

Beginners Workshop: Javascript & Hardware

Programming the ESP8266!

About Makerden

We're an Educational Makerspace where we combine the necessary tools, equipment, and instruction for hands-on learning through building things.

Members of our group vary both widely and wildly in terms of skill level and age range (7 to 68).



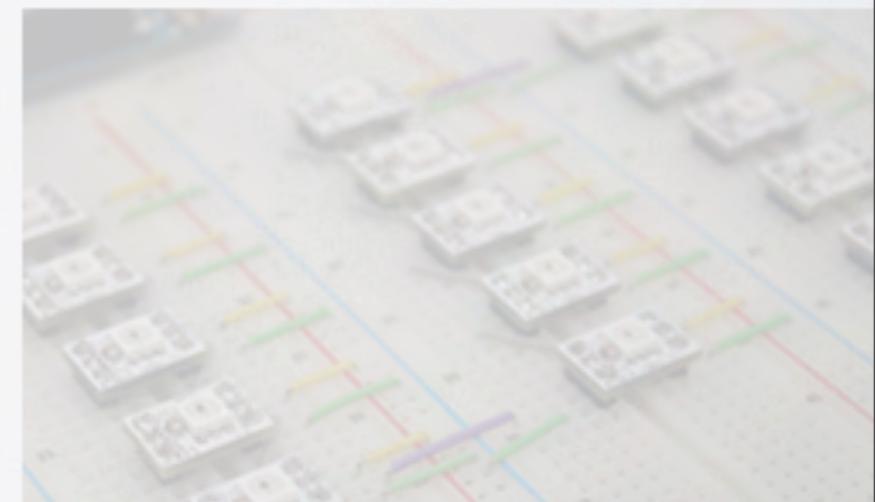
About Makerden

Events organized at our Educational Makerspace:

[DIY] These events include show-and-tells by our members followed by a work-on-your-project(s) and ask-for-help sessions.

[Workshop] An instructor leads a hands-on workshop for learning or polishing a practical skill useful for Makers (including schematic-drawing, PCB design, 3D-Printing, soldering).

[Class] An instructor leads a formal lecture featuring instructor-led activities that allow participants to learn, develop, or refine a technical skill.

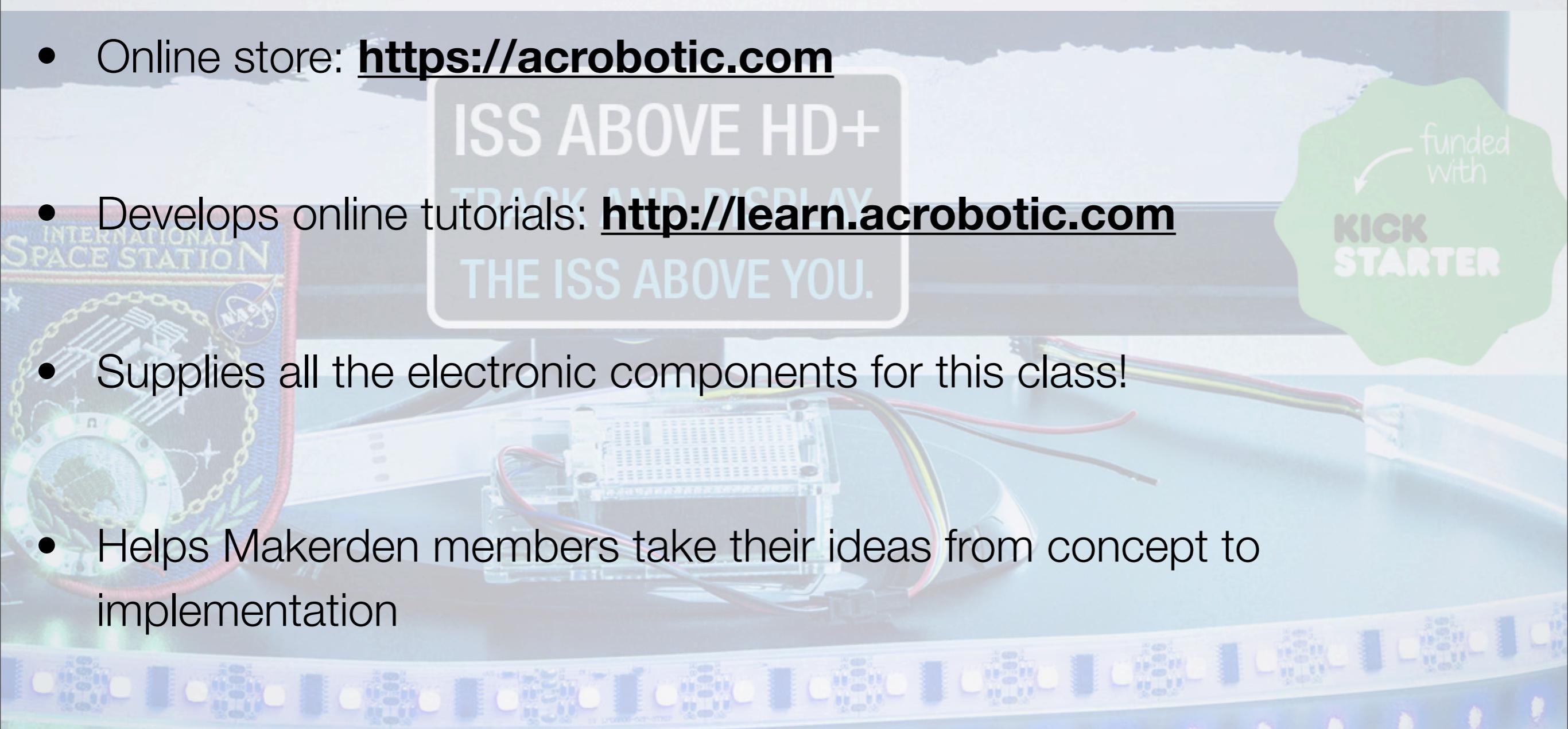


About ACROBOTIC

Makerden's Educational Electronics partner

Small, bootstrapped Open-Source electronics startup dedicated to the design of hardware and software products for use in education, DIY, hobby, arts, science, and more!

- Online store: [**https://acrobotic.com**](https://acrobotic.com)
- Develops online tutorials: [**http://learn.acrobotic.com**](http://learn.acrobotic.com)
- Supplies all the electronic components for this class!
- Helps Makerden members take their ideas from concept to implementation



Download this presentation

Navigate to:

<https://github.com/MakerdenIO/?????????>

Class outline

Duration: 2 hrs; Difficulty: Beginner

Presentation (15-20 min)

ESP8266 Development Board

The World of Hardware

Working with Microcontrollers

Getting Hands-On (90-100 mins)

Setting up the Interface

Running Javascript on the ESP8266

Playing with Components!

The ESP8266

ESP8266 Development Board

Acrobotic's Getting Started guide for ESP8266

<http://learn.acrobotic.com/tutorials/...>

Purchase:

<https://acrobotic.com/acr-00018>

<http://www.amazon.com/dp/B0179SW31O>



ESP8266 Development Board

Link to Espruino firmware download:

<http://forum.espruino.com/conversation...>

Link to Pyserial download:

<https://github.com/pyserial/pyserial>

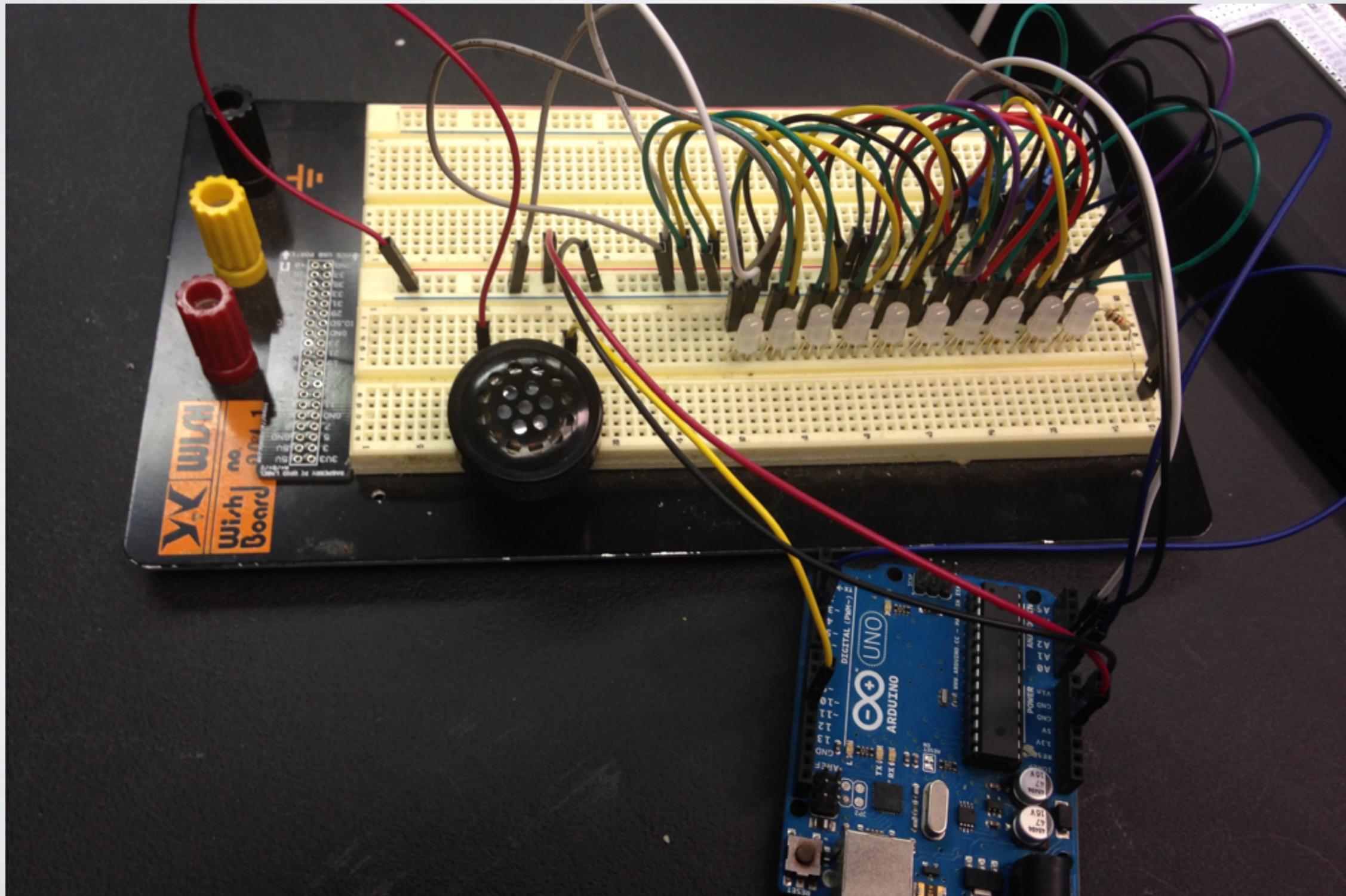
Get the Esptool here:

<https://github.com/themadinventor/esp...>

Hardware

The World of Hardware

Use low voltages to drive small components. Make all kinds of fun projects!



Power (Batteries)

Provide voltage to circuits and therefore create current. Many options.



Resistors

Reduce the amount of current flowing.

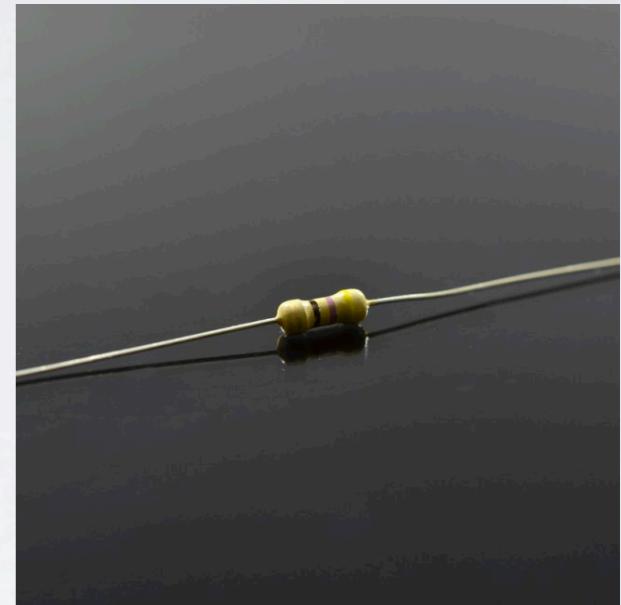
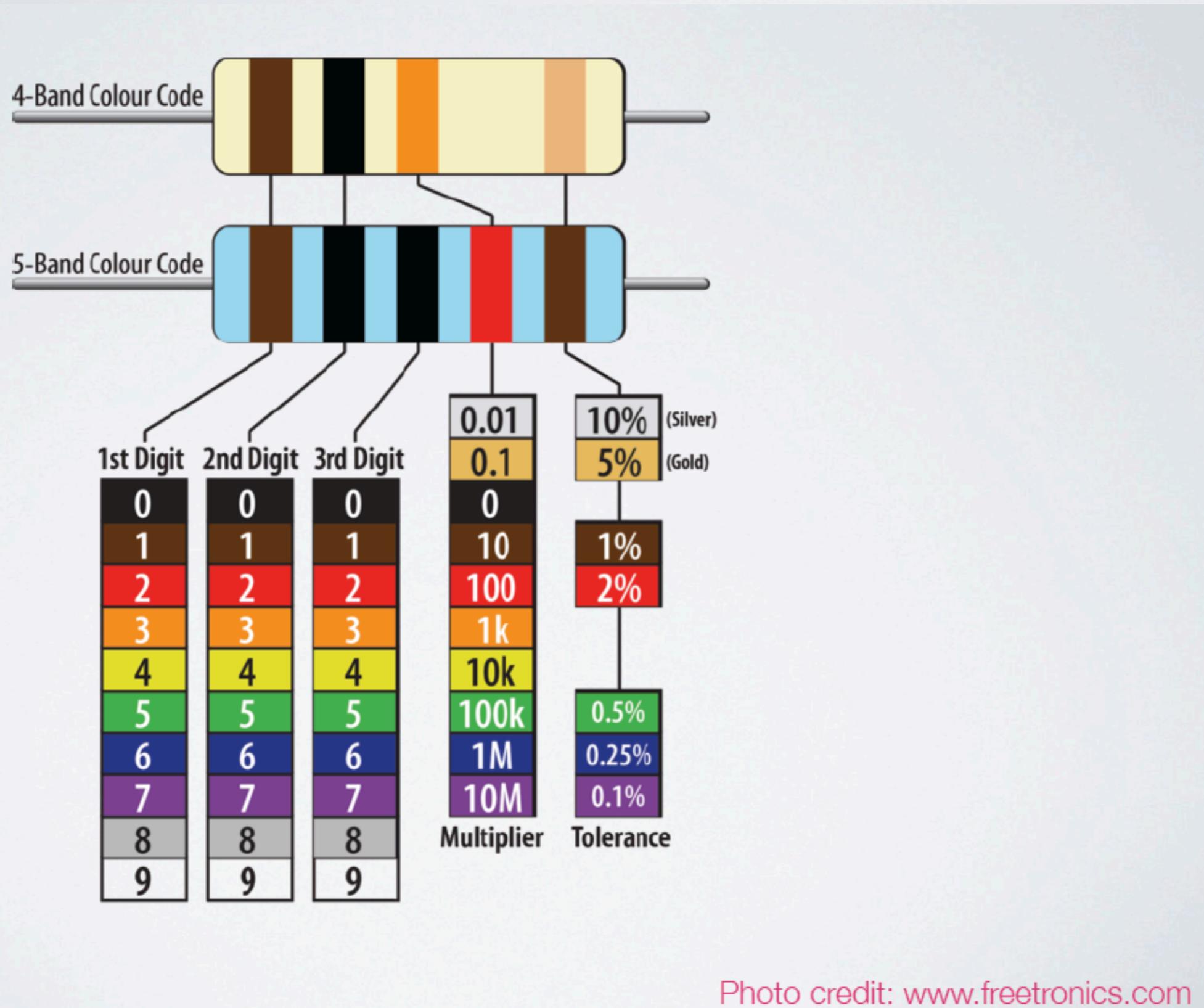
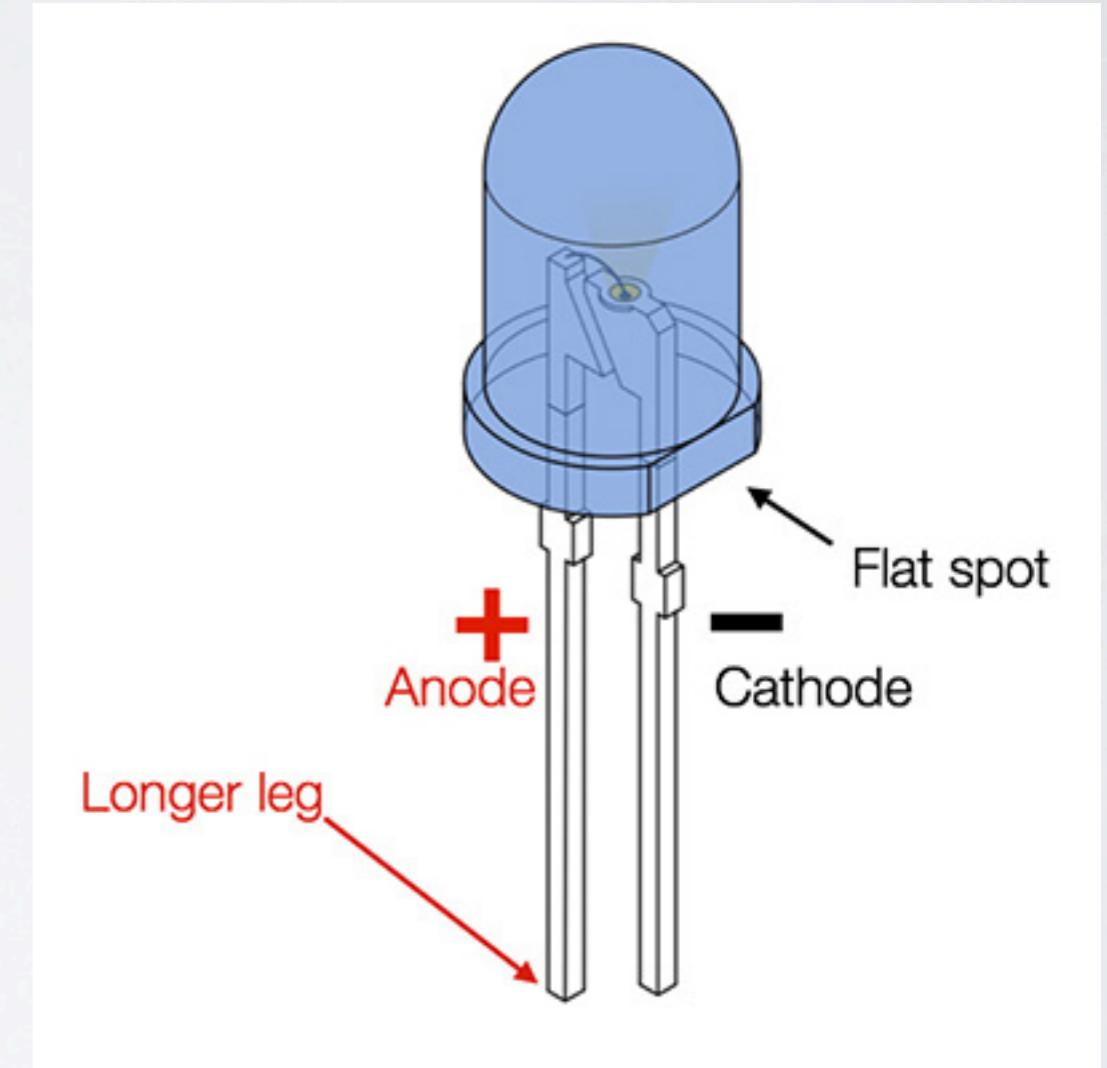


Photo credit: www.freetronics.com

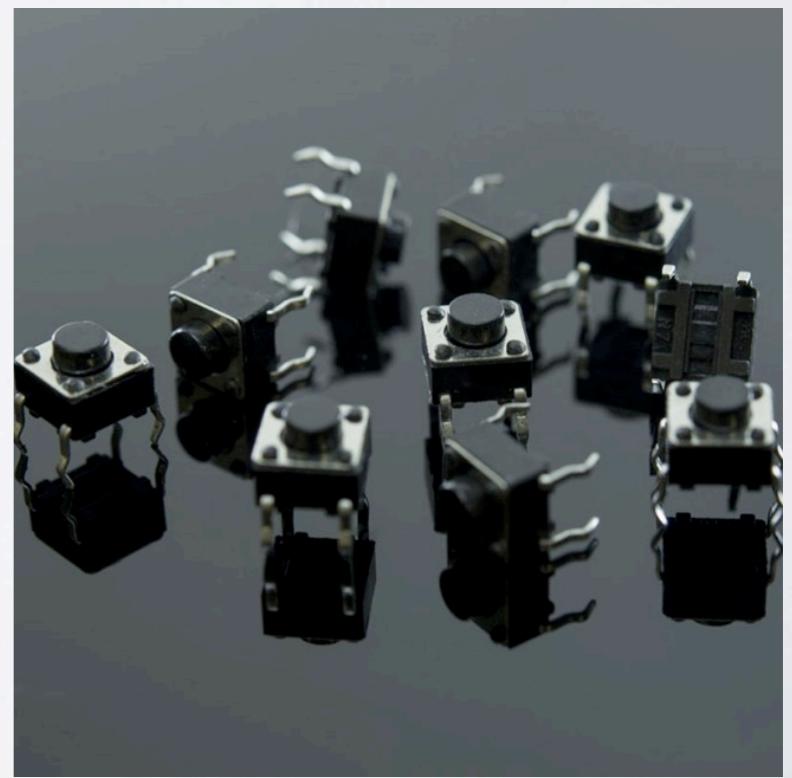
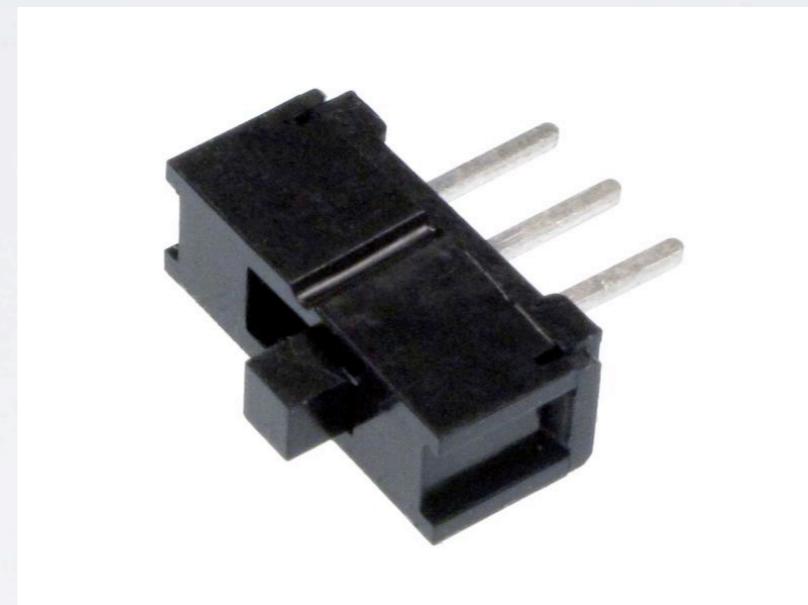
Light Emitting Diode (LED)

Shine light when current passes through. Some are smart.



Switches and buttons

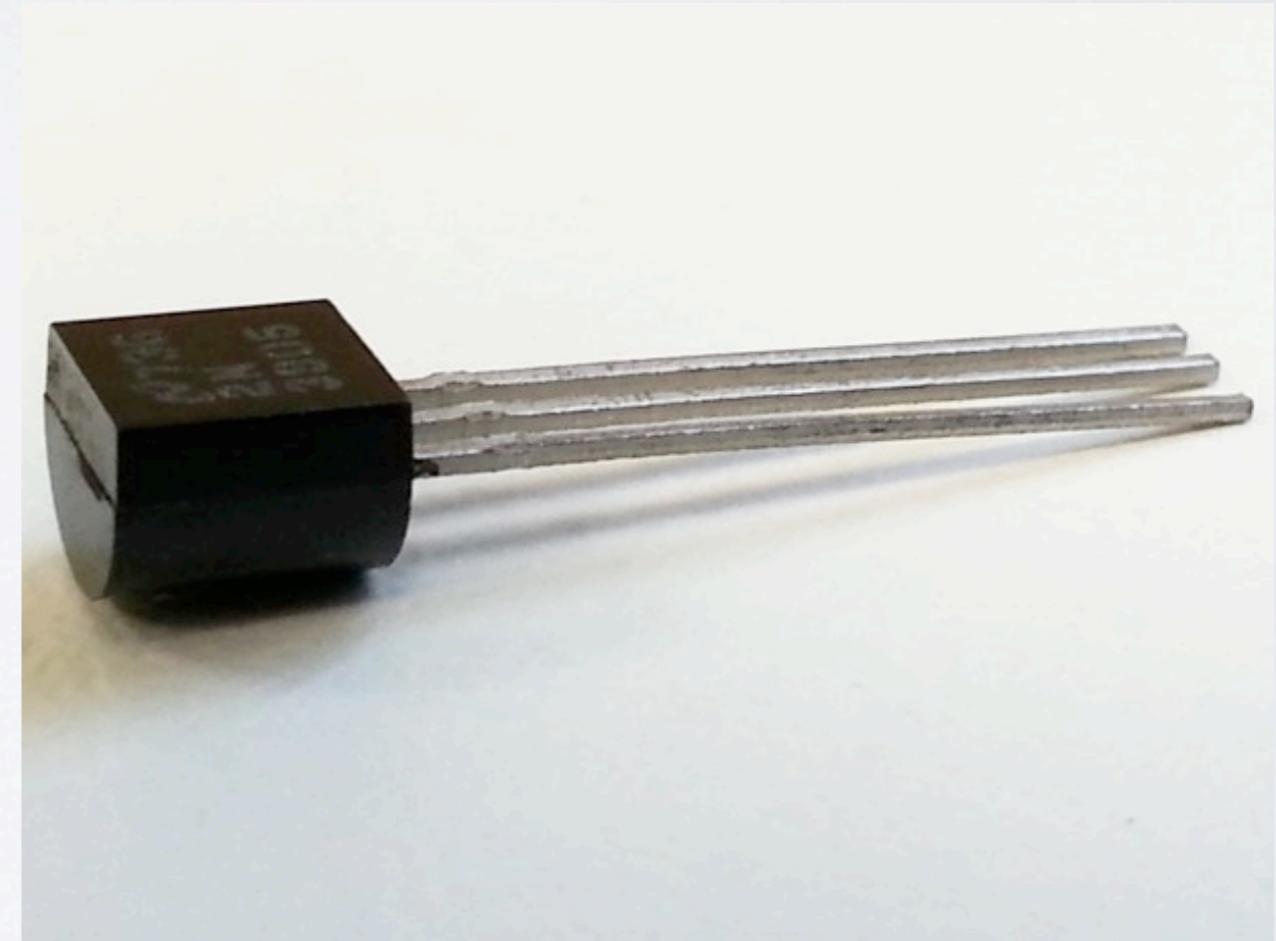
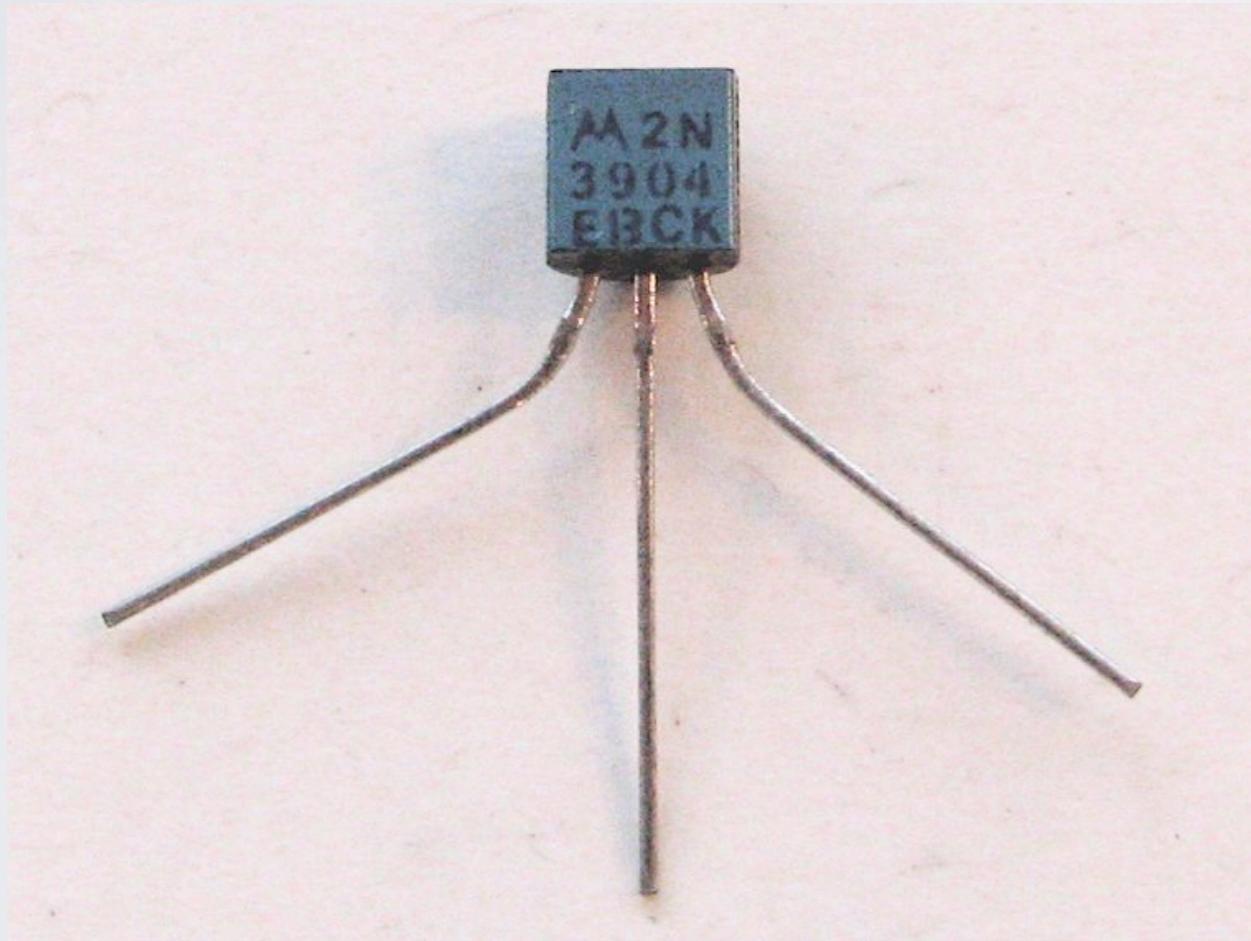
Break a connection momentarily or indefinitely.



The transistor

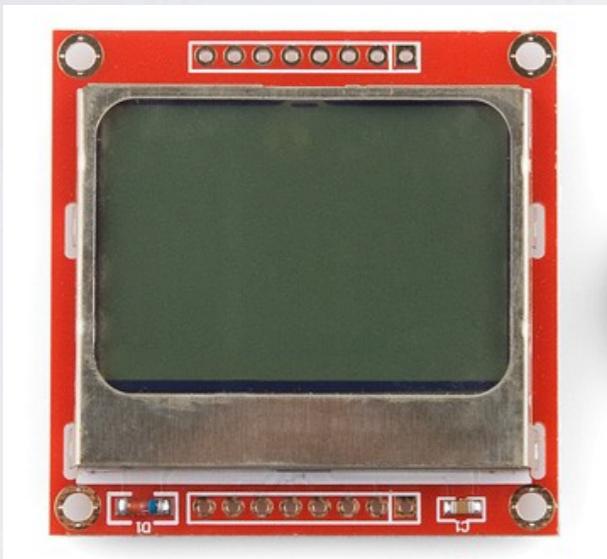
Semiconductor that acts like a switch. Can amplify power.

Game changer in electronics!

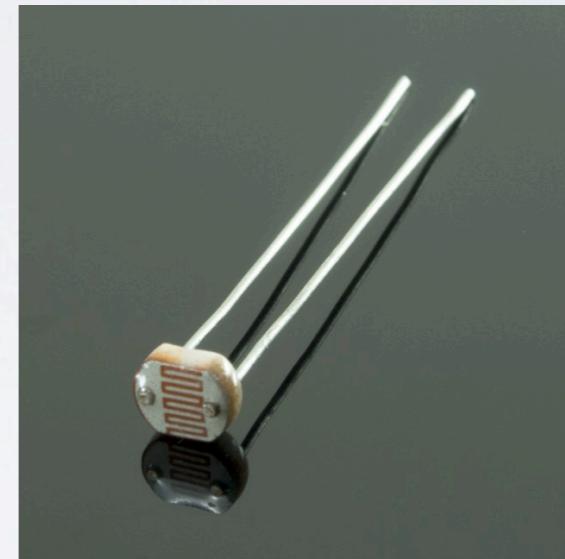


Other components

LCD



Photoresistor



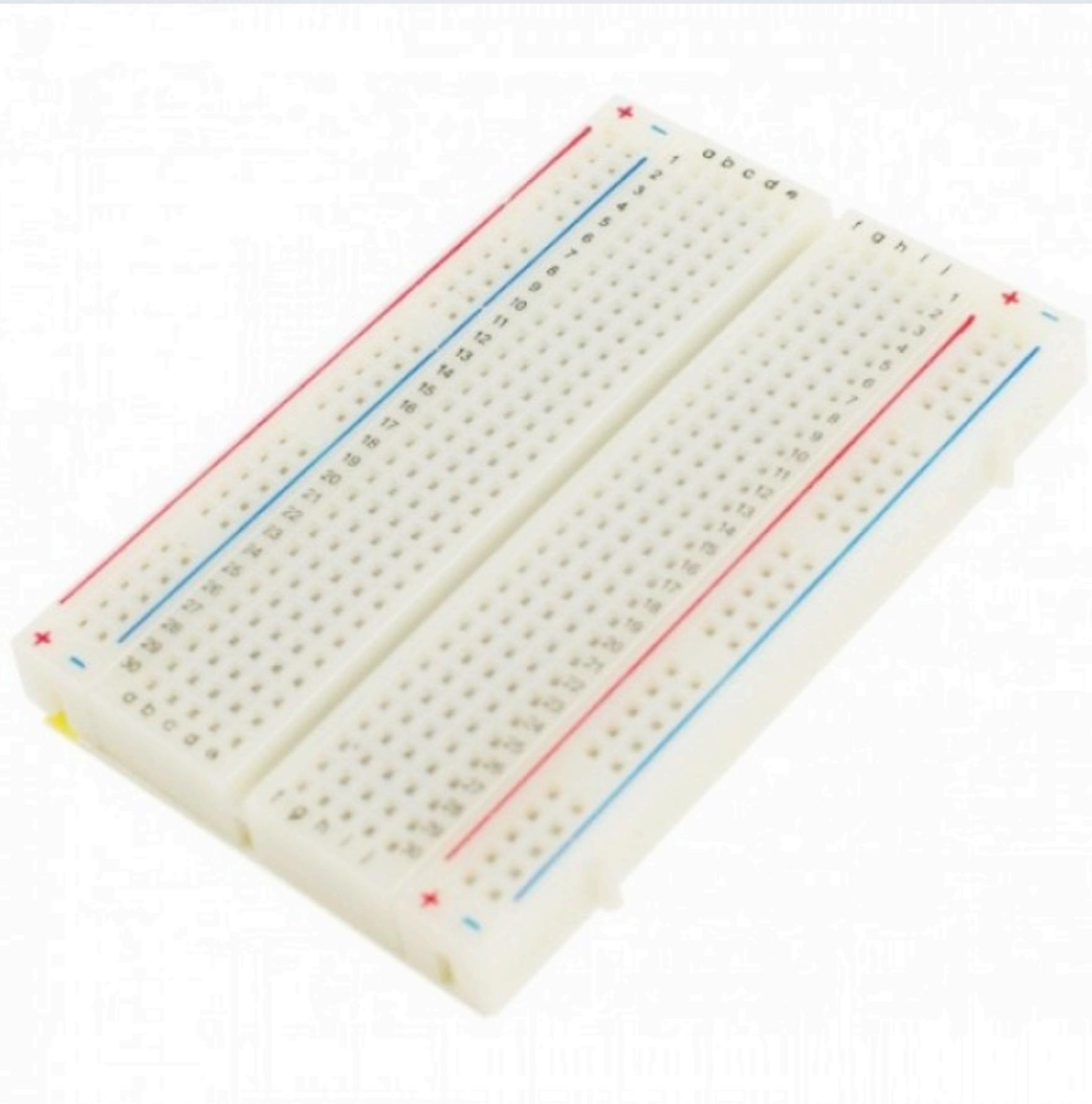
Motor



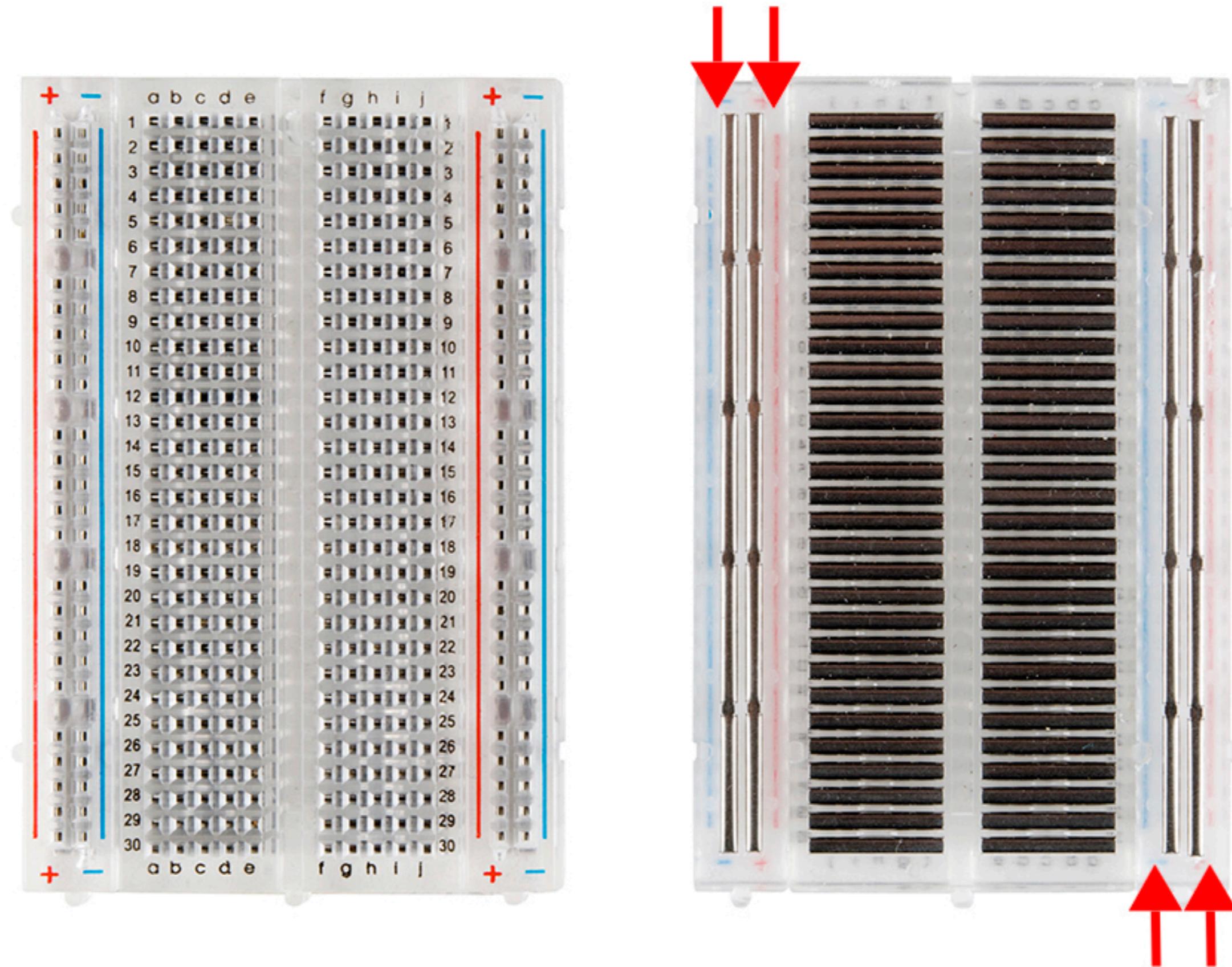
Speaker



Half breadboard



How the solderless breadboard works



Microcontrollers

Microcontrollers

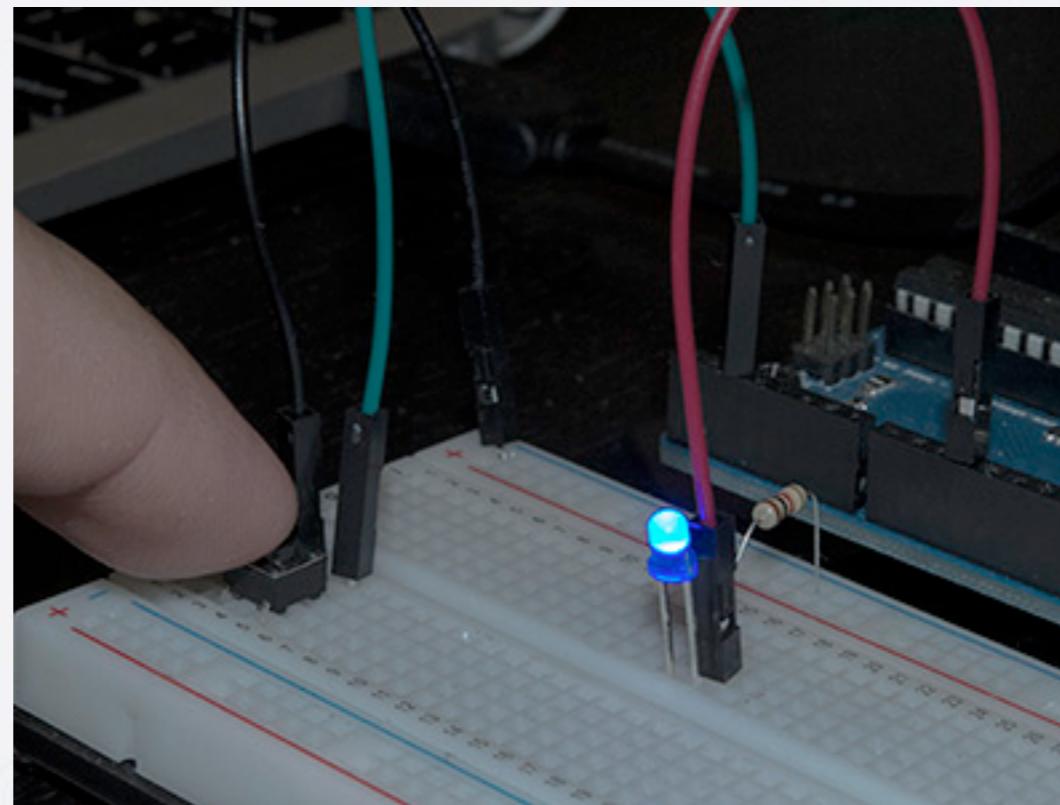
Automate

Who wants to sit and push buttons/flip switches all day?

&

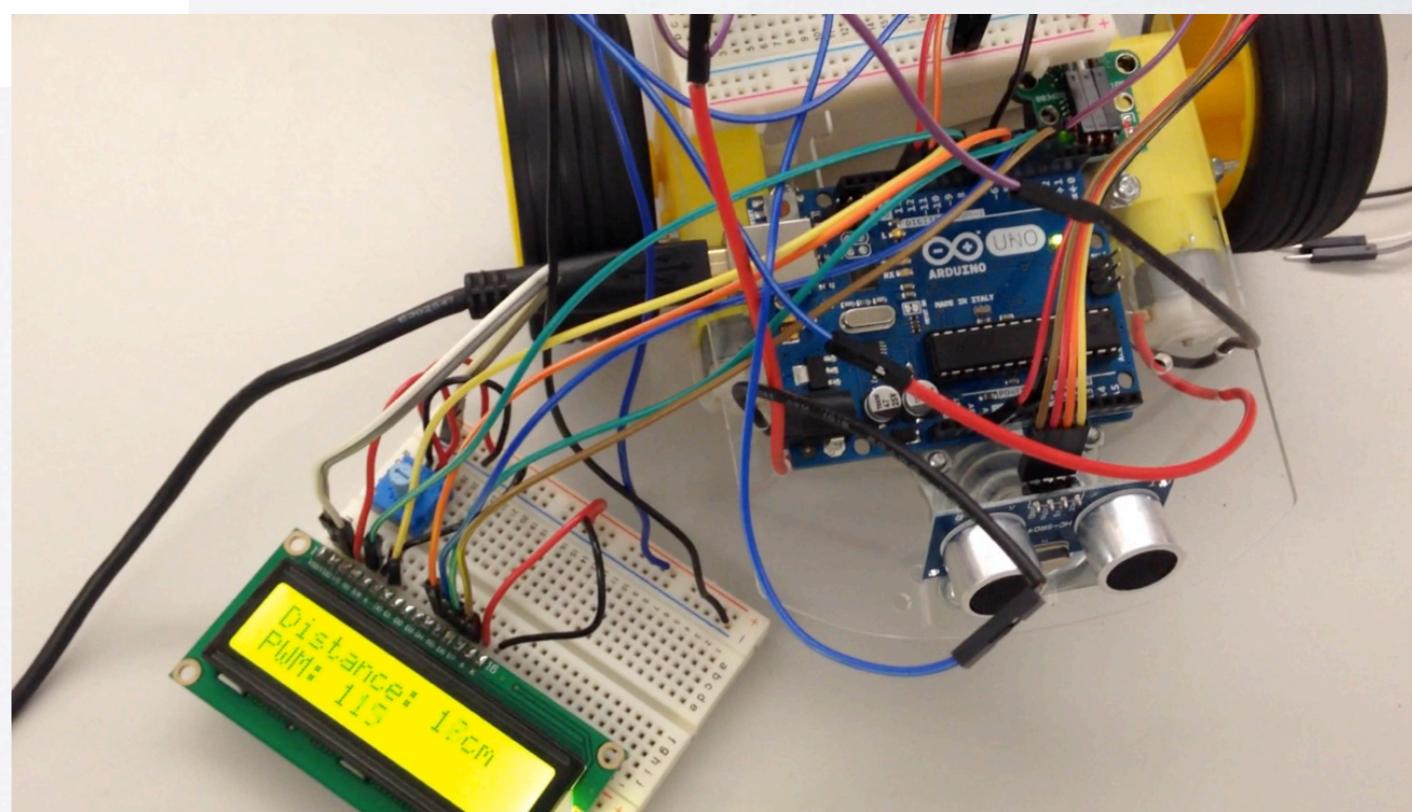
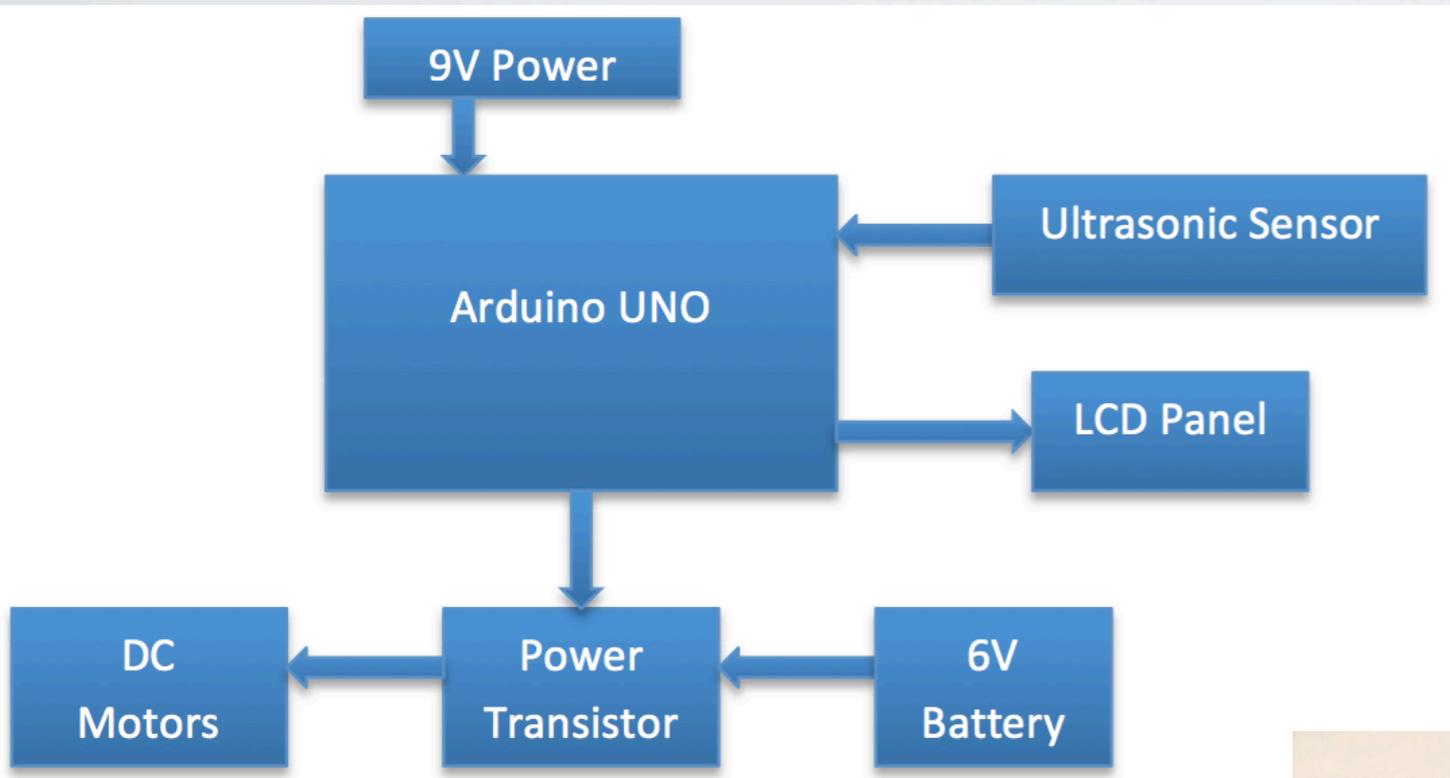
Program

What if you need to do something more complex with your circuit?



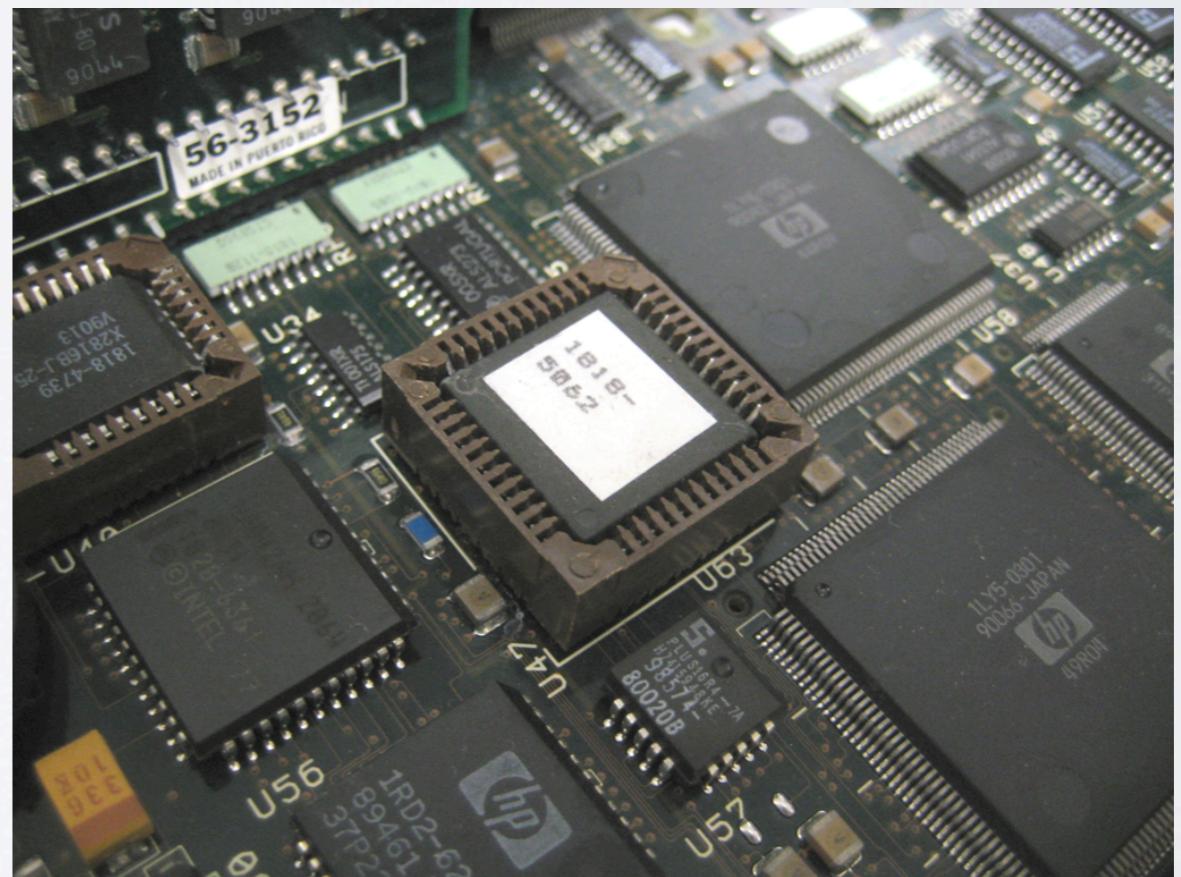
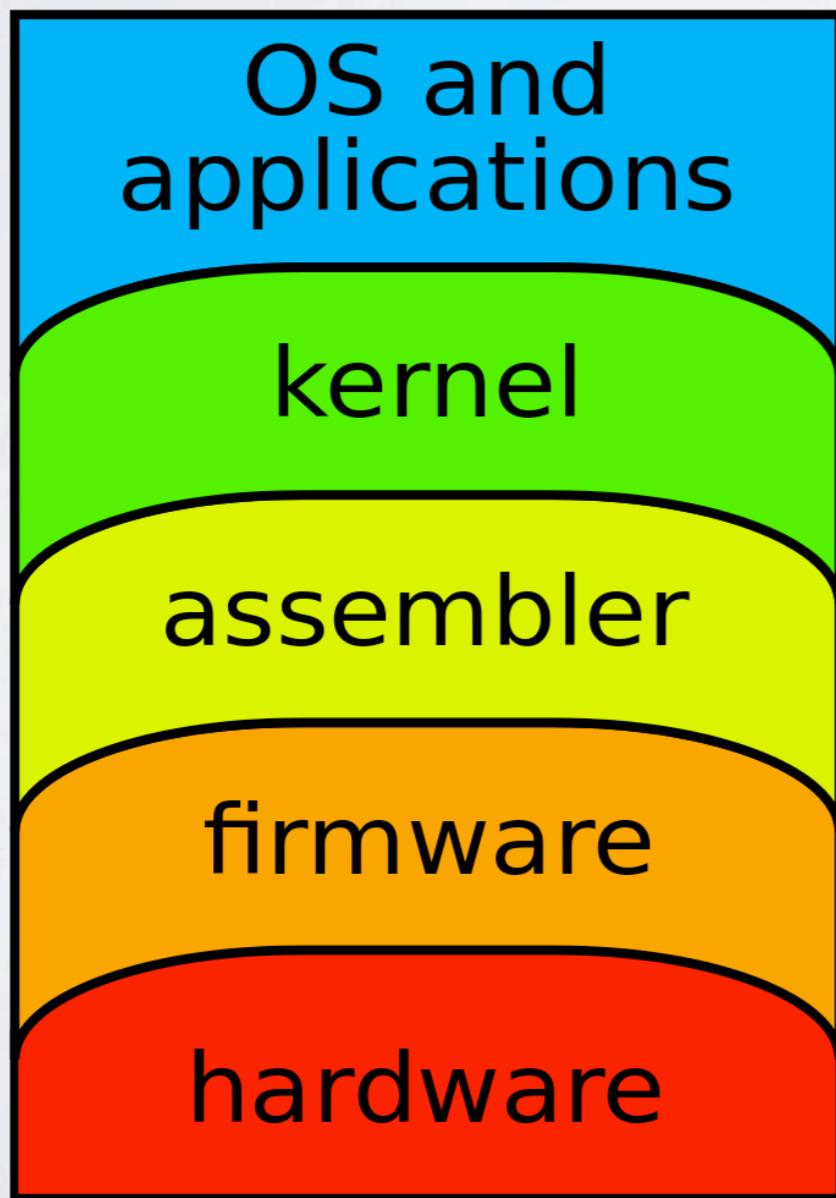
Microcontrollers

Are also components! They are the brains of your circuits.



Microcontrollers

Firmware is the code that gets downloaded.



Now You Try!

Setting Up The Interface

Installing the Arduino IDE—a computer application to edit, compile, and upload our programs, as well as communicate via USB with the ESP8266 development board (and others)

Windows

Mac (OSX 10.5+)

Linux (32-bit, 64-bit)



The screenshot shows the Arduino IDE interface with the title bar "Blink | Arduino 1.6.5". 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.

Most Arduinos have an on-board LED you can control. On the Uno and
Leonardo, it is attached to digital pin 13. If you're unsure what
pin the on-board LED is connected to on your Arduino model, check
the documentation at http://www.arduino.cc

This example code is in the public domain.

modified 8 May 2014
by Scott Fitzgerald
*/

// the setup function runs once when you press reset or power the board
void setup() {
  // initialize digital pin 13 as an output.
  pinMode(13, OUTPUT);
}

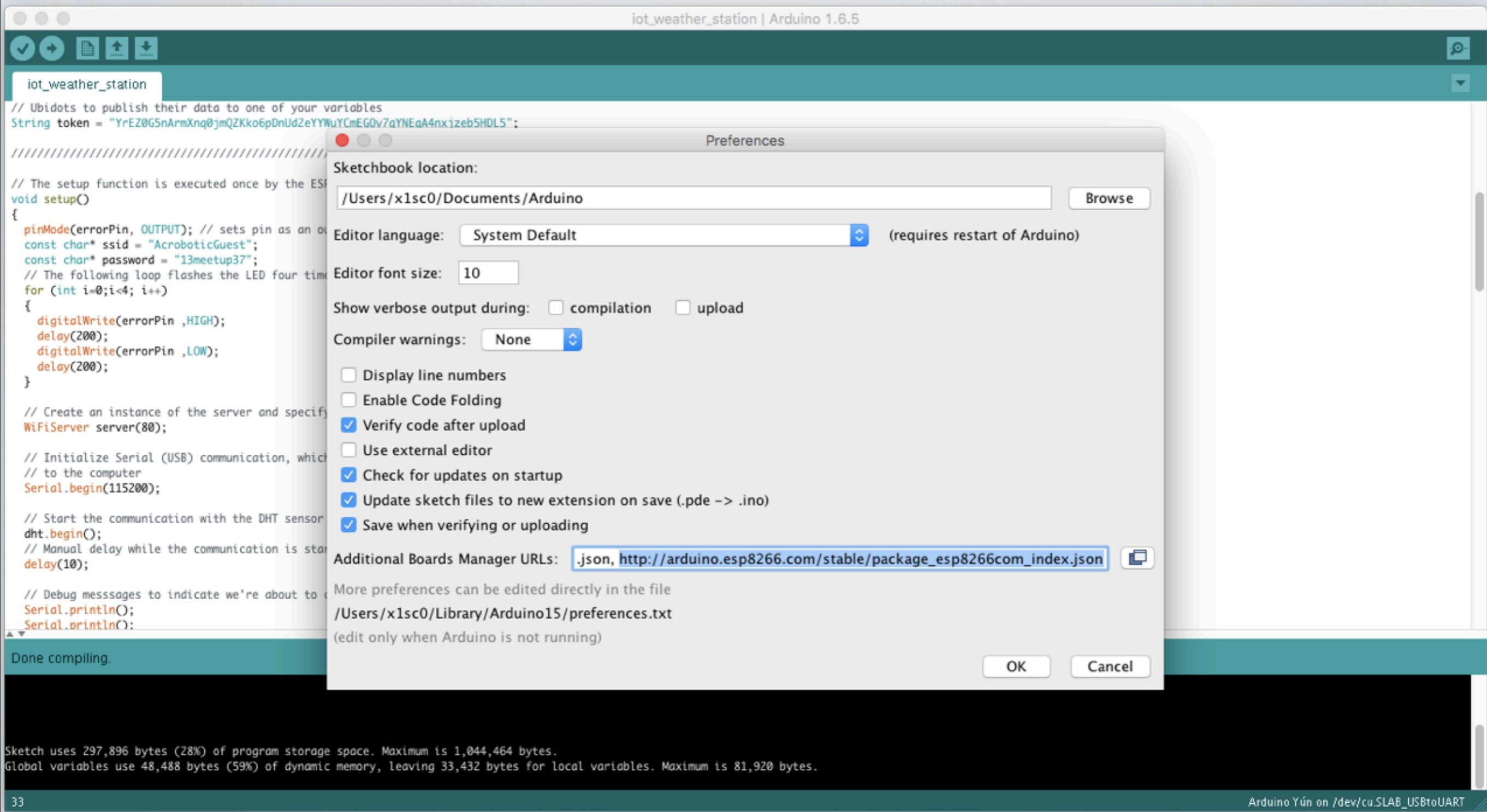
// the loop function runs over and over again forever
void loop() {
  digitalWrite(13, HIGH);    // turn the LED on (HIGH is the voltage level)
  delay(1000);              // wait for a second
  digitalWrite(13, LOW);     // turn the LED off by making the voltage LOW
  delay(1000);              // wait for a second
}
```

The status bar at the bottom right shows "NodeMCU 1.0 (ESP-12E Module), 80 MHz, 115200 on /dev/cu.SLAB_USBtoUART".

Setting Up The Interface

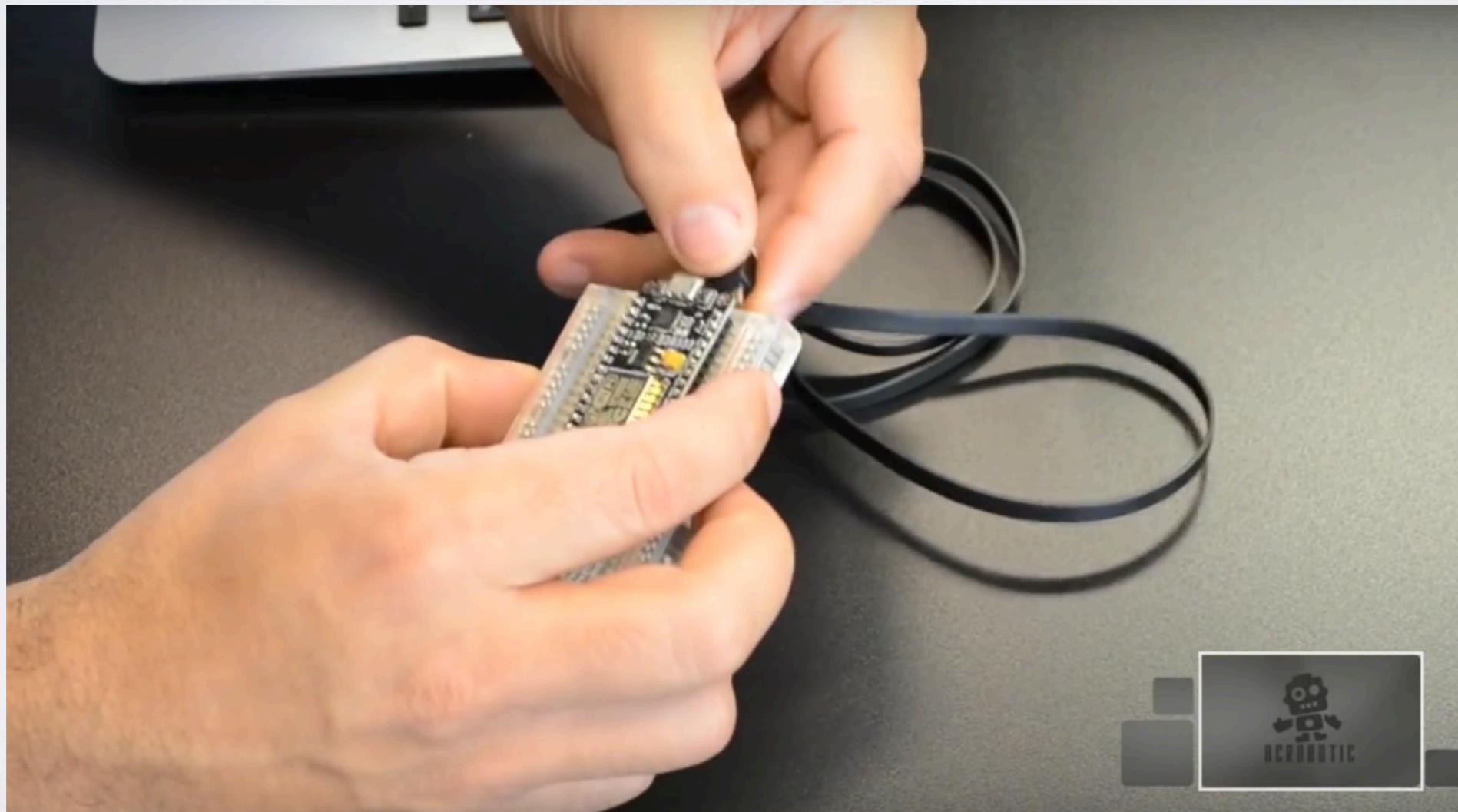
Configuring the Arduino IDE to support the ESP8266

Navigate to “Preferences” and under Additional Board Manager URLs enter:
http://arduino.esp8266.com/stable/package_esp8266com_index.json



Setting Up The Interface

When you have finished installing, connect the board to your computer



Setting Up The Interface

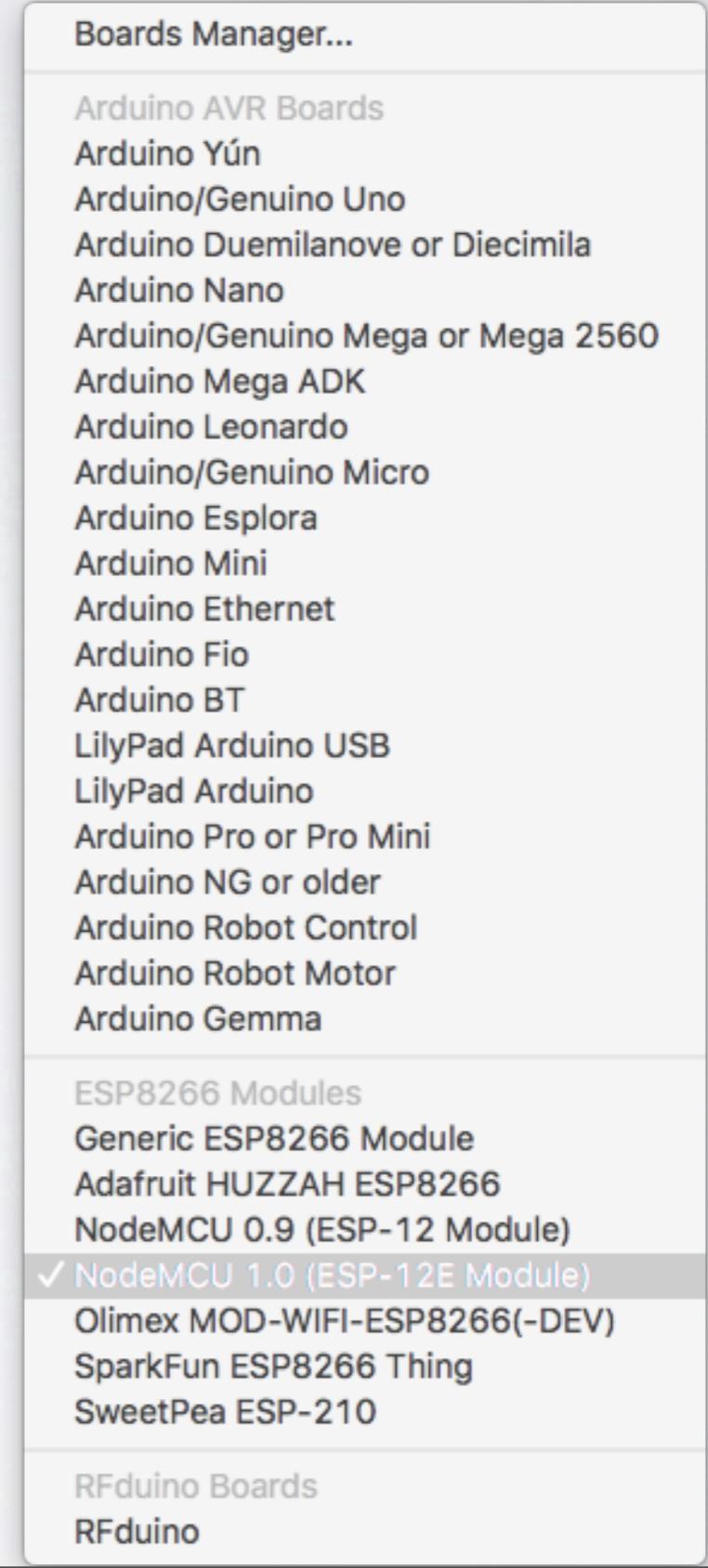
Configuring the Arduino IDE to support the ESP8266

Install the ESP8266 boards under:

Tools > Board > Boards Manager

In the Arduino IDE select:

Tools > Board > NodeMCU 1.0 (ESP-12E)



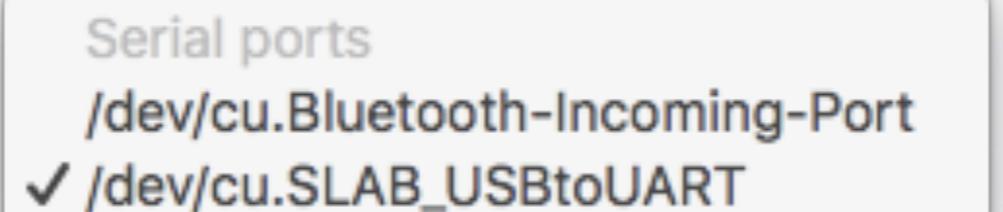
Setting Up The Interface

Configuring the Arduino IDE to support the ESP8266

Download and install the USB drivers:

<http://j.mp/ESP8266-driver>

In the Arduino IDE check under:
Tools > Port



Serial ports

/dev/cu.Bluetooth-Incoming-Port

✓ /dev/cu.SLAB_USBtoUART

Running Javascript