

LAB 4

MOTORI ELETTRICI CC

ELECTRIC DC MOTORS

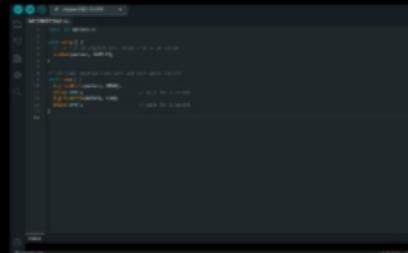
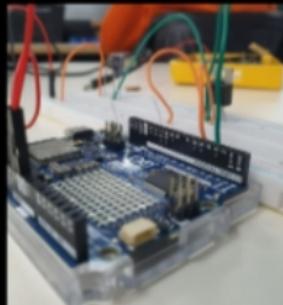
ARDUINO

THE ARDUINO

DI CAPOZZI RICCARDO, MARINI NICCOLÒ E
PARMA CHRISTIAN

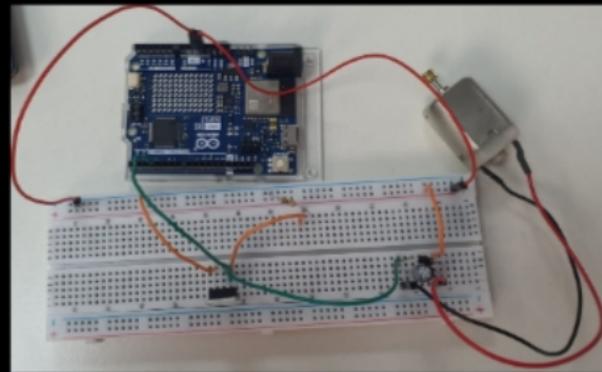
Riassunto

IN QUESTA PRESENTAZIONE
SPIEGHEREMO COME
REALIZZARE VARI CIRCUITI
UTILIZZANDO IL MOTORE
ELETTRICO PRESENTE NEL KIT DI
ARDUINO UNO R3.



Summary

*IN THIS PRESENTATION WE ARE
GOING TO EXPLAIN HOW TO
REALIZE VARIOUS ELECTRIC
CIRCUITS USING THE ELECTRIC
DC MOTOR INCLUDED IN THE
ARDUINO R3 KIT.*

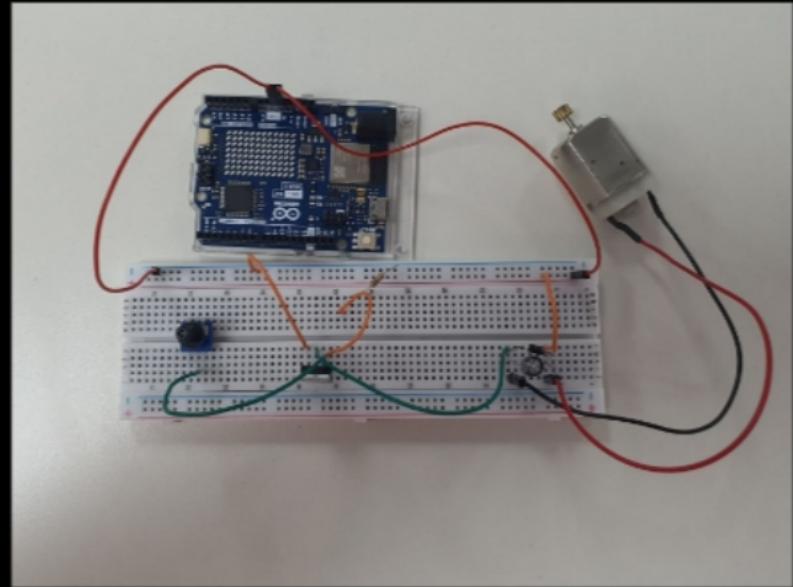
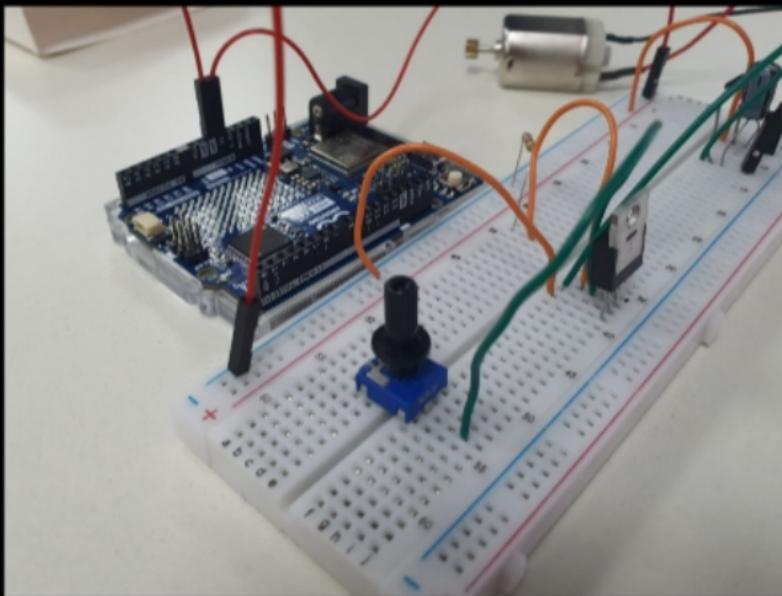


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CIRCUITO 1 / CIRCUIT 1

In questo circuito vi spiegheremo come utilizzare il potenziometro per far partire gradualmente il motore.

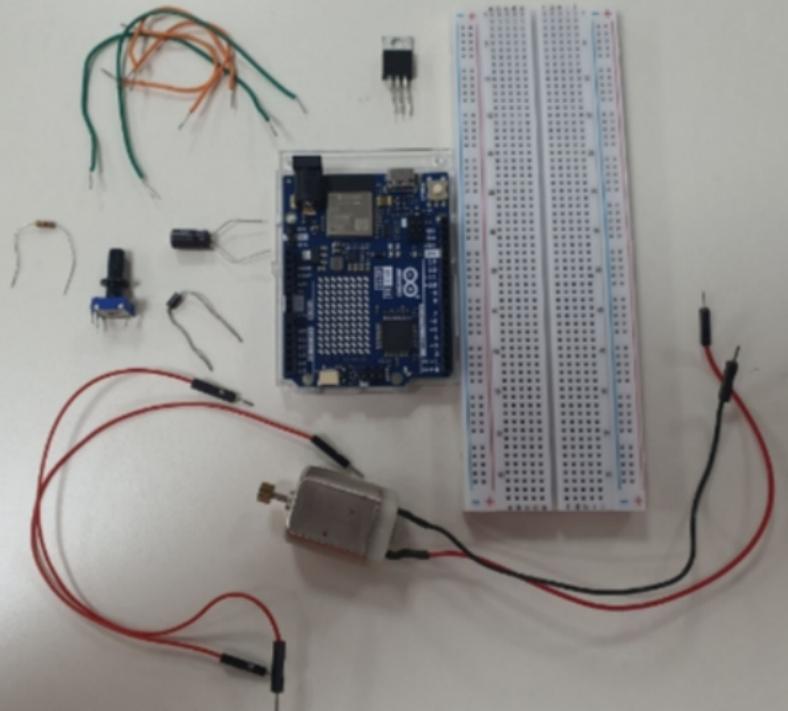


In this circuit we are going to explain to you how to use the potentiometer to make a DC motor spin gradually.

CIRCUITO 1 / CIRCUIT 1 COMPONENTI / MATERIALS NEEDED

Per realizzare questo circuito,
serviranno:

- Scheda Arduino Uno R3 / R4;
- Breadboard;
- 2x Cavi Jumper;
- 7x Ponticelli;
- Potenziometro da 10k;
- Motore;
- Mosfet (IRF520N);
- Diodo (IN4007 / MIC);
- Resistenza da 10kΩ;
- Condensatore (100µF / 16V).

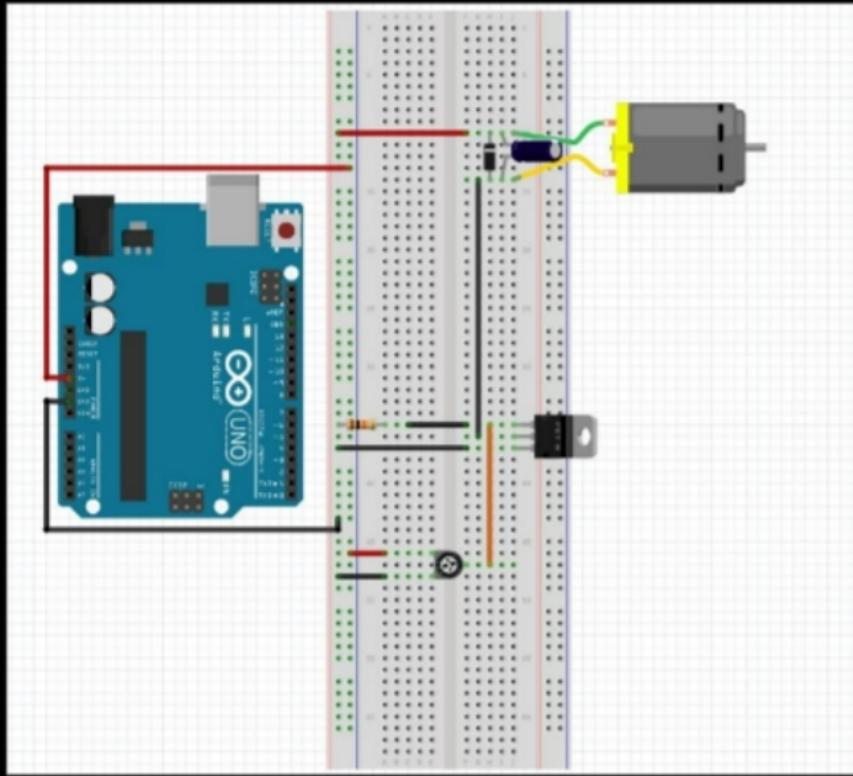


*In order to realize this circuit, you will
need:*

- Arduino Uno Board R3 / R4;
- Breadboard;
- 2x Jumper Cables;
- 7x Cables;
- 10k Potentiometer;
- Motor;
- Mosfet (IRF520N);
- Diode (IN4007 / MIC);
- 10kΩ Resistor;
- Capacitor (100µF / 16V).

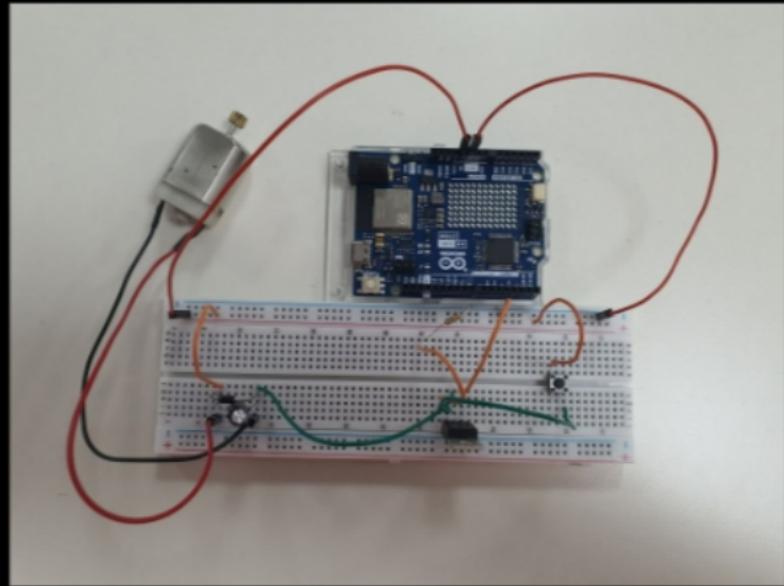
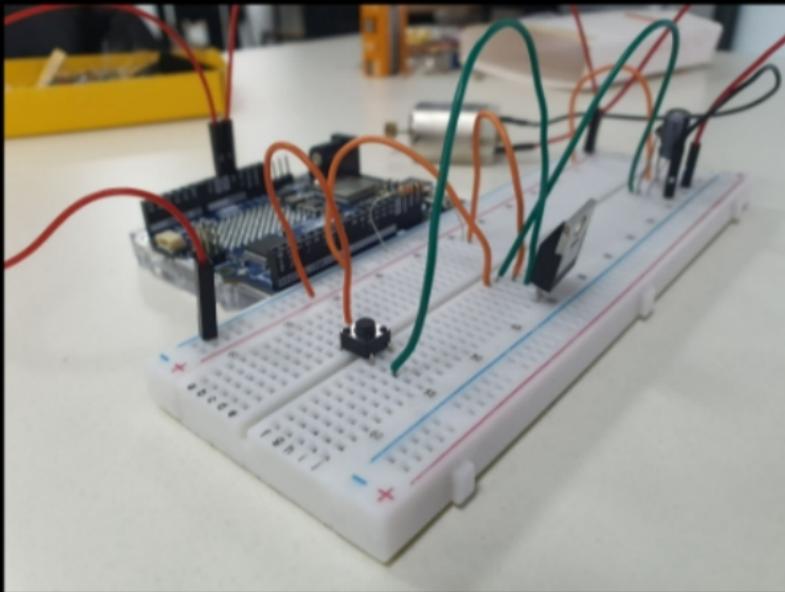
CIRCUITO 1 / CIRCUIT 1

SCHEMA FRITZING / FRITZING SCHEME



CIRCUITO 2 / CIRCUIT 2

In questo circuito vi spiegheremo come utilizzare un pushbutton per accendere e spegnere il motore.



In this circuit we are going to explain to you how to use a pushbutton in order to make a motor spin and then stop.

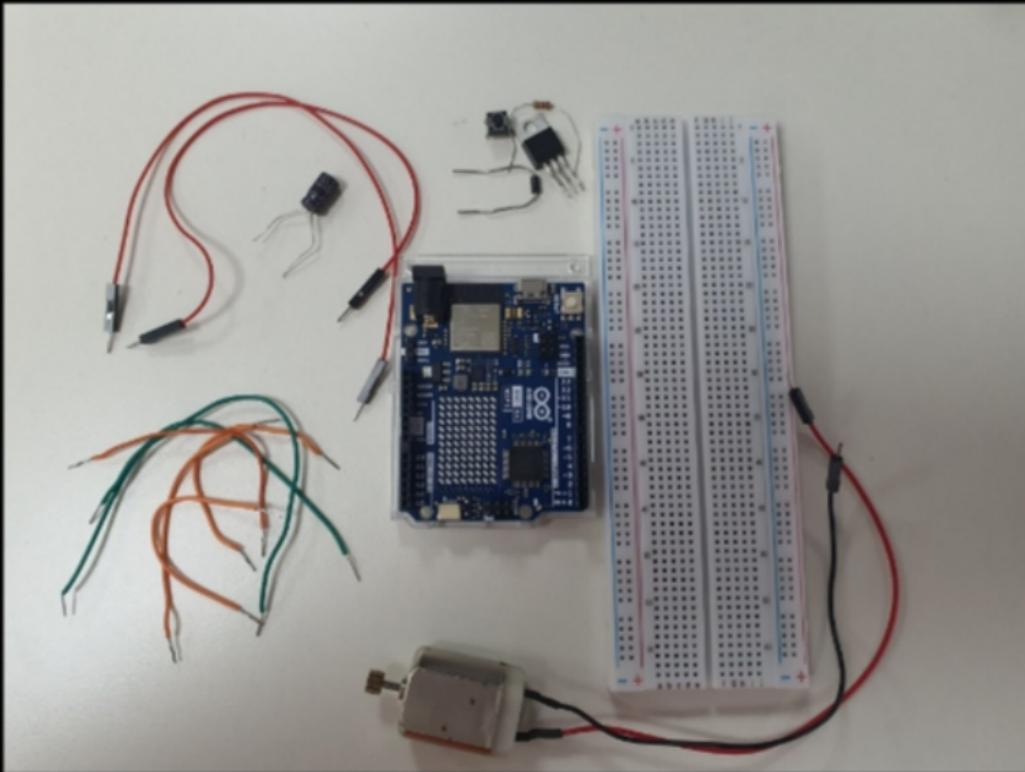
CIRCUITO 2 / CIRCUIT 2 COMPONENTI / MATERIALS NEEDED

Per realizzare questo circuito,
serviranno:

- Scheda Arduino Uno R3 / R4;
- Breadboard;
- 2x Cavi Jumper;
- 6x Ponticelli;
- Pushbutton;
- Motore;
- Mosfet (IRF520N);
- Diodo (IN4007 / MIC);
- Resistenza da $10k\Omega$;
- Condensatore ($100\mu F$ / 16V).

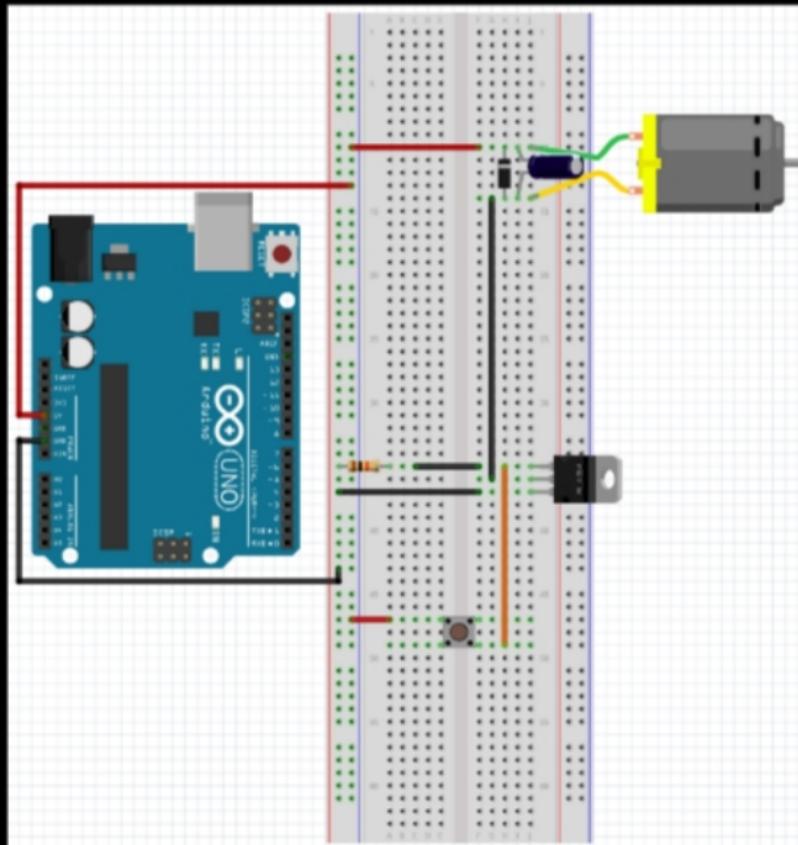
*In order to realize this circuit, you will
need:*

- Arduino Uno Board R3 / R4;
- Breadboard;
- 2x Jumper Cables;
- 6x Cables;
- Pushbutton;
- Motor;
- Mosfet (IRF520N);
- Diode (IN4007 / MIC);
- $10k\Omega$ Resistor;
- Capacitor ($100\mu F$ / 16V).



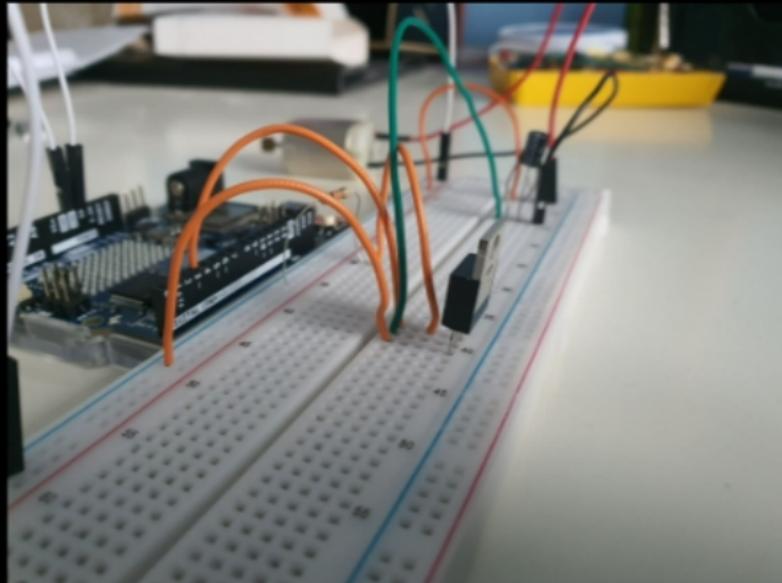
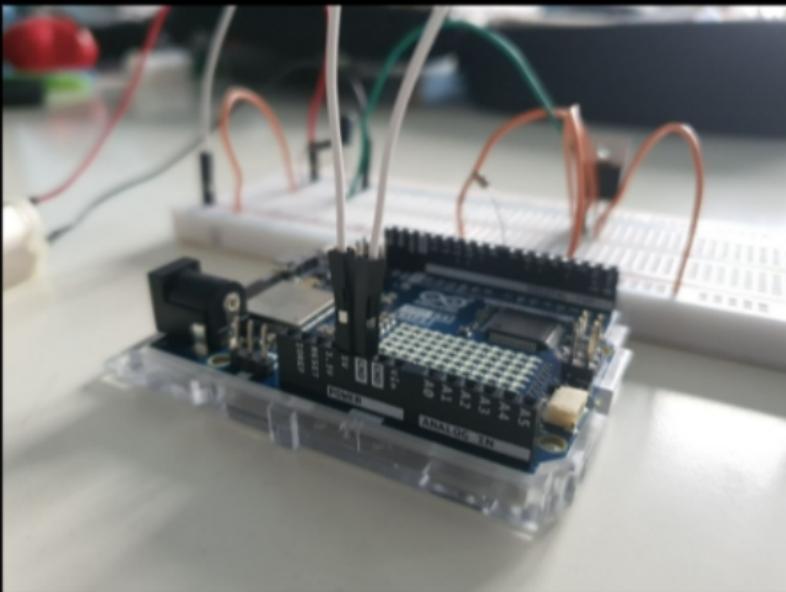
CIRCUITO 2 / CIRCUIT 2

SCHEMA FRITZING / FRITZING SCHEME



CIRCUITO 3 / CIRCUIT 3

In questo circuito vi spiegheremo come utilizzare Arduino IDE per accendere il motore in svariati modi.

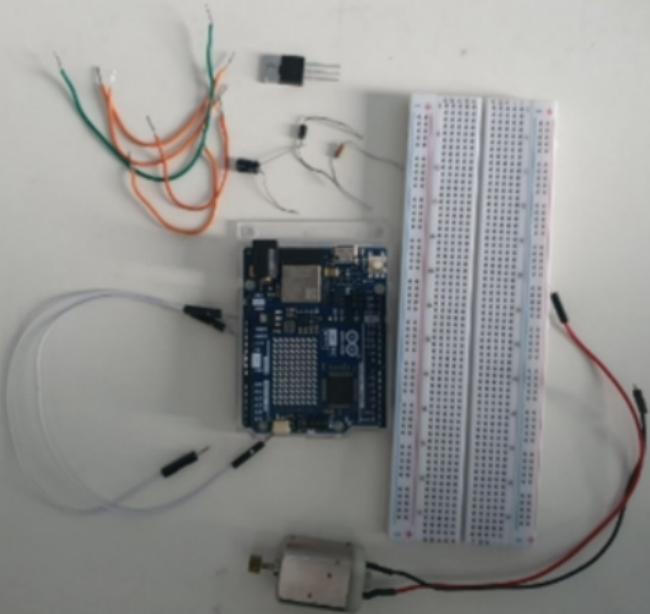


In this circuit we are going to explain to you how to use Arduino IDE in order to make a DC motor spin in various ways.

CIRCUITO 3 / *CIRCUIT 3* COMPONENTI / *MATERIALS NEEDED*

Per realizzare questo circuito,
serviranno:

- Scheda Arduino Uno R3 / R4;
- Breadboard;
- 2x Cavi Jumper;
- 5x Ponticelli;
- Motore;
- Mosfet (IRF520N);
- Diodo (IN4007 / MIC);
- Resistenza da 10kΩ;
- Condensatore (100µF / 16V).

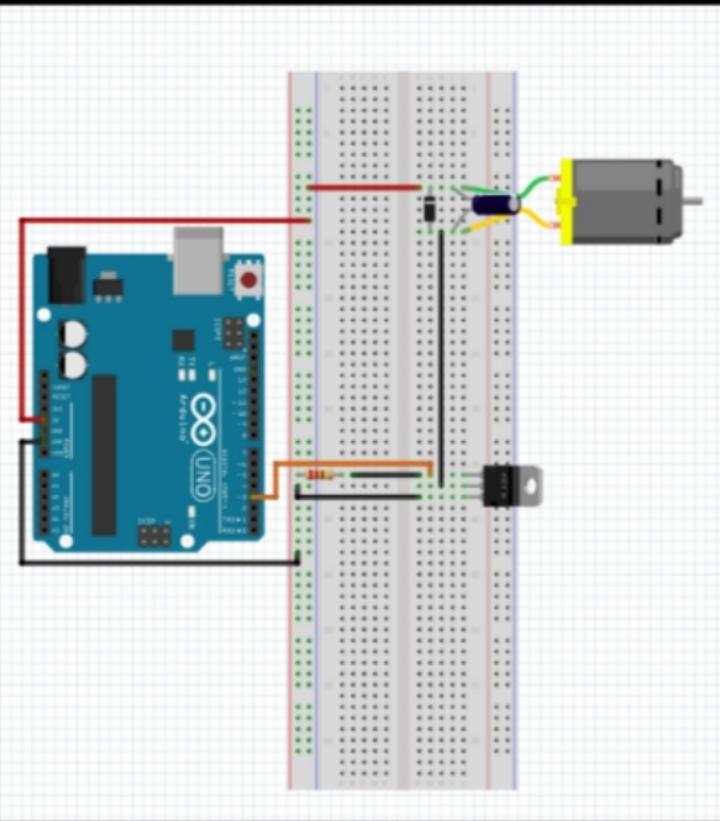


*In order to realize this circuit, you will
need:*

- *Arduino Uno Board R3 / R4;*
- *Breadboard;*
- *2x Jumper Cables;*
- *5x Cables;*
- *Motor;*
- *Mosfet (IRF520N);*
- *Diode (IN4007 / MIC);*
- *10kΩ Resistor;*
- *Capacitor (100µF / 16V).*

CIRCUITO 3 / CIRCUIT 3

SCHEMA FRITZING / FRITZING SCHEME



CODICE ACCENSIONE MOTORE CON MONITOR SERIALE *CODE TO SPIN THE DC MOTOR WITH THE SERIAL MONITOR*

```
File Edit Sketch Tools Help
Arduino UNO R4 WiFi
MOTORE.ino
1  int motorPin = 3;
2  void setup()
3  {
4    pinMode (motorPin, OUTPUT);
5    Serial.begin(9600);
6    while (! Serial);
7    Serial.println("speed # to 255");
8  }
9  void loop()
10 {
11   if (Serial.available())
12   {
13     int speed = Serial.parseInt();
14     if (speed >= 0 && speed <= 255)
15     {
16       analogWrite(motorPin, speed);
17     }
18     delay(100);
19   }
20 }
21
```



 CODICI / CODES

CODICE ACCENSIONE MOTORE AD INTERMITTENZA

CODE TO SPIN THE DC MOTOR ON INTERMITTANCE

File Edit Sketch Tools Help

Arduino UNO R4 WiFi

INTERMITTENZAino

```
1 const int motore=3;
2
3 void setup() {
4     // Initialize digital pin LED_BUILTIN as an output.
5     pinMode(motore, OUTPUT);
6 }
7
8 // If the loop function runs over and over again forever
9 void loop() {
10    digitalWrite(motore, HIGH);           // wait for a second
11    delay(1000);
12    digitalWrite(motore, LOW);          // wait for a second
13    delay(1000);
14 }
```

SCAN
ME



 CODICI / CODES

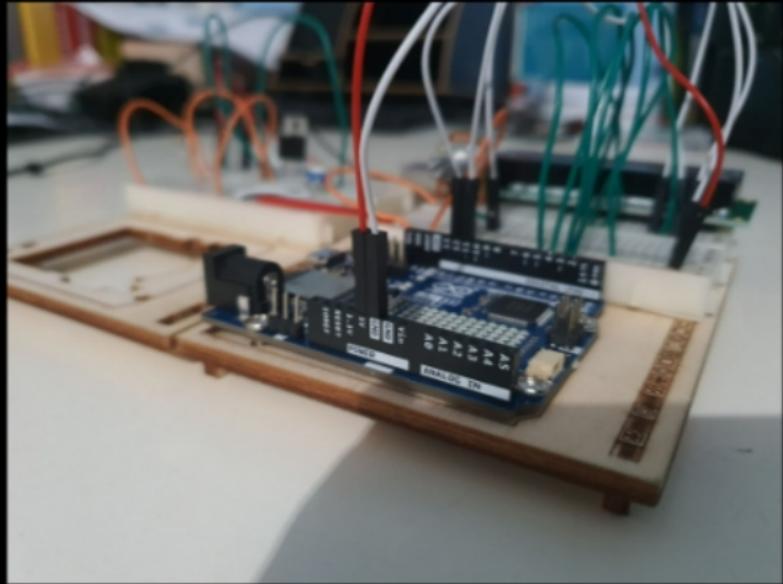
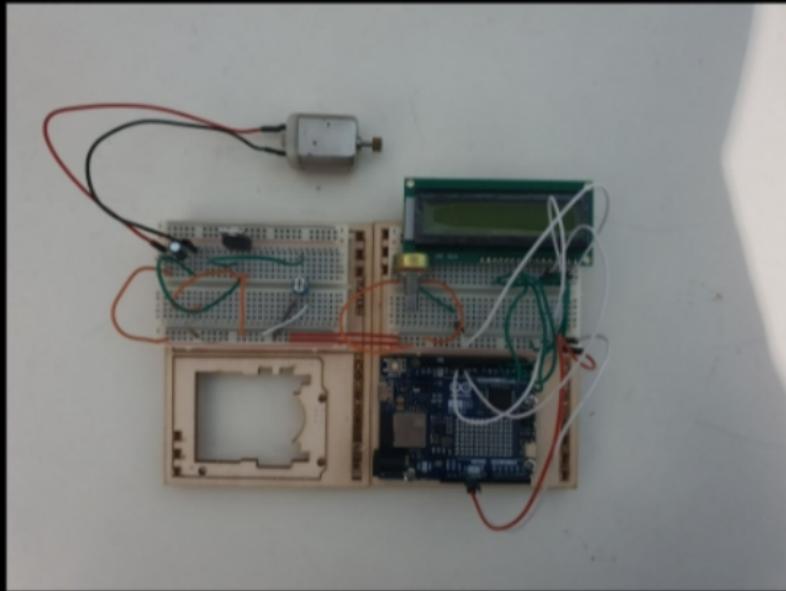
Output

Indexing 13/67

Ln 15, Col 1 Arduino UNO R4 WiFi on COM3 (not connected)

CIRCUITO 4 / CIRCUIT 4

In questo circuito vi spiegheremo come utilizzare Arduino IDE per accendere il motore e vedere sullo schermo LCD i suoi valori.



In this circuit we are going to explain to you how to use Arduino IDE in order to make a DC motor spin and see its values on an LCD screen.

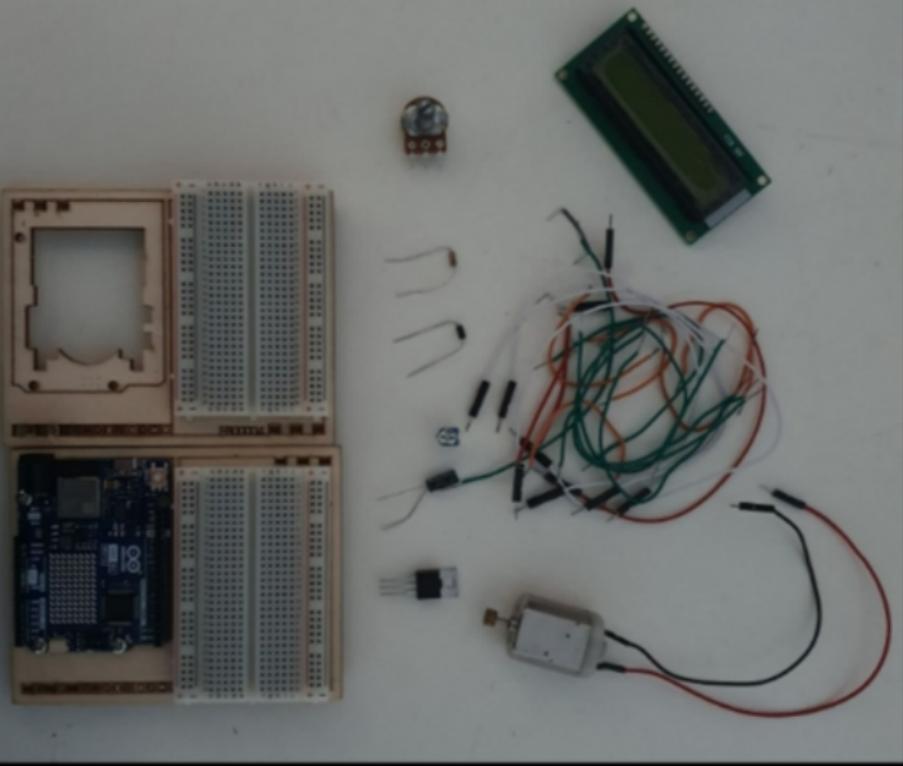
CIRCUITO 4 / CIRCUIT 4 COMPONENTI / MATERIALS NEEDED

Per realizzare questo circuito,
serviranno:

- Scheda Arduino Uno R3 / R4;
- 2x Breadboard;
- 2x Cavi Jumper;
- 19x Ponticelli;
- Motore;
- Mosfet (IRF520N);
- Diodo (IN4007 / MIC);
- Resistenza da 10kΩ;
- Condensatore (100µF / 16V);
- 2x Potenziometri da 10k;
- Schermo LCD a cristalli liquidi;
- Arduino IDE Software
(<https://www.arduino.cc/en/software>)

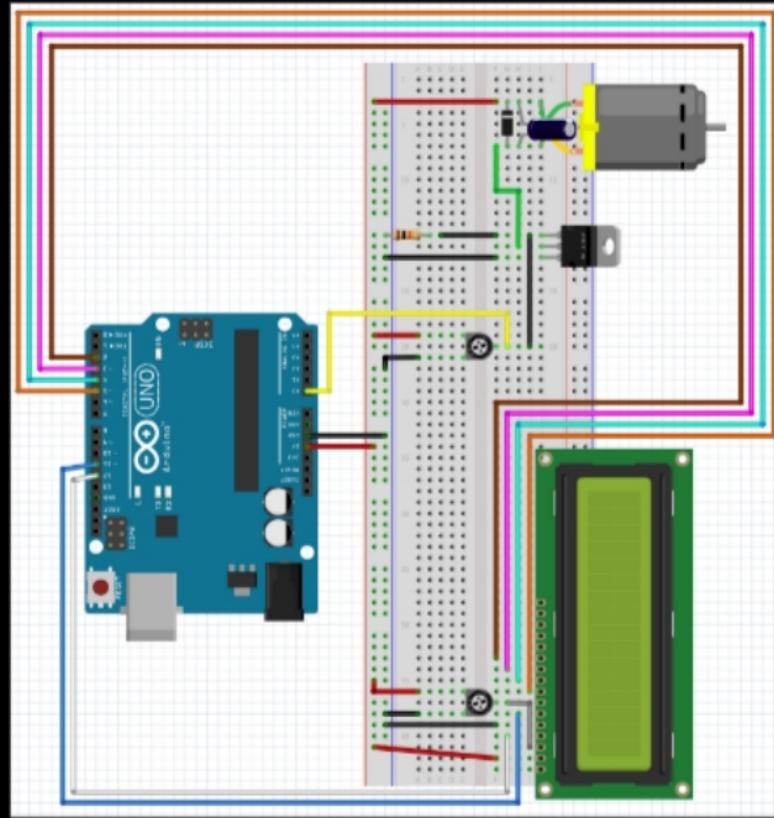
*In order to realize this circuit, you will
need:*

- Arduino Uno Board R3 / R4;
- 2x Breadboard;
- 2x Jumper Cables;
- 19x Cables;
- Motor;
- Mosfet (IRF520N);
- Diode (IN4007 / MIC);
- 10kΩ Resistor;
- Capacitor (100µF / 16V);
- 2x 10k Potentiometers;
- LCD Liquid Crystals Screen;
- Arduino IDE Software
(<https://www.arduino.cc/en/software>)



CIRCUITO 4 / CIRCUIT 4

SCHEMA FRITZING / FRITZING SCHEME



CODICE ACCENSIONE MOTORE CON LCD

CODE TO SPIN THE DC MOTOR WITH THE LCD SCREEN

File Edit Sketch Tools Help

Arduino UNO R4 WiFi

LCD.h

```
31 by Tom Igoe
32 modified 7 Nov 2016
33 by Arturo Guadalupi
34
35 This example code is in the public domain.
36
37 https://docs.arduino.cc/learn/electronics/lcd-displays/autoscroll-example
38 https://github.com/arduino-libraries/LiquidCrystal
39 */
40 // Include the library code:
41 #include <LiquidCrystal.h>
42 const int pot=40;
43 float value;
44
45 // Initialize the library by associating any needed LCD interface pin
46 // with the Arduino pin number it is connected to
47 const int rs = 2, en = 11, d4 = 5, d5 = 4, d6 = 3, d7 = 2;
48 LiquidCrystal lcd(rs, en, d4, d5, d6, d7);
49
50 void setup() {
51   // Set up the LCD's number of columns and rows:
52   lcd.begin(16, 2);
53   pinMode(pot, INPUT);
54 }
55
56 void loop() {
57   // Set the cursor to (0,0):
58   lcd.setCursor(0, 0);
59   // Print from 0 to 9:
60   value=analogRead(pot);
61   lcd.print("Value is: ");
62
63   lcd.print(value);
64
65   delay(500);
66
67
68
69
70 }
71
```

Output

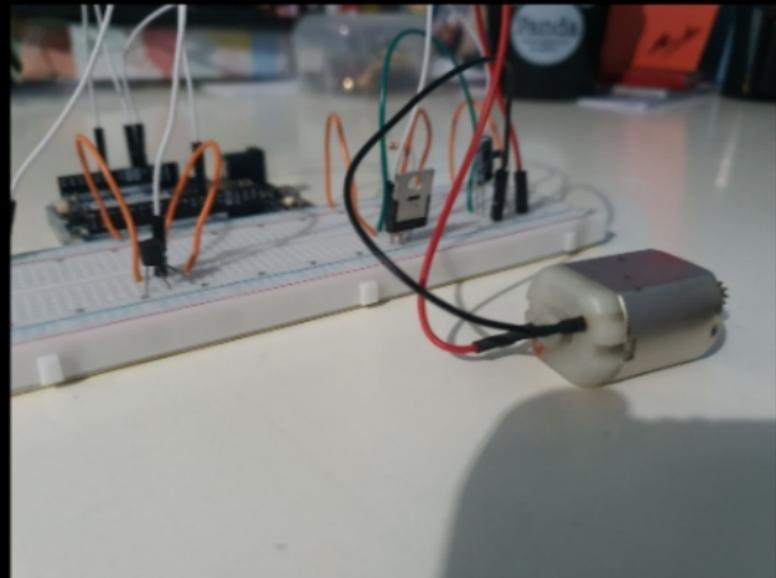
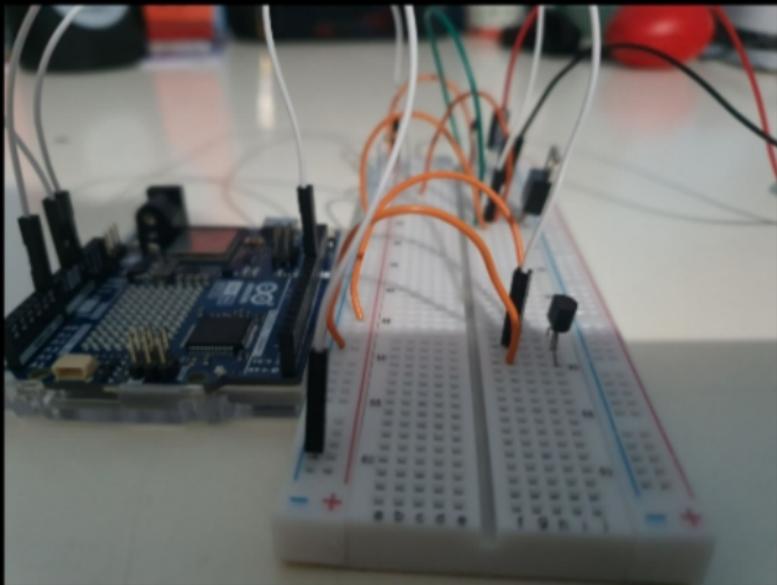
Ln 75, Col 1 Arduino UNO R4 WiFi on COM3 (not connected) ☰

SCAN ME

CODICI / CODES

CIRCUITO 5 / CIRCUIT 5

In questo circuito vi spiegheremo come utilizzare Arduino IDE per accendere il motore con il sensore della temperatura.



In this circuit we are going to explain to you how to use Arduino IDE in order to make a DC motor spin thanks to the temperature sensor.

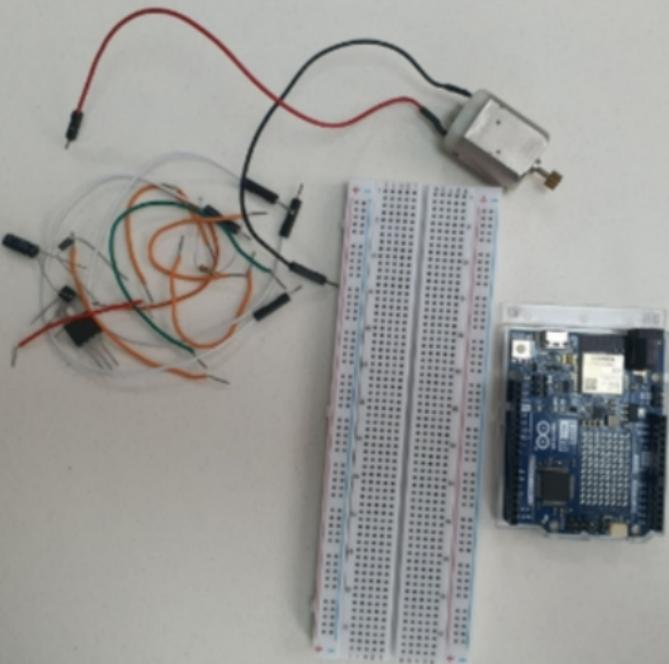
CIRCUITO 5 / CIRCUIT 5 COMPONENTI / MATERIALS NEEDED

Per realizzare questo circuito, serviranno:

- Scheda Arduino Uno R3 / R4;
- Breadboard;
- 2x Cavi Jumper;
- 7x Ponticelli;
- Motore;
- Mosfet (IRF520N);
- Diodo (IN4007 / MIC);
- Resistenza da 10kΩ;
- Condensatore (100µF / 16V);
- Sensore della temperatura TMP
- Arduino IDE Software
(<https://www.arduino.cc/en/software>)
- Opzionale:
- Multimetro.

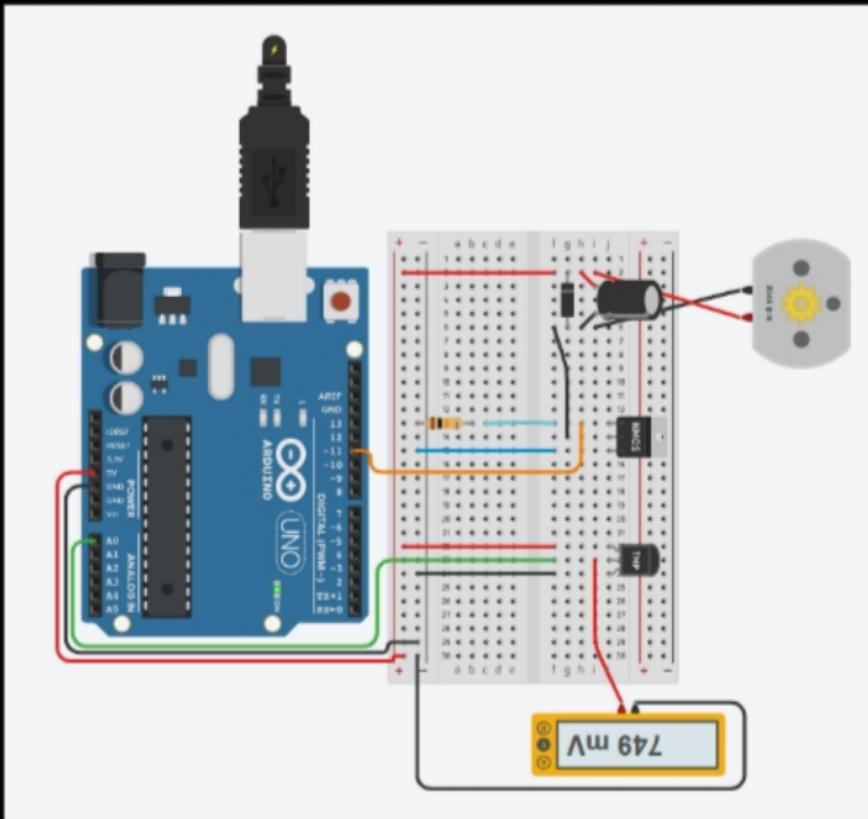
In order to realize this circuit, you will need:

- Arduino Uno Board R3 / R4;*
- Breadboard;*
- 2x Jumper Cables;*
- 7x Cables;*
- Motor;*
- Mosfet (IRF520N);*
- Diode (IN4007 / MIC);*
- 10kΩ Resistor;*
- Capacitor (100µF / 16V);*
- Temperature Sensor TMP*
- Arduino IDE Software*
(<https://www.arduino.cc/en/software>)
- Optional:*
- Multimeter.*



CIRCUITO 5 / CIRCUIT 5

SCHEMA FRITZING / FRITZING SCHEME



CODICE ACCENSIONE MOTORE CON SENSORE DI TEMPERATURA

CODE TO SPIN THE DC MOTOR WITH THE TEMPERATURE SENSOR

File Edit Sketch Tools Help

Select Board

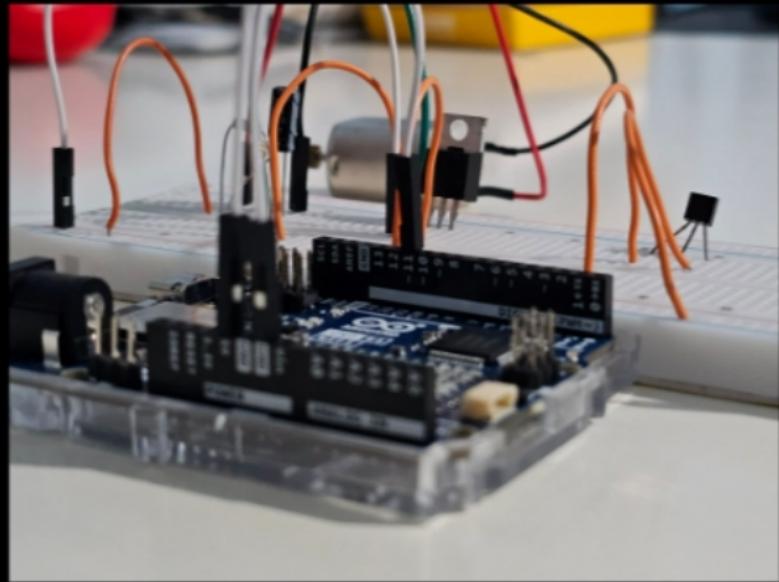
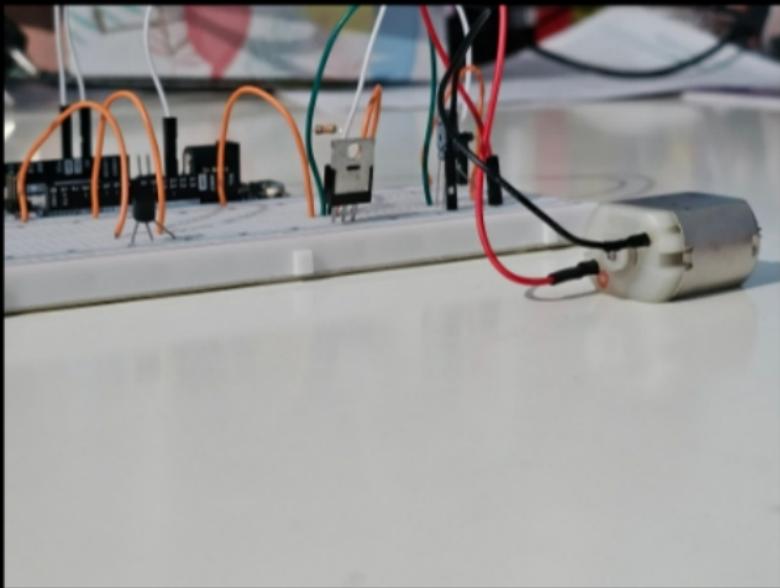
```
sketch_marte11a.ino
1 void setup()
2 {
3     pinMode(A0, INPUT);
4     pinMode(11, OUTPUT);
5 }
6
7 void loop()
8 {
9     float value=analogRead(A0);
10    float volt=value*5/1023;
11
12    if (volt > 0,5){
13        digitalWrite(11, HIGH);
14    }
15
16 }
```



CODICI / CODES

CIRCUITO 6 / CIRCUIT 6

In questo circuito vi spiegheremo come utilizzare Arduino IDE per accendere proporzionalmente alla temperatura il motore.



In this circuit we are going to explain to you how to use Arduino IDE in order to make a DC motor spin proportionally to the temperature.

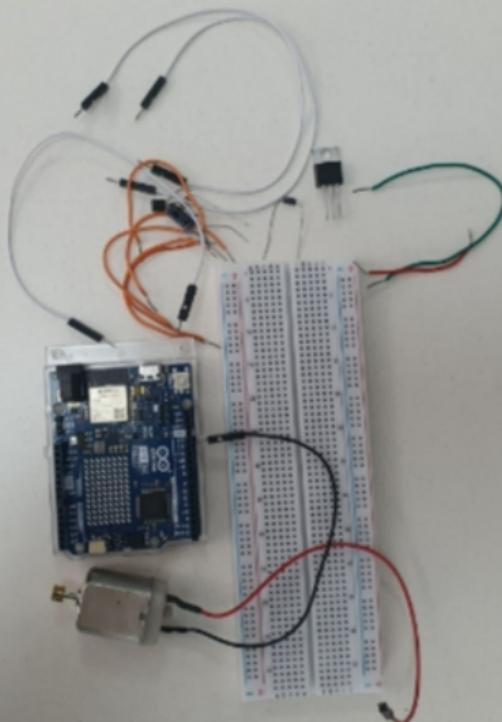
CIRCUITO 6 / CIRCUIT 6 COMPONENTI / MATERIALS NEEDED

Per realizzare questo circuito, serviranno:

- Scheda Arduino Uno R3 / R4;
 - Breadboard;
 - 2x Cavi Jumper;
 - 8x Ponticelli;
 - Motore;
 - Mosfet (IRF520N);
 - Diodo (IN4007 / MIC);
 - Resistenza da 10kΩ;
 - Condensatore (100µF / 16V);
 - Sensore della temperatura TMP
 - Arduino IDE Software
(<https://www.arduino.cc/en/software>)
- Opzionale:
- Multimetro.

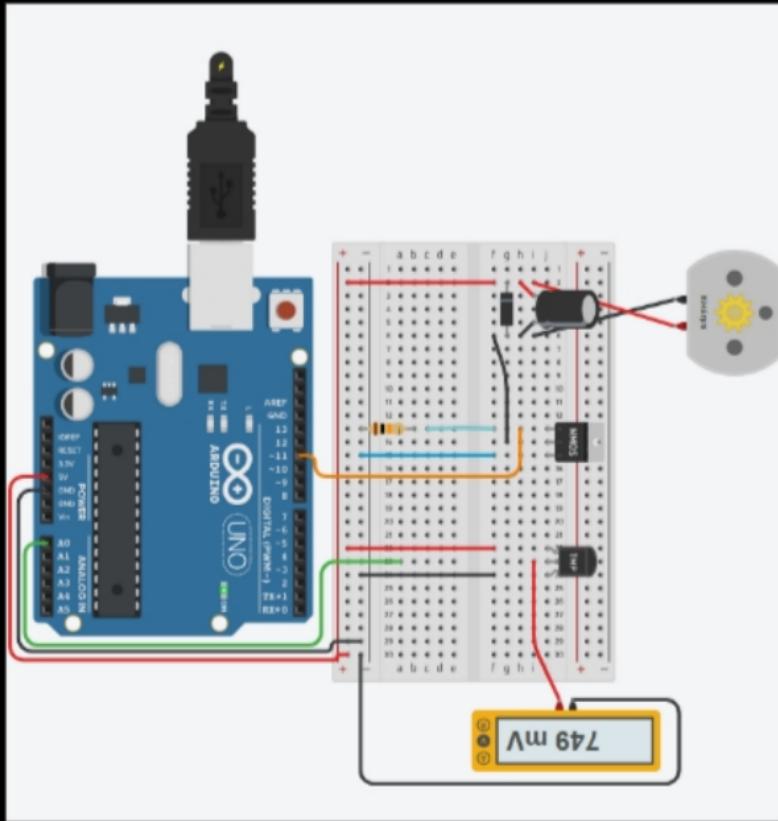
In order to realize this circuit, you will need:

- *Arduino Uno Board R3 / R4;*
 - *Breadboard;*
 - *2x Jumper Cables;*
 - *8x Cables;*
 - *Motor;*
 - *Mosfet (IRF520N);*
 - *Diode (IN4007 / MIC);*
 - *10kΩ Resistor;*
 - *Capacitor (100µF / 16V);*
 - *Temperature Sensor TMP*
 - *Arduino IDE Software*
(<https://www.arduino.cc/en/software>)
- Optional:*
- *Multimeter.*

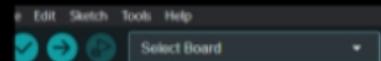


CIRCUITO 6 / CIRCUIT 6

SCHEMA FRITZING / FRITZING SCHEME



CODICE ACCENSIONE MOTORE CON SENSORE DI TEMPERATURA CODE TO SPIN THE DC MOTOR WITH THE TEMPERATURE SENSOR



```
1 void setup()
2 {
3   pinMode(A0, INPUT);
4   pinMode(11, OUTPUT);
5 }
6
7 void loop()
8 {
9   float value=analogRead(A0);
10  float volt=value*5/1023;
11  int speed=map(volt, 0, 0.8, 0, 255);
12  analogWrite(11, speed);
13 }
14
```



 CODICI / CODES

**GRAZIE PER
L'ATTENZIONE!**

