FATEC - SP
Faculdade de Tecnologia de São Paulo

ARDUINO

MINICURSO

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Aluno	Marcos Watanabe	DSE
Auxiliar Docente	Enrico Nadeo	DSE

OBJETIVO

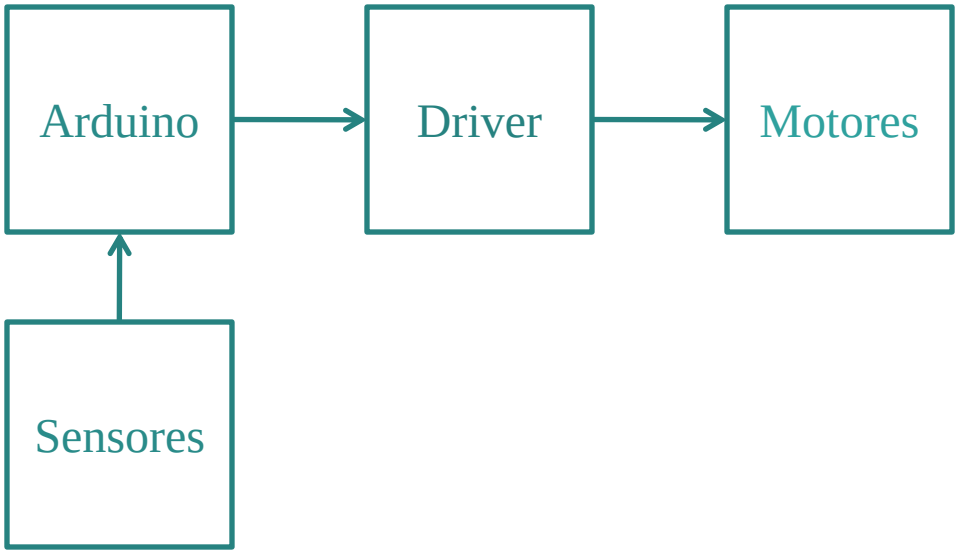
- ✓Introdução à plataforma Arduino;
- ✓Noções de circuito elétricos;
- ✓Conceito de Digital e Analógico;
- ✓Conceito de PWM;
- ✓Entrada e saída digital;
- ✓Entrada e saída analógica;
- ✓Comunicação Serial.

INTRODUÇÃO

O Arduino é uma plataforma de código aberto baseado em hardware e software baixa complexidade. É destinado ao desenvolvimento de projetos interativos

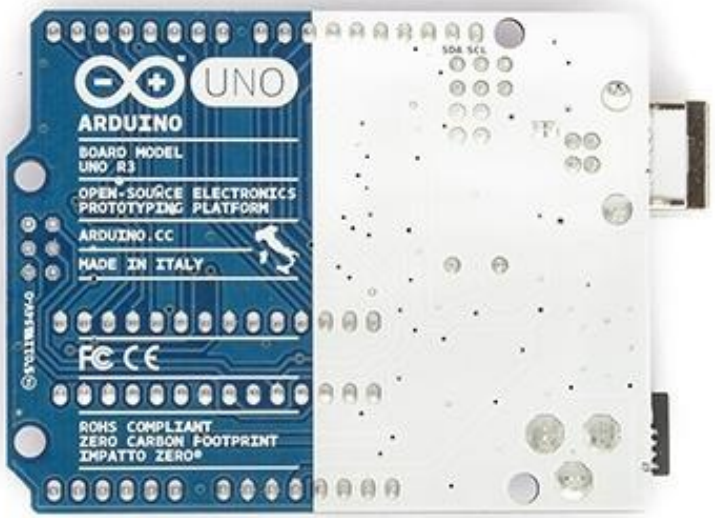
INTRODUÇÃO

Pode ser utilizado para controlar processos, captar sinais de sensores, transmitir/receber informações, realizar conexões de uma rede e entre outras aplicações.

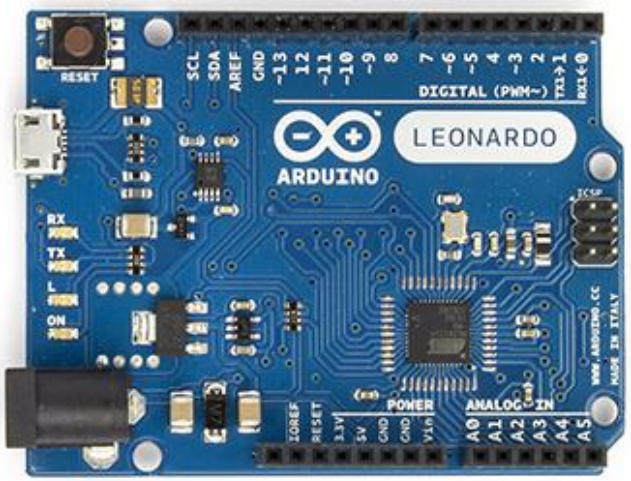


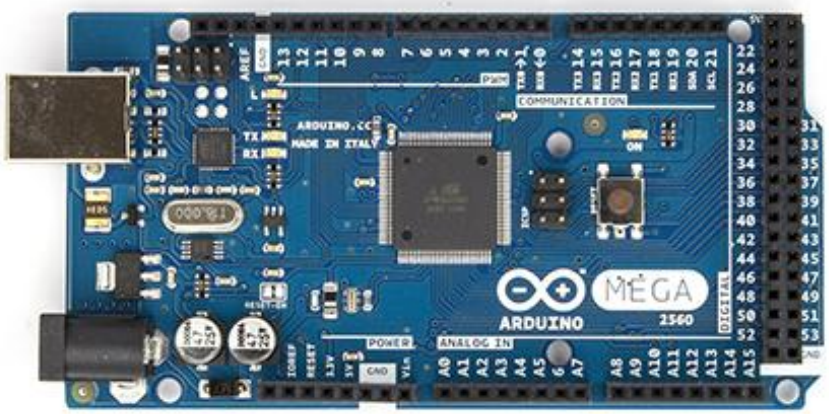
INTRODUÇÃO

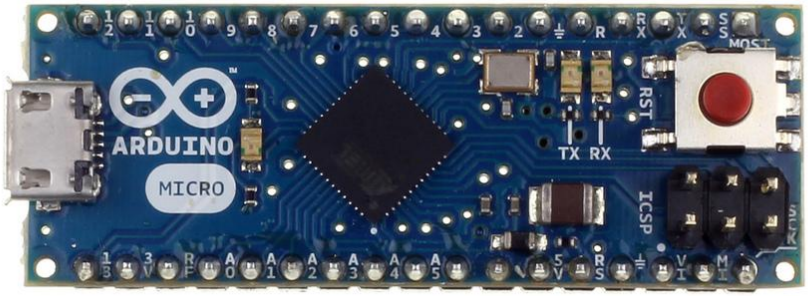

UNO
ARDUINO
MADE IN ITALY
DIGITAL
POWER
ANALOG IN

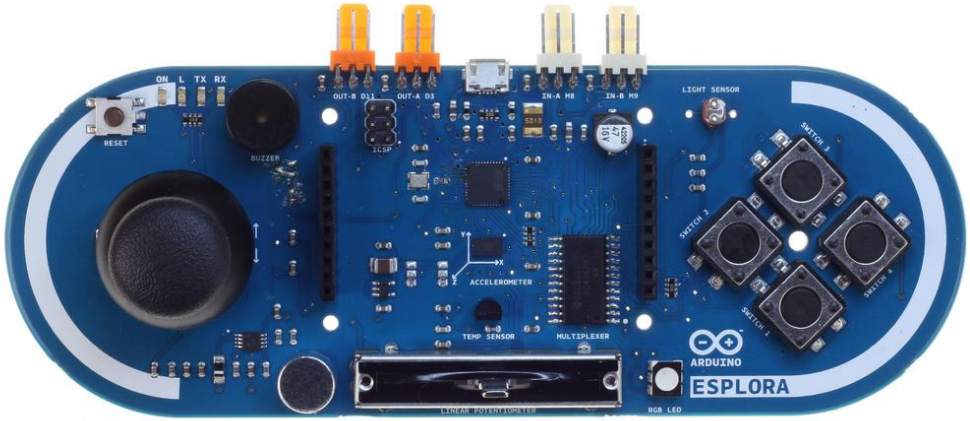

UNO
ARDUINO
BOARD MODEL
UNO R3
OPEN-SOURCE ELECTRONICS
PROTOTYPING PLATFORM
ARDUINO.CC
MADE IN ITALY
ROHS COMPLIANT
ZERO CARBON FOOTPRINT
IMPATTO ZERO®

INTRODUÇÃO

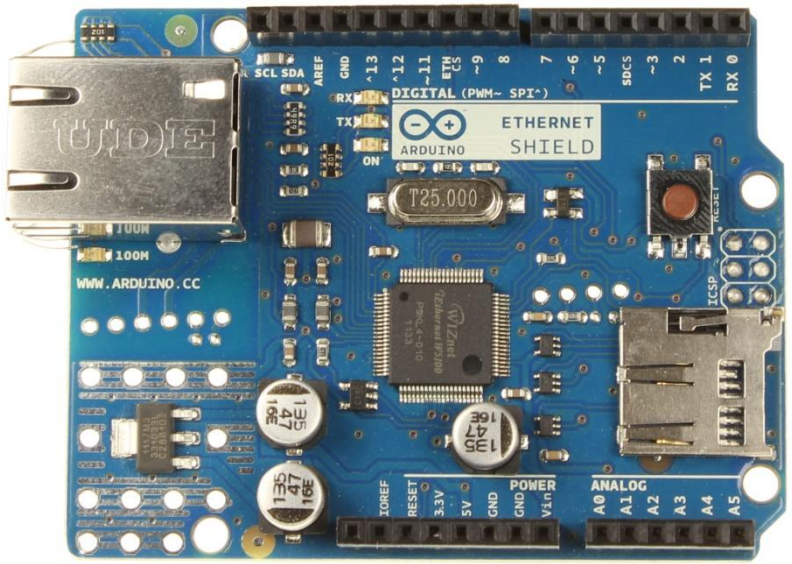

RESET
DIGITAL (PWM~)
LEONARDO
ARDUINO
POWER
ANALOG IN

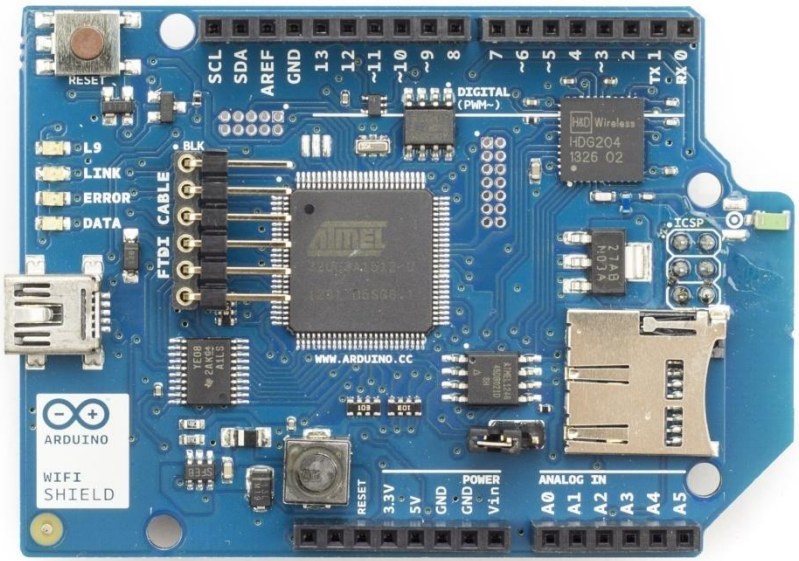

COMMUNICATION
MEGA
2560
ARDUINO
POWER
ANALOG IN
DIGITAL


ARDUINO
MICRO
TX RX
RST
ICSP


RESET
BUZZER
LIGHT SENSOR
ACCELEROMETER
TEMP SENSOR
MULTIPLEXER
ARDUINO
ESPLORA

INTRODUÇÃO


ETHERNET
SHIELD
ARDUINO
DIGITAL (PWM~ SPI^)
POWER
ANALOG
WWW.ARDUINO.CC

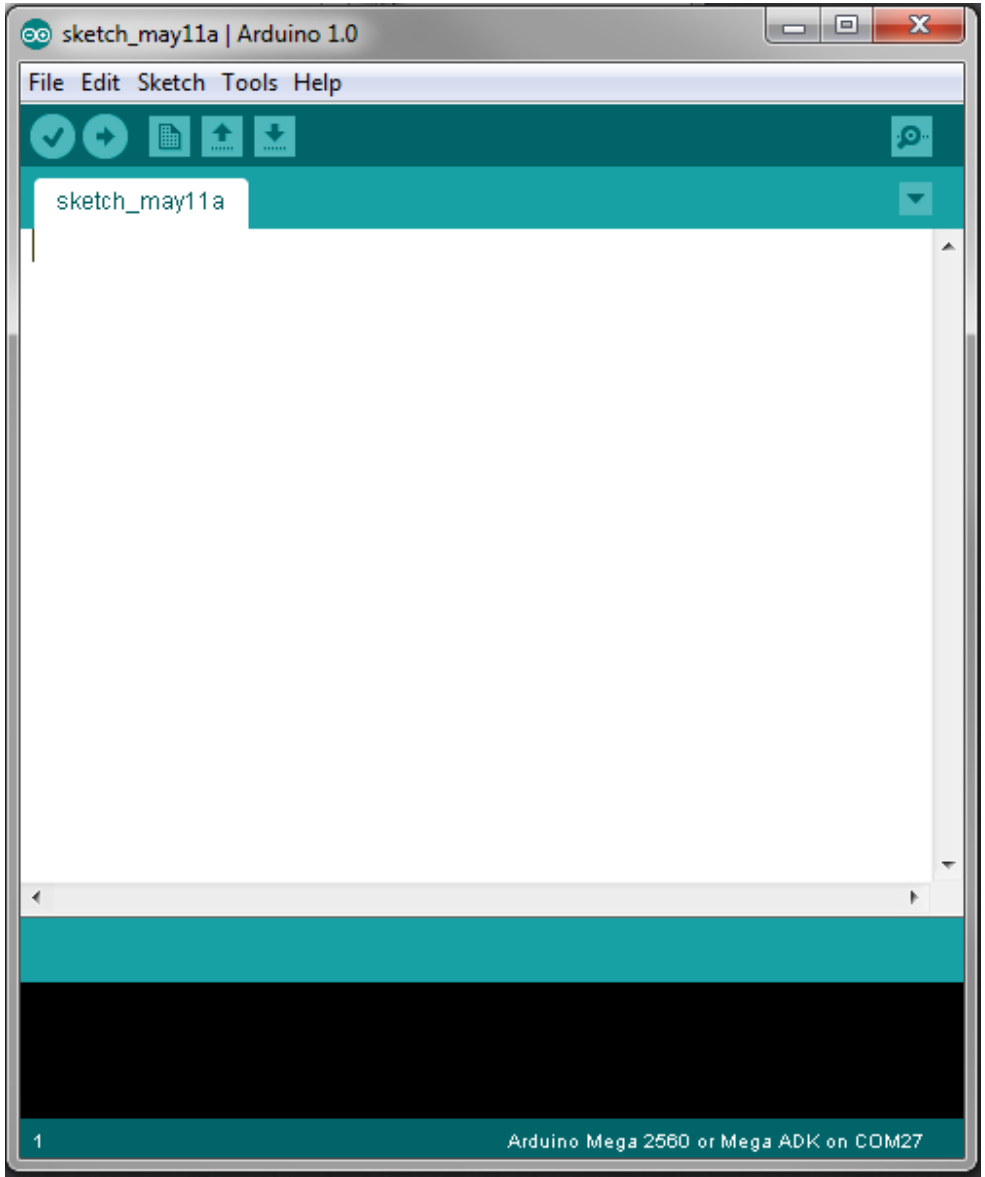

ARDUINO
WIFI
SHIELD
DIGITAL (PWM~)
ANALOG IN
POWER
WWW.ARDUINO.CC

INTRODUÇÃO

Especificações Técnicas:

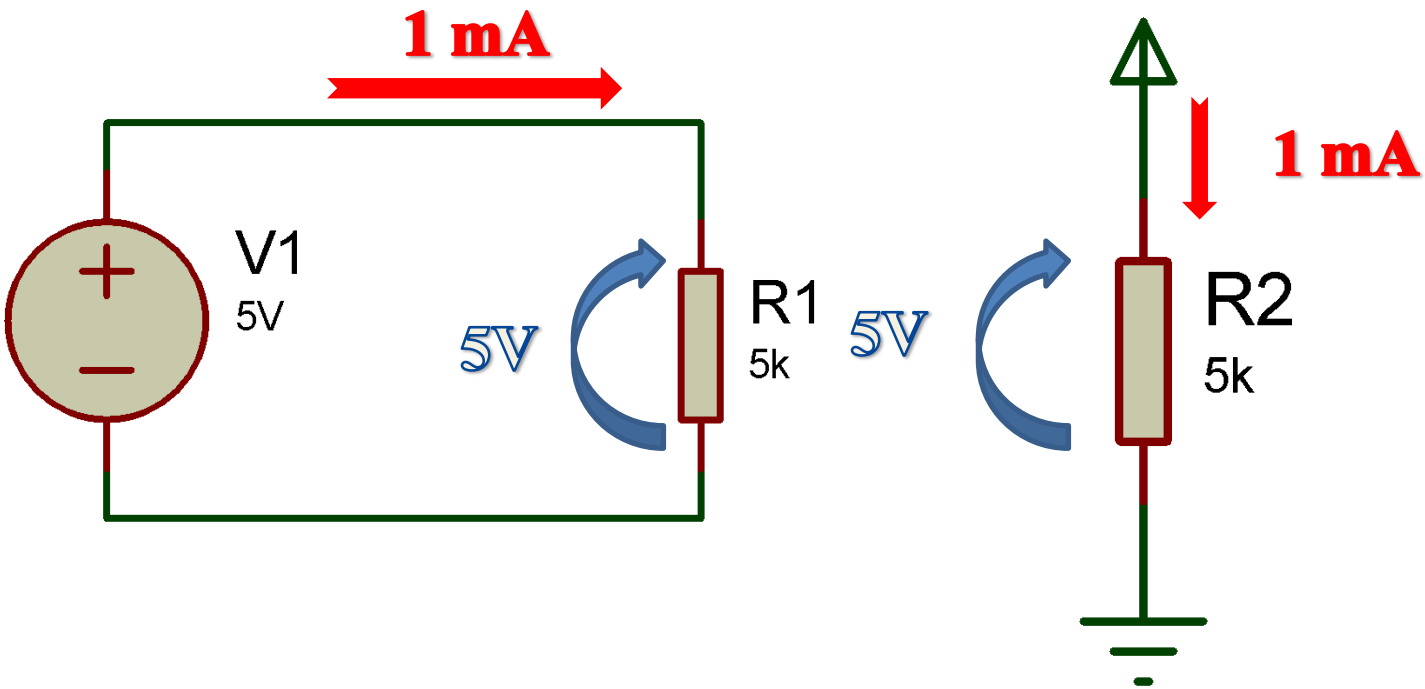
Microcontroller	**ATmega328**
Operating Voltage	**5V**
Input Voltage (recommended)	**7-12V**
Input Voltage (limits)	**6-20V**
Digital I/O Pins	**14 (6 PWM)**
Analog Input Pins	**6**
DC Current per I/O Pin	**40 mA**
DC Current for 3.3V Pin	**50 mA**
Flash Memory	**32 KB**
SRAM	**2 KB**
EEPROM	**1 KB**
Clock Speed	**16 MHz**
Length	**68.6 mm**
Width	**53.4 mm**
Weight	**25 g**

INTRODUÇÃO

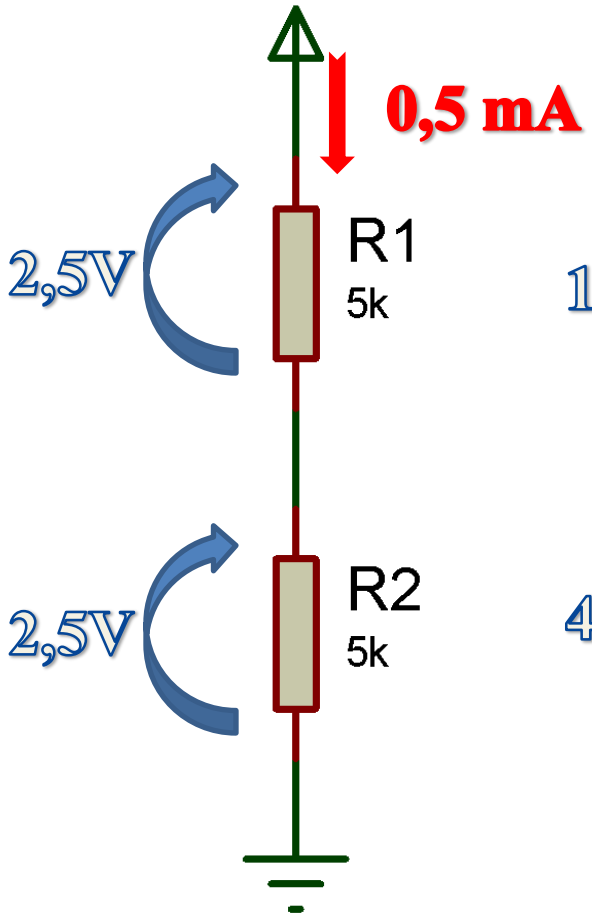

sketch_may11a | Arduino 1.0
File Edit Sketch Tools Help
sketch_may11a
1
Arduino Mega 2560 or Mega ADK on COM27

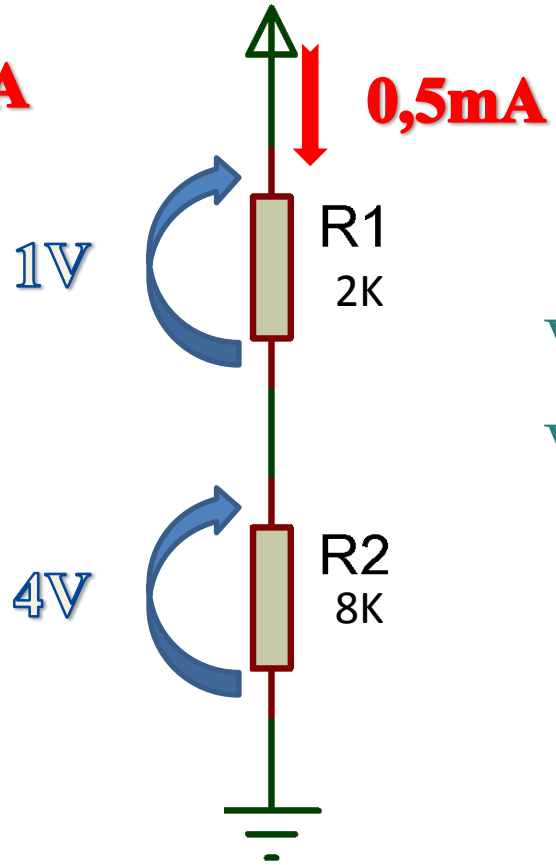
CONCEITO

$$V=R.I$$



CONCEITO

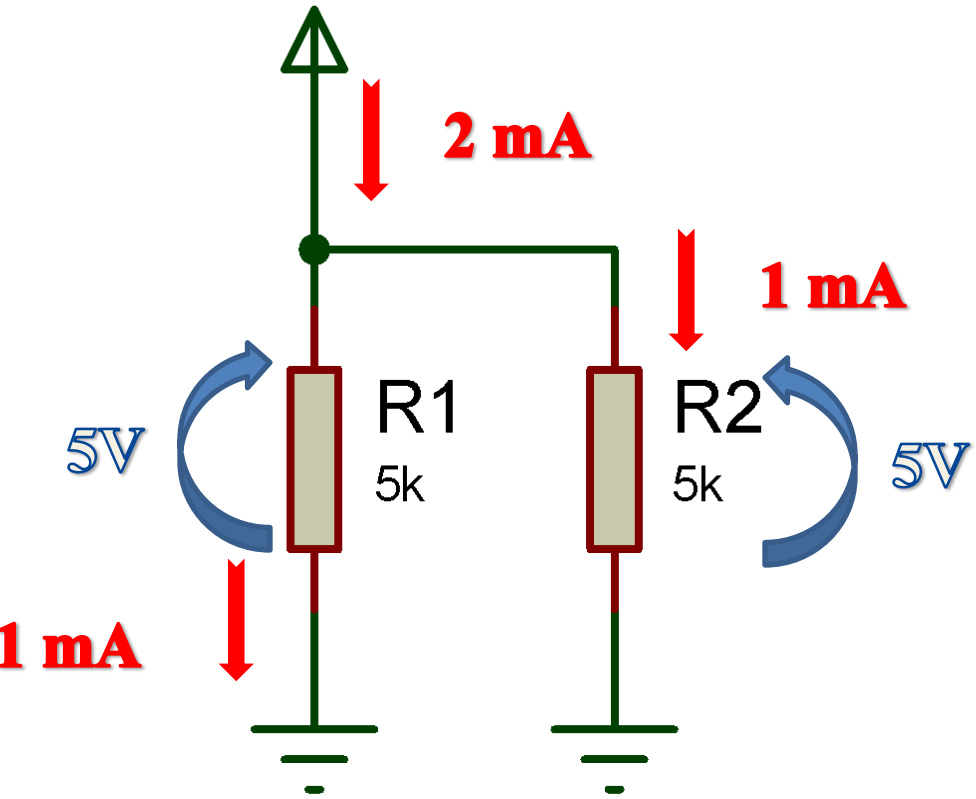




V1=R1.V/(R1+R2)

V2=R2.V/(R1+R2)

CONCEITO



I1=V/R1

I2=V/R2

CONCEITO

DIGITAL

1: 5V

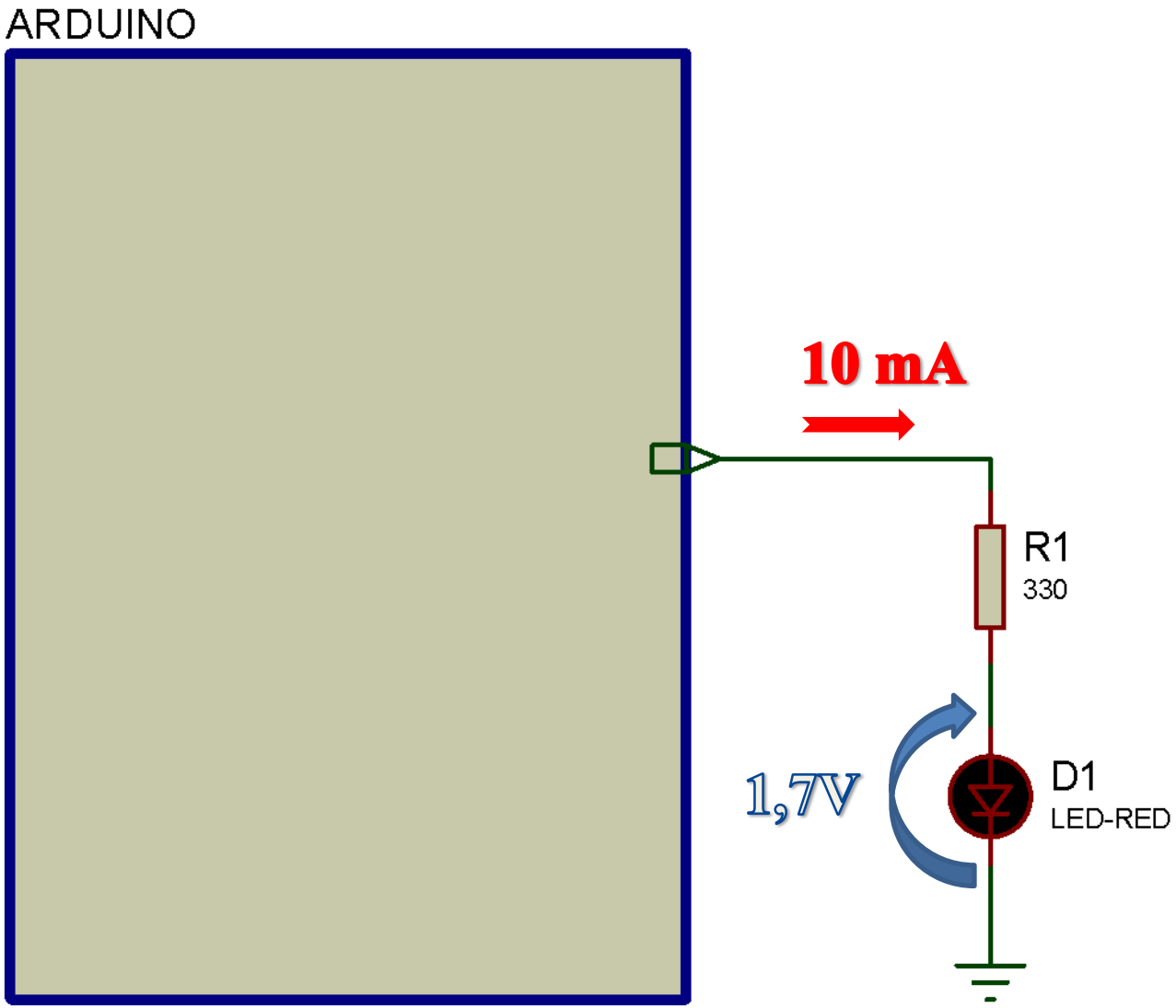
0: ~0V

Analógico

0 a 5V

0,1V 2,0V 3,0V 4,5V

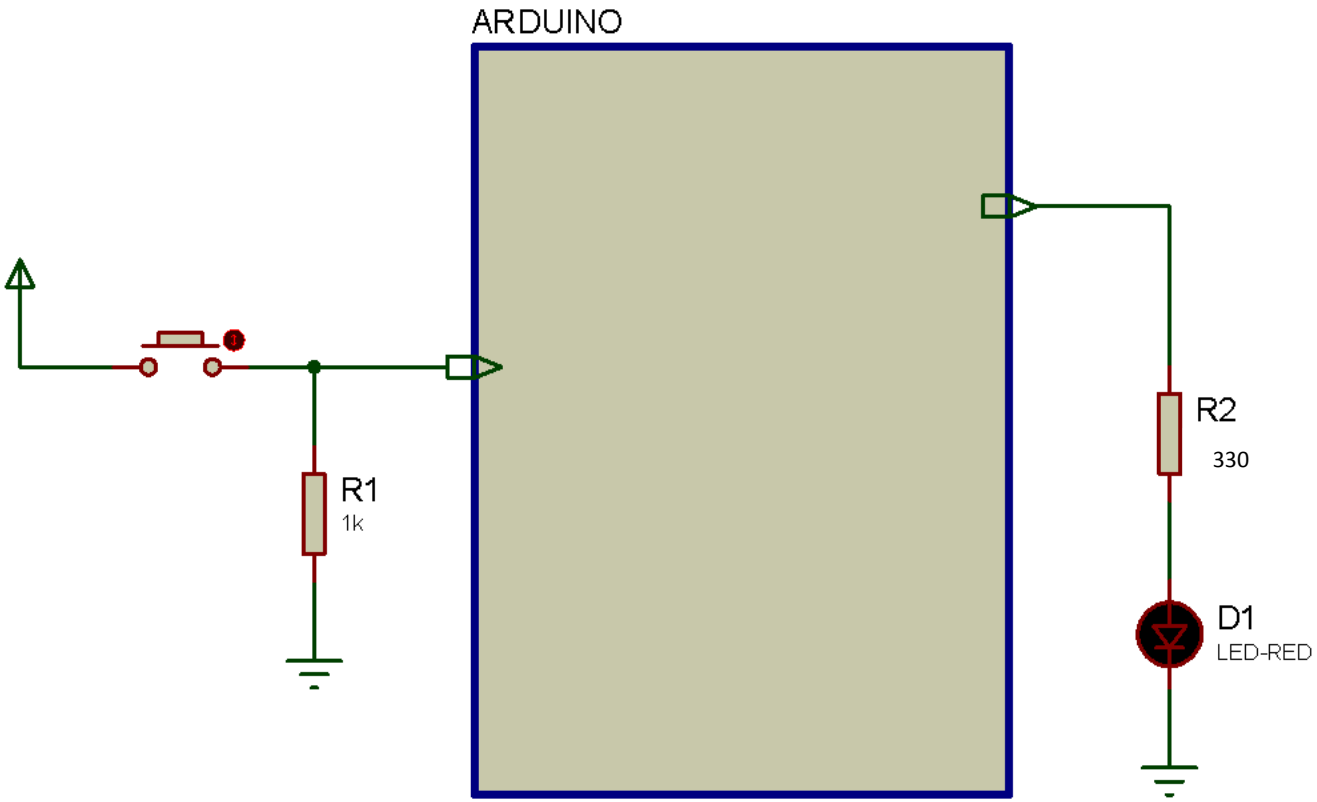
EXPERIMENTO 1



EXPERIMENTO 1

```
int led = 13;

// the setup routine runs once when you press reset:
void setup() {
  // initialize the digital pin as an output.
  pinMode(led, OUTPUT);
}

// the loop routine runs over and over again forever:
void loop() {
  digitalWrite(led, HIGH);   // turn the LED on (HIGH is the voltage level)
  delay(1000);               // wait for a second
  digitalWrite(led, LOW);    // turn the LED off by making the voltage LOW
  delay(1000);               // wait for a second
}
```

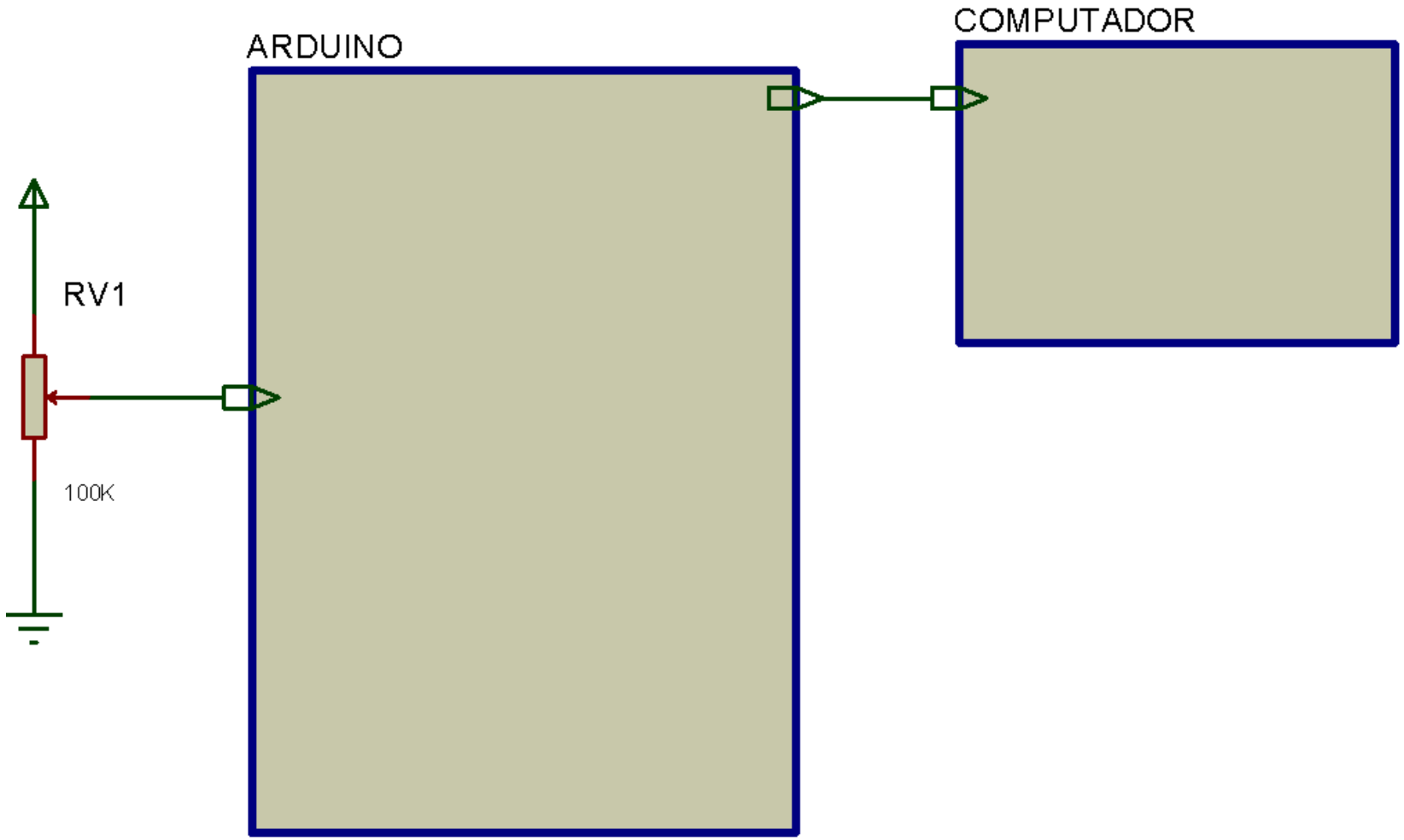
EXPERIMENTO 2



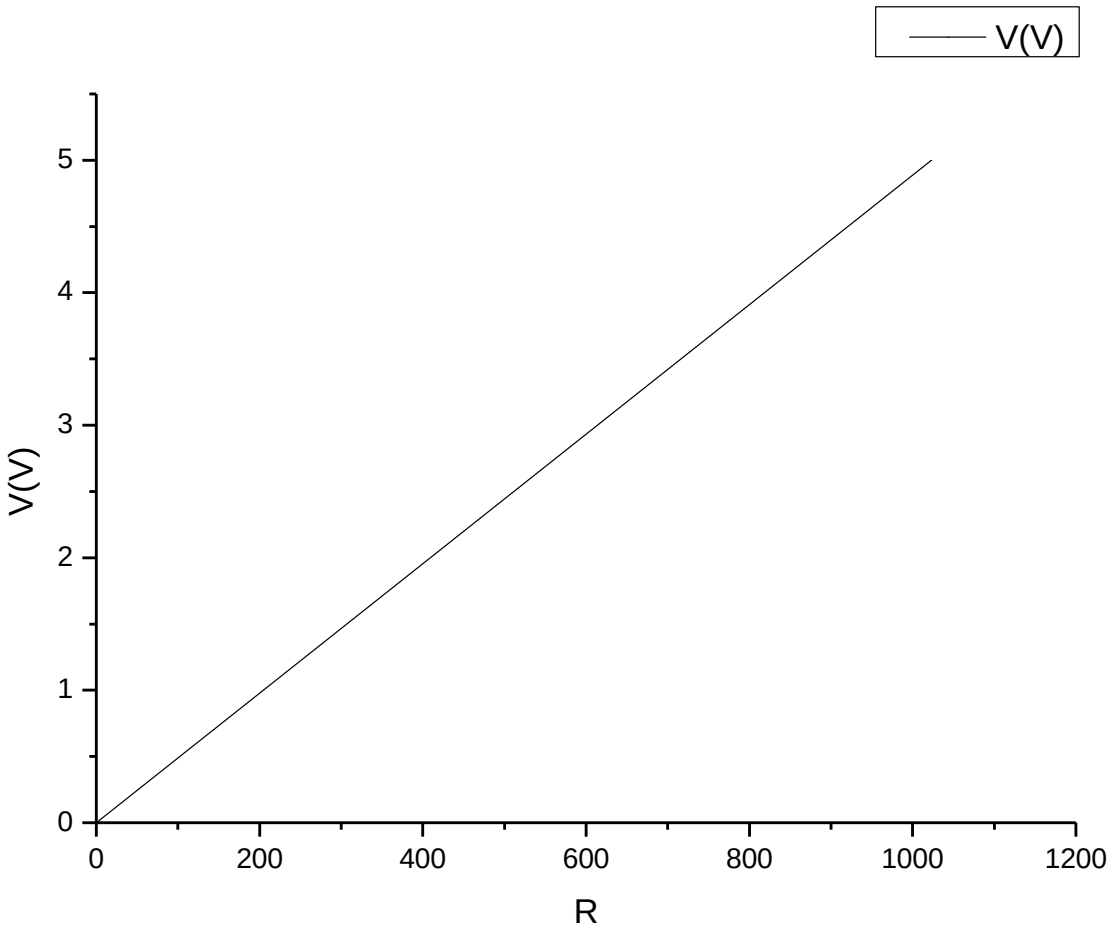
EXPERIMENTO 2

```
const int buttonPin = 2;     // the number of the pushbutton pin
const int ledPin =  13;      // the number of the LED pin

// variables will change:
int buttonState = 0;         // variable for reading the pushbutton status

void setup() {
  // initialize the LED pin as an output:
  pinMode(ledPin, OUTPUT);
  // initialize the pushbutton pin as an input:
  pinMode(buttonPin, INPUT);
}

void loop(){
  // read the state of the pushbutton value:
  buttonState = digitalRead(buttonPin);

  // check if the pushbutton is pressed.
  // if it is, the buttonState is HIGH:
  if (buttonState == HIGH) {
    // turn LED on:
    digitalWrite(ledPin, HIGH);
  }
  else {
    // turn LED off:
    digitalWrite(ledPin, LOW);
  }
}
```

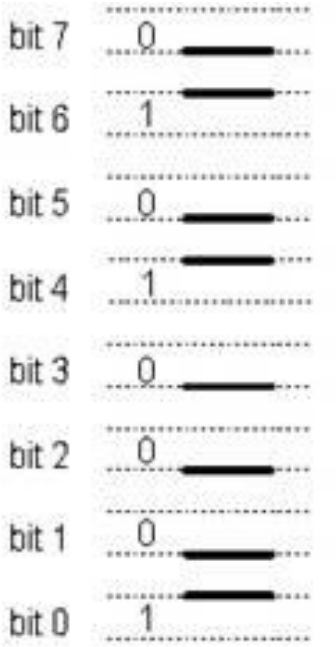
EXPERIMENTO 3



EXPERIMENTO 3



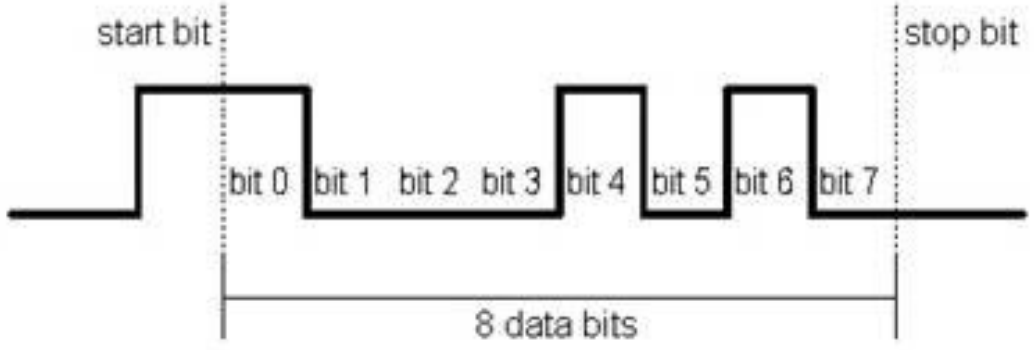
EXPERIMENTO 3



paralela:
8 fios

51H = Q
(ASCII)

serial:
1 fio



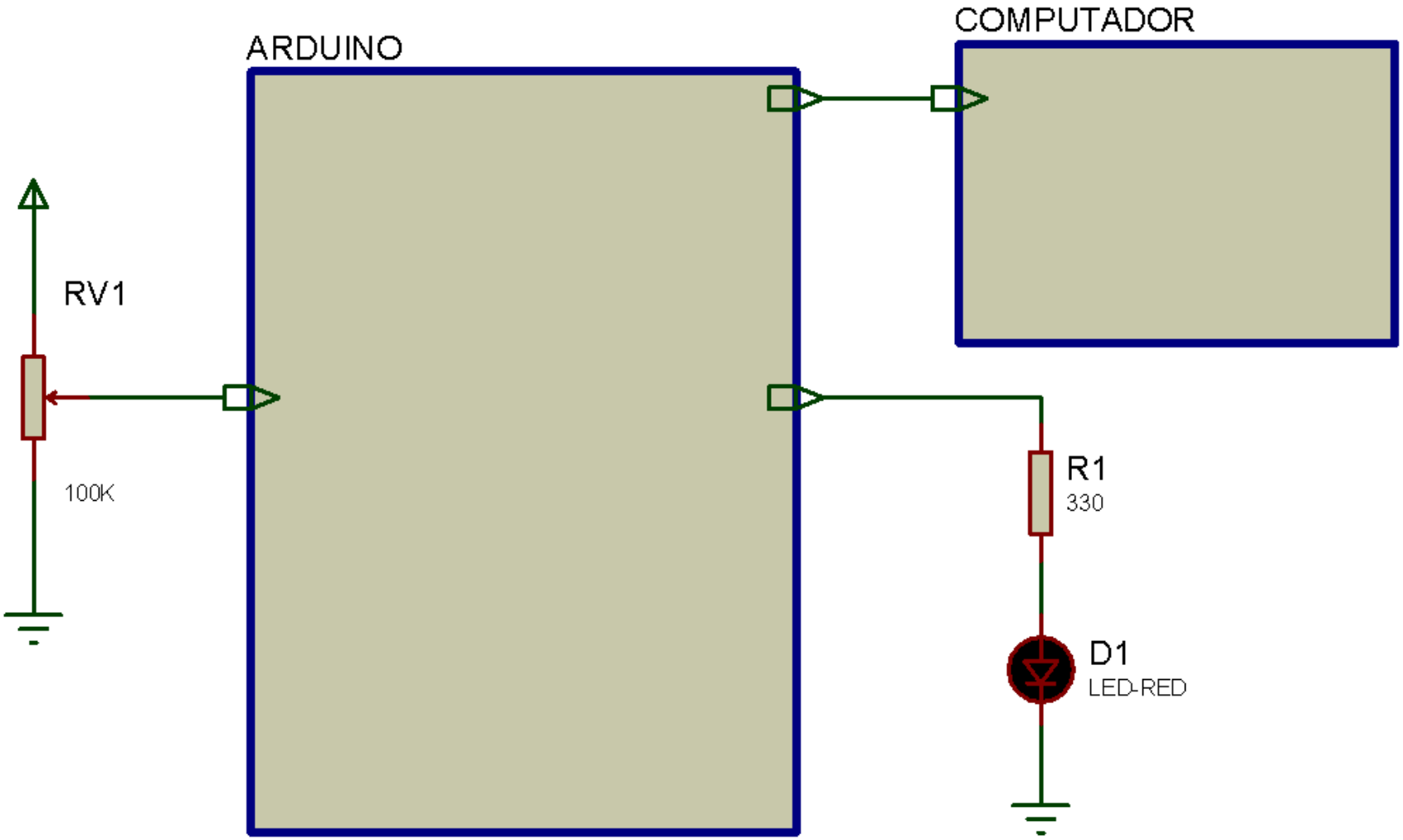
EXPERIMENTO 3

Caracter	Código ASCI	Caracter	Código ASCI
(espaço)	0100 0000	M	1010 1101
.	0100 1110	N	1010 1110
(	0100 1000	O	1010 1111
+	0100 1011	P	1011 0000
$	0100 0100	Q	1011 0001
*	0100 1010	R	1011 0010
)	0100 1001	S	1011 0011
-	0100 1101	T	1011 0100
/	0100 1111	U	1011 0101
'	0100 1100	V	1011 0111
,	0100 0111	W	1011 0111
=	0101 1101	X	1011 1000
A	1010 0001	Y	1011 1001
B	1010 0010	Z	1011 1010
C	1010 0011	0	0101 0000
D	1010 0100	1	0101 0001
E	1010 0101	2	0101 0010
F	1010 0110	3	0101 0011
G	1010 0111	4	0101 0100
H	1010 1000	5	0101 0101
I	1010 1001	6	0101 0110
J	1010 1010	7	0101 0111
K	1010 1011	8	0101 1000
L	1010 1100	9	0101 1001

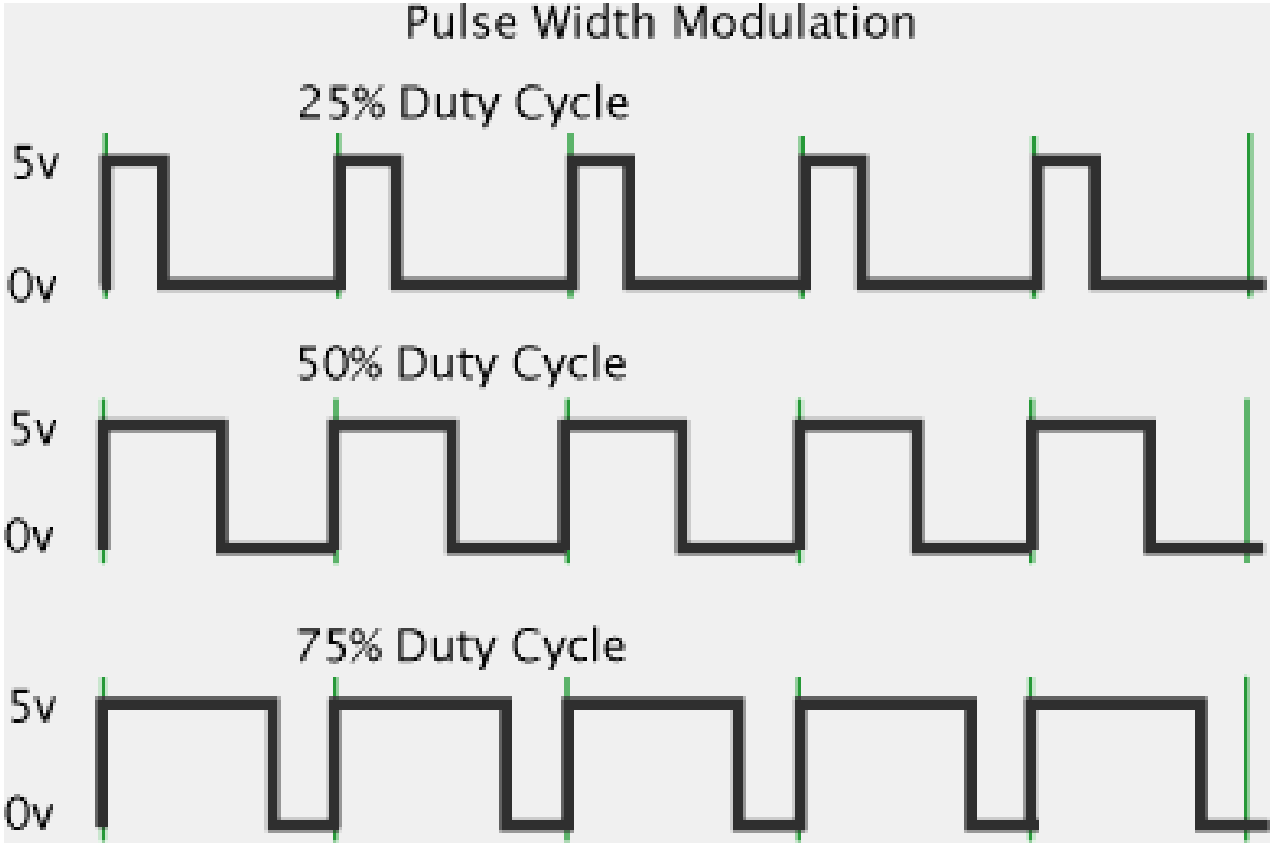
EXPERIMENTO 3

```
void setup() {
  // initialize serial communication at 9600 bits per second:
  Serial.begin(9600);
}

// the loop routine runs over and over again forever:
void loop() {
  // read the input on analog pin 0:
  int sensorValue = analogRead(A0);
  // Convert the analog reading (which goes from 0 - 1023) to a voltage (0 - 5V):
  float voltage = sensorValue * (5.0 / 1023.0);
  // print out the value you read:
  Serial.println(voltage);
}
```

EXPERIMENTO 4



EXPERIMENTO 4



EXPERIMENTO 4

```
const int analogInPin = A0;  // Analog input pin that the potentiometer is attached to
const int analogOutPin = 9; // Analog output pin that the LED is attached to

int sensorValue = 0;        // value read from the pot
int outputValue = 0;        // value output to the PWM (analog out)

void setup() {
  // initialize serial communications at 9600 bps:
  Serial.begin(9600);
}

void loop() {
  // read the analog in value:
  sensorValue = analogRead(analogInPin);
  // map it to the range of the analog out:
  outputValue = map(sensorValue, 0, 1023, 0, 255);
  // change the analog out value:
  analogWrite(analogOutPin, outputValue);

  // print the results to the serial monitor:
  Serial.print("sensor = " );
  Serial.print(sensorValue);
  Serial.print("\t output = ");
  Serial.println(outputValue);

  // wait 2 milliseconds before the next loop
  // for the analog-to-digital converter to settle
  // after the last reading:
  delay(2);
}
```

BIBLIOGRAFIA

✓http://www.arduino.cc/

✓MCROBERTS Michael. *Arduino:básico*. Ed. 1. São Paulo: Novatec,2011.

OBRIGADO!