

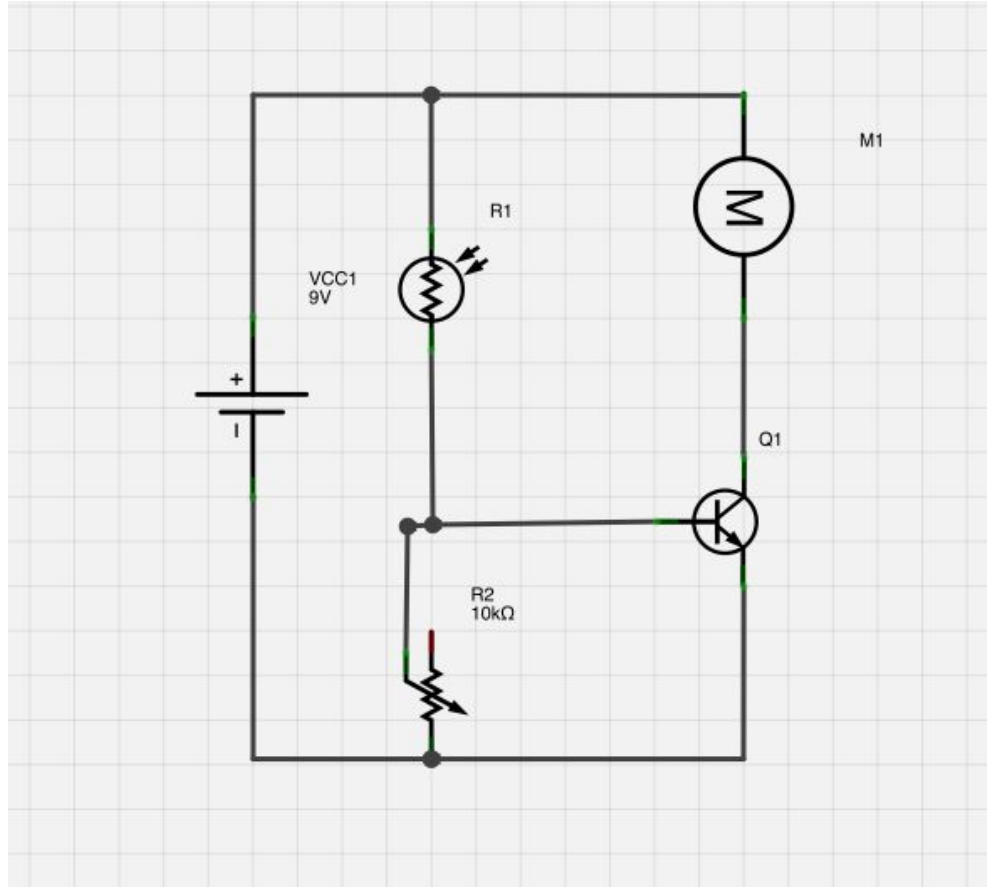
Carving PCB
and day/night bug

1: Prototyping

Day bug

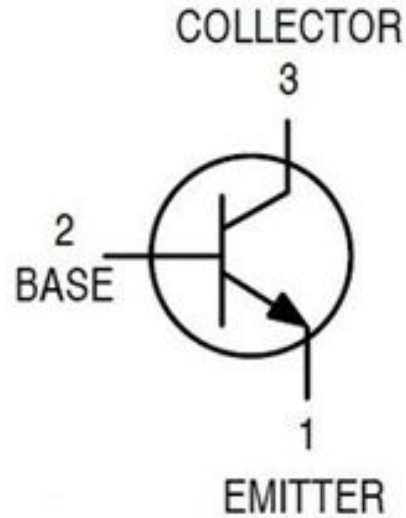
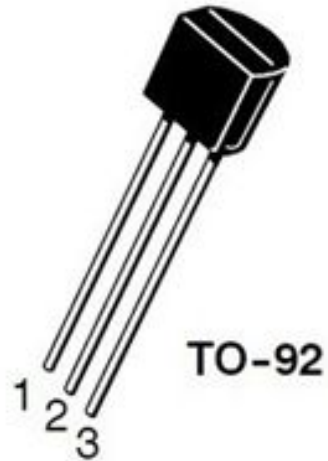
(On when there is light)

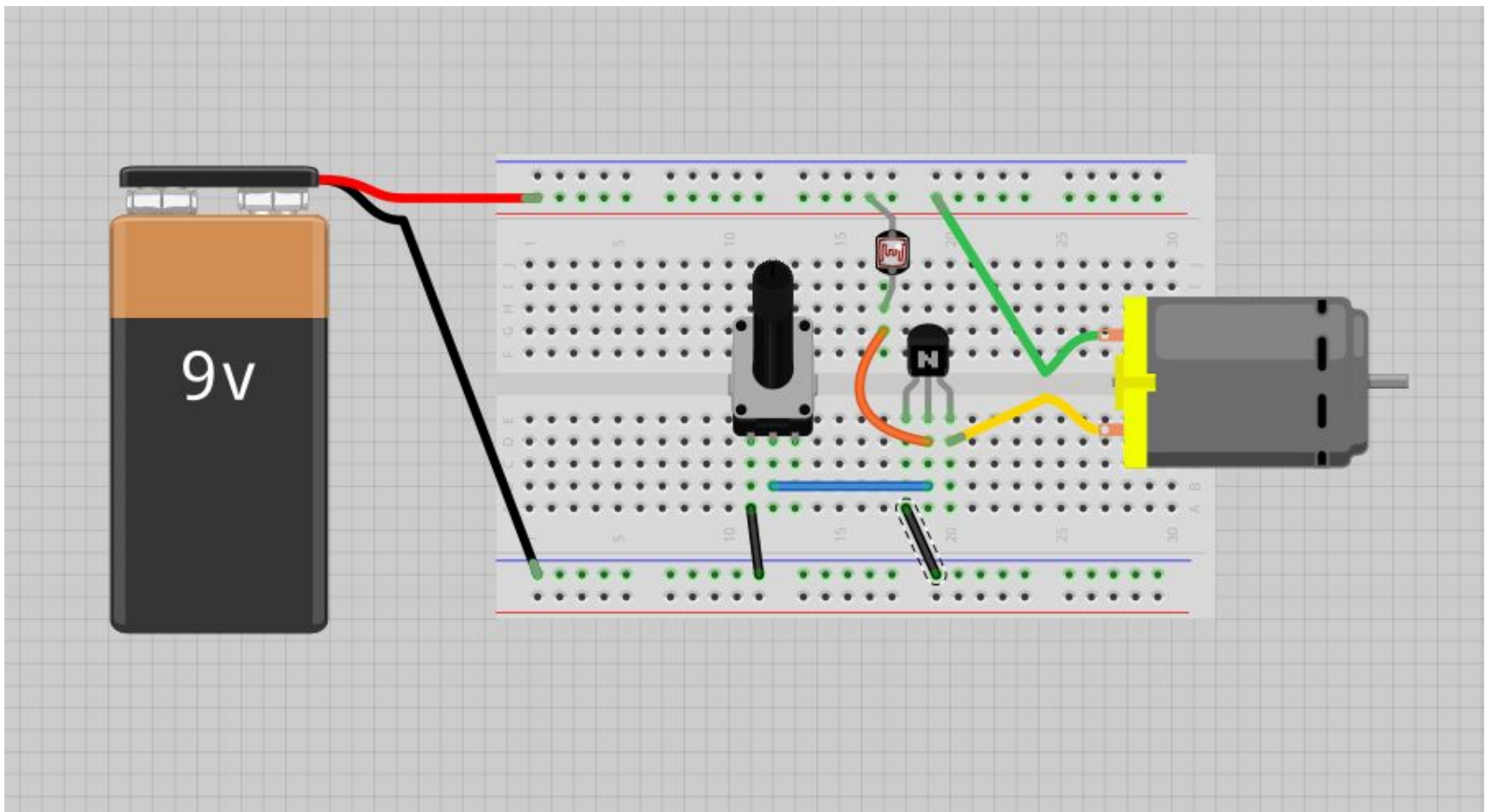
- 1 x 9V battery
- 1 x Photoresistor
- 1 x 10K potentiometer
- 1 x Motor or LED
- 1 x NPN 2N2222 Transistor



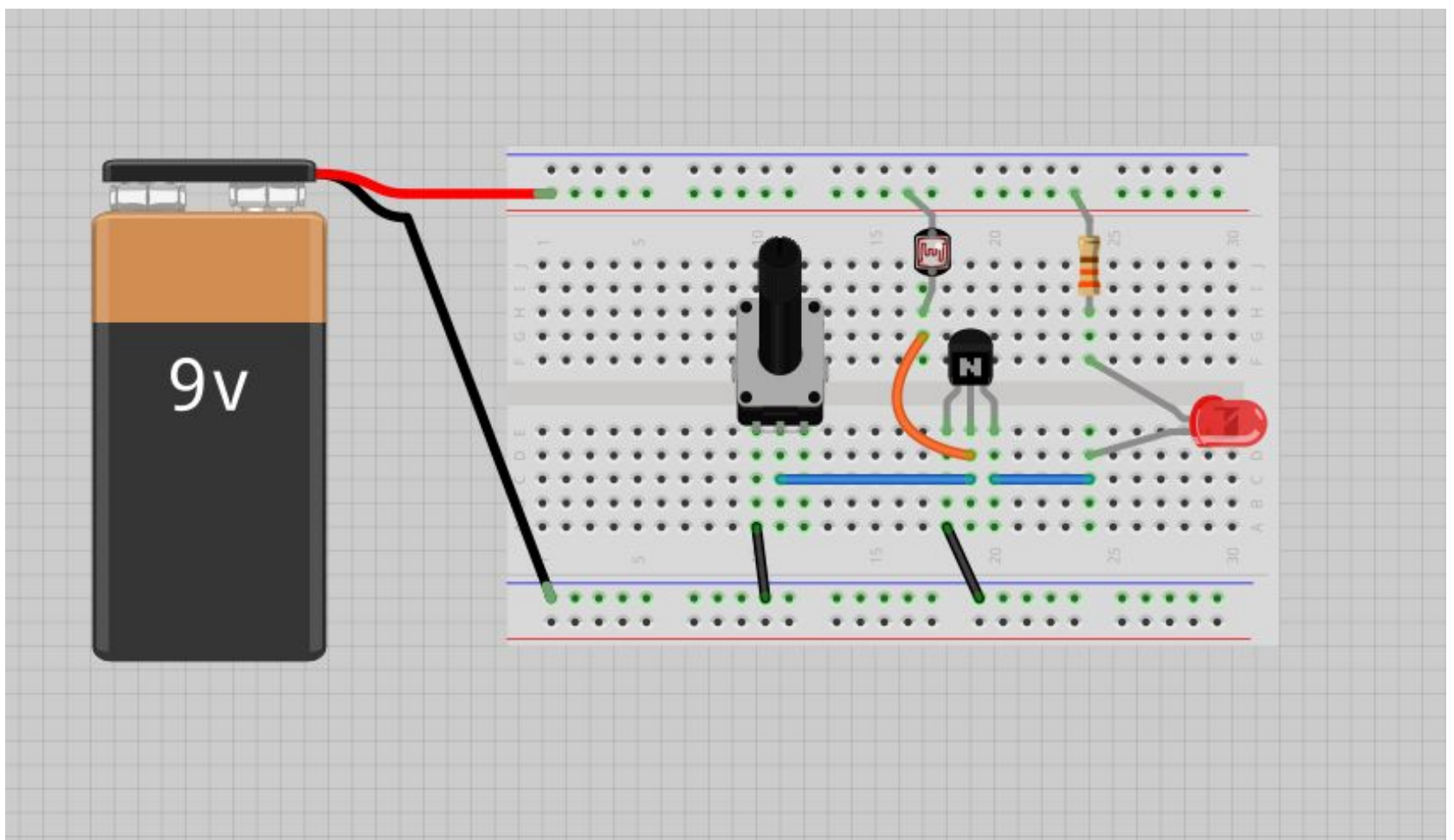
2N2222 NPN transistor

2N2222





Plug in power **LAST!**



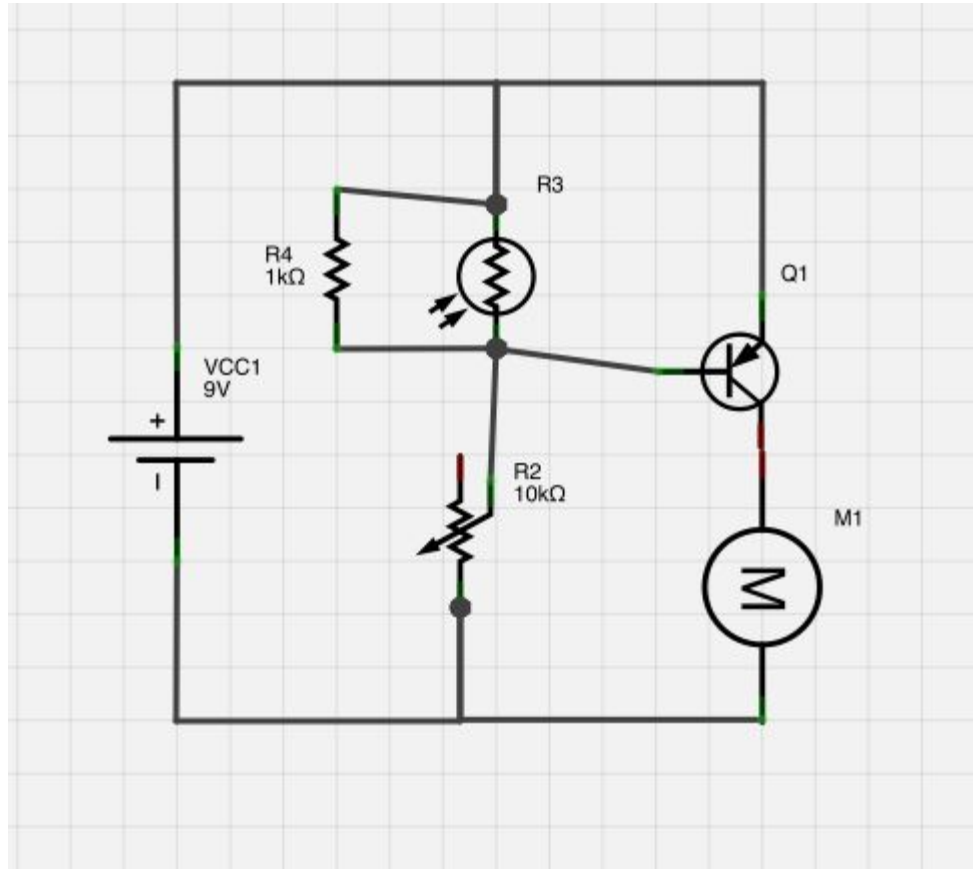
Plug in power LAST!

1: Prototyping

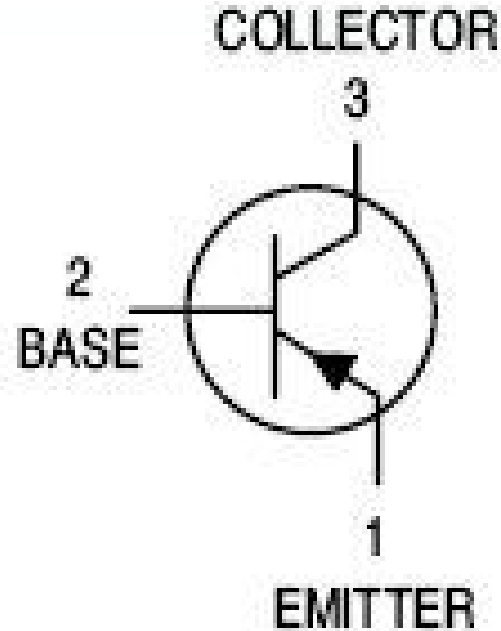
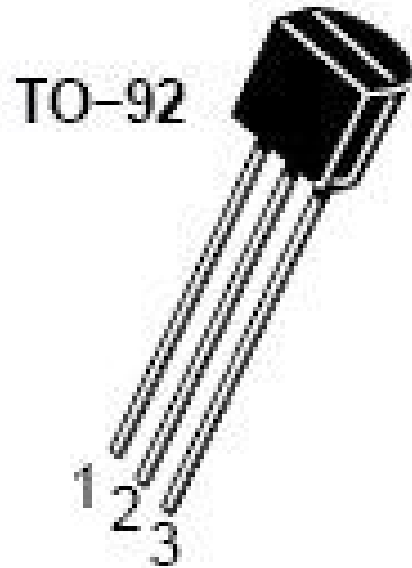
Night bug

(on when there is **no** light)

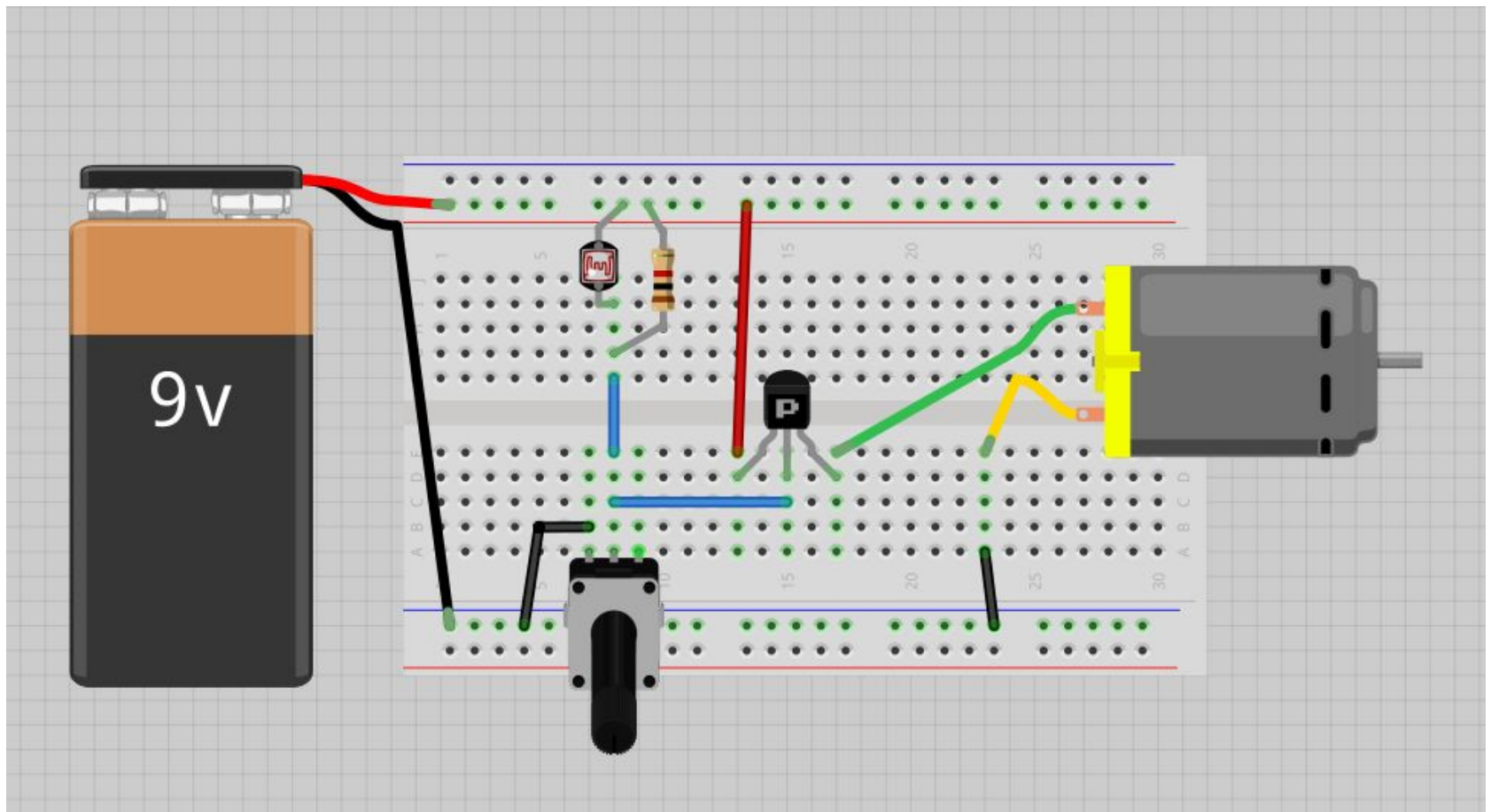
- 1 x 9V battery
- 1 x Photoresistor
- 1 x 10K potentiometer
- 1 x Motor or LED
- 1 x 1Kohm resistor
- 1 x PNP 2N3906 Transistor



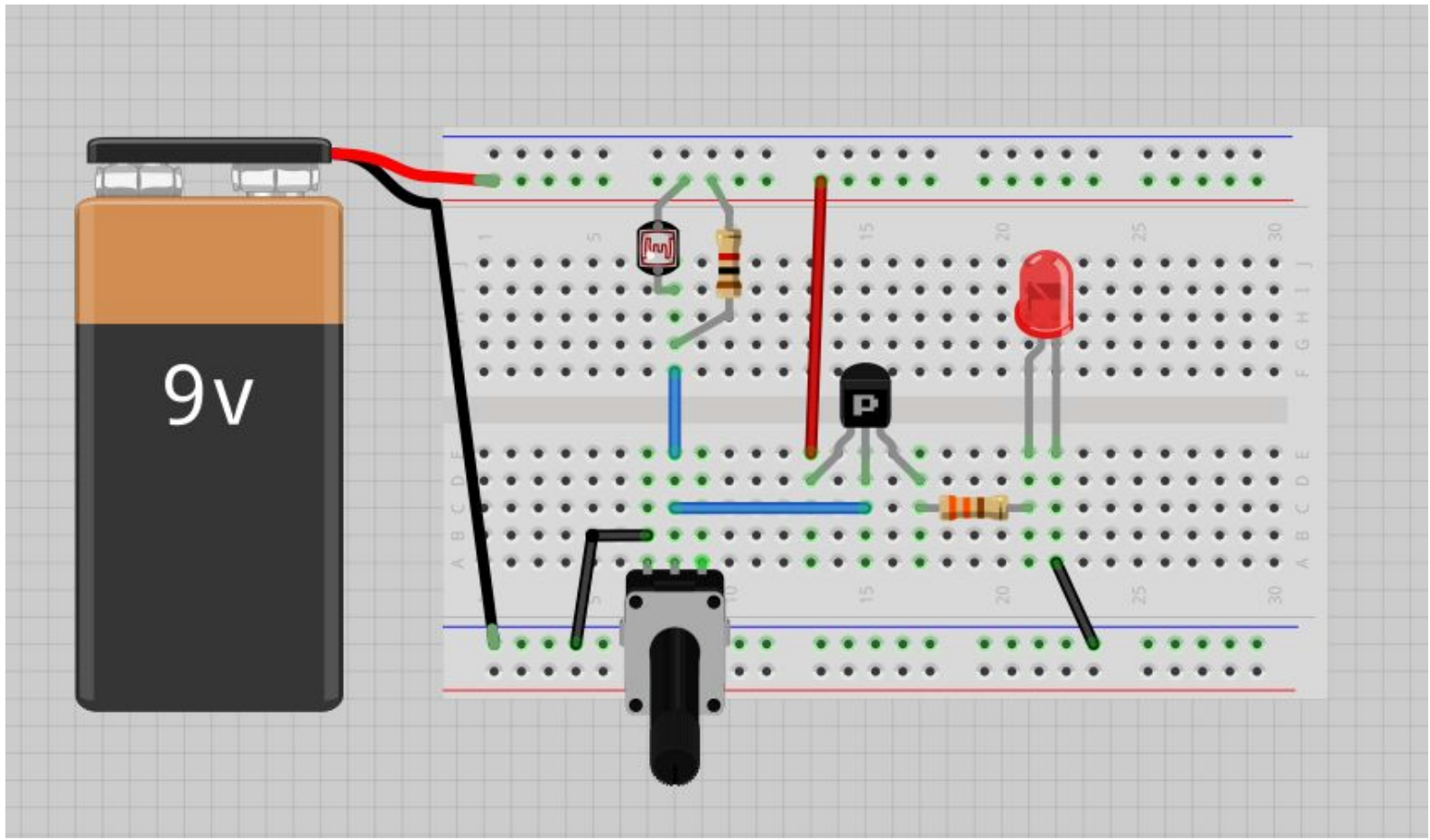
2N3906 PNP transistor



2N3906 PNP - TO-92 Case



Plug in power LAST!

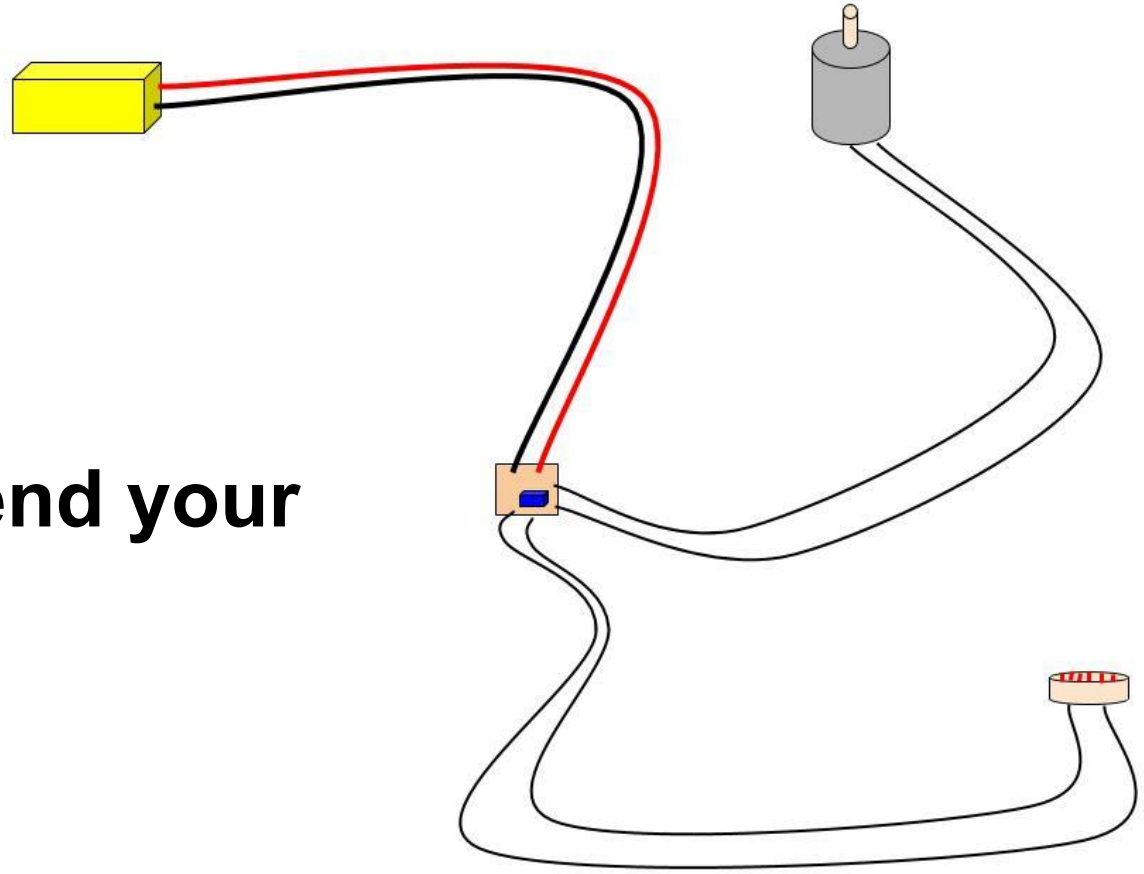


Plug in power LAST!

2: Connecting power / fine tuning

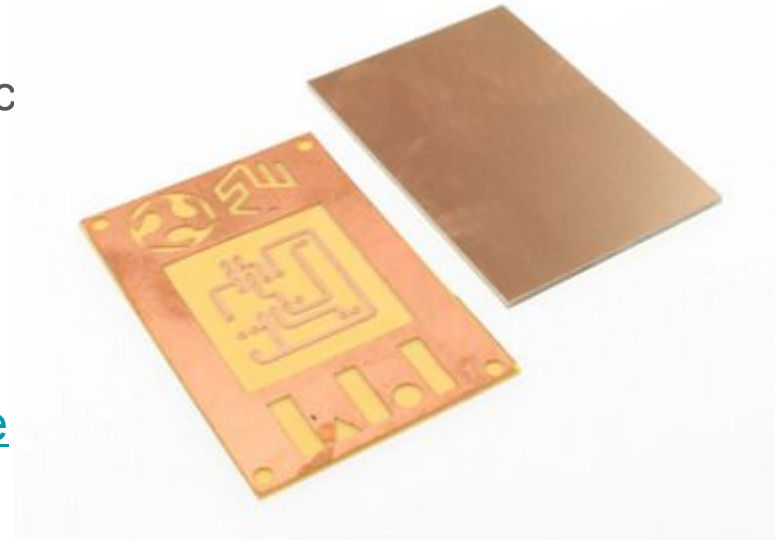
- Only use small motors 3 ~ 6V for this circuit. These transistors aren't designed to handle large amounts of current
- Do not overload the motor, it will draw a lot more current that might reach the limit of the transistors
- UNPLUG the power IMMEDIATELY if any component is smoking or getting too hot
- Double check your prototype connections before you plug in the power
- Use small (-) screwdriver to adjust the trigger threshold
- Add a resistor on plus side of motor and adjust speed if needed

You can extend your circuit!



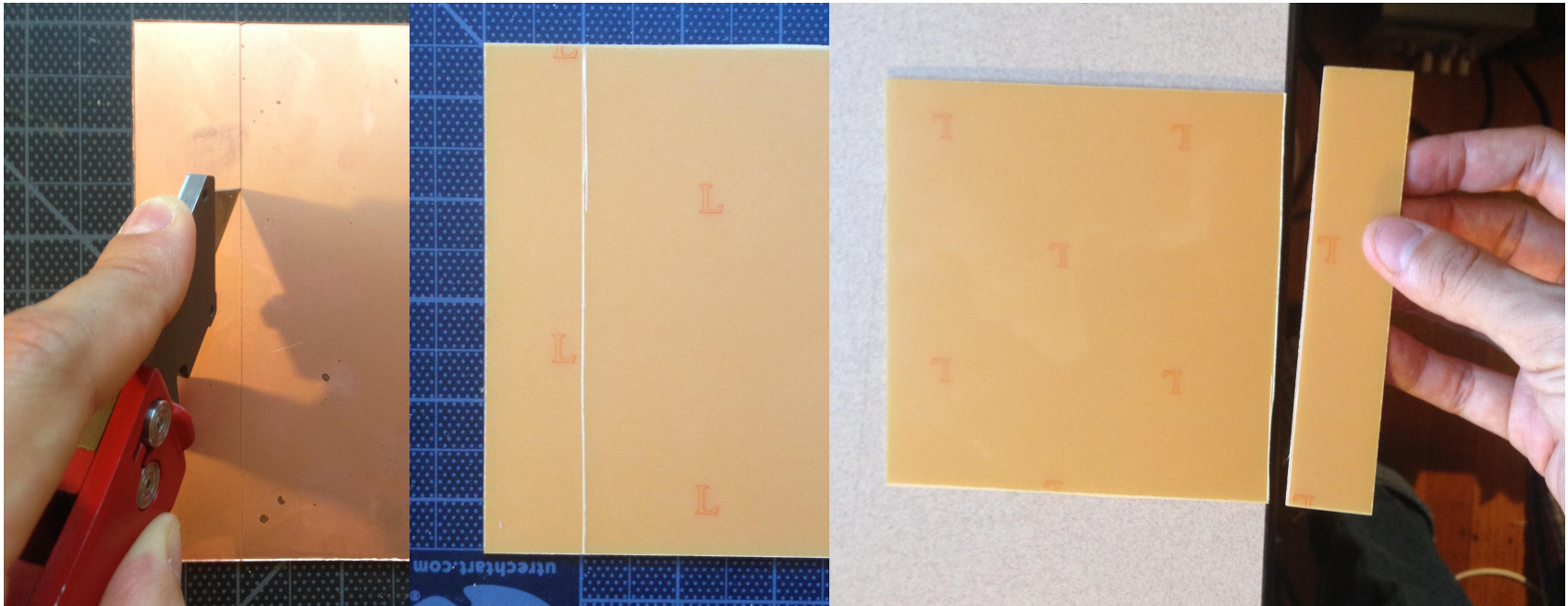
3: cutting the Printed Circuit Board

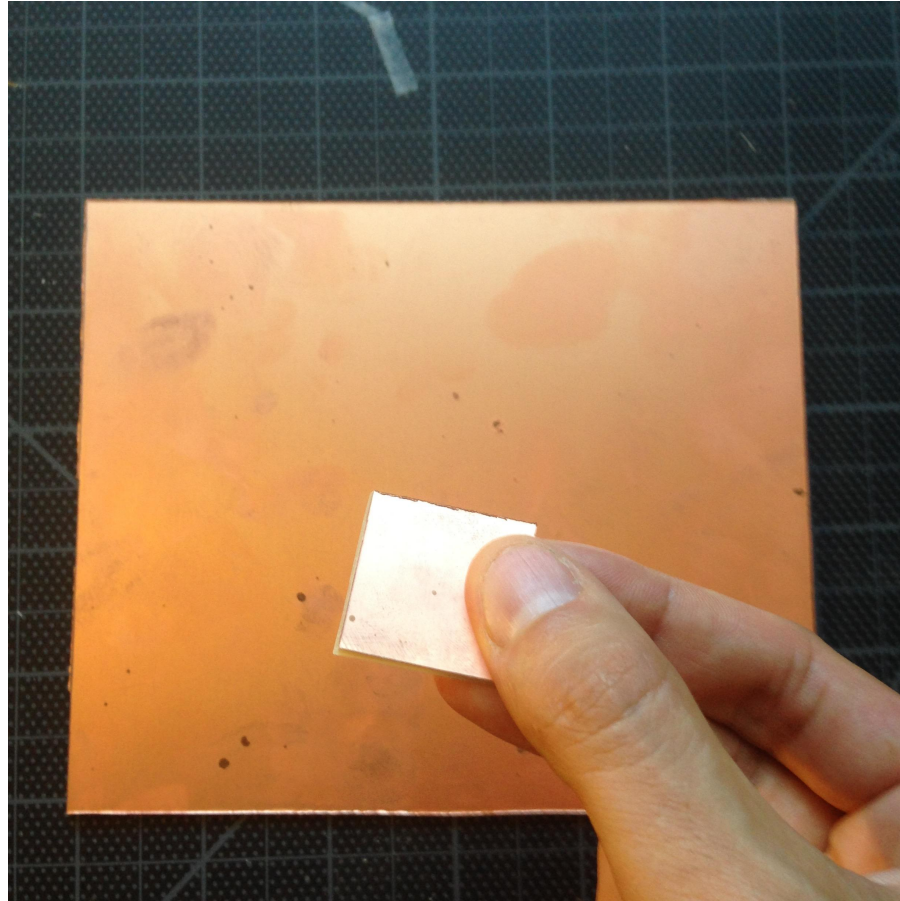
- We are using FR-1 grade board which is paper based instead of common FR-4 grade that is fiberglass. FR-1 is less toxic and softer to carve
- The top layer is copper which conducts electricity
- You can get these on <https://www.inventables.com/technologies/circuit-board-blanks>



3a: Score and snap

You can score the front and back of the PCB with a knife multiple times and snap off on the edge of a table



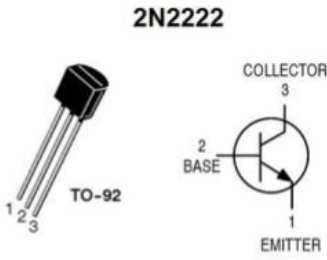
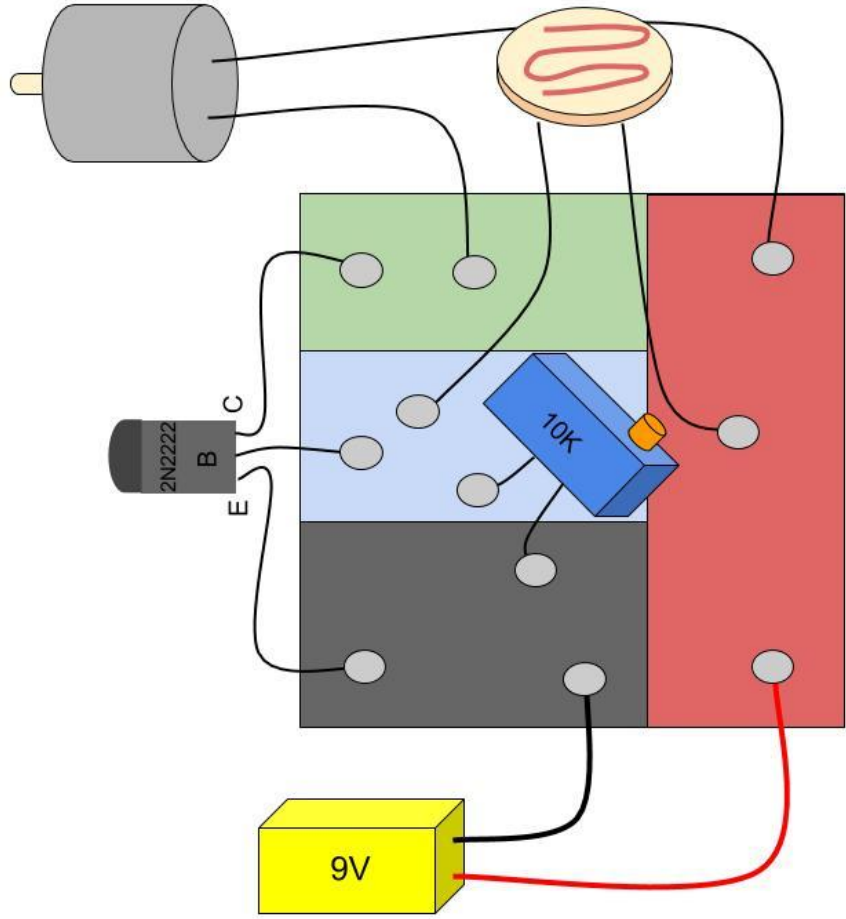


3b: Scoring and Carving

- Score the PCB with a knife to the pattern of choice for your bug
- Set up carving station
- Carve the PCB

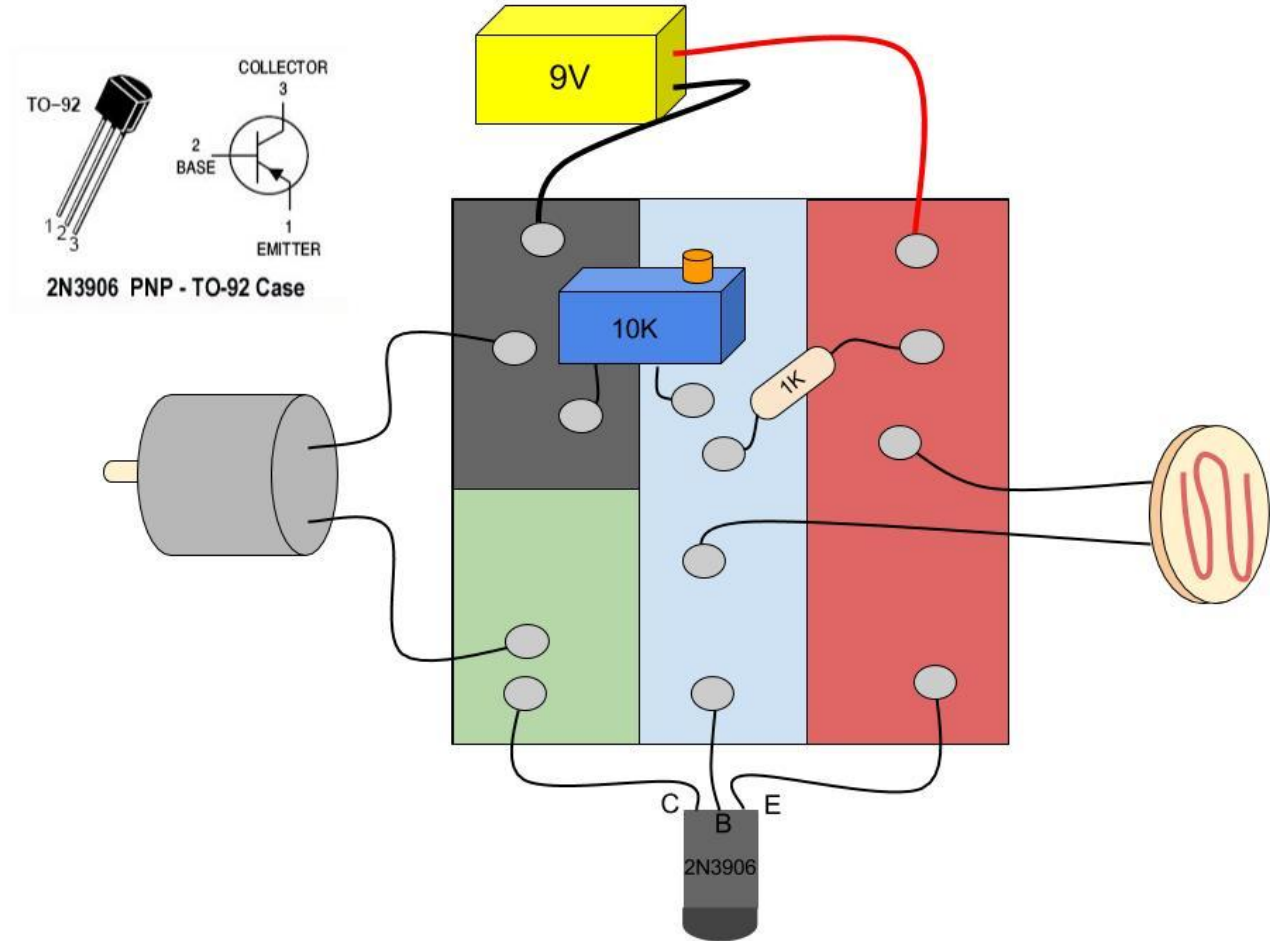
Day bug

(on when there is light)

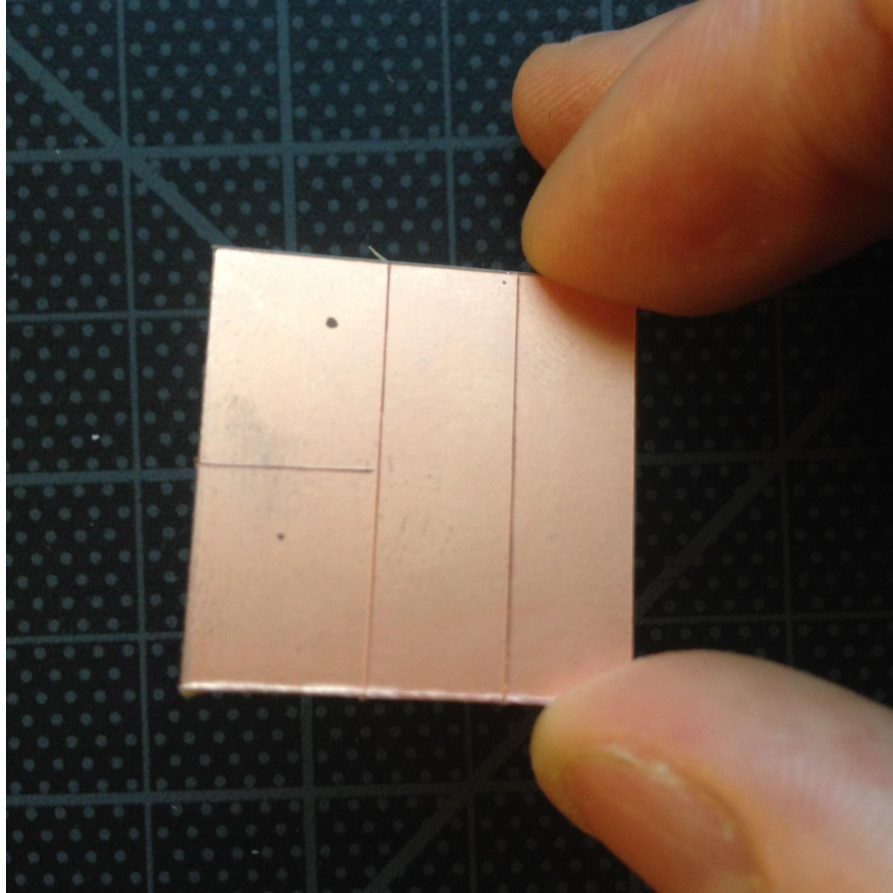


Night bug

(on when there is no light)



Scoring

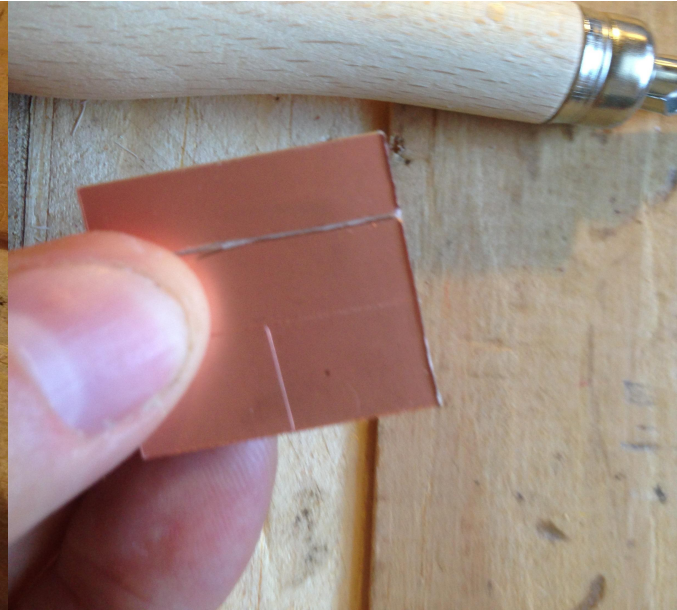
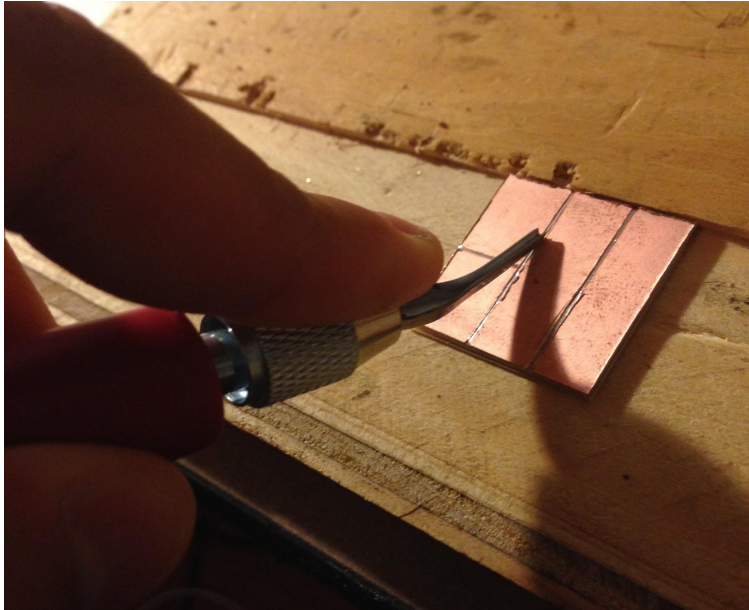


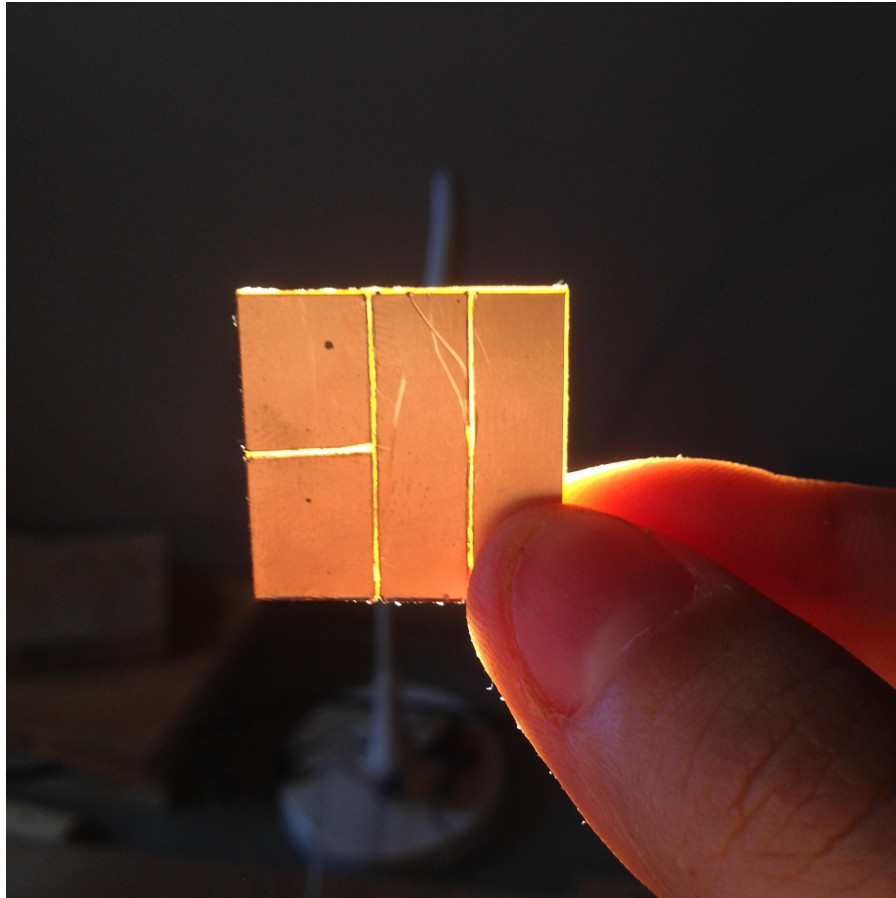
Setting up the carving station



Carving

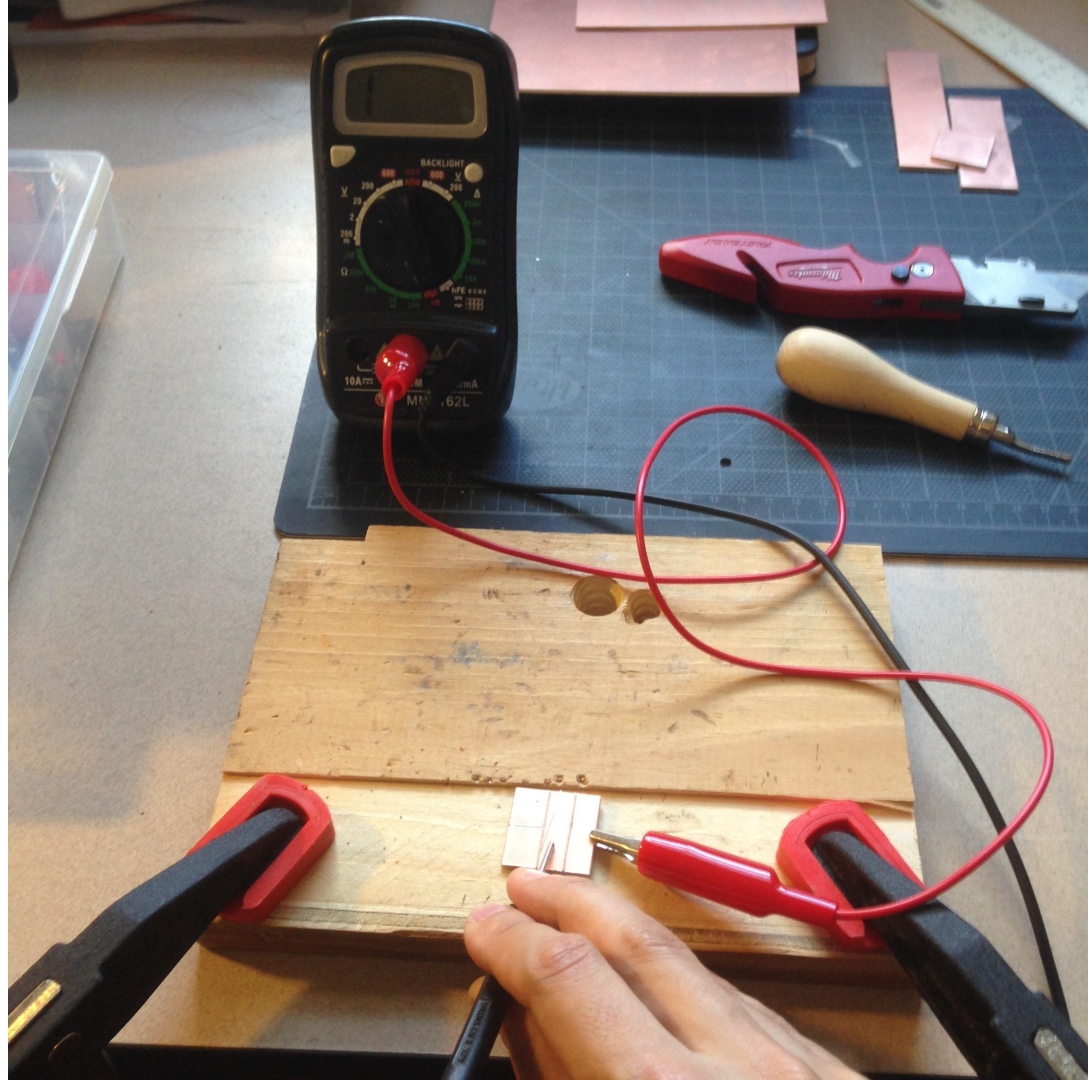
- Use a linoleum carving tool for printmaking
- Start from the middle and carve to the edge
- NEVER carve in the direction of your hand. Always carve away from your hands and body





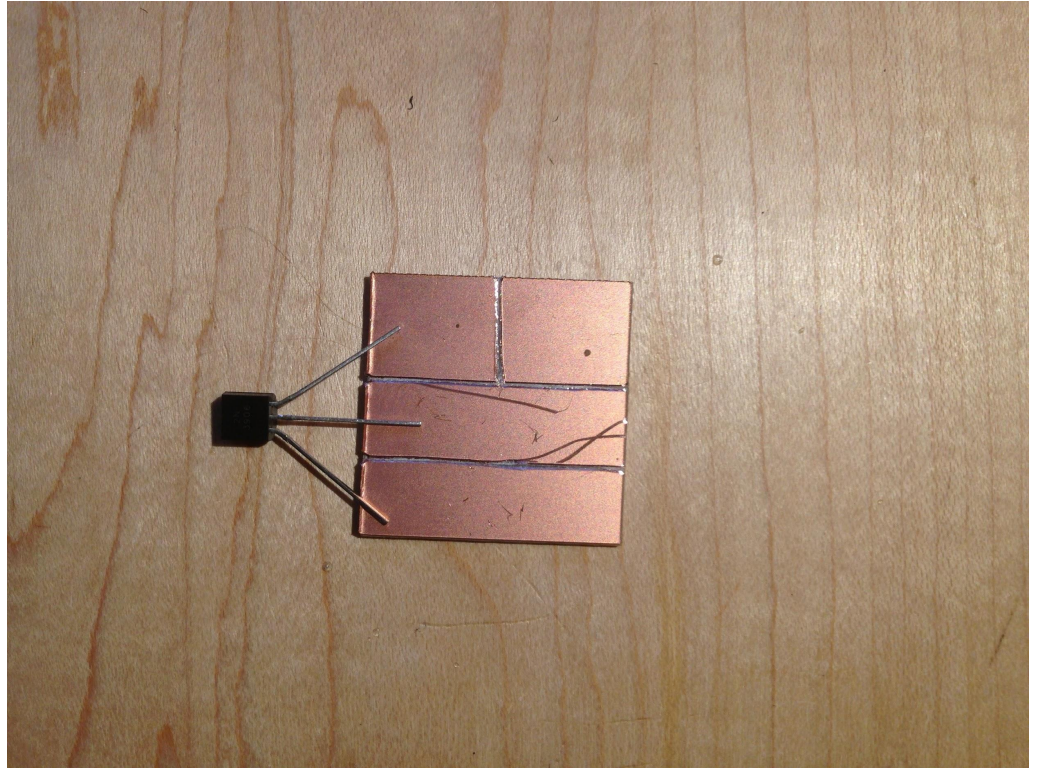
Testing the continuity

All cells must be disconnected from each other

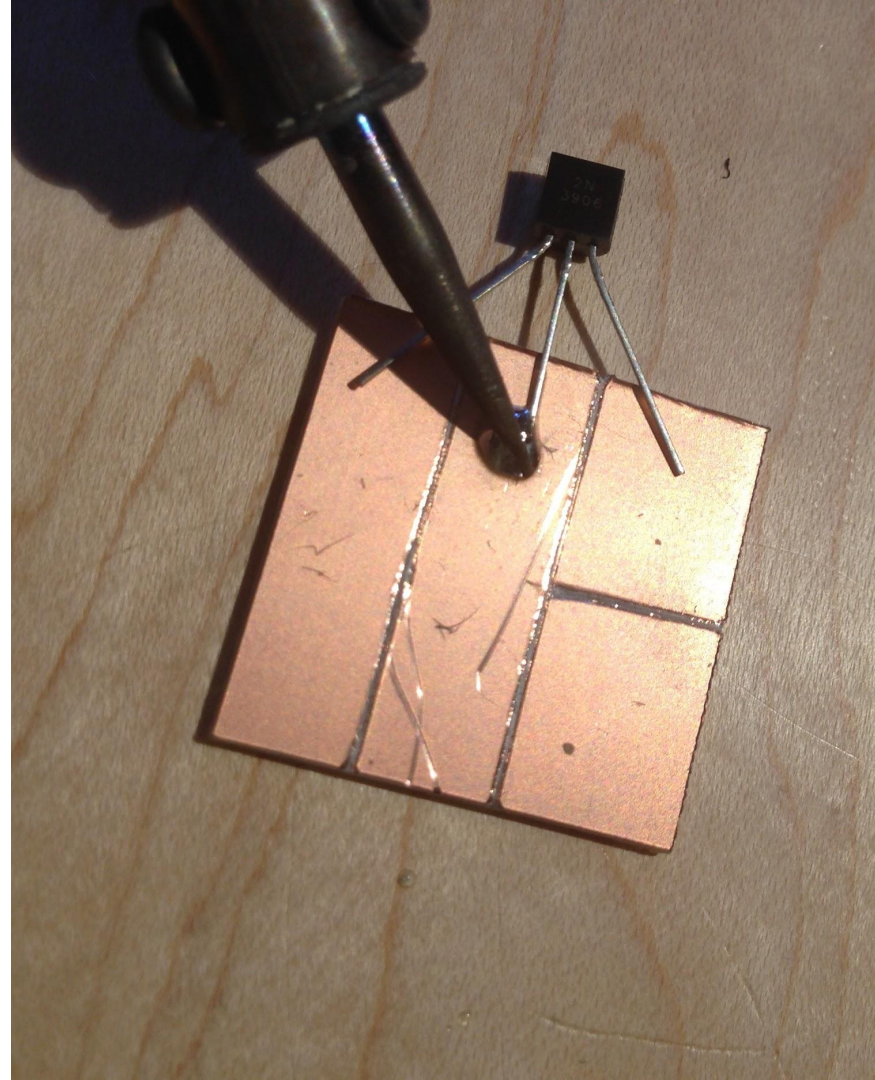


Soldering

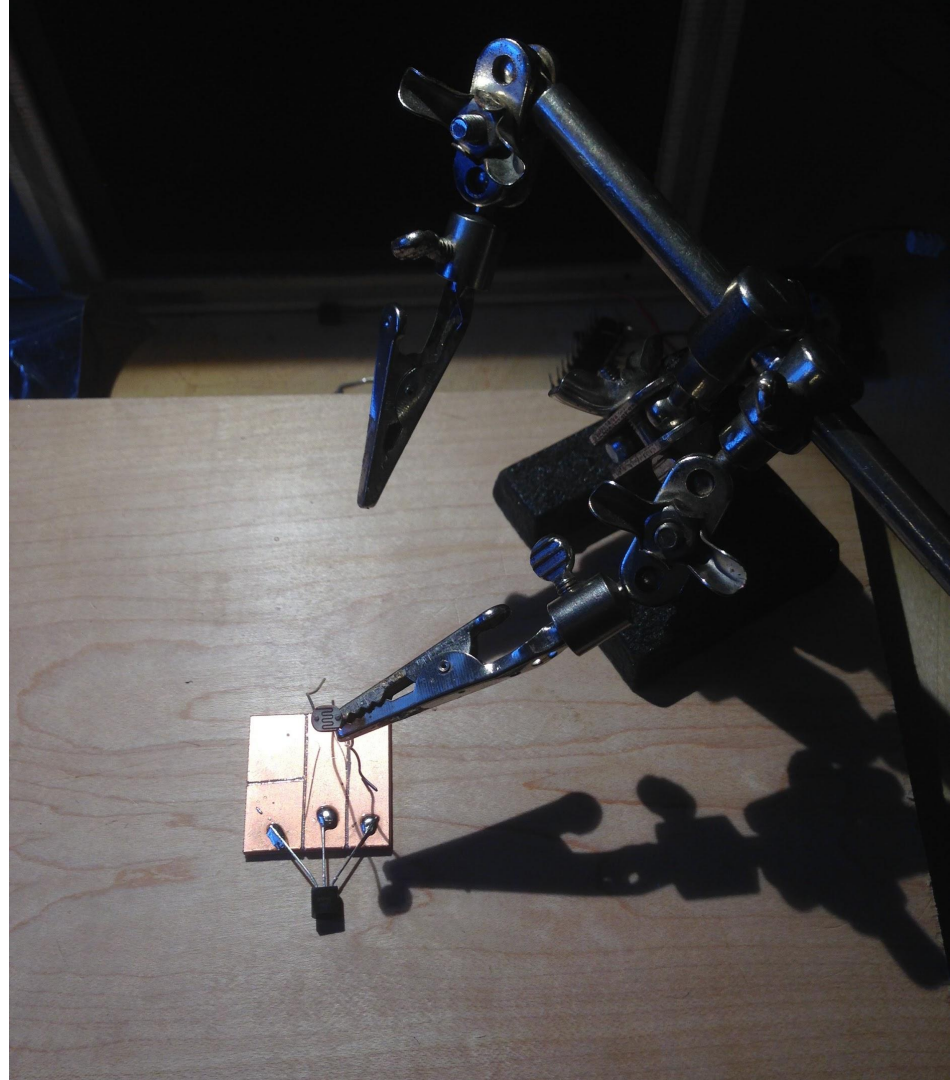
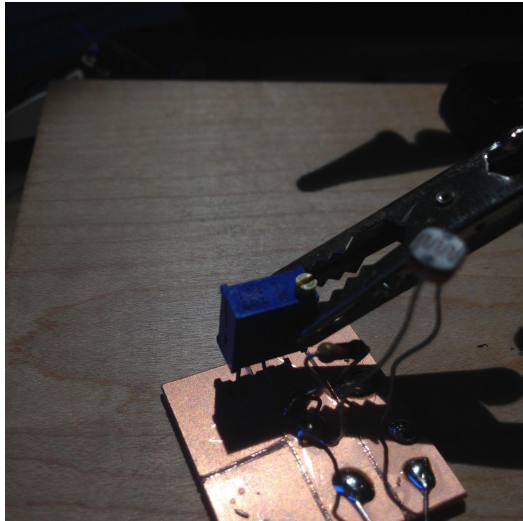
Form your components to
prepare for soldering



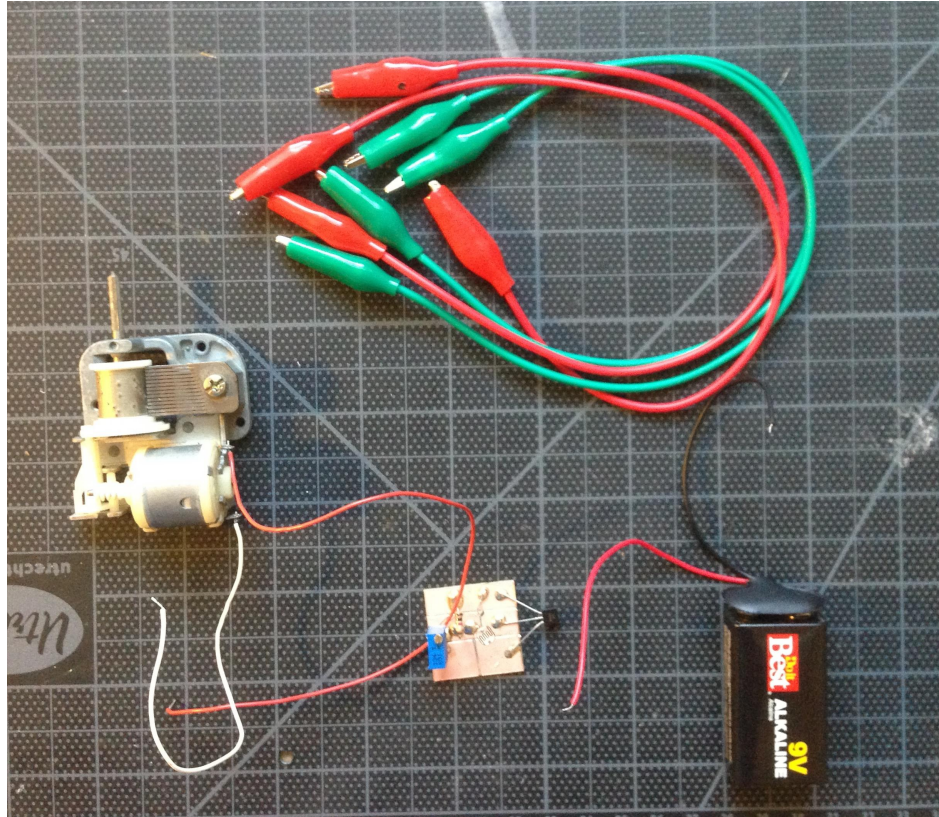
1. Prime the soldering iron tip with solder
2. Place the iron tip at where PCB surface and component's leads meet
3. Wait for a couple seconds to heat the surface
4. Feed the solder
5. Once puddle is formed, exit the solder puddle



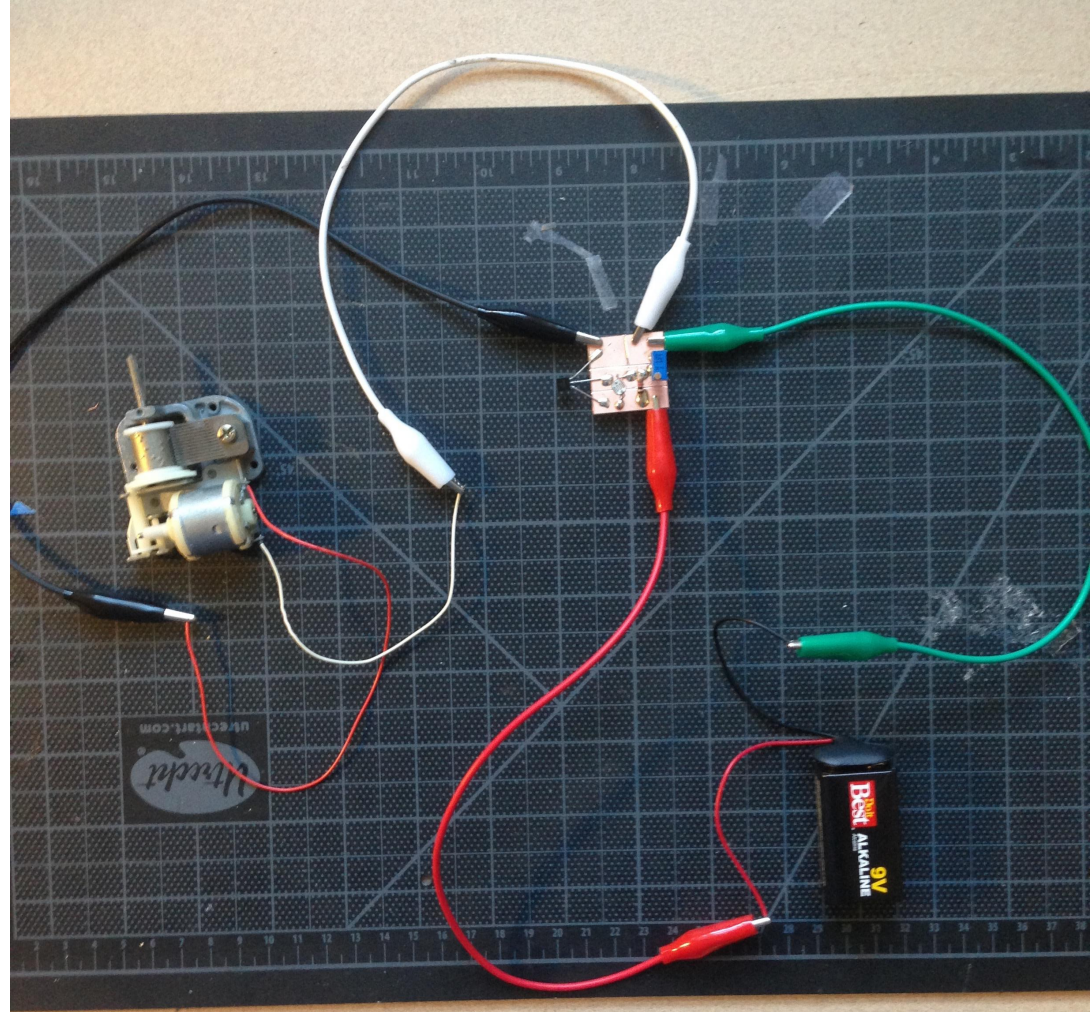
Use the helping hand to hold the components in place while you solder



Test the board

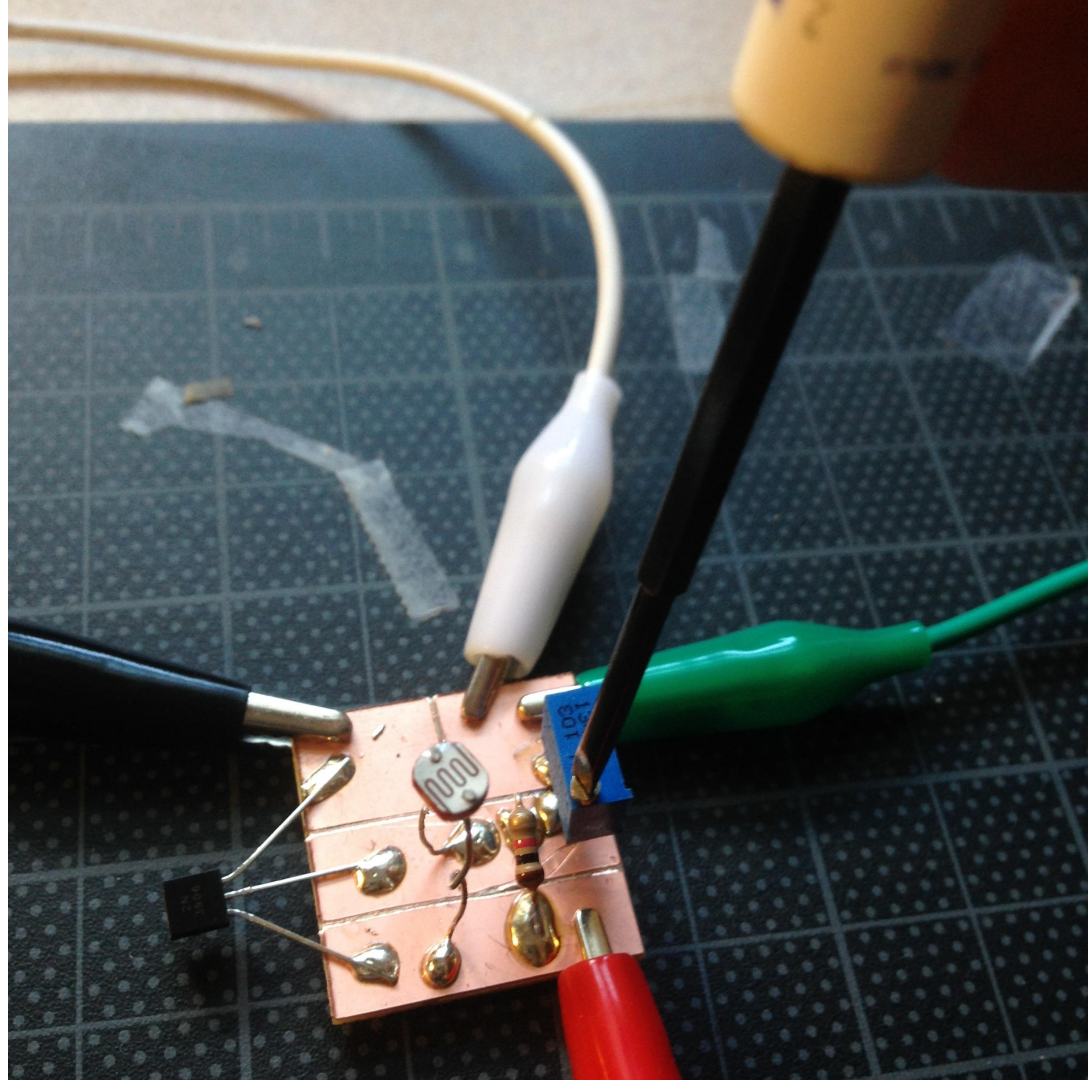


Connect motor of your choice
and battery with alligator clips



Adjustment

Adjust the threshold of trigger (sensitivity) of circuit by turning the screw on potentiometer (trim pot)



Finish the rest of the circuit and start attaching things to the motor!