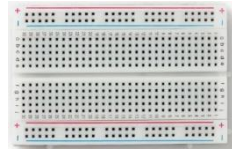


Componentes envolvidos:

Led Vermelho



Breadboard



Resistência



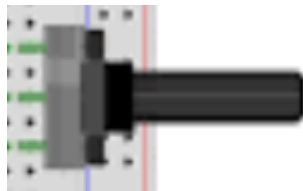
Arduino



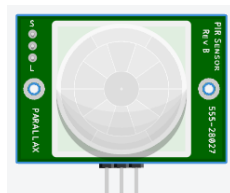
Cabos



Potenciômetro



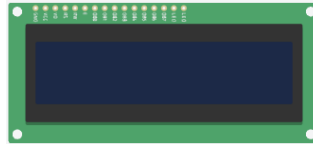
Sensor movimento (PIR)



Display de 7 segmentos



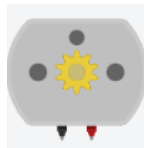
Display LCD e sensor de temperatura



Motor Servo Control

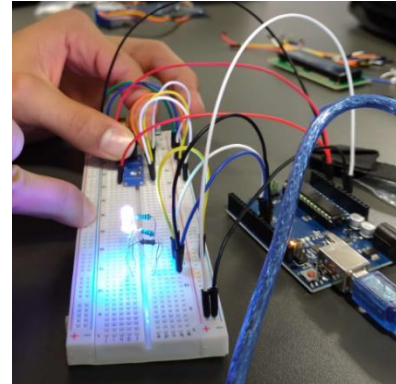
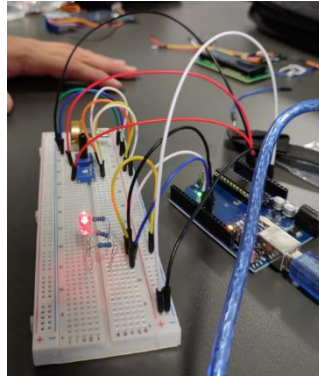
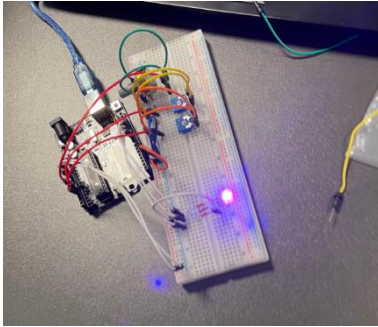


Motor



Exercício 1

Montagem do circuito e respectivos testes:



Código Utilizado:

```
int LEDR = 9;
int LEDG = 10;
int LEDB = 11;
int POTR = 0;
int POTG = 1;
int POTB = 2;

void setup()
{
  pinMode(LEDR, OUTPUT);
  pinMode(LEDG, OUTPUT);
  pinMode(LEDB, OUTPUT);
}

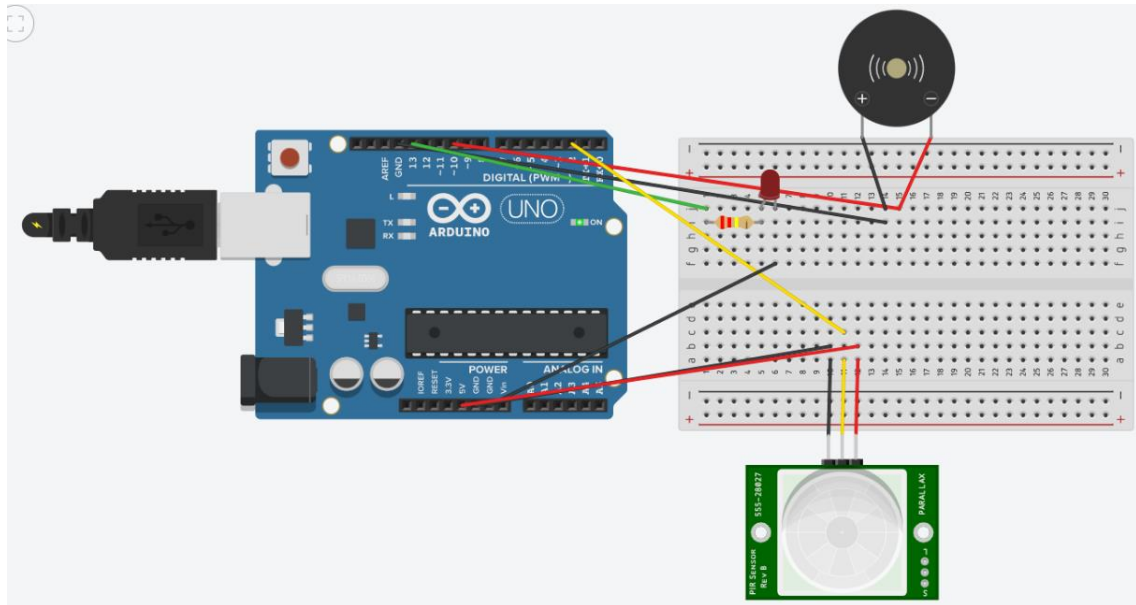
void loop()
{
  int R = analogRead(POTR) / 4;
  int G = analogRead(POTG) / 4;
  int B = analogRead(POTB) / 4;

  analogWrite(LEDR, R);
  analogWrite(LEDG, G);
  analogWrite(LEDB, B);
}
```

Neste exercício ao alterar os valores dos respectivos potenciômetros, os valores tanto do R, G e/ou B irão mudar a cor do LED dentro do espectro RGB.

Exercício 2

Montagem do circuito e respectivos testes:



Código Utilizado:

```
int ledPin = 13;
int piezoBuzzerPin = 10;
int pirSensorPin = 2;
float sinVal;
int toneVal;
int motionDetected = LOW;

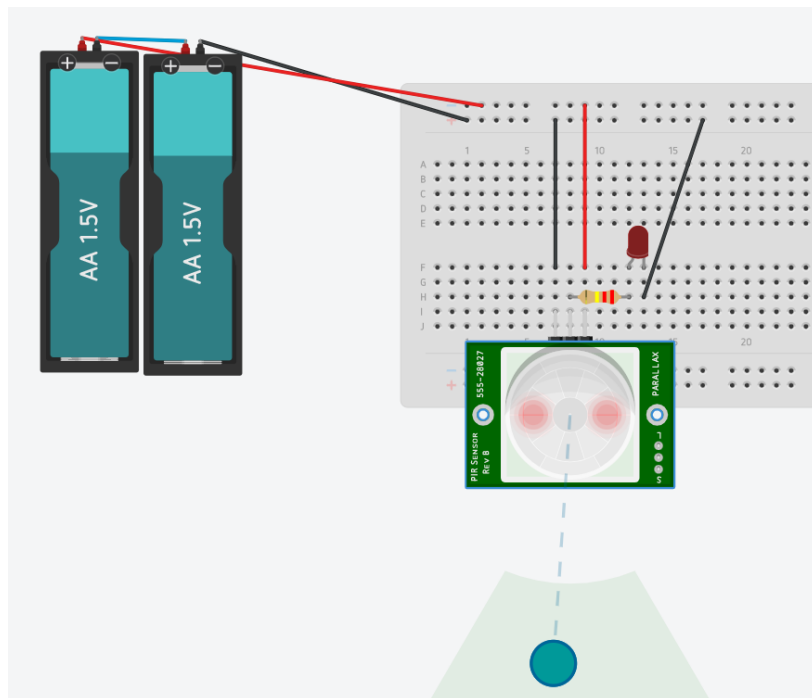
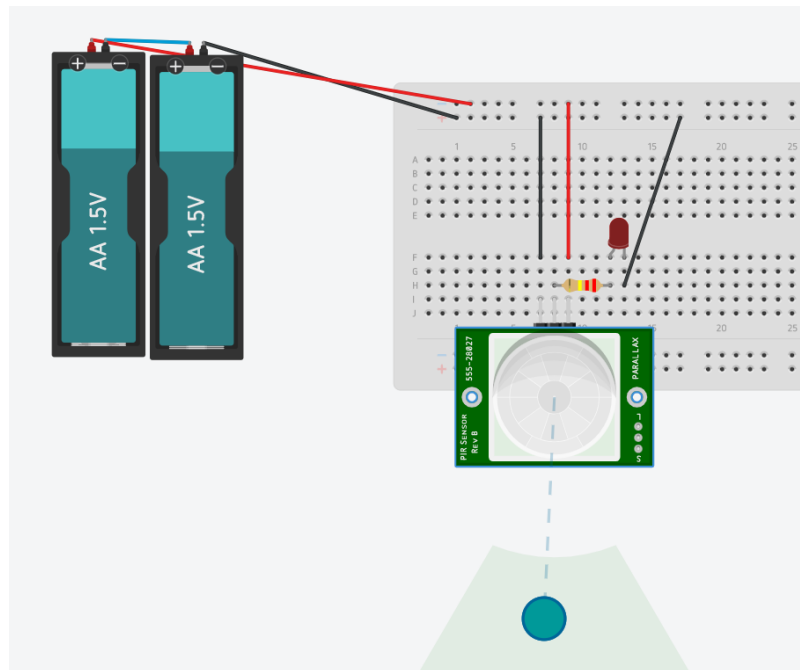
void setup()
{
  pinMode(ledPin, OUTPUT);
  pinMode(pirSensorPin, INPUT);
  pinMode(piezoBuzzerPin, OUTPUT);
  Serial.begin(9600);
  delay(5000);
}
```

```
void loop()
{
  motionDetected = digitalRead(pirSensorPin);
  if (motionDetected == HIGH)
  {
    Serial.println("motion detected!");
    digitalWrite(ledPin, HIGH);
    for (int x = 0; x < 180; x++)
    {
      sinVal = (sin(x*(3.1412/180)));
      toneVal = 1000+(int(sinVal*2000));
      tone(piezoBuzzerPin, toneVal);
      delay(1);
    }
  }
  else
  {
    Serial.println("NO motion!");
    digitalWrite(ledPin, LOW);
    noTone(piezoBuzzerPin);
    delay(200);
  }
}
```

Neste exercício quando o sensor registrar movimento, o buzzer apita e o led liga-se.

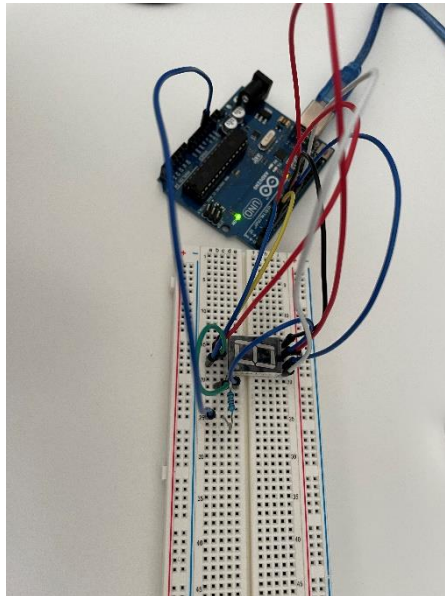
Exercício 2a

Montagem do circuito e respectivos testes:



Exercício 3

Montagem do circuito e respectivos testes:



Código Utilizado:

```
#define A 8
#define B 9
#define C 4
#define D 3
#define E 2
#define F 7
#define G 6

void clr()
{
  digitalWrite(A, HIGH);
  digitalWrite(B, HIGH);
  digitalWrite(C, HIGH);
  digitalWrite(D, HIGH);
  digitalWrite(E, HIGH);
  digitalWrite(F, HIGH);
  digitalWrite(G, HIGH);
}

void one()
{
  digitalWrite(D, HIGH);
  digitalWrite(E, LOW);
  digitalWrite(F, LOW);
  digitalWrite(G, HIGH);
  digitalWrite(A, HIGH);
  digitalWrite(B, HIGH);
  digitalWrite(C, HIGH);
}

void two()
{
  digitalWrite(D, LOW);
  digitalWrite(E, LOW);
  digitalWrite(F, HIGH);
  digitalWrite(G, LOW);
  digitalWrite(A, LOW);
  digitalWrite(B, LOW);
  digitalWrite(C, HIGH);
}

void three()
{
  digitalWrite(D, LOW);
  digitalWrite(E, HIGH);
  digitalWrite(F, HIGH);
  digitalWrite(G, LOW);
  digitalWrite(A, LOW);
  digitalWrite(B, LOW);
  digitalWrite(C, LOW);
}

void four()
{
  digitalWrite(D, HIGH);
  digitalWrite(E, HIGH);
  digitalWrite(F, LOW);
  digitalWrite(G, LOW);
  digitalWrite(A, HIGH);
  digitalWrite(B, LOW);
  digitalWrite(C, LOW);
}

void five()
{
  digitalWrite(D, LOW);
  digitalWrite(E, HIGH);
  digitalWrite(F, LOW);
  digitalWrite(G, LOW);
  digitalWrite(A, LOW);
  digitalWrite(B, HIGH);
  digitalWrite(C, LOW);
}

void six()
{
  digitalWrite(D, LOW);
  digitalWrite(E, LOW);
  digitalWrite(F, LOW);
  digitalWrite(G, LOW);
  digitalWrite(A, LOW);
  digitalWrite(B, HIGH);
  digitalWrite(C, LOW);
}

void seven()
{
  digitalWrite(D, HIGH);
  digitalWrite(E, HIGH);
  digitalWrite(F, HIGH);
  digitalWrite(G, HIGH);
  digitalWrite(A, LOW);
  digitalWrite(B, LOW);
  digitalWrite(C, LOW);
}

void eight()
{
  digitalWrite(D, LOW);
  digitalWrite(E, LOW);
  digitalWrite(F, LOW);
  digitalWrite(G, LOW);
  digitalWrite(A, LOW);
  digitalWrite(B, LOW);
  digitalWrite(C, LOW);
}

void nine()
{
  digitalWrite(D, LOW);
  digitalWrite(E, HIGH);
  digitalWrite(F, LOW);
  digitalWrite(G, LOW);
  digitalWrite(A, LOW);
  digitalWrite(B, LOW);
  digitalWrite(C, LOW);
}

void zero()
{
  digitalWrite(D, LOW);
  digitalWrite(E, LOW);
  digitalWrite(F, LOW);
  digitalWrite(G, HIGH);
  digitalWrite(A, LOW);
  digitalWrite(B, LOW);
  digitalWrite(C, LOW);
}

void LoopDisplay()
{
  zero();
  delay(1000);
  one();
  delay(1000);
  two();
  delay(1000);
  three();
  delay(1000);
  four();
  delay(1000);
  five();
  delay(1000);
  six();
  delay(1000);
  seven();
  delay(1000);
  eight();
  delay(1000);
  nine();
  delay(1000);
  zero();
  delay(1000);
}
```

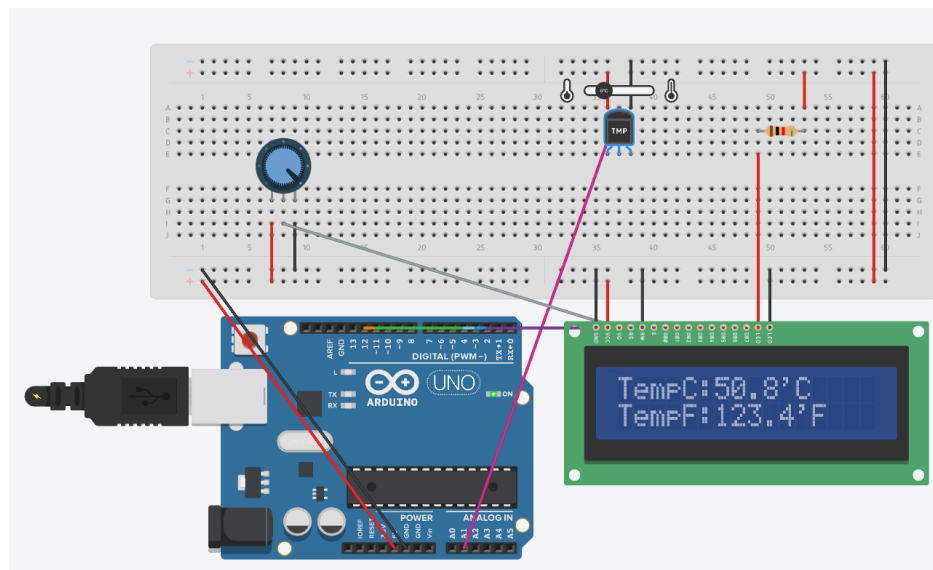
```
void setup()
{
  pinMode(A, OUTPUT);
  pinMode(B, OUTPUT);
  pinMode(C, OUTPUT);
  pinMode(D, OUTPUT);
  pinMode(E, OUTPUT);
  pinMode(F, OUTPUT);
  pinMode(G, OUTPUT);
  Serial.begin(9600);
}

void loop()
{
  Serial.println("Starting\n");
  LoopDisplay();
}
```

Ao correr este programa um *loop* apresenta no display de 7 segmentos os números de 0 a 9.

Exercício 4

Montagem do circuito e respectivos testes:



Código Utilizado:

```
#include <LiquidCrystal.h>

LiquidCrystal lcd(12,11,5,4,3,2);

float tempC;
float tempF;
int tempPin = A1;

void setup()
{
  lcd.begin(16,2);
  lcd.print("TempC: ");
  lcd.setCursor(0, 1);
  lcd.print("TempF: ");
  Serial.begin(9600);
}
```

```
void loop()
{
  tempC = analogRead(tempPin);
  tempC = (tempC * 5 * 100.0) / 1024.0;
  tempF = ((tempC*9)/5) + 32;

  lcd.setCursor(6, 0);
  lcd.print(tempC, 1);
  lcd.print("'C ");
  Serial.print("TempC: ");
  Serial.print(tempC);

  lcd.setCursor(6, 1);
  lcd.print(tempF, 1);
  lcd.print("'F ");
  Serial.print(" -- TempF: ");
  Serial.println(tempF);
  delay(500);
}
```

Neste programa o sensor de temperatura lê a temperatura ambiente e o Display apresenta a temperatura em graus Celsius tal como a temperatura em Fahrenheit previamente convertida pelo código.

Exercício 5

Leitura do *Serial Monitor*:

Output	Serial Monitor	X
Message (Enter to send message to 'Arduino Uno')		
Adress: 0	Value: 23	
Adress: 1	Value: 255	
Adress: 2	Value: 255	
Adress: 3	Value: 255	
Adress: 4	Value: 255	
Adress: 5	Value: 255	
Adress: 6	Value: 255	
Adress: 7	Value: 255	
Adress: 8	Value: 255	
Adress: 9	Value: 255	
Adress: 10	Value: 255	

Código Utilizado:

```
#include <EEPROM.h>

int a= 0, i;
int value;

void setup ()
{
  Serial.begin(9600);
  EEPROM.write(0, 23);
}

void loop()
{
  value = EEPROM.read(a);

  Serial.print("Adress: ");
  Serial.print(a);
  Serial.print("\t");
  Serial.print("Value: ");
  Serial.print(value);
  Serial.println();

  a = a + 1;

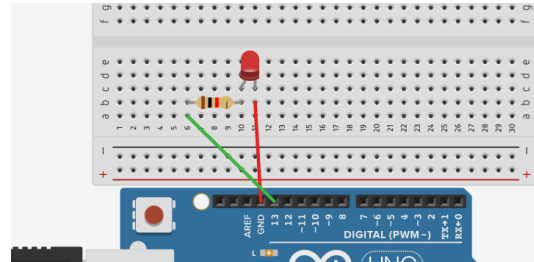
  if (a == 1024)
  {
    a = 0;
  }
  delay (100);
}
```

Em relação ao exercício anterior, o endereço 0 foi atribuído o valor de 23 e nos restantes 255.

Exercício 6

Leitura do *Serial Monitor* e montagem do Arduino:

Output Serial Monitor X			
Message (Enter to send message to 'Arduino Uno' on 'COM5')			
Address: 0	Value: 0	Voltage (V): 0.0	
Address: 1	Value: 31	Voltage (V): 0.155	
Address: 2	Value: 62	Voltage (V): 1.55	
Address: 3	Value: 93	Voltage (V): 1.210	
Address: 4	Value: 124	Voltage (V): 2.110	
Address: 5	Value: 155	Voltage (V): 3.10	
Address: 6	Value: 186	Voltage (V): 3.165	
Address: 7	Value: 217	Voltage (V): 4.65	
Address: 8	Value: 248	Voltage (V): 4.220	
Address: 9	Value: 0	Voltage (V): 0.0	



Código Utilizado:

```
#include <EEPROM.h>

int a = 0;
int value;
int RedPin = 3;

void setup()
{
  Serial.begin(9600);
  EEPROM.write(0, 0);
  EEPROM.write(1, 31);
  EEPROM.write(2, 62);
  EEPROM.write(3, 93);
  EEPROM.write(4, 124);
  EEPROM.write(5, 155);
  EEPROM.write(6, 186);
  EEPROM.write(7, 217);
  EEPROM.write(8, 248);

  pinMode(RedPin, OUTPUT);
}
```

```
void loop()
{
  value = EEPROM.read(a);
  analogWrite(RedPin, value);

  Serial.print("Address: ");
  Serial.print(a);
  Serial.print("\t");
  Serial.print("Value: ");
  Serial.print(value);
  Serial.print("\t");
  Serial.print("Voltage (V): ");
  Serial.print(value * 5 / 255);
  Serial.print(".");
  Serial.println(value * 5 % 255);

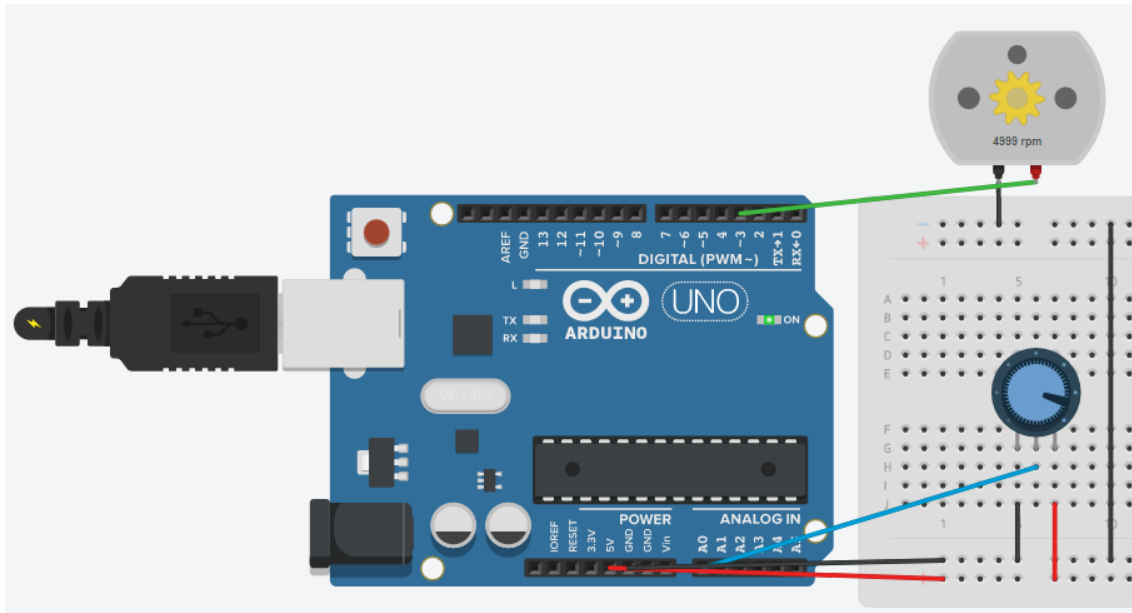
  a = a + 1;
  if(a == 9) a = 0;

  delay(1000);
}
```

Neste exercício é atribuído um valor de intensidade a um LED dependendo do valor em memória, dando um efeito com 9 valores de intensidade num intervalo de 1 segundo.

Exercício 7

Montagem do circuito e respectivos testes:



Código Utilizado:

```
int motor;  
int pin = 3;  
  
void setup ()  
{  
  Serial.begin (9600);  
}  
  
void loop()  
{  
  motor = analogRead(A0) / 4;  
  analogWrite (pin, motor);  
  Serial.println (motor);  
}
```

Alterando os valores no potenciômetro o motor acelera as suas rotações por minuto.