

# *Unleash Your Inner Inventor*

*Using the Arduino Microcontroller  
For More Than You Would Expect*

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<http://cs.uccs.edu/~kjustice/arduino>



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# What is an Arduino?

A tiny, easily programmable computer to process inputs and outputs

Used to build objects that interact with other objects, people, and networks

14 Digital Input/Output Pins



6 Analog Input (sensors) Pins



Power and Ground

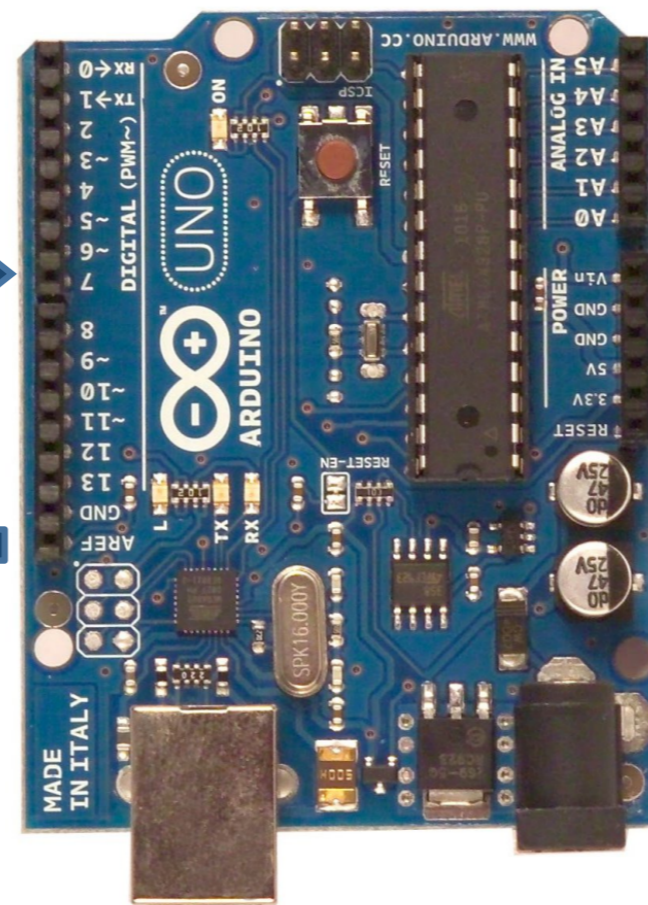


Lights

Motors & Servos

Sound

Devices



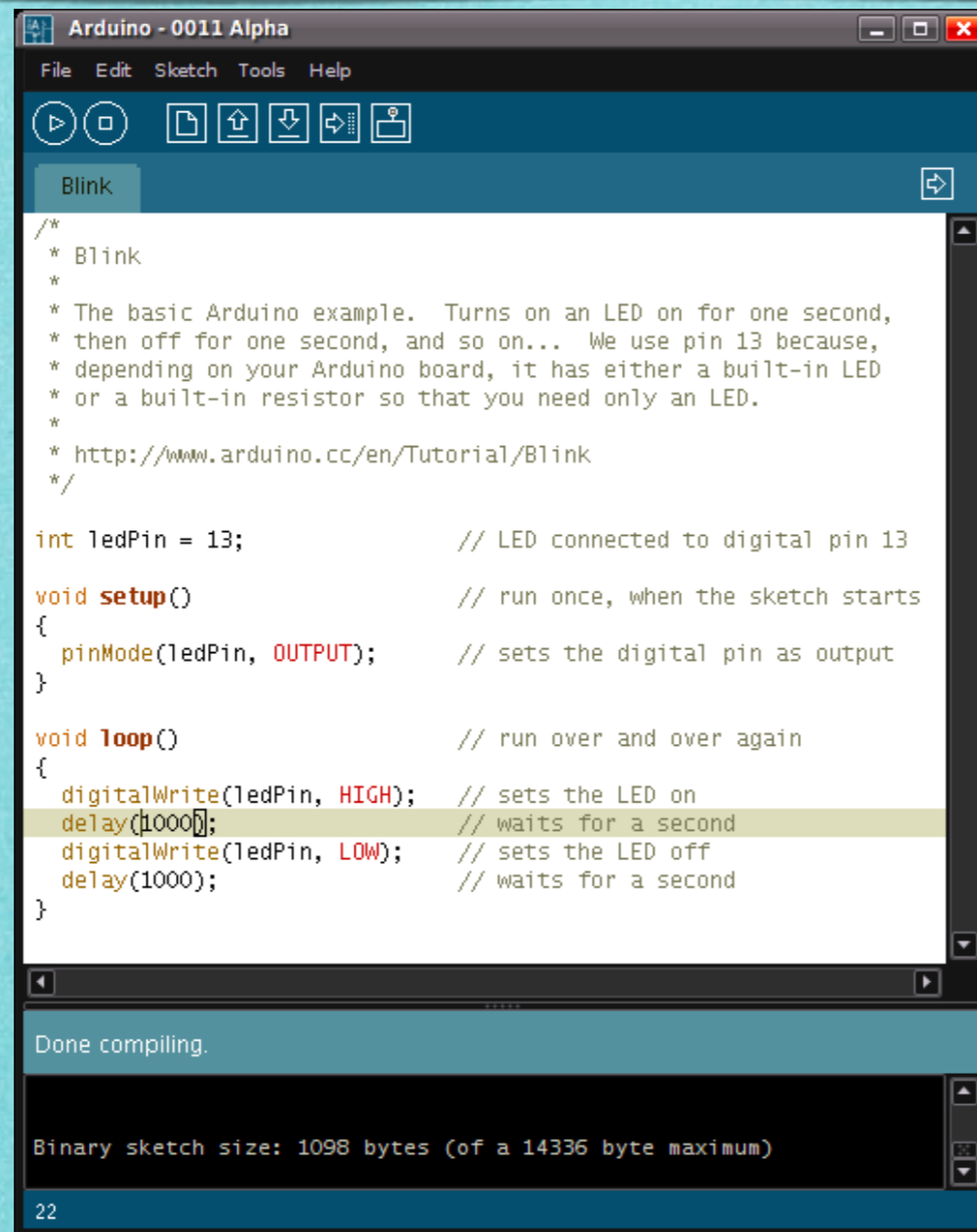
<http://arduino.cc/en/Main/ArduinoBoardUno>



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# How is an Arduino Programmed?



The screenshot shows the Arduino IDE interface. At the top is a menu bar with 'File', 'Edit', 'Sketch', 'Tools', and 'Help'. Below the menu bar is a toolbar with icons for running, stopping, saving, opening, and other functions. The main area is the sketch window, which contains the following code:

```
/*
 * Blink
 *
 * The basic Arduino example. Turns on an LED on for one second,
 * then off for one second, and so on... We use pin 13 because,
 * depending on your Arduino board, it has either a built-in LED
 * or a built-in resistor so that you need only an LED.
 *
 * http://www.arduino.cc/en/Tutorial/Blink
 */

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

void setup()               // run once, when the sketch starts
{
  pinMode(ledPin, OUTPUT); // sets the digital pin as output
}

void loop()                // run over and over again
{
  digitalWrite(ledPin, HIGH); // sets the LED on
  delay(1000);                // waits for a second
  digitalWrite(ledPin, LOW);  // sets the LED off
  delay(1000);                // waits for a second
}
```

At the bottom of the IDE is a message window that displays the following text:

```
Done compiling.

Binary sketch size: 1098 bytes (of a 14336 byte maximum)

22
```

← **Toolbar**

← **Sketch Window**

← **Message Window**



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<http://arduino.cc/en/Guide/HomePage>



# What are Arduinos Used For?

- ▶ Arduino powered furniture
- ▶ Mood lamps
- ▶ Dancing lights
- ▶ Reading robots
- ▶ Music from movement
- ▶ Laser harp
- ▶ Many more!



# Lights to Music



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[http://www.youtube.com/watch?  
feature=player\\_embedded&v=3cAMF8Ay1T4](http://www.youtube.com/watch?feature=player_embedded&v=3cAMF8Ay1T4)



# Laser Harp



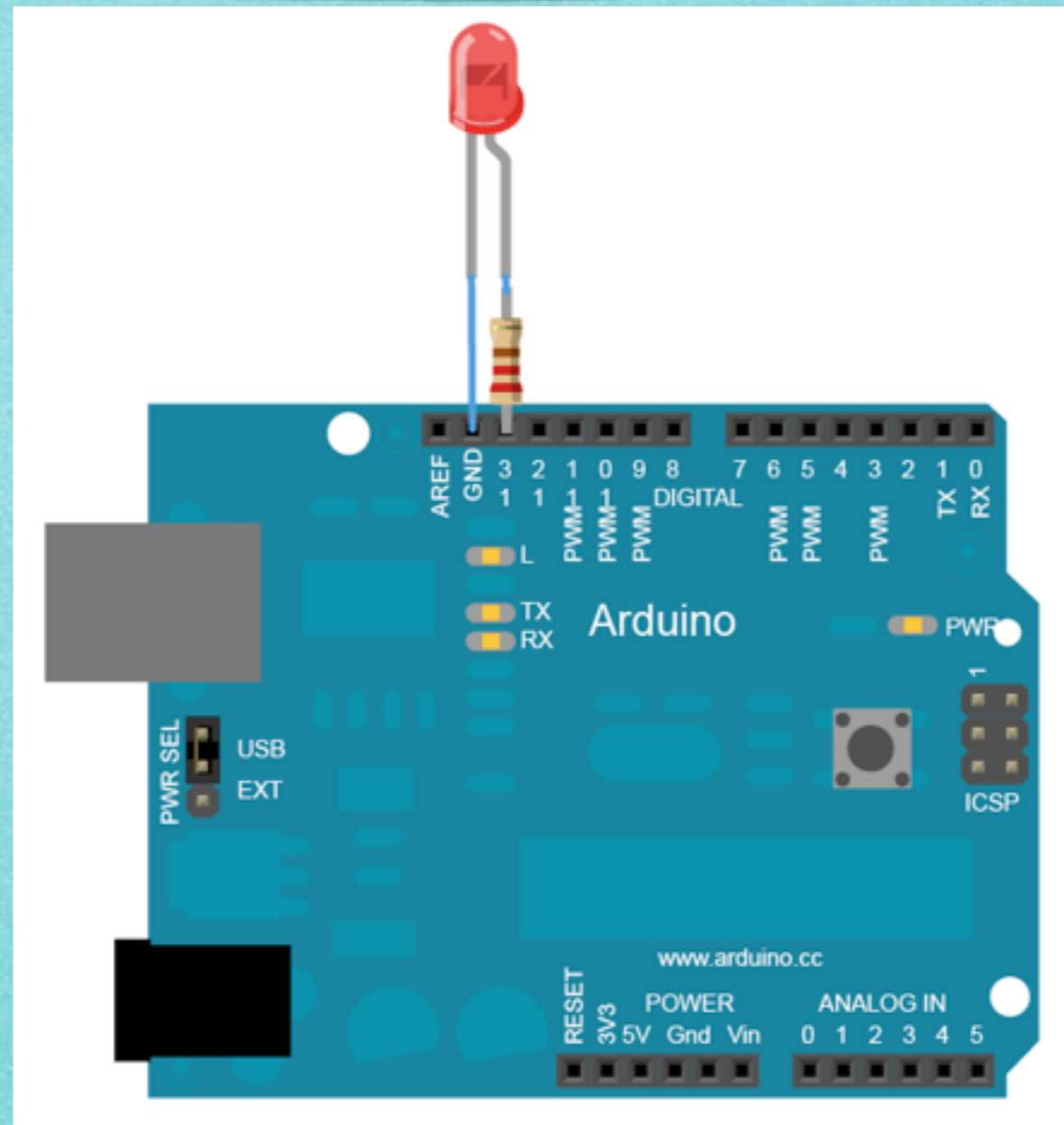
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[http://www.youtube.com/watch?  
feature=player\\_embedded&v=sLVXmsbVwUs#!](http://www.youtube.com/watch?feature=player_embedded&v=sLVXmsbVwUs#!)



# Flashing Light

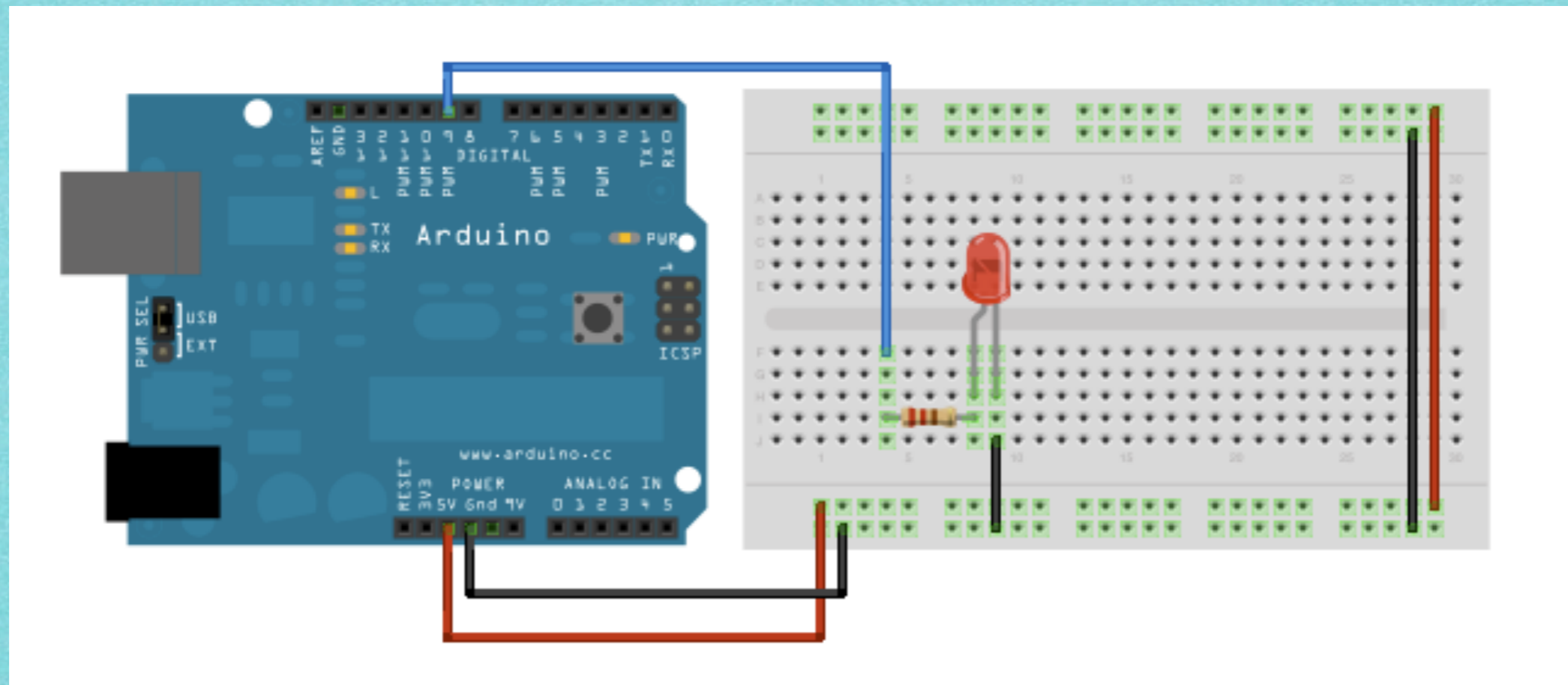
Hardware Setup-  
Testing



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# Flashing Light



## Hardware Setup



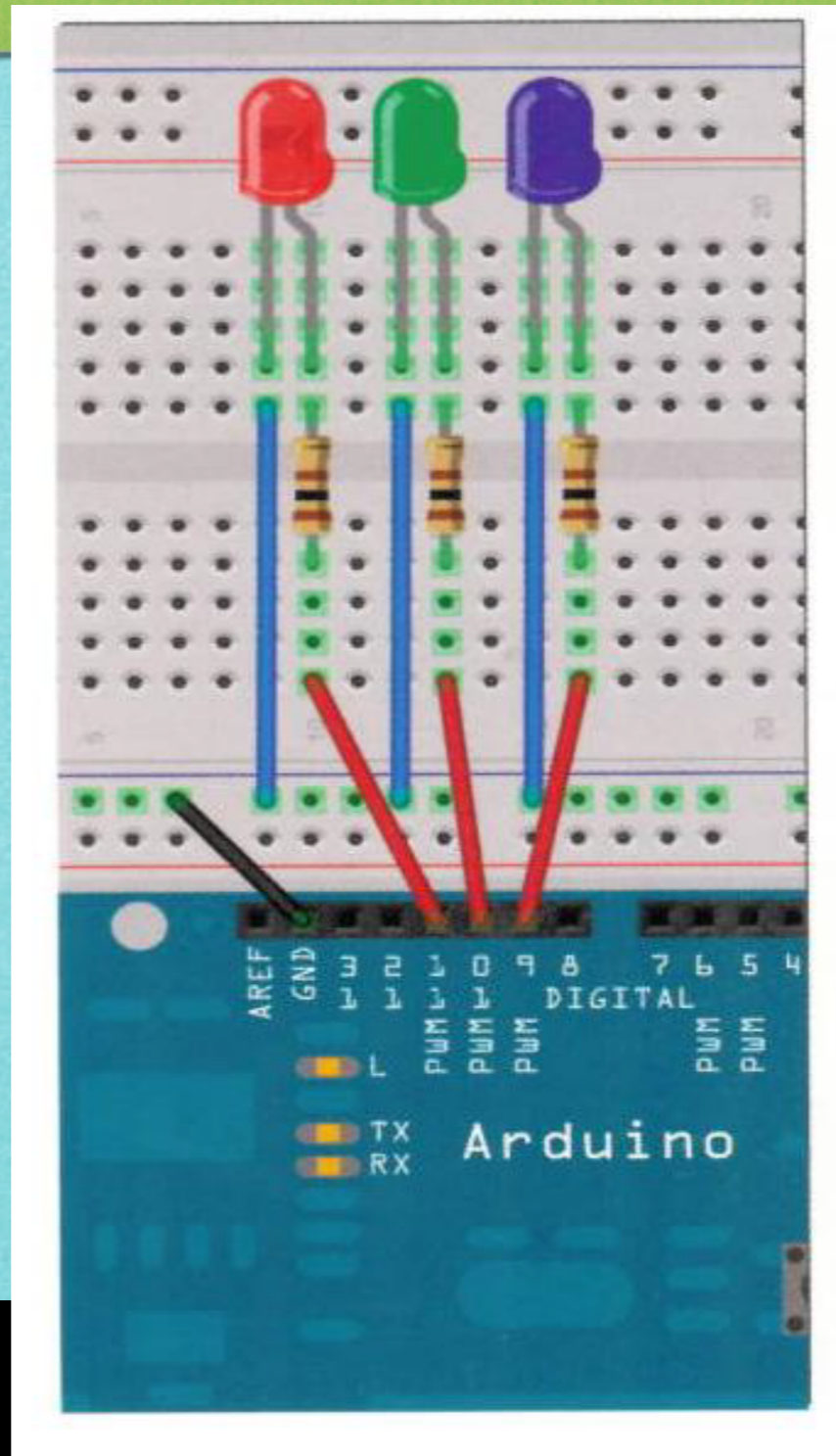
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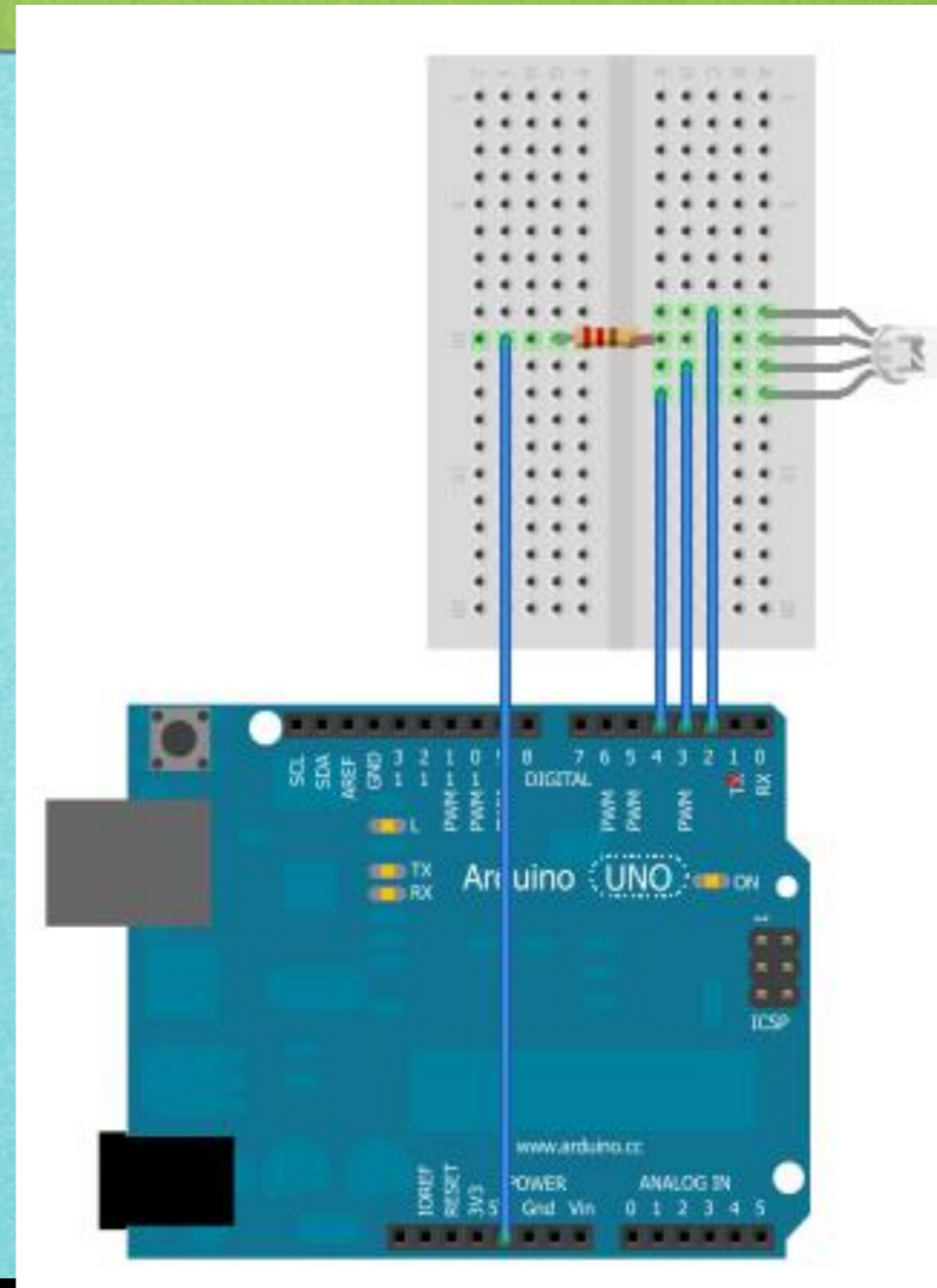
# Mood Light

## Hardware Setup



# Mood Lamp

- ▶ Hook up a 5 volt supply from the Arduino.
- ▶ Add a resistor to Pin 2 of the LED (220 Ohms)
- ▶ Add three wires from PWM pins 2,3,and 4 from the Arduino. Then use the code to randomly generate colors on the LED.



# Arduino Resources

- ▶ Getting Started with Arduino – Massimo Banzi
- ▶ Fritzing Alpha - <http://fritzing.org/>
- ▶ Practical Arduino – Jonathan Oxer and Hugh Blemings
- ▶ Arduino Home Page - <http://www.arduino.cc/>
- ▶ Adafruit Industries - <http://www.ladyada.net/learn/arduino/>
- ▶ Instructables - <http://www.instructables.com/id/Arduino/>

