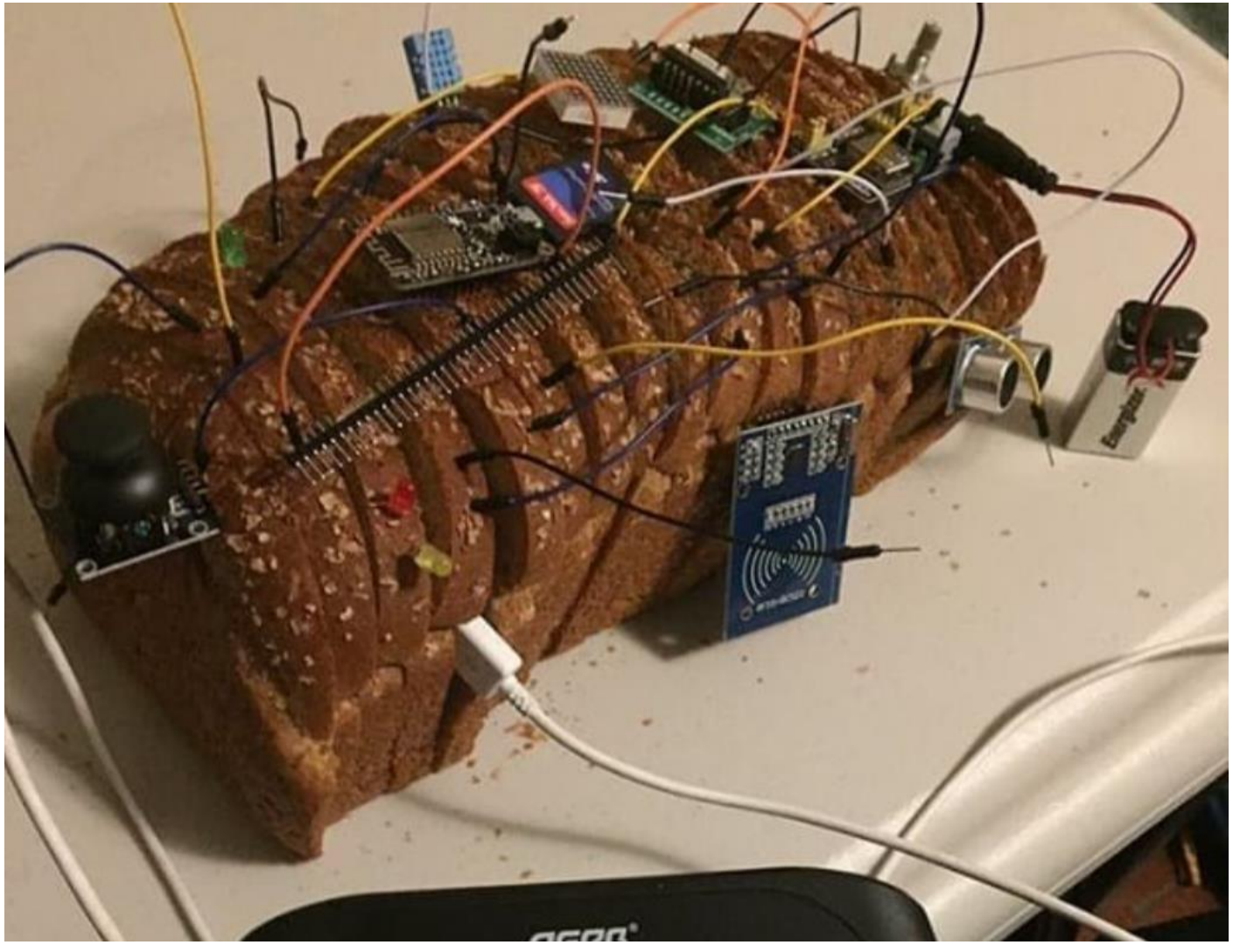
YOU WILL BE GIVEN AN ELECTONICS KIT.

Please bring to class EVERY DAY or store at you lab bench.



How to use a breadboard.

https://www.youtube.com/watch?v=6WReFkfrUIk



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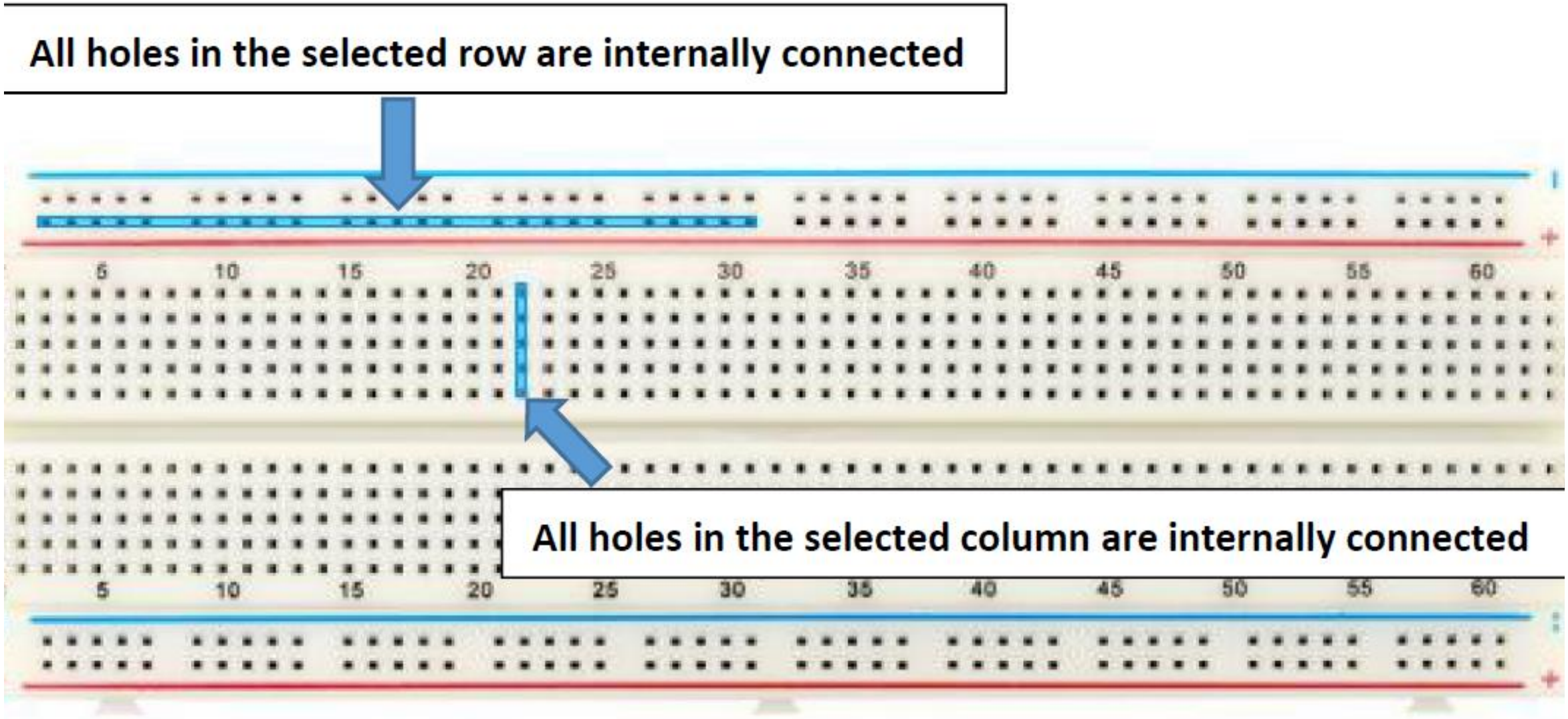
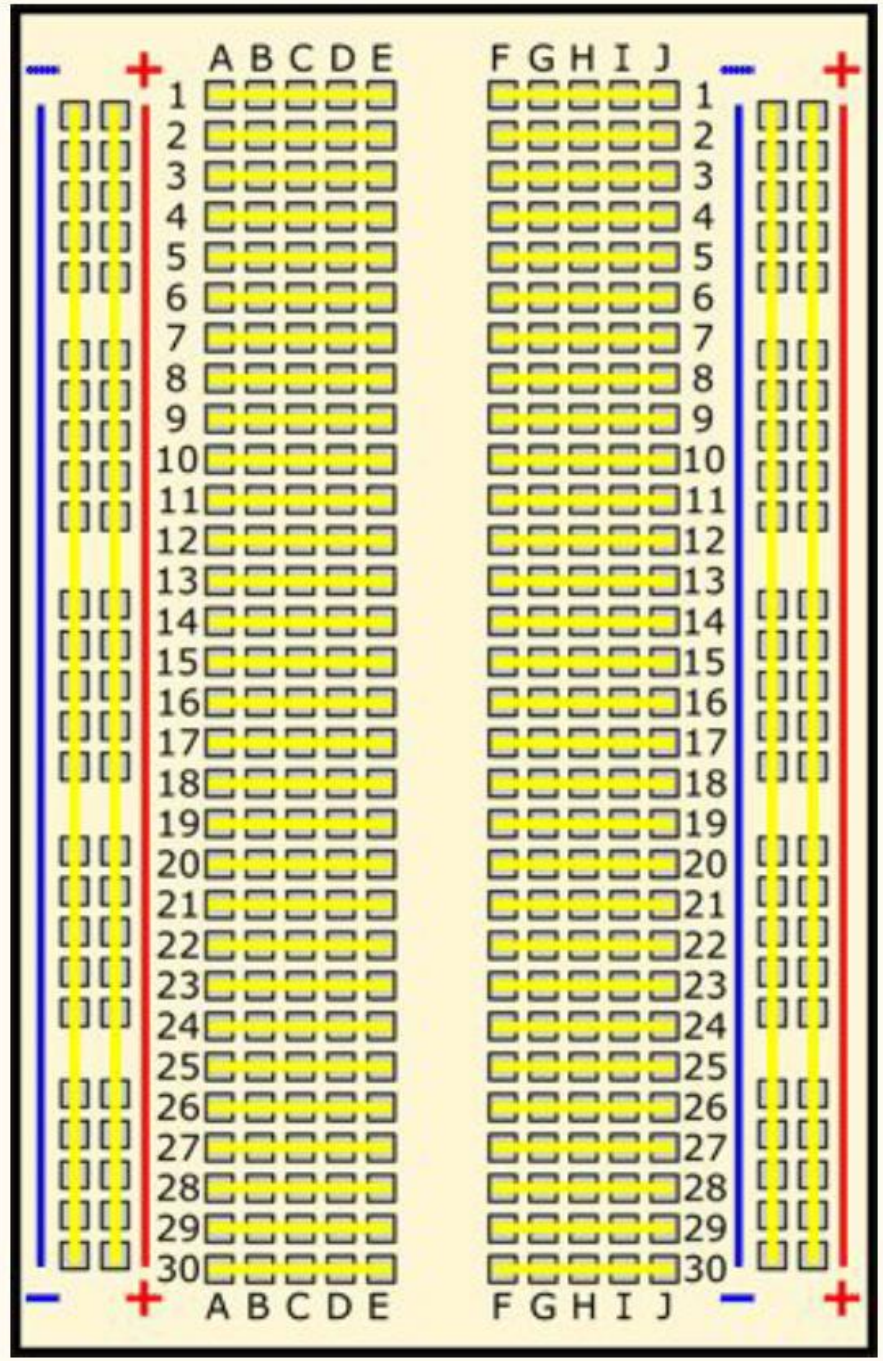


Inside a Breadboard

In breadboards, the holes are connected together in a standard way.

The yellow lines show which holes are connected together. For example, in row 1 (at the top) the holes A through E are all connected to one another.

Usually builders connect the long columns marked "+" and "-" to a supply of electricity, like a battery. Then they plug the other components into holes in the center of the board and use jumpers to go from one set of holes to another.

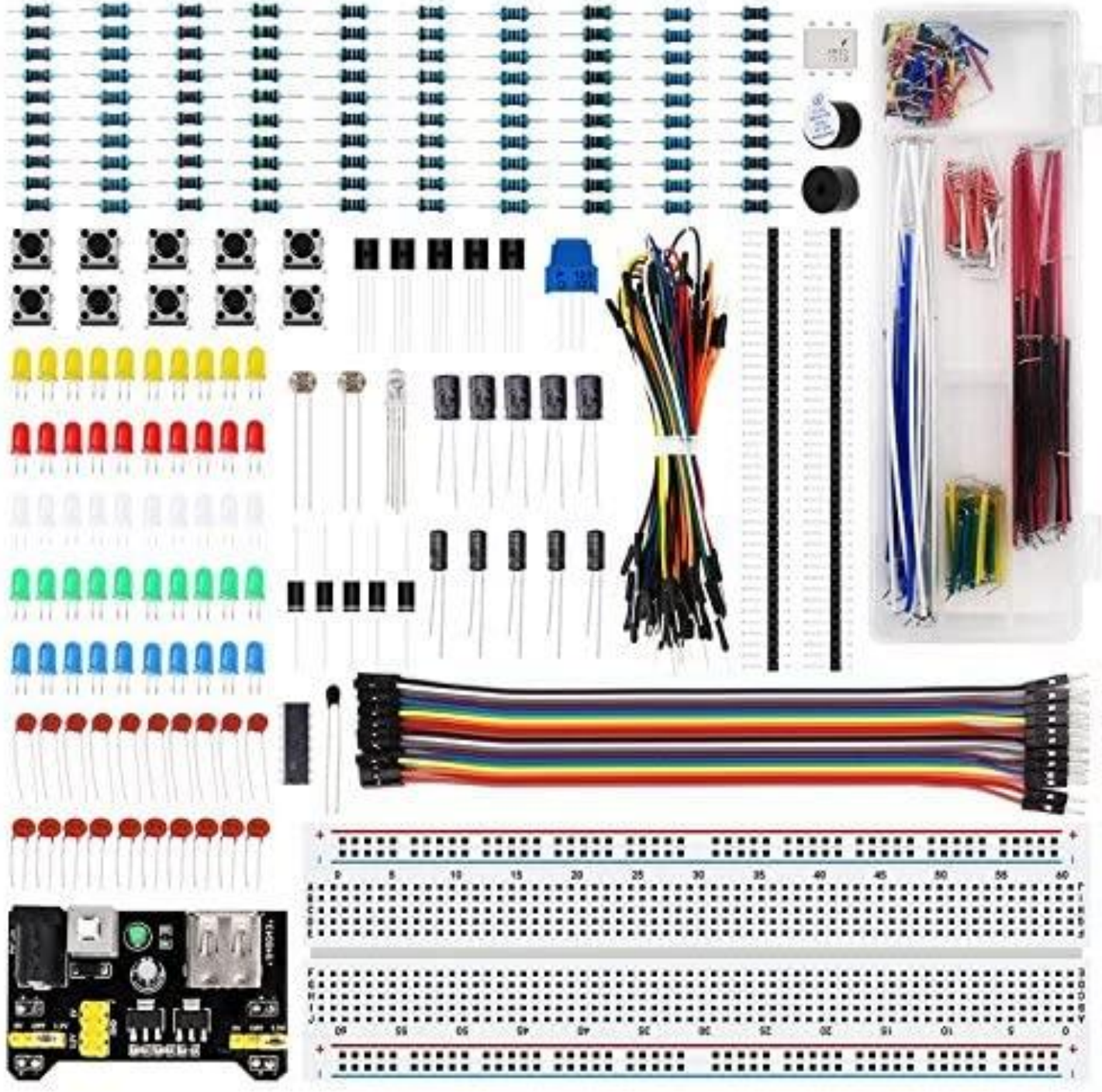


Resistors

Switches

LEDs

3/5 V power source (USB)

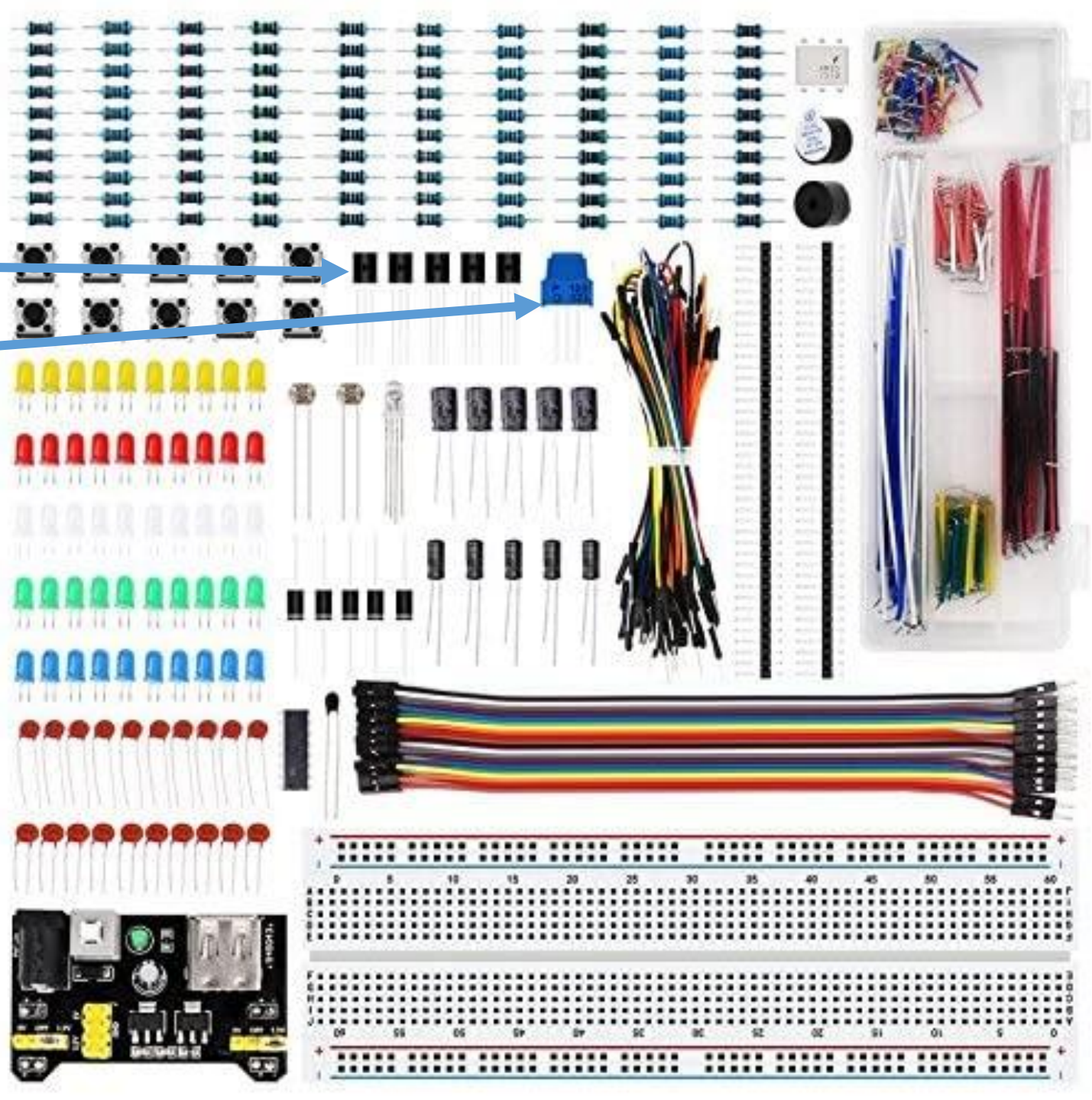


Resistors

npn transistors

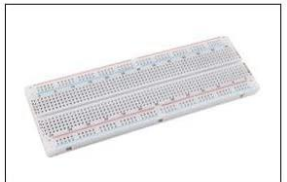
1-turn potentiometr

3.3/5 V power source (USB)



https://www.youtube.com/watch?v=ZpCep1jL-iA

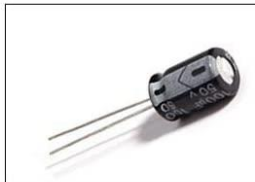
Power Supply Module 1PCS3



830 Tie-Points Breadboard 1PCS

65 Jumper Wire 1PCS

10UF 50V 5PCS



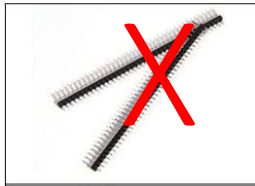
100UF 50V 5PCS

Resistor 100PCS

Soderless jumper Wire 140PCS

104 ceramic capacitor 10pcs

2PFceramic capacitor 10pcs

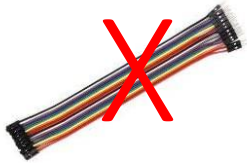


DIODE RECTIFIER(1N4007)

Small Button 10PCS

Active Buzzer 1PCS

Passive Buzzer 1PCS



F--M Dupont Wrie 20PCS

IC 4N35 1PCS

Yellow Led 5PCS

Red Led 5PCS

Blue Led 5PCS

Green Led 5PCS

White Led 5PCS

RGB Led 1PCS

PRESCISION POTENTIOMETER 1PCS

74HC595 1PCS

Photoresistor 2PCS

Tilt Switch 1PCS

Thermistor 1PCS

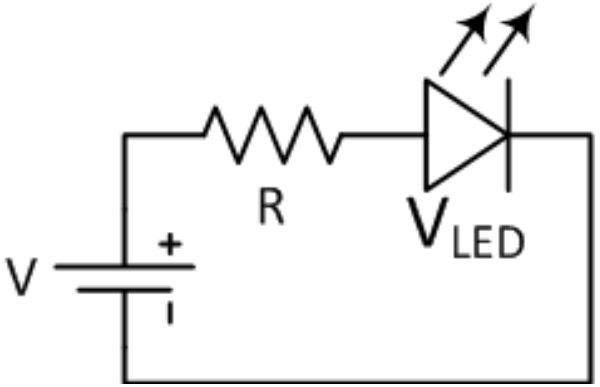
PN2222 2PCS

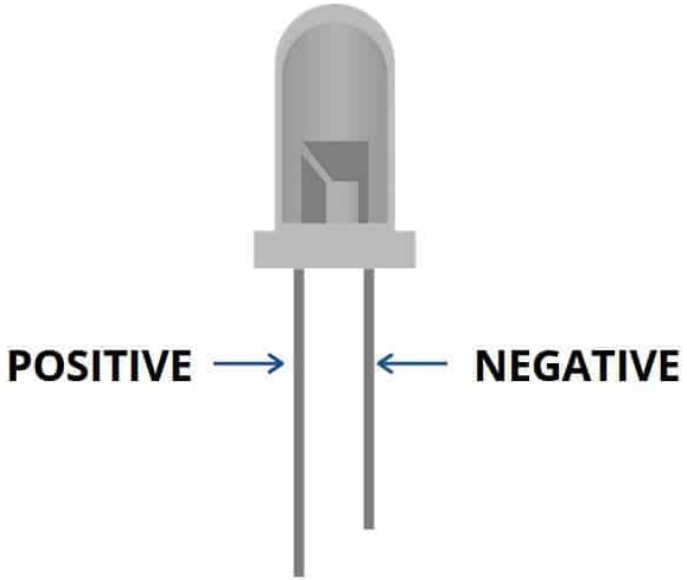
Diode Rectifier(1N4007)

LAFVIN

WORKSHOP CHALLENGE #1

- Remove your breadboard, your power supply, 1 LED and a resistor. Make your LED turn ON!





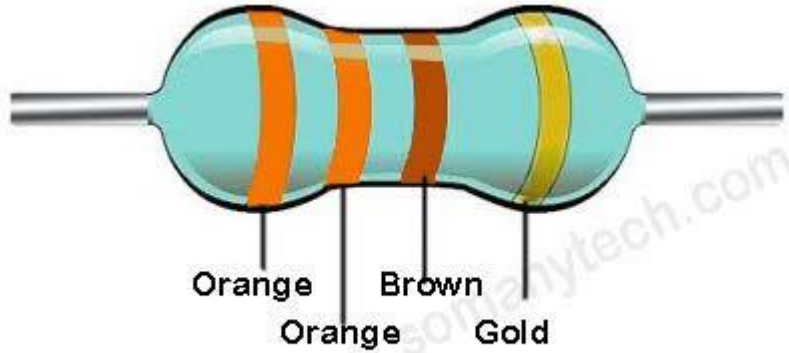
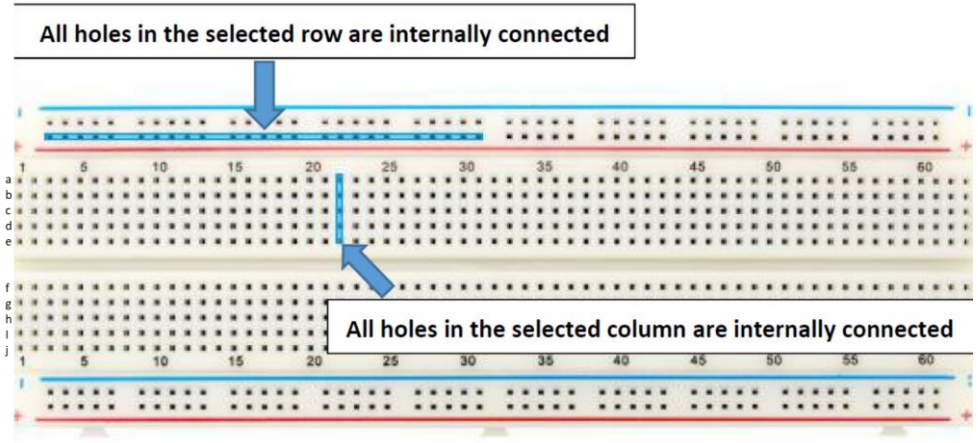
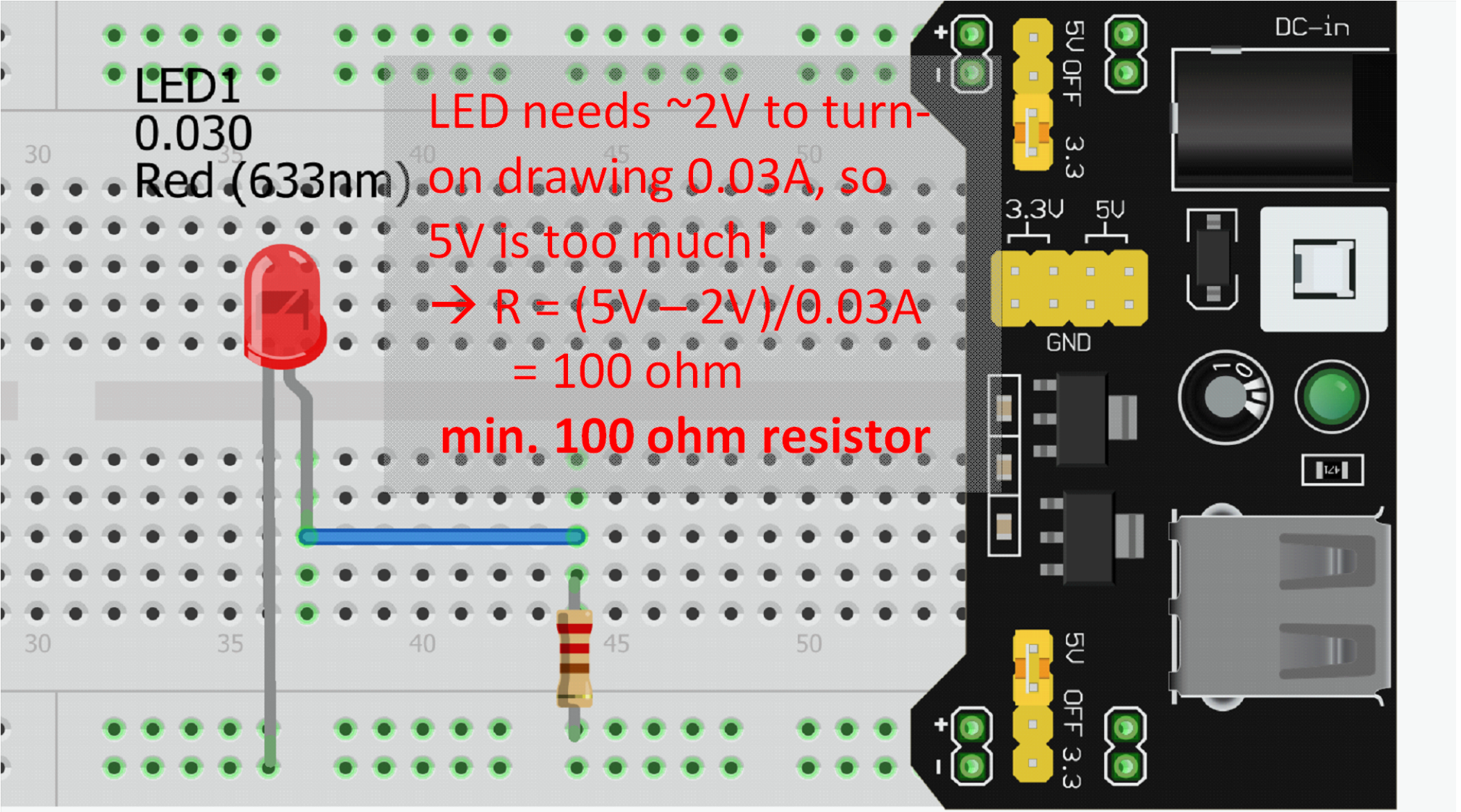


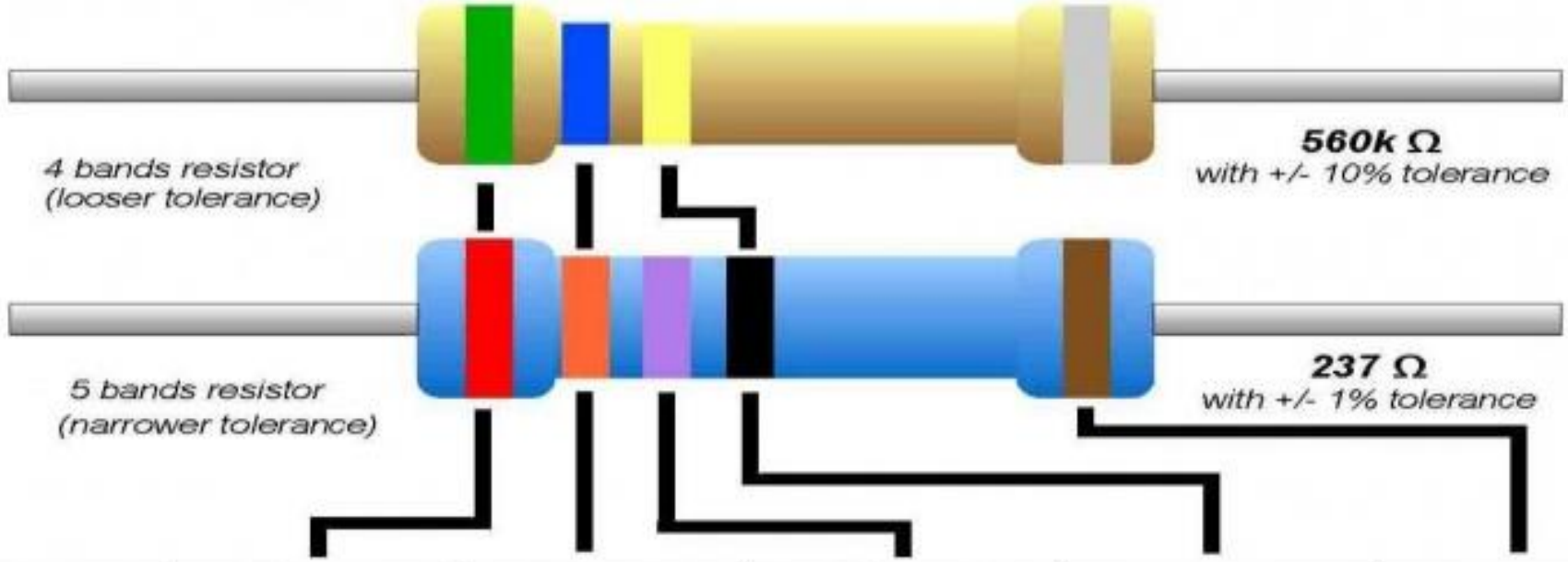
Fig. showing color code of 330 ohm resistor



Optional Challenge #2:
Make a light switch.


LED1
0.030
Red (633nm)
LED needs ~2V to turn-on drawing 0.03A, so 5V is too much!
→ R = (5V−2V)/0.03A = 100 ohm
min. 100 ohm resistor
30
35
40
45
50
5V OFF 3.3
3.3V
5V
GND
DC-in
5V OFF 3.3
R1
220Ω
0.25

Resistor Color Code



Color	1st Band	2nd Band	3rd Band	Multiplier	Tolerance
Black	0	0	0	x 1 Ω	
Brown	1	1	1	x 10 Ω	+/- 1%
Red	2	2	2	x 100 Ω	+/- 2%
Orange	3	3	3	x 1K Ω	
Yellow	4	4	4	x 10K Ω	
Green	5	5	5	x 100K Ω	+/- 5%
Blue	6	6	6	x 1M Ω	+/- .25%
Violet	7	7	7	x 10M Ω	+/- .1%
Grey	8	8	8		+/- .05%
White	9	9	9		
Gold				x .1 Ω	+/- 5%
Silver				x .01 Ω	+/- 10%