

**A Jumpstart to Programming
Your Surroundings**

Introducing Arduino



Presented by Arch Reactor

What's an Arduino?



Arduino is an open-source electronics prototyping platform intended for artists, designers, hobbyists, and anyone interested in creating interactive objects or environments.

The Arduino platform is:

- A physical board design
- A programming environment
- A development philosophy

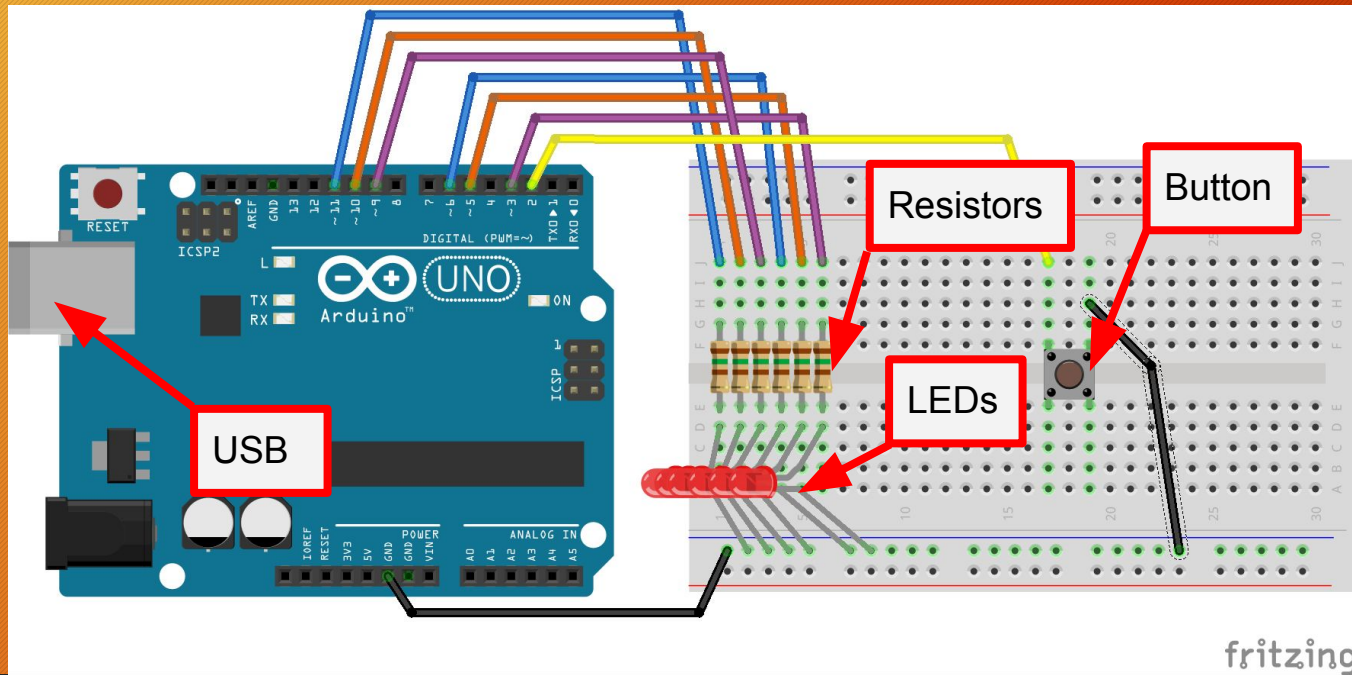
What we're doing today



- Load an existing program to the board
- Modify a sample program
- Talk about some basic electronics and programming concepts

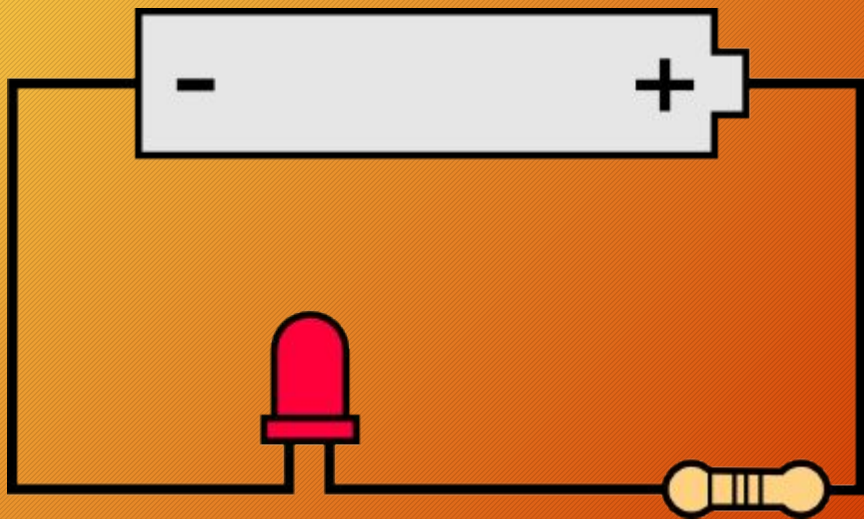
Let's get started!





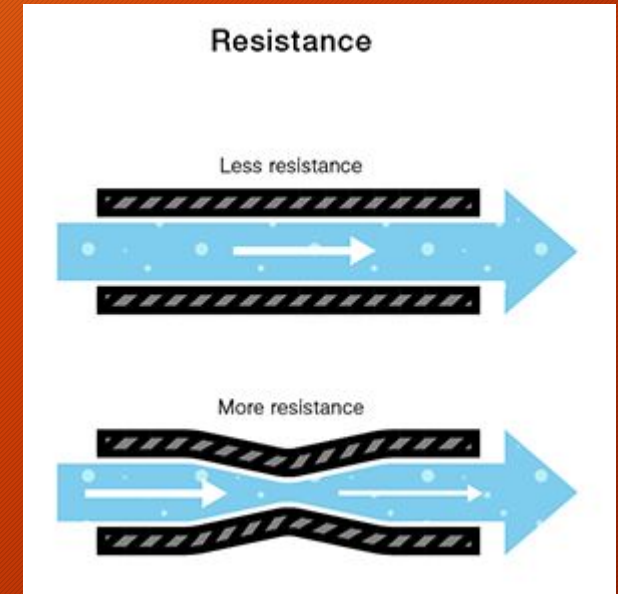
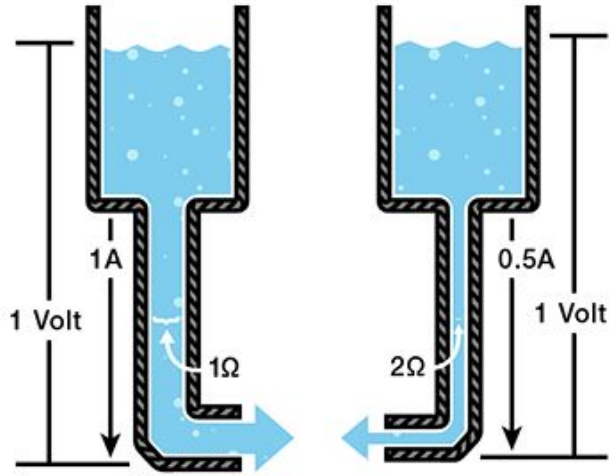
Our Prototype





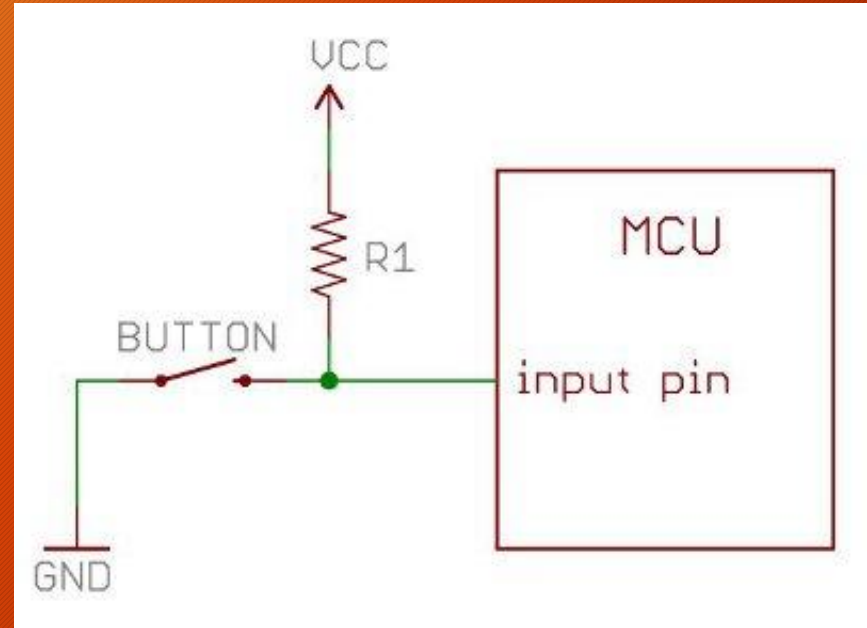
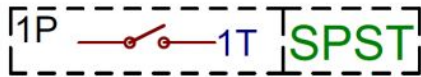
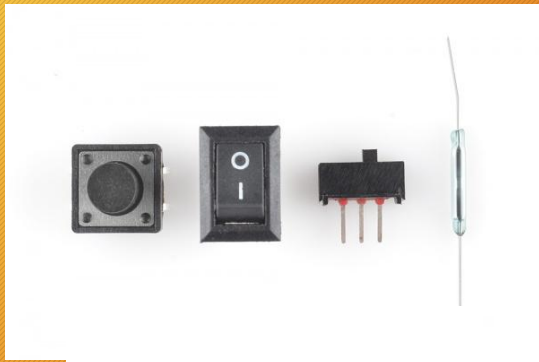
LED





Resistors





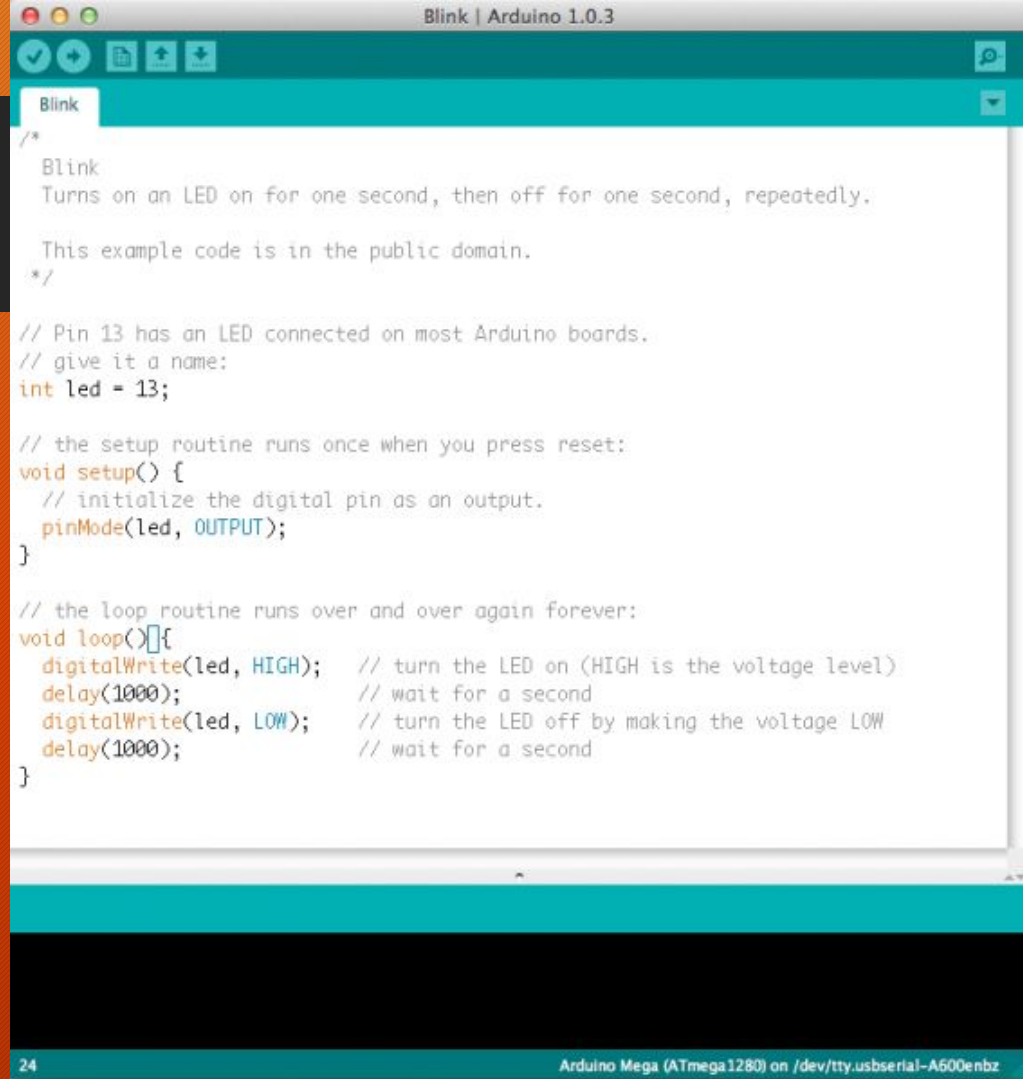
Buttons and Switches



IDE and Sketch

IDE = Integrated Development Environment

Sketch = The code.

A screenshot of the Arduino IDE interface. The title bar at the top reads "Blink | Arduino 1.0.3". Below the title bar is a toolbar with icons for file operations (checkmark, plus, document, up arrow, down arrow) and a search icon. The main text area contains the following code:

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

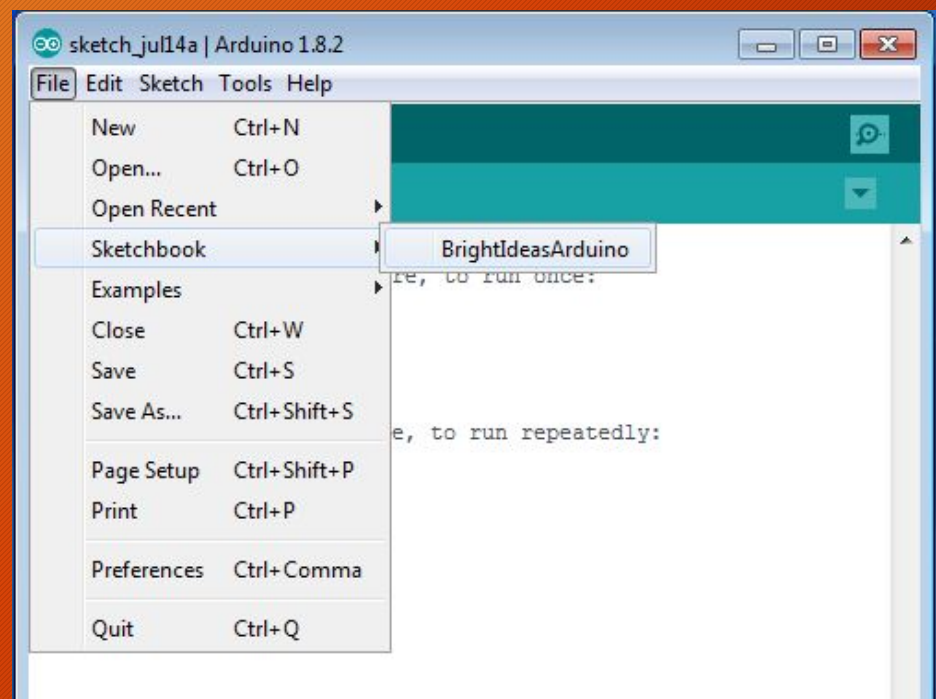
  This example code is in the public domain.
  */

// Pin 13 has an LED connected on most Arduino boards.
// 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 voltage level)
  delay(1000);             // wait for a second
  digitalWrite(led, LOW);  // turn the LED off by making the voltage LOW
  delay(1000);             // wait for a second
}
```

File
Sketchbook
BrightIdeasArduino



Open the
BrightIdeasArduino Sketch



- Int - whole number from -32,768 to 32,767
- Long - whole number from -2,147,483,648 to 2,147,483,647
- Char - Character code value (ASCII -127 to 127)
- Float - 6 or 7 digit decimal number
- Unsigned - can't be negative but holds a larger number
 - Int - 0 to 65,535
 - Long - 0 to 4,294,967,295
 - Char - 0 to 255
- Arrays - {} and [] - hold multiple values under one name

Variables



- **Keywords - OUTPUT, INPUT, LOW, HIGH**
- **pinMode() - Setup**
- **digitalRead() - Input**
- **digitalWrite() - Output**
- **analogWrite() - Output, only works on some pins**
- **analogRead() - Input, only works on some pins**
- **delay() - Timing**
- **millis() - Timing**

Functions



- == “is equal to” (true if values are equal, false otherwise)
- != “is not equal to” (true if values are different)
- > “is greater than” (true if left operand is greater than right operand)
- < “is less than” (true if left operand is less than right operand)
- >= “is greater than, or equal to” (true if left operand is greater than, or exactly equal to, right operand)
- <= “is less than, or equal to” (true if left operand is less than, or exactly equal to, right operand)

Comparing Values



- `if()``else` `for()` `while()`
- `&&` Logical “and”
- `||` Logical “or”
- `()` Logic grouping - `a && b || c` is different than `a && (b || c)`
- `{ }` Code grouping - functions, groups, conditions, scope.

Logic



Math

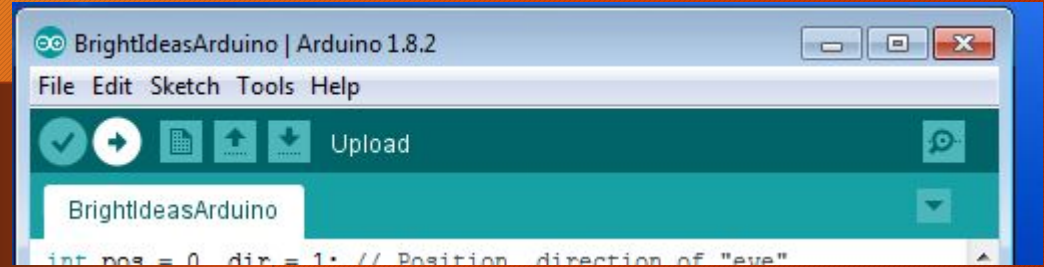
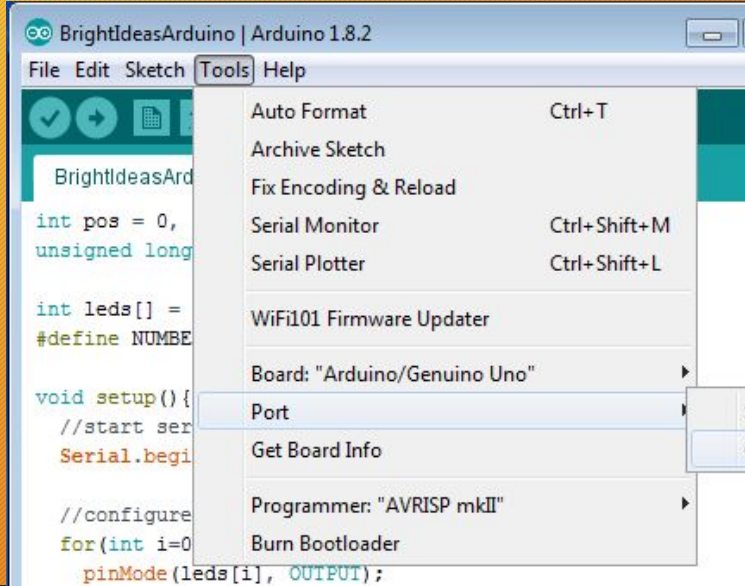
- $+$ $-$ $/$ $*$ - Addition Subtraction Division Multiplication
- Math does not change a variable's value by itself

Assignment

- $=$ (equal assignment) Overwrite a variable with a new value
- $+=$ (addition assignment) Add a value to a variable's existing value
- $-=$ (subtraction assignment) Subtract a value to a variable's existing value

Math and Changing Values





Board "Arduino/Genuino Uno"

Upload Sketch



Done uploading.

Sketch uses 2130 bytes (6%) of program storage space. Maximum is 32256 bytes.
Global variables use 202 bytes (9%) of dynamic memory, leaving 1846 bytes free.

5

Arduino/Genuino Uno on COM3

Problem uploading to board. See <http://www.arduino.cc/en/Guide/Troubleshooting>

Copy error messages

Problem uploading to board. See <http://www.arduino.cc/en/Guide/Troubleshooting>

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Arduino/Genuino Uno on COM3

Success or Failure?



What would you
like to make?



Next Steps



<http://arduino.cc/>

<http://learn.sparkfun.com/>

<https://learn.adafruit.com/>

Watch Arch Reactor's calendar and discussion group for the next Arduino class

<http://archreactor.org/>