

# An Introduction to the Arduino



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“Arduino” refers to an **open-source** electronics platform or **board** and the **software** used to program it.

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- A pre-assembled Arduino board includes a **microcontroller**
- Programmed using Arduino programming language (a simplified form of C/C++) and the Arduino IDE, available at <https://www.arduino.cc>
- Provides a way to build and program electronic circuits

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## “Empty Program”

This program will allow you to:

- See the basic functions of an Arduino program
- Learn how to configure the editor (IDE) for the Arduino
- Learn how to check the syntax of a program
- Learn how to upload the program into the Arduino

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“Empty”

```
void setup() {
```

```
}
```

```
void loop() {
```

```
}
```

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Program # 1: “Blink”

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## “Blink”

- This program 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 it is attached to digital pin 13.

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## Save as “Blink”

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

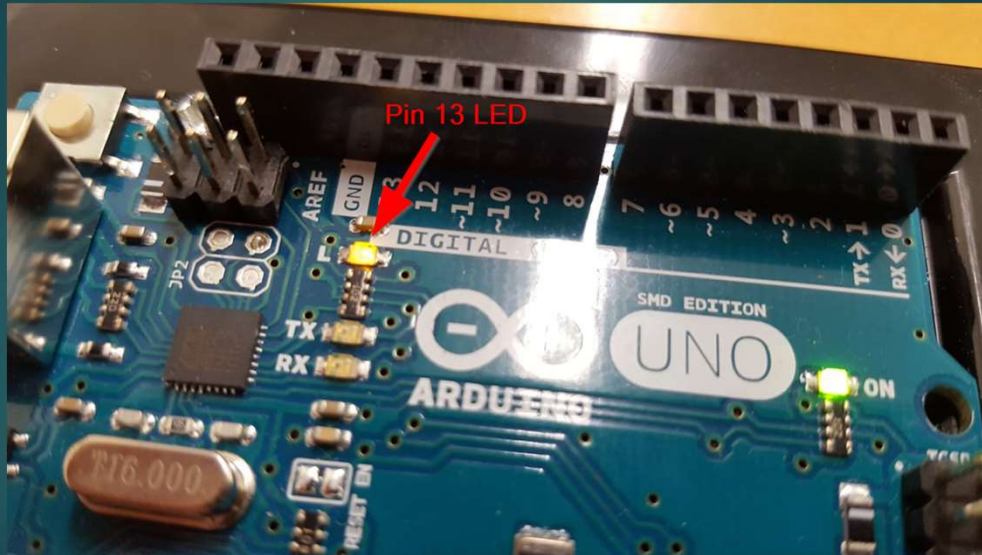
// the loop function runs over and over again
void loop()
{
  digitalWrite(13, HIGH); // turn the LED on
  delay(1000);           // wait for a second
  digitalWrite(13, LOW); // turn the LED off
  delay(1000);           // wait for a second
}
```

### Note!

The highlighted comments are not necessary for your program, but it's good programming practice for you to include lots of them to help document your program.

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Did it Work?!!



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Some Arduino Programming Basics

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# Variables

A variable is a place for storing a piece of data. It has a name, a type, and a value.

Example:

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

It's being used to indicate which Arduino pin the LED is connected to.

Every time the variable "ledPin" appears in the code, its value will be retrieved (i.e. the value 13).

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## Program #2: Blink with a Variable

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## Task:

Modify your Blink program by inserting the ledPin declaration (as shown in the previous slide) and substituting "13" with "ledPin" everywhere in your program.

The declaration line should go above the setup() function.

Don't forget to save your program!

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## Your code should look like this:

```
int ledPin = 13;

void setup() {
  pinMode(ledPin, OUTPUT);
}

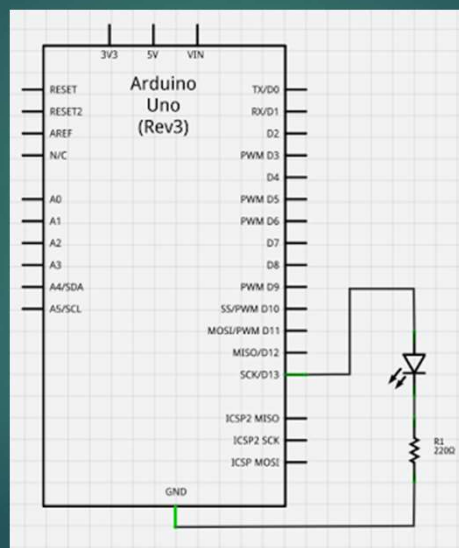
void loop() {
  digitalWrite(ledPin, HIGH);
  delay(1000);
  digitalWrite(ledPin, LOW);
  delay(1000);
}
```

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# Let's Hook Up an External LED!

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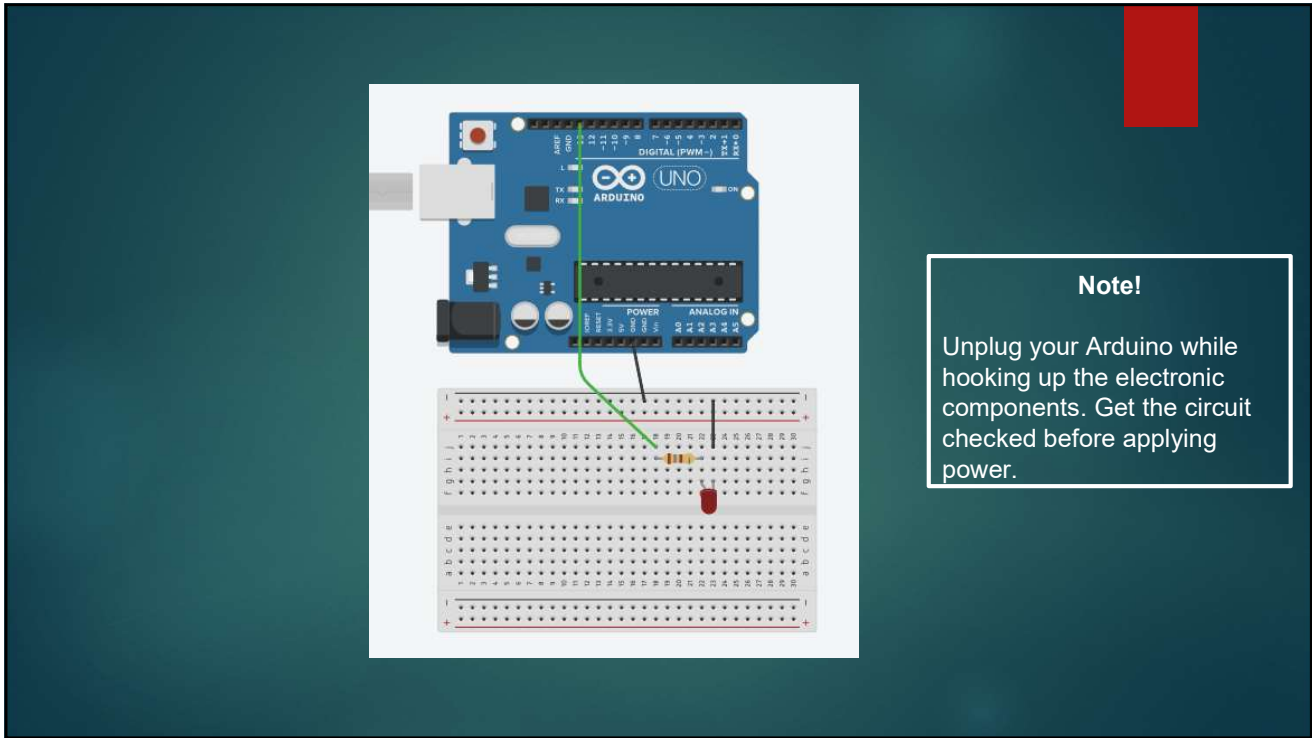
## Schematic



The resistor is needed to protect the LED. It limits the current to a safe amount and drops the voltage across the LED to about 2 volts.

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## Program #3: A Traffic Light

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## Let's Build a Traffic Light!

Save your Blink program as "TrafficLight".

Modify "ledPin" to be "redLED" throughout your program.

Add two variables "yellowLED" and "greenLED", using pins 12 and 11, respectively.

Modify your program and your circuitry to simulate a traffic light!

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Program #4, 5, and 6: 8 LEDs

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## 8 LED Circuit and Programs

First, wire up 8 LEDs. Remember that each LED requires its own resistor. For convenience, use pins 6-13. (Hint: use pin 6 for LED 1, 7 for LED 2, etc.)

Program 4: Simply flash all 8 LEDs on and off.

Program 5: Light the LEDs in sequence.

Program 8: Create a binary counter, with each LED representing one bit in a byte.