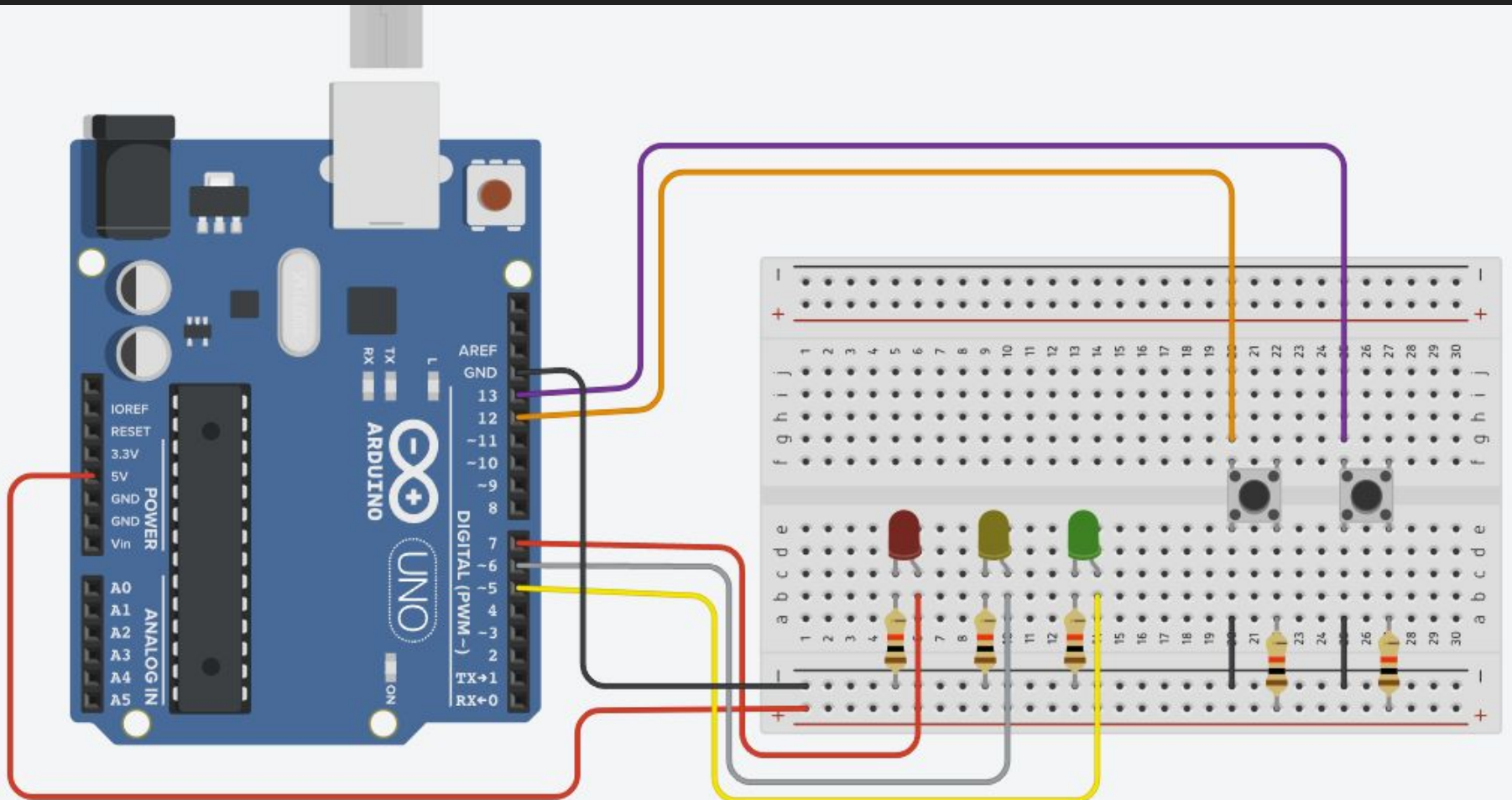
LED Dimmer with Modes

Lesson 2

Homework


AREF
GND
13
12
~11
~10
~9
8
7
~6
~5
4
~3
2
TX→1
RX←0
DIGITAL (PWM~)
IOREF
RESET
3.3V
5V
GND
GND
Vin
POWER
A0
A1
A2
A3
A4
A5
ANALOG IN
ARDUINO
UNO
TX
RX
L
ON

```
1
2
3  const int redLed = 7;
4  const int yellowLed = 6;
5  const int greenLed = 5;
6  const int startBtn = 12;
7  const int stopBtn  = 13;
8
9  void setup() {
10   pinMode(redLed, OUTPUT);
11   pinMode(yellowLed, OUTPUT);
12   pinMode(greenLed, OUTPUT);
13   pinMode(startBtn, INPUT_PULLUP);
14   pinMode(stopBtn, INPUT_PULLUP);
15 }
16
17 void loop() {
18
19   if (digitalRead(startBtn) == LOW) {
20
21     digitalWrite(redLed, HIGH);
22     delay(3000);
23     if (digitalRead(stopBtn) == LOW) return;
24
25     digitalWrite(redLed, LOW);
26     digitalWrite(yellowLed, HIGH);
27     delay(1000);
28     if (digitalRead(stopBtn) == LOW) return;
29
30     digitalWrite(yellowLed, LOW);
31     digitalWrite(greenLed, HIGH);
32     delay(3000);
33     if (digitalRead(stopBtn) == LOW) return;
34
35     digitalWrite(greenLed, LOW);
36   }
37 }
38
```

LED Dimmer with Modes

Цель:

Сделать управляемую лампу: поворот потенциометра меняет яркость LED (через PWM), а кнопка переключает режимы работы.

Режим 1 (ручной диммер):

Положение потенциометра определяет яркость LED (0–255) в реальном времени.

Режим 2 (автопульс):

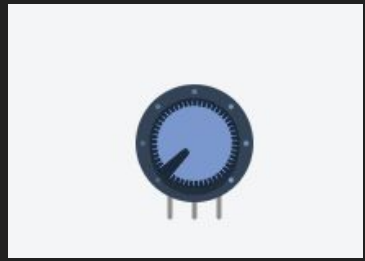
LED мягко «дышит» (плавно увеличивает и уменьшает яркость).

Переключение режимов:

Короткое нажатие кнопки D6 переключает Режим 1 ↔ Режим 2.

Используйте INPUT_PULLUP: не нажата = HIGH, нажата = LOW.

Потенциометр/ Potentiometer



Inside the Potentiometer

Inside is a resistive track shaped like a ring or arc.

The two outer terminals connect to the ends of this resistive track.

The middle terminal (the wiper) is a sliding contact that moves along the track as you turn the knob.

If you connect the two outer pins to 5 V and 0 V (GND), there's a continuous 5 V drop along the track.

Think of the track as one long resistor split into two variable pieces:

[5 V] ----[R1]----(wiper)----[R2]---- [GND]

R1 = resistance from 5 V to the wiper.

R2 = resistance from the wiper to GND.

Total resistance = R1 + R2 (fixed by the potentiometer's rating, e.g., 10 kΩ).

The voltage at the wiper (Vout) is given by the divider formula:

$$V_{out} = 5V \times (R2/(R2R2))$$

When you turn the knob:

- Rotate toward the 5 V side → R1 decreases, R2 increases → Vout rises.
- Rotate toward the GND side → R1 increases, R2 decreases → Vout falls.

Knob position	Approx. Vout	analogRead()
Fully CCW	0 V	~0
Center	2.5 V	~512
Fully CW	5 V	~1023