



Arduino 101

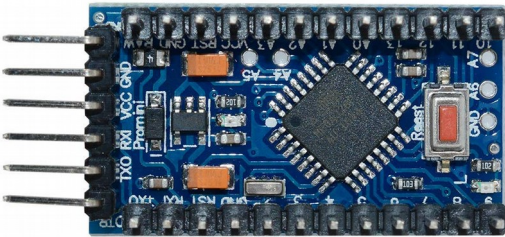
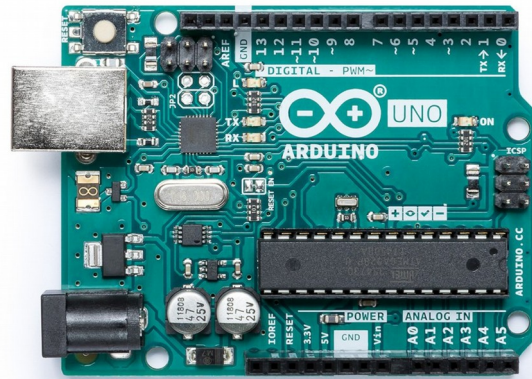
The Basics

Thomas Ose
Jim Tatum

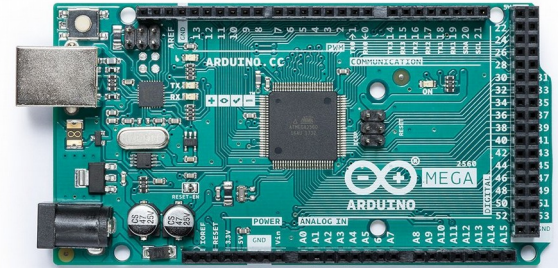
What Will be Covered

- Arduino Hardware Overview
- Arduino IDE Installations and setup
- Things You need to know about Arduino
- LED and Resistors
- Programming LED with effects
- Programming Inputs
- Programming Servos
- Q&A

Arduino Hardware

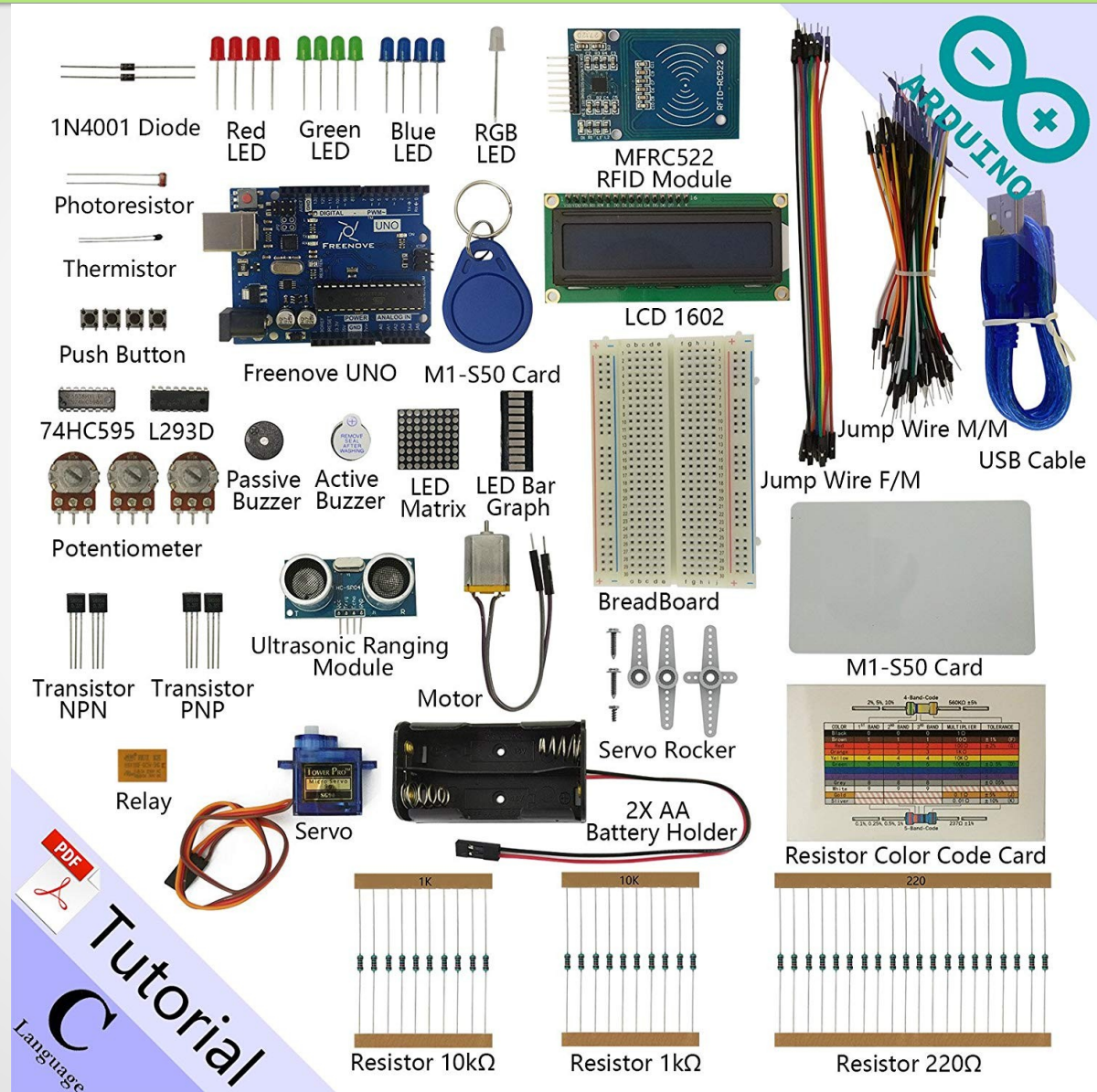


Arduino Uno
Arduino Mega
Arduino Mini Pro
Arduino Nano



All Different form factors but program the same
We will use an Uno from the kit and a Nano

The Kit

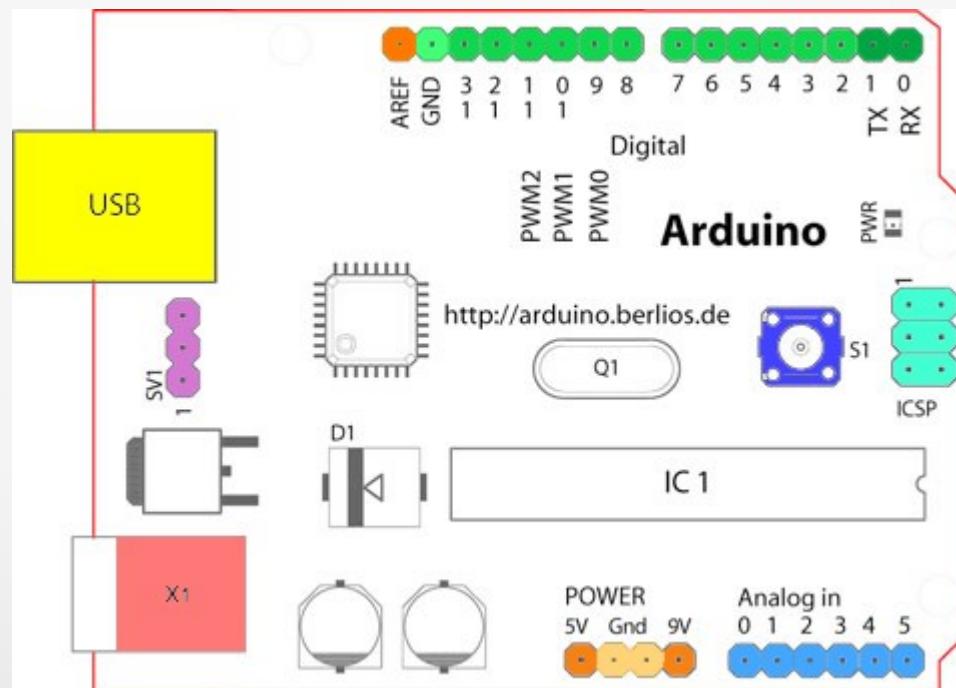




Arduino Things to Know

Pins

- Green Digital
- Blue Analog



Pins Continued

Digital Pins

- Basically On/Off
- Can be PWM (Pulse Width Modulation)
- Will float on Input unless pulled down

• ***Analogue Pins***

- Analogue to digital conversion
- Have a range from 0-1023
- Can be used as digital inputs
- Will float unless pulled down

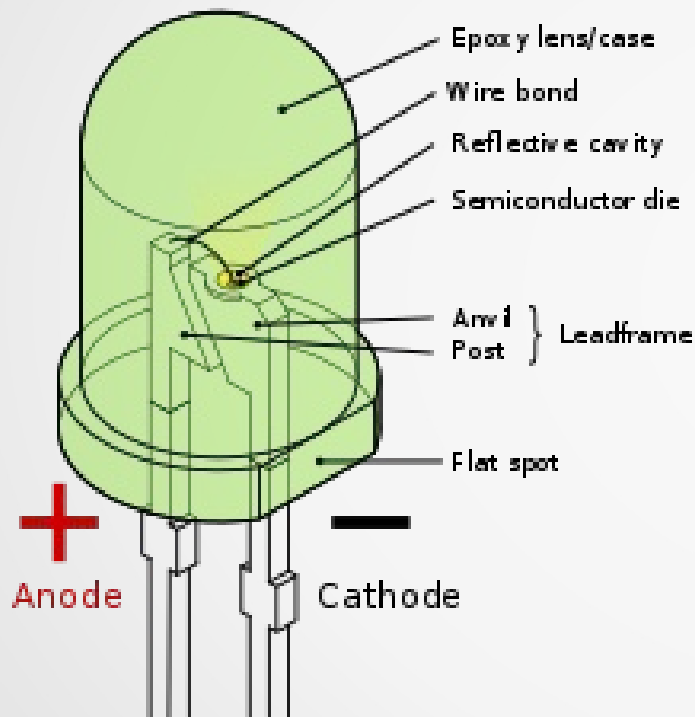
Floating Digital Pins

- Digital Pins on an Arduino float
 - If nothing is connected then inputs will be random
 - Caused by noise being picked up on the pin
 - Use a resistor to clamp input to a known state
 - Pullup – resistor connects pin to +5v
 - Pulldown – resistor connects to ground
 - 10k resistor is a good value to use for both
 - Use INPUT_PULLUP option
 - Inverts return value
 - Internal 20k resistor
 - Will dimly light an LED if connected

Pin 13

- Avoid pin 13 if possible
- Pin 13 is the internal LED
- Values fluctuate because of internal use
- Using as Output is OK
- Using as input not OK

LED



- LED are directional
- Anode get plus voltage
- Anode is the longer leg
- Cathode gets ground
- Resistor can go either
- Flat side is Cathode
- Different Colors have different resistor needs

Resistors

- In our application, use a $\frac{1}{4}$ watt resistor
- There are 4 and 5 band markings
- If calculated resistor is not available use next standard value.
- Resistors are non directional

Tutorials

Simple LED

Arduino Controls LED

Dual LED Arduino Controlled

Smooth Blinking LED

Push button controls LED through Arduino

Tutorials

Control LED by Potentiometer

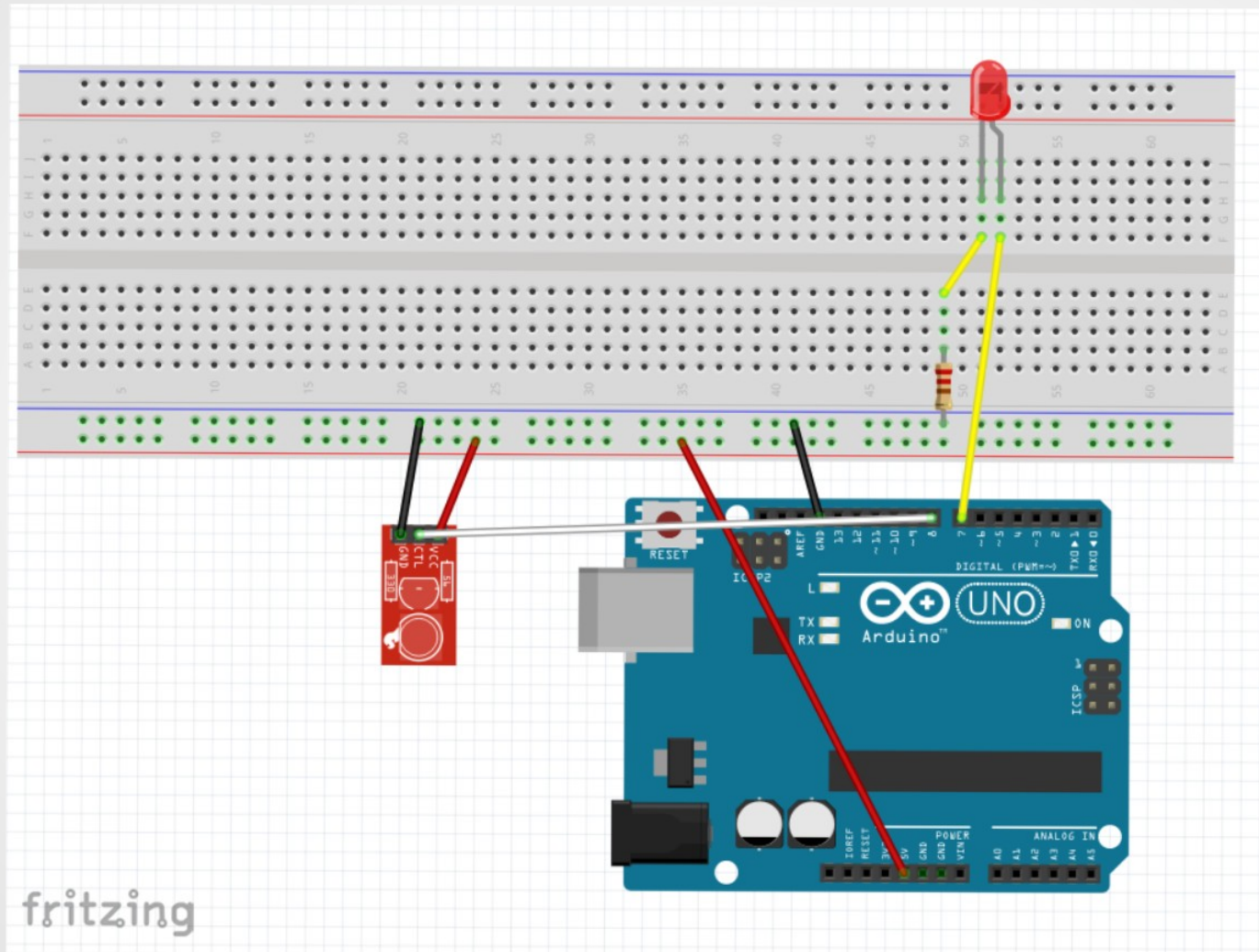
Control LED through Photoresistor

Detect the Temperature

Introduction to Modules

- Modules are self contained circuits
- They have 3 common pins
 - VCC
 - GND
 - Signal
- Interface nicely with Arduino
- Some can be digital and analogue
 - These have 4 pins

Module Tutorial



Tutorial

- Build the circuit
- Write a sketch that does the following
 - Initialize the serial port to 9600 baud
 - Read the digital signal from the module
 - Turn on LED based on the signal
 - Print out module status (ON or OFF)

Introduction to Libraries

- Are chunks of code that can be reused
- Can be expanded
- Some are just functional
 - Exposing functions only
 - Ease of reuse

pinMode(pin, type);

- Some are objects
 - Derived objects inherit base functionality
 - Can be extended

*Servo MyServo;
MyServo.attach(pin);*

Including Libraries

In the editor select

Sketch → Include Library → (name of library)

In the source code the following line will be added

```
#include <Servo.h>
```

Tutorials

Servo Sweep

Control Servo by Potentiometer

Q & A

Thank You for your time

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Files are found at

<https://www.omsremodels.com>