CCLab Fall 2012

Parsons The New School For Design

WEEK 7. Intro to Arduino

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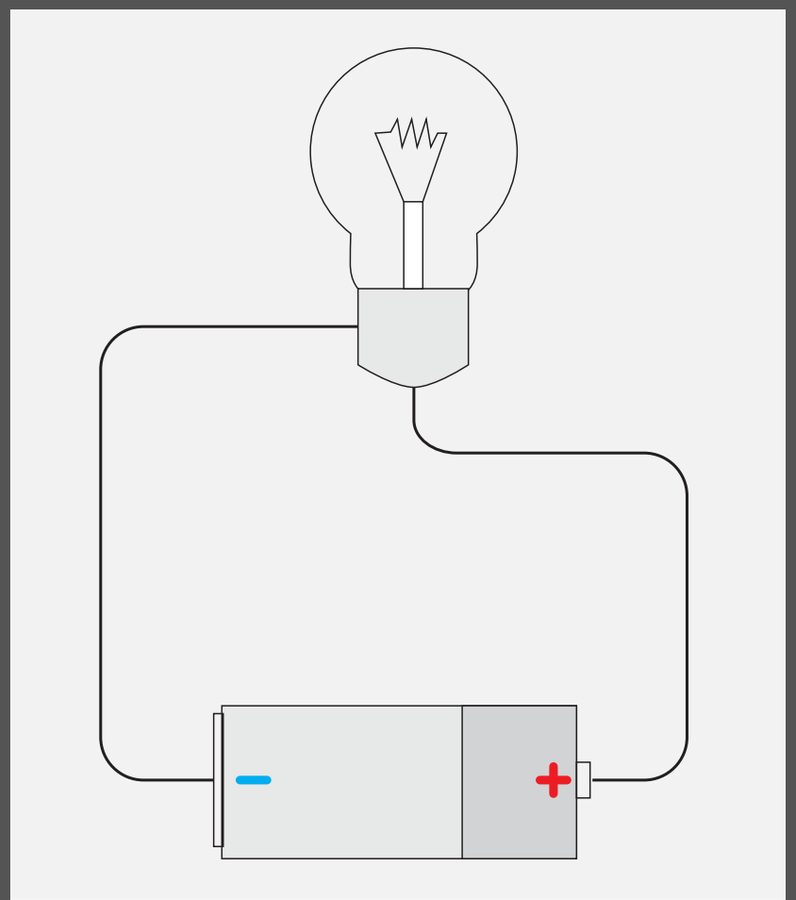
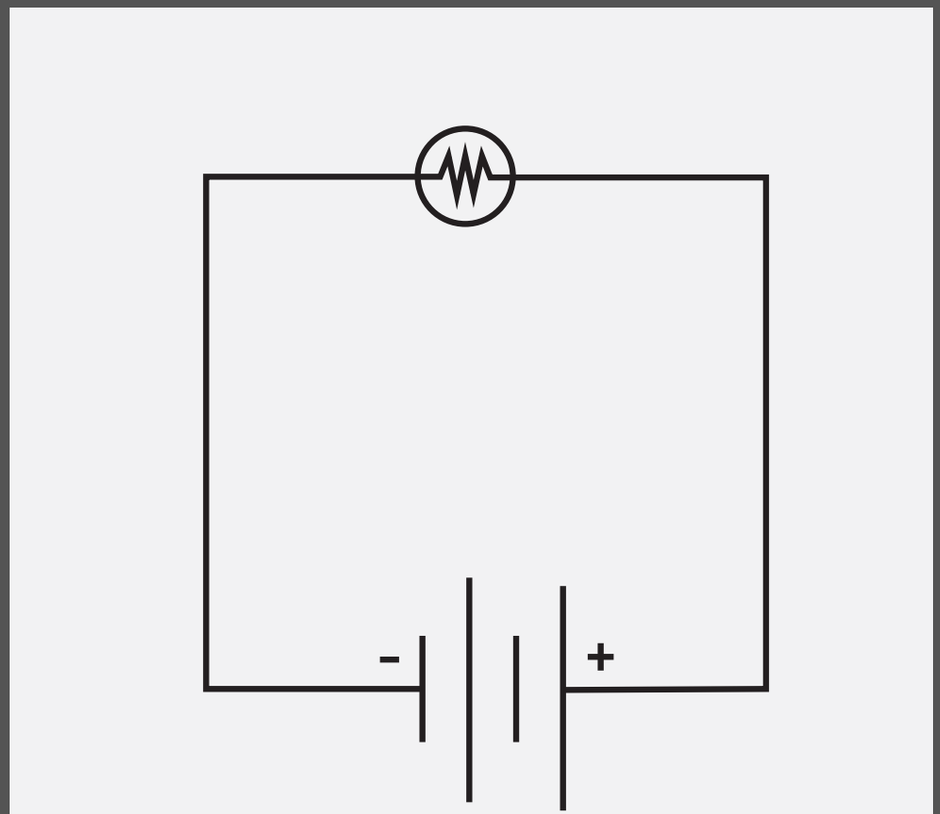
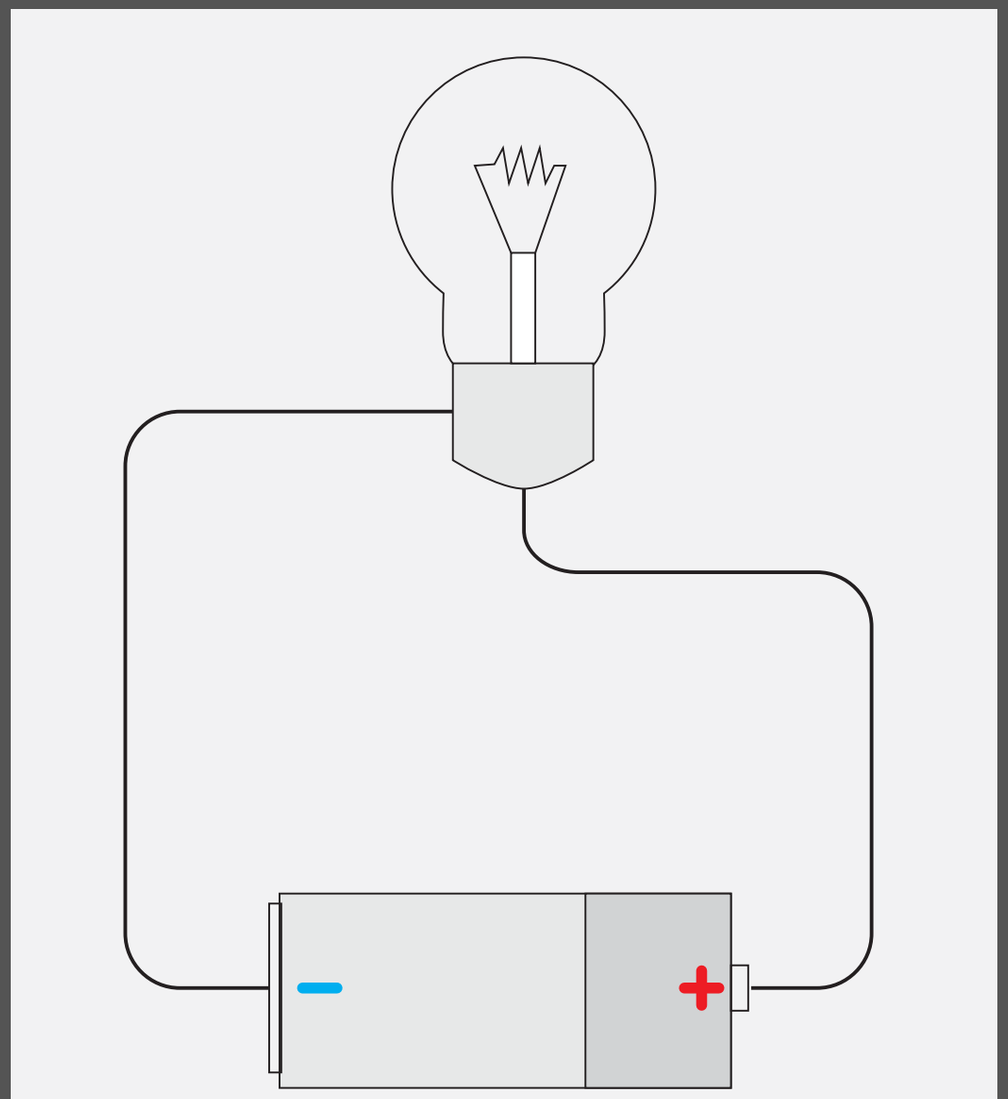
Circuit

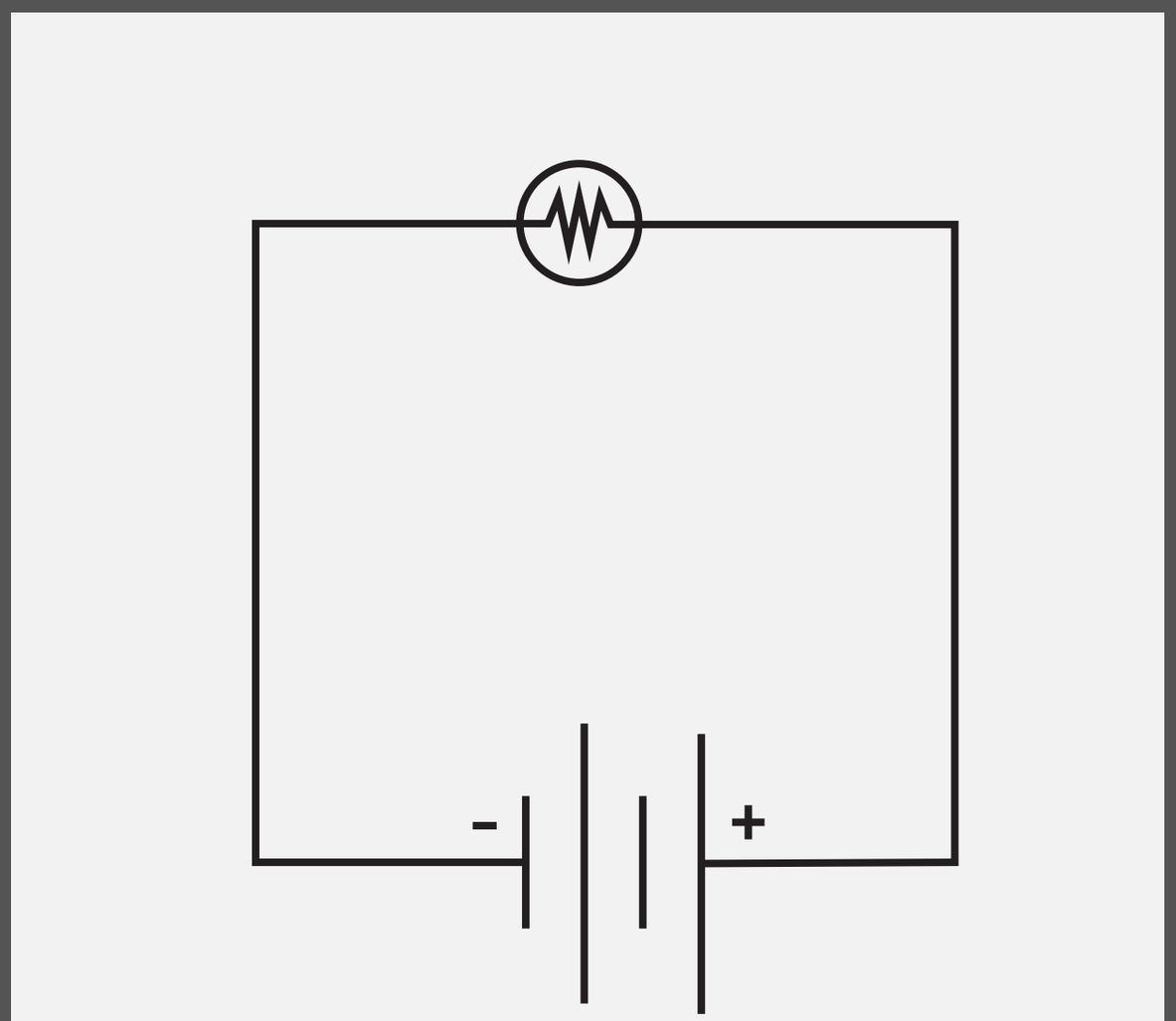
From the latin circuitus(a going around) and circum (round)

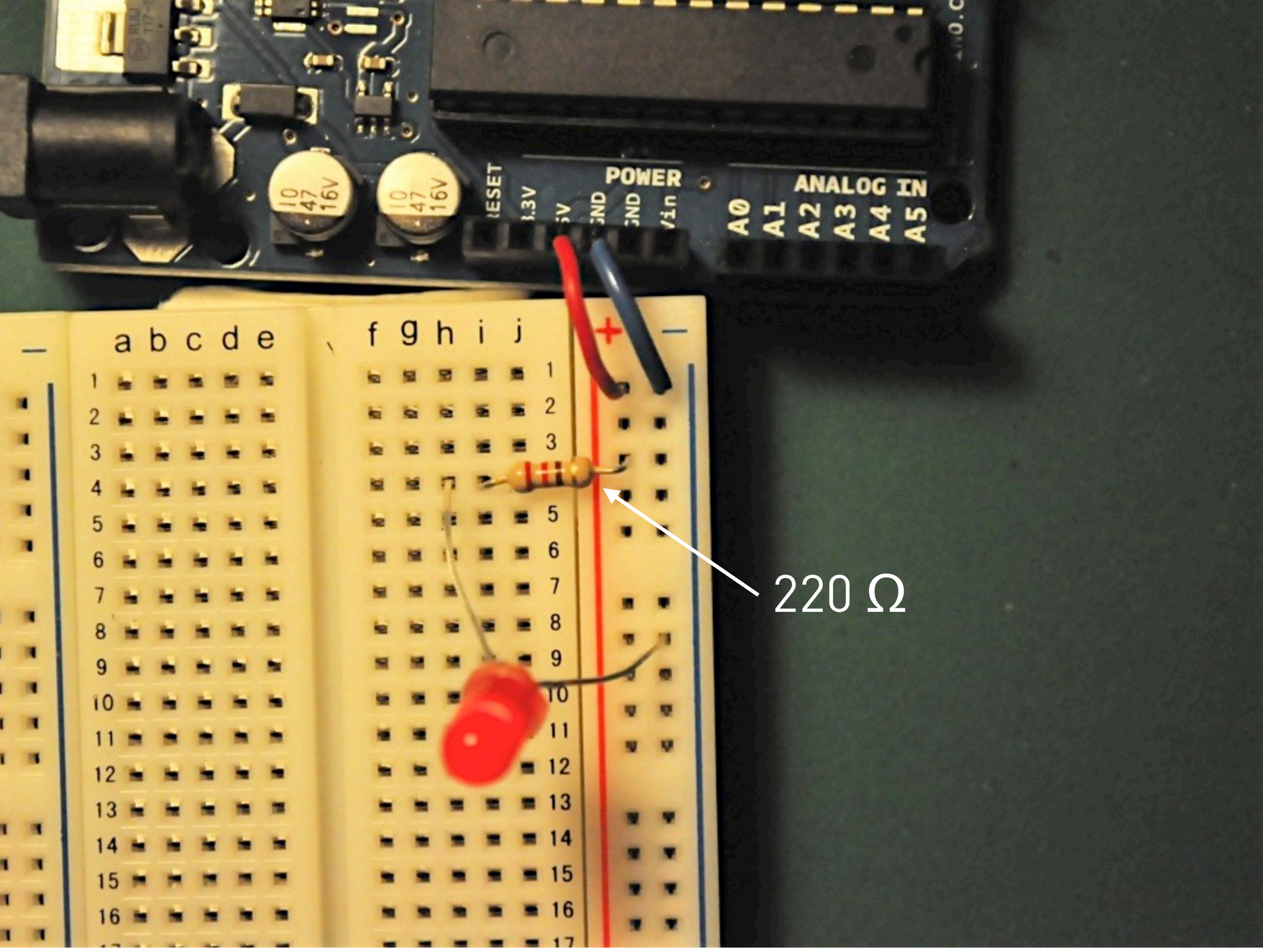
A closed loop containing a source of electrical energy (eg. a battery) and a load (eg. a light bulb)

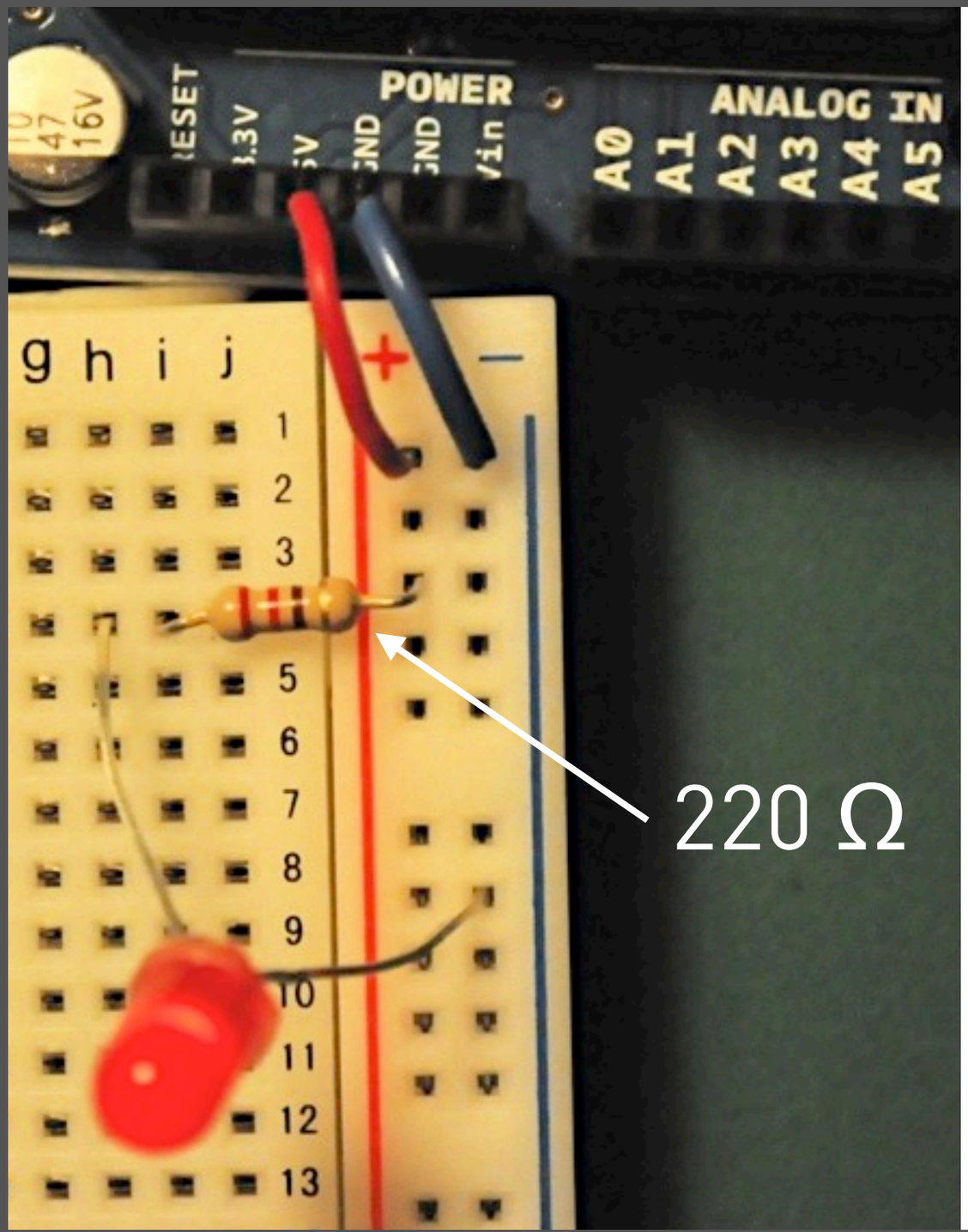


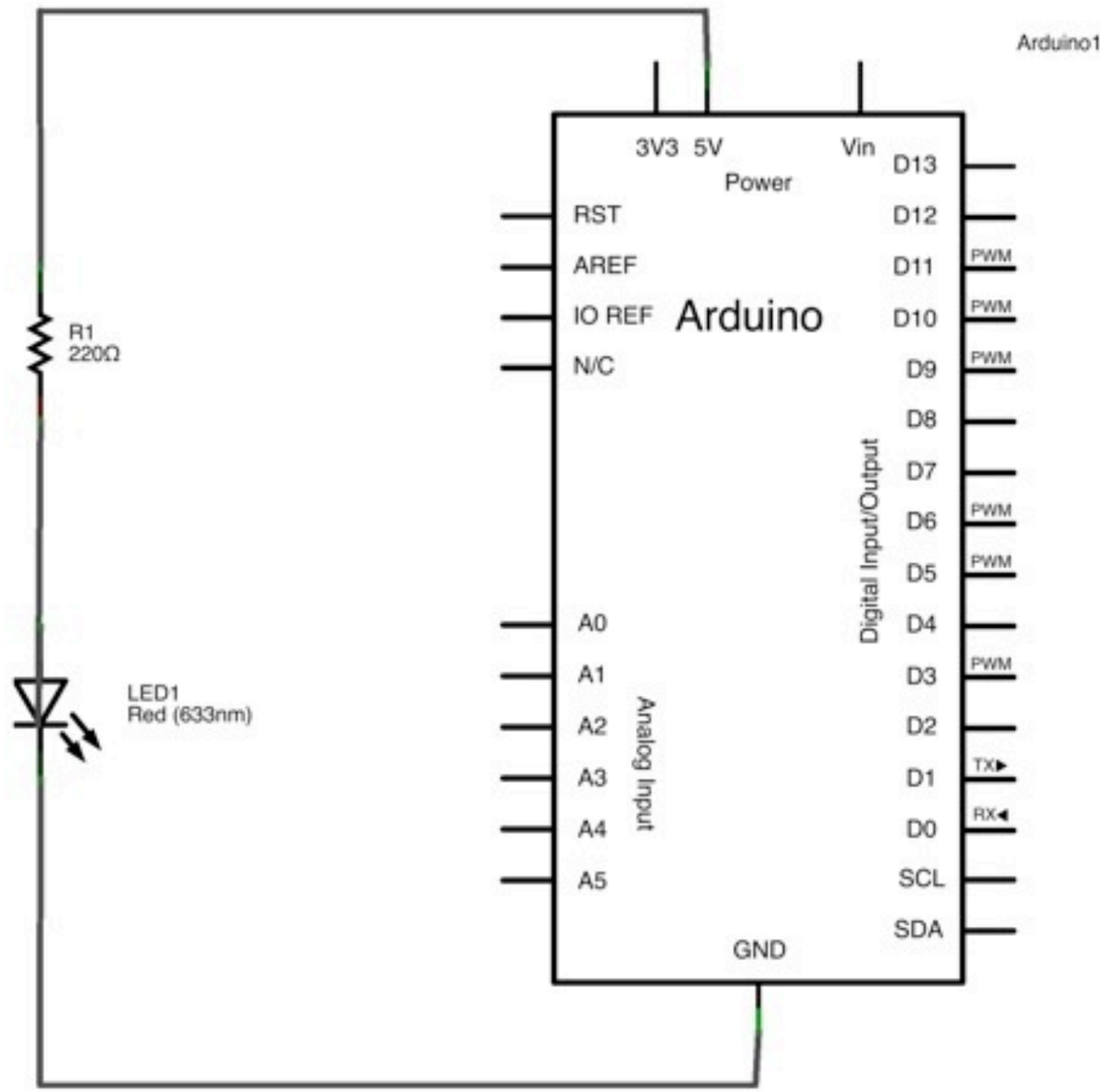







POWER
ANALOG IN
A0
A1
A2
A3
A4
A5
a b c d e
f g h i j
220 Ω

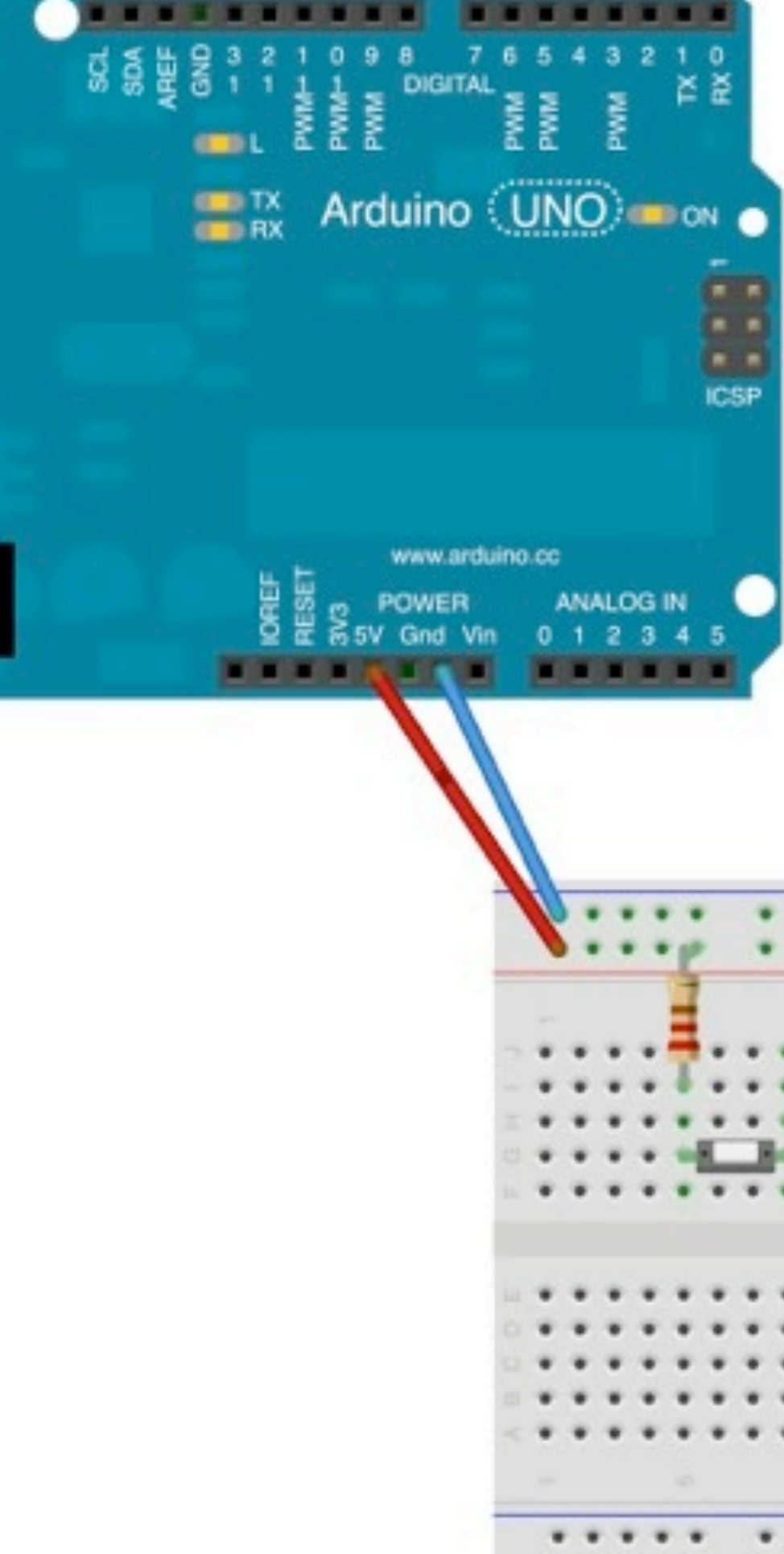

POWER
ANALOG IN
A0
A1
A2
A3
A4
A5
g h i j
220 Ω

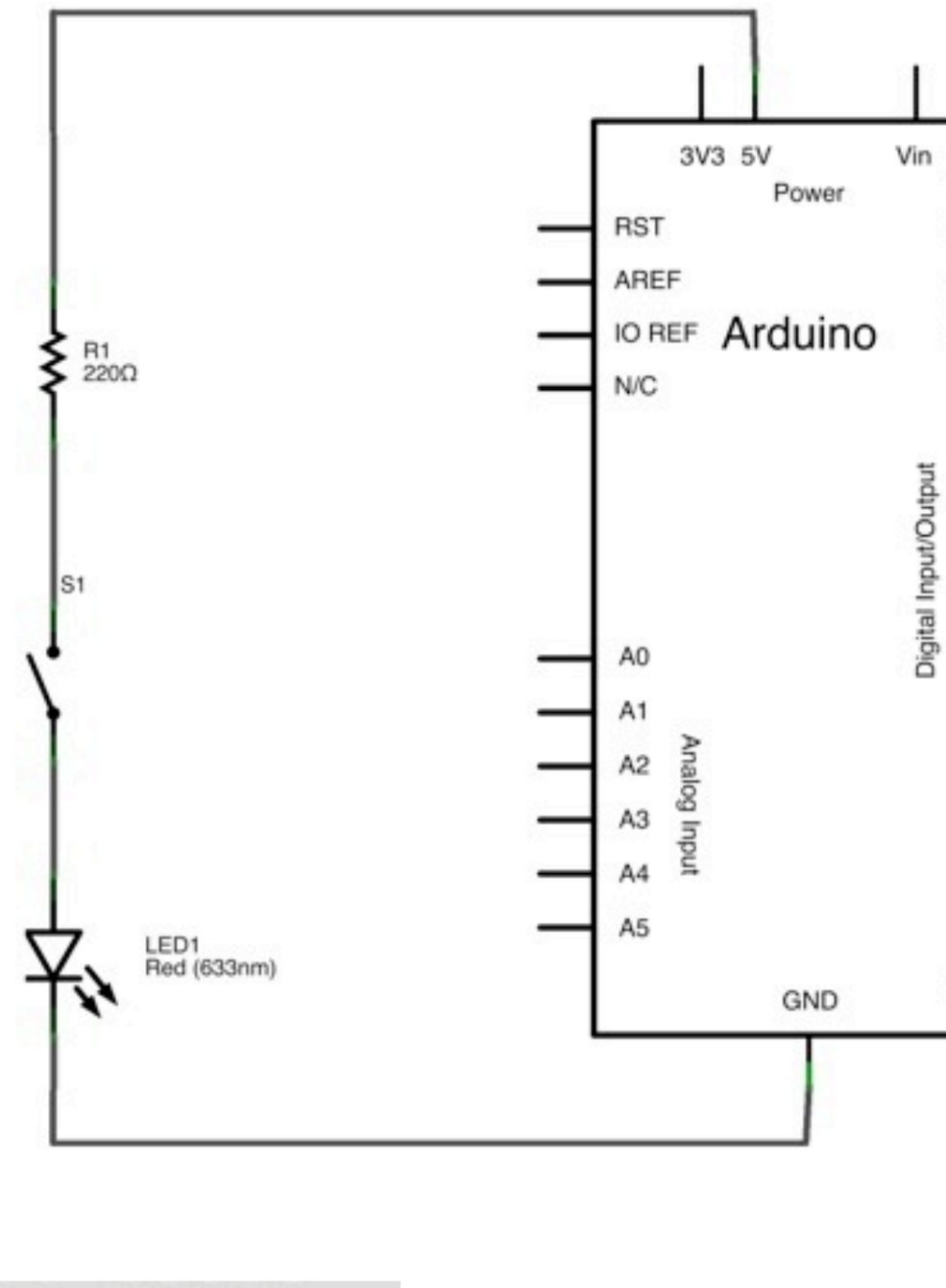

Arduino1
R1
220Ω
LED1
Red (633nm)
3V3 5V
Power
Vin
RST
AREF
IO REF
Arduino
N/C
A0
A1
A2
A3
A4
A5
Analog Input
GND
D13
D12
D11
D10
D9
D8
D7
D6
D5
D4
D3
D2
D1
D0
SCL
SDA
Digital Input/Output
PWM
TX
RX

Switches

A break in the circuit that can be opened or closed.

SWITCH EXAMPLE





Arduino

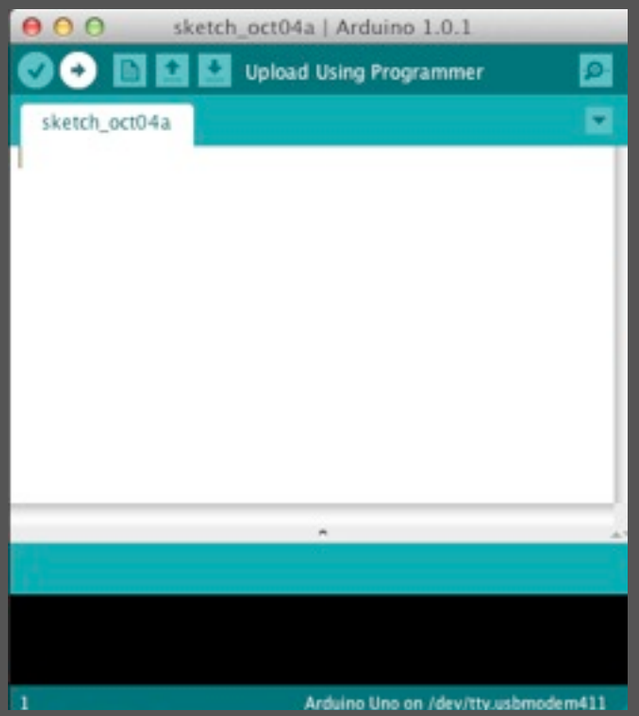
Arduino

Microcontroller (board)

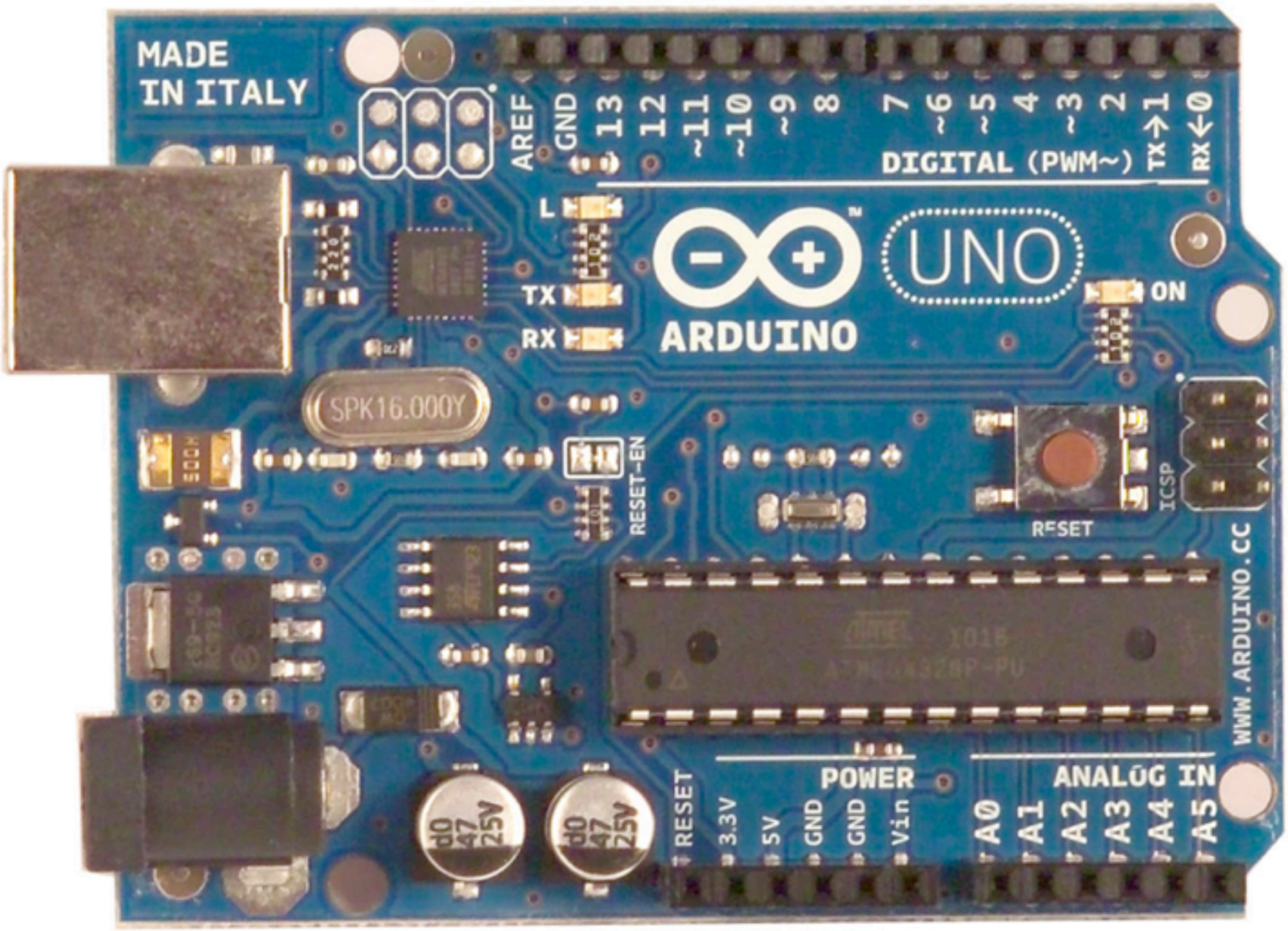
Language

```
void setup() {
  // initialize serial communication at 9
  Serial.begin(9600);
  // make the pushbutton's pin an input:
  pinMode(pushButton, INPUT);
}


void loop() {
  //read the state of the button
  int buttonState = digitalRead(pushButto

  if (buttonState == HIGH){
    Serial.write(1); //we send a byte nu
  }
  else{
    Serial.write(2); //we send a byte nu
  }
```

Environment (IDE)



Board


MADE
IN ITALY
AREF
GND
13
12
~11
~10
~9
8
7
~6
~5
4
~3
2
TX→1
RX←0
DIGITAL (PWM~)
L
TX
RX
ARDUINO
UNO
ON
SPK16.000Y
RESET-EN
RESET
ICSP
WWW.ARDUINO.CC
POWER
ANALOG IN
RESET
3.3V
5V
GND
GND
Vin
A0
A1
A2
A3
A4
A5

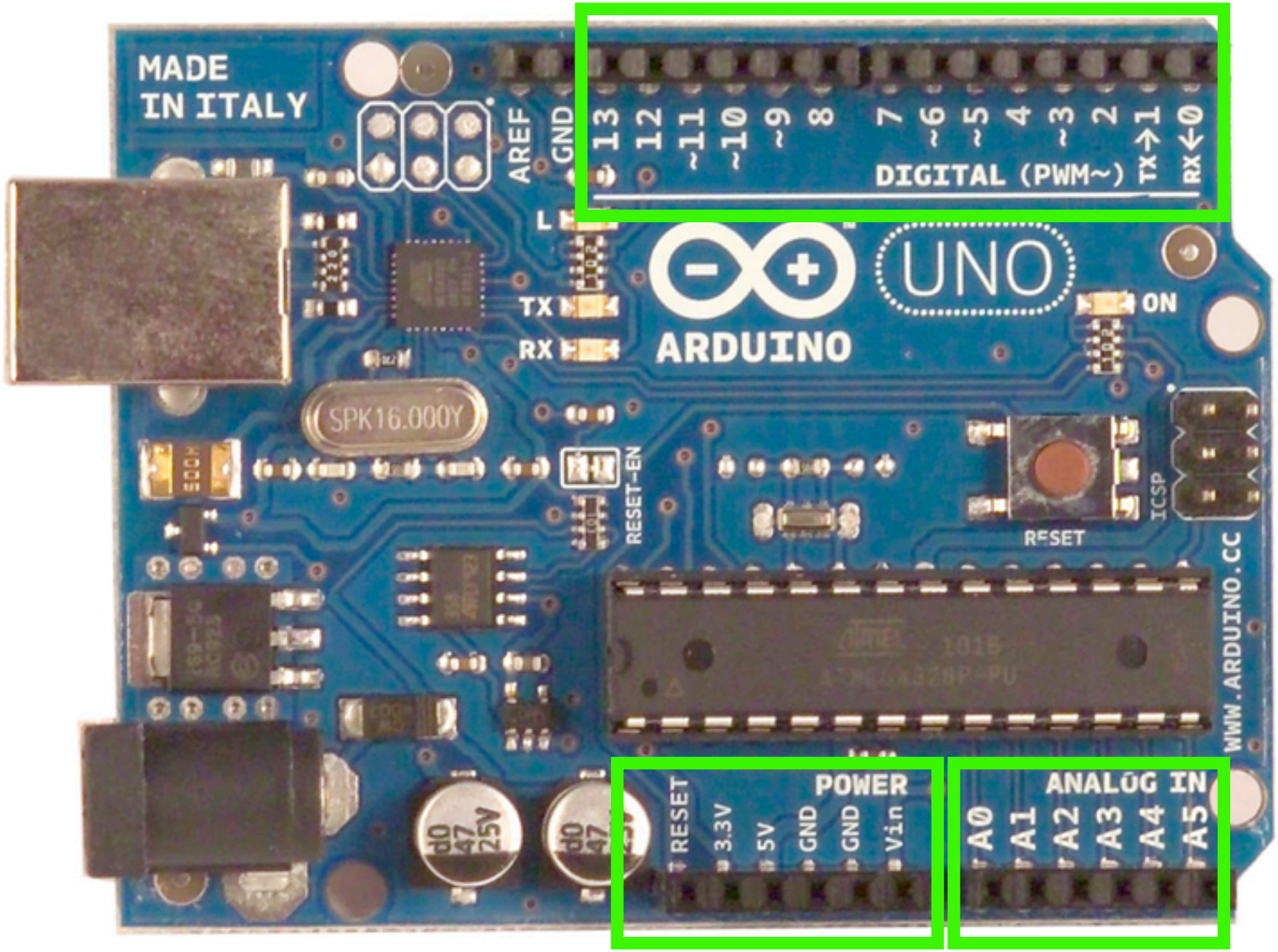
Pins?

A pin provides an input or output through which the controller can communicate with components

On the Arduino board we have 3 groups of pins

DIGITAL ANALOG POWER

DIGITAL PINS



POWER PINS

ANALOG INPUT PINS

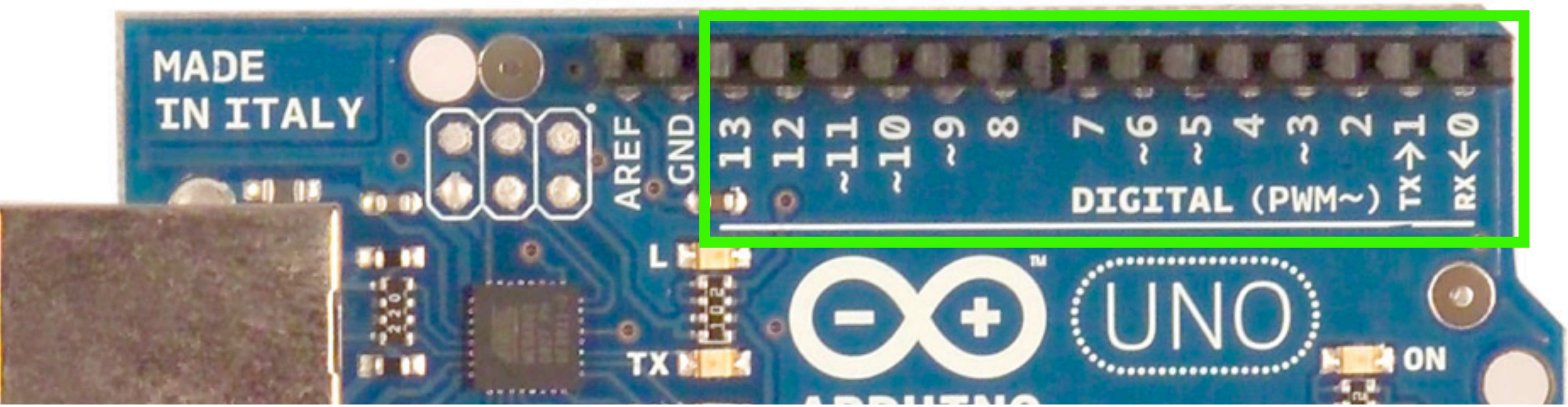
DIGITAL PINS

They have only two values that can be read/written to them : HIGH and LOW

They can be set to send or receive values: pinMode(INPUT) or pinMode(OUTPUT)

HIGH	: 5 Volts	ON	1	true
LOW	: 0 Volts	OFF	0	false

BINARY INFO

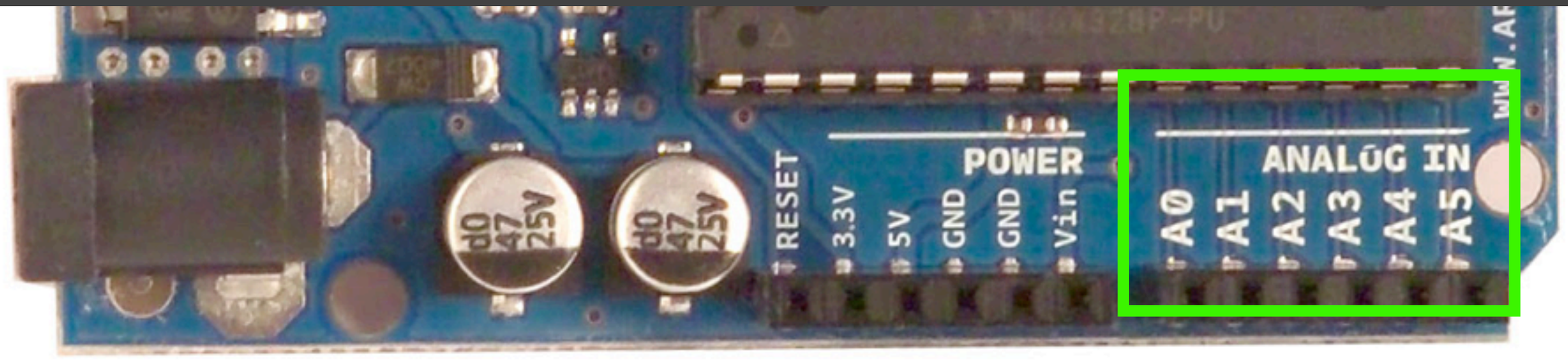


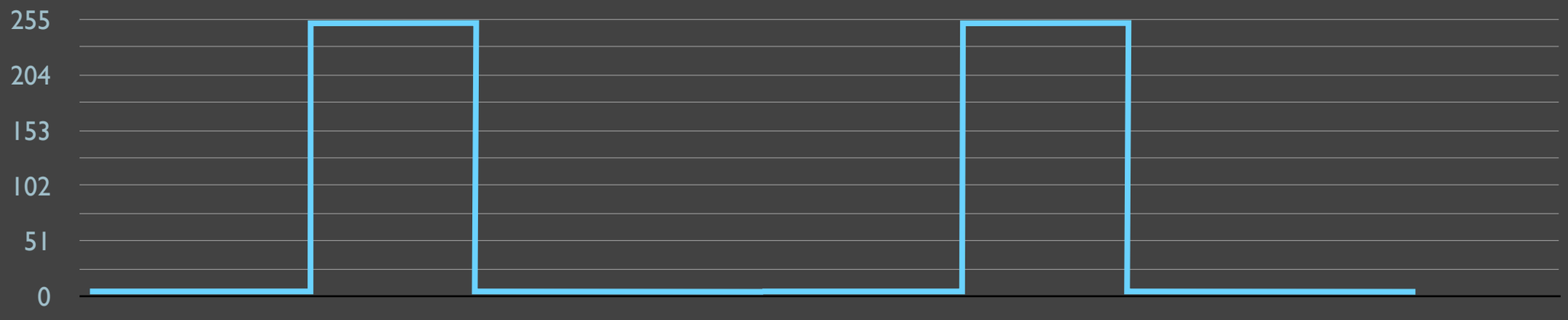
ANALOG PINS

RANGE of values can be read/written to them

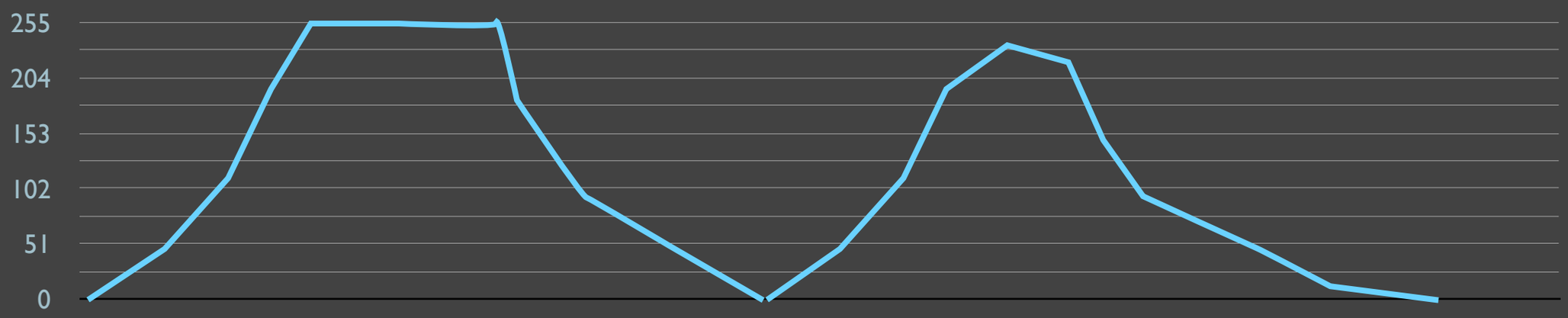
write	read	Volts
255	1023	5V
0	0	0V

We use analogRead() for incoming , and analogWrite() for outgoing messages



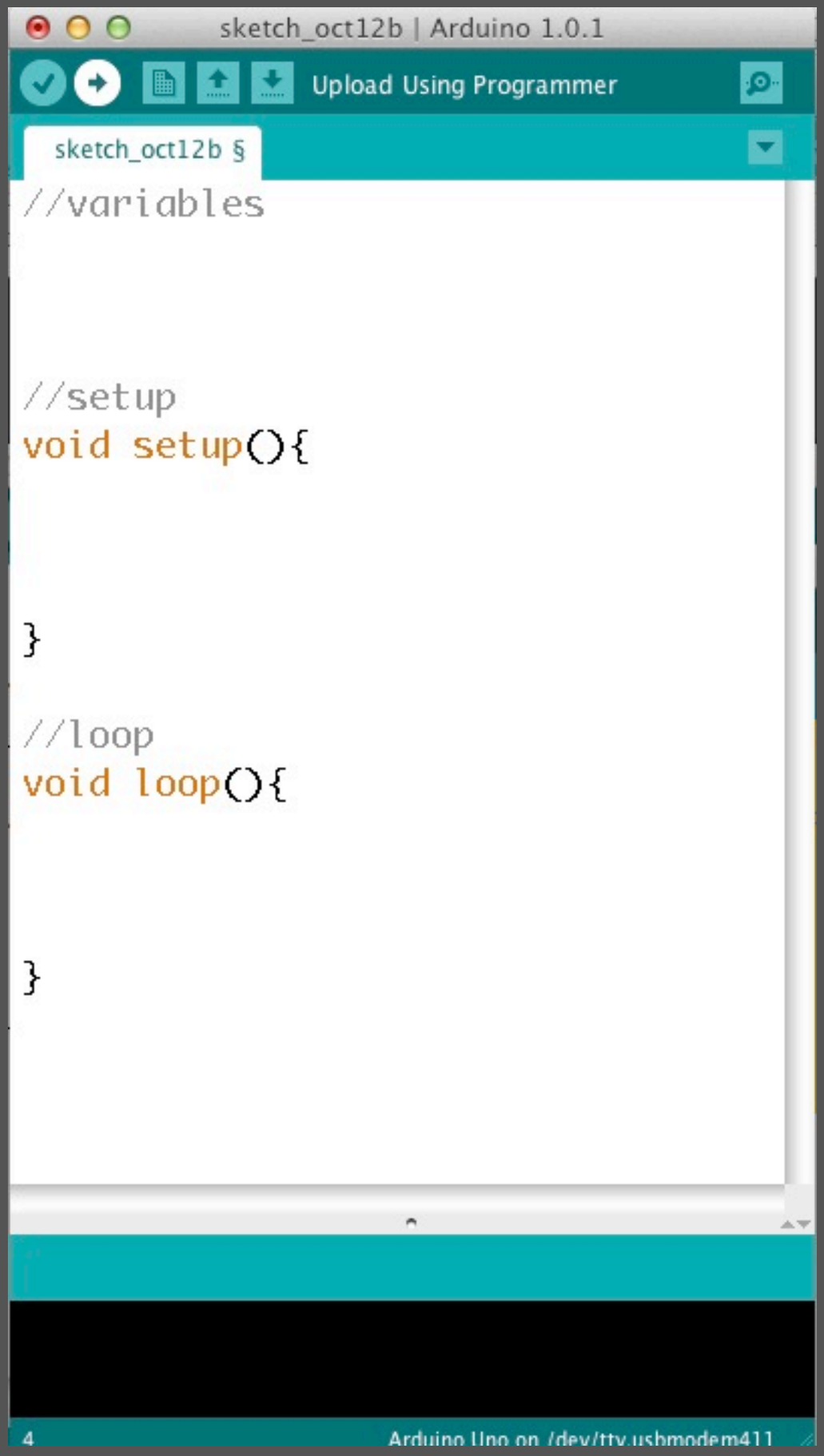


DIGITAL is for things that require a binary logic. Like lighting up an LED, or turning on a speaker, or reading if a button is pressed or unpressed, etc



ANALOG is for things that require a range: reading position of a dial, control the brightness of an LED, getting the distance from a sensor, etc

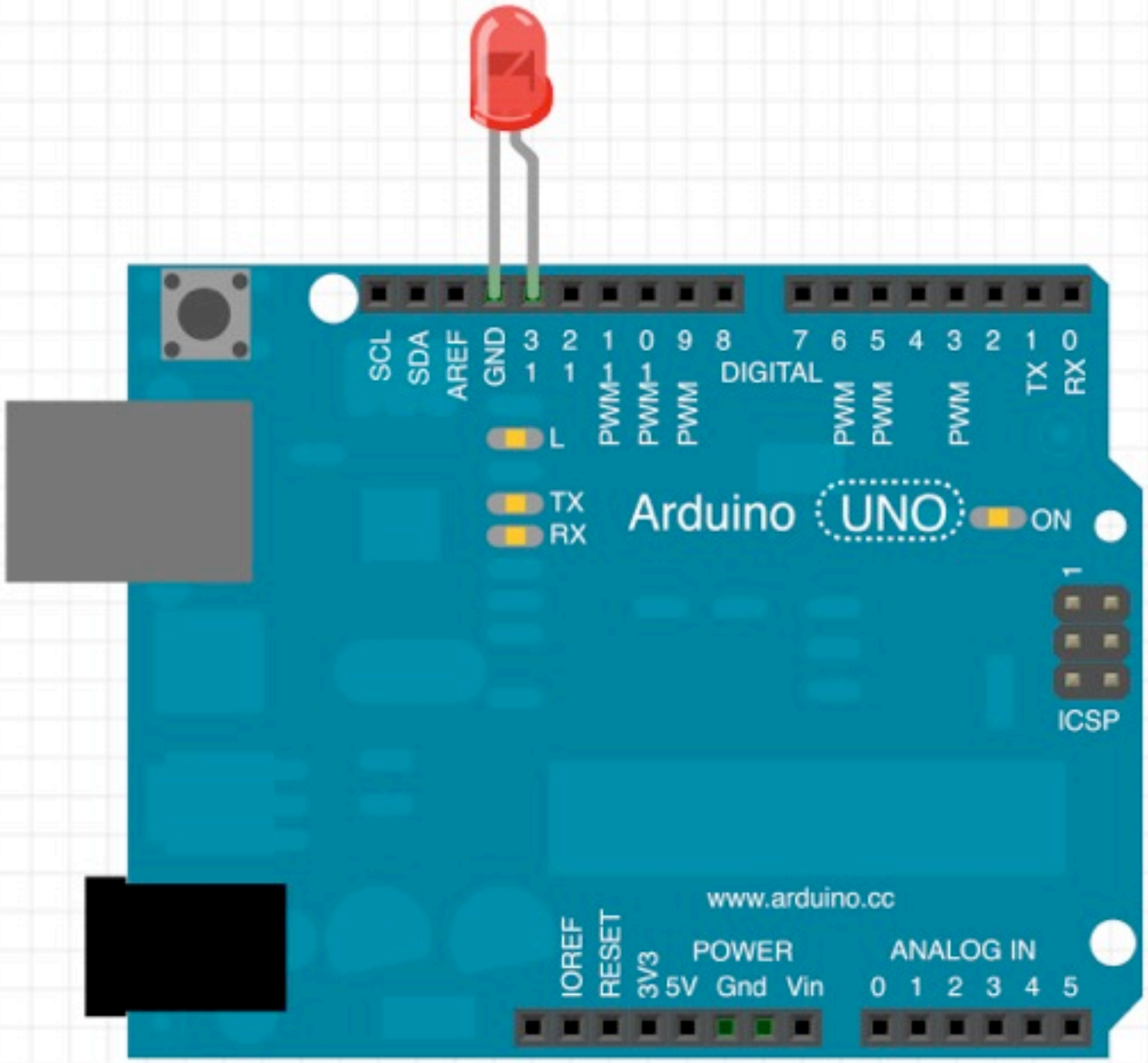
Code



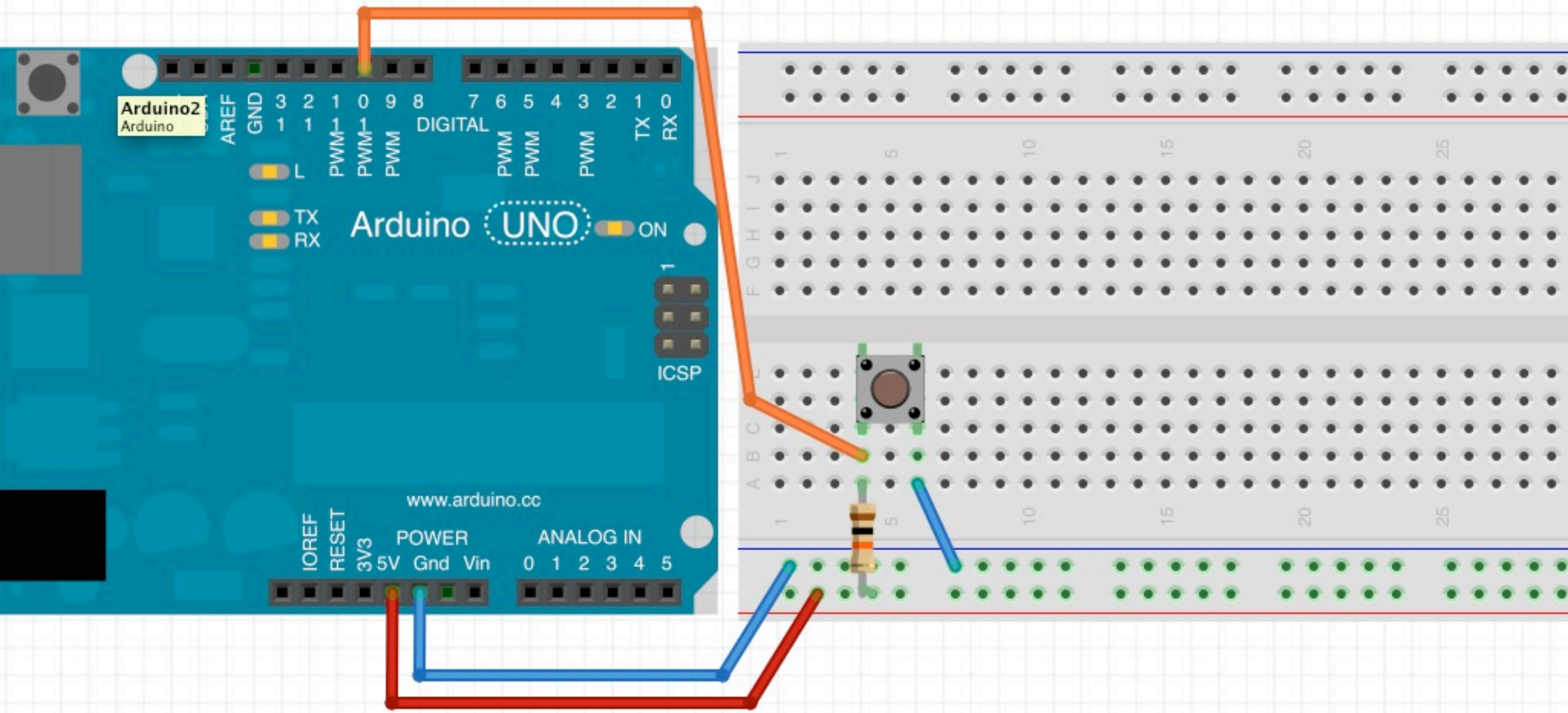
Arduino language is very similar to Processing.

Instead of using draw(), we use loop()

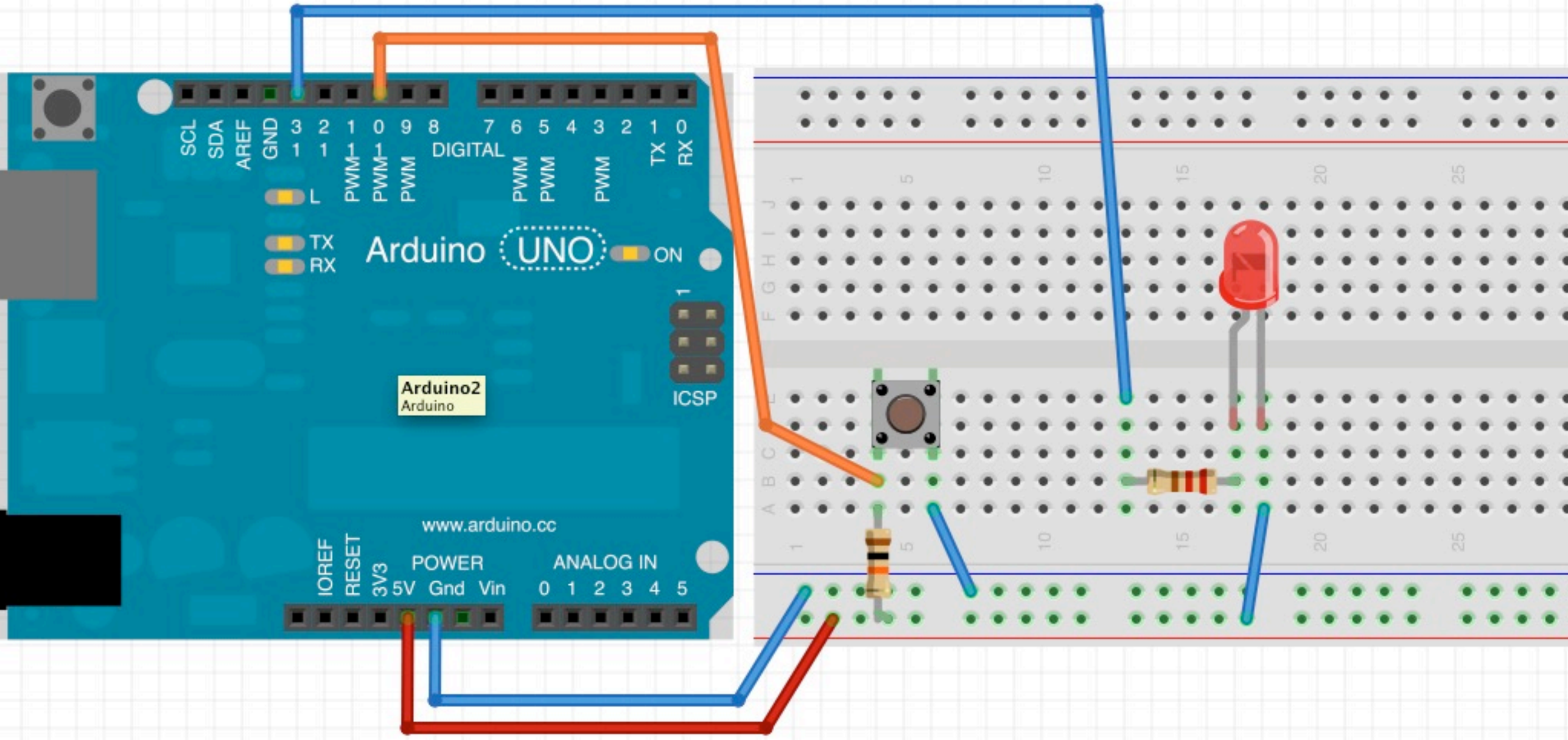
DIGITAL WRITE EXAMPLE
LED blink



DIGITAL READ EXAMPLE
Reading button state, print to console using serial



DIGITAL READ-WRITE EXAMPLE
Reading button state, light an LED



ANALOG READ, DIGITAL WRITE PWM EXAMPLE
reading potentiometer, dimming LED