# LED Sushi

The basic Arduino program to start you off with the LED Dojo Sushi challenges is provided: blink.

“Blink” is a super simple program which flashes the small LED on your Arduino UNO board on and off once per second.

## Challenge #0 – Getting Started

* Get the Arduino IDE installed on your computer
* Build the “Blink” sketch
* Download it to the Arduino and check that the LED beside pin 13 blinks of and off once per second

When you have this working, your environment is up and running and you are ready for the rest of the LED Sushi challenges.

## Challenge #1 – Blinking slower

* Make a copy of the “Blink” sketch
* Change it so that it blinks the LED off and on once per 3 seconds, and not once per second

## Challenge #2 – Blinking faster

* Make a copy of the “Blink” sketch
* Change it so that it blinks the LED off and on 5 times per second
* Find out how fast you have to switch the LED off and on per second before you can no longer tell that the LED is blinking at all, and it just looks like it’s on all the time.

## Challenge #3 – Move your LED to a breadboard

* Make a copy of the “Blink” sketch
* Get a breadboard, a LED and some jumper wires from the Arduino supplies
* Build a LED circuit on the breadboard and make it flash on and off with the Blink sketch
* Change the circuit so that the LED is connected to PIN 12 instead of PIN 13
* Now change the code for your sketch so that the LED flashes on and off when connected to PIN 12.

## Challenge #4 – Flashing 3 LEDs at the same time

* On your breadboard, build a circuit with 3 LEDs and connect this up to three different outputs on the Arduino
* Make a copy of the Blink sketch
* Change the sketch so that all three LEDs flash on and off at the same time

## Challenge #5 – Flashing 3 LEDs in sequence

* On your breadboard, build a circuit with 3 LEDs and connect this up to three different outputs on the Arduino (If you have done Challenge #4 already, this is the same circuit)
* Make a copy of the Blink sketch
* Let’s call our three LEDs: LED1, LED2, and LED3
* Change your sketch so that the LEDs flash like this:  
  LED1 LED2 LED3 LED1 LED2 LED2 LED3 …

## Challenge #6 – Sweeping the LEDs back and forth

* On your breadboard, build a circuit with 4 LEDs and connect this up to four different outputs on the Arduino.
* Make a copy of the Blink sketch
* Let’s call our four LEDs: LED1 LED2 LED3 LED4
* Change your sketch so that the LEDs flash like this:  
  LED1 LED2 LED3 LED4 LED3 LED2 LED1 LED2 LED3 LED4

## Challenge #7 – S.O.S

* On your breadboard, build a circuit with a single LED (or you can use a circuit with >1 LED and just control one of them)
* Make a copy of the Blink sketch
* The international distress call in Morse code is SOS. In Morse code, this is three short flashes, three long flashes, and three short flashes, repeated forever
* Change your sketch so that it flashes the Morse code SOS signal

# Challenge #8 – Your Name in Morse Code

* On your breadboard, build a circuit with a single LED (or you can use a circuit with >1 LED and just control one of them)
* Make a copy of the Blink sketch
* Change your sketch so that it flashes out your first name in Morse code. You can look up the Morse code for your name on the Internet.

## Challenge #9 – Morse Code

* On your breadboard, build a circuit with a single LED (or you can use a circuit with >1 LED and just control one of them)
* Make a copy of the Blink sketch
* Make a sketch which can send a message in Morse code. The message can be a fixed string which is built into your sketch. The sketch should know the complete Morse code “alphabet”, which you can look up on the Internet.

## Challenge #10 – RGB

* On your breadboard, build a circuit with one Red, one Green and one Blue LED, close together
* Make a copy of the Blink sketch
* Change the sketch so that it uses PWM to control the level of the Red, Green and Blue LED.
* See if you put a piece of paper over the LEDs can you set the colour you see to Yellow.
* Can you set the colour to Purple?

## Challenge #11 – RGB LED Strip

* On your breadboard, build a circuit which uses transistors to control an RBG LED strip. You will need to get a mentor to get the right parts for you, and show you the idea of the circuit.
* Make a copy of the Blink sketch
* Change the sketch so that it continually changes the colour of the RGB LED strip, gradually changing through all the colours on the colour wheel. You will need to use PWM (Pulse Width Modulation) for this challenge: you can look up PWM for Arduino. Ask the other Arduino ninjas for help with PWM if you can’t find it – and if they don’t know, then come and find a mentor.

If you can complete these Challenges, then you have mastered controlling LEDs with your Arduino. Congratulations!