Introduction to Arduino

KU1202 Pengantar Rekayasa dan Desain

K-20

Sekolah Teknik Elektro dan Informatika
Institut Teknologi Bandung

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Overview

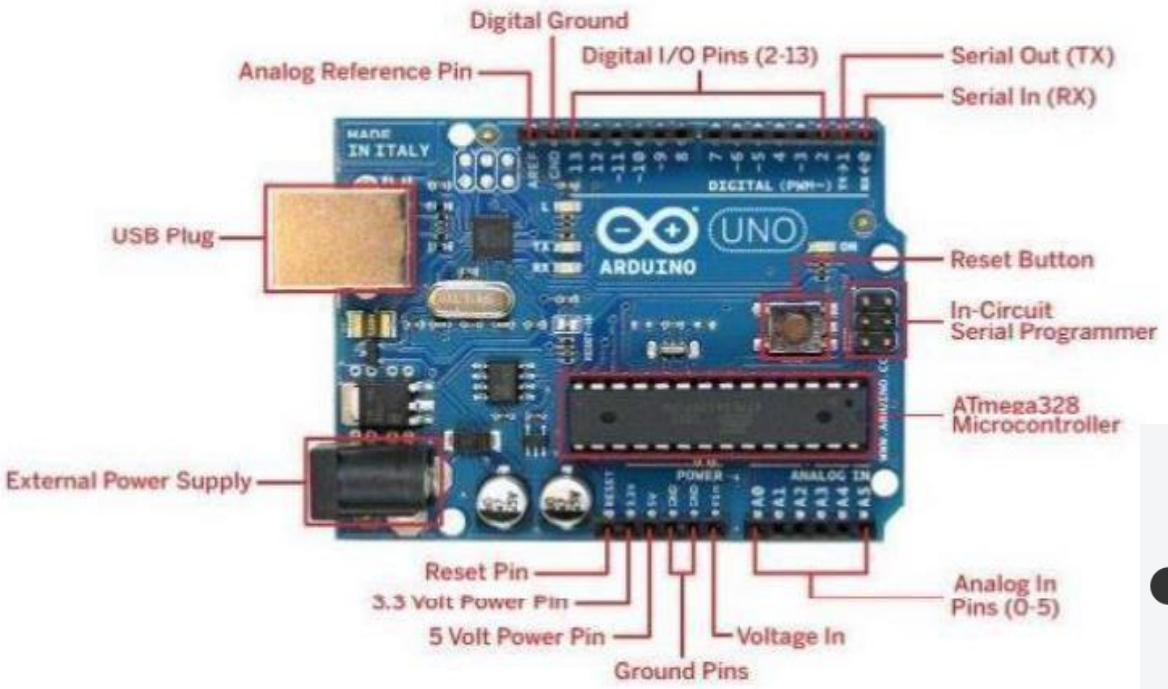
- Arduino
- LED
- RGB LED

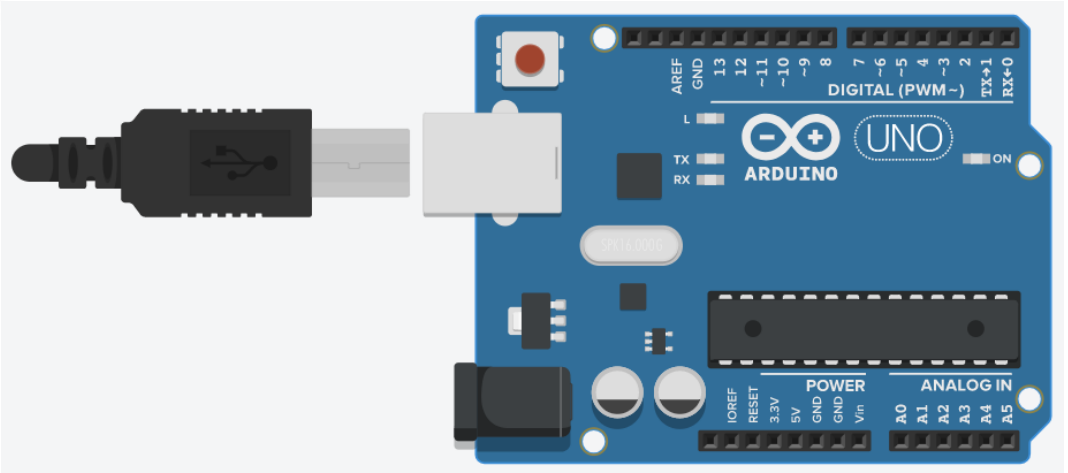
Introduction

Arduino

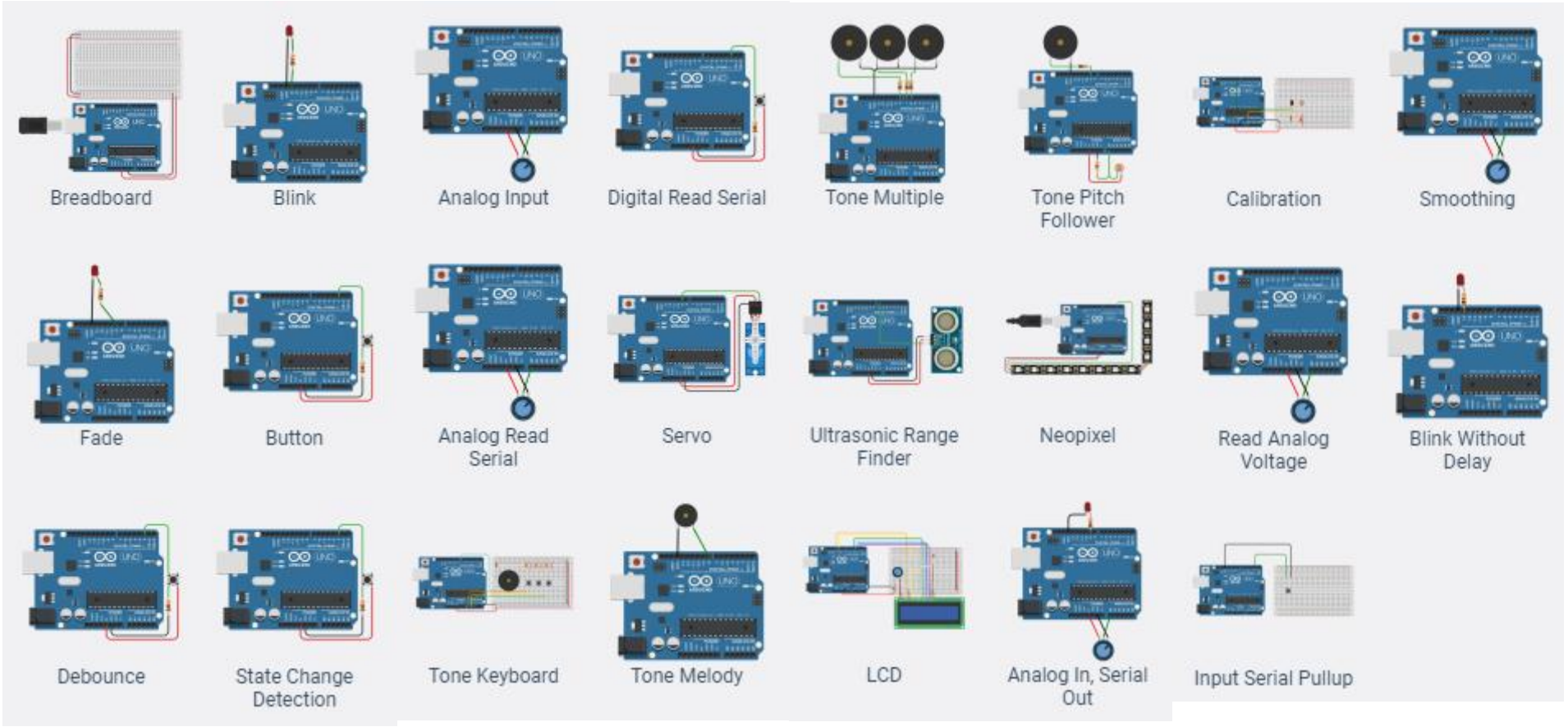
- Open-source
- Berbasis C++
- Arduino IDE
- Arduino in Tinkercad
- Referensi: https://www.arduino.cc/reference/en/

Arduino Uno R3

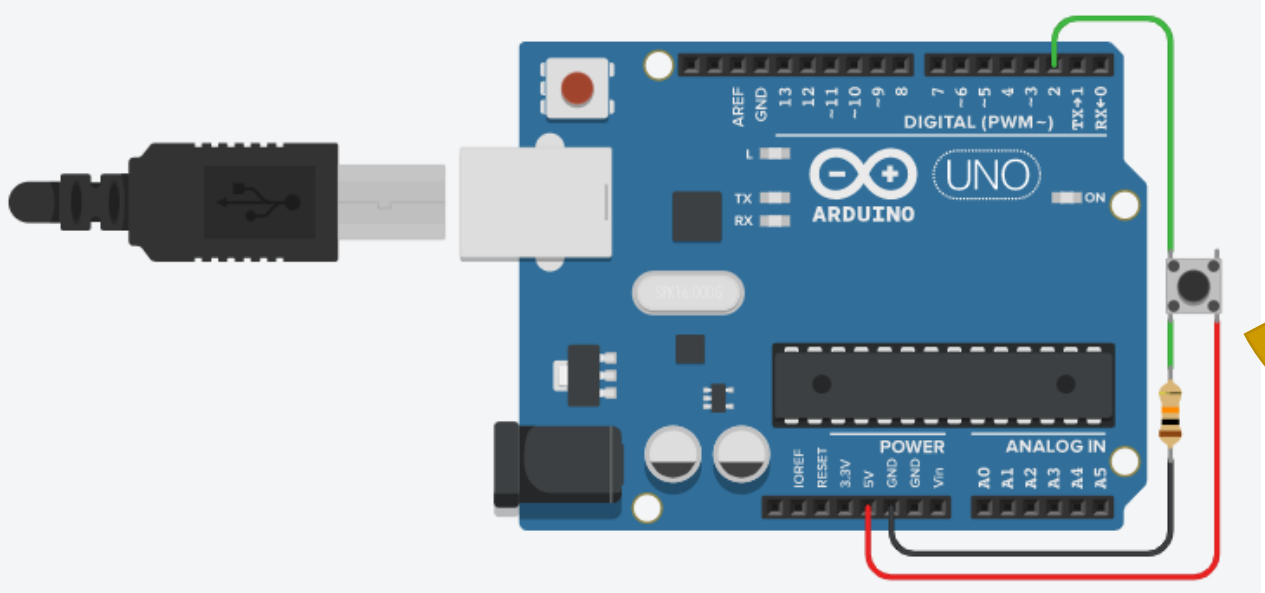


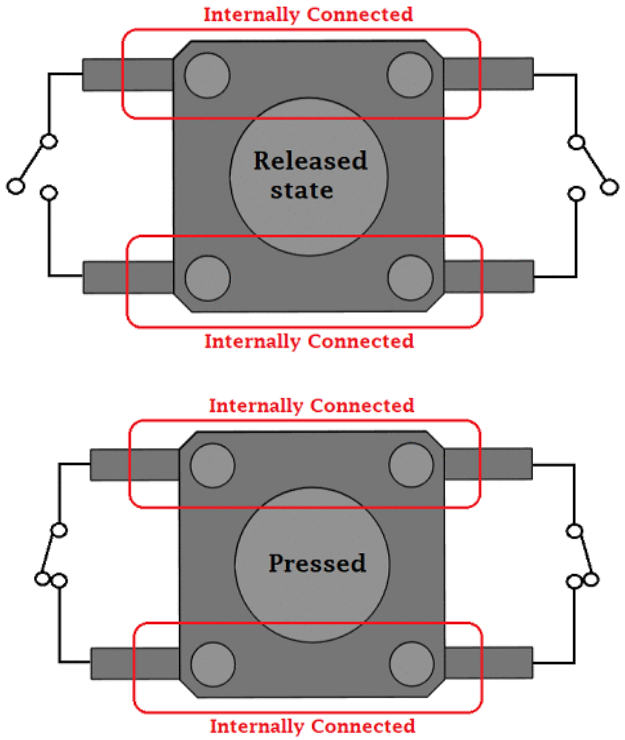


Arduino Circuits



Example: Button





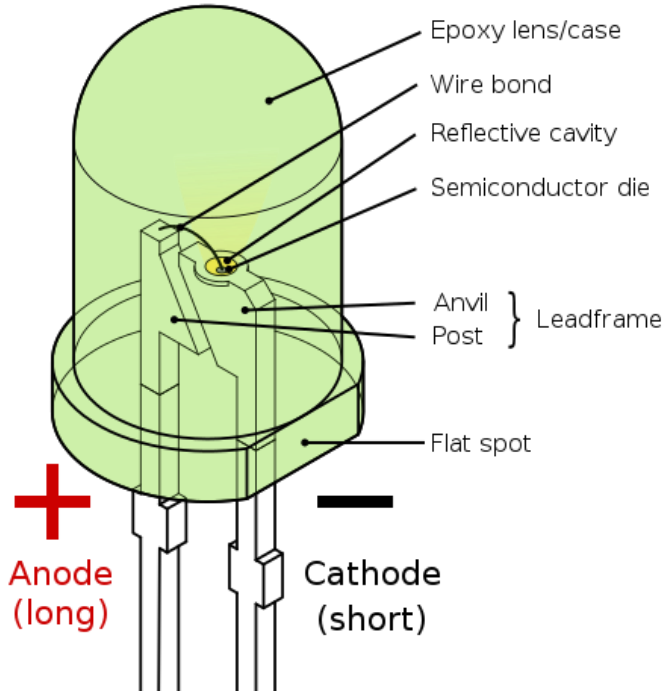
https://components101.com/switches/push-button

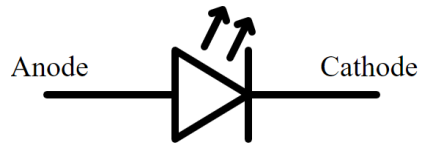
Name	Quantity	Component
U1	1	Arduino Uno R3
R1	1	10 kΩ Resistor
S1	1	Pushbutton

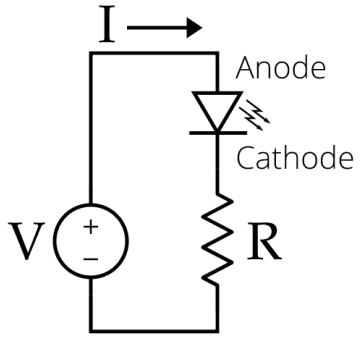
LED

Light Emitting Diode

LED







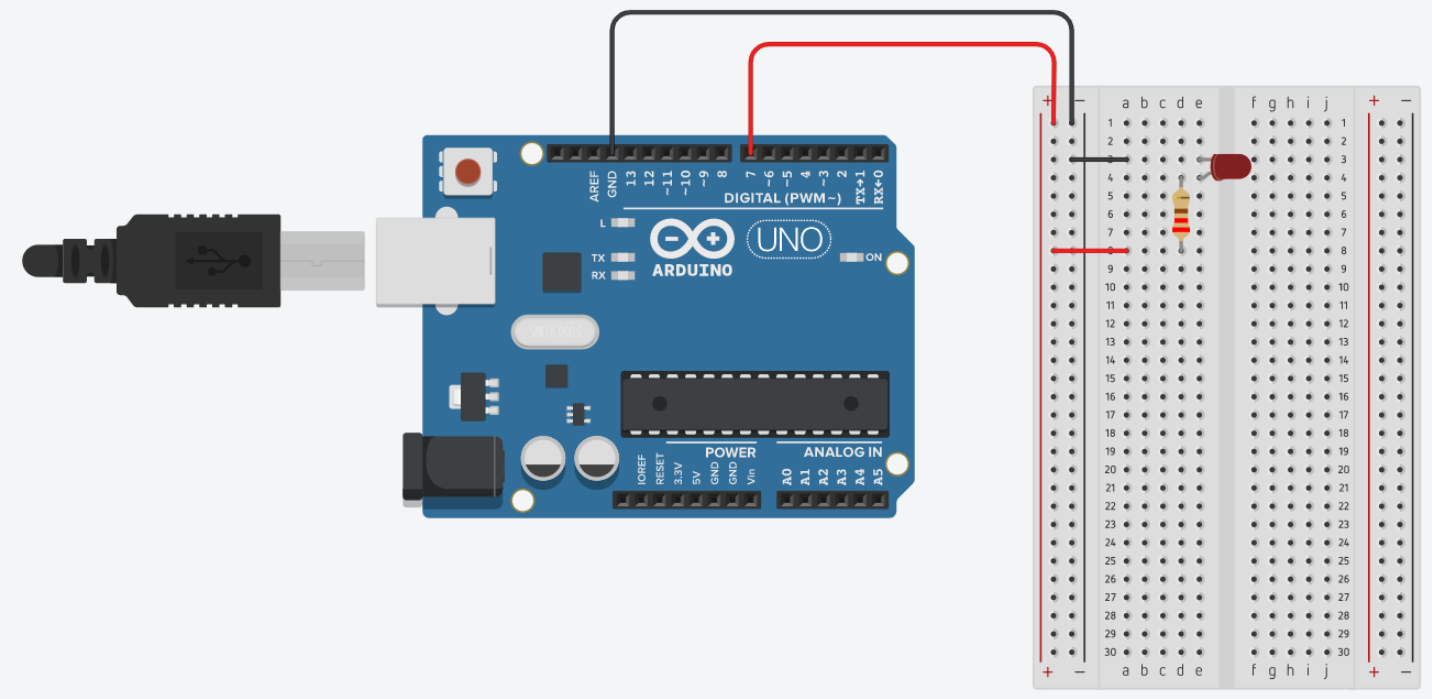
Sumber: https://en.wikipedia.org/wiki/Light-emitting_diode

Exercise #1

LED

Format Nama Desain: 10_NIM_01, contoh: 10_16520999_01

Circuit Design

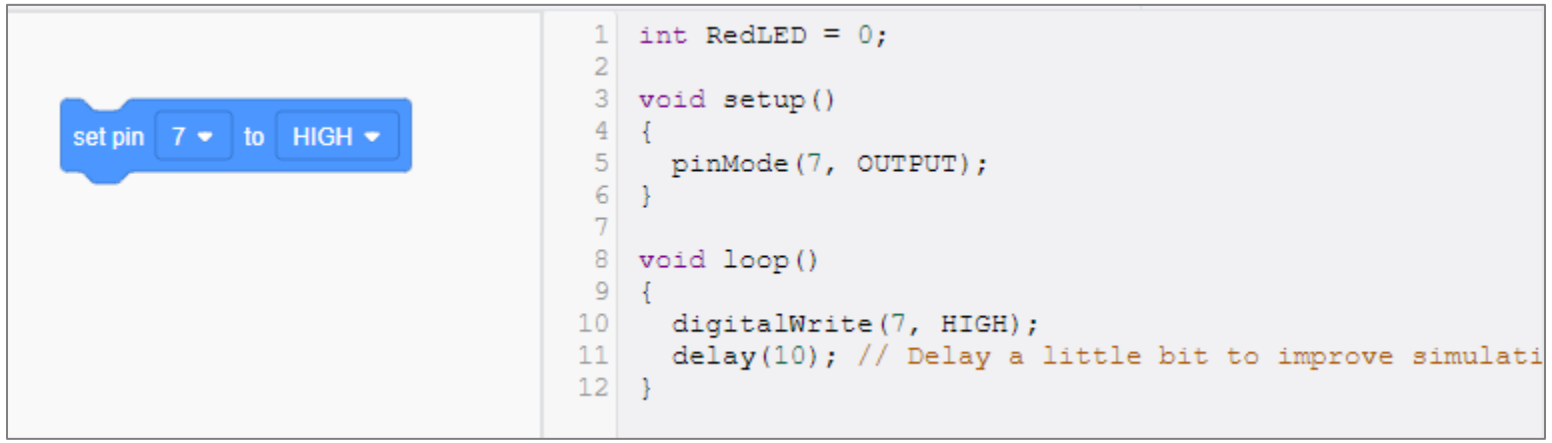


Name	Quantity	Component
U1	1	Arduino Uno R3
D2	1	LED
R1	1	220 Ω Resistor

LED

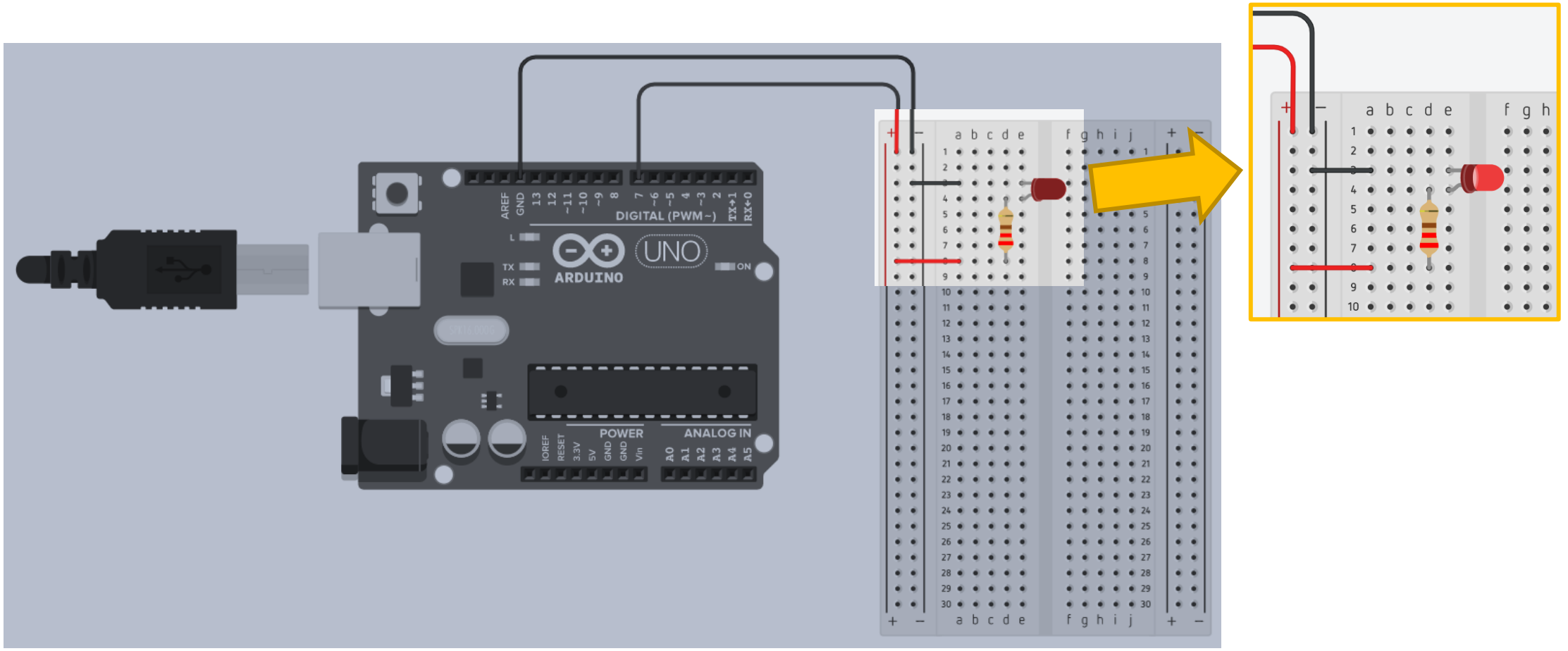
Wiring LED

Code



Format Nama File Kode: 10_NIM_01a.ino, contoh: 10_16520999_01a.ino

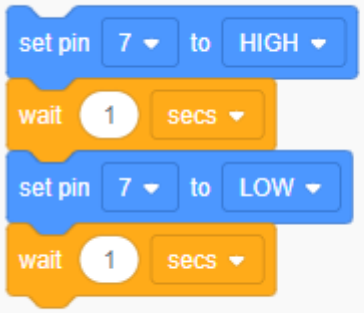
Simulation



LED

Turn LED ON/OFF

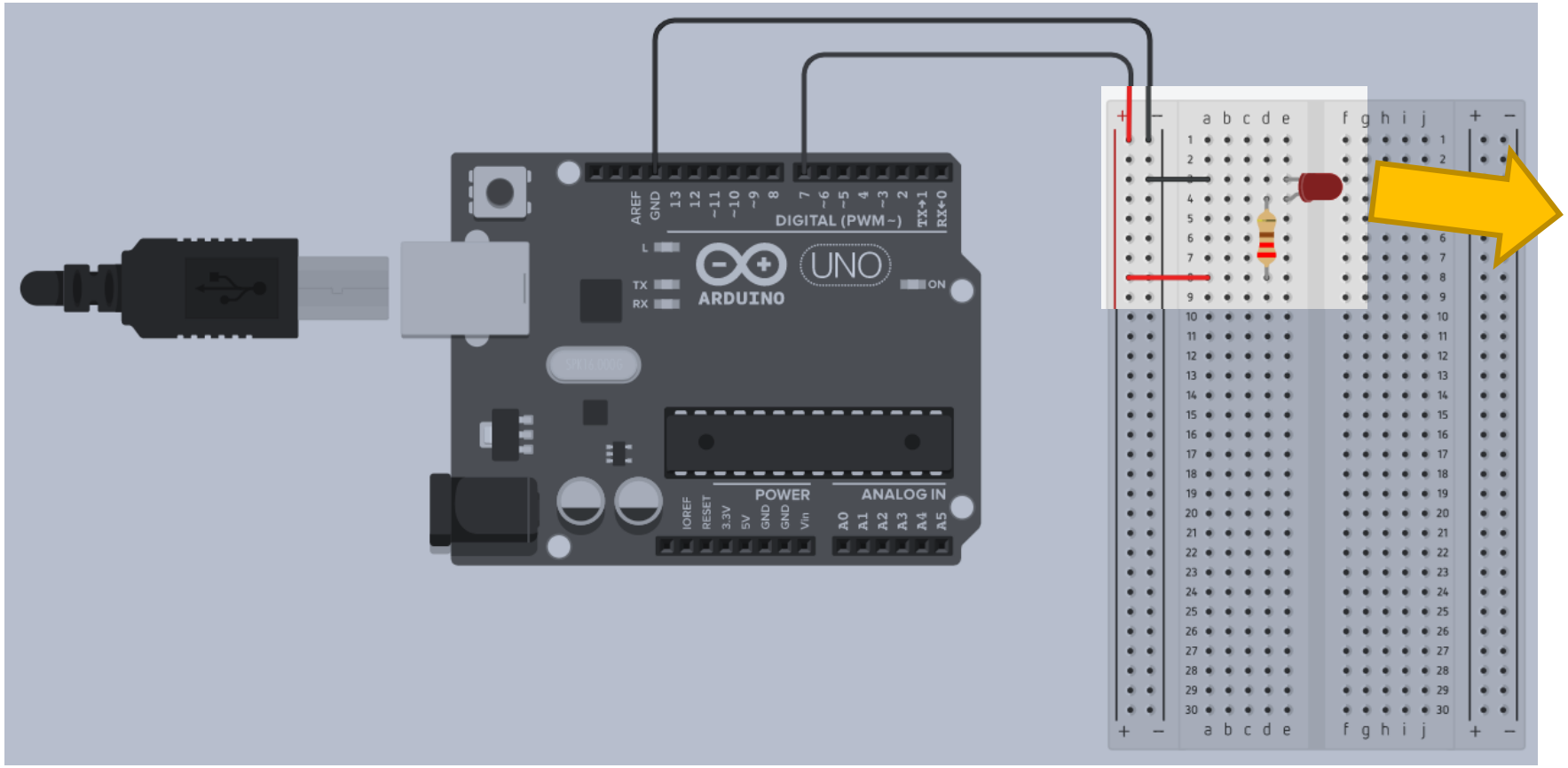
Code



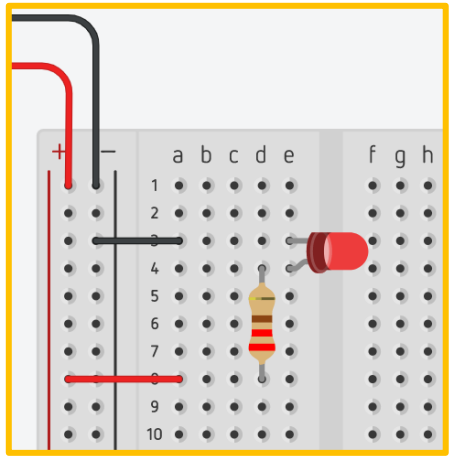

```
1  void setup()
2  {
3    pinMode(7, OUTPUT);
4  }
5
6  void loop()
7  {
8    digitalWrite(7, HIGH);
9    delay(1000); // Wait for 1000 millisecond(s)
10   digitalWrite(7, LOW);
11   delay(1000); // Wait for 1000 millisecond(s)
12 }
```

Format Nama File Kode: 10_NIM_01b.ino, contoh: 10_16520999_01b.ino

Simulation



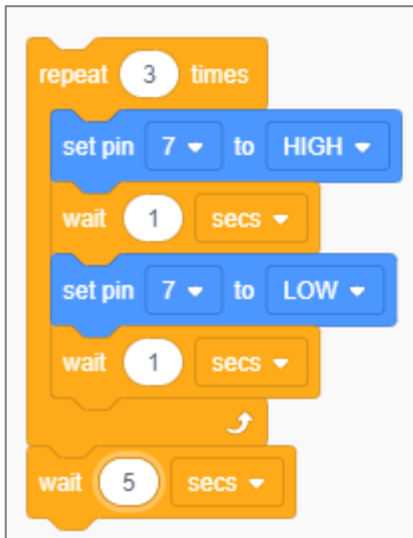
Blink (on-off-on-off)



LED

Control the ON/OFF Number of LED

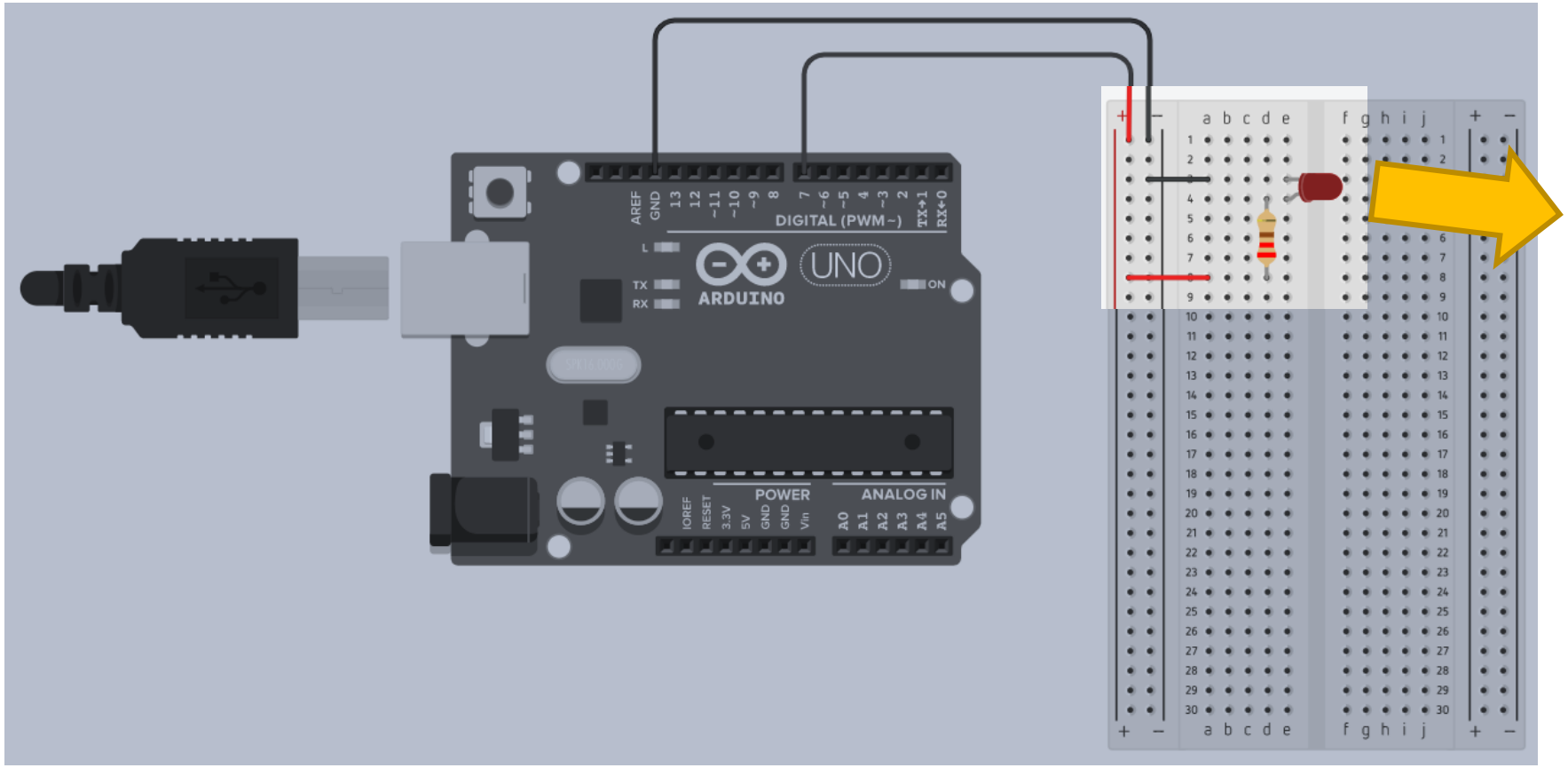
Code



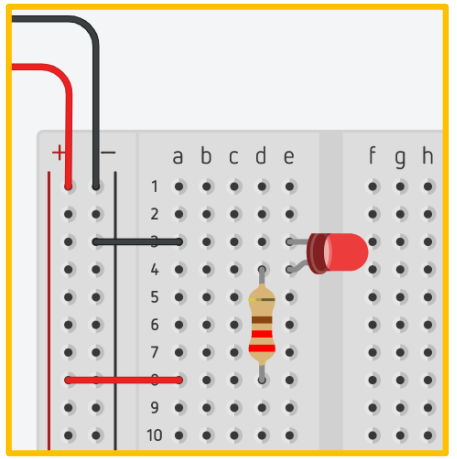

```
1  int counter;
2
3  void setup()
4  {
5    pinMode(7, OUTPUT);
6  }
7
8  void loop()
9  {
10   for (counter = 0; counter < 3; ++counter) {
11     digitalWrite(7, HIGH);
12     delay(1000); // Wait for 1000 millisecond(s)
13     digitalWrite(7, LOW);
14     delay(1000); // Wait for 1000 millisecond(s)
15   }
16   delay(5000); // Wait for 5000 millisecond(s)
17 }
```

Format Nama File Kode: 10_NIM_01c.ino, contoh: 10_16520999_01c.ino

Simulation



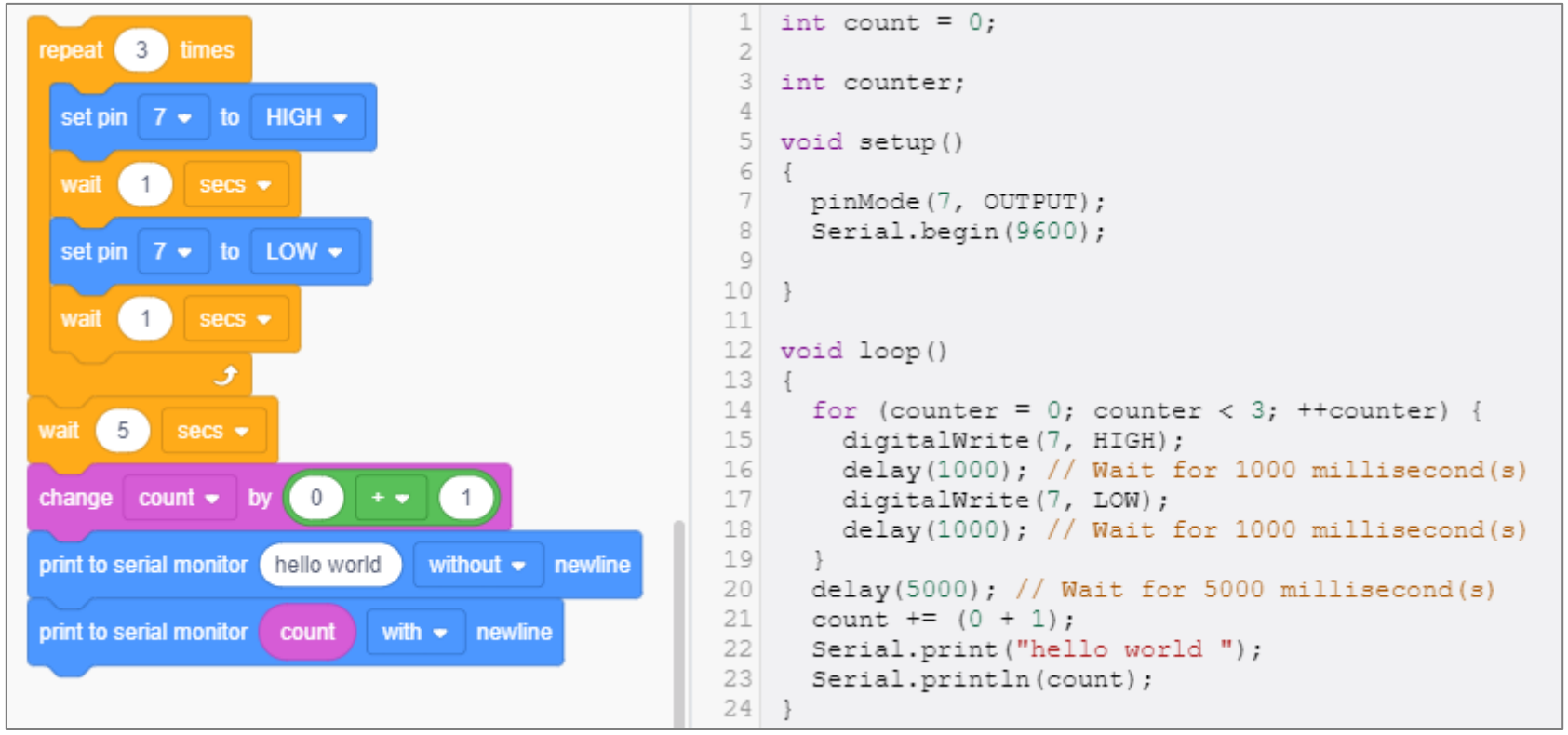
Blink 3x
(on-off-on-off)



LED

Adding Text Output

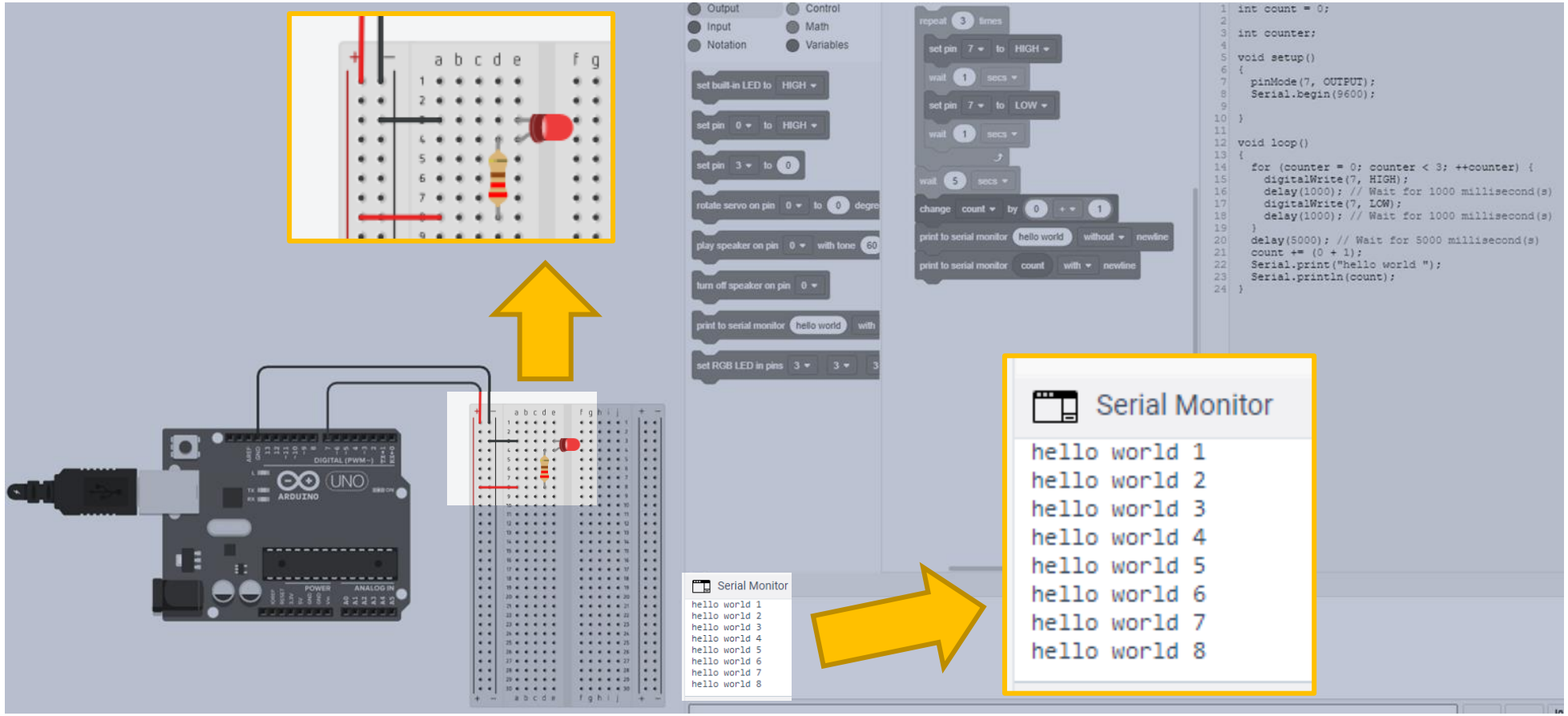
Code




```
1  int count = 0;
2
3  int counter;
4
5  void setup()
6  {
7    pinMode(7, OUTPUT);
8    Serial.begin(9600);
9
10 }
11
12 void loop()
13 {
14   for (counter = 0; counter < 3; ++counter) {
15     digitalWrite(7, HIGH);
16     delay(1000); // Wait for 1000 millisecond(s)
17     digitalWrite(7, LOW);
18     delay(1000); // Wait for 1000 millisecond(s)
19   }
20   delay(5000); // Wait for 5000 millisecond(s)
21   count += (0 + 1);
22   Serial.print("hello world ");
23   Serial.println(count);
24 }
```

Format Nama File Kode: 10_NIM_01d.ino, contoh: 10_16520999_01d.ino

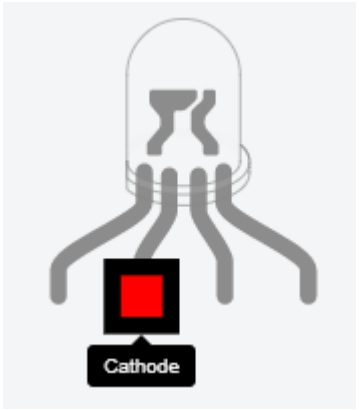
Simulation


Output
Input
Notation
Control
Math
Variables
set built-in LED to HIGH
set pin 0 to HIGH
set pin 3 to 0
rotate servo on pin 0 to 0 degre
play speaker on pin 0 with tone 60
turn off speaker on pin 0
print to serial monitor hello world with
set RGB LED in pins 3 3
repeat 3 times
set pin 7 to HIGH
wait 1 secs
set pin 7 to LOW
wait 1 secs
wait 5 secs
change count by 0 + 1
print to serial monitor hello world without newline
print to serial monitor count with newline
int count = 0;
int counter;
void setup()
{
pinMode(7, OUTPUT);
Serial.begin(9600);
}
void loop()
{
for (counter = 0; counter < 3; ++counter) {
digitalWrite(7, HIGH);
delay(1000); // Wait for 1000 millisecond(s)
digitalWrite(7, LOW);
delay(1000); // Wait for 1000 millisecond(s)
}
delay(5000); // Wait for 5000 millisecond(s)
count += (0 + 1);
Serial.print("hello world ");
Serial.println(count);
}
Serial Monitor
hello world 1
hello world 2
hello world 3
hello world 4
hello world 5
hello world 6
hello world 7
hello world 8

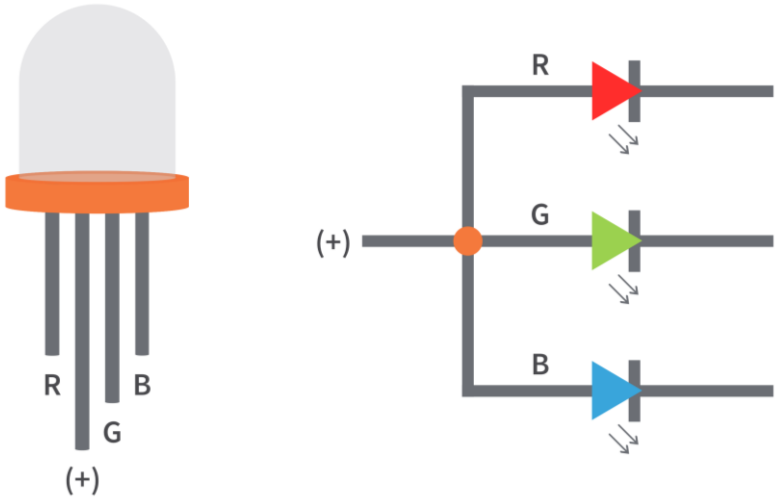
RGB LED

RGB LED

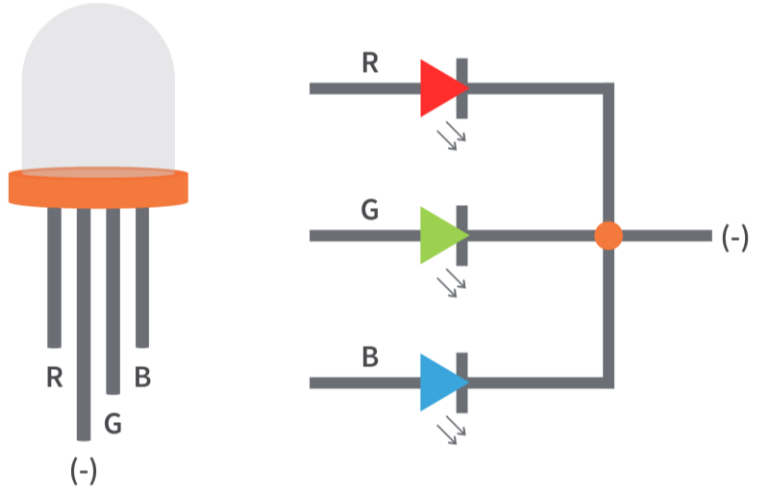
Sumber: https://en.wikipedia.org/



Sumber: https://www.tinkercad.com/



Common Anode



Common Cathode

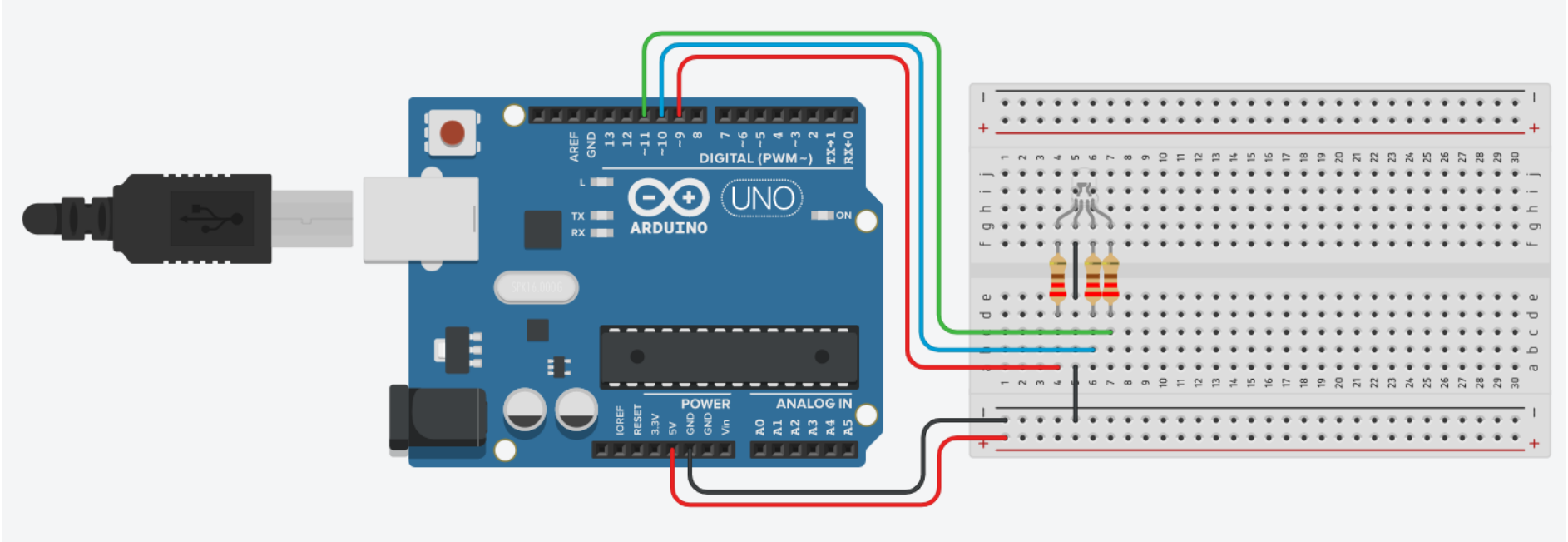
Sumber: https://www.circuitbread.com/

Exercise #2

RGB LED

Format Nama Desain: 10_NIM_02, contoh: 10_16520999_02

Circuit Design

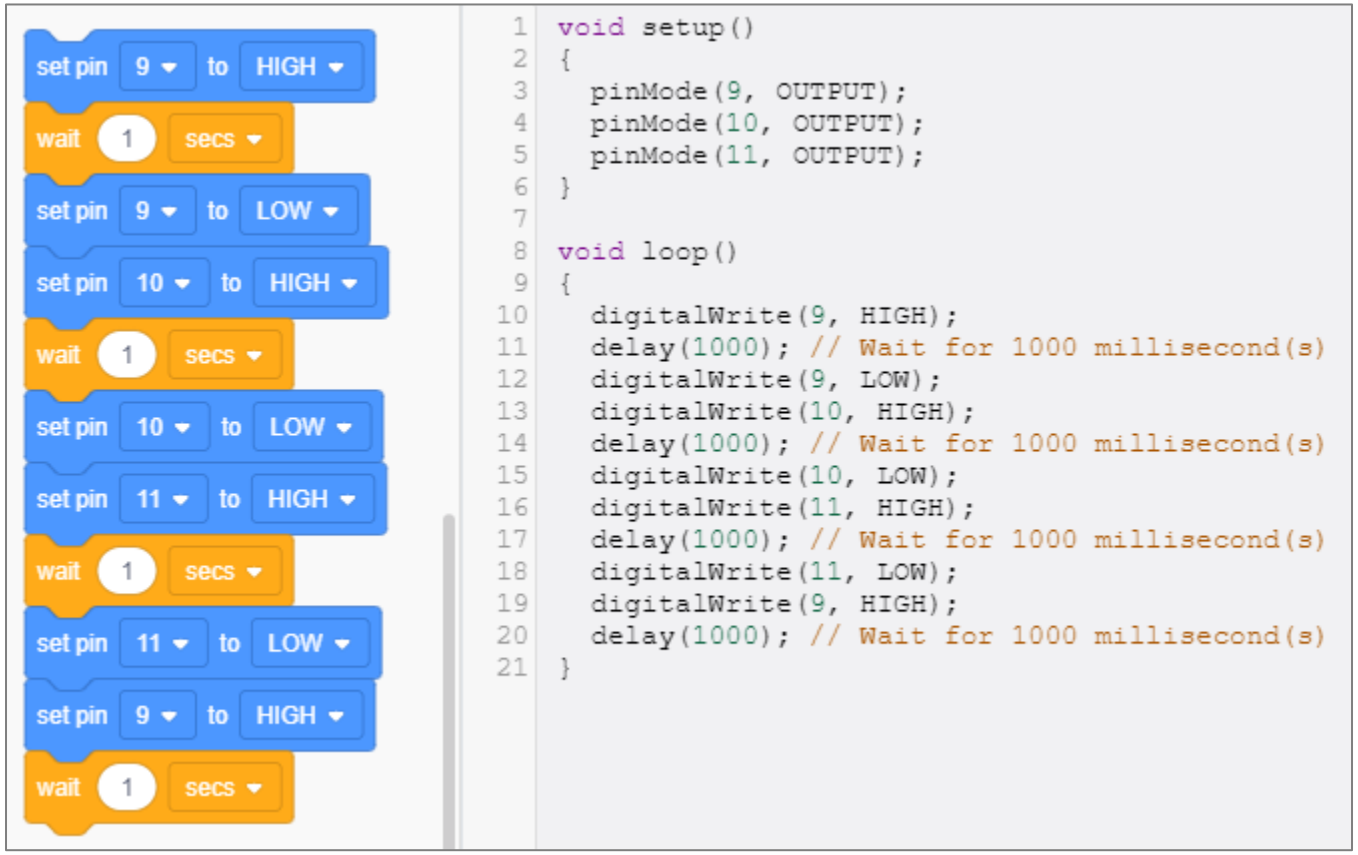


Name	Quantity	Component
U1	1	Arduino Uno R3
D2	1	LED RGB
R1, R2, R3	3	220 Ω Resistor

RGB LED

Red-Blue-Green

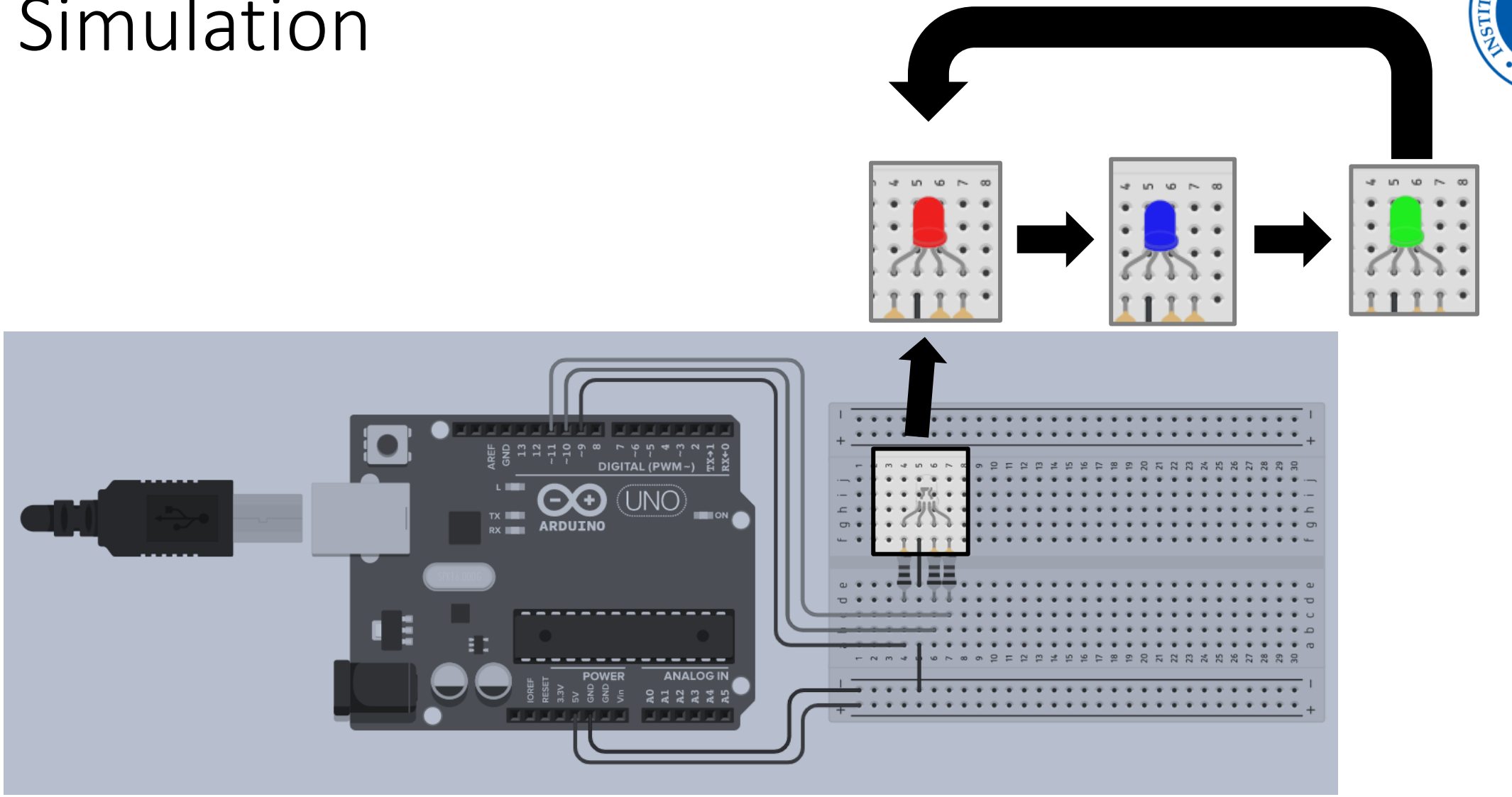
Code




```
1  void setup()
2  {
3    pinMode(9, OUTPUT);
4    pinMode(10, OUTPUT);
5    pinMode(11, OUTPUT);
6  }
7
8  void loop()
9  {
10   digitalWrite(9, HIGH);
11   delay(1000); // Wait for 1000 millisecond(s)
12   digitalWrite(9, LOW);
13   digitalWrite(10, HIGH);
14   delay(1000); // Wait for 1000 millisecond(s)
15   digitalWrite(10, LOW);
16   digitalWrite(11, HIGH);
17   delay(1000); // Wait for 1000 millisecond(s)
18   digitalWrite(11, LOW);
19   digitalWrite(9, HIGH);
20   delay(1000); // Wait for 1000 millisecond(s)
21 }
```

Format Nama File Kode: 10_NIM_02a.ino, contoh: 10_16520999_02a.ino

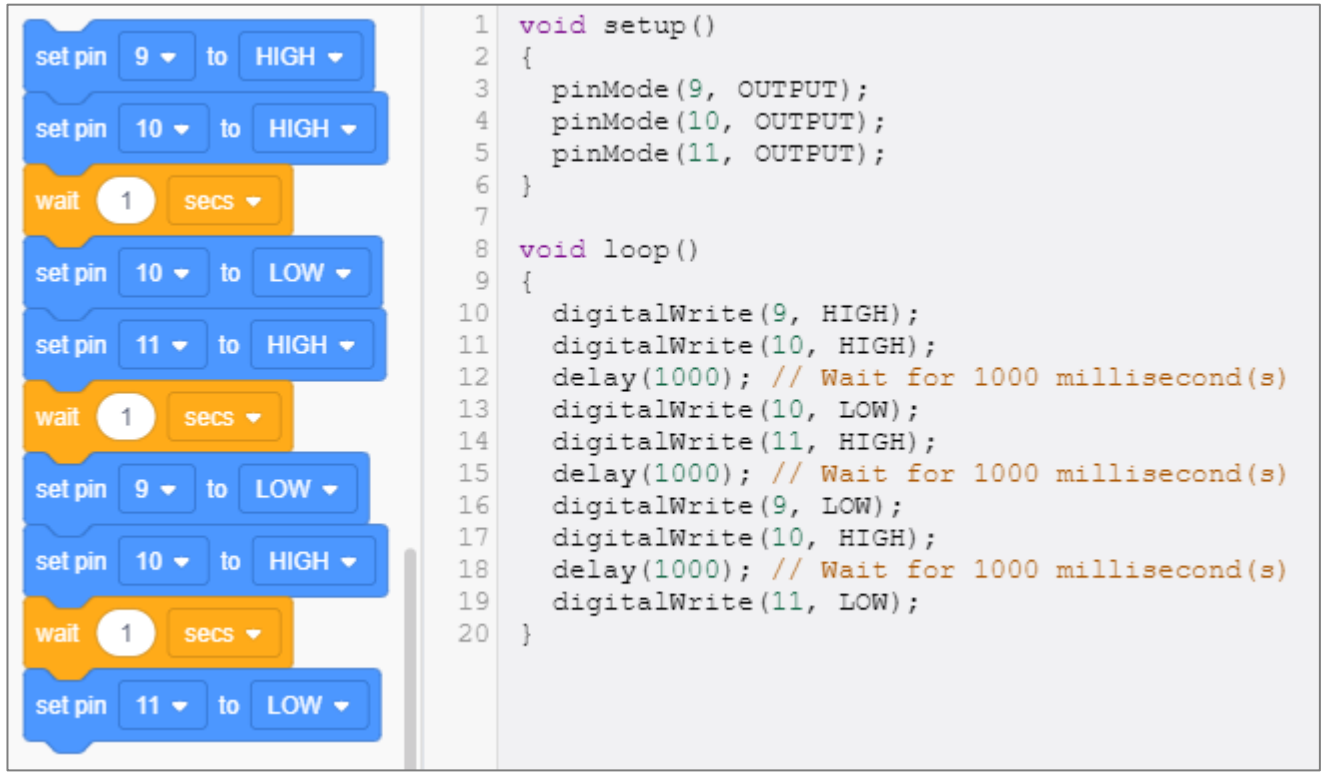
Simulation



RGB LED

Magenta-Yellow-Cyan

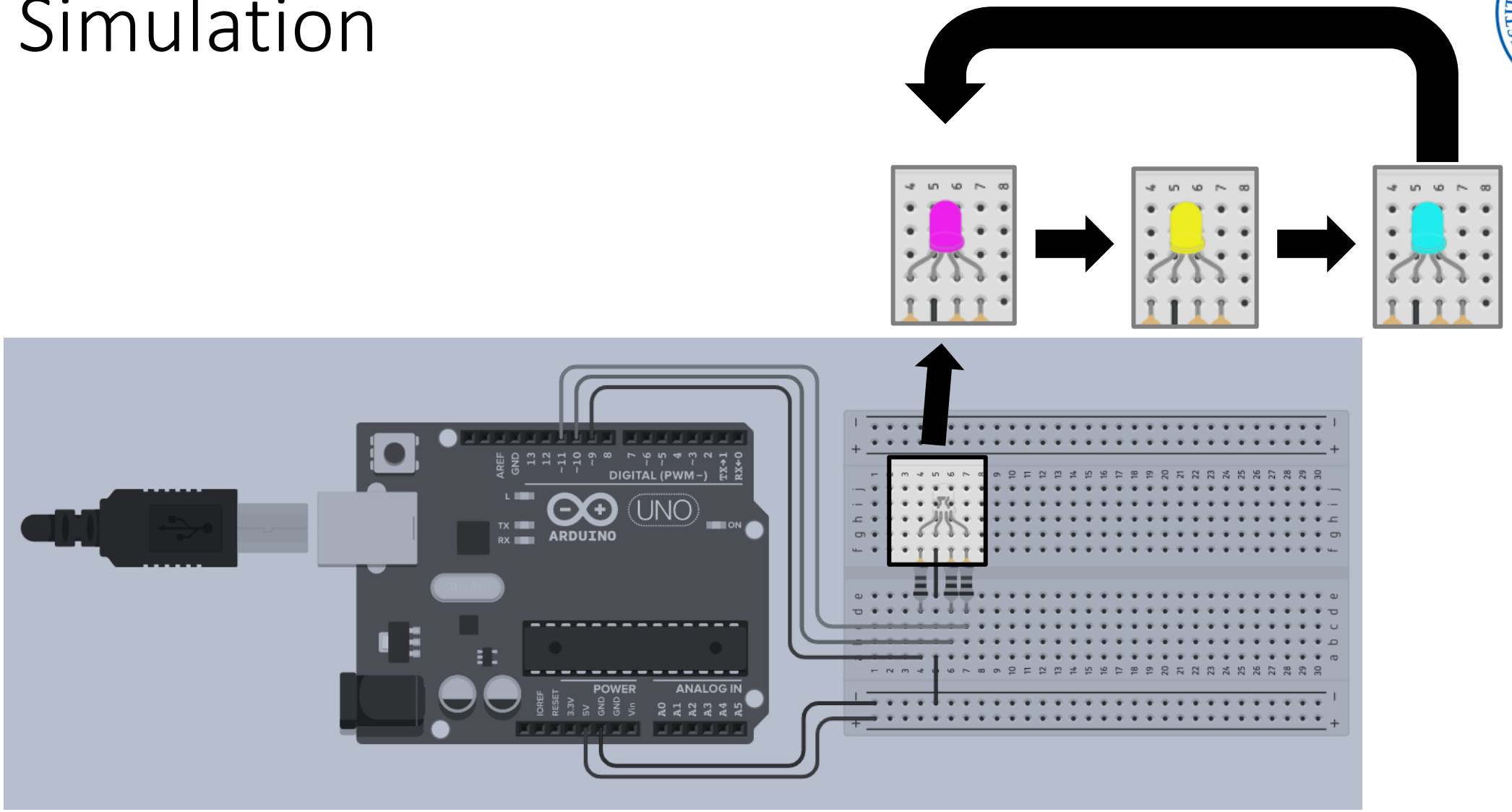
Code




```
1  void setup()
2  {
3    pinMode(9, OUTPUT);
4    pinMode(10, OUTPUT);
5    pinMode(11, OUTPUT);
6  }
7
8  void loop()
9  {
10   digitalWrite(9, HIGH);
11   digitalWrite(10, HIGH);
12   delay(1000); // Wait for 1000 millisecond(s)
13   digitalWrite(10, LOW);
14   digitalWrite(11, HIGH);
15   delay(1000); // Wait for 1000 millisecond(s)
16   digitalWrite(9, LOW);
17   digitalWrite(10, HIGH);
18   delay(1000); // Wait for 1000 millisecond(s)
19   digitalWrite(11, LOW);
20 }
```

Format Nama File Kode: 10_NIM_02b.ino, contoh: 10_16520999_02b.ino

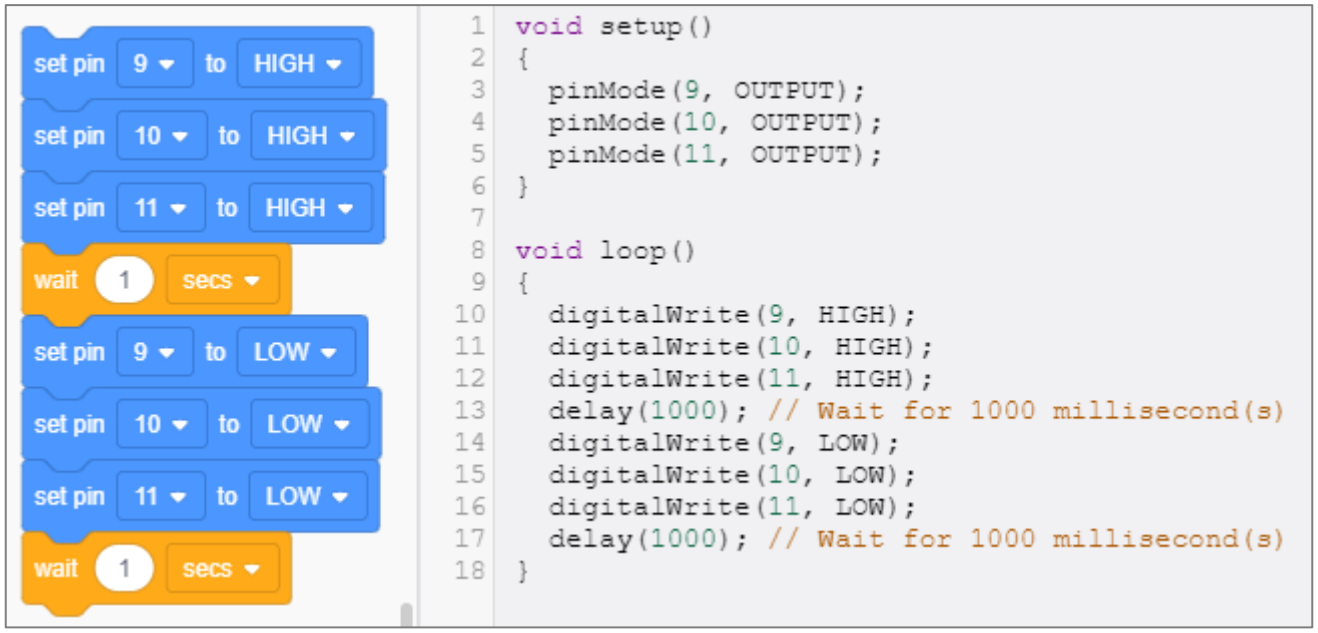
Simulation



RGB LED

White

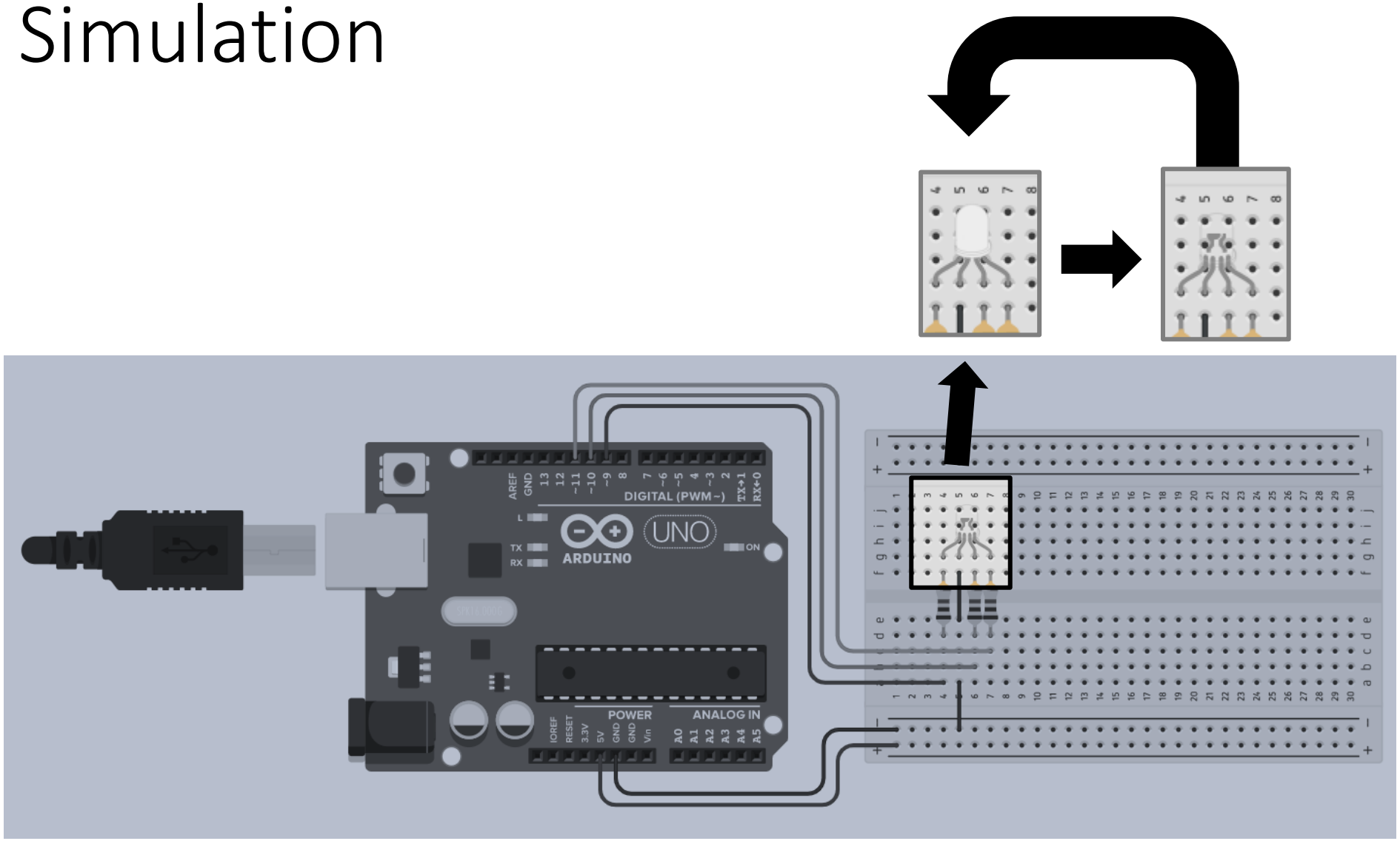
Code




```
1  void setup()
2  {
3    pinMode(9, OUTPUT);
4    pinMode(10, OUTPUT);
5    pinMode(11, OUTPUT);
6  }
7
8  void loop()
9  {
10   digitalWrite(9, HIGH);
11   digitalWrite(10, HIGH);
12   digitalWrite(11, HIGH);
13   delay(1000); // Wait for 1000 millisecond(s)
14   digitalWrite(9, LOW);
15   digitalWrite(10, LOW);
16   digitalWrite(11, LOW);
17   delay(1000); // Wait for 1000 millisecond(s)
18 }
```

Format Nama File Kode: 10_NIM_02c.ino, contoh: 10_16520999_02c.ino

Simulation



Penutup

Kesimpulan

- Mengenal Arduino.
- Simulasi rangkaian pada Tinkercad, menggunakan:
  - board Arduino
  - LED
  - RGB LED

Terima Kasih