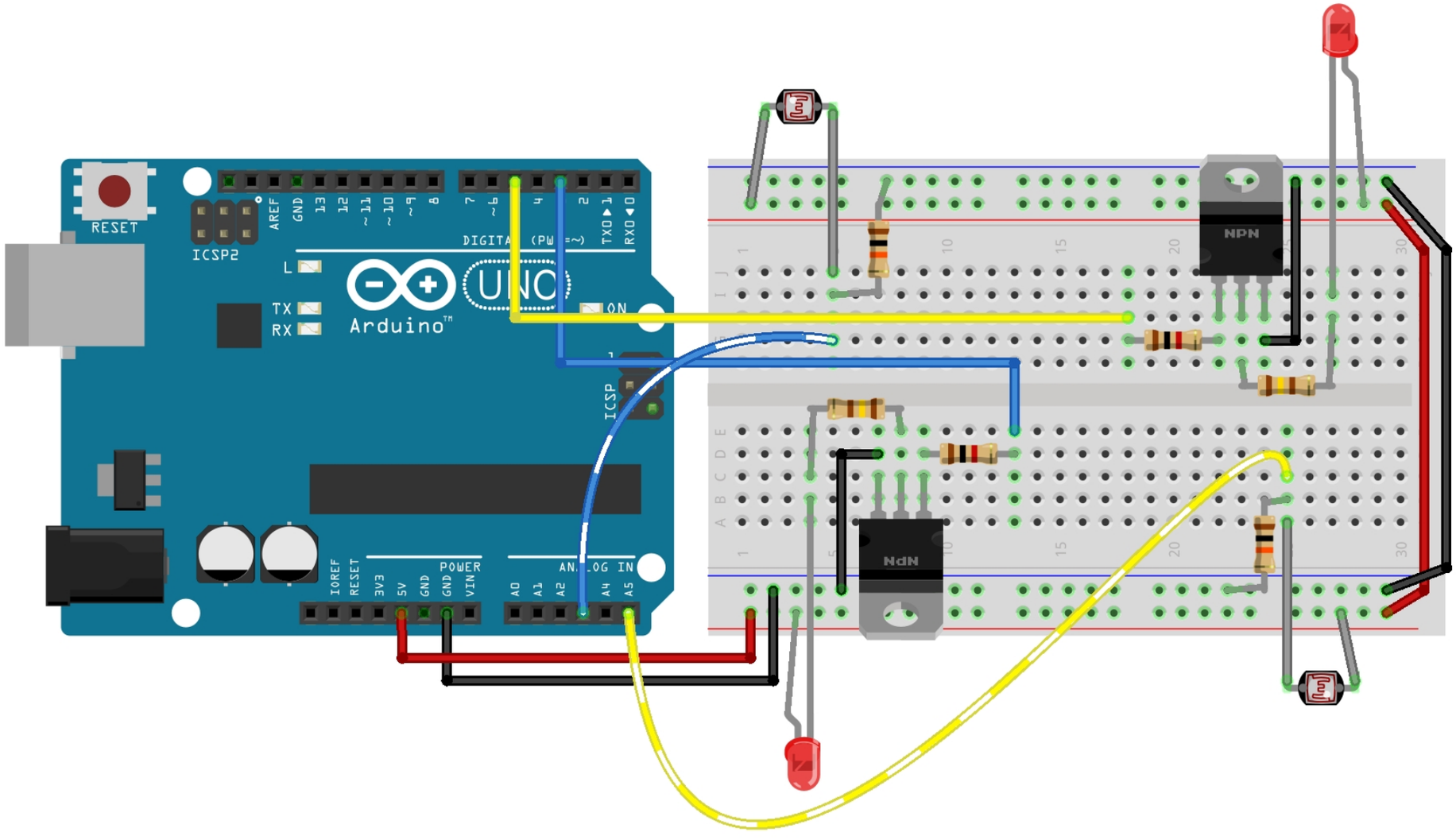
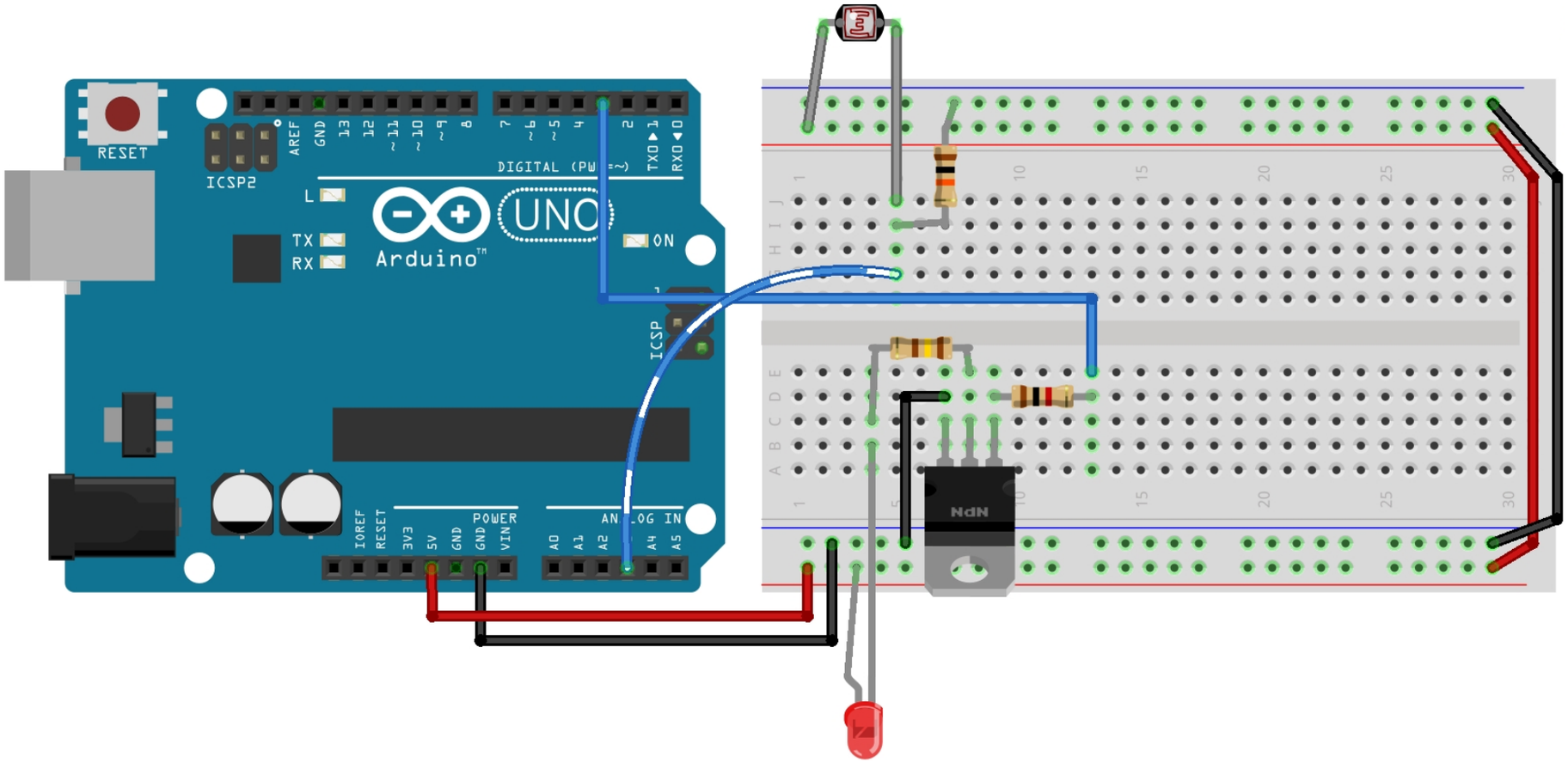
Firefly Build!

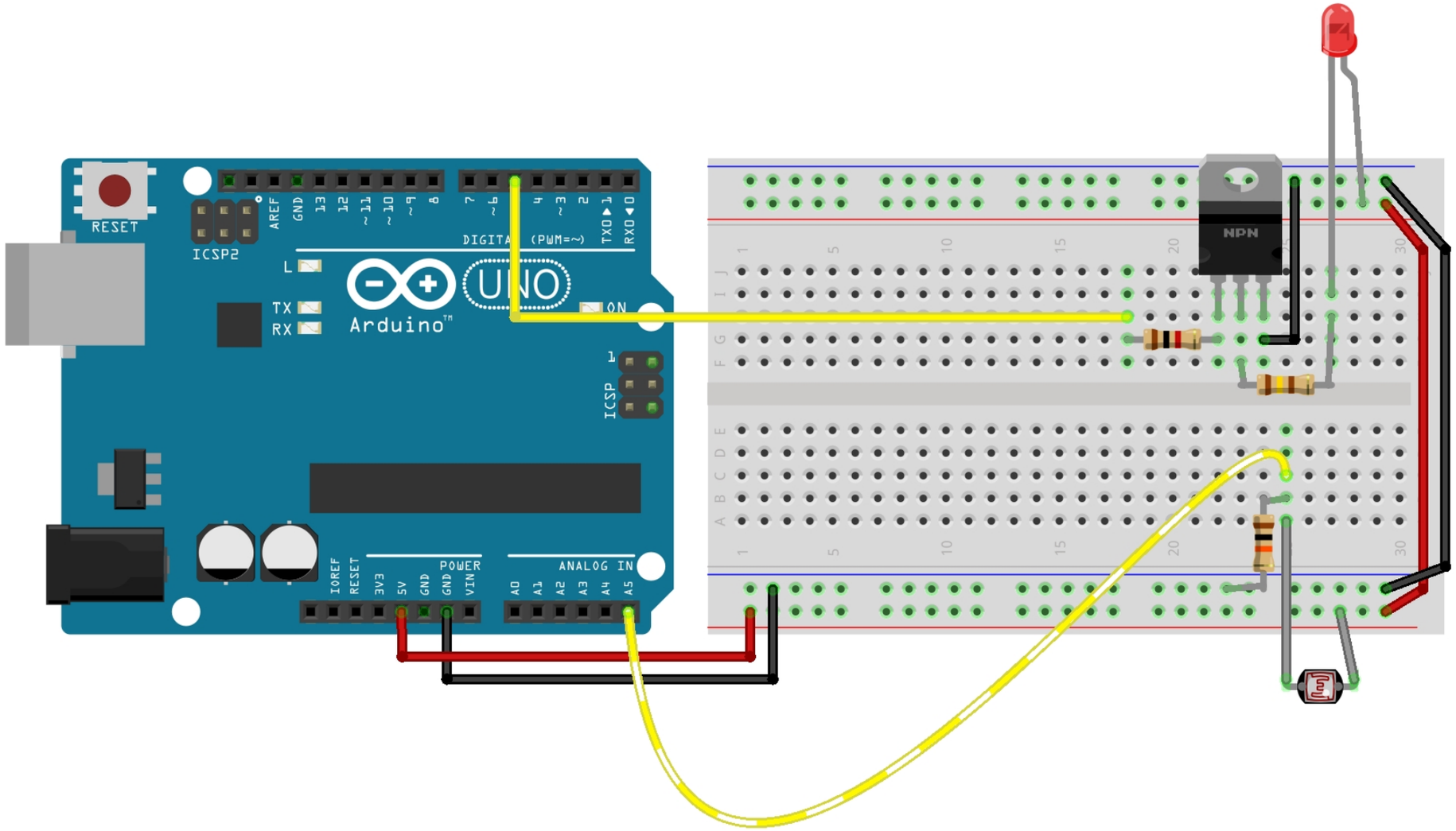
Two complete fireflies!



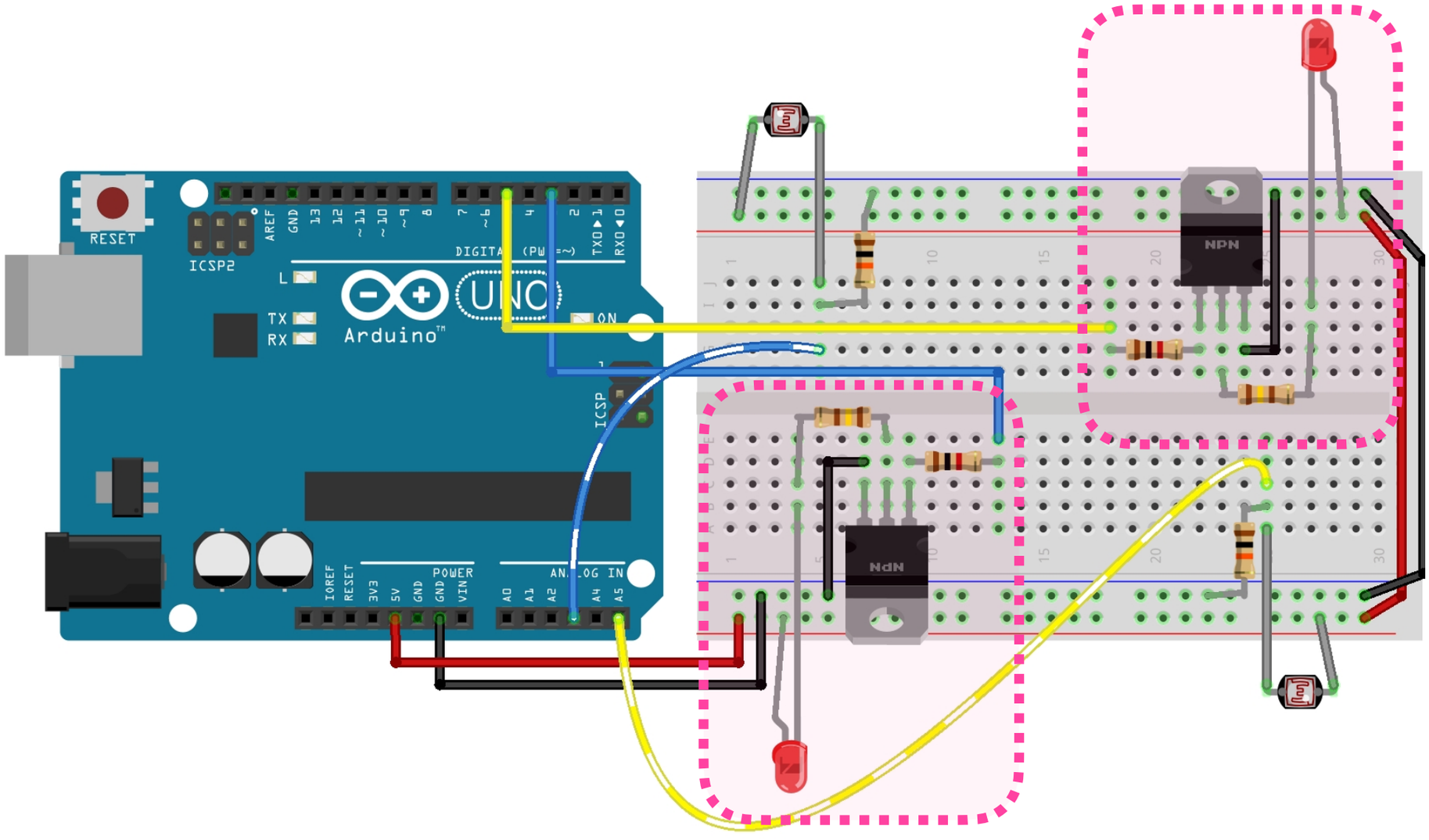
One BLUE firefly!



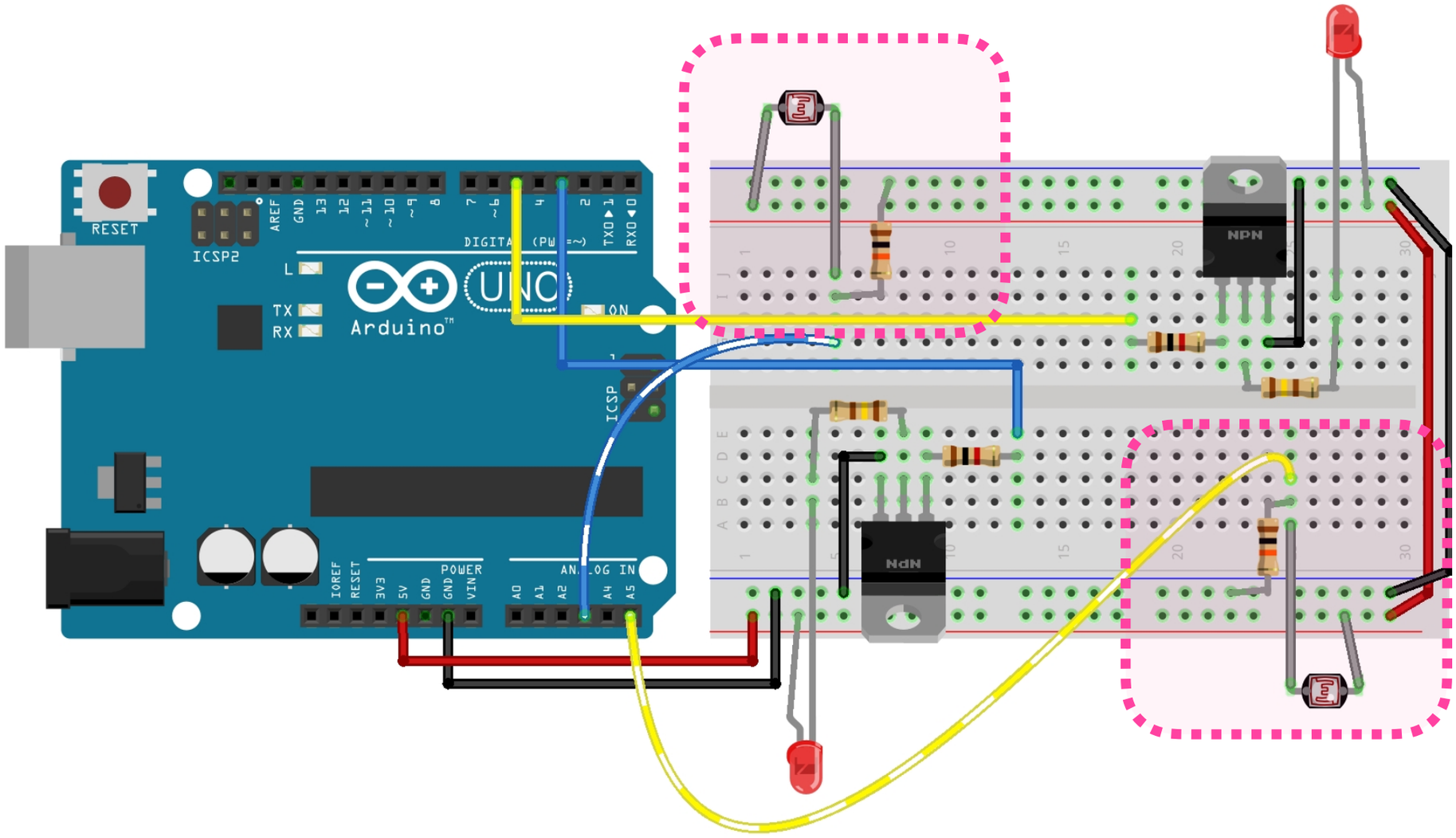
One YELLOW firefly!



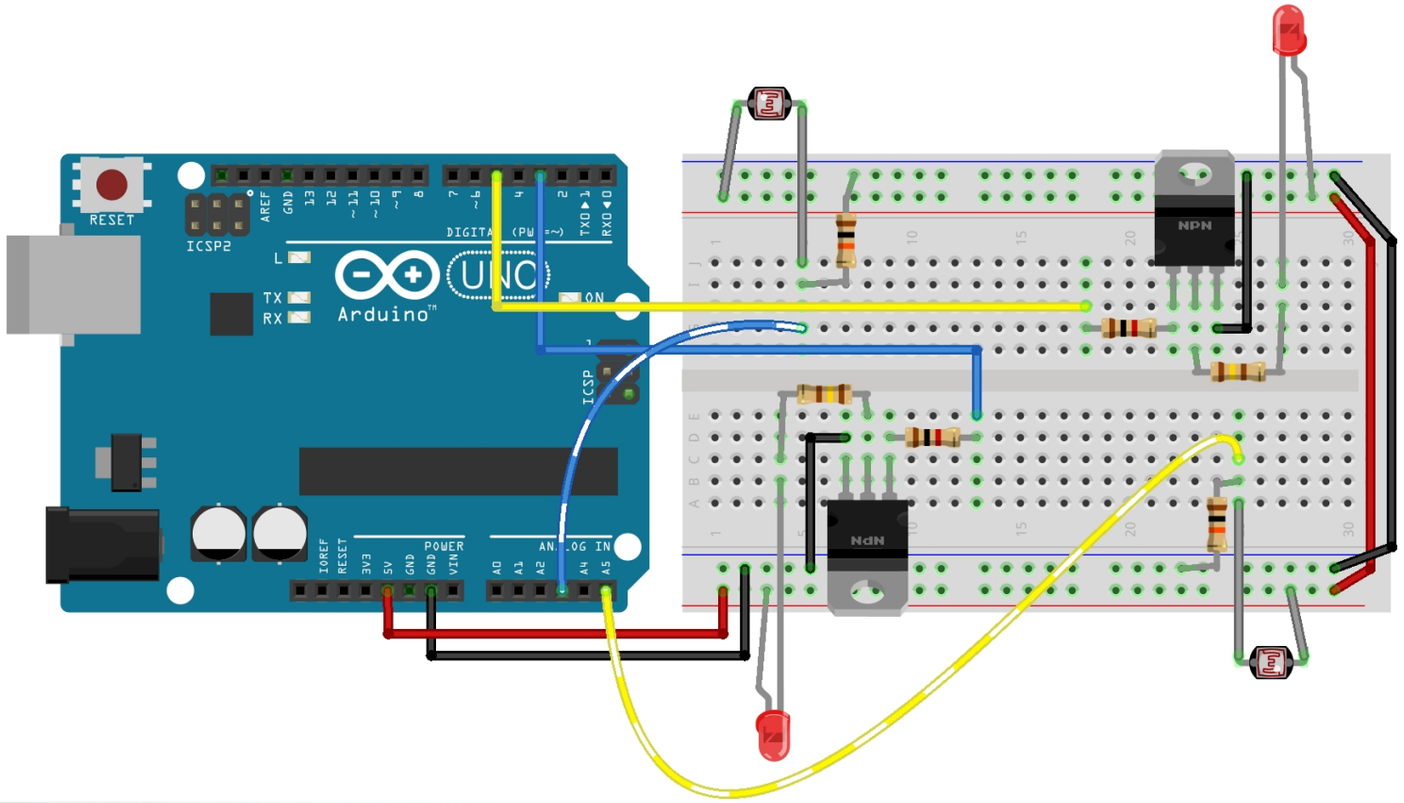
Note the symmetry!

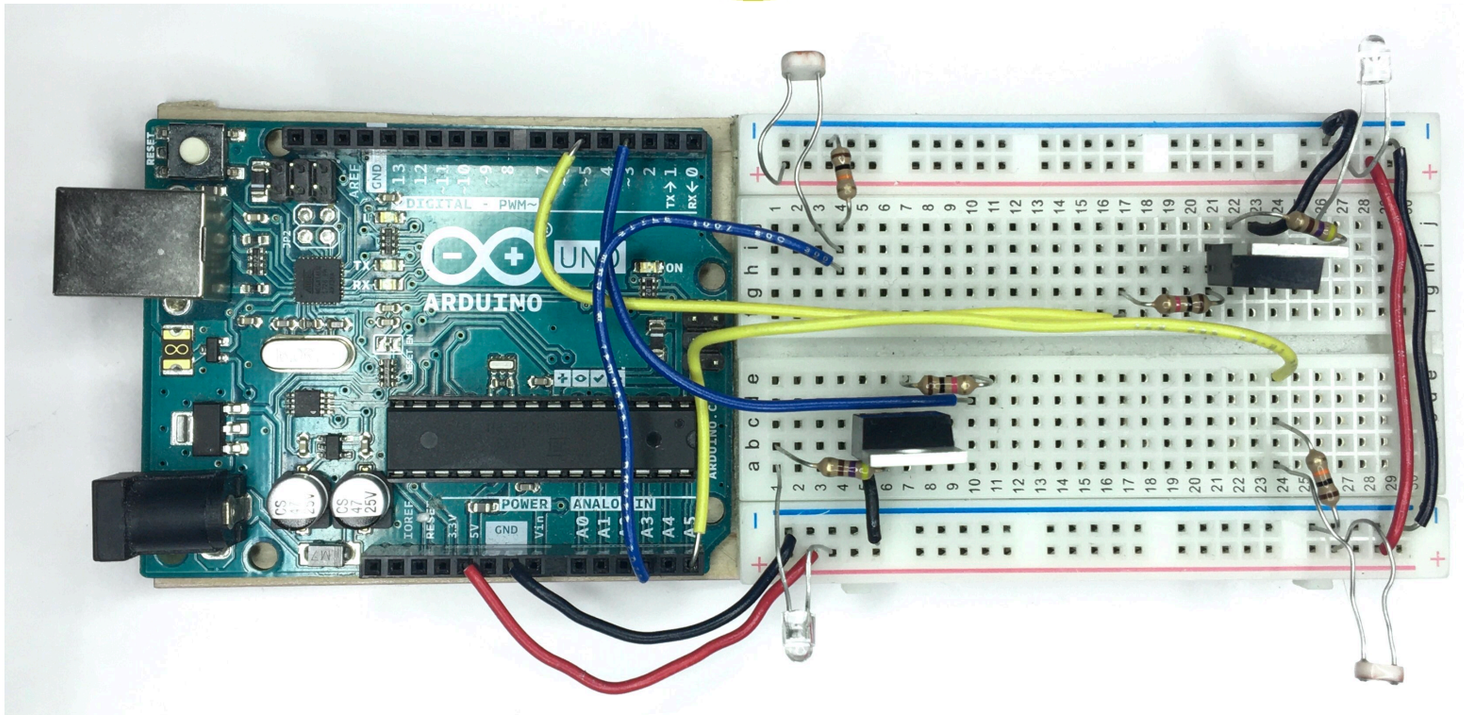


Note the symmetry!



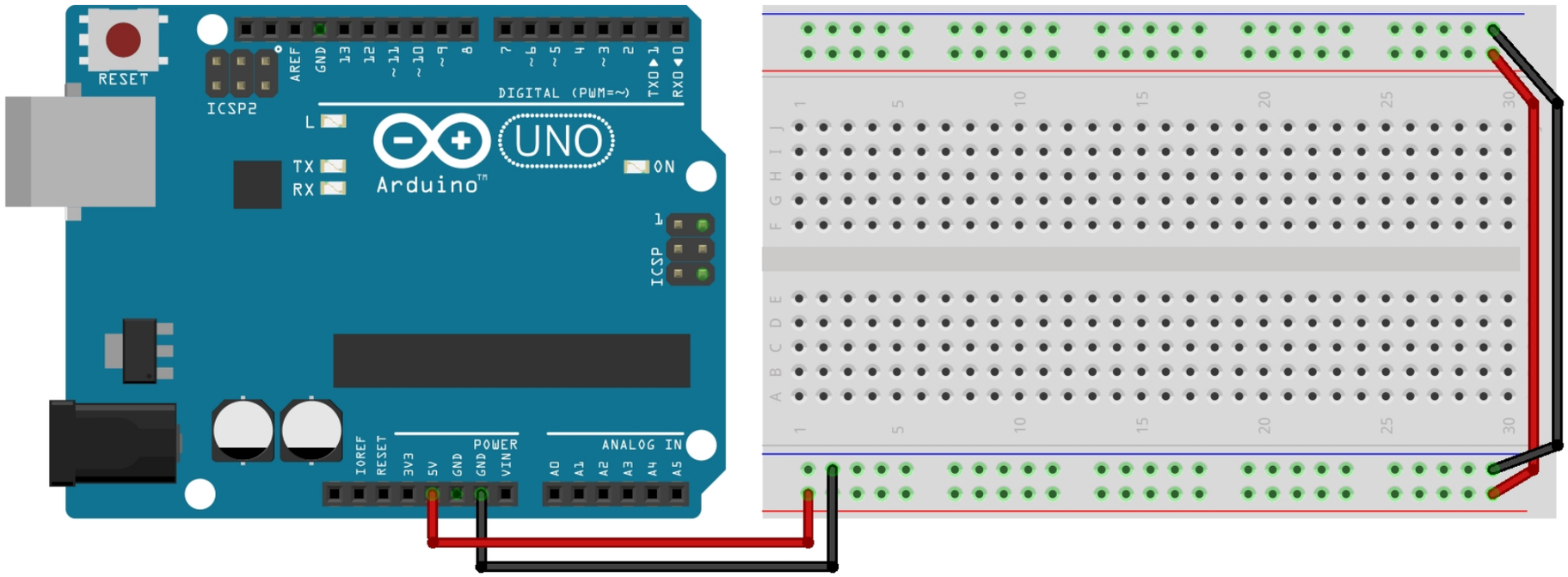
Complete fireflies!





Let’s build,
break it down!

Power

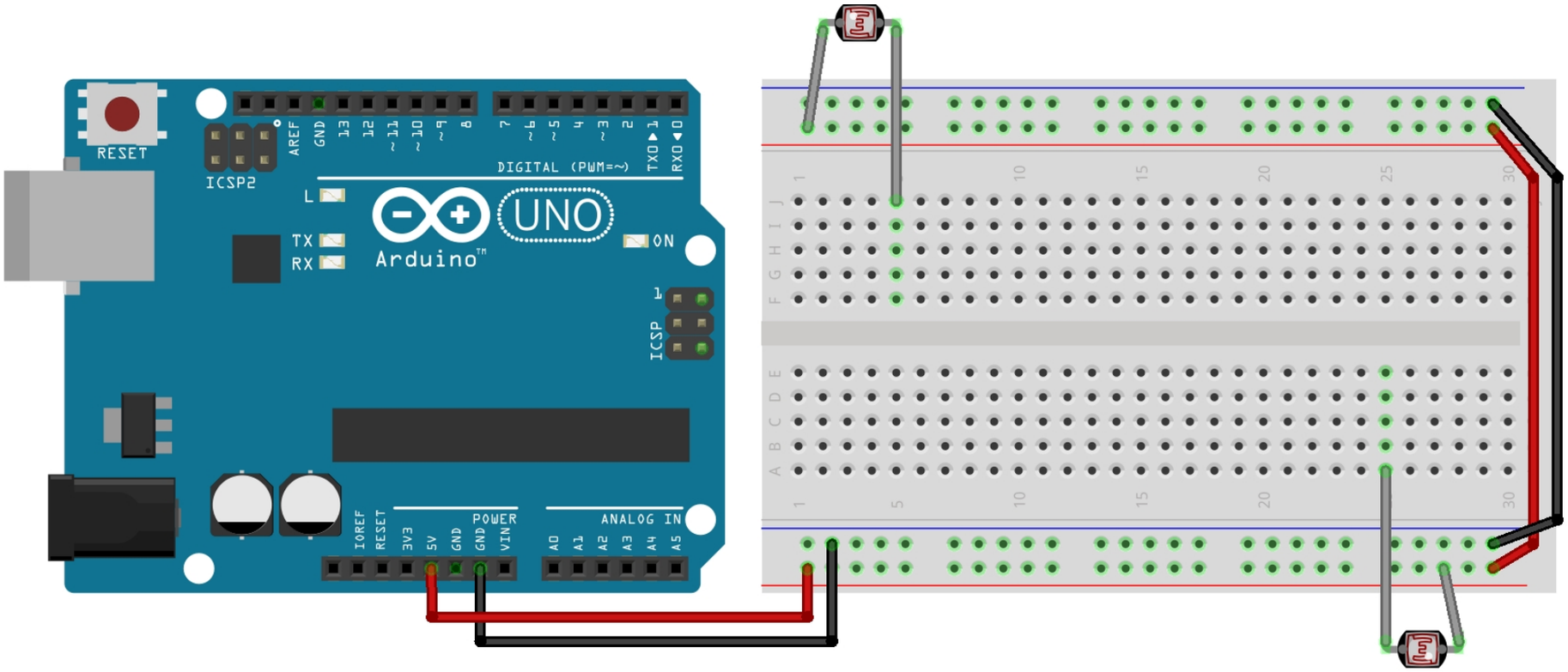


This part should be familiar (or at least a distant memory)

One RED wire 5V to red rail. One RED-to-RED jumper.

BLACK wire GND to blue rail. One BLUE-to-BLUE jumper.

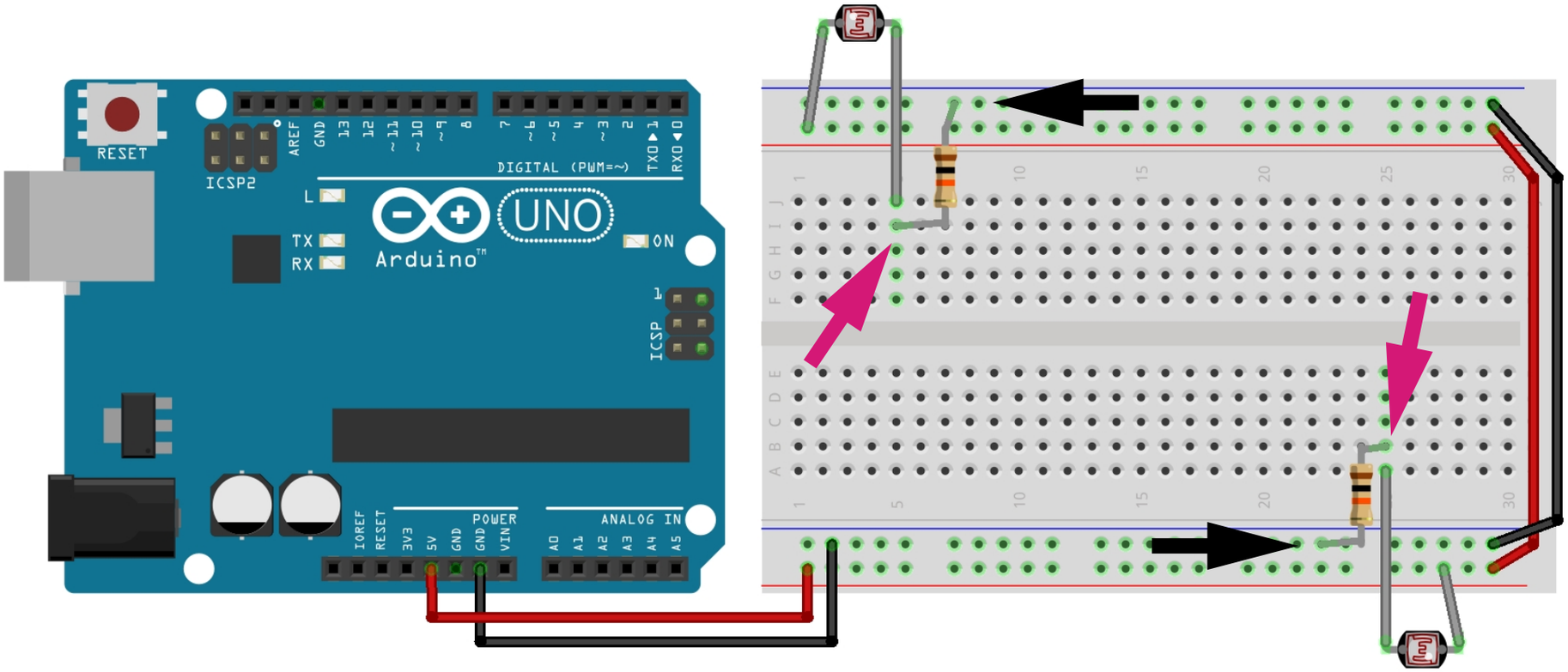
Photocells (eyes)



We have all built this circuit.

One leg of each photocell into 5V, the other into a column on the breadboard.

Photocells (eyes)

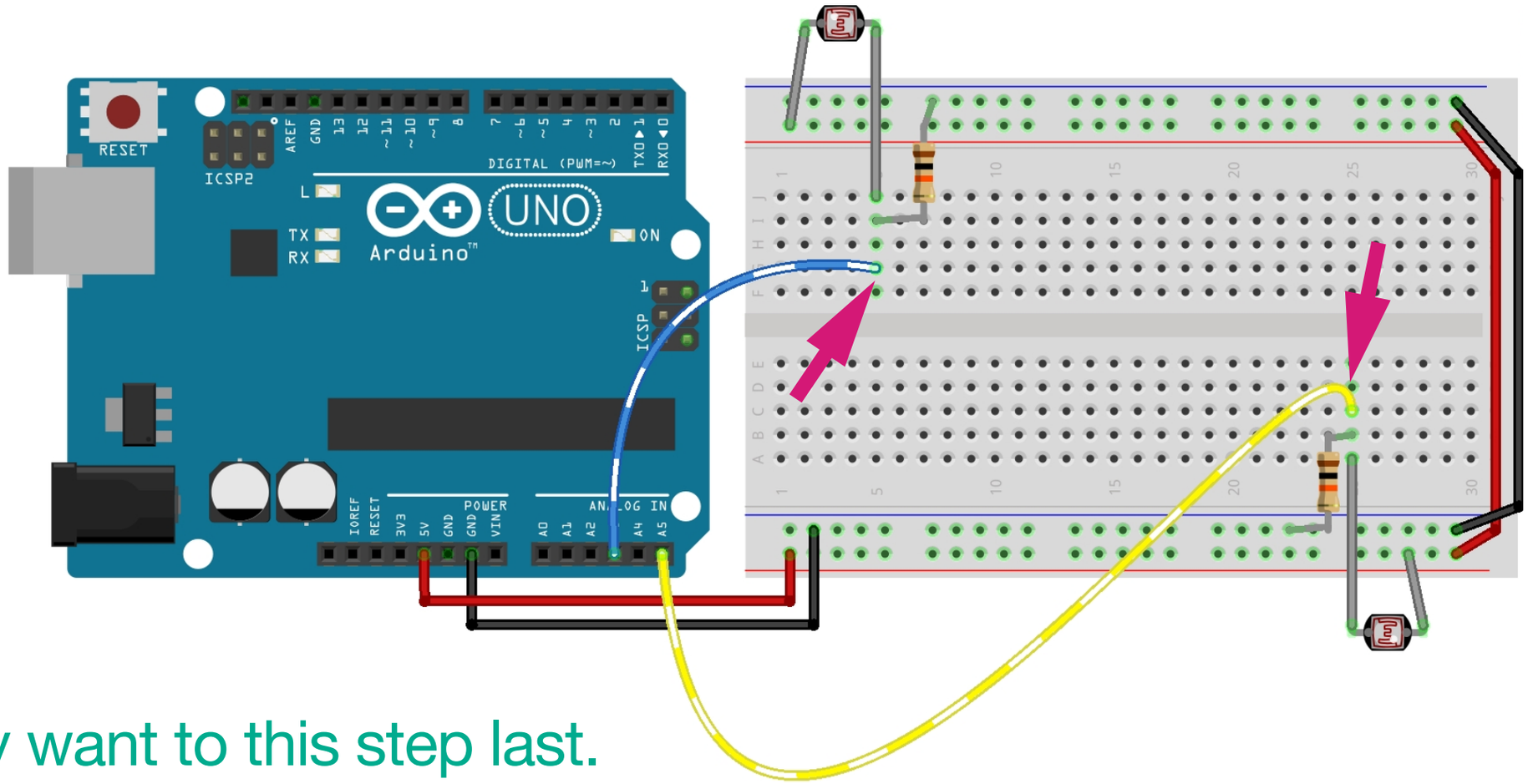


We have all built this circuit.

Add a10K resistor (brown, black orange) to make a voltage divider.

One resistor leg shares the column with the free photocell leg ( ), the other resistor leg goes to ground ( ).

Photocells (eyes)



You may want to this step last.

Connect the middle of the divider ( ) to an ANALOG input.

Yellow firefly connects to A5.
Blue connects to A3.

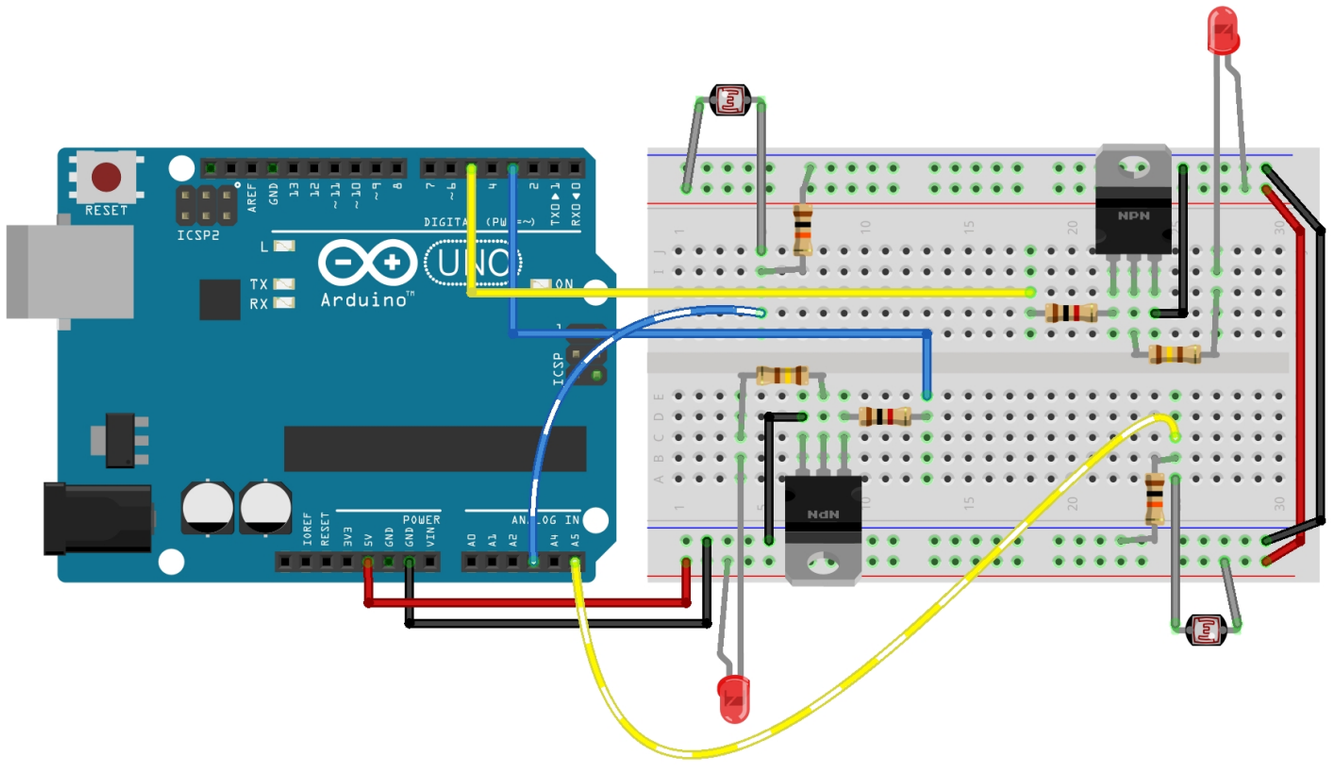
In the real world I ran all my wires down the great divide.

Nearly half way !

You are doing great.

Remember the goal!

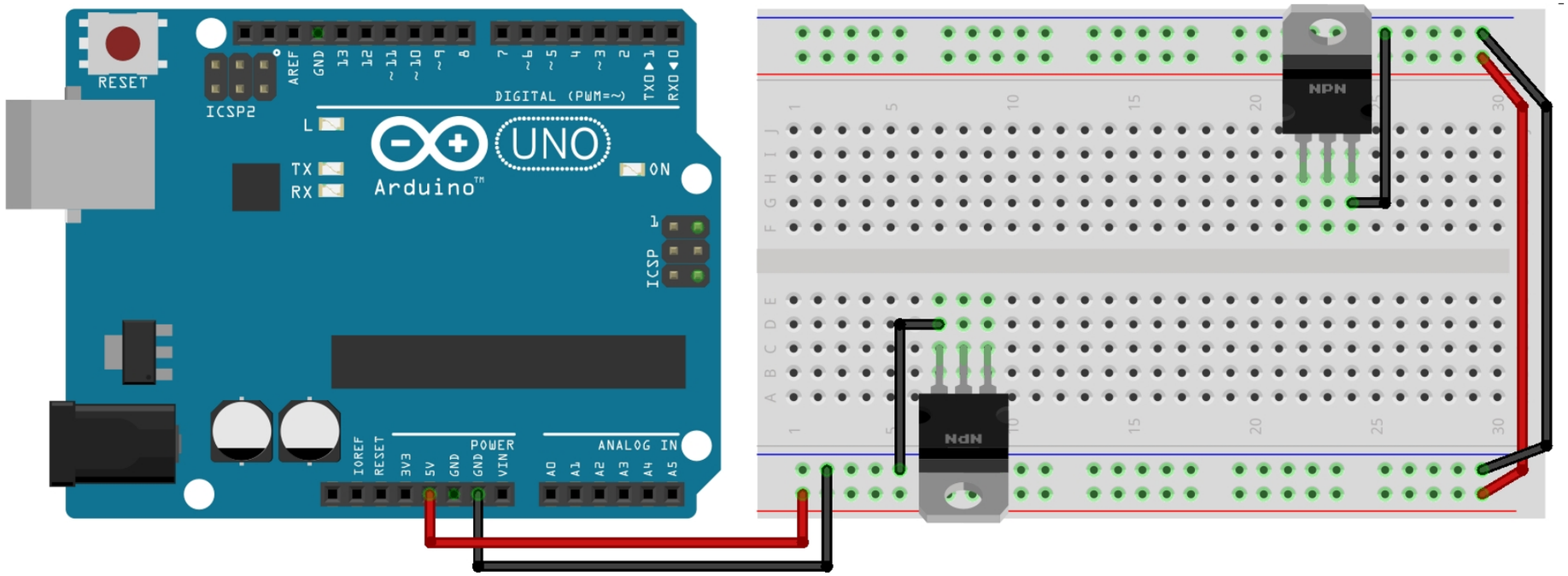
Two complete fireflies



Now, leave your eyes where they are.

For clarity, they are not in the next slides. Do NOT remove them.

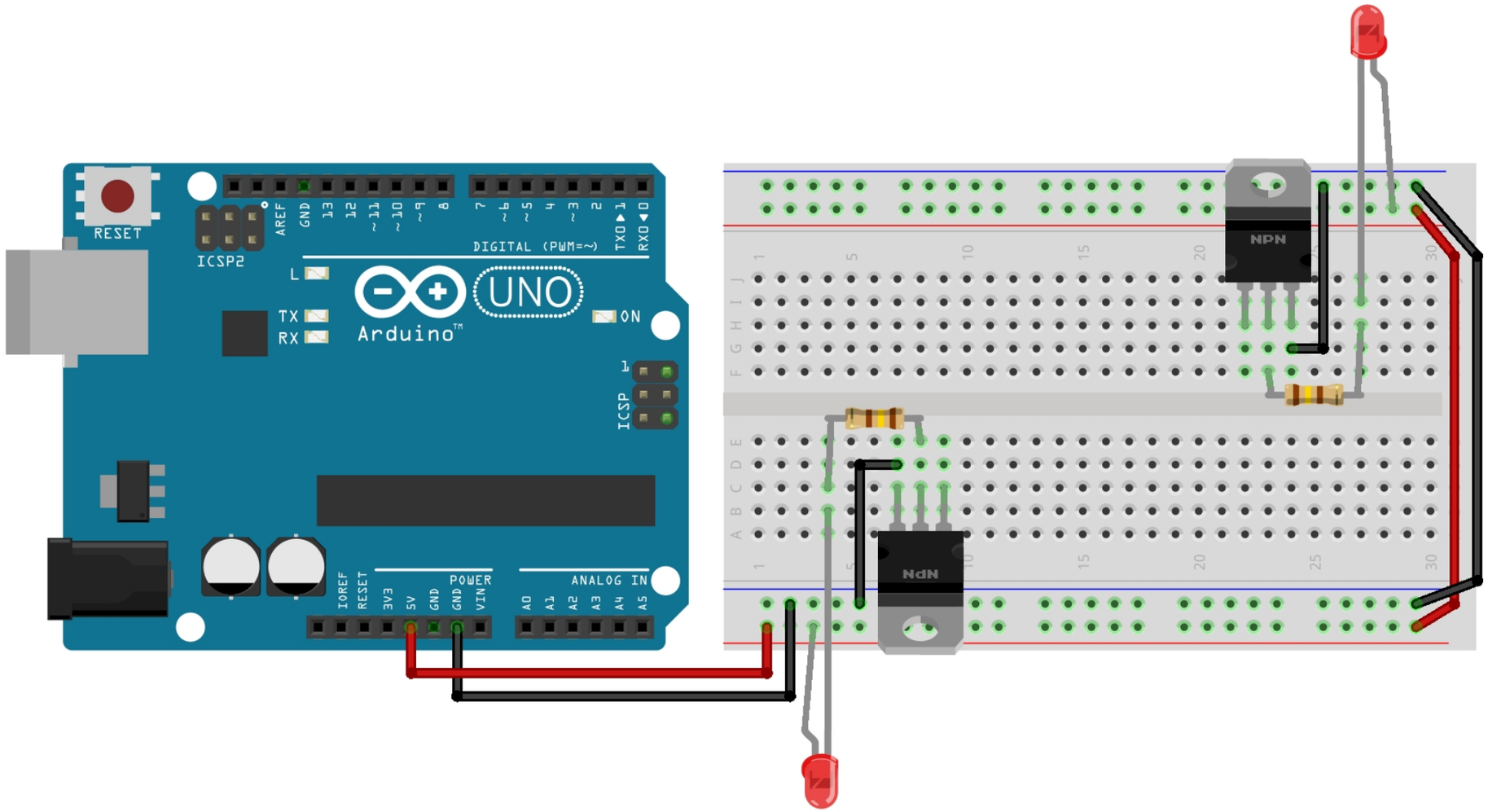
Add transistors



Note that the TIP122s are facing towards the great divide!

That GROUND wire (right leg of TIP to blue rail) can go BEHIND the TIP122, instead of beside it.

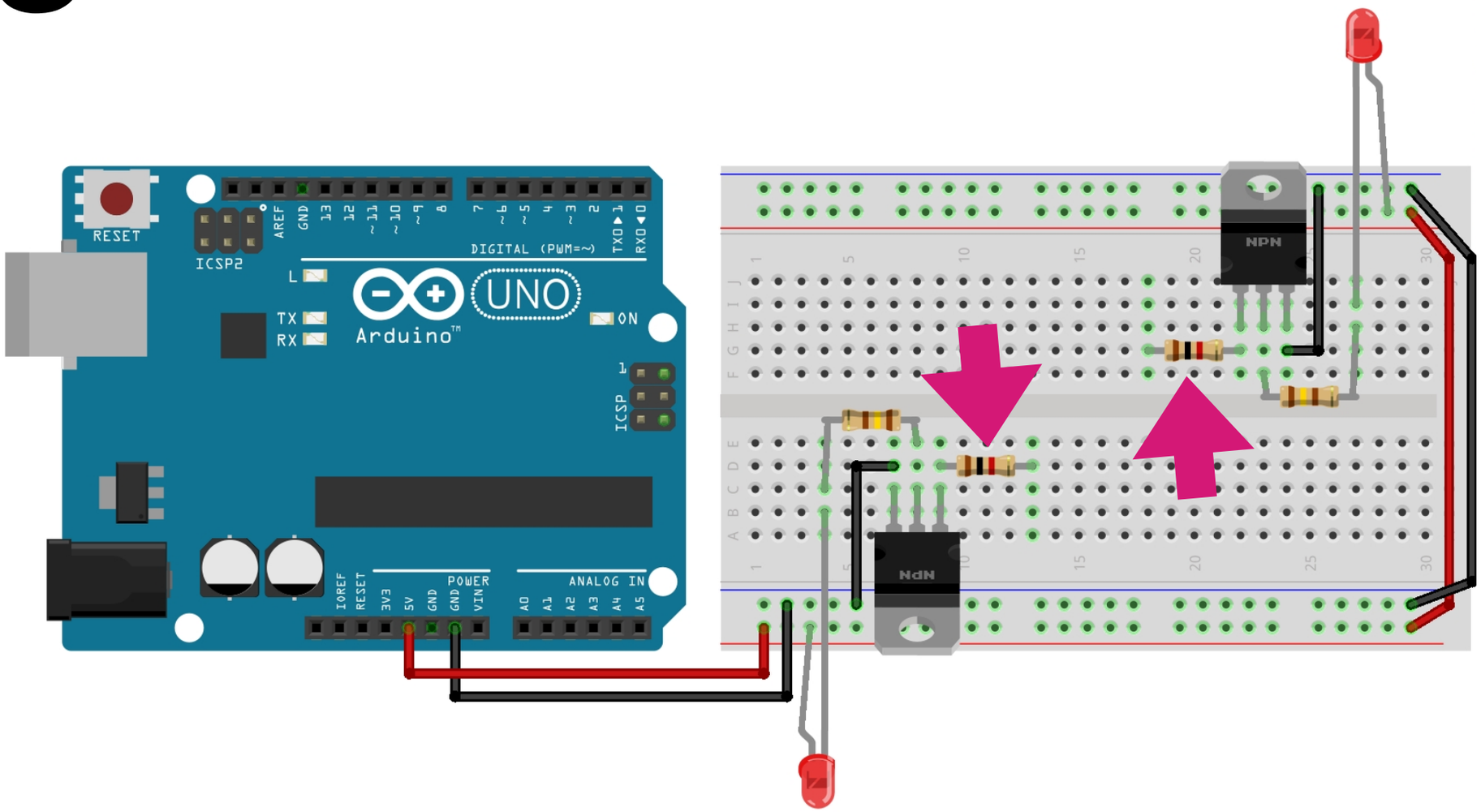
LED and resistor



Add one leg of 470 OHM resistor to middle leg of TIP 122. Other leg toward end of breadboard.

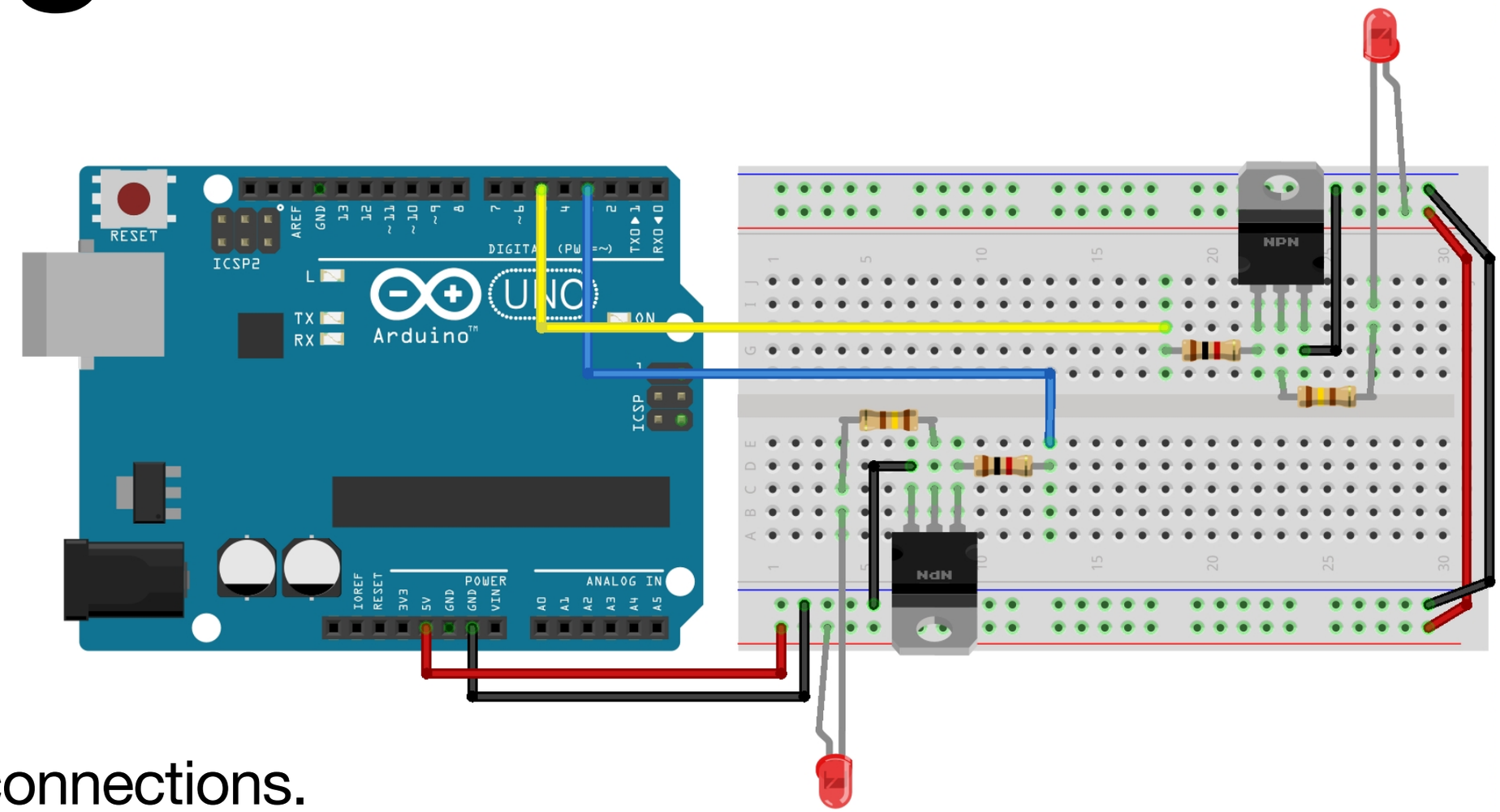
Add LED from 5V to 470 ohm resistor. REMEMBER : short LED leg (flat side) to ground (in this case towards the resistor). Long leg to 5V.

Signal Resistor



Add **1k** resistor (brown black red) from left leg of EACH TIP122 towards middle of board. These are called base resistors.

Signal Resistor



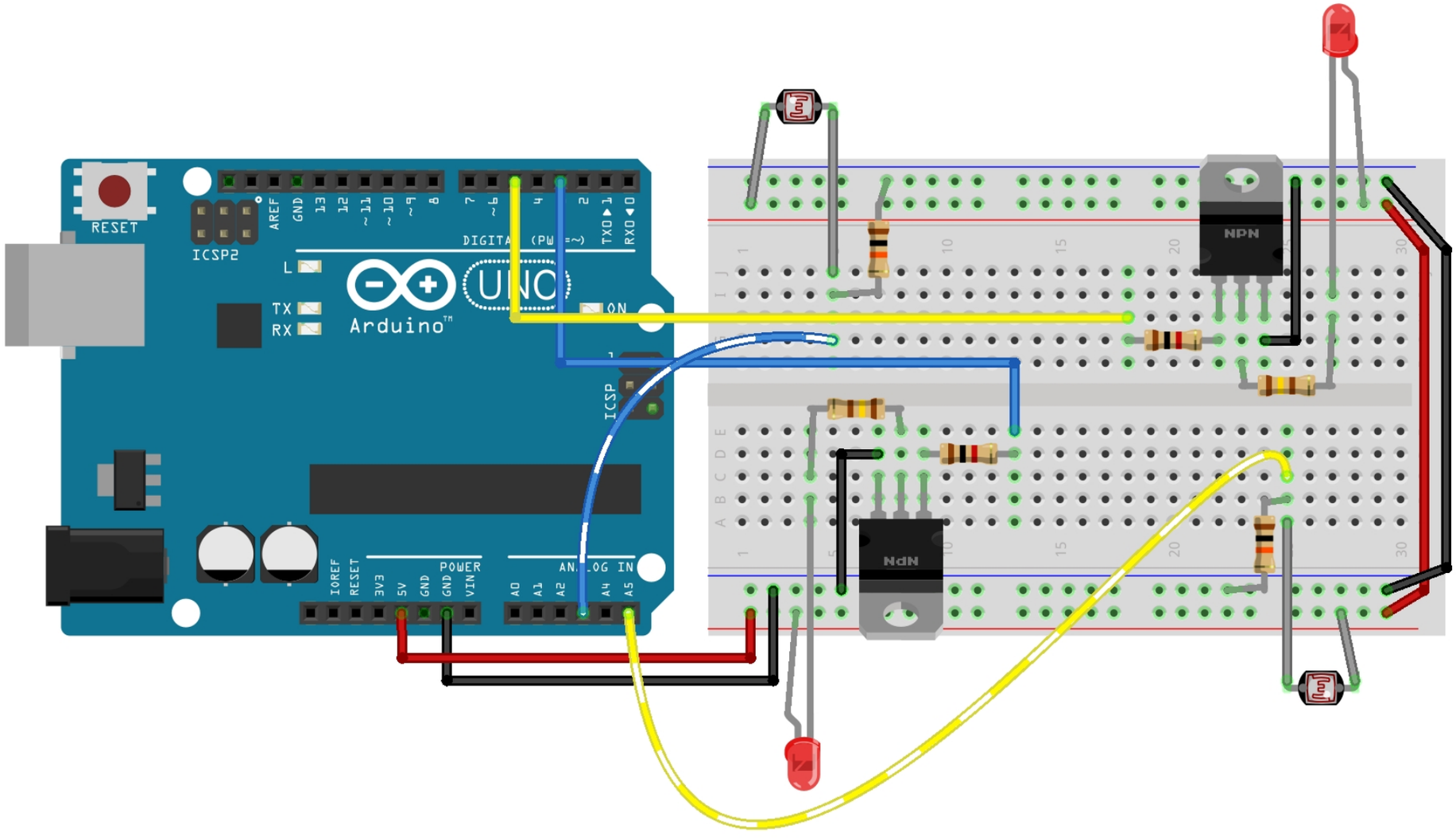
Last connections.

Signal wire from 5 to yellow base resistor

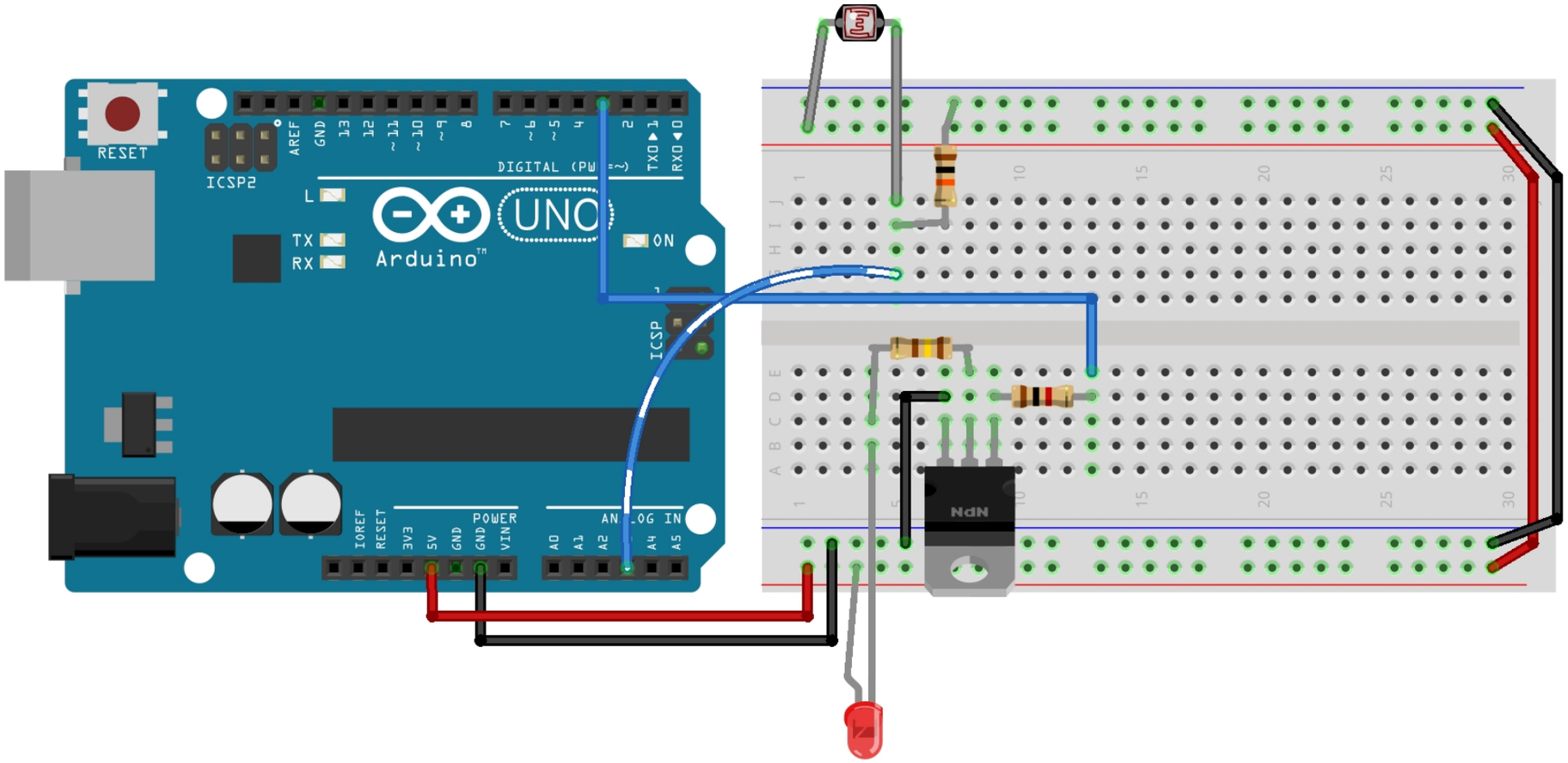
Signal wire from 3 to blue base resistor

Double check your work!

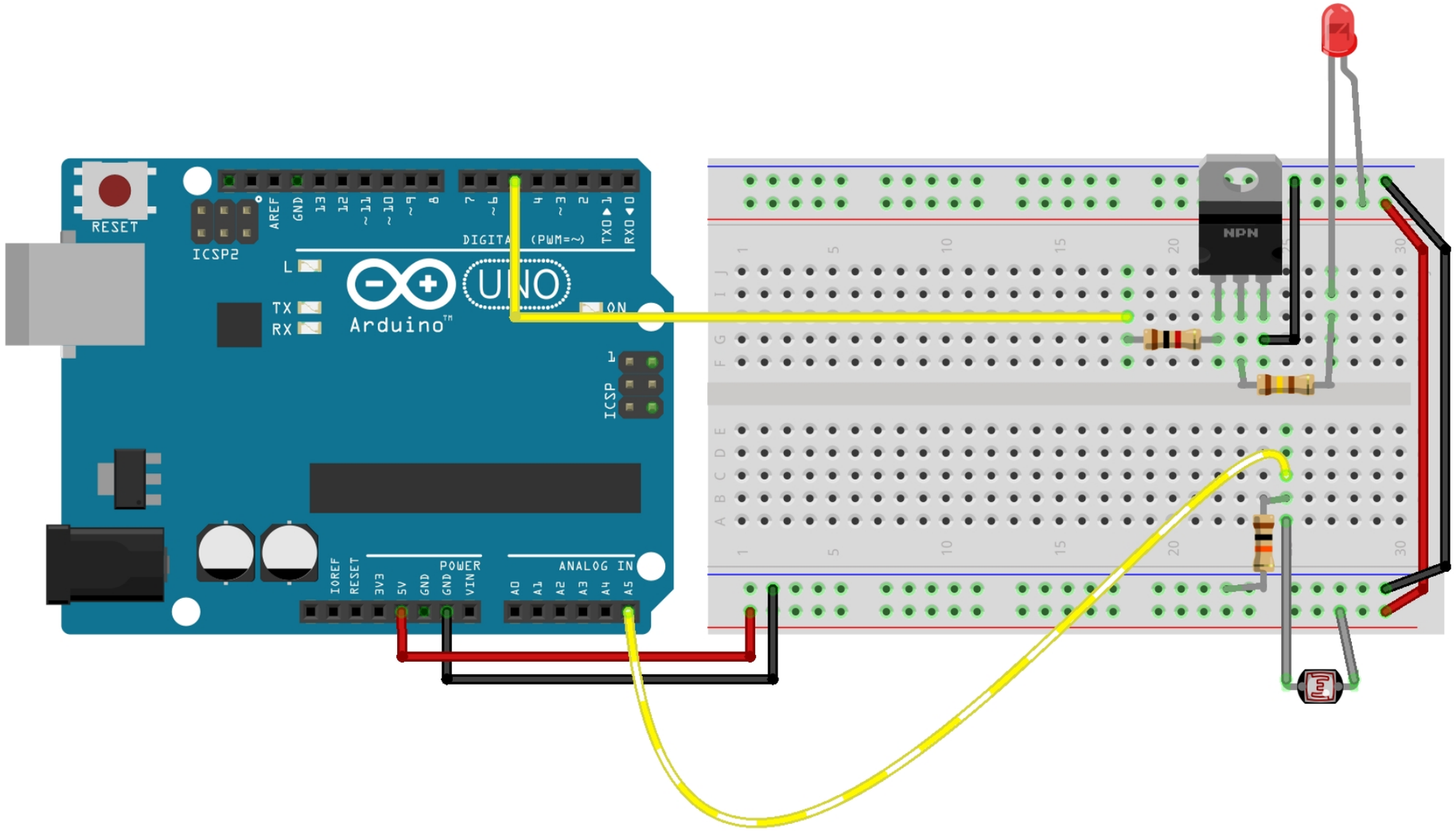
Two complete fireflies!



One BLUE firefly!



One YELLOW firefly!



Two software tests

and you are done !

1

Blink the LEDs

Make sure the LEDs come on when you need them to!

`firefly-blinktest.ino`

When you run this code the LEDs should both blink at the same time.

2

Make sure your firefly FIRES!

`firefly_v1.ino`

Technically we need to tune this circuit — but give this a shot anyway (it may not work as expected — we will tune in class).

Upload this code. Shine your phone flashlight on the yellow photo cell, this should cause the yellow LED to turn on. Similarly, flashlight pointed at blue firefly's photocell should turn on blue LED.