MAKE

MAP

BLINK

MAKE MAP BLINK

John Keefe

@jkeefe

johnkeefe.net

john@johnkeefe.net

MAKE

MAP

BLINK

Class No. 4
Resistance
is
Fruitful

MAKE

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Attendance!
Text your name to
646-699-3993

MAKE

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#MakeMapBlink

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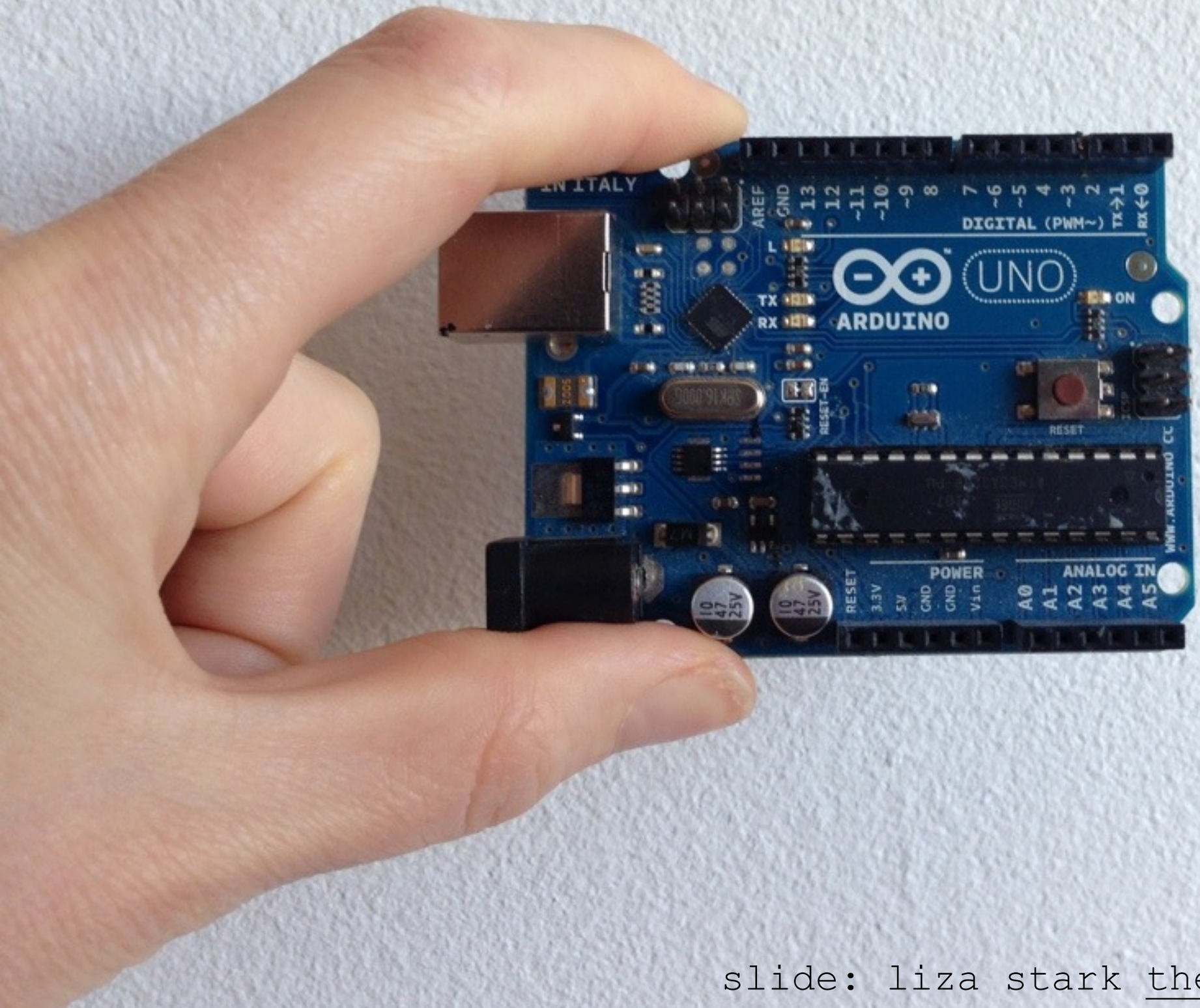
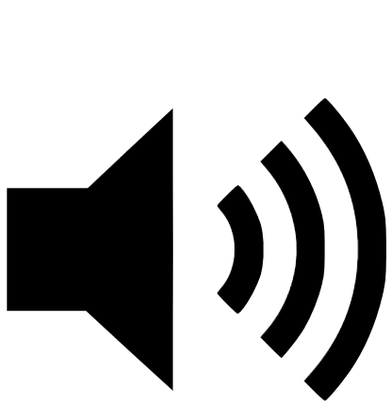
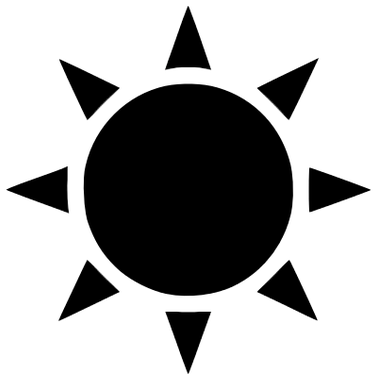
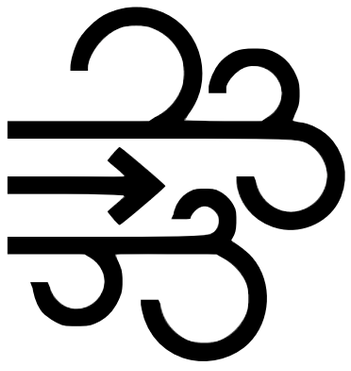
Get to Know Arduino a microcontroller

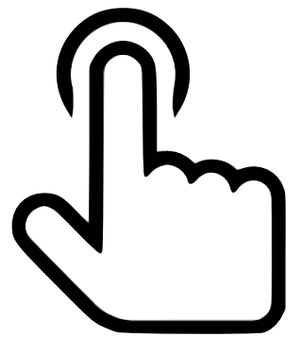


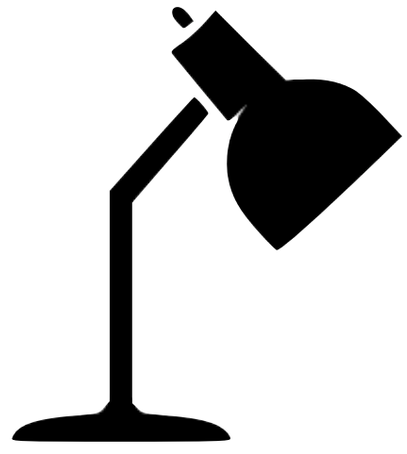
slide: liza stark thesoftcircuiteer.net

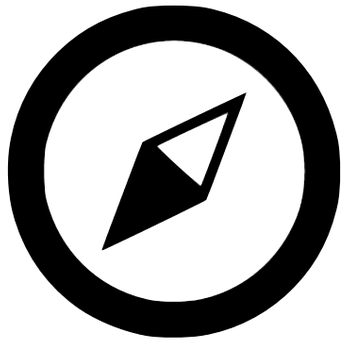


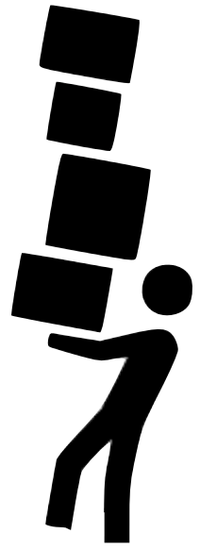












let's build!

slide: liza stark thesoftcircuiteer.net

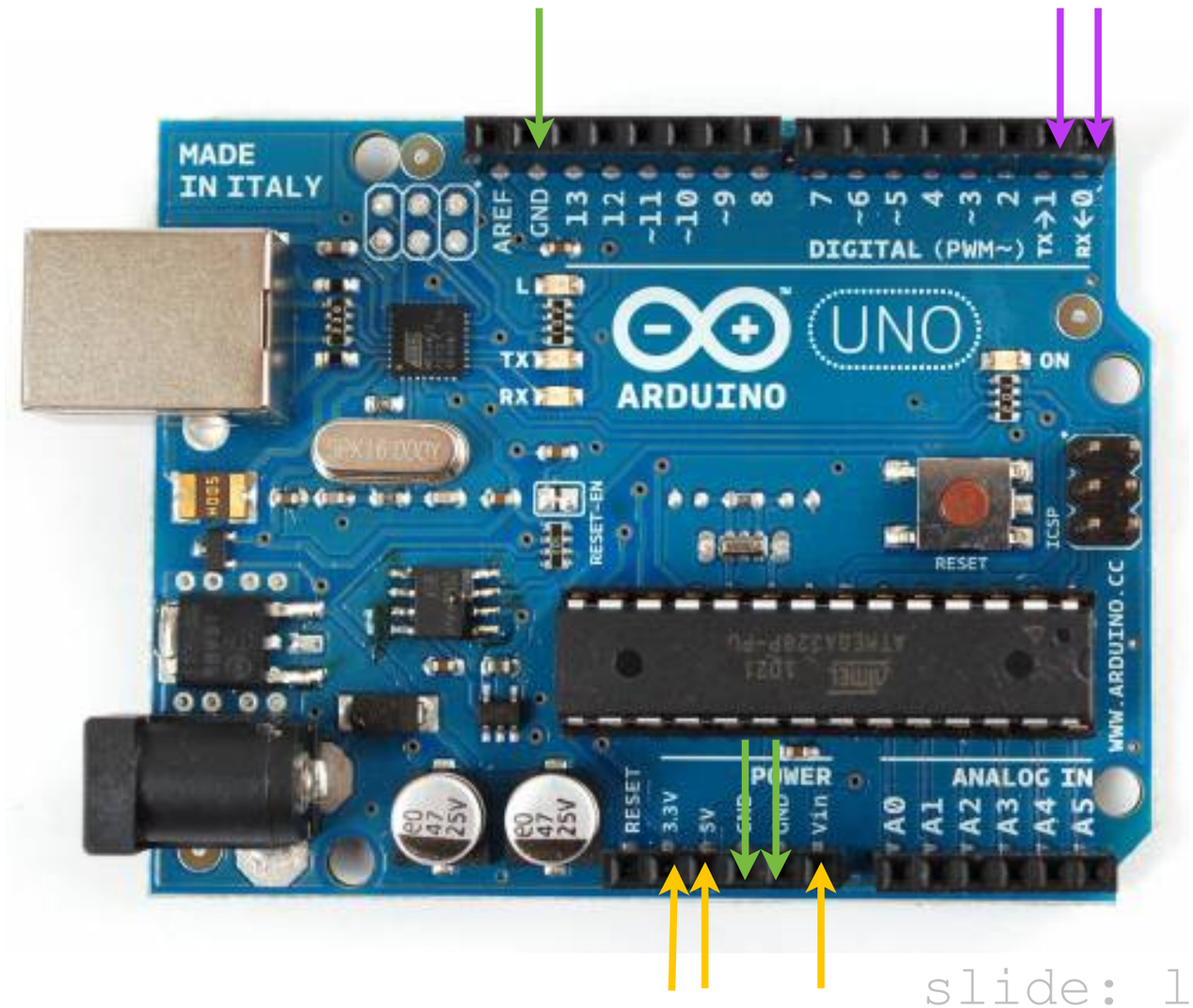
-/GRD

+/PIN 13

YOU CAN ONLY DO THIS ON PIN 13!

slide: liza stark thesoftcircuiteer.net

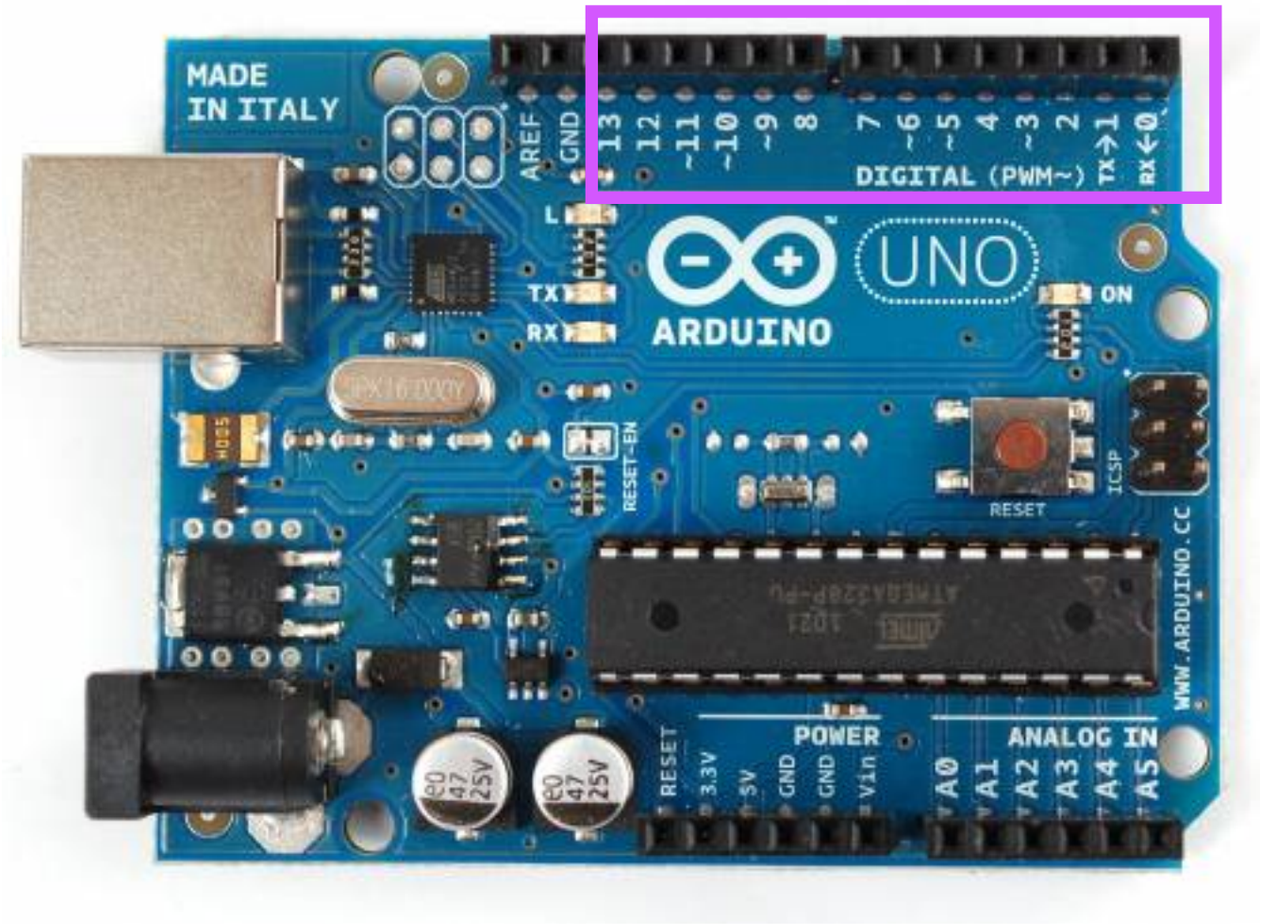
a **pin** provides an input or output through which the controller can communicate with components.



TX/RX (serial - transmit/receive)

3 ground pins

3 power pins
// 5 volts
// 3 volts
// VIN - can plug 9 volts here



14 Digital pins

You can read or write 2 different values to them:

HIGH	LOW
5 volts	0 volts
ON	OFF

They can be configured as input OR output.

Arduino File Edit Sketch Tools Help

New ⌘N
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Sketchbook
Examples
Close ⌘W
Save ⌘S
Save As... ⇧⌘S
Upload ⌘U
Upload Using Programmer ⇧⌘U

Page Setup ⇧⌘P
Print ⌘P

sketch_oct07

```
/*

My first sketch

*/
```

01.Basics
02.Digital
03.Analog
04.Communication
05.Control
06.Sensors
07.Display
08.Strings
09.USB(Leonardo)
ArduinoISP

IRremote
LPD8806
PCM

EEPROM
Ethernet
Firmata
LiquidCrystal
SD
Servo
SoftwareSerial
SPI
Stepper
Wire

AnalogReadSerial
BareMinimum
Blink
DigitalReadSerial
Fade
ReadAnalogVoltage

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Arduino File Edit Sketch Tools Help

Auto Format ⌘T
Archive Sketch
Fix Encoding & Reload
Serial Monitor ⇧⌘M

ArduBlock

Board
Serial Port

Programmer
Burn Bootloader

ATtiny45 (internal 1 MHz clock)
ATtiny45 (internal 8 MHz clock)
ATtiny45 (external 20 MHz clock)
ATtiny85 (internal 1 MHz clock)
ATtiny85 (internal 8 MHz clock)
ATtiny85 (external 20 MHz clock)
✓ ATtiny44 (internal 1 MHz clock)
ATtiny44 (internal 8 MHz clock)
ATtiny44 (external 20 MHz clock)
ATtiny84 (internal 1 MHz clock)
ATtiny84 (internal 8 MHz clock)
ATtiny84 (external 20 MHz clock)
Arduino Uno
Arduino Duemilanove w/ ATmega328
Arduino Diecimila or Duemilanove w/ ATmega168
Arduino Nano w/ ATmega328
Arduino Nano w/ ATmega168
Arduino Mega 2560 or Mega ADK
Arduino Mega (ATmega1280)
Arduino Leonardo
Arduino Mini w/ ATmega328
Arduino Mini w/ ATmega168
Arduino Ethernet
Arduino Fio
Arduino BT w/ ATmega328
Arduino BT w/ ATmega168
LilyPad Arduino w/ ATmega328
LilyPad Arduino w/ ATmega168
Arduino Pro or Pro Mini (5V, 16 MHz) w/ ATmega328
Arduino Pro or Pro Mini (5V, 16 MHz) w/ ATmega168

Blink

```
/*
  Blink
  Turns on an LED on for one sec
  This example code is in the pub
 */

// Pin 13 has an LED connected or
// give it a name:
int led = 13;

// the setup routine runs once when you press reset:
void setup() {
  // initialize the digital pin as an output.
  pinMode(led, OUTPUT);
}

// the loop routine runs over and over again forever:
void loop() {
  digitalWrite(led, HIGH);   // turn the LED on (HIGH is the voltag
  delay(1000);               // wait for a second
  digitalWrite(led, LOW);    // turn the LED off by making the volt
  delay(1000);               // wait for a second
}
```

5 11 ATtiny44 (internal 1 MHz clock) on /dev/tty.u

liza stark

Arduino File Edit Sketch Tools Help

Auto Format ⌘T
Archive Sketch
Fix Encoding & Reload
Serial Monitor ⇧⌘M

ArduBlock

Board
Serial Port
Programmer
Burn Bootloader

/dev/tty.usbmodemfa141
/dev/cu.usbmodemfa141
/dev/tty.Bluetooth-PDA-Sync
/dev/cu.Bluetooth-PDA-Sync
/dev/tty.Bluetooth-Modem
/dev/cu.Bluetooth-Modem

sket Blink

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```

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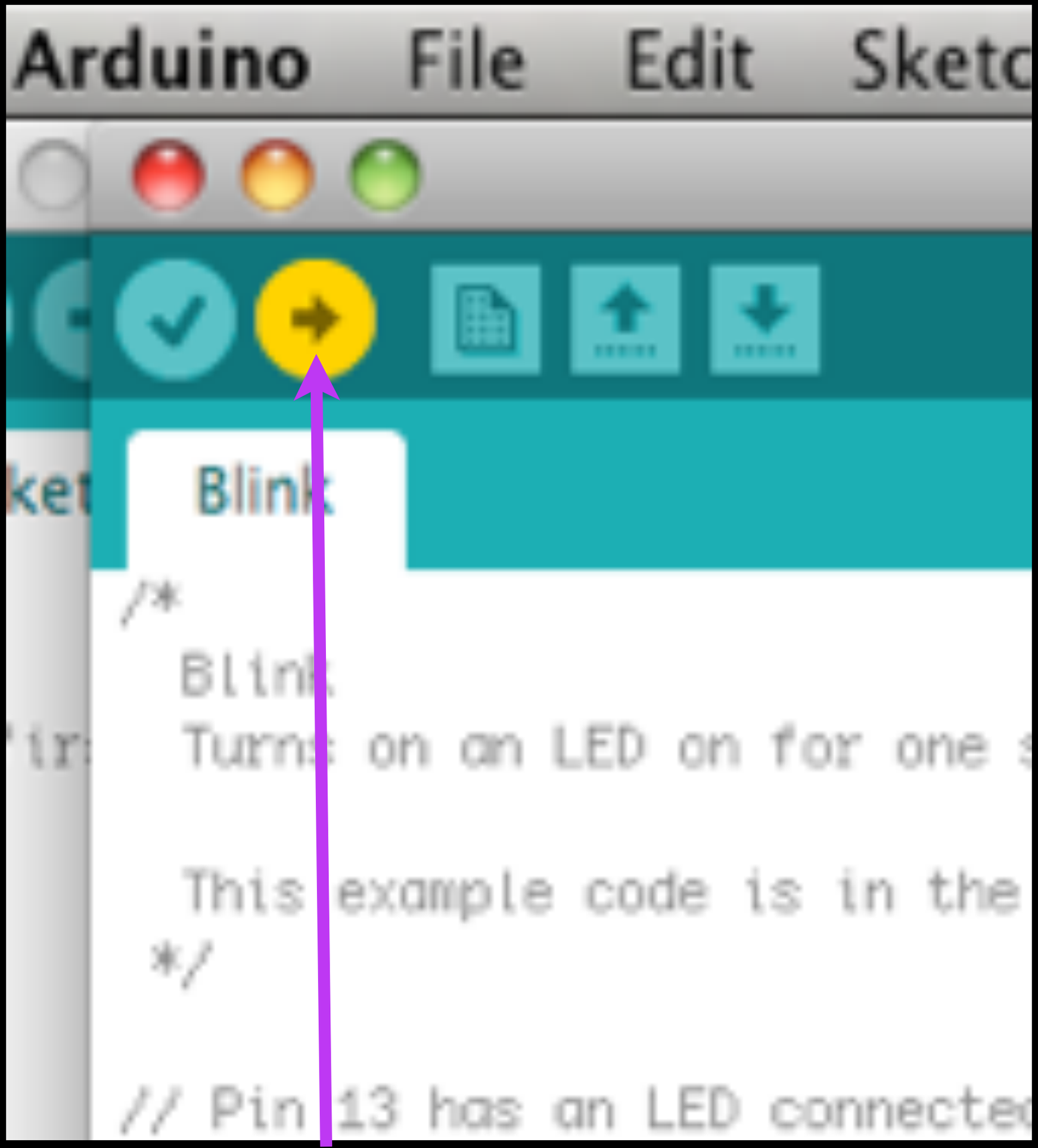
Arduino
File
Edit
Sketc
Blink
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Blink
Turns on an LED on for one
This example code is in the
*/
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Blink §

```
/*
  Blink
  Turns on an LED on for one second, then off for one second, repeatedly.

  This example code is in the public domain.
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// give it a name:
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Blink §

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  delay(1000);               // wait for a second
}
```

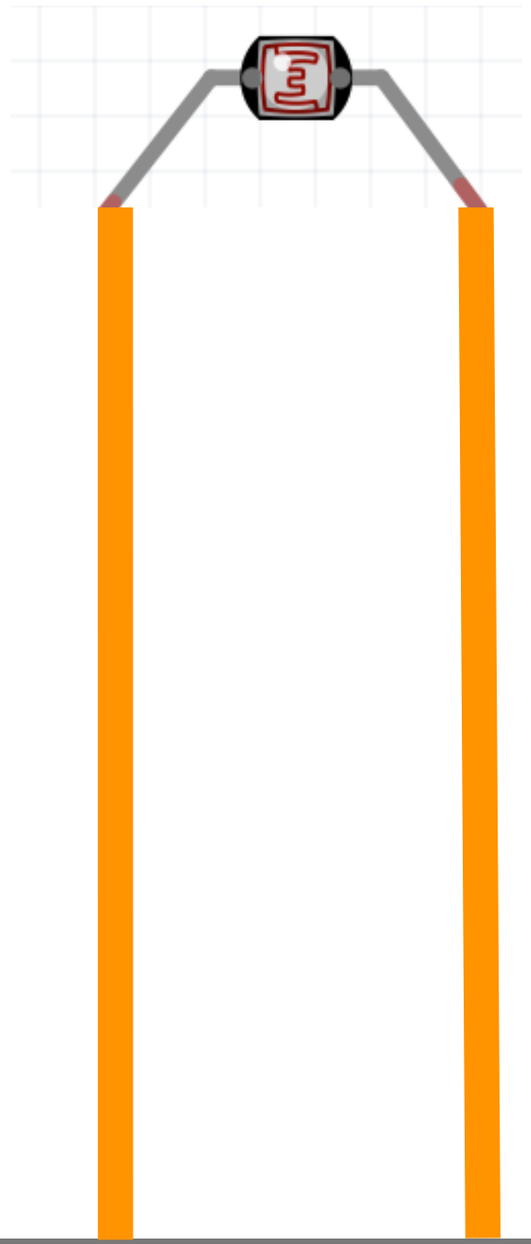
Remember how we played with these numbers?

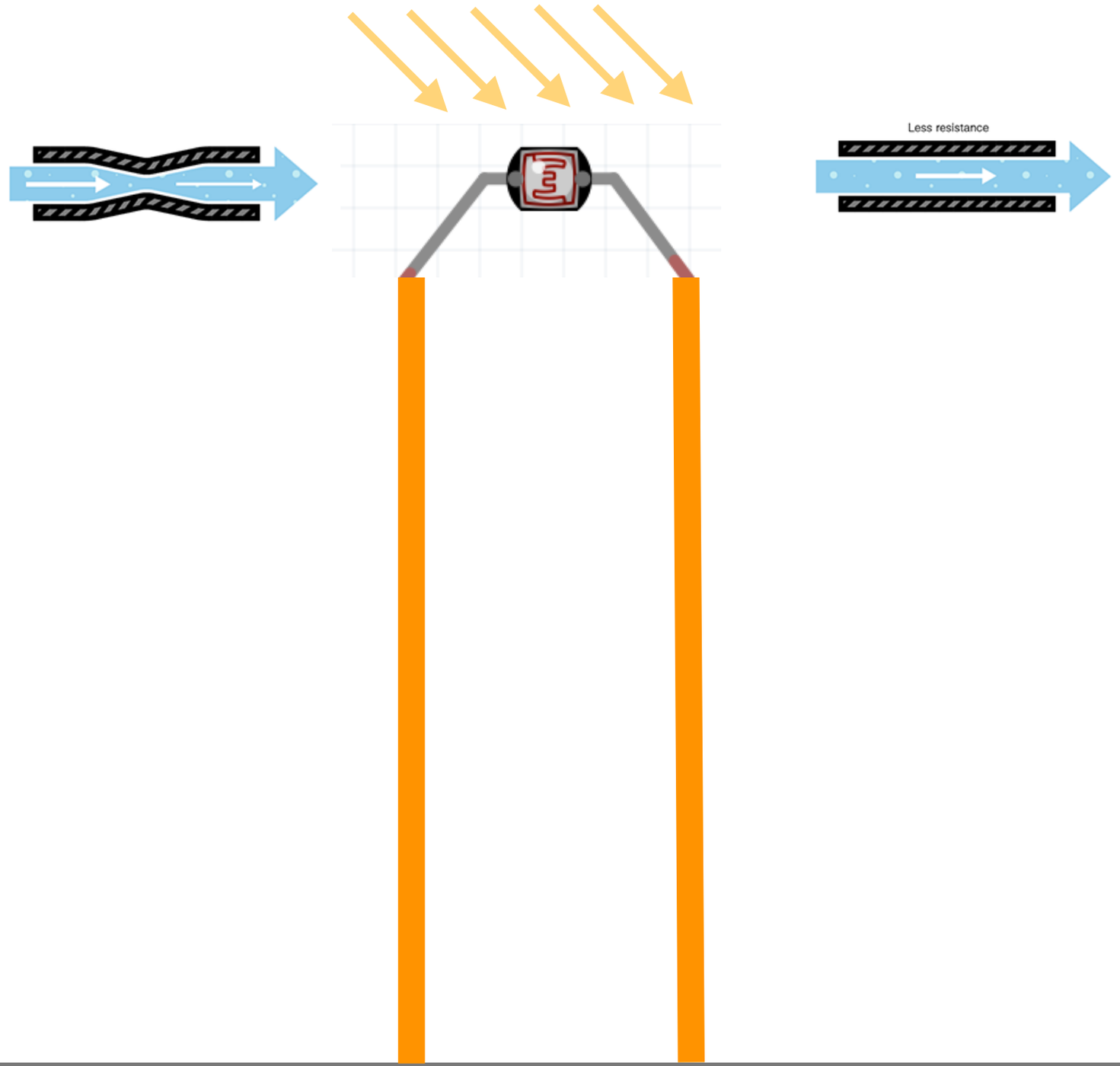
the *really* cool thing about this: we can make the arduino **sense** like we can.

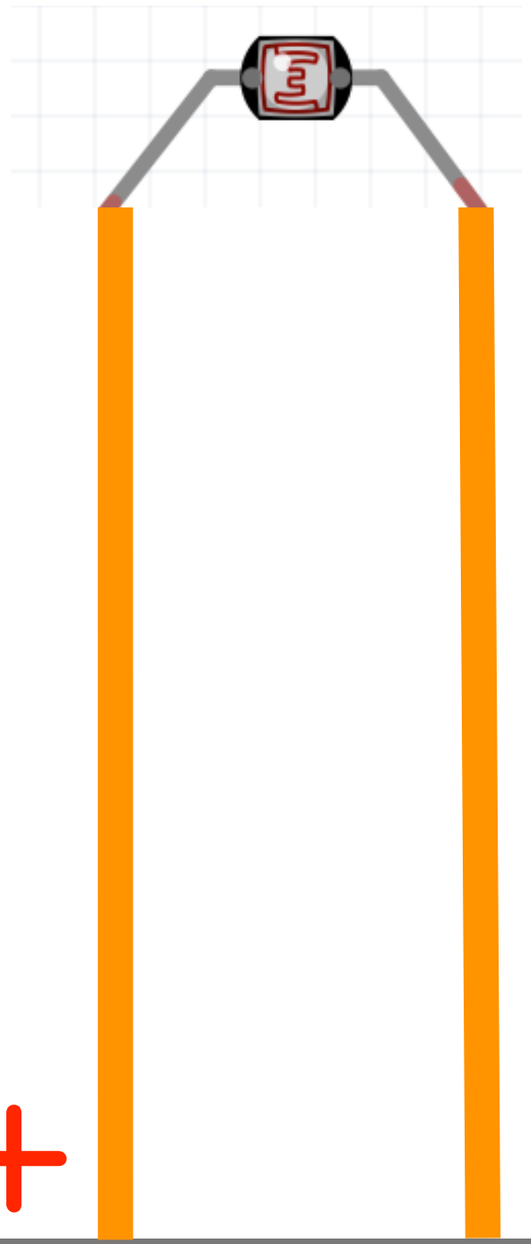
resistance is a material's tendency to resist the flow of charge(current).

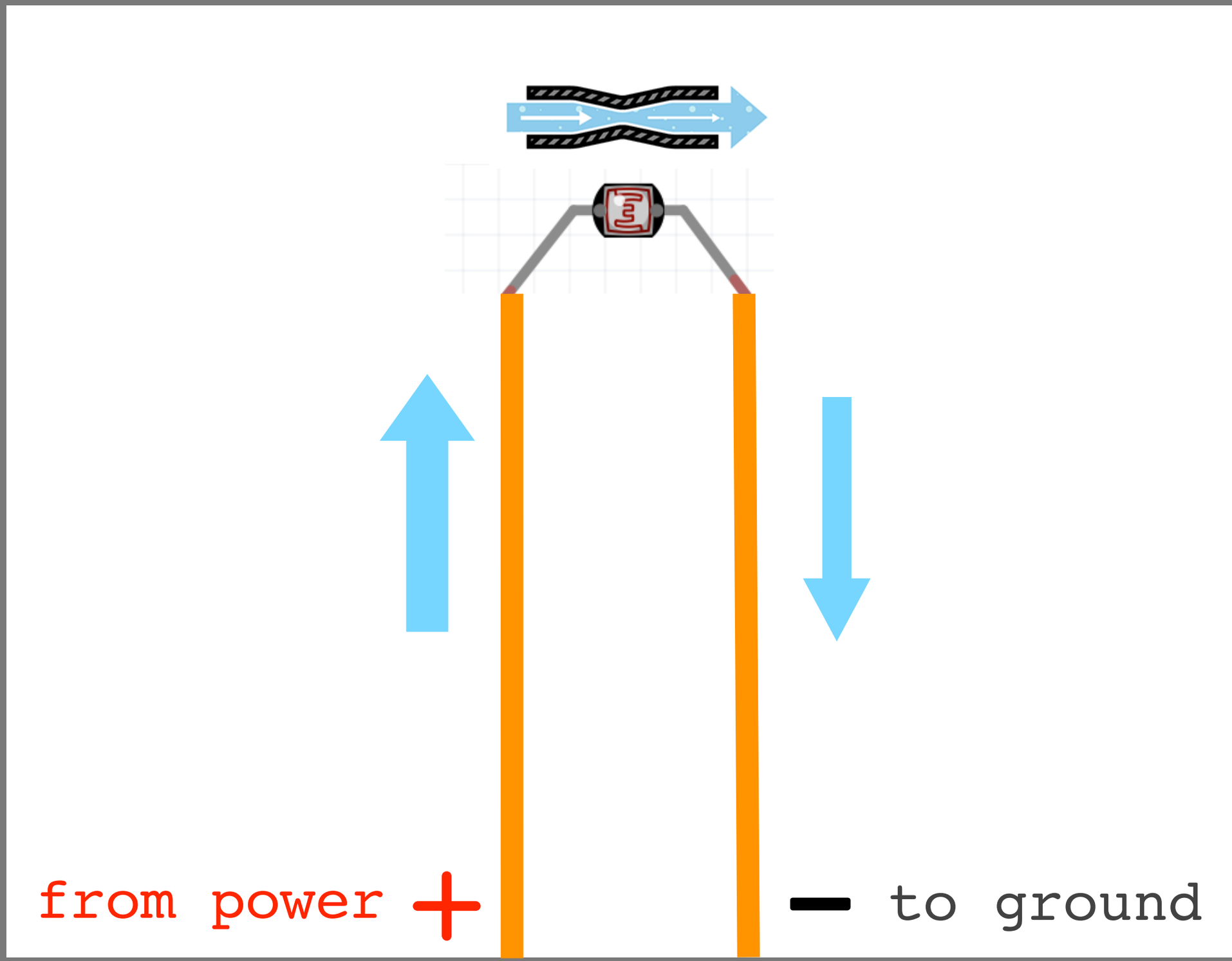
Images taken from Sparkfun: https://learn.sparkfun.com/tutorials/voltage-current-resistance-and-ohms-law/all

Pic of resistor




Less resistance


from power +
– to ground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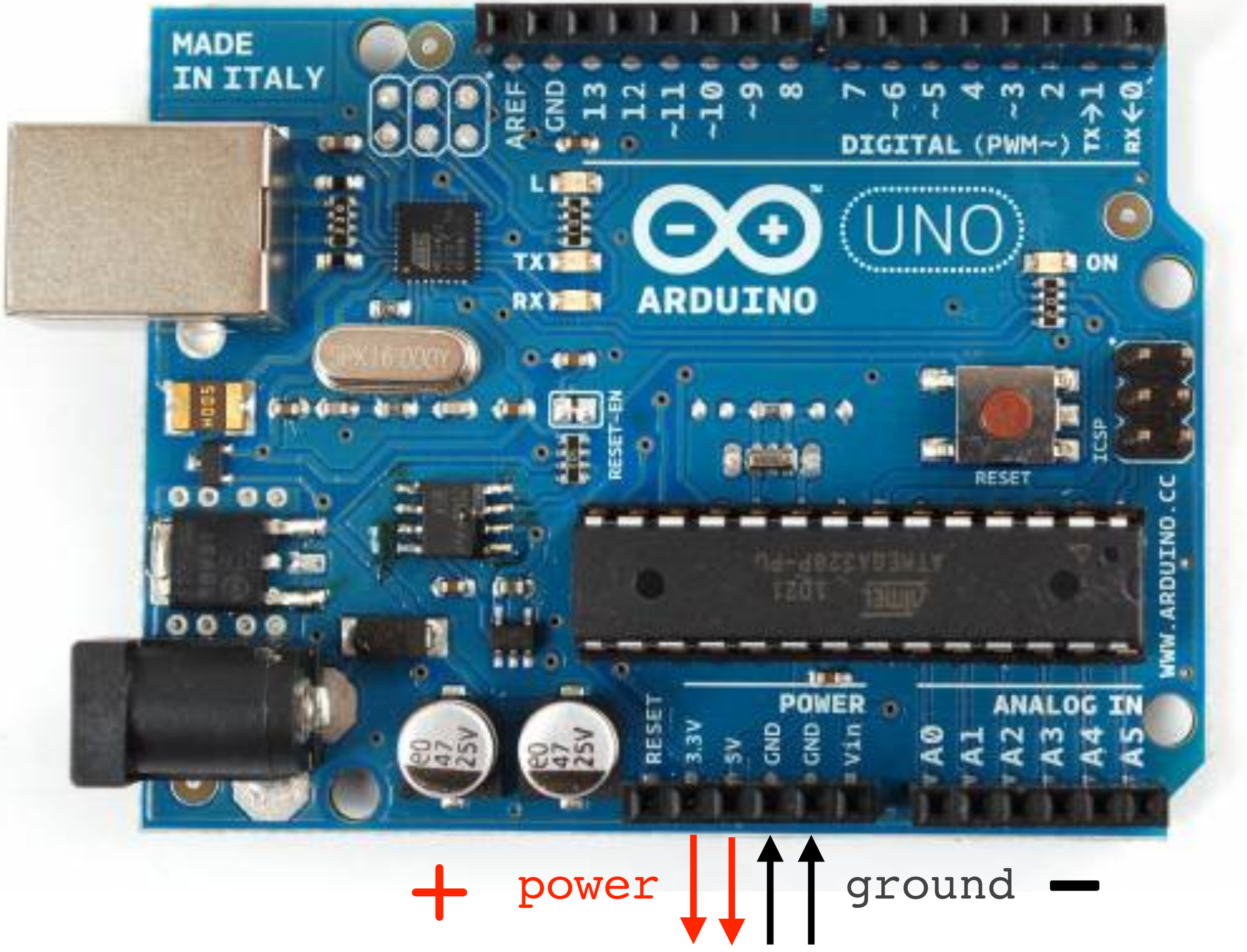
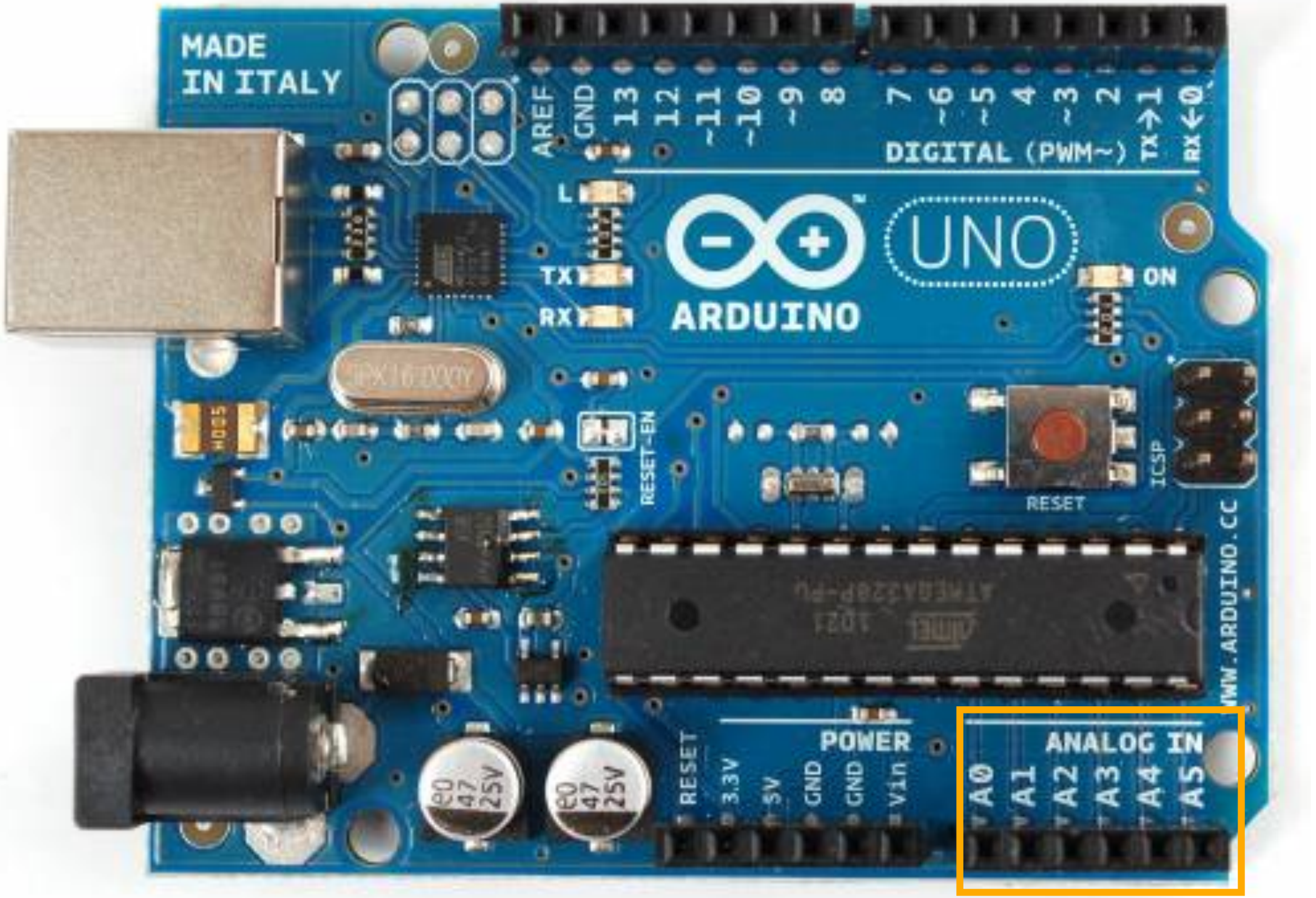
+
−
to ground


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
RESET-EN
RESET
ICSP
POWER
ANALOG IN
RESET
3.3V
5V
GND
GND
Vin
A0
A1
A2
A3
A4
A5
WWW.ARDUINO.CC
+
power
ground
−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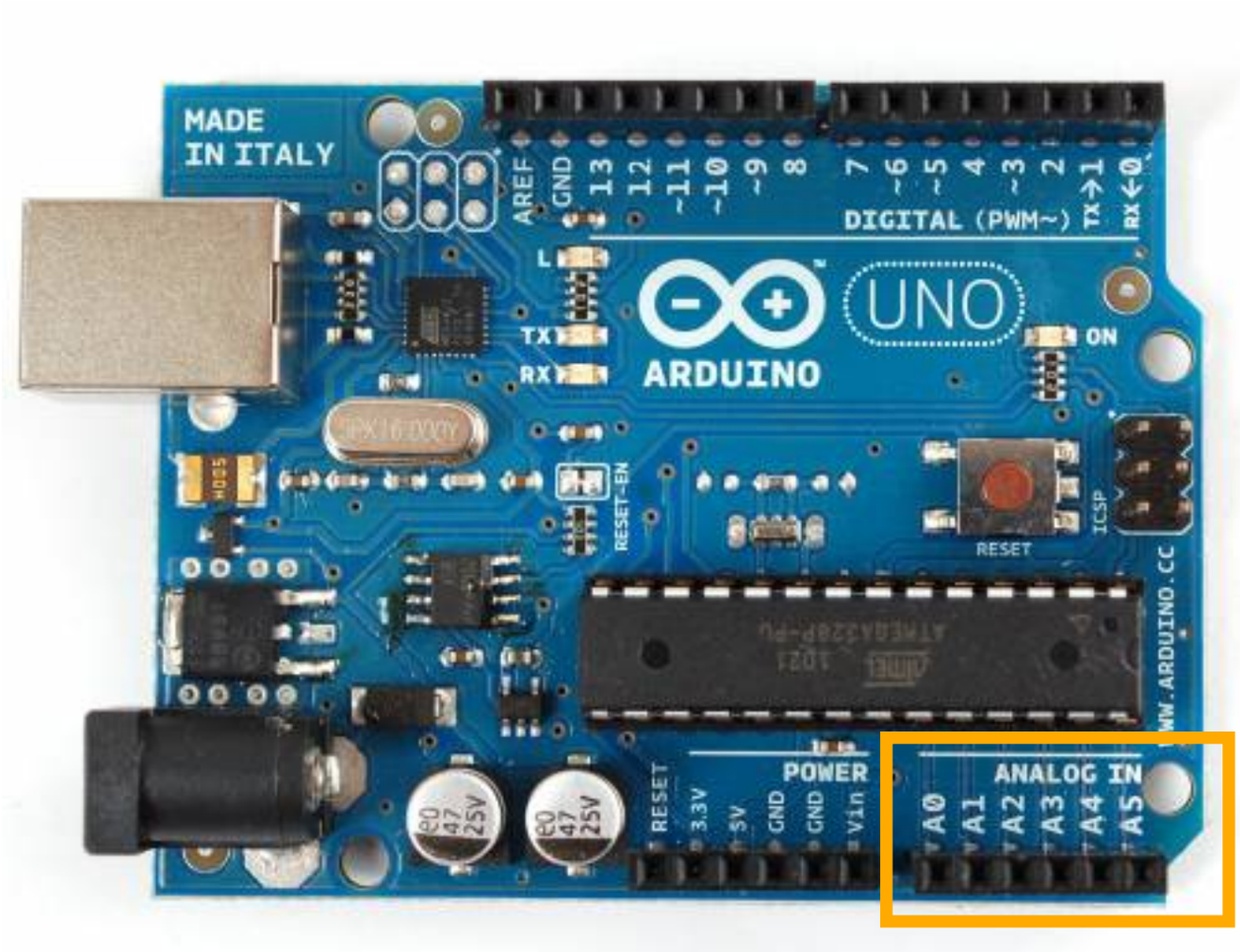
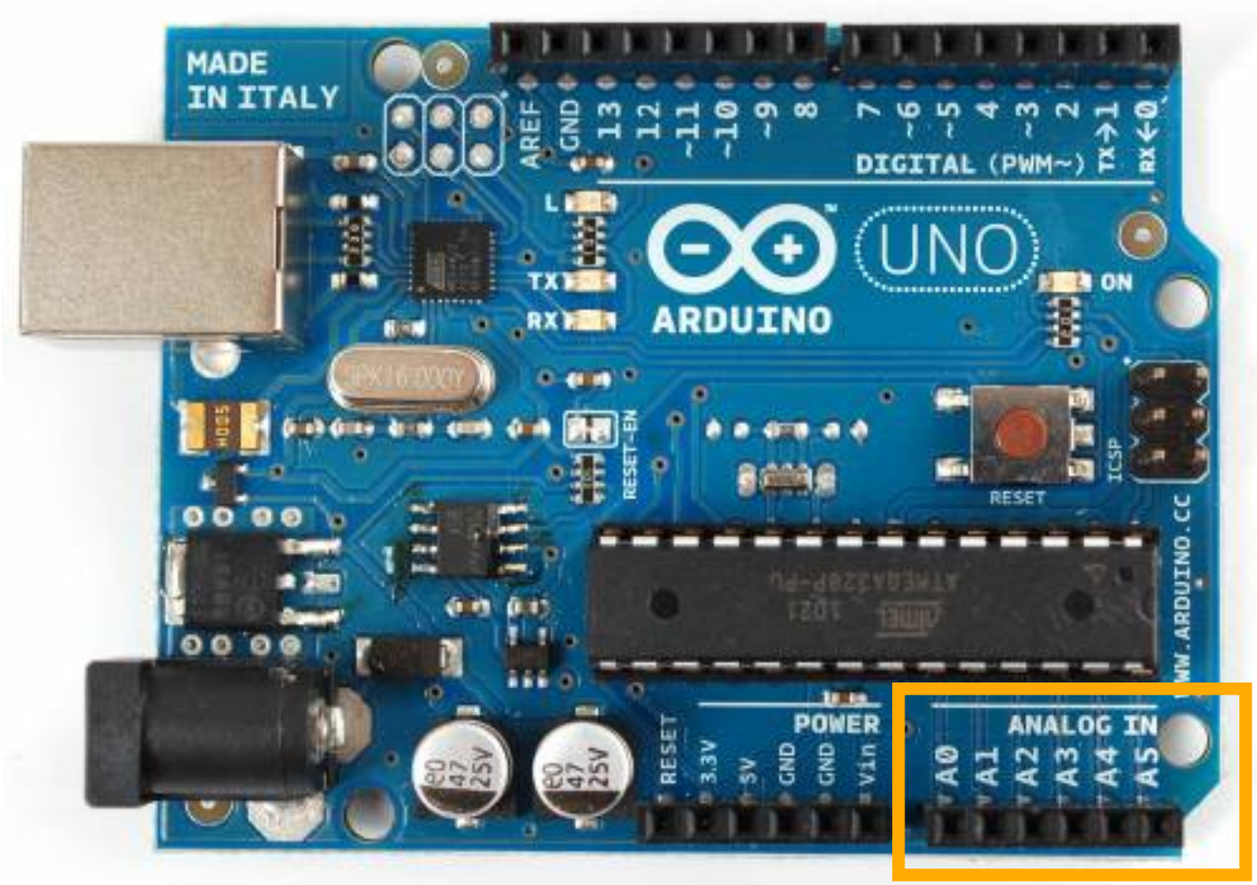


6 Analog Input pins

You can read a wide range of values

Read 0 - 1023



6 Analog Input pins

You can read a wide range of values

Read 0 - 1023

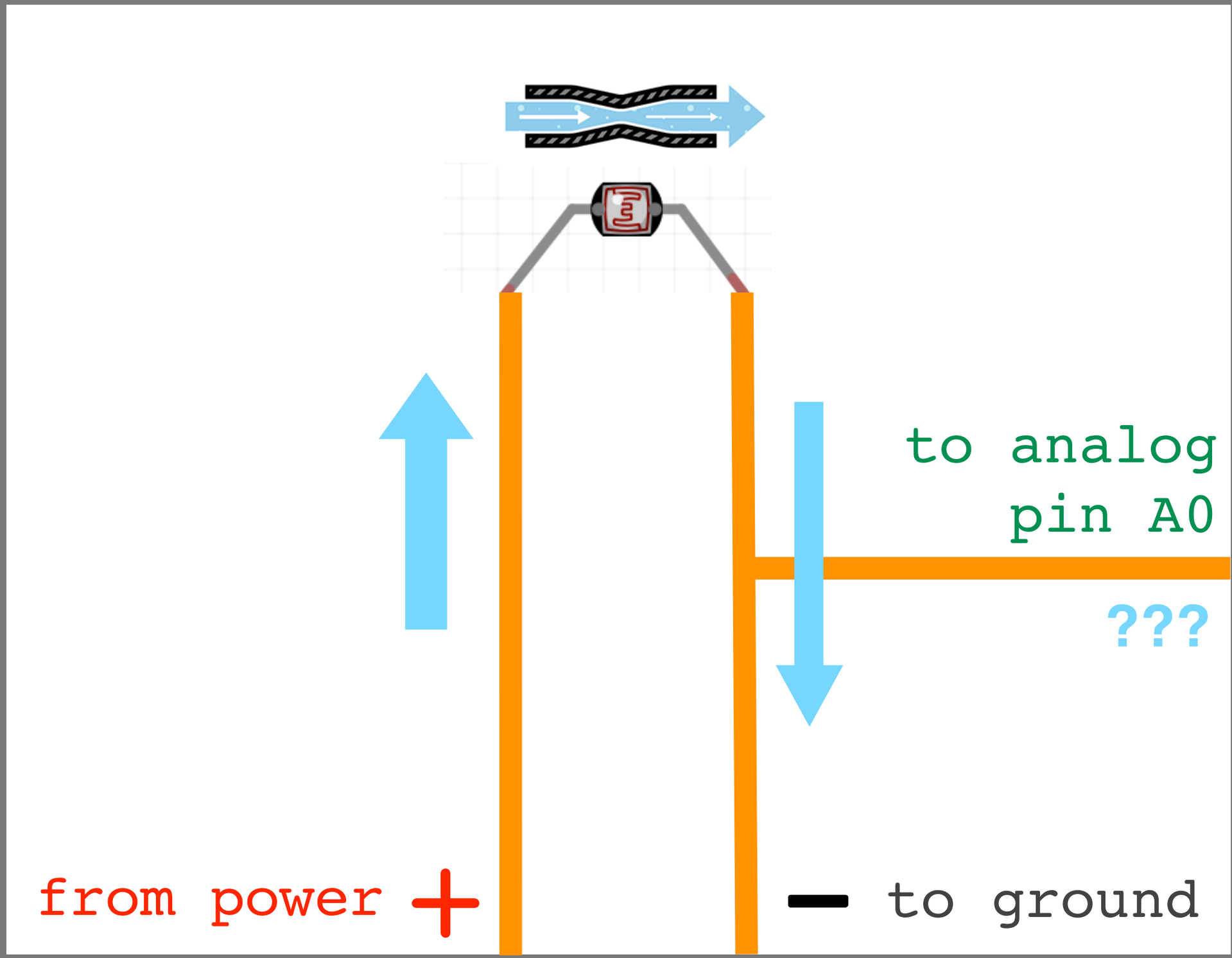
These allow you to turn current into numbers!

You can use numbers in your computer progam.

to analog
pin A0

from power +

— to ground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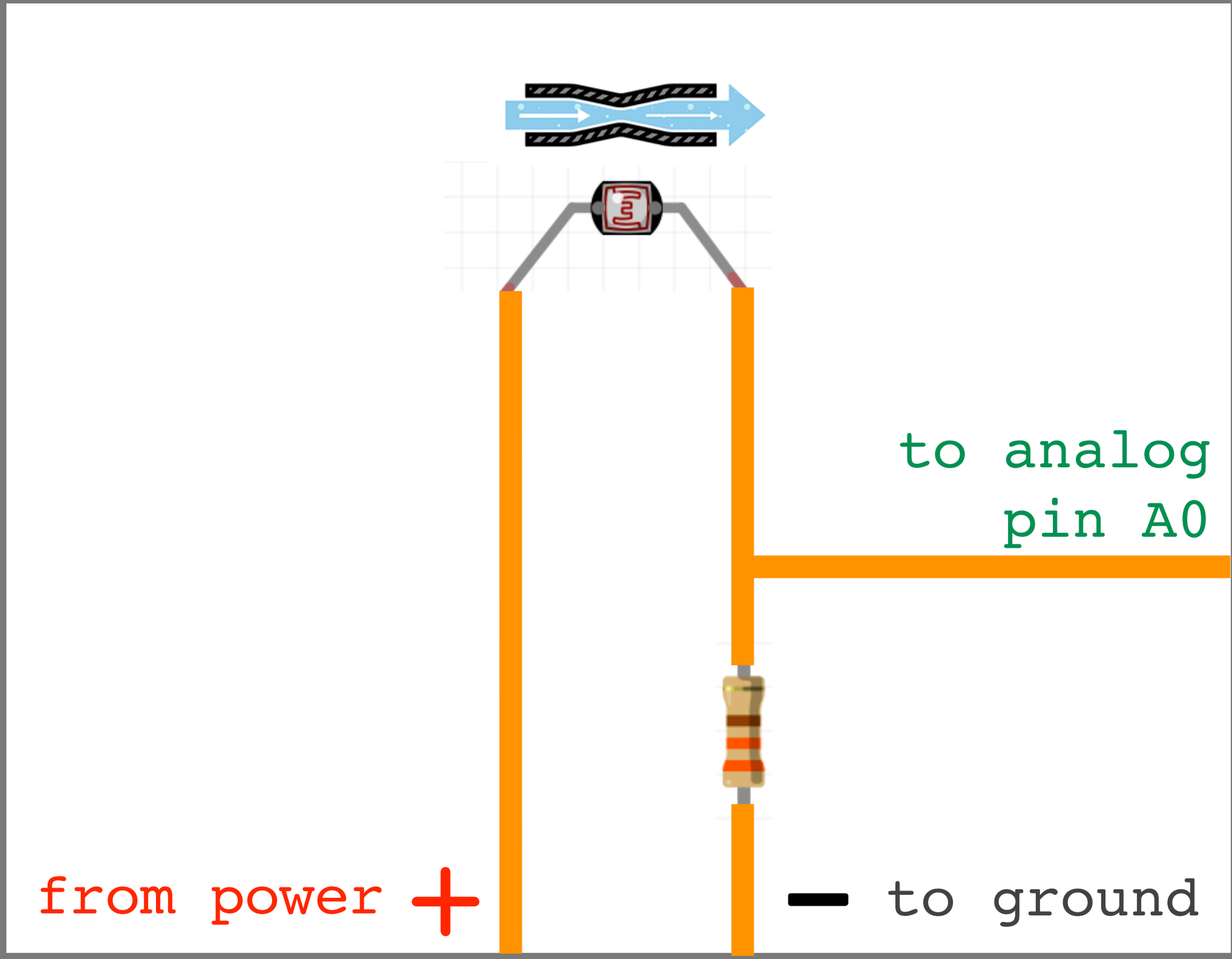
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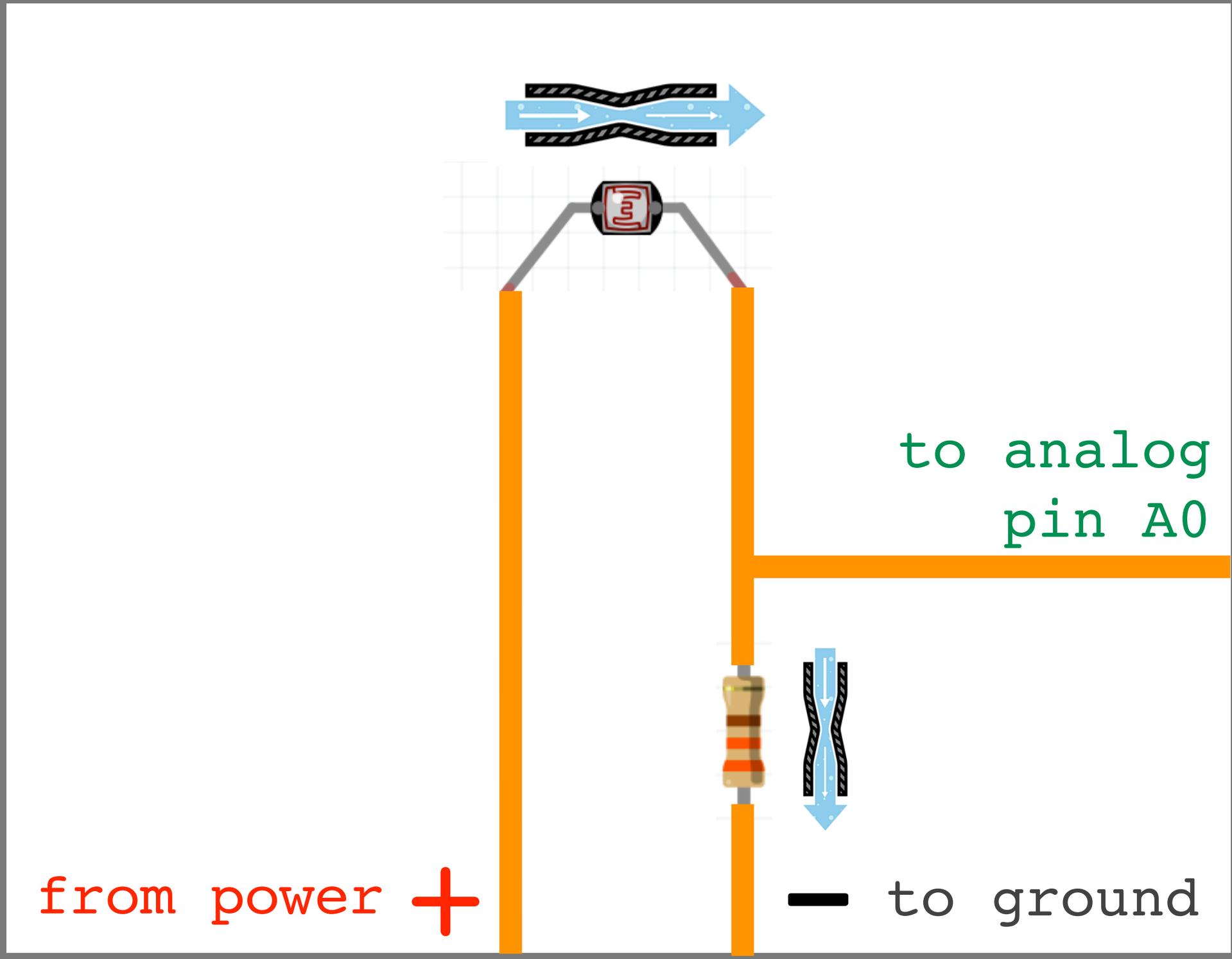
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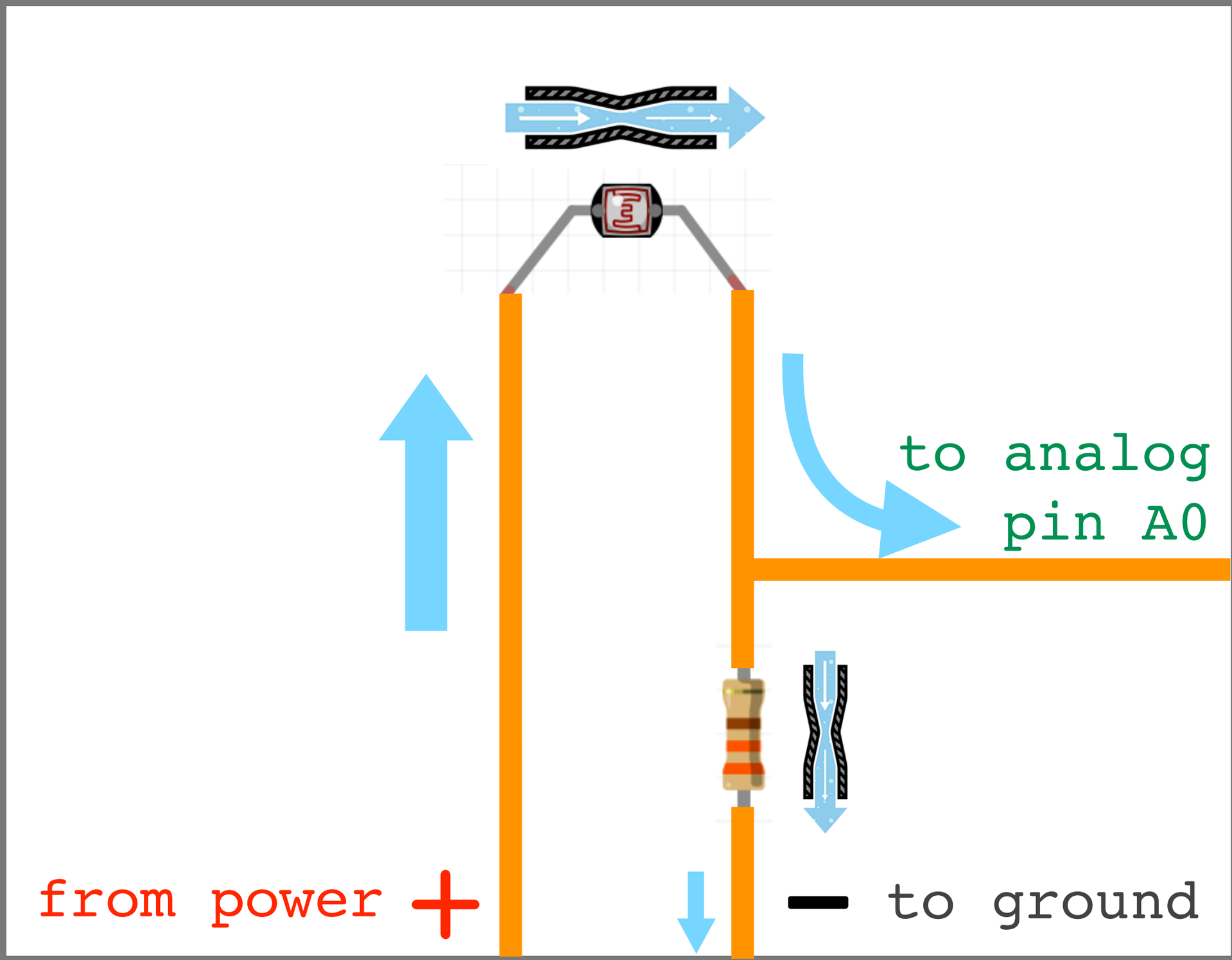
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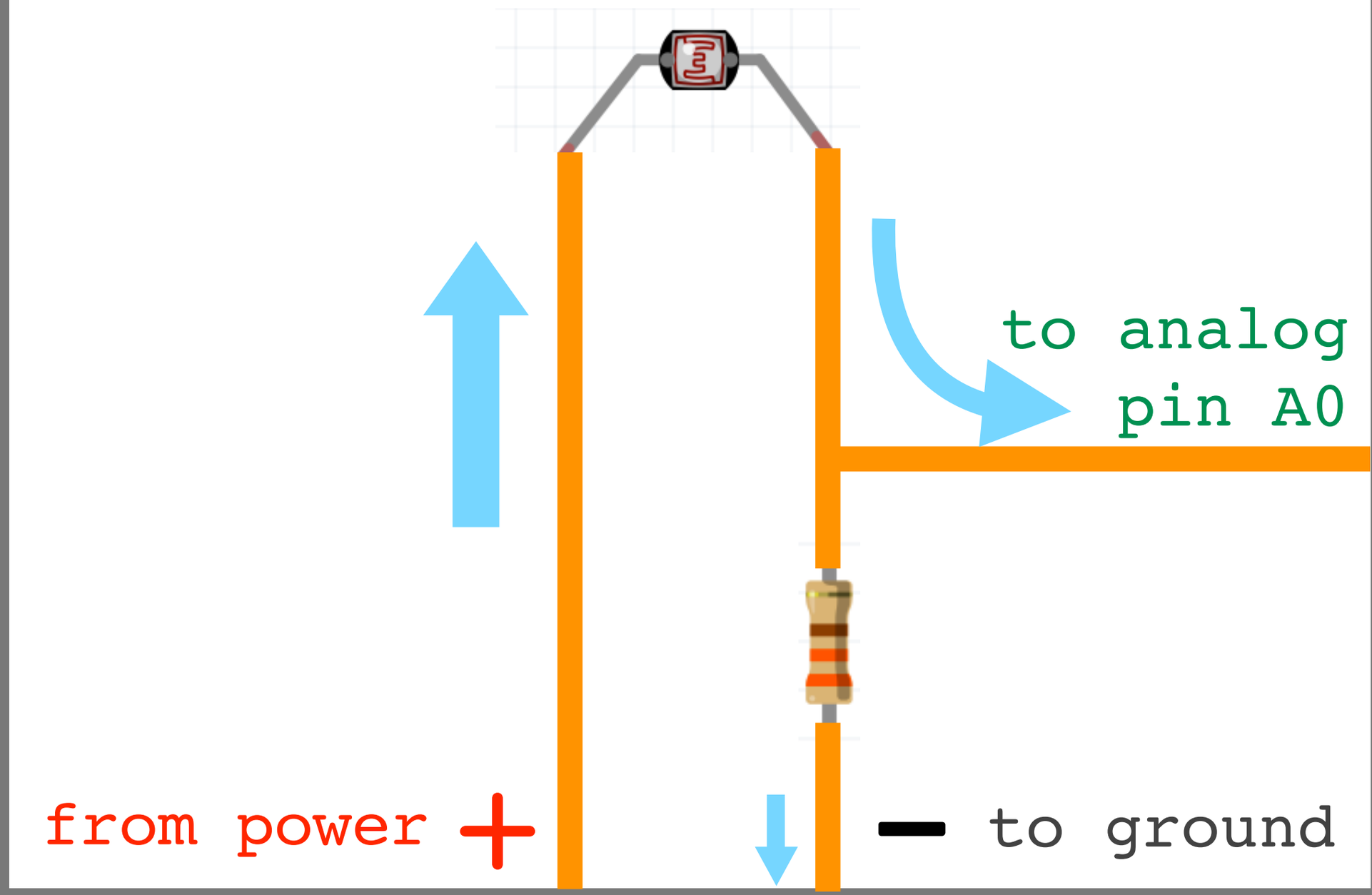
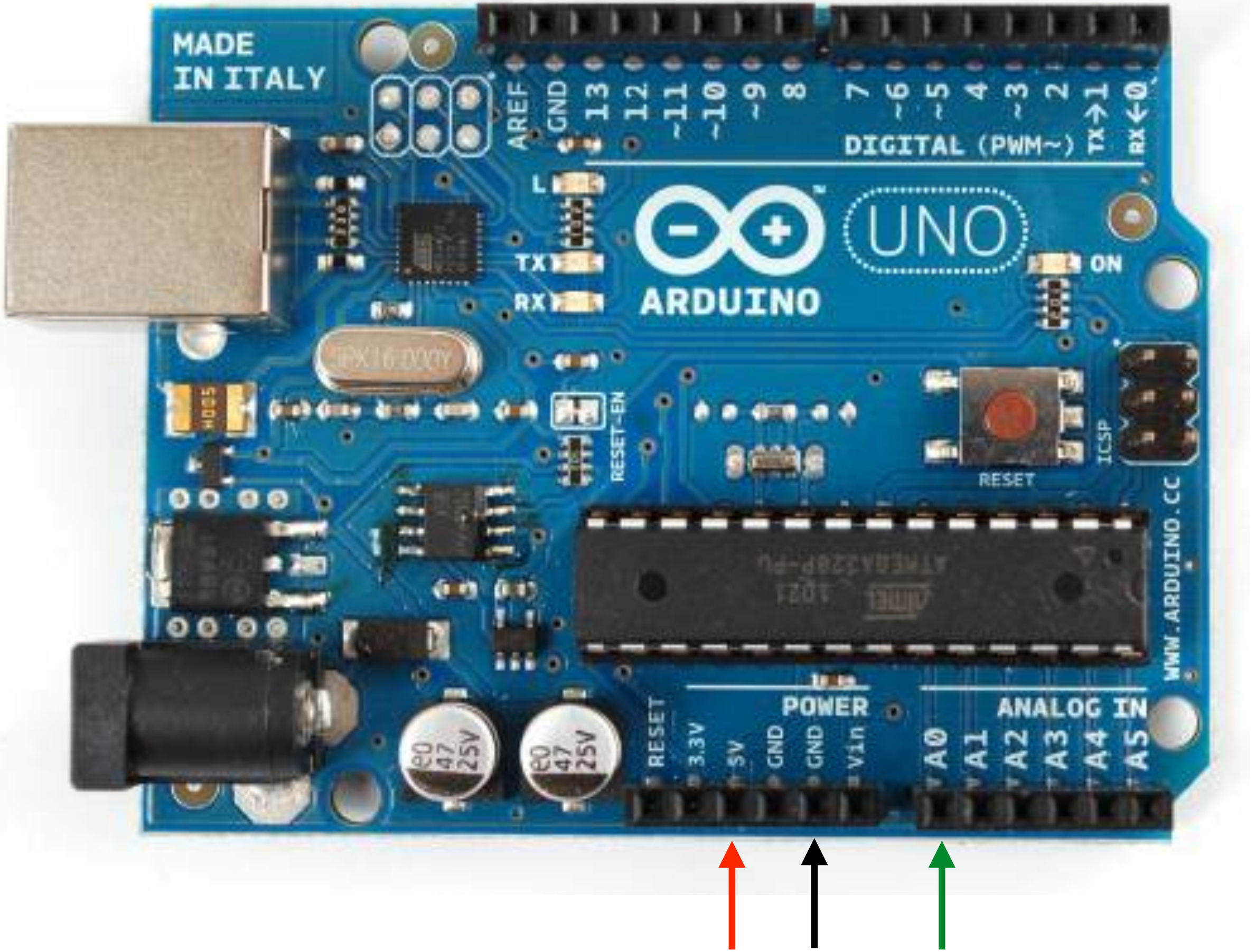
— to ground

My Light Sensor




MADE
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WWW.ARDUINO.CC

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Close ⌘W
Save ⌘S
Save As... ⇧⌘S
Upload ⌘U
Upload Using Programmer ⇧⌘U

Page Setup ⇧⌘P
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10.StarterKit ▶
ArduinoISP

Adafruit_NeoMatrix ▶
Adafruit_NeoPixel ▶
Time ▶
TimeAlarms ▶

EEPROM ▶
Esplora ▶
Ethernet ▶
Firmata ▶

AnalogInOutSerial
AnalogInput
AnalogWriteMega
Calibration
Fading
Smoothing

AnalogInput | Arduino 1.0.5

AnalogInput

```
int sensorPin = A0;    // select the input pin for the potentiometer
int ledPin = 13;      // select the pin for the LED
int sensorValue = 0;  // variable to store the value coming from the sensor

void setup() {
  // declare the ledPin as an OUTPUT:
  pinMode(ledPin, OUTPUT);
}

void loop() {
  // read the value from the sensor:
  sensorValue = analogRead(sensorPin);
  // turn the ledPin on
  digitalWrite(ledPin, HIGH);
  // stop the program for <sensorValue> milliseconds:
  delay(sensorValue);
  // turn the ledPin off:
  digitalWrite(ledPin, LOW);
  // stop the program for for <sensorValue> milliseconds:
  delay(sensorValue);
}
```

AnalogInput | Arduino 1.0.5

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int sensorPin = A0;    // select the input pin for the potentiometer
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  // turn the ledPin off:
  digitalWrite(ledPin, LOW);
  // stop the program for for <sensorValue> milliseconds:
  delay(sensorValue);
}
```

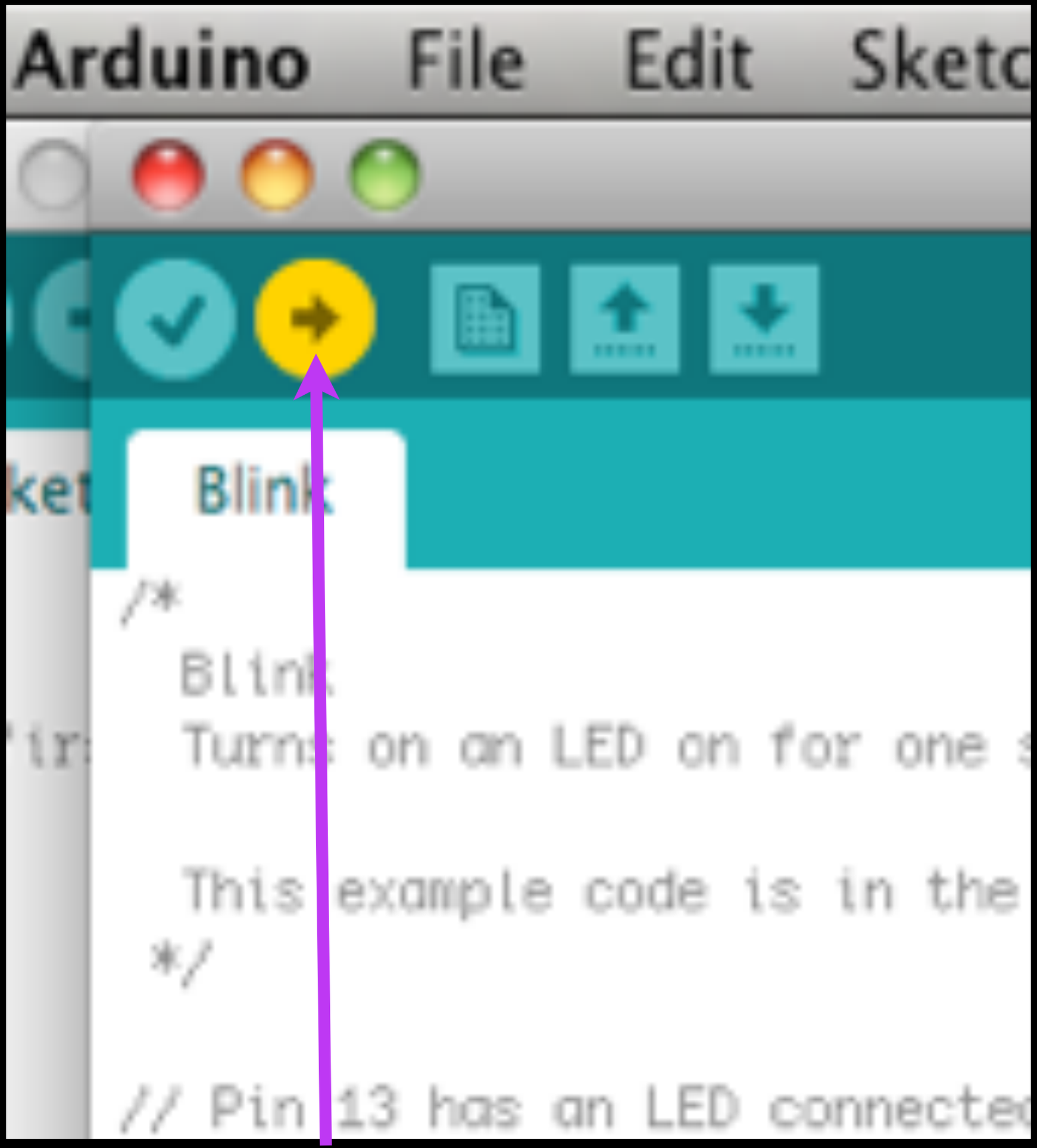
Arduino
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Edit
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Blink
/*
Blink
Turns on an LED on for one
This example code is in the
*/
// Pin 13 has an LED connecte

the

"Serial Monitor"

AnalogInput | Arduino 1.0.5

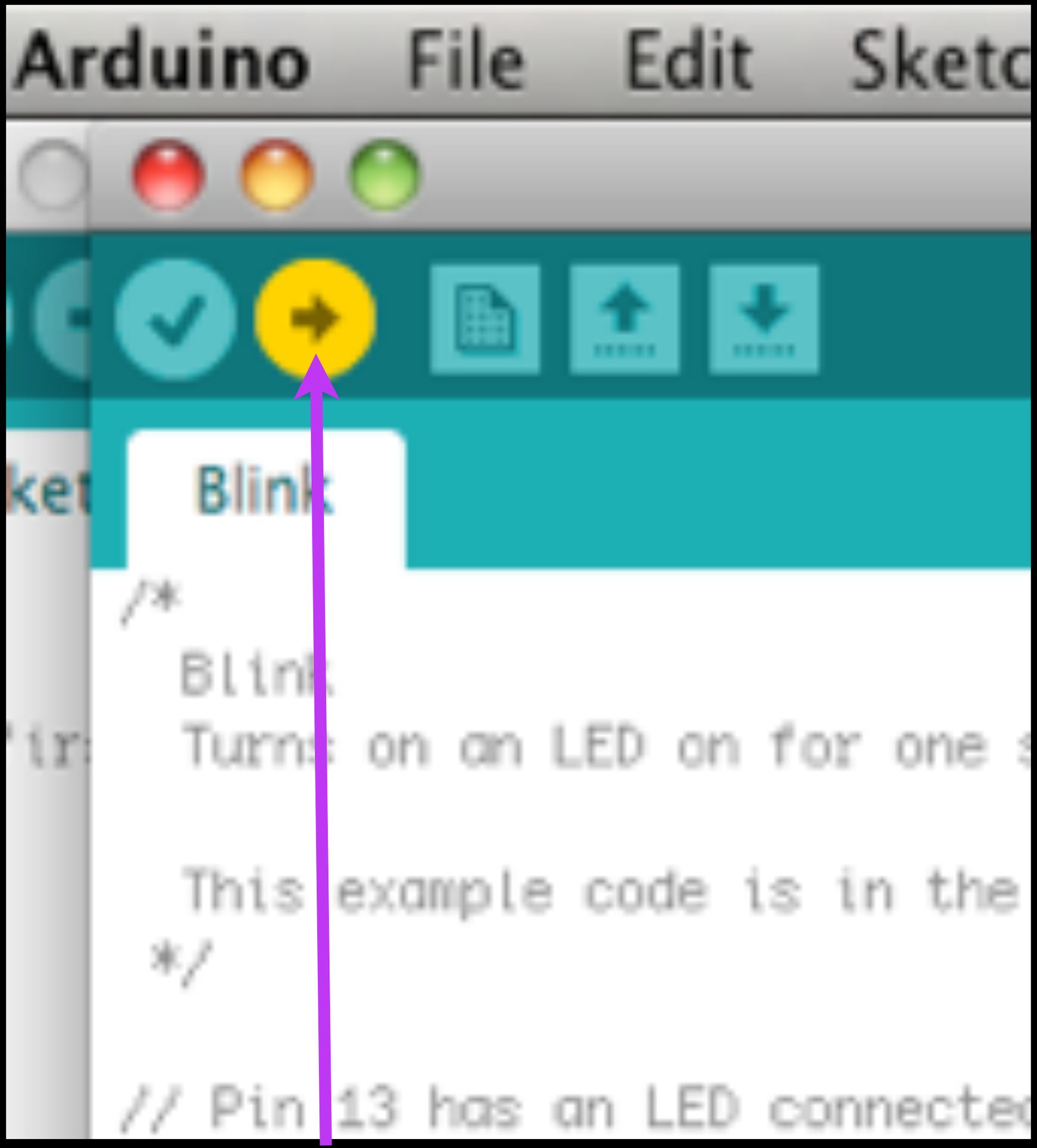
AnalogInput §

```
int sensorValue = 0;  // variable to store the value coming

void setup() {
  // declare the ledPin as an OUTPUT:
  pinMode(ledPin, OUTPUT);
  Serial.begin(9600);
}

void loop() {
  // read the value from the sensor:
  sensorValue = analogRead(sensorPin);
  Serial.println(sensorValue);
  // turn
  digital
  // stop
  delay(sensorValue);
  // turn the ledPin off:
  digitalWrite(ledPin, LOW);
  // stop the program for for <sensorValue> milliseconds:
  delay(sensorValue);
}
```

```
Serial.begin(9600);
```

```
Serial.println(sensorValue);
```

Save Canceled.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Serial Port ▶

Programmer ▶
Burn Bootloader

MAKE MAP BLINK

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