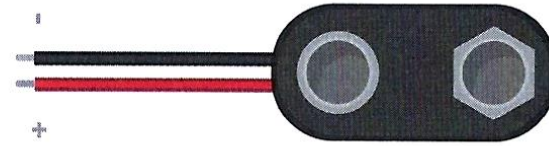
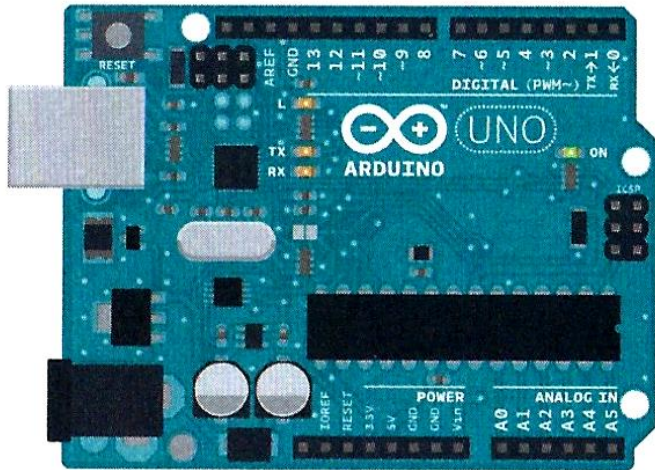
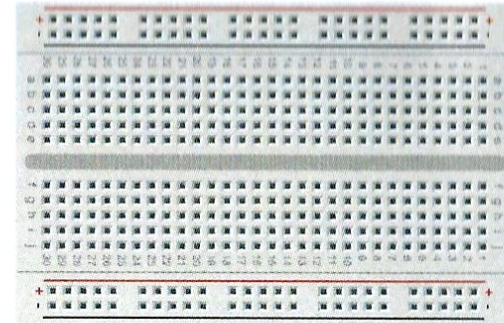


Introduktion till Arduino

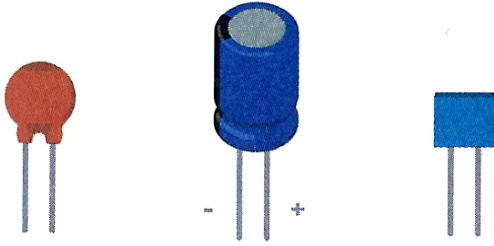


Battery Snap - Used to connect a 9V battery to power leads that can be easily plugged into a breadboard or your Arduino.

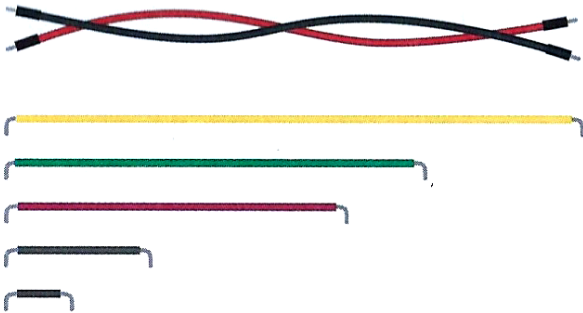


Breadboard - A board on which you can build electronic circuits. It's like a patch panel, with rows of holes that allow you to connect wires and components together. Versions that require soldering are available, as well as the solder-less type used here.

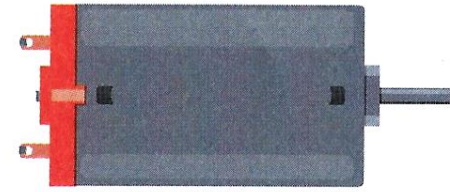
Arduino Uno - The microcontroller development board that will be at the heart of your projects. It's a simple computer, but one that has no way for you to interact with it yet. You will be building the circuits and interfaces for interaction, and telling the microcontroller how to interface with other components.



Capacitors - These components store and release electrical energy in a circuit. When the circuit's voltage is higher than what is stored in the capacitor, it allows current to flow in, giving the capacitor a charge. When the circuit's voltage is lower, the stored charge is released. Often placed across power and ground close to a sensor or motor to help smooth fluctuations in voltage.



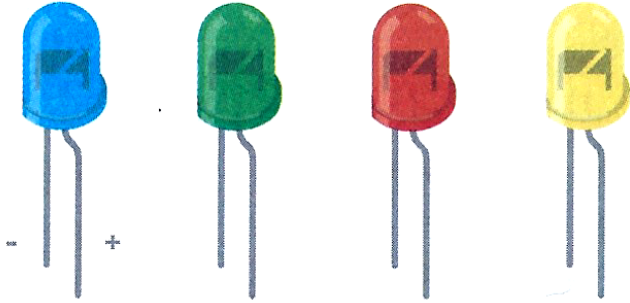
Jumper wires - Use these to connect components to each other on the breadboard, and to the Arduino.



DC motor - Converts electrical energy into mechanical energy when electricity is applied to its leads. Coils of wire inside the motor become magnetized when current flows through them.



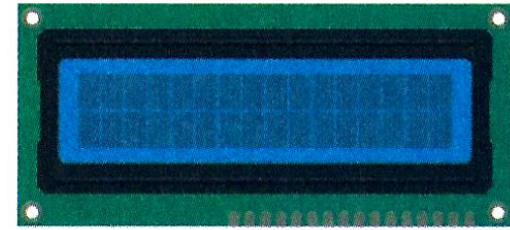
Diode - Ensures electricity only flows in one direction. Useful when you have a motor or other high current/voltage load in your circuit. Diodes are polarized, meaning that the direction that they're placed in a circuit matters. Placed one way, they allow current to pass through. Placed the other way, they block it. The anode side generally connects to the point of higher energy in your circuit. The cathode typically connects to the point of lower energy, or to ground. The cathode is usually marked with a band on one side of the component's body.



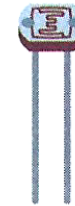
Light Emitting Diodes (LEDs) - A type of diode that illuminates when electricity passes through it. Like all diodes, electricity only flows in one direction through these components. You're probably familiar with these as indicators on a variety of electronic devices. The anode, which typically connects to power, is usually the longer leg, and the cathode is the shorter leg.



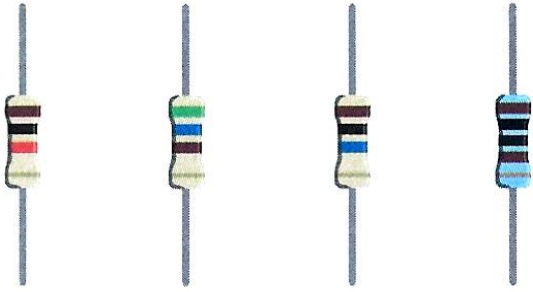
Piezo - An electrical component that can be used to detect vibrations and create noises.



Liquid Crystal Display (LCD) - A type of alpha-numeric or graphic display based on liquid crystals. LCDs are available in a many sizes, shapes, and styles. Yours has 2 rows with 16 characters each.



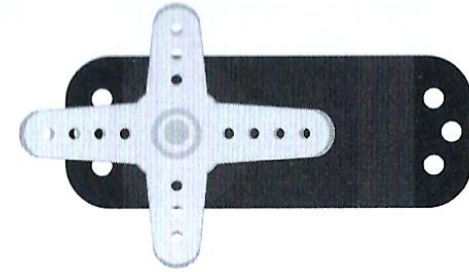
Photoresistor - (also called a photocell, or light-dependent resistor). A variable resistor that changes its resistance based on the amount of light that falls on its face.



Resistors - Resist the flow of electrical energy in a circuit, changing the voltage and current as a result. Resistor values are measured in ohms (represented by the Greek omega character: Ω). The colored stripes on the sides of resistors indicate their value (see resistor color code table, p. 41).



Pushbuttons - Momentary switches that close a circuit when pressed. They snap into breadboards easily. These are good for detecting on/off signals.



Servo motor - A type of geared motor that can only rotate 180 degrees. It is controlled by sending electrical pulses from your Arduino. These pulses tell the motor what position it should move to.



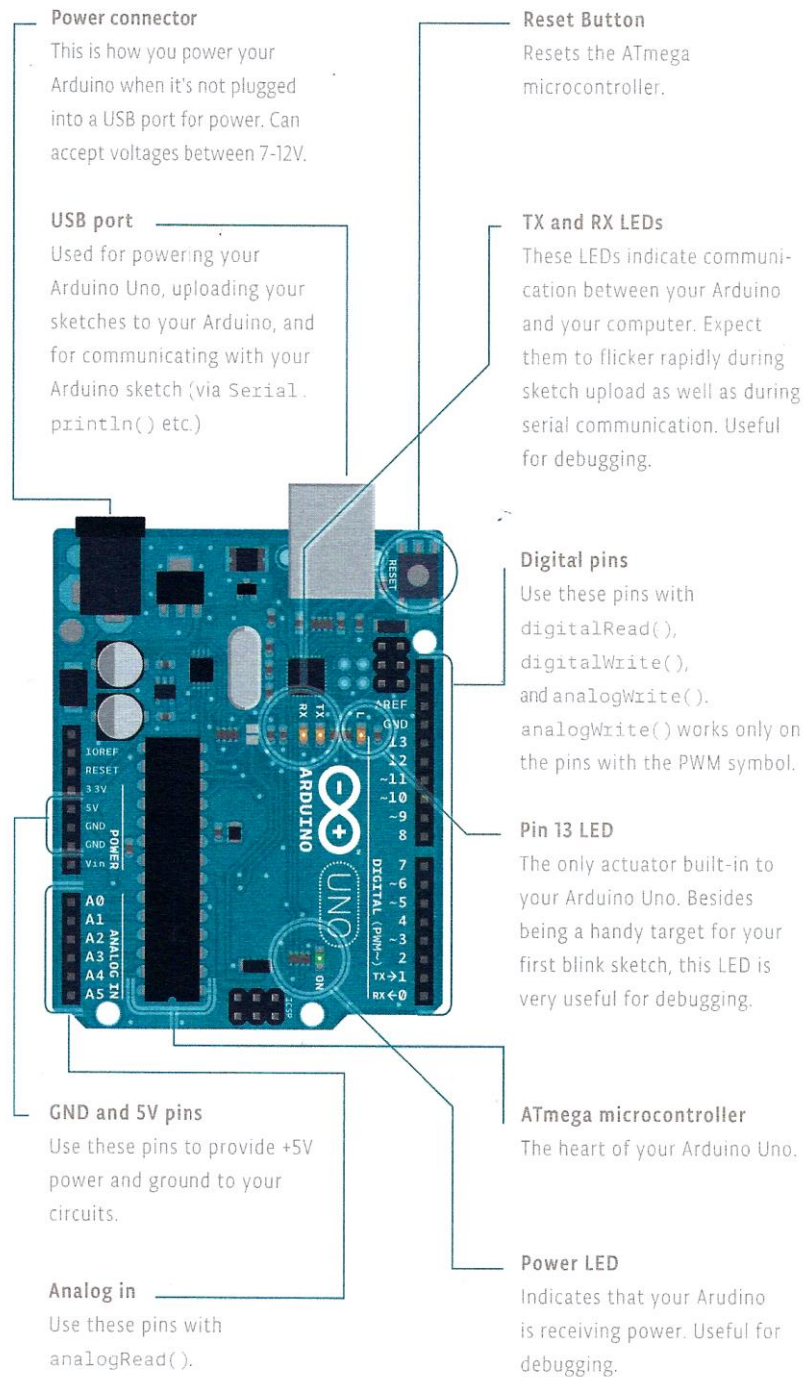
Temperature sensor - Changes its voltage output depending on the temperature of the component. The outside legs connect to power and ground. The voltage on the center pin changes as it gets warmer or cooler.

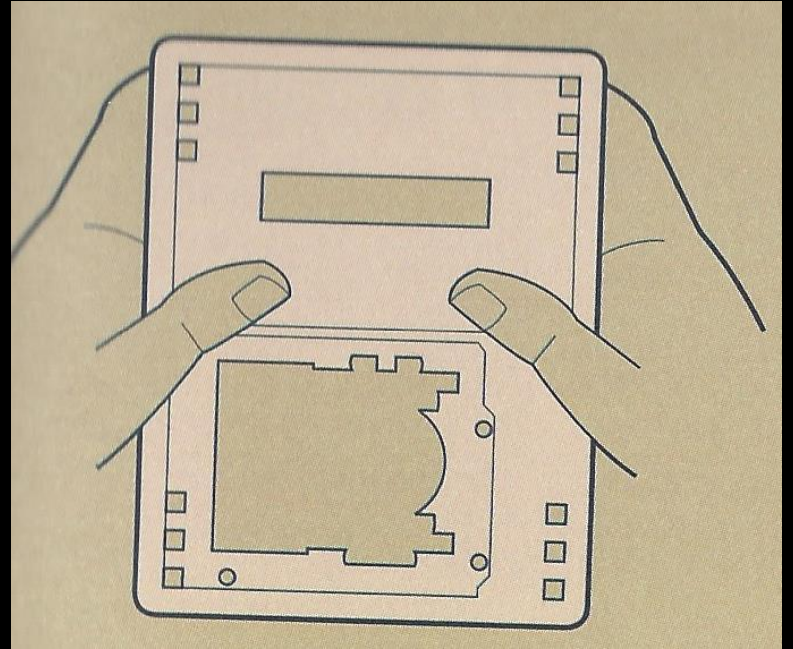
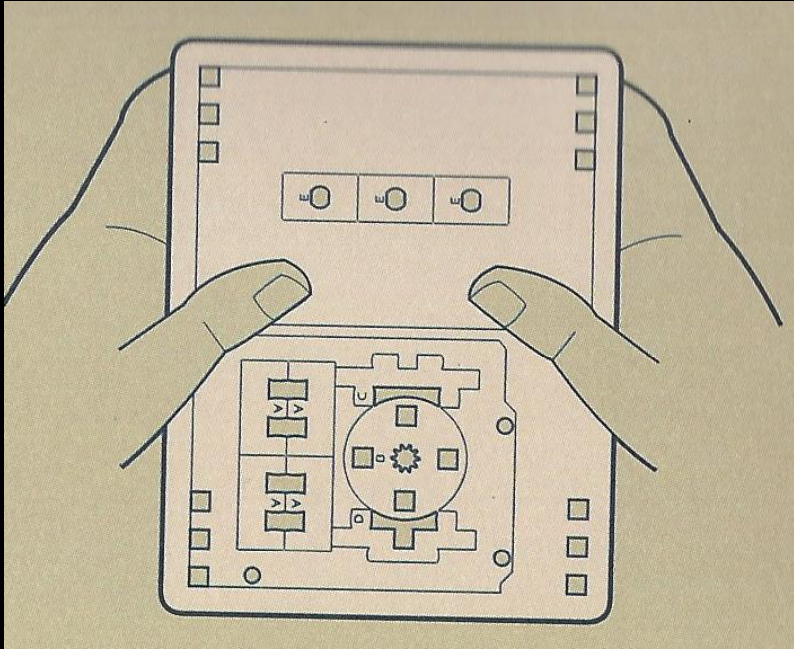


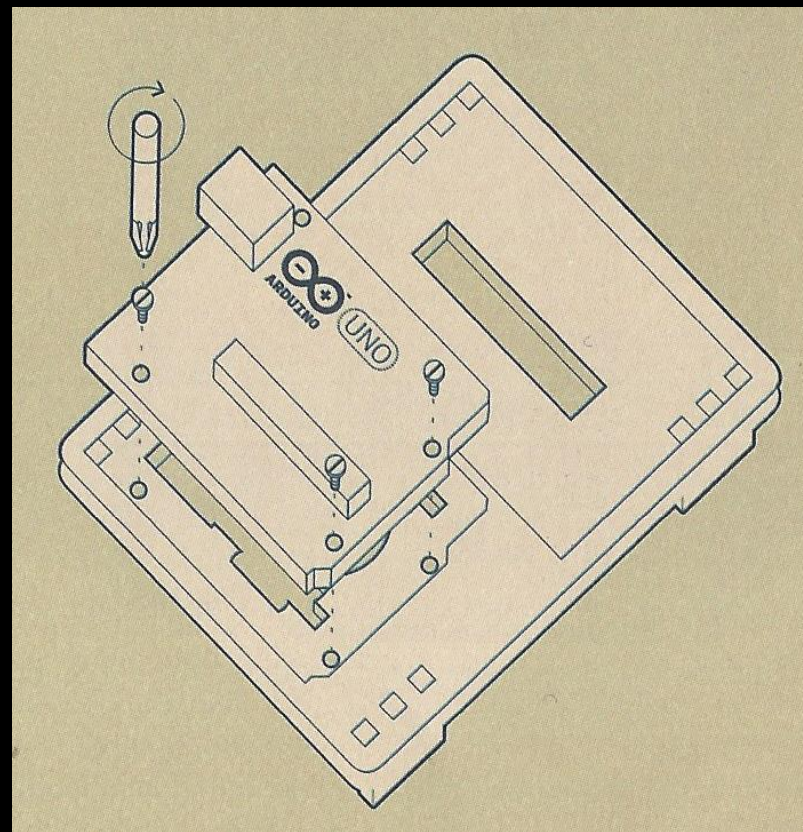
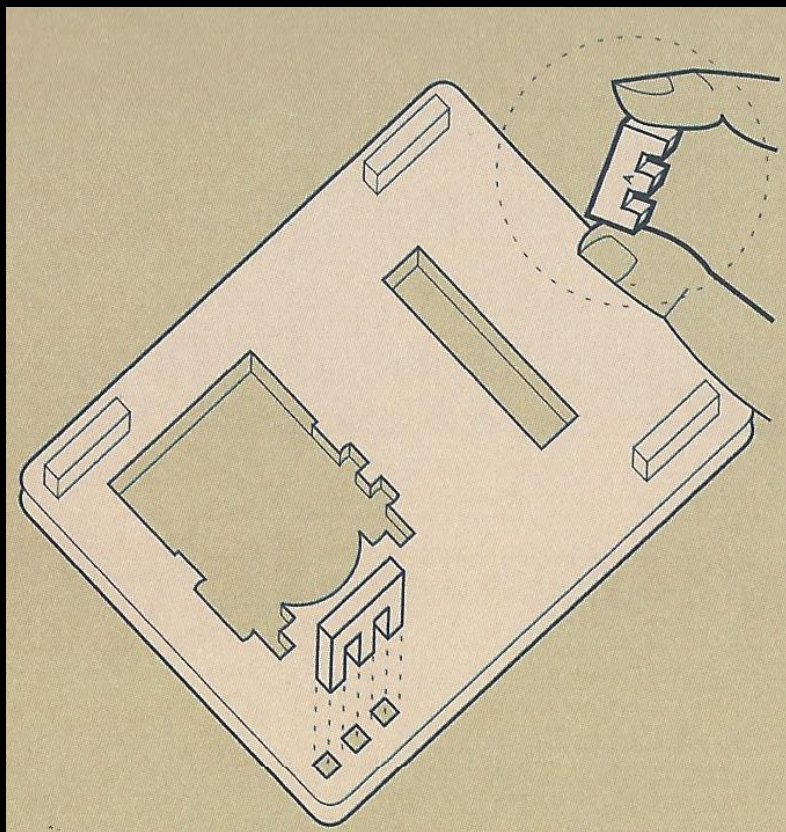
Tilt sensor - A type of switch that will open or close depending on its orientation. Typically they are hollow cylinders with a metal ball inside that will make a connection across two leads when tilted in the proper direction.

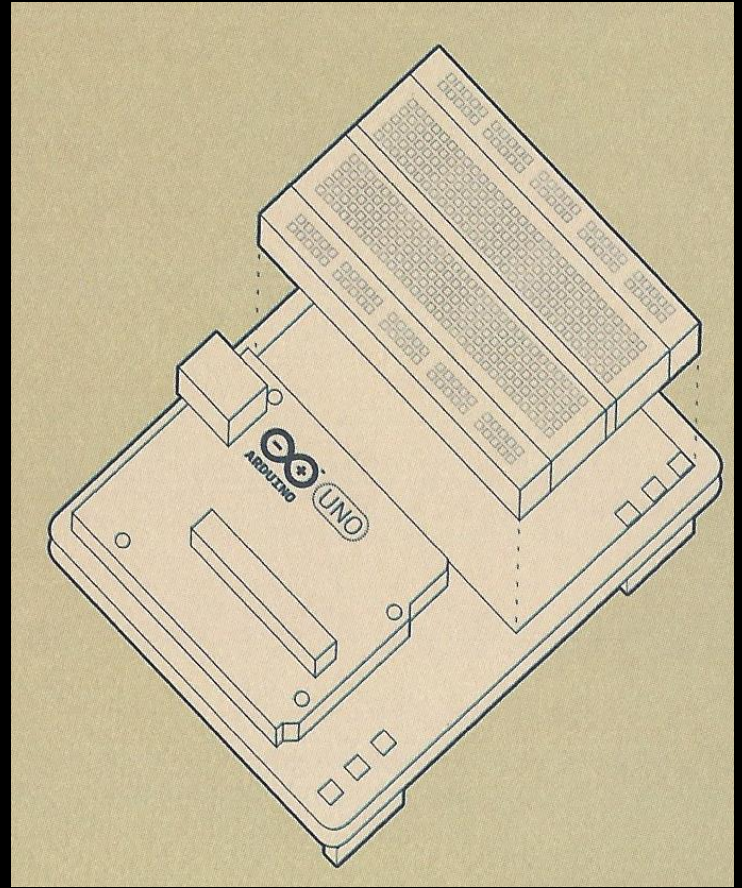


USB Cable - This allows you to connect your Arduino Uno to your personal computer for programming. It also provides power to the Arduino for most of the projects in the kit.

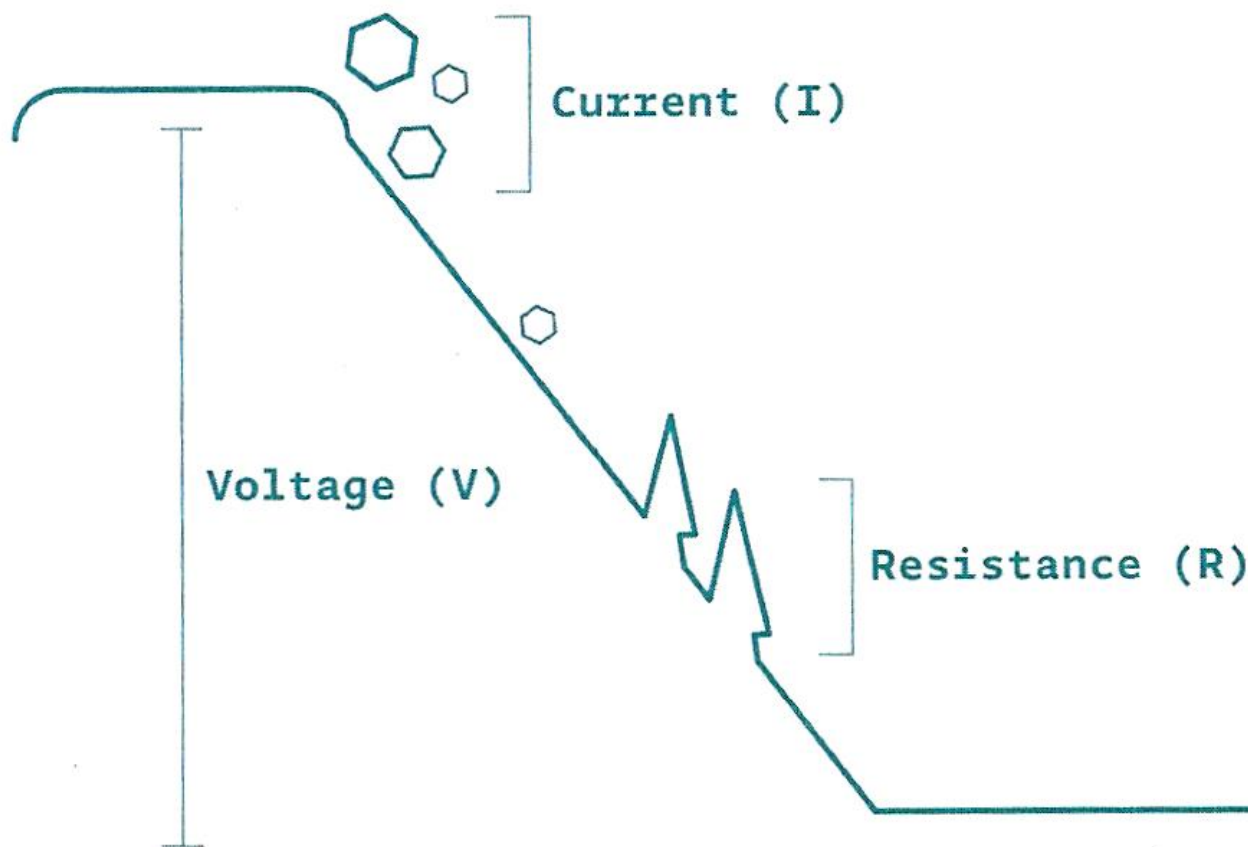




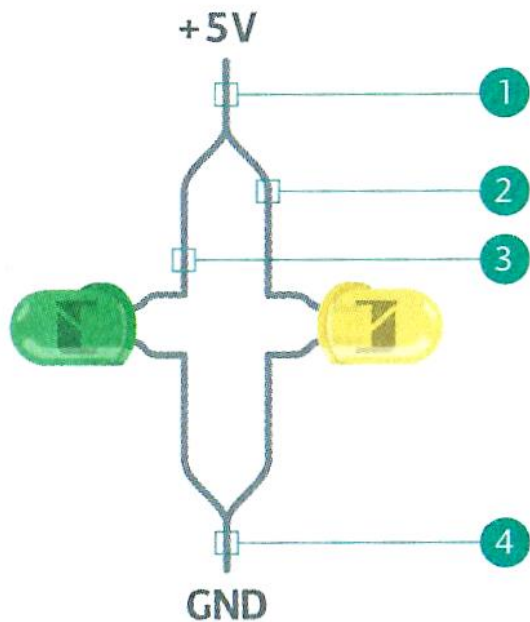




Ström, volt och motstånd



A COUPLE OF THINGS ABOUT CIRCUITS

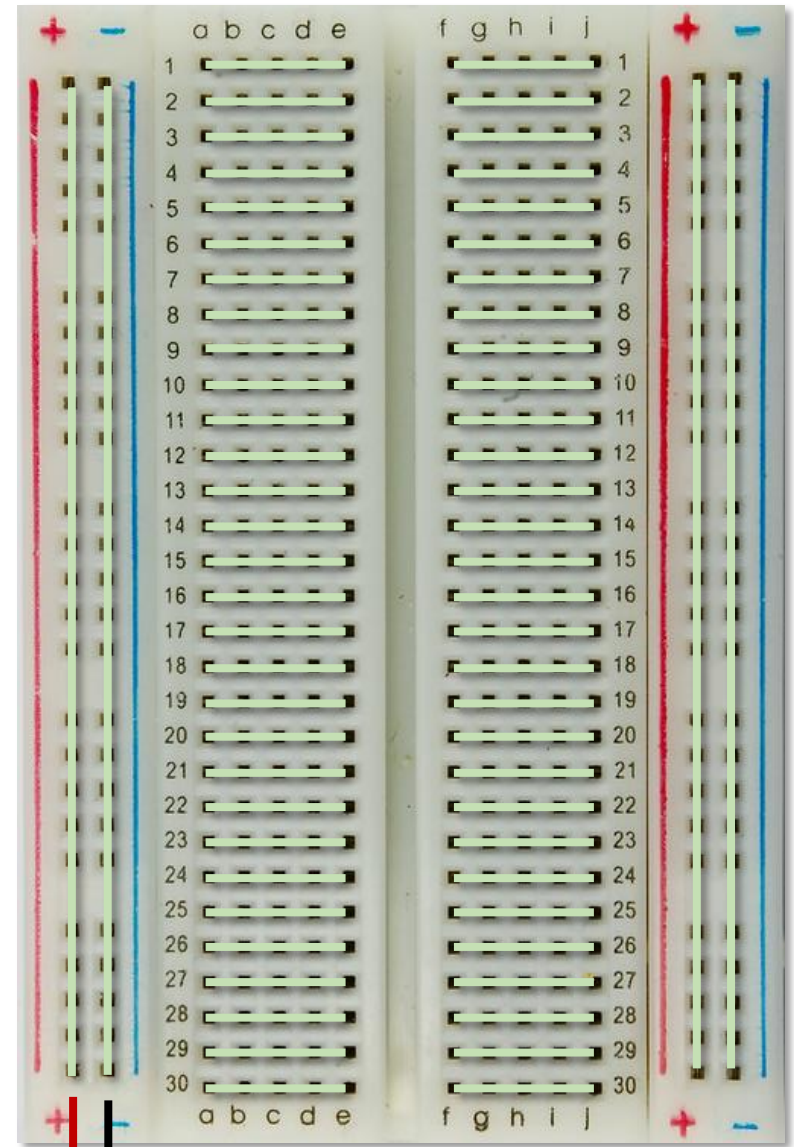
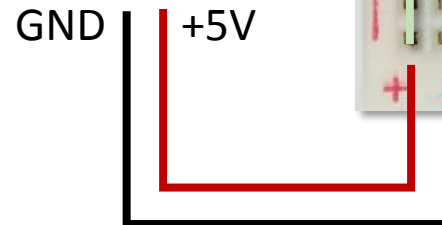


The current at (1) = current at (2)
+ current at (3) = current at (4).

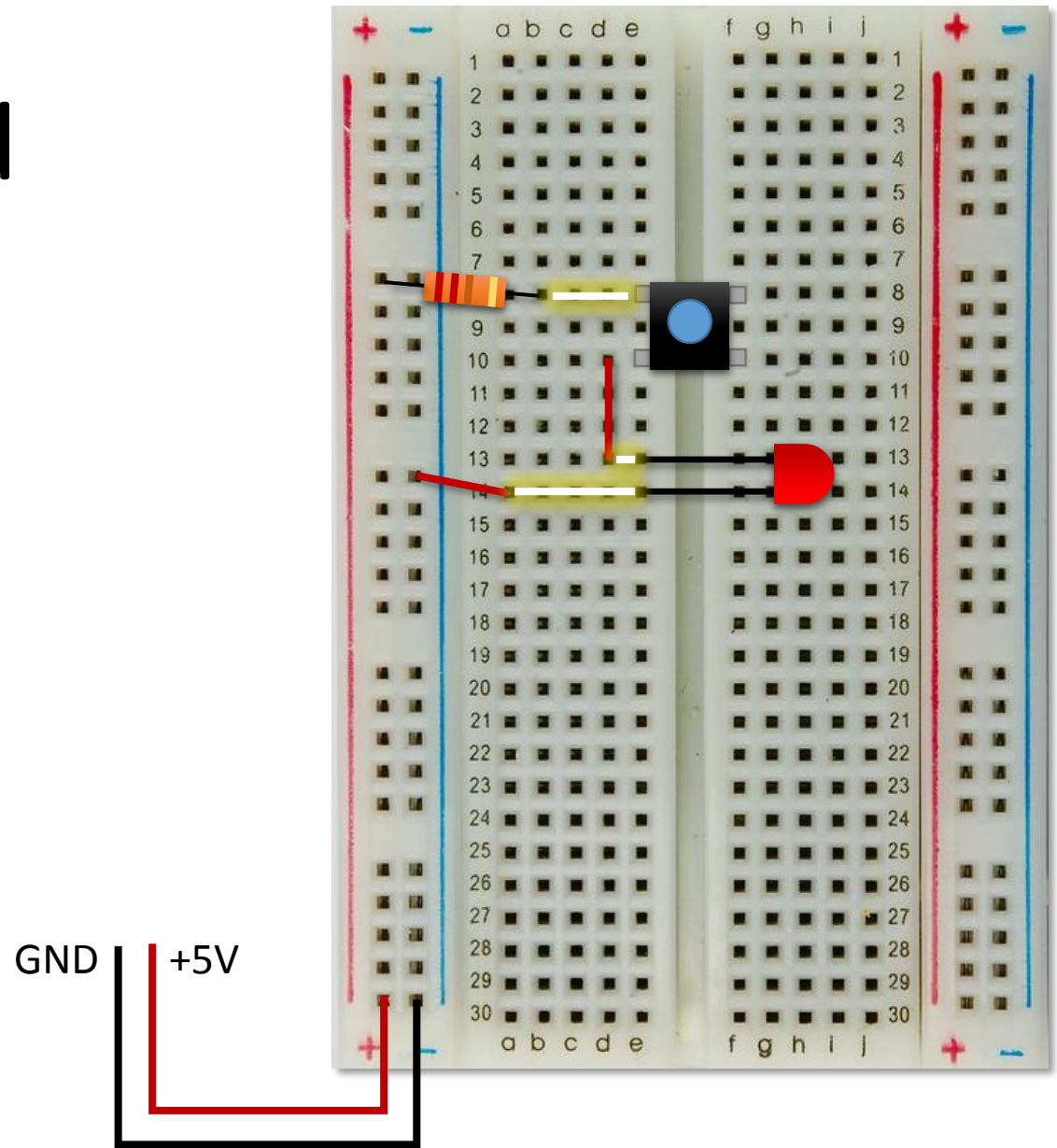
Fig. 2

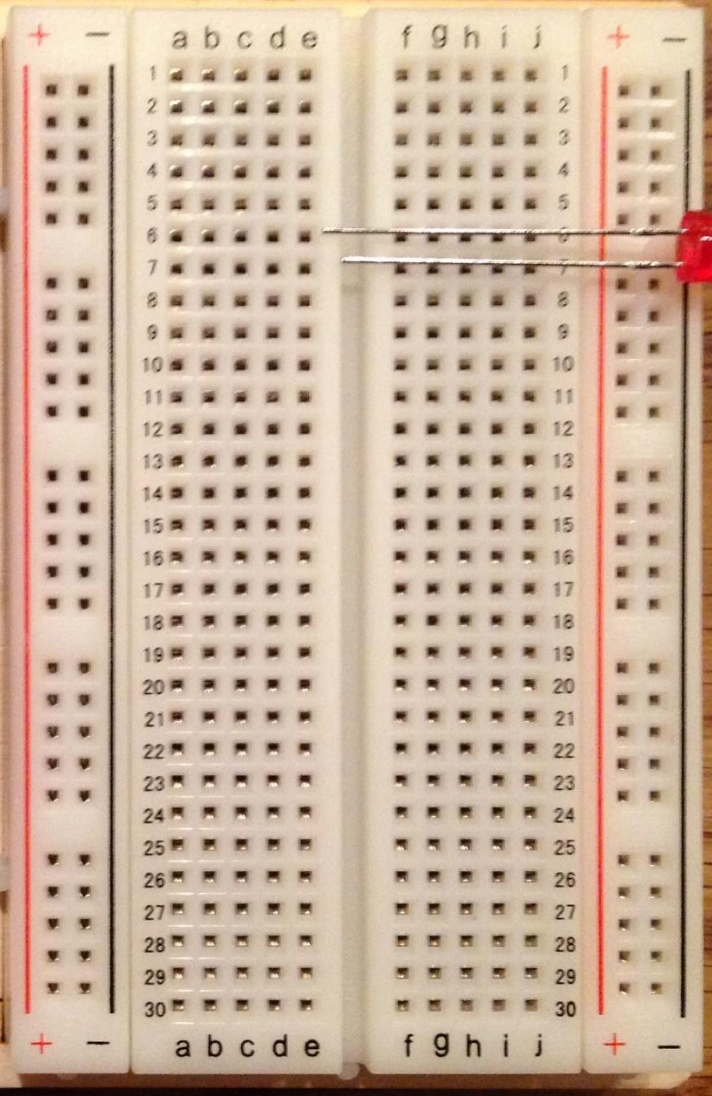
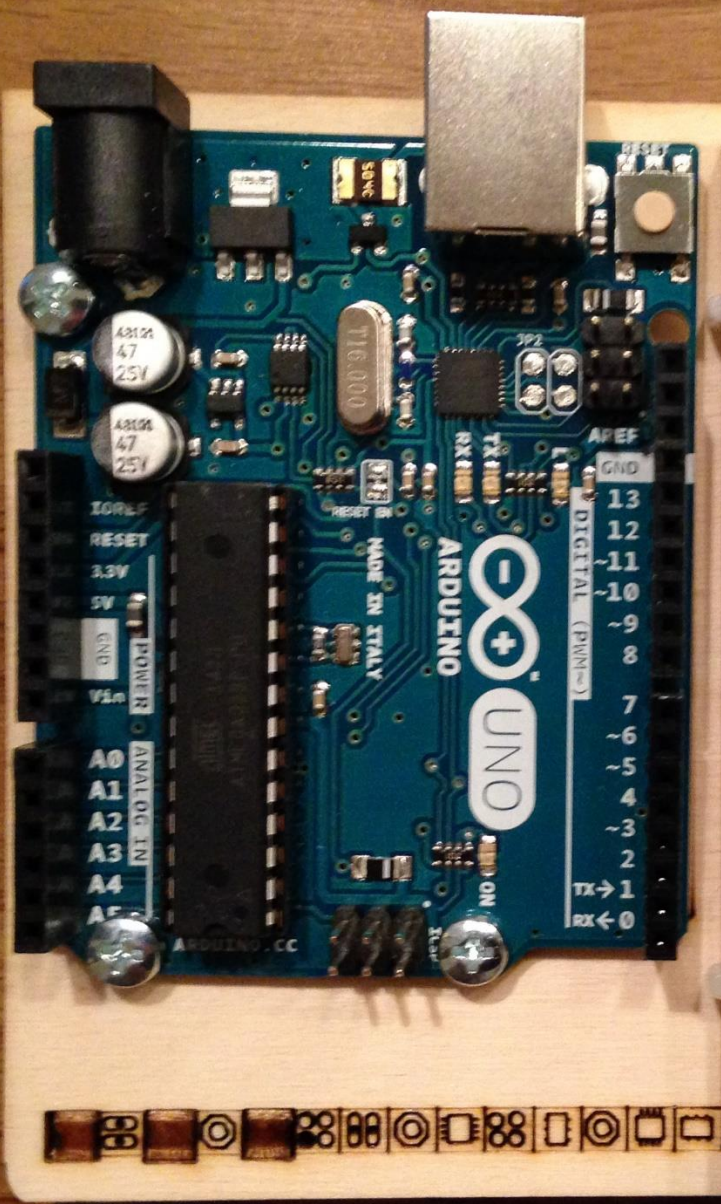
- There needs to be a complete path from the energy source (power) to the point of least energy (ground) to make a circuit. If there's no path for the energy to travel, the circuit won't work.
- All the electrical energy gets used up in a circuit by the components in it. Each component converts some of the energy into another form of energy. In any circuit, all of the voltage is converted to another form of energy (light, heat, sound, etc.).
- The flow of current at a specific point in a circuit will always be the same coming in and going out.
- Electrical current will seek the path of least resistance to ground. Given two possible paths, more of the electrical current will go down the path with less resistance. If you have a connection that connects power and ground together with no resistance, you will cause a short circuit, and the current will try to follow that path. In a short circuit, the power source and wires convert the electrical energy into light and heat, usually as sparks or an explosion. If you've ever shorted a battery and seen sparks, you know how dangerous a short circuit can be.

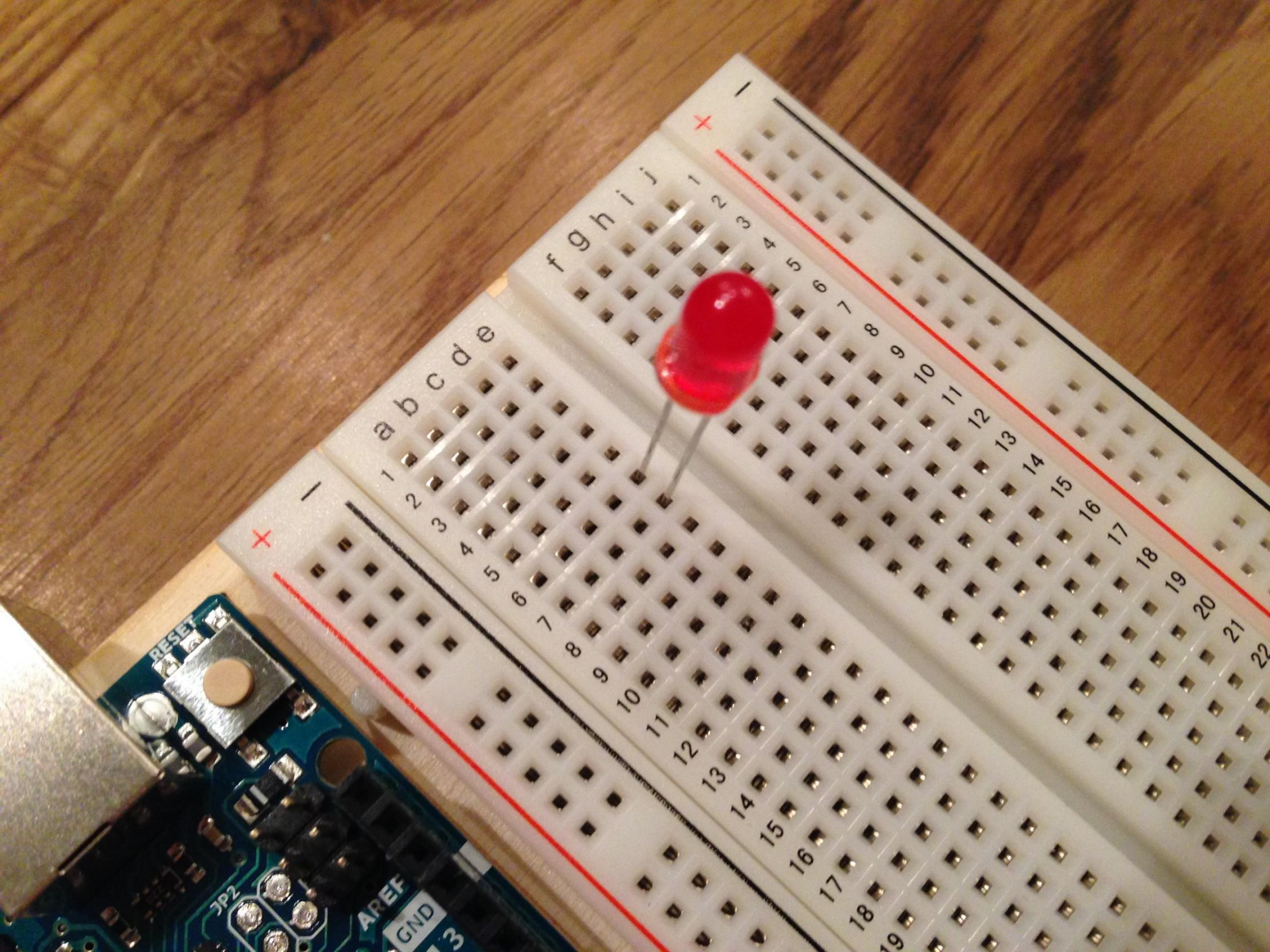
Breadboard

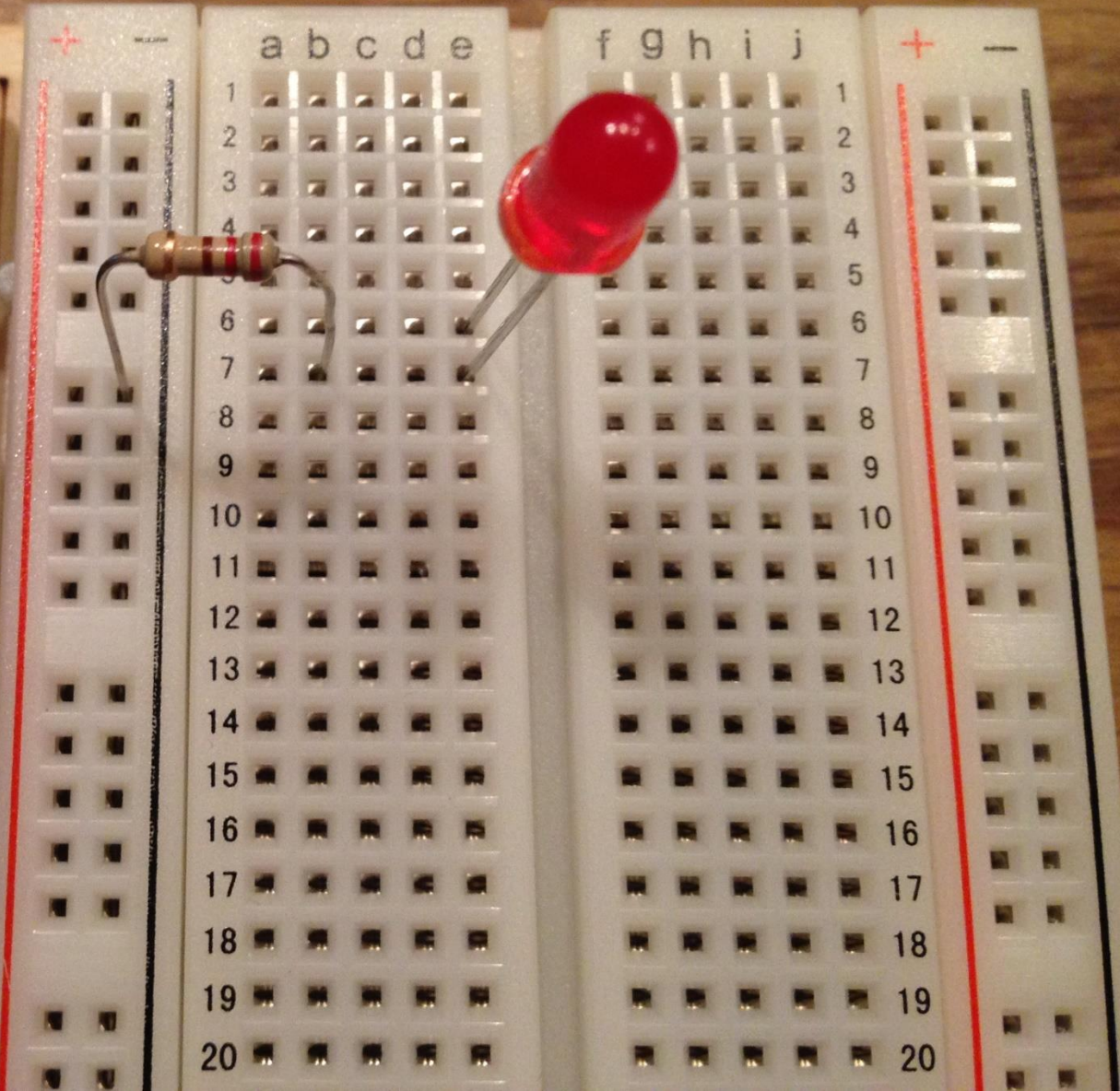
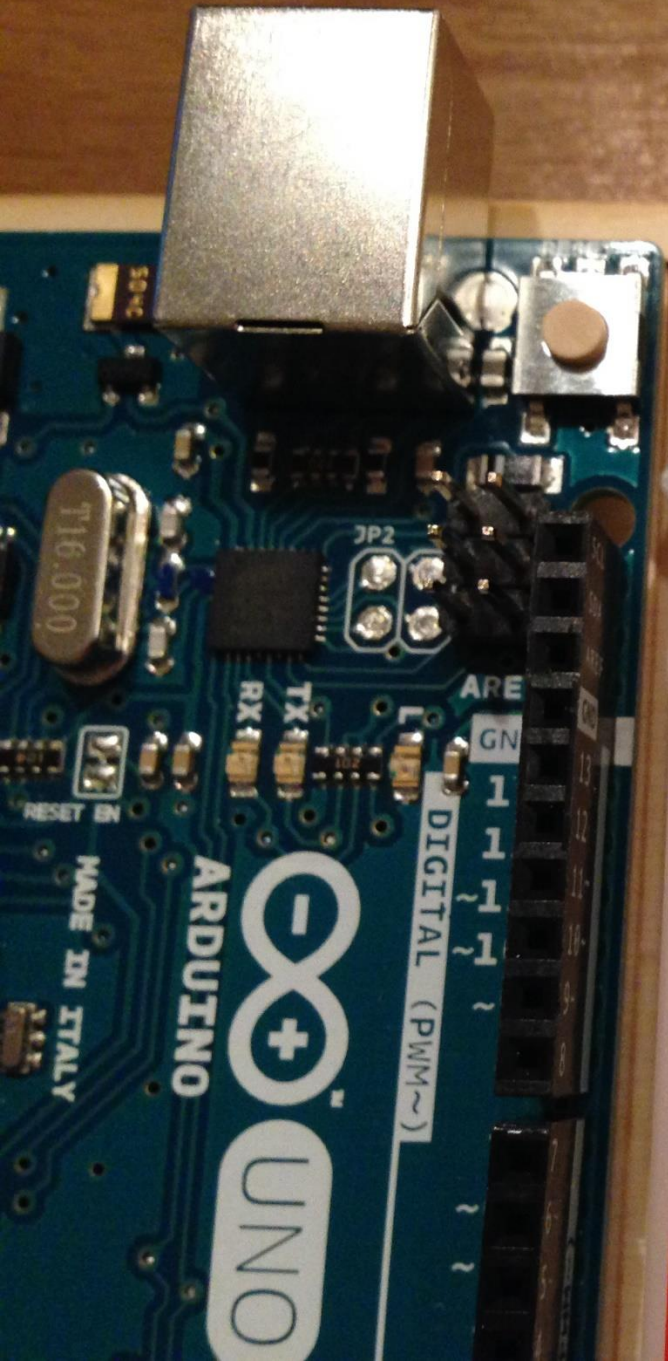


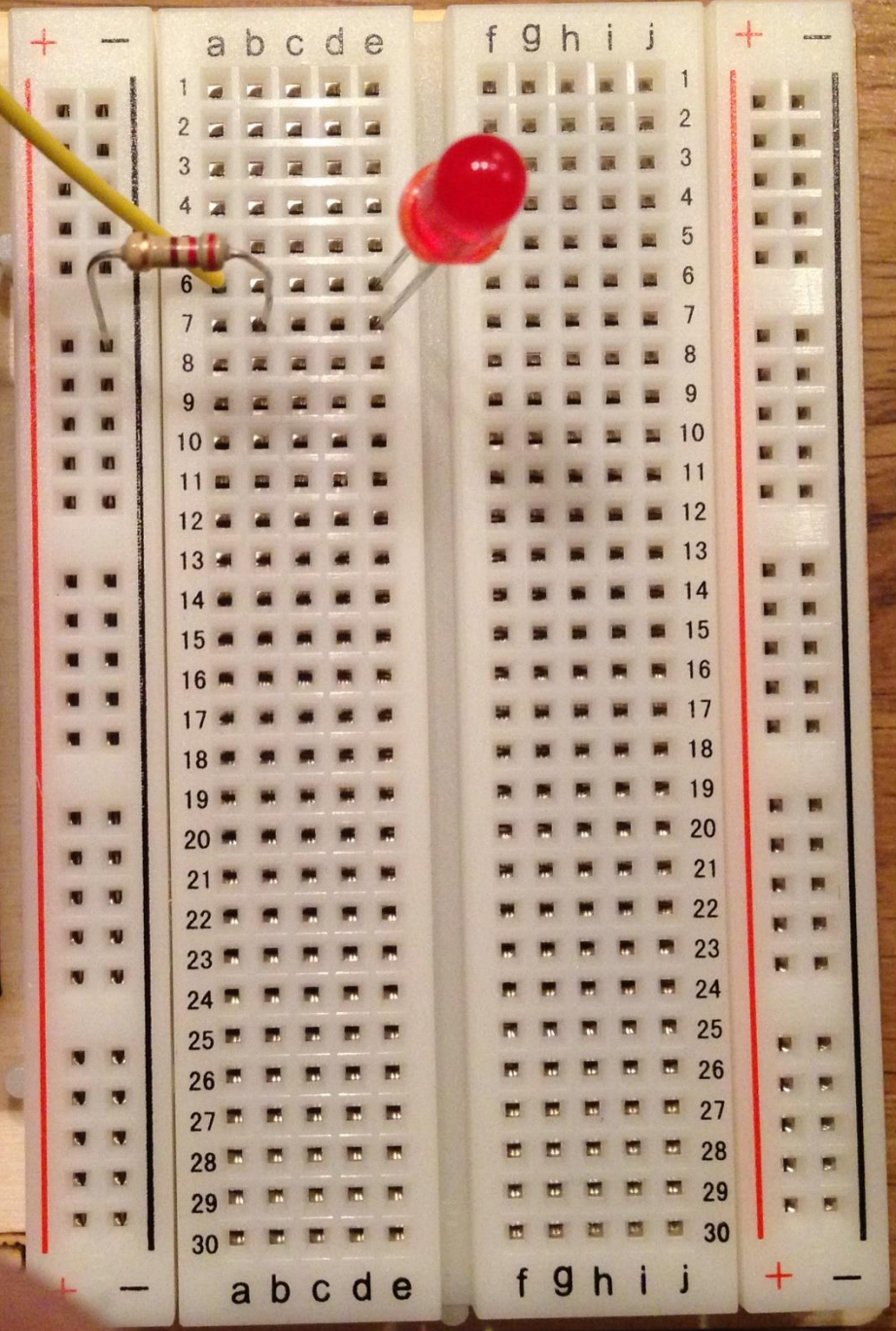
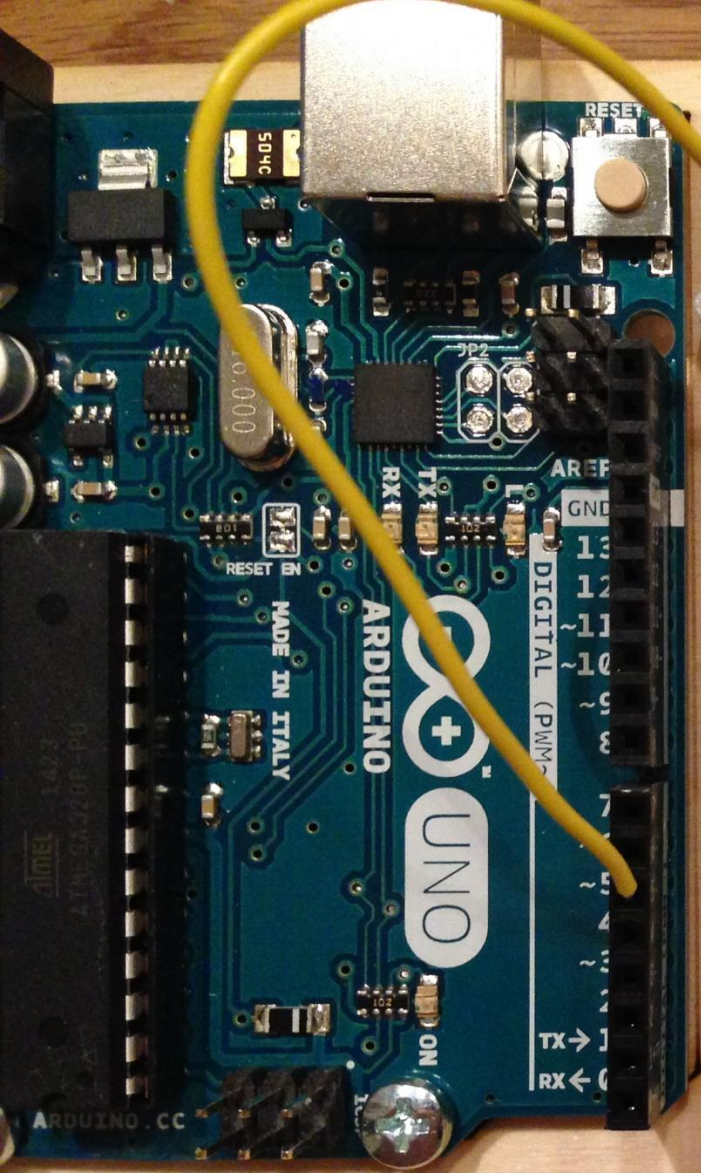
Breadboard

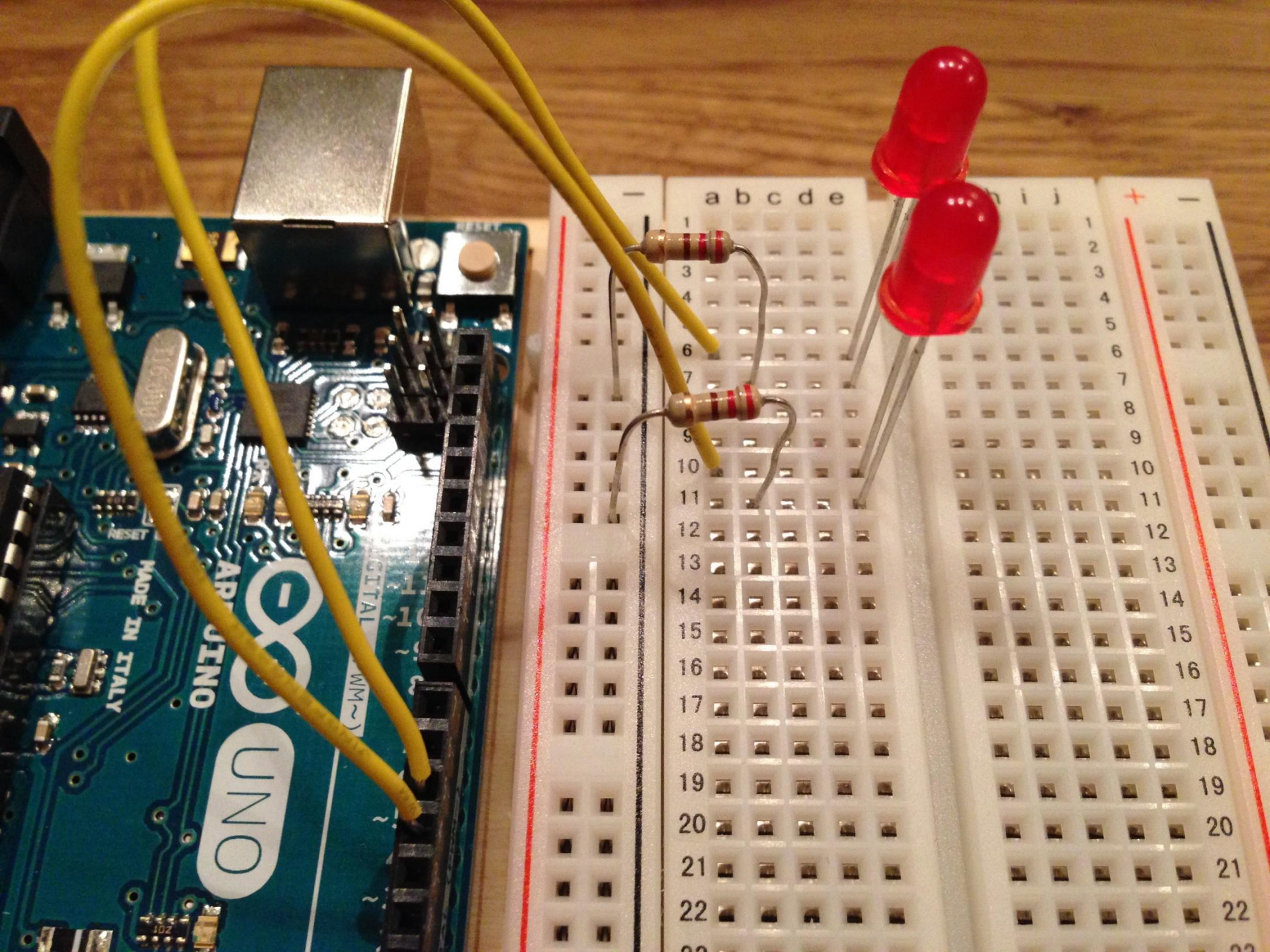


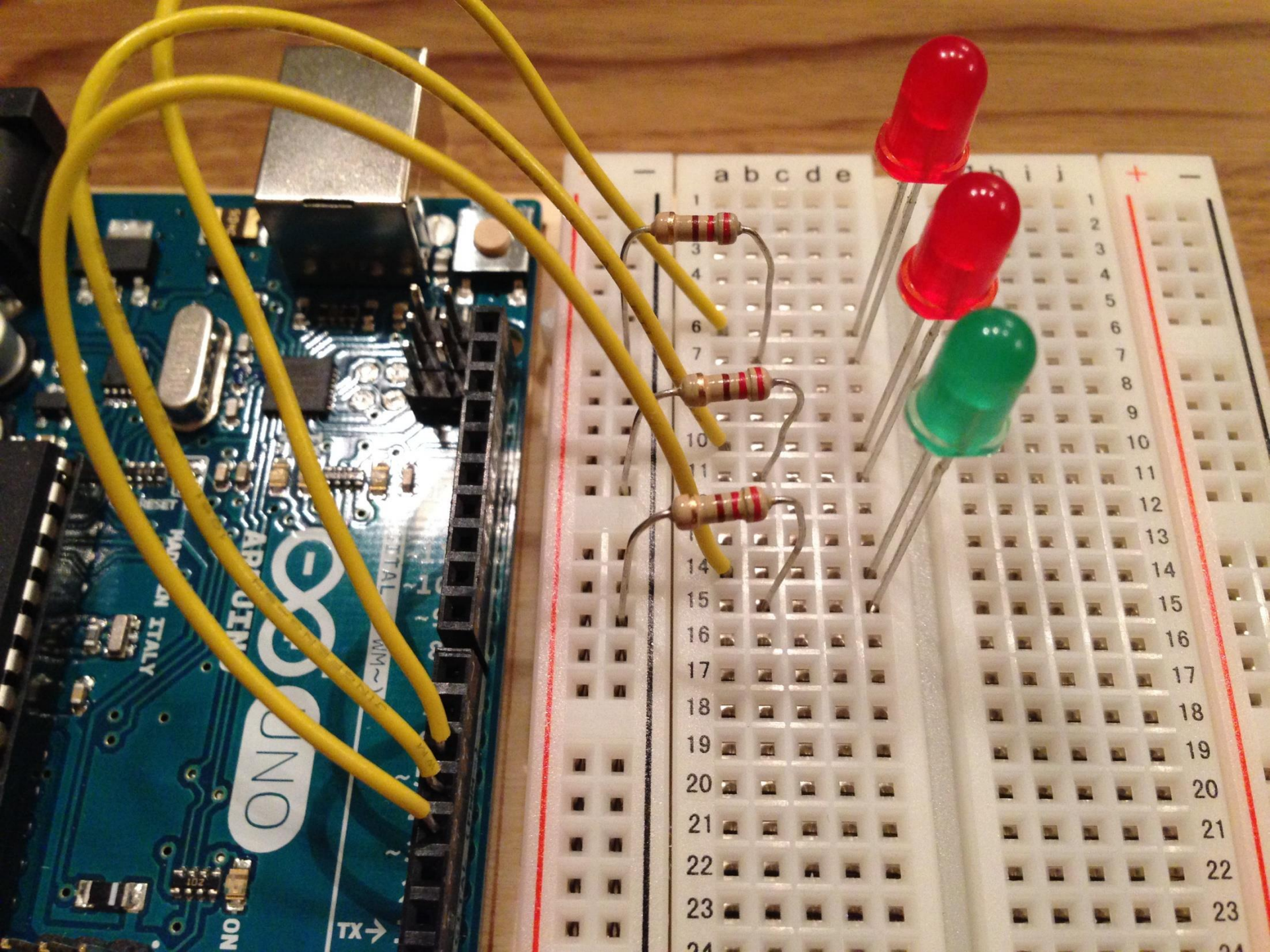


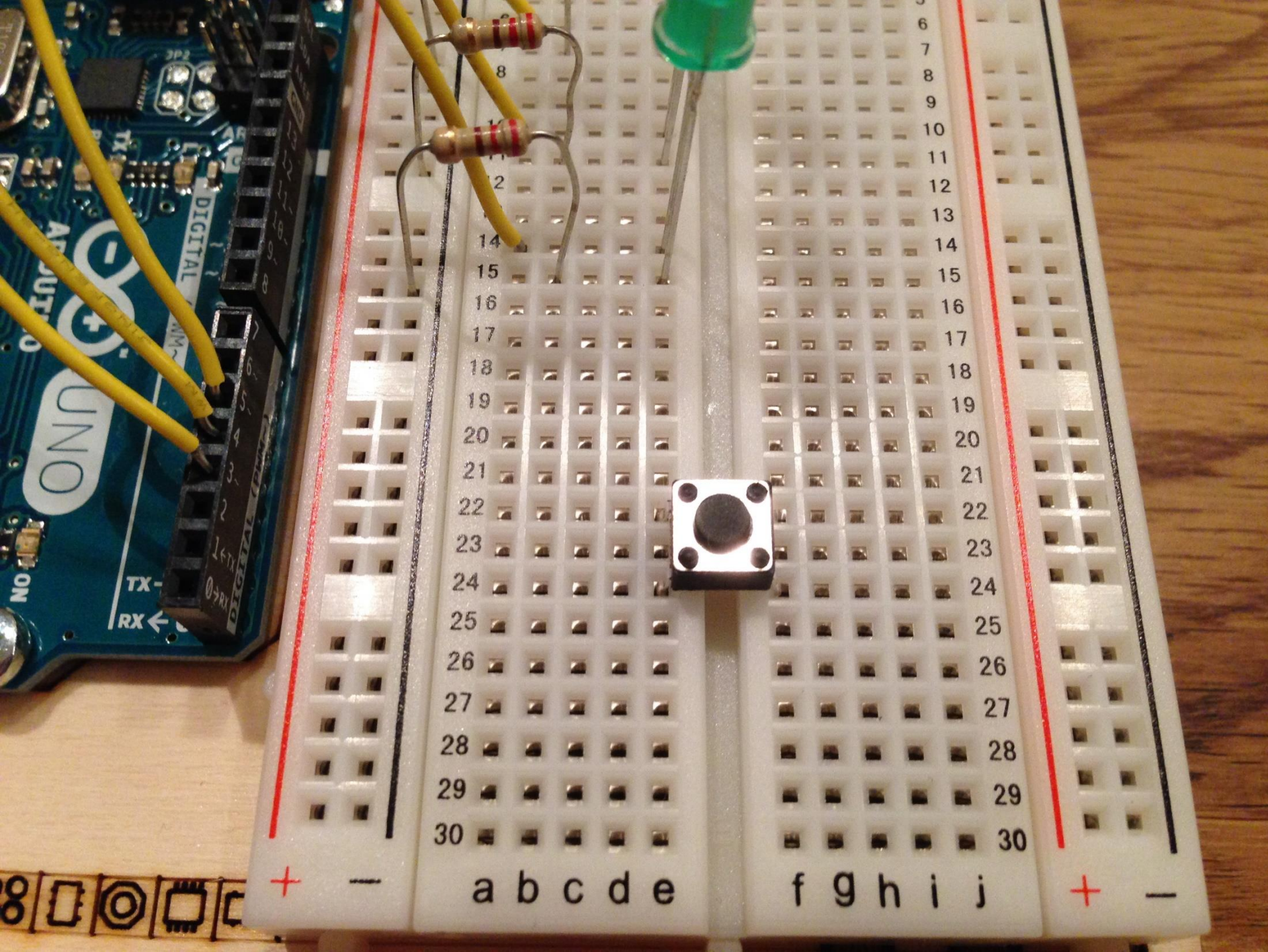


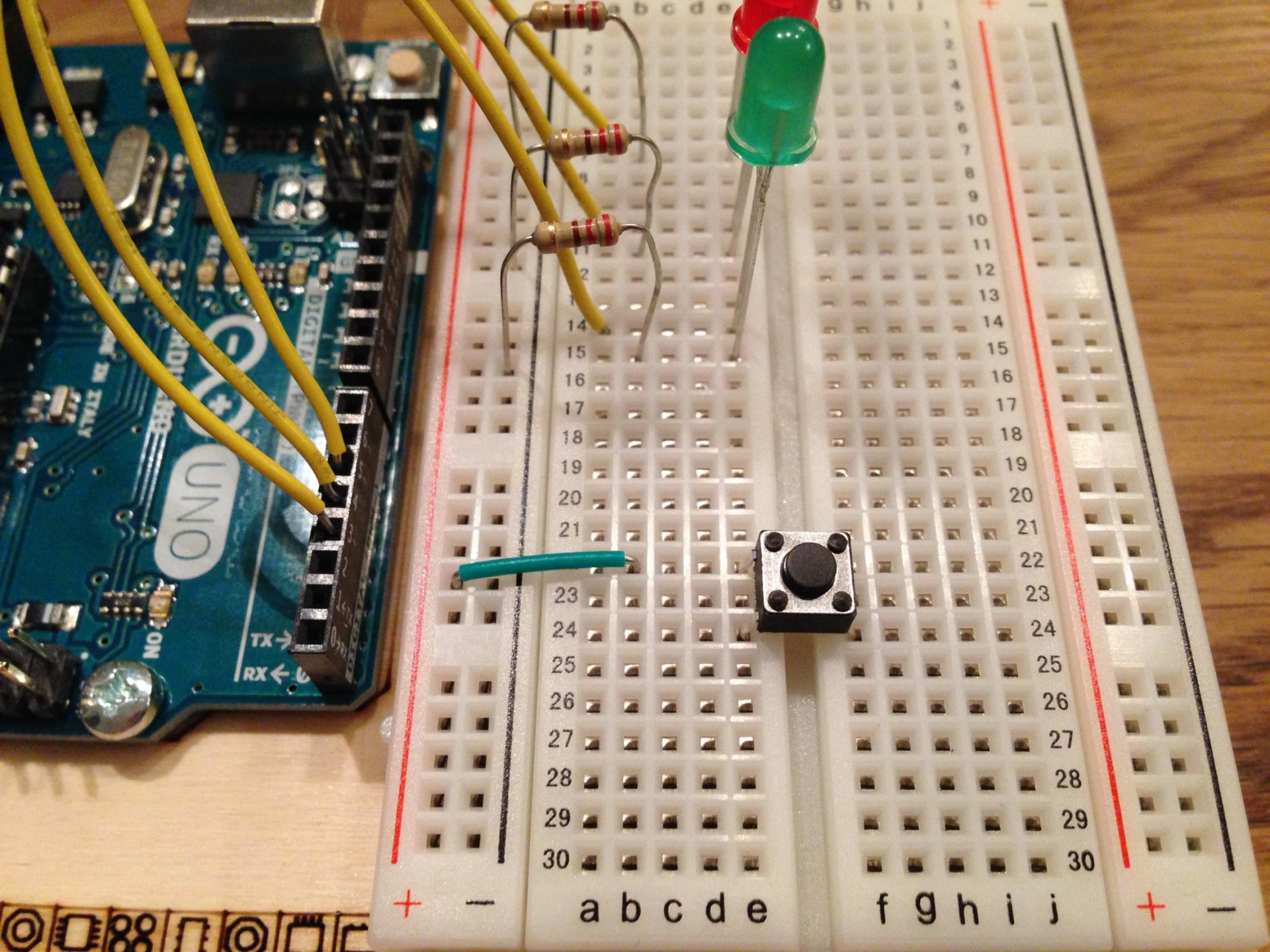












UNO

TX →
RX ←

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a b c d e

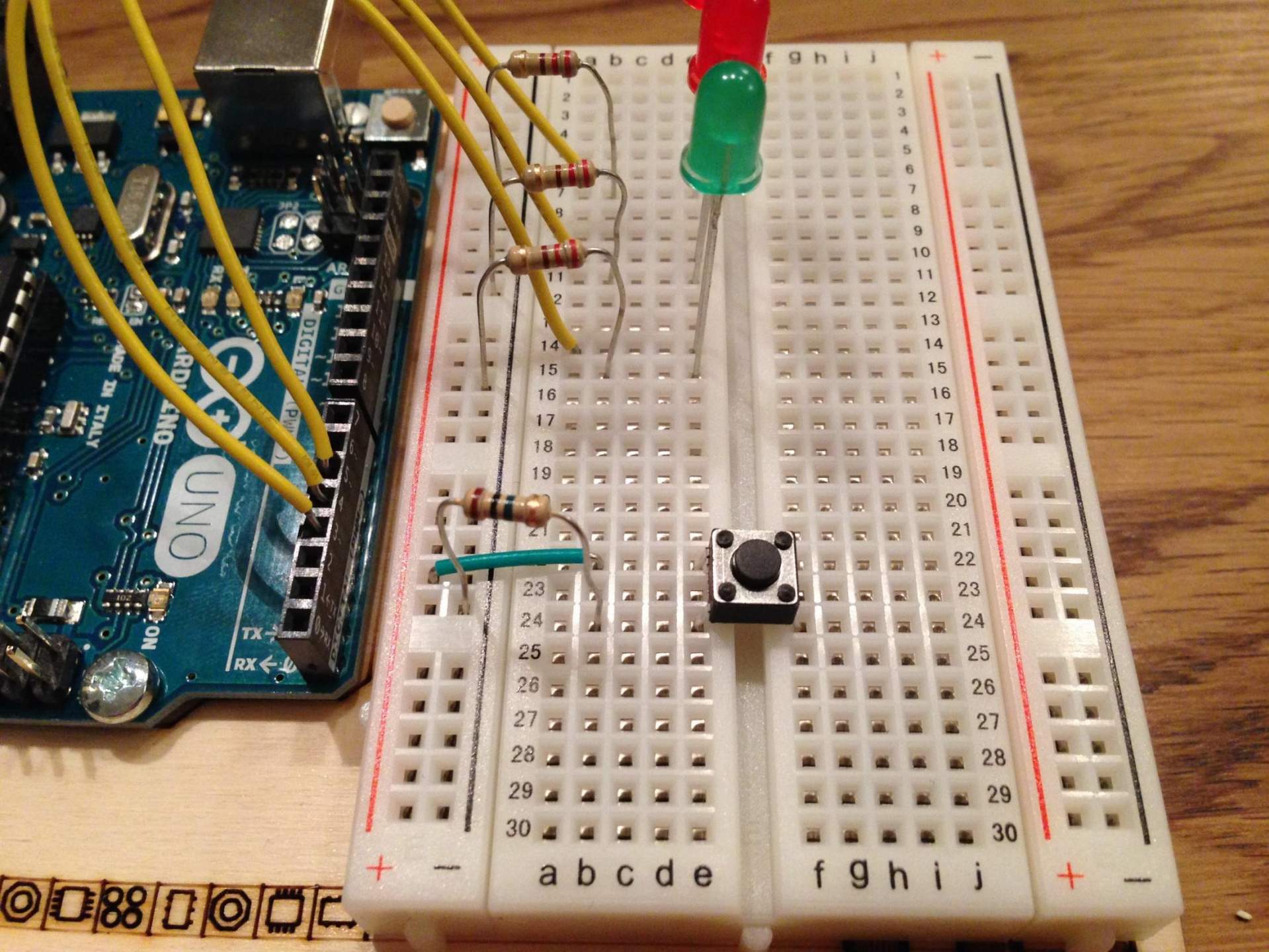
f g h i j

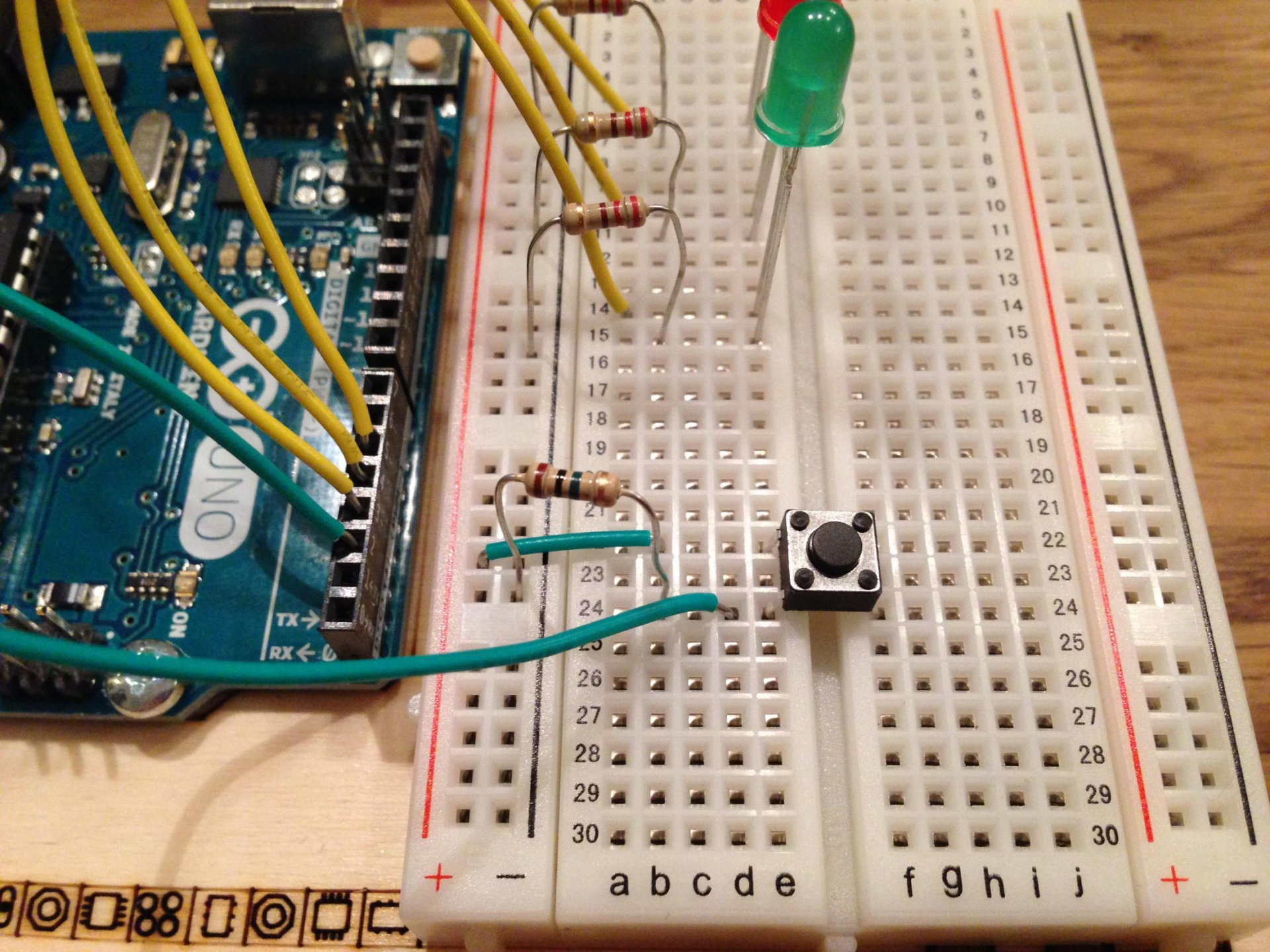
+

-

+

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ARDUINO UNO

TX →
RX ←

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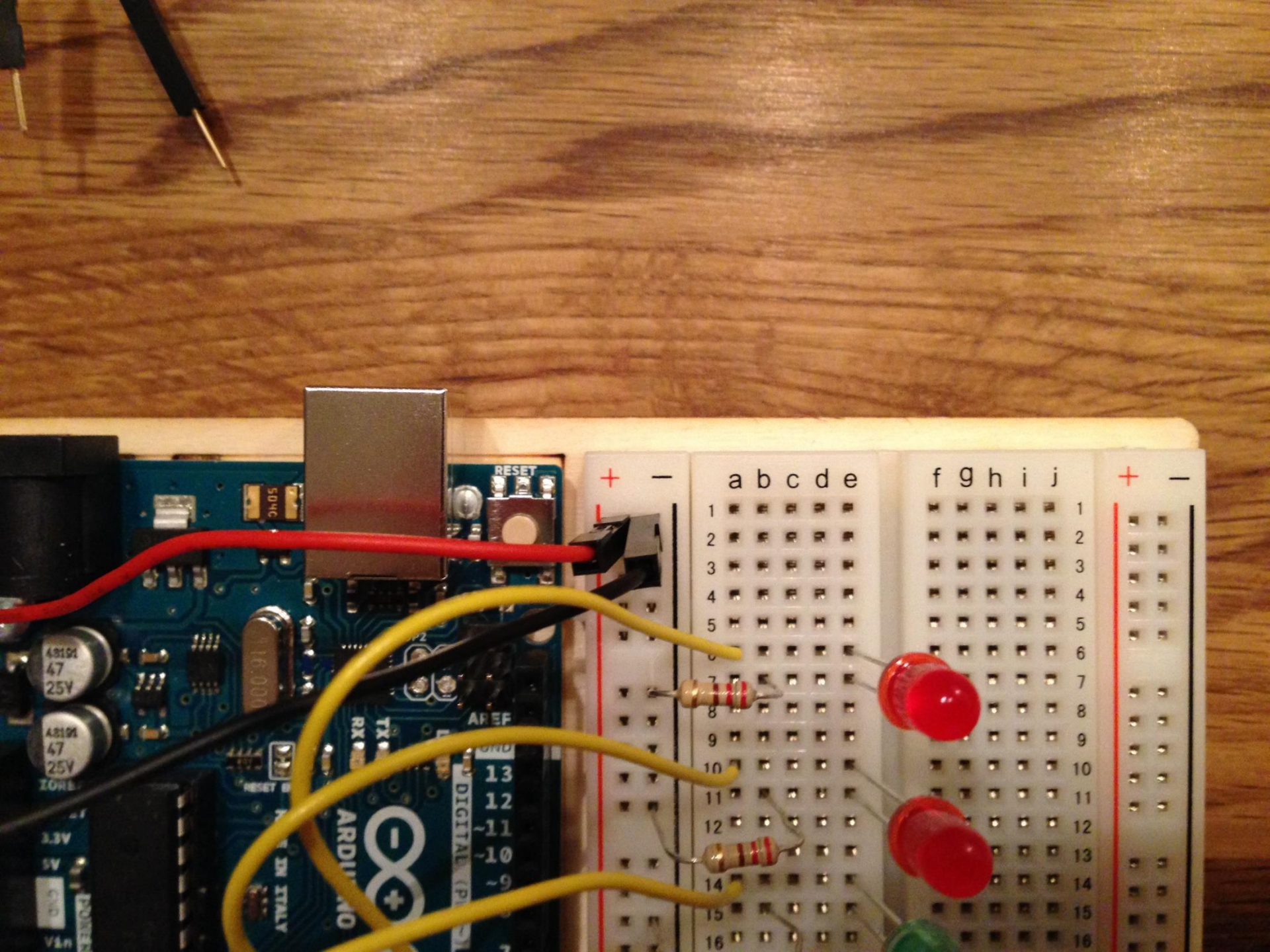
a b c d e

f g h i j

+

+





+ - a b c d e f g h i j + -

1											1
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6											6
7											7
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9											9
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12											12
13											13
14											14
15											15
16											16

48101
47
25Y

48101
47
25Y

3.3V

5V

V_{IN}

16-000

ARDUINO

DIGITAL (PUSH-OUT)

RESET

AREF

GROUND

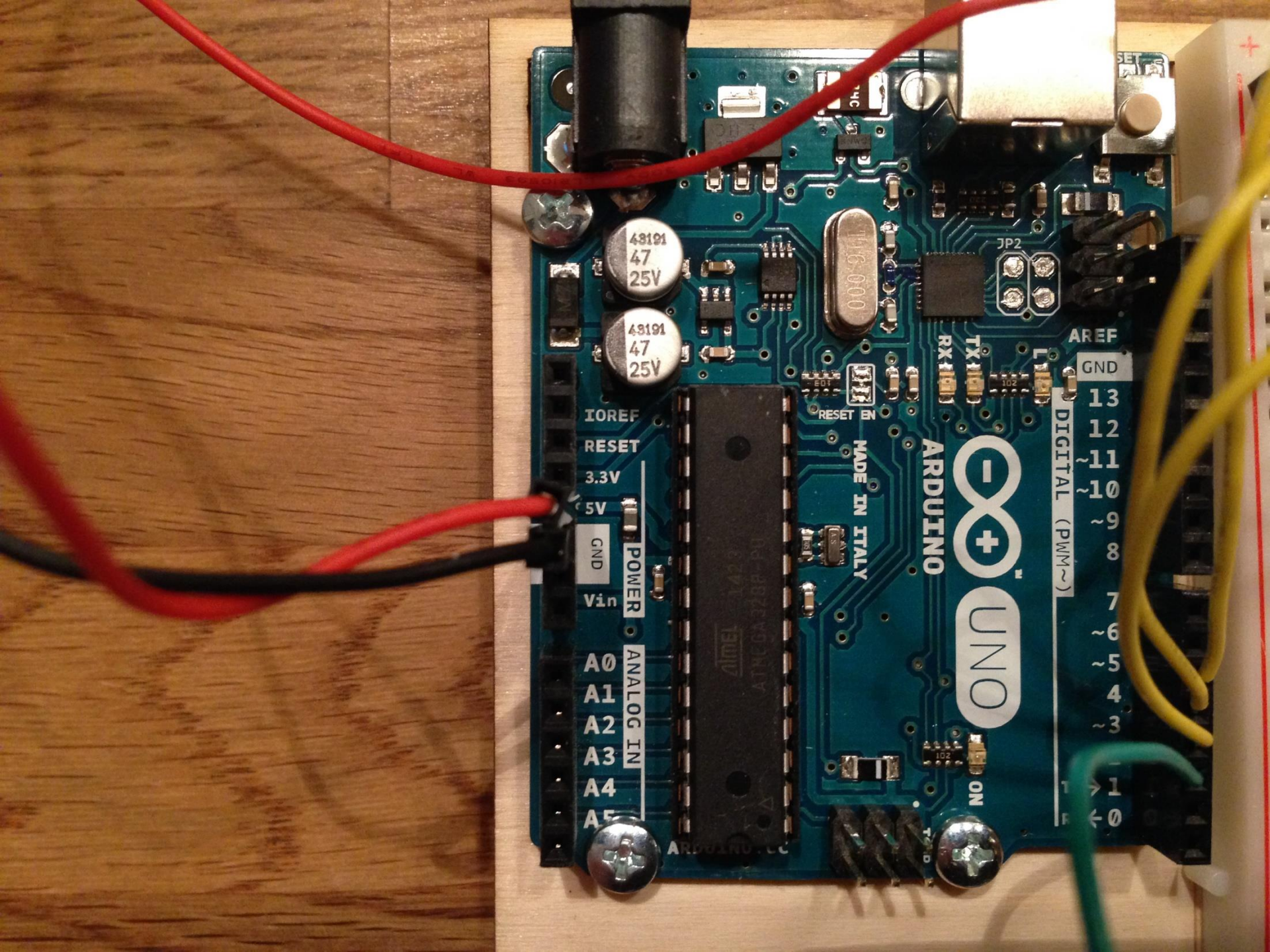
13

12

11

10

9



ARDUINO UNO

MADE IN ITALY

ATMEL ATmega328P

49101 47 25V

49101 47 25V

000000

JP2

RESET EN

TX+ TX- RX+ RX-

AREF

DIGITAL (PWM ~)

GND	13
	12
	11
	10
	9
	8
	7
	6
	5
	4
	3
	2
	1
	0

IOREF

RESET

3.3V

5V

GND

POWER

V_{in}

ANALOG IN

A0

A1

A2

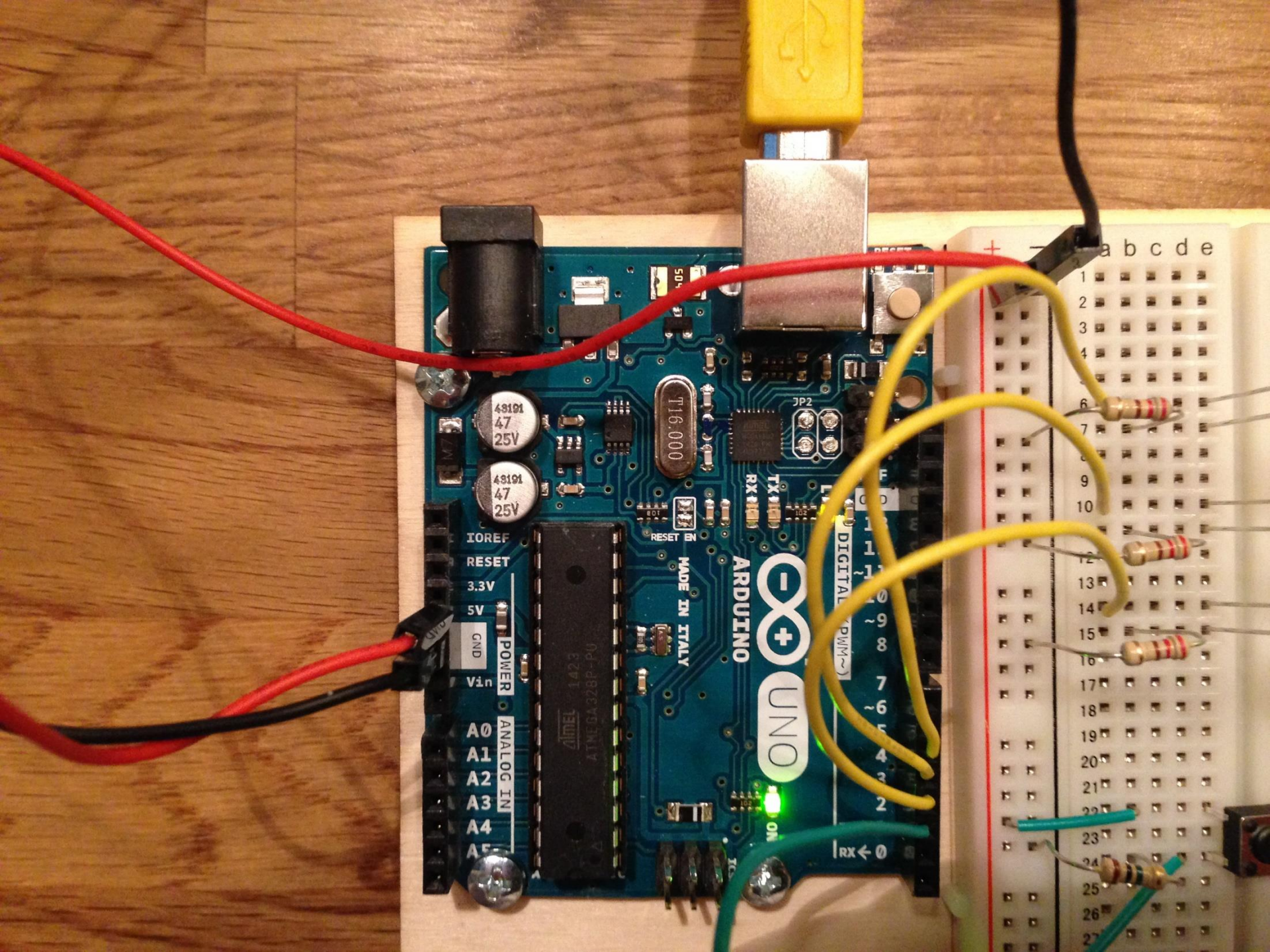
A3

A4

A5

ON

ARDUINO CC



ARDUINO UNO

MADE IN ITALY

ATMEL 1A23 ATMEGA328P-PU

48101 47 25V

48101 47 25V

116.000

RESET

POWER

3.3V

5V

GND

Vin

ANALOG IN

A0

A1

A2

A3

A4

A5

DIGITAL (PWM ~)

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26

27

RX ←

ON

+

-

a b c d e

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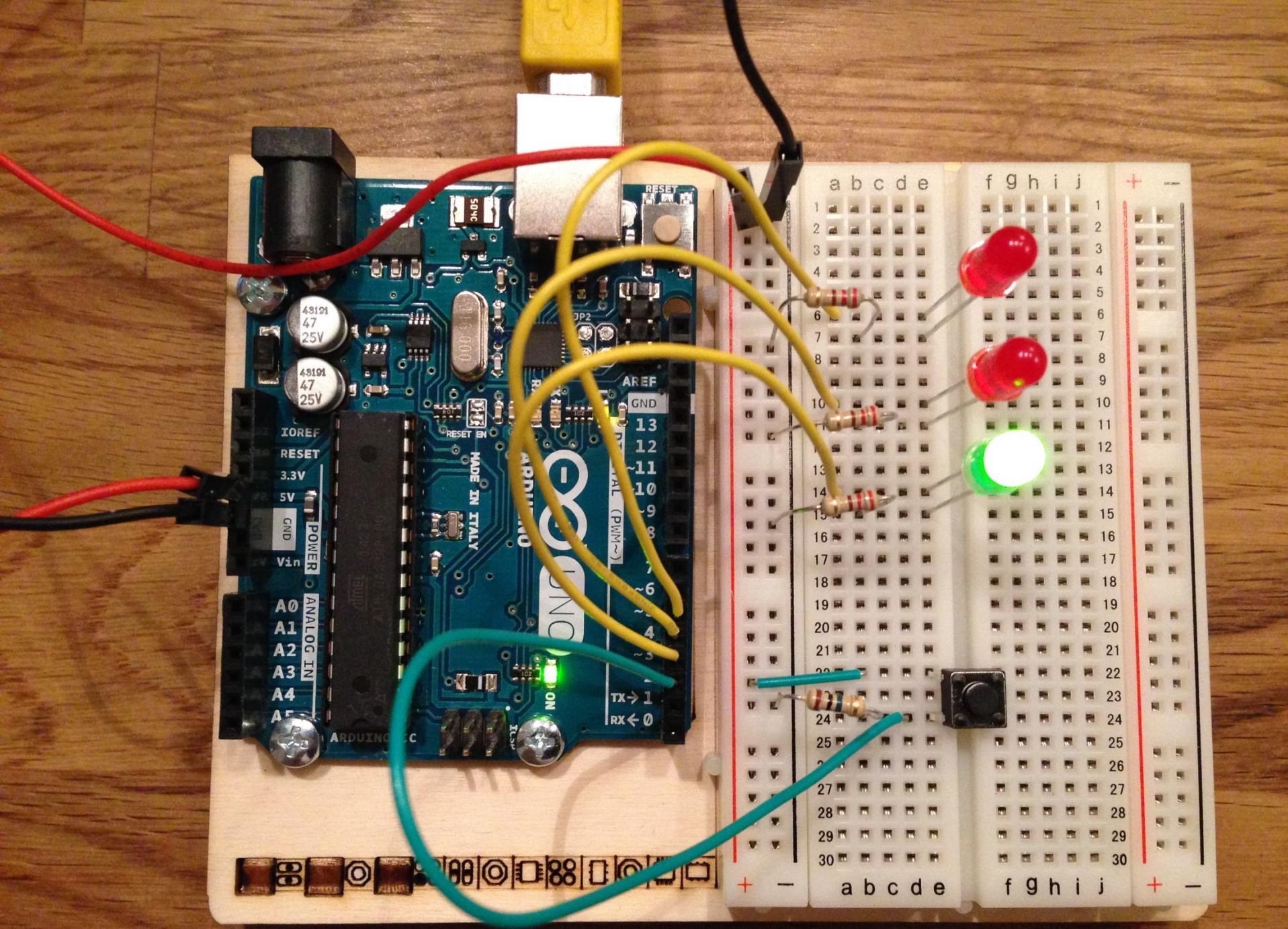
23

24

25

26

27



ARDUINO UNO
MADE IN ITALY
GND
TX → 1
RX ← 0

49101 47 25V
49101 47 25V

IOREF
RESET
3.3V
5V
GND
POWER
V_{in}

A0
A1
A2
A3
A4
A5
ANALOG IN

AREF
GND
13
12
11
10
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7
6
5
4
3
2
1

RESET EN
DP2

500-000

500C

	a	b	c	d	e		f	g	h	i	j		
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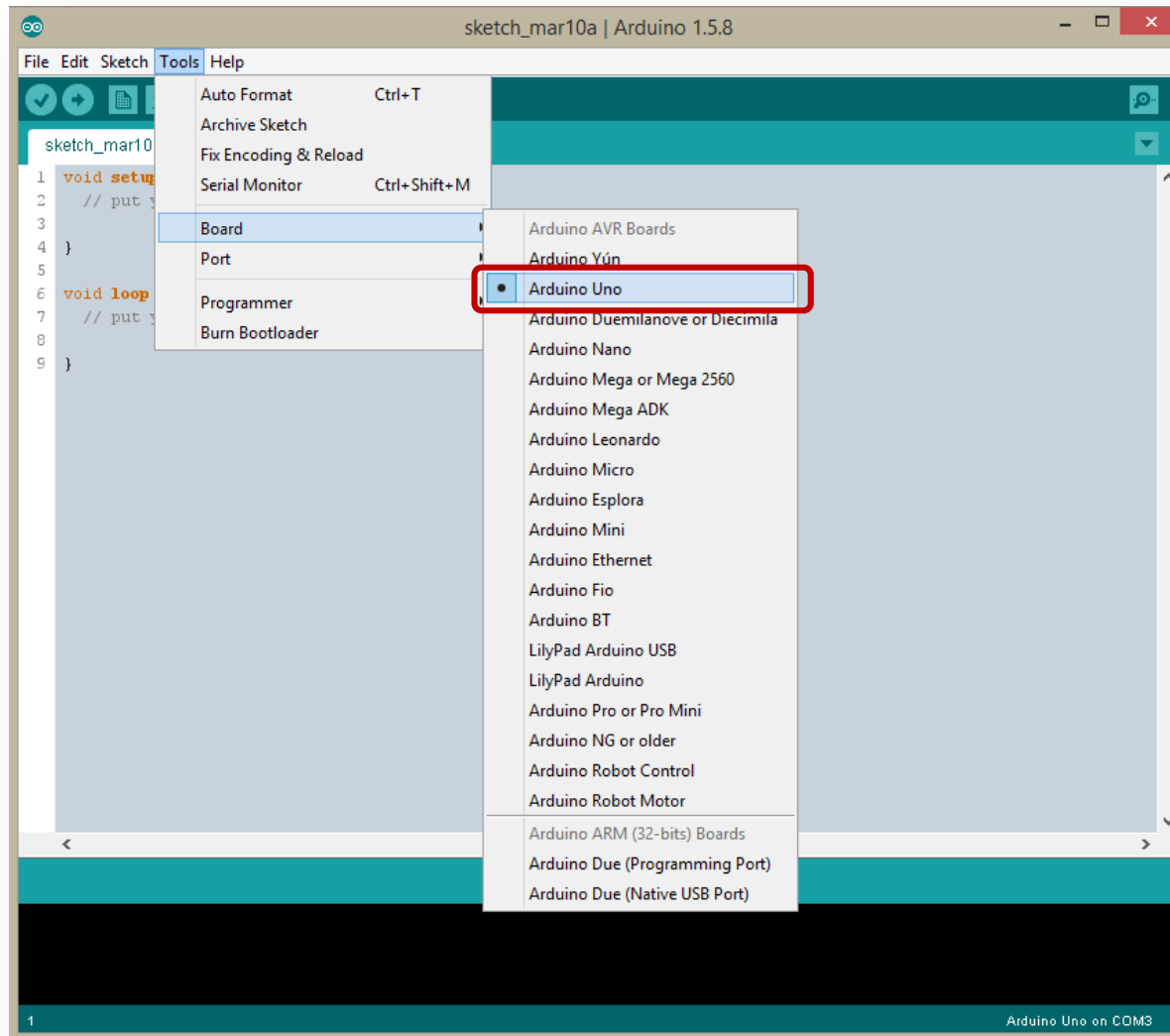
a b c d e

f g h i j

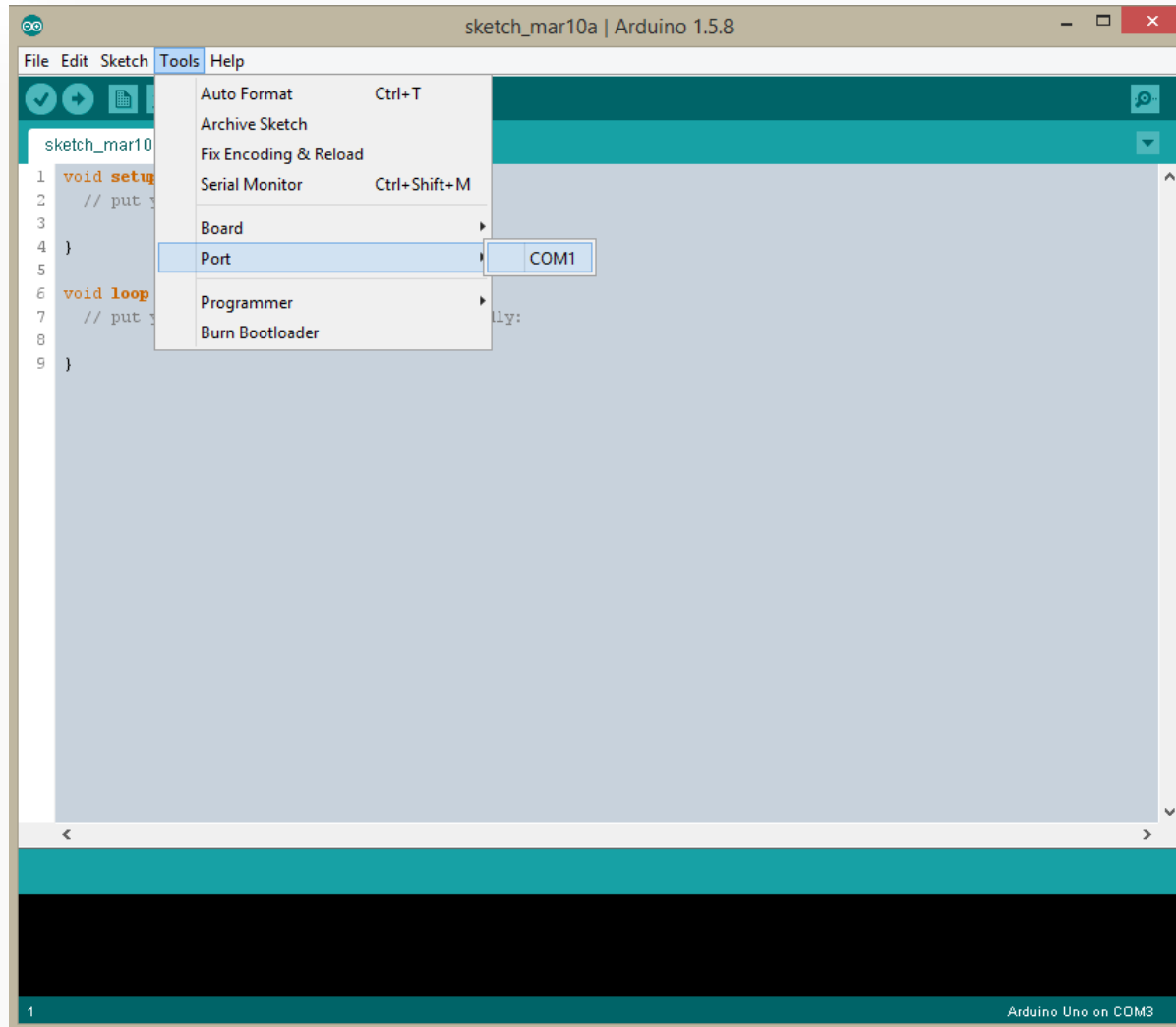
+

-

Välj Arduinotyp



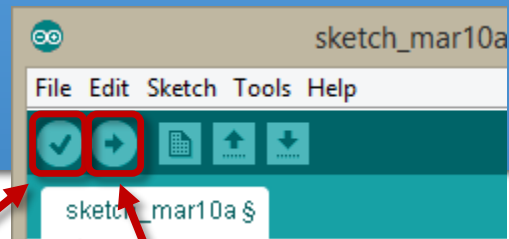
Välj Arduinotyp



Tänd den gröna lysdioden

```
void setup()
{
  // declare the LED pins as outputs
  pinMode(3, OUTPUT);
  digitalWrite(3, HIGH); // turn the green LED on pin 3 on
}

void loop()
{
}
}
```



Kontrollera att
programmet är
korrekt

Ladda upp och
starta programmet

Gå vidare med kapitel 02 i boken

”Spaceship interface”