



Wi-Fi Settings

SSID: AcroboticGuest
Password: 13meetup37

Workshop: Build an Arduino from scratch!

Welcome!

Workshop outline

- **Overview of Arduino and hardware electronics [15min]**
- Q&A [5–10min]
- Hands-on, instructor-led activity [60min]
- Q&A [5–10min]

What is Arduino?

Arduino is the *brand* of a toolset that enables anyone to interact with the physical world.

The Arduino toolset is comprised by both hardware and software:



+

A screenshot of the Arduino IDE interface. The window title is "Blink | Arduino 0018". The code editor displays the "Blink" sketch, which is a classic example that turns an LED on and off repeatedly. The code includes comments explaining the setup and loop, and credits the original author, H. Barragan. The code itself uses standard C-like syntax for defining pins and setting up the loop. The bottom of the screen shows the Arduino IDE's status bar with the number "1".

```
/*
 * Blink
 *
 * Turns on an LED on for one second, then off for one second, repeatedly.
 *
 * The circuit:
 * * LED connected from digital pin 13 to ground.
 *
 * Note: On most Arduino boards, there is already an LED on the board
 * connected to pin 13, so you don't need any extra components for this example.
 *
 * Created 1 June 2005
 * By David Cuartielles
 *
 * http://arduino.cc/en/Tutorial/Blink
 *
 * based on original by H. Barragan for the Wiring i/o board
 */
int ledPin = 13; // LED connected to digital pin 13

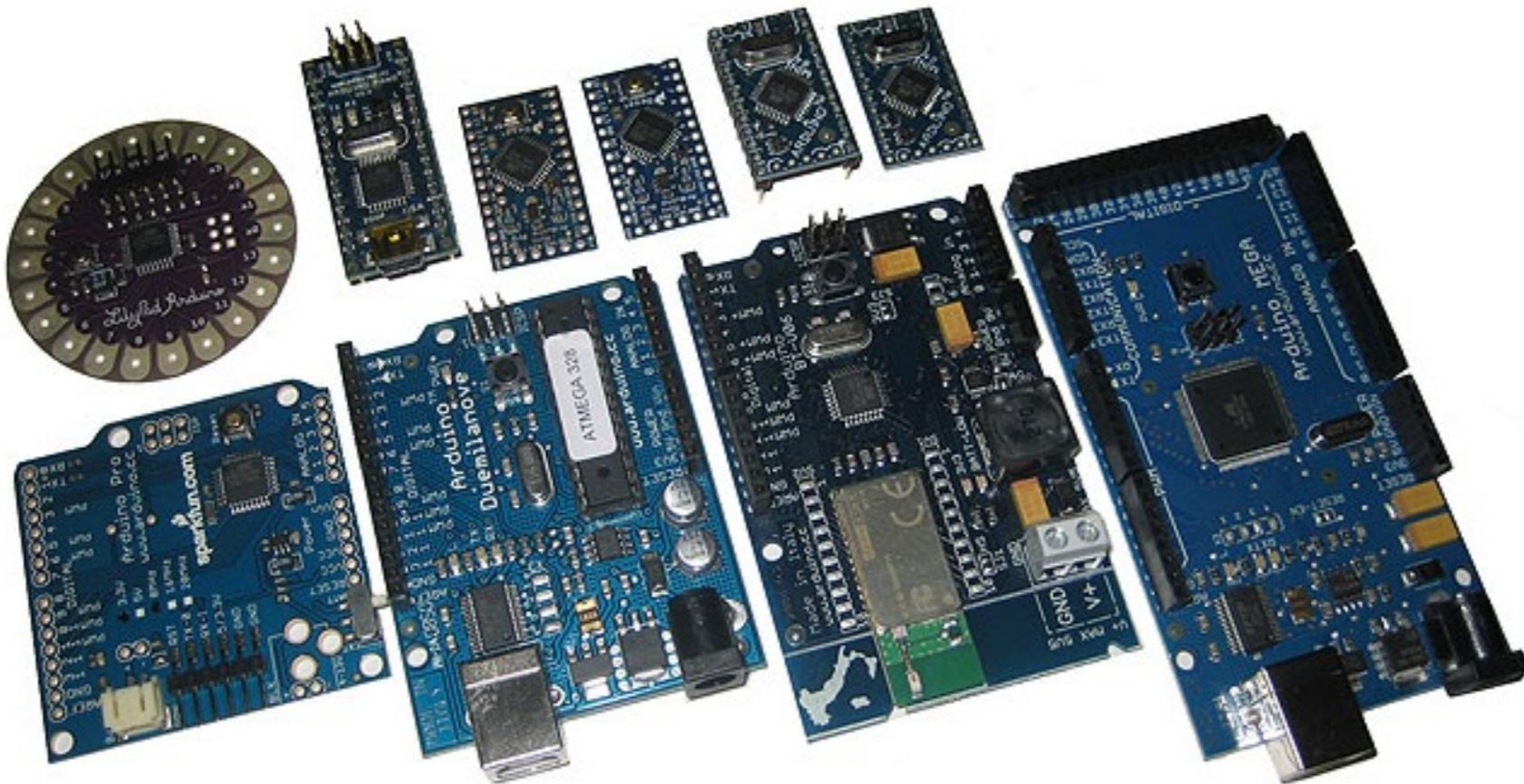
// The setup() method runs once, when the sketch starts

void setup() {
  // initialize the digital pin as an output:
  pinMode(ledPin, OUTPUT);
}
```

What is Arduino?

Arduino Hardware (plural!)

There are many, Many, MANY official Arduino boards and clones that vary in form factor, computing power, number and type of peripherals, etc.



http://blog.arduino.cc/wp-content/uploads/2013/11/ArduinoEvolution_make.jpg

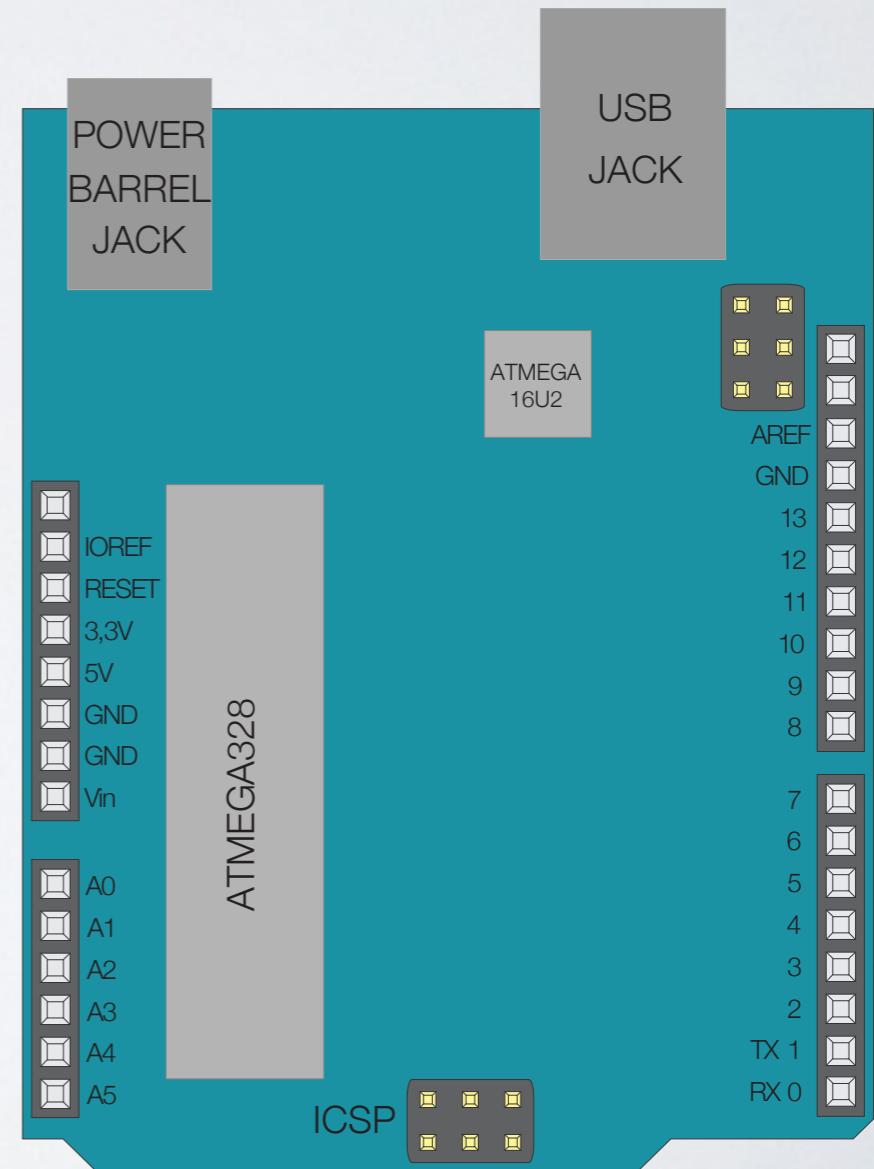
What is Arduino?

Arduino Hardware (plural!)

Arduino hardware are development boards for Microcontrollers—small computer chips that contain a processor core, memory, and programmable input and output.

The Arduino boards typically comprise:

- DC power regulation circuitry
- Serial communication port (USB)
- Microcontroller Unit (MCU)
- Digital Input/Output (GPIO)
- Analog Input



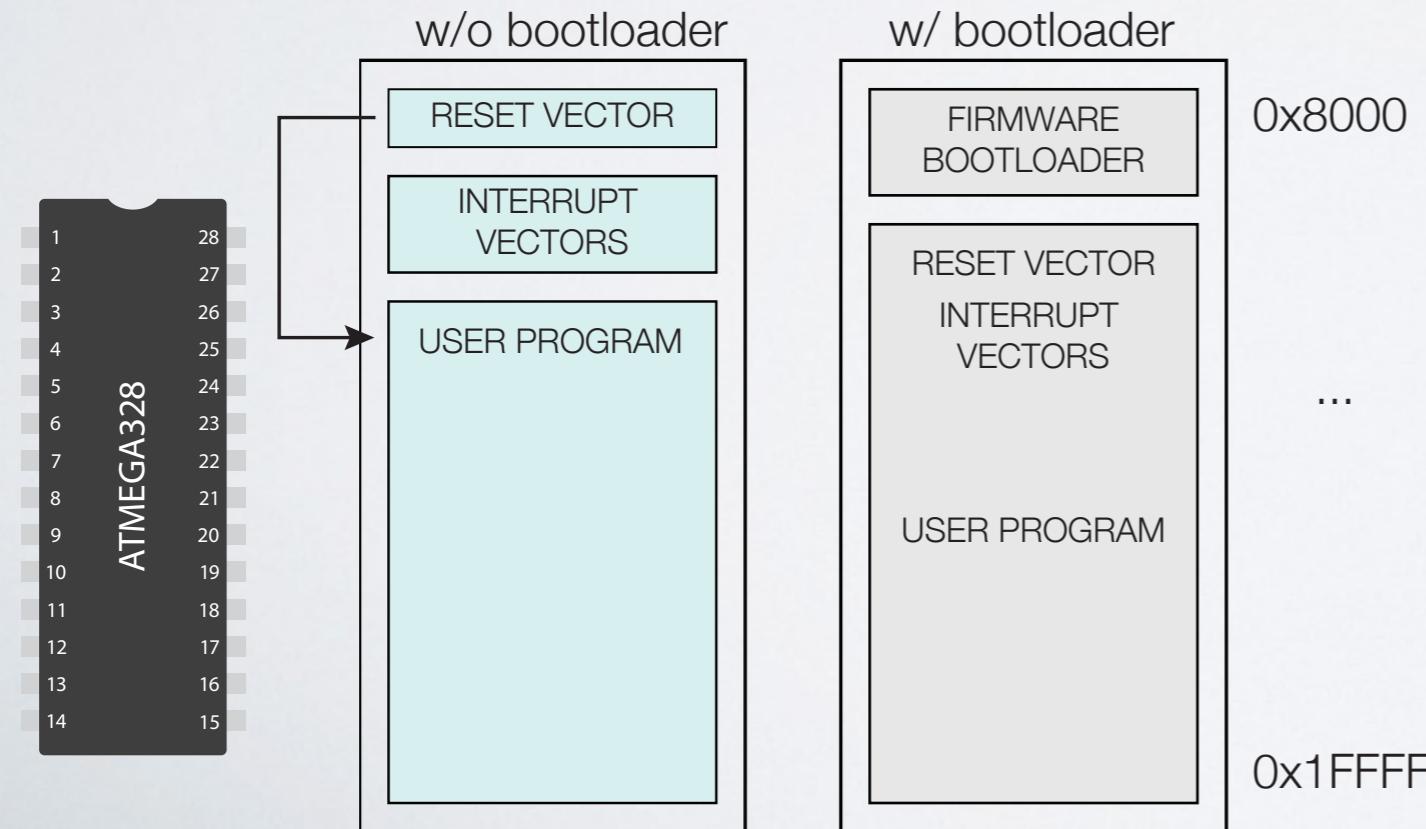
What is Arduino?

Arduino Software (plural!)

The Arduino software is comprised by:

- A *firmware bootloader* that enables us to easily load programs onto the MCU
- A computer application (*IDE*) to edit, compile, and upload our programs, as well as communicate via USB with the Arduino boards

MICROCONTROLLER MEMORY MAPS



A screenshot of the Arduino IDE interface titled 'Blink | Arduino 0018'. The window shows the code for the 'Blink' sketch. The code is as follows:

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

  The circuit:
  * LED connected from digital pin 13 to ground.

  * Note: On most Arduino boards, there is already an LED on the board
  connected to pin 13, so you don't need any extra components for this example.

  Created 1 June 2005
  By David Cuartielles

  http://arduino.cc/en/Tutorial/Blink

  based on an original by H. Barragan for the Wiring i/o board

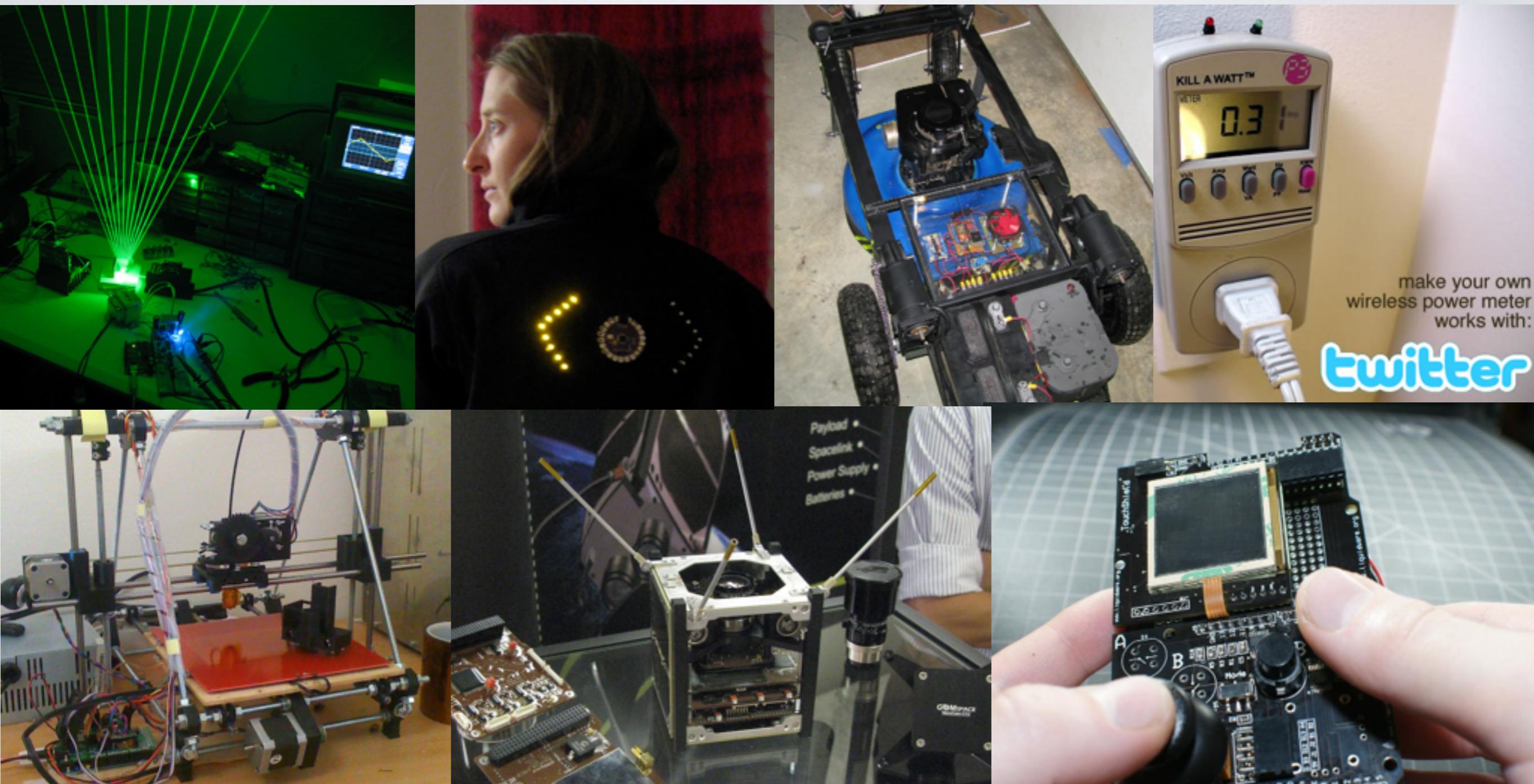
*/
int ledPin = 13; // LED connected to digital pin 13

// The setup() method runs once, when the sketch starts

void setup() {
  // initialize the digital pin as an output:
  pinMode(ledPin, OUTPUT);
}
```

What use(s) do Arduino boards have?

The Arduino toolset enables us to interact with the physical world. As such, the ever-increasing range of applications is only limited by the users' imagination.



What use(s) do Arduino boards have?

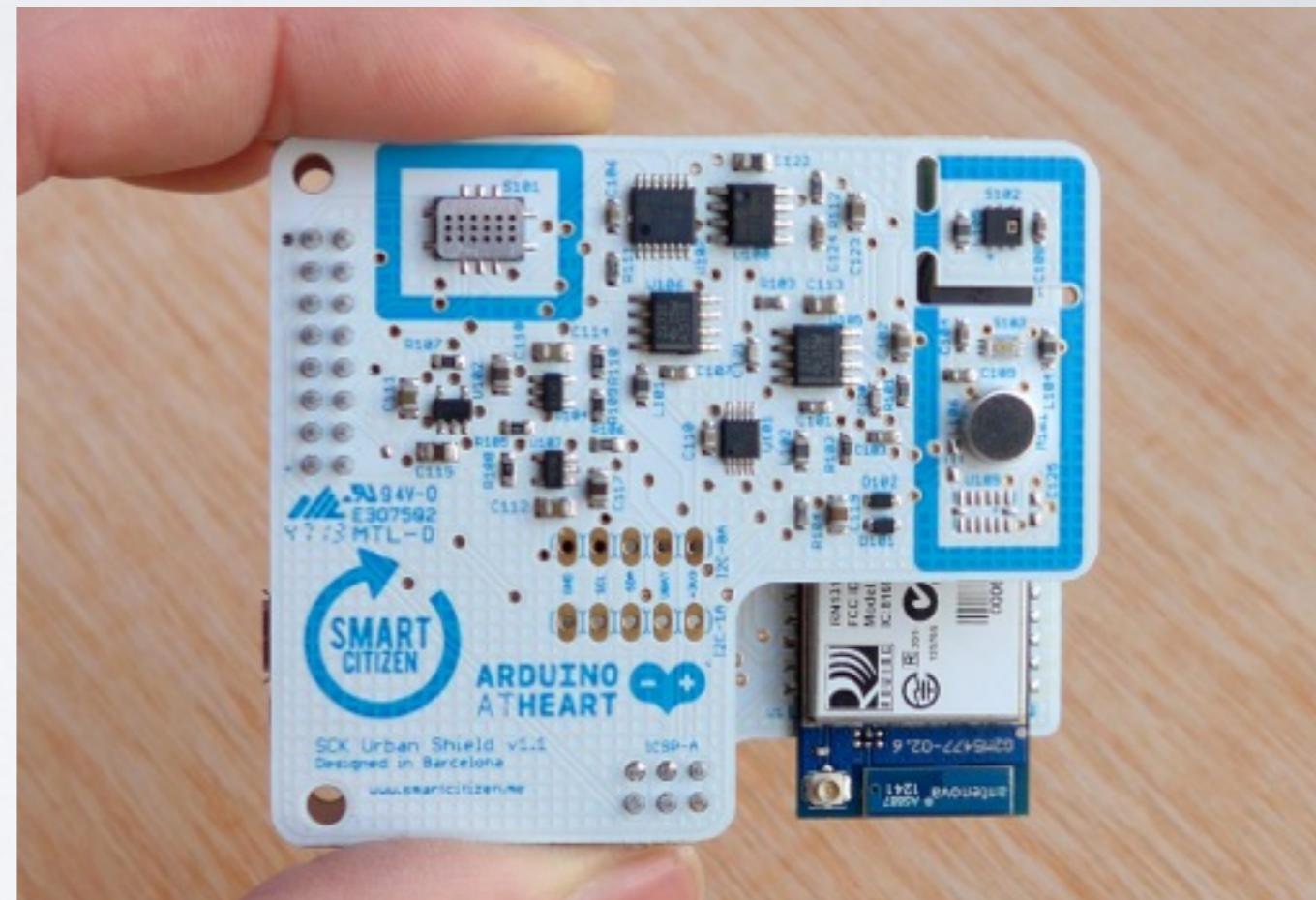
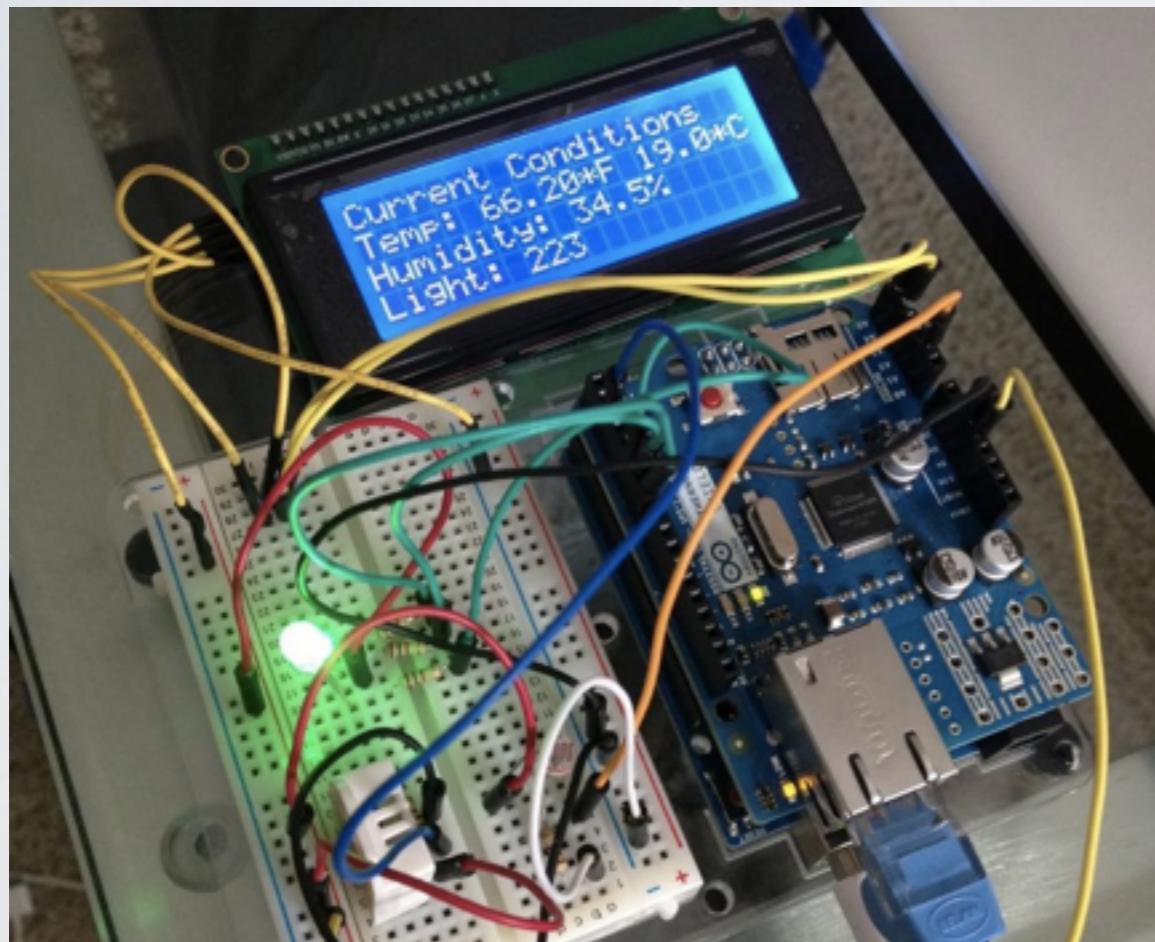
From the horse's mouth:



<https://www.youtube.com/watch?v=UoBUXOOdLXY&t=175s>

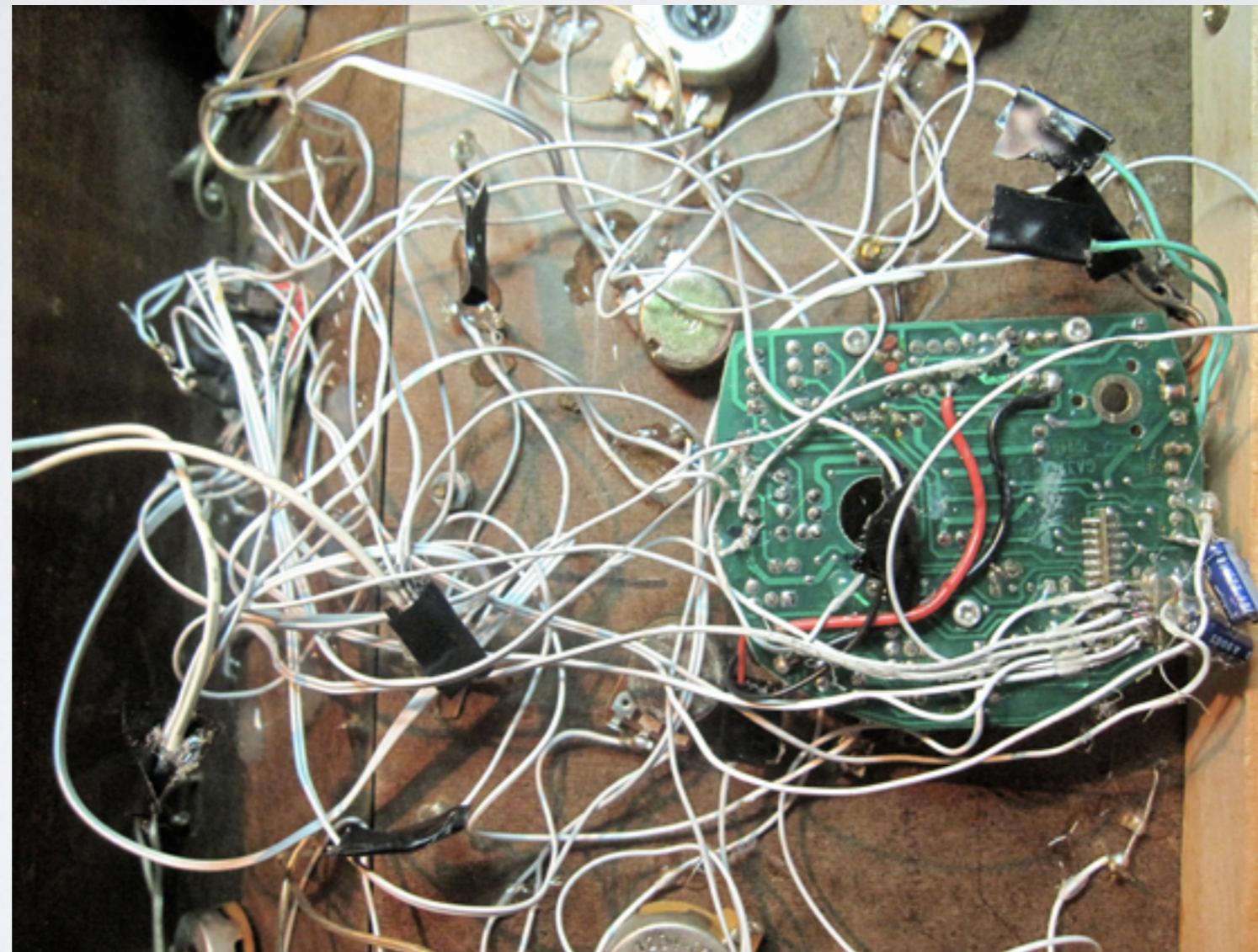
What happens when we're done prototyping?

Turn it into a commercial product.



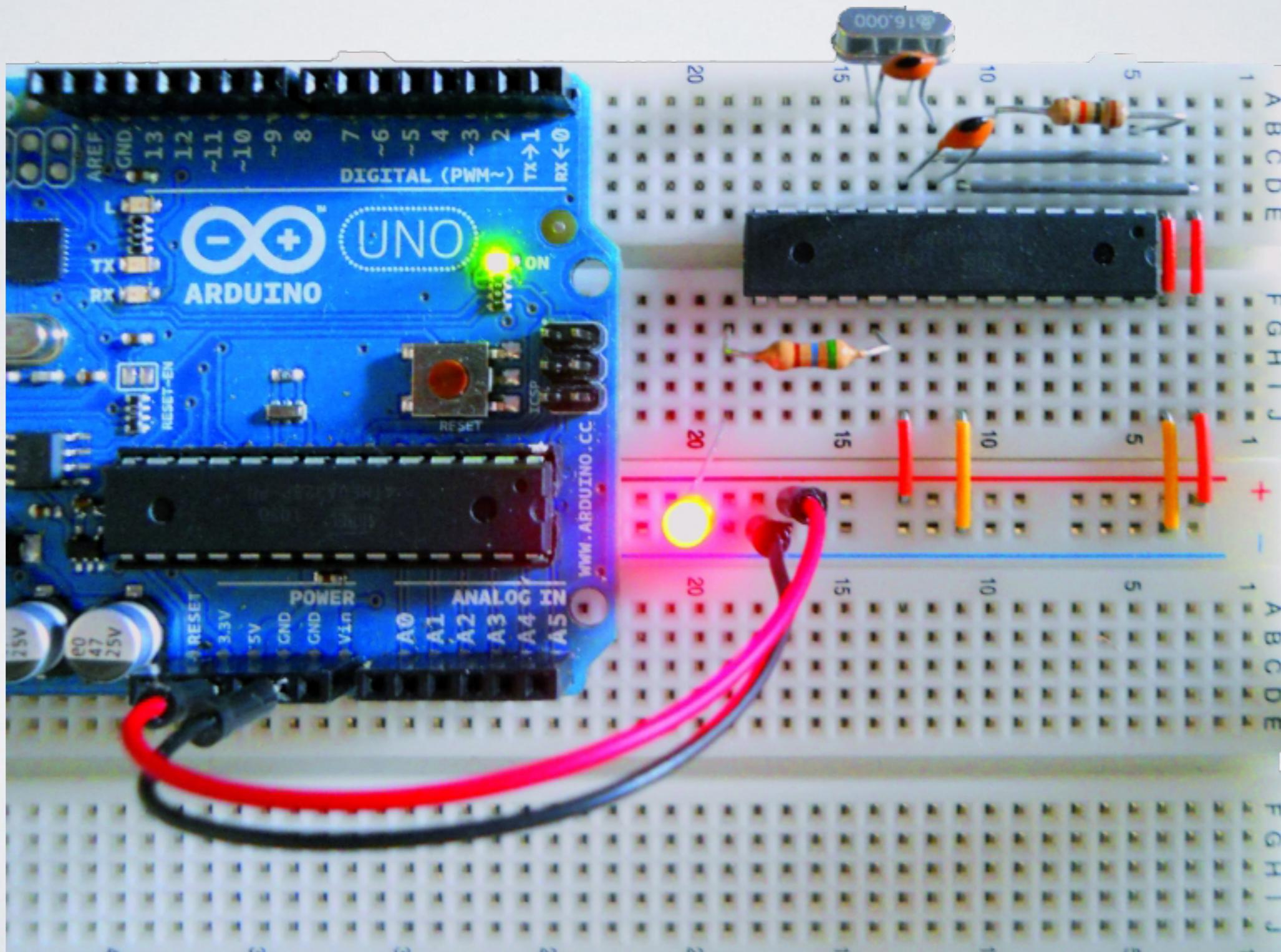
What happens when we're done prototyping?

Tear down and re-use to in a new project :(



What happens when we're done prototyping?

Migrate to a standalone microcontroller, and re-use development board :)



Welcome!

Workshop outline

- Overview of Arduino and hardware electronics [15min]
- **Q&A [5–10min]**
- Hands-on, instructor-led activity [60min]
- Q&A [5–10min]

Welcome!

Workshop outline

- Overview of Arduino and hardware electronics [15min]
- Q&A [5–10min]
- Hands-on, instructor-led activity [60min]**
- Q&A [5–10min]

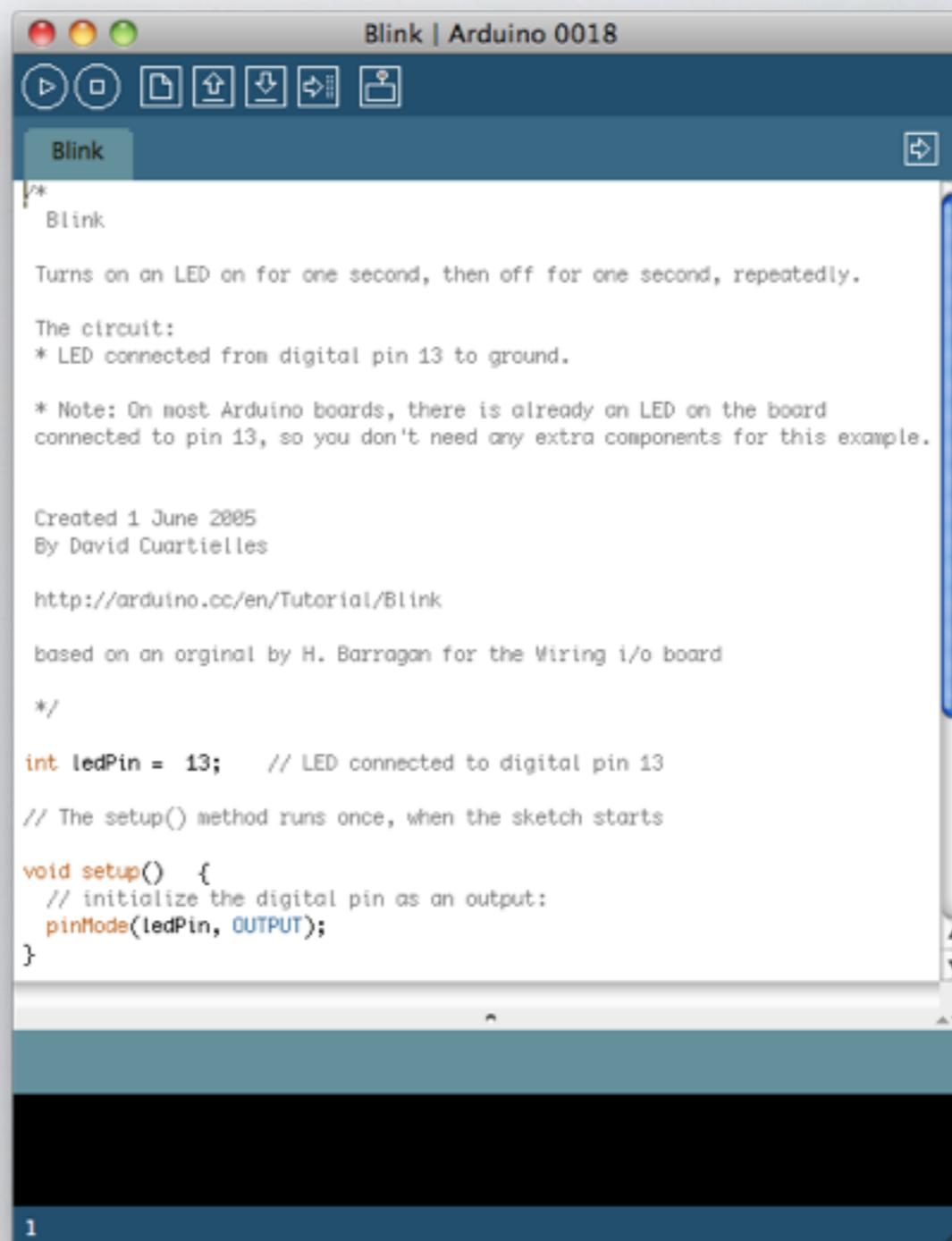
Getting Started with Arduino

Installing the Arduino IDE—a computer application to edit, compile, and upload our programs, as well as communicate via USB with the Arduino boards

[Windows](#)

[Mac \(OSX 10.5+\)](#)

[Linux \(32-bit, 64-bit\)](#)

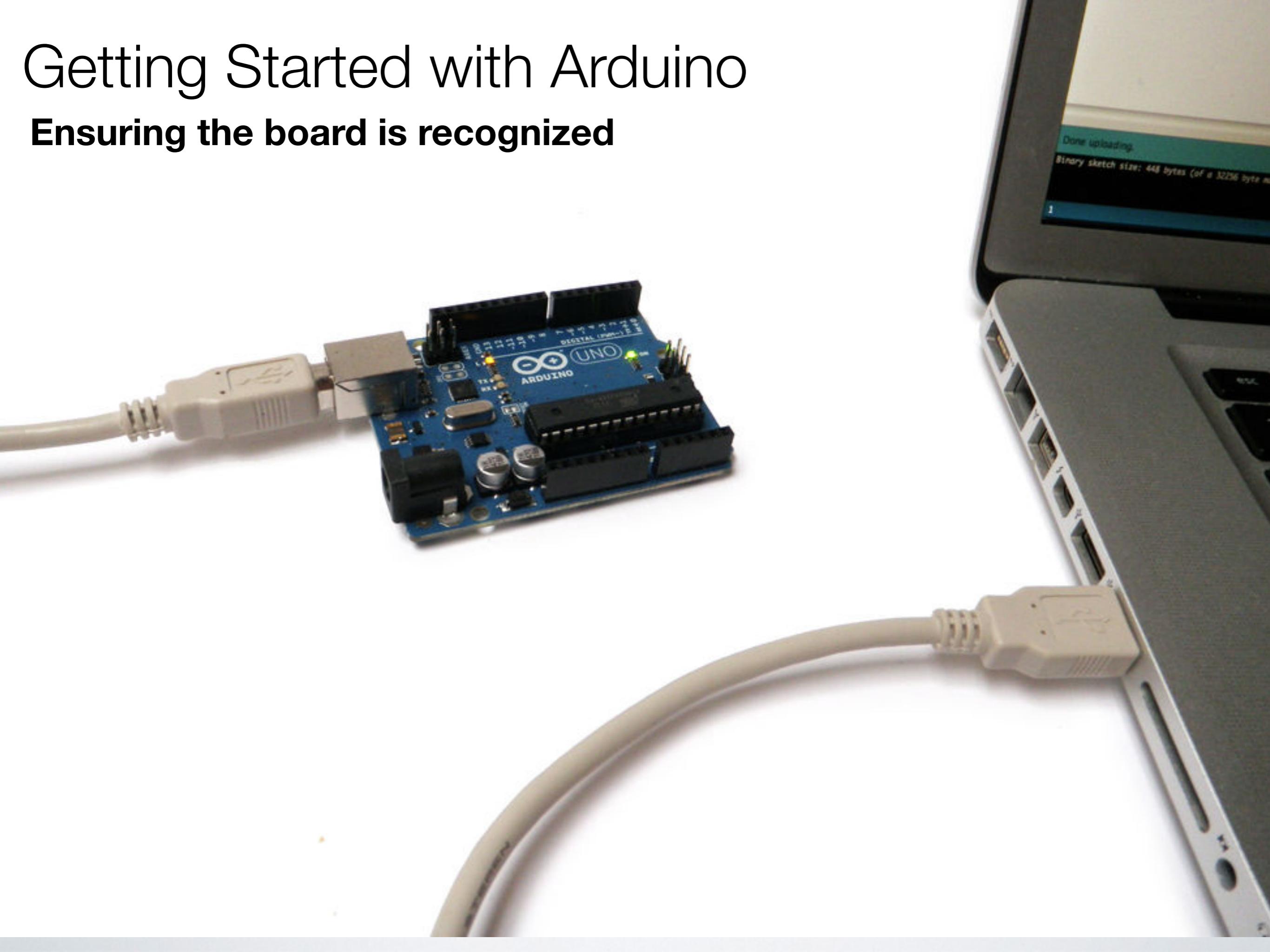


The screenshot shows the Arduino IDE interface with the title bar "Blink | Arduino 0018". The main window displays the "Blink" sketch. The code is as follows:

```
/*
 * Blink
 *
 * Turns on an LED on for one second, then off for one second, repeatedly.
 *
 * The circuit:
 * * LED connected from digital pin 13 to ground.
 *
 * * Note: On most Arduino boards, there is already an LED on the board
 * connected to pin 13, so you don't need any extra components for this example.
 *
 * Created 1 June 2005
 * By David Cuartielles
 *
 * http://arduino.cc/en/Tutorial/Blink
 *
 * based on an original by H. Barragon for the Wiring i/o board
 */
int ledPin = 13; // LED connected to digital pin 13
// The setup() method runs once, when the sketch starts
void setup() {
  // initialize the digital pin as an output:
  pinMode(ledPin, OUTPUT);
}
```

Getting Started with Arduino

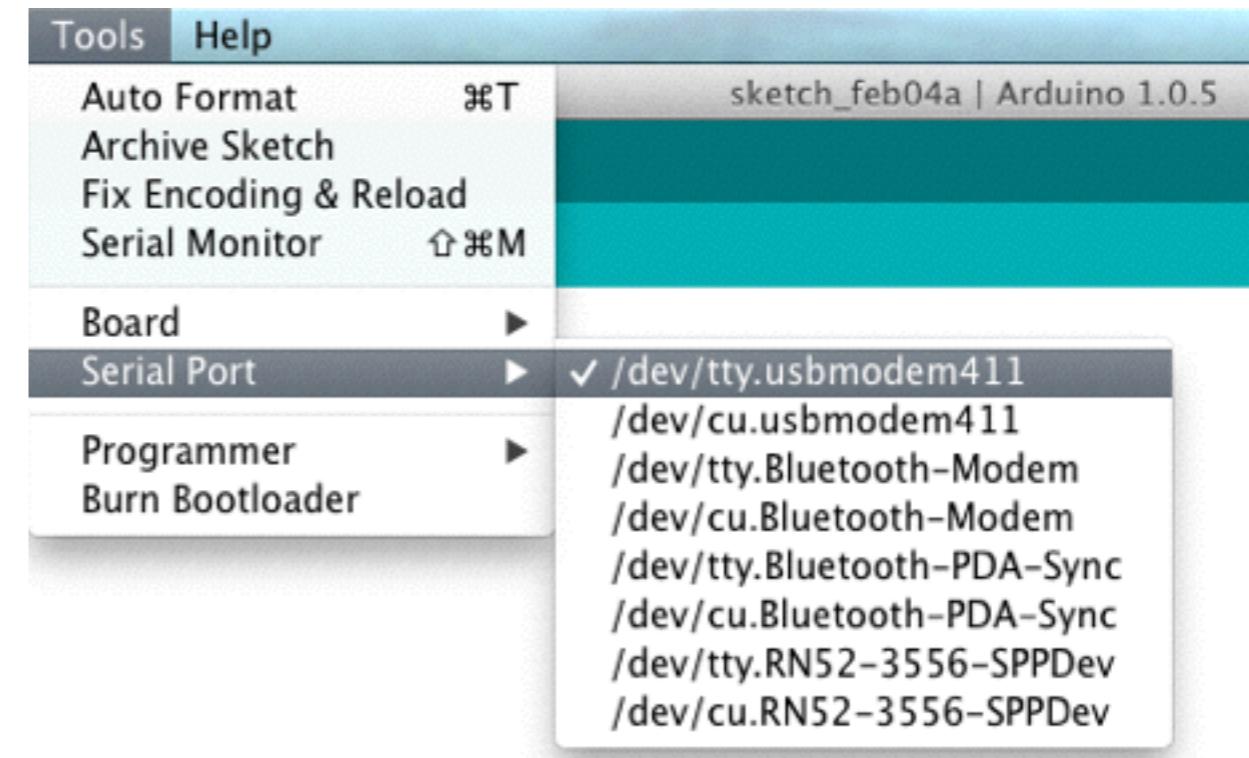
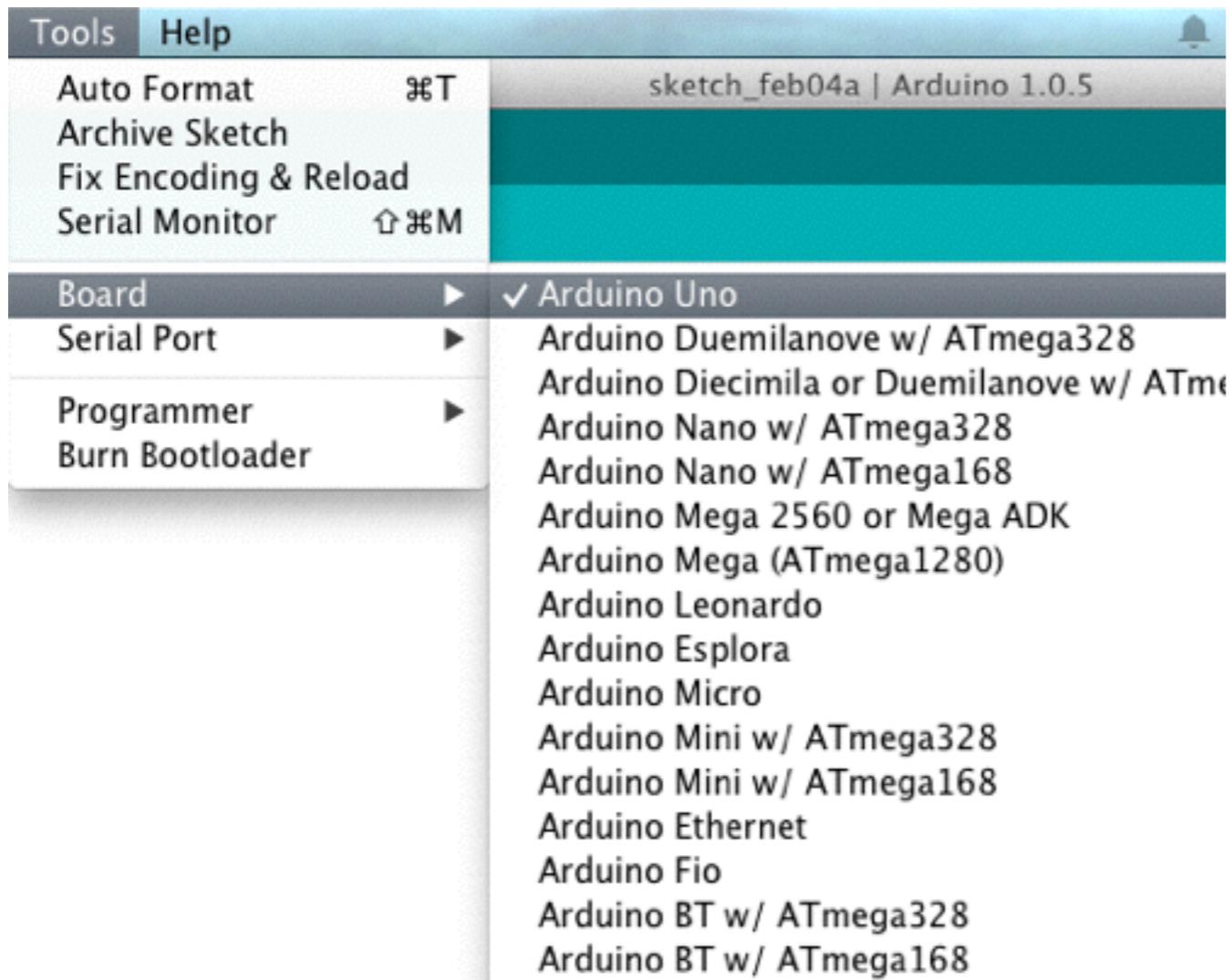
Ensuring the board is recognized



Getting Started with Arduino

Ensuring the board is recognized

Using the Arduino IDE menu options, select the Board and Serial Port for the connected device.

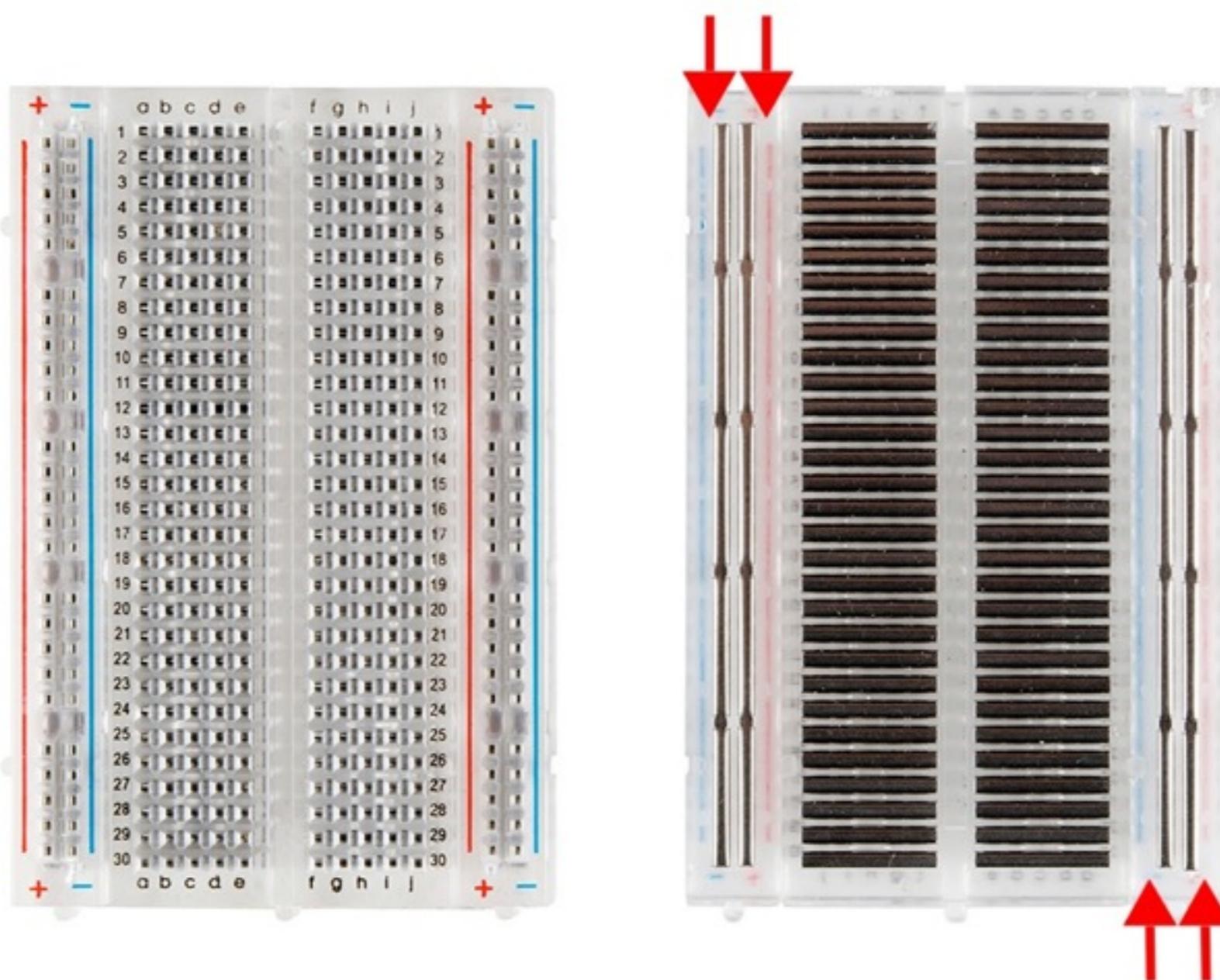


Windows users might need to install/update the board driver:

<http://learn.acrobotic.com/tutorials/intro-to-electronics-with-arduino#step-3>

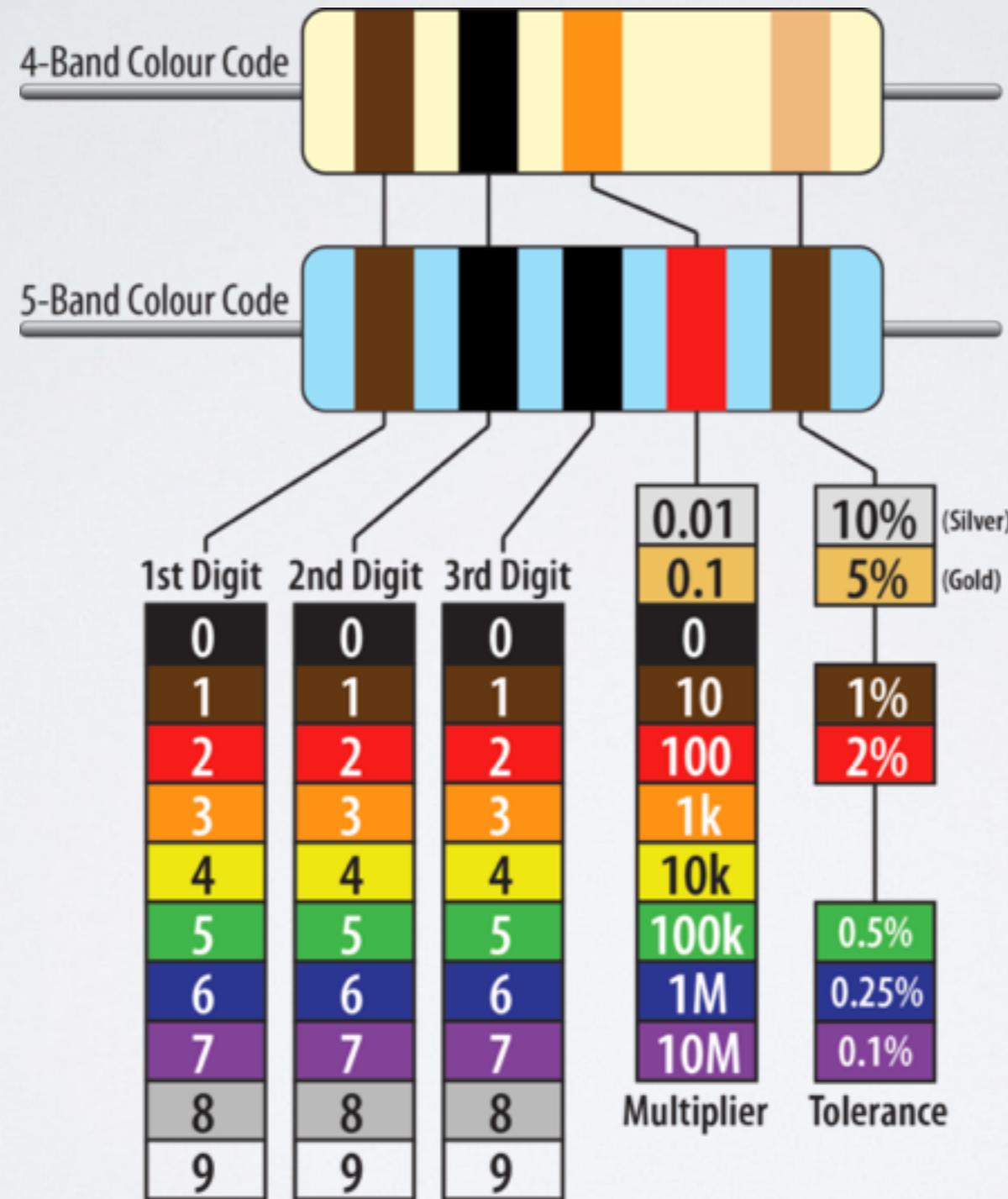
Getting Started with Arduino

How the solderless breadboard works:



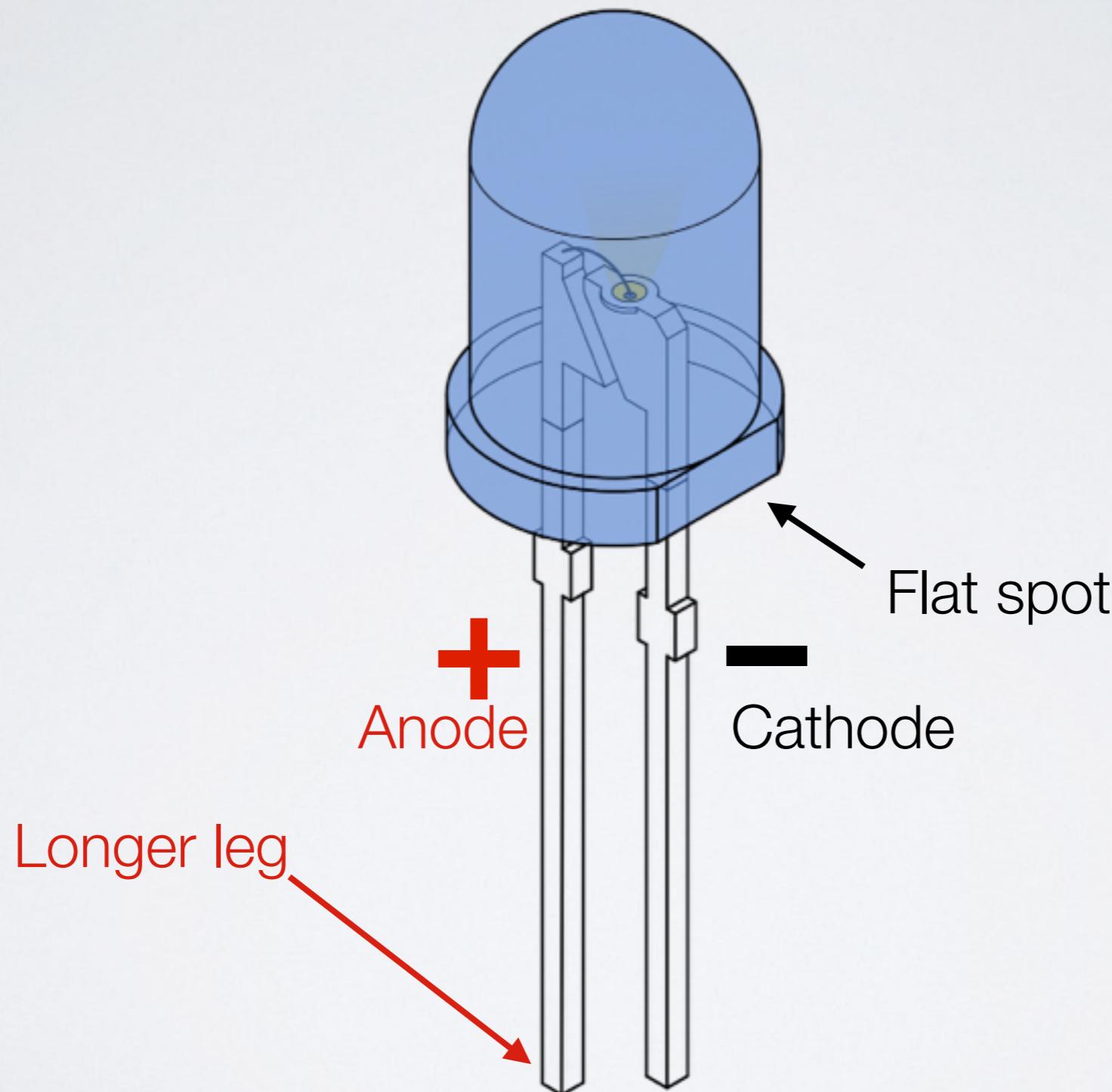
Getting Started with Arduino

Reading Resistor Codes:

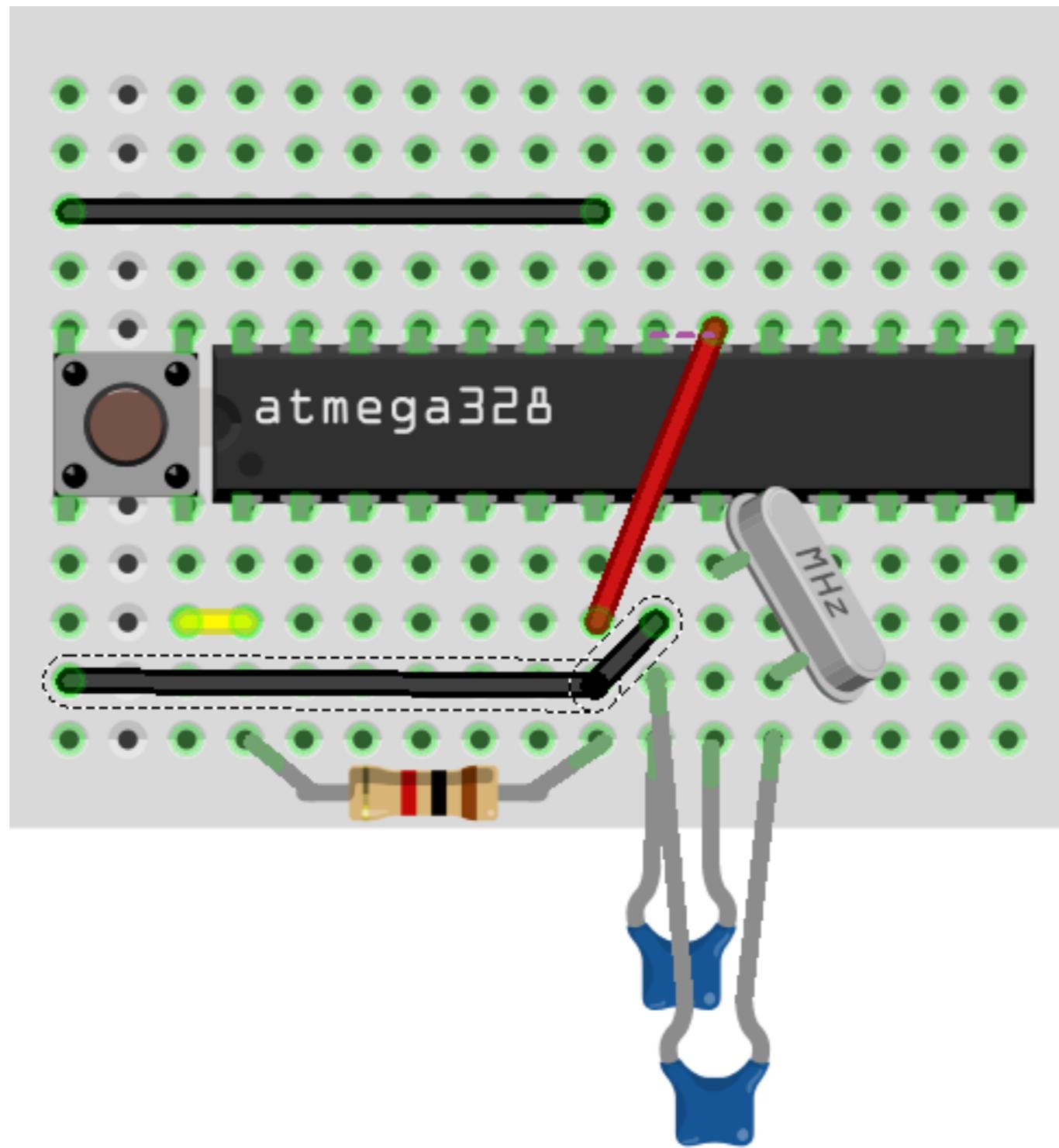


Getting Started with Arduino

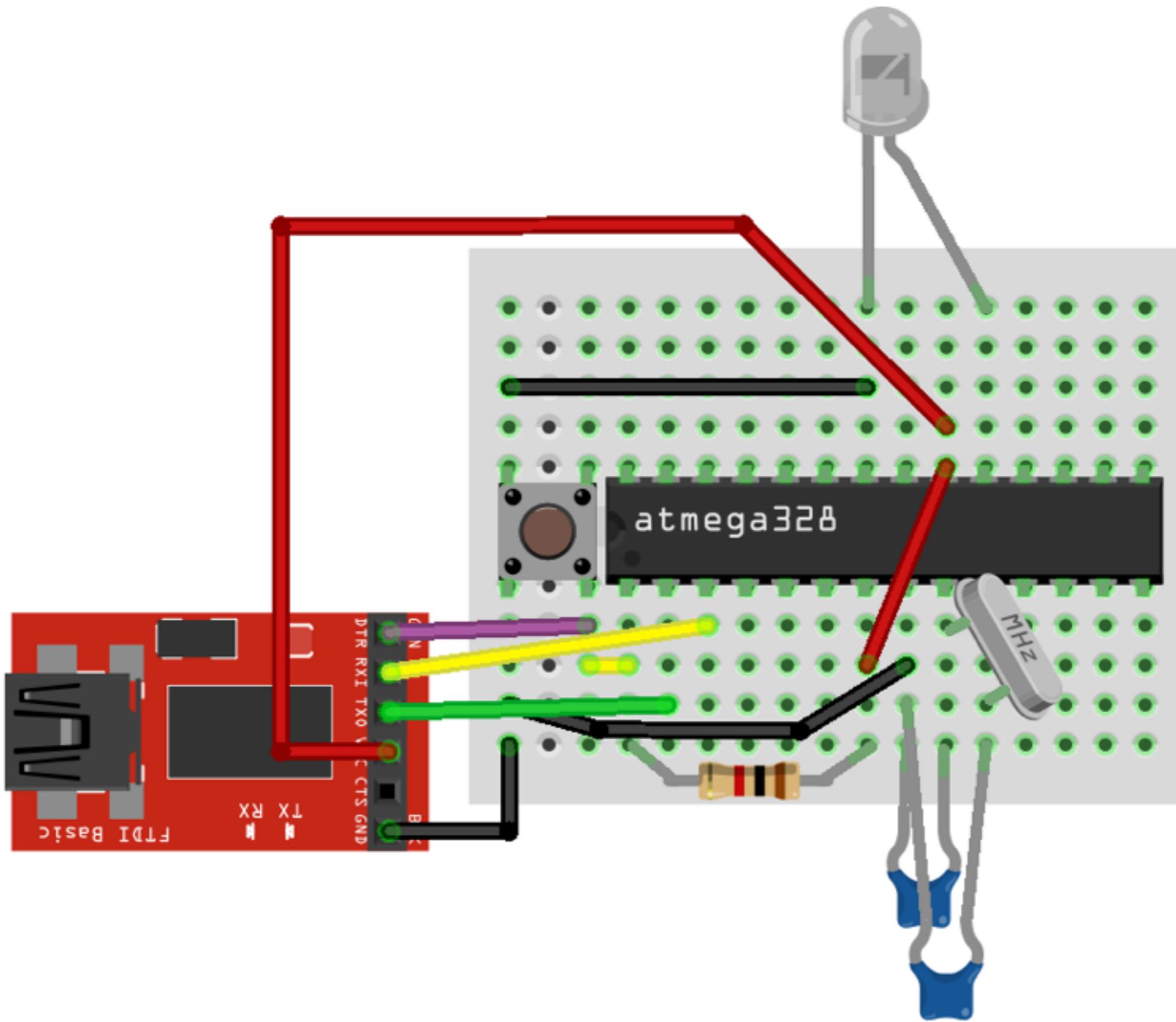
Reading LED polarity:



Wiring up the circuit



Testing the circuit



Visit us at:



<https://acrobotic.com>

<http://meetup.com/Arduino-Electronics-DIY-Robotics-Pasadena/>

Thank You!