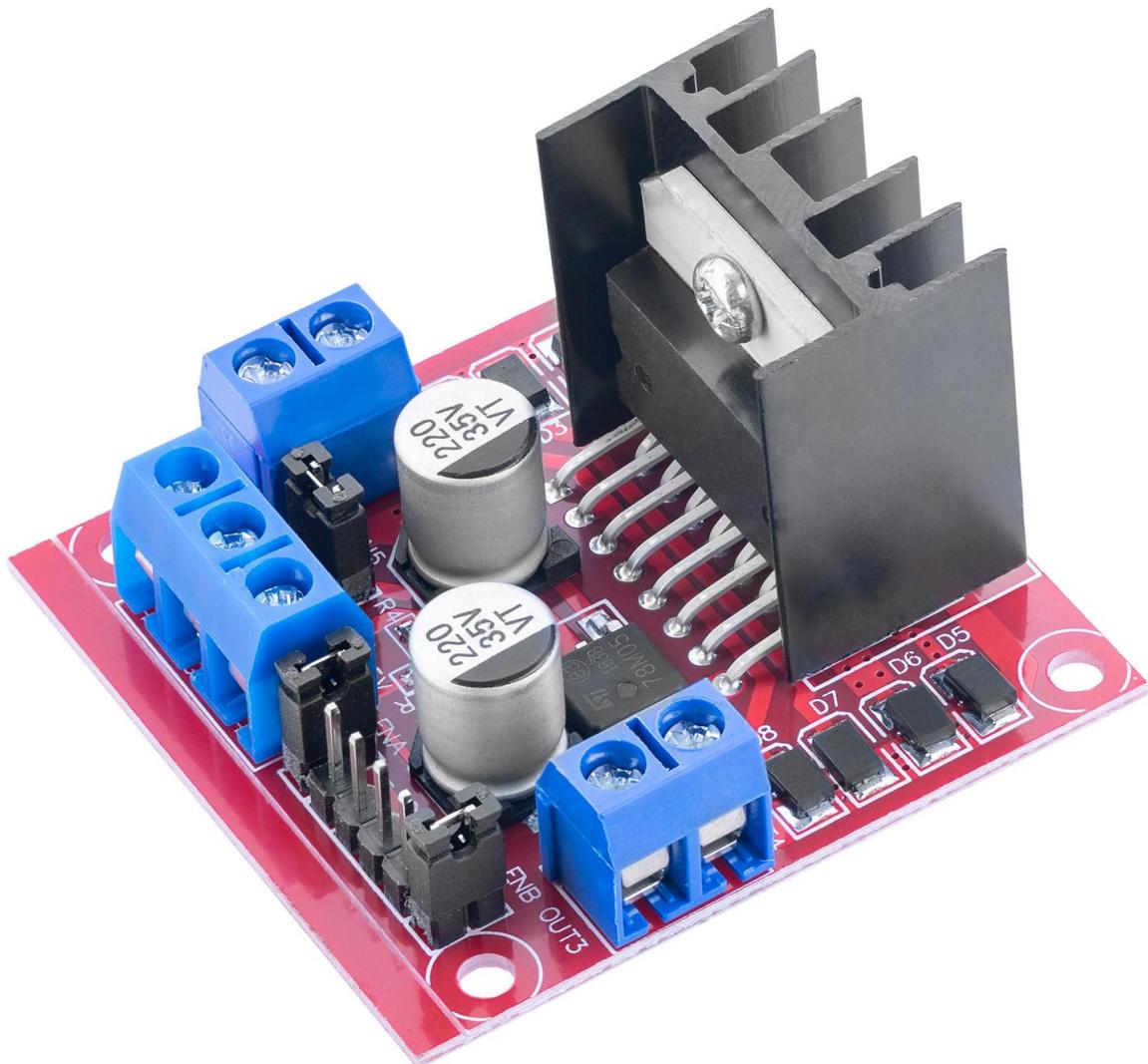


AZ-L298N

ebook

AZ-L298N Motor Driver Board



Areas of application

Education and teaching: Use in schools, universities and training institutions to teach the basics of electronics, programming and embedded systems. Research and development: Use in research and development projects to create prototypes and experiments in the fields of electronics and computer science. Prototype development: Use in the development and testing of new electronic circuits and devices. Hobby and Maker Projects: Used by electronics enthusiasts and hobbyists to develop and implement DIY projects.

Required knowledge and skills

Basic understanding of electronics and electrical engineering. Knowledge of programming, especially in the C/C++ programming language. Ability to read schematics and design simple circuits. Experience working with electronic components and soldering.

Operating conditions

The product may only be operated with the voltages specified in the data sheet to avoid damage. A stabilized DC power source is required for operation. When connecting to other electronic components and circuits, the maximum current and voltage limits must be observed to avoid overloads and damage.

Environmental conditions

The product should be used in a clean, dry environment to avoid damage caused by moisture or dust. Protect the product from direct sunlight (UV)

Intended Use

The product is designed for use in educational, research and development environments. It is used to develop, program and prototype electronic projects and applications. The Sensor product is not intended as a finished consumer product, but rather as a tool for technically savvy users, including engineers, developers, researchers and students.

Improper foreseeable use

The product is not suitable for industrial use or safety-relevant applications. Use of the product in medical devices or for aviation and space travel purposes is not permitted

disposal

Do not discard with household waste! Your product is according to the European one Directive on waste electrical and electronic equipment to be disposed of in an environmentally friendly manner. The valuable raw materials contained therein can be recycled become. The application of this directive contributes to environmental and health protection. Use the collection point set up by your municipality to return and Recycling of old electrical and electronic devices. WEEE Reg. No.: DE 62624346

electrostatic discharge

Attention: Electrostatic discharges can damage the product. Note: Ground yourself before touching the product, such as by wearing an anti-static wrist strap or touching a grounded metal surface.

safety instructions

Although our product complies with the requirements of the RoHS Directive (2011/65/EU) and does not contain any hazardous substances in quantities above the permitted limits, residues may still be present. Observe the following safety instructions to avoid chemical hazards: Caution: Soldering can produce fumes that can be harmful to health. Note: Use a solder fume extractor or work in a well-ventilated area. If necessary, wear a respirator mask. Caution: Some people may be sensitive to certain materials or chemicals contained in the product. Note: If skin irritation or allergic reactions occur, stop use and, if necessary, consult a doctor. Caution: Keep the product out of the reach of children and pets to avoid accidental contact and swallowing of small parts. Note: Store the product in a safe, closed container when not in use. Attention: Avoid contact of the product with food and drinks. Note: Do not store or use the product near food to prevent contamination. Although our product complies with the requirements of the RoHS Directive (2011/65/EU) and does not contain any hazardous substances in quantities above the permitted limits, residues may still be present. Observe the following safety instructions to avoid chemical hazards: Caution: Soldering can produce fumes that can be harmful to health. Note: Use a solder fume extractor or work in a well-ventilated area. If necessary, wear a respirator mask. Caution: Some people may be sensitive to certain materials or chemicals contained in the product. Note: If skin irritation or allergic reactions occur, stop use and, if necessary,

consult a doctor. Caution: Keep the product out of the reach of children and pets to avoid accidental contact and swallowing of small parts. Note: Store the product in a safe, closed container when not in use. Attention: Avoid contact of the product with food and drinks. Note: Do not store or use the product near food to prevent contamination. The product contains sensitive electronic components and sharp edges. Improper handling or assembly can result in injury or damage. Observe the following safety instructions to avoid mechanical hazards: Attention: The product's circuit board and connectors may have sharp edges. Use caution to avoid cuts. Note: Wear appropriate protective gloves when handling and assembling the product. Caution: Avoid excessive pressure or mechanical stress on the board and components. Note: Only mount the product on stable and flat surfaces. Use appropriate spacers and housings to minimize mechanical stress. Attention: Make sure the product is securely fastened to prevent accidental slipping or falling. Note: Use appropriate support or secure mounting in enclosures or on mounting plates. Caution: Make sure all cable connections are connected securely and correctly to avoid strain and accidental unplugging. Note: Route cables so that they are not under tension and do not pose a tripping hazard. The product operates with electrical voltages and currents that, if used improperly, can result in electric shocks, short circuits or other hazards. Observe the following safety instructions to avoid electrical hazards: Attention: Use the product only with the specified voltages. Note: The performance limits of the product can be found in the associated data sheet Caution: Avoid short circuits between the connectors and components of the product Note: Make sure that no conductive objects touch or bridge the circuit board. Use insulated tools and pay attention to the arrangement of connections. Caution: Do not perform any work on the product when it is connected to a power source. Note: Disconnect the product from power before making any circuit changes or connecting or removing components. Caution: Do not exceed the specified current ratings for the product's inputs and outputs. Note: The performance limits of the product can be found in the technical specifications or in the data sheet Attention: Make sure that the power sources used are stable and correctly sized. Note: Only use tested and suitable power supplies to avoid voltage fluctuations and overloads. Attention: Maintain sufficient distance from live parts to avoid accidental contact. Note: Ensure that the cabling is arranged safely and clearly according to the voltage used. Caution: Use insulating housings or protective covers to protect the product from direct contact. Note: Place the product in a non-conductive case to avoid accidental touching and short circuits. The product and the components on it may become warm during operation. Improper handling or overloading the product can result in burns, damage or fire. Observe the following safety instructions to avoid thermal hazards: Caution: Make sure the product is used within recommended operating temperatures. Note: The recommended operating temperature range is typically between -40°C and +85°C. Check the specific information in the product data sheet. Attention: Do not place the product near external heat sources such as radiators or direct sunlight. Note: Ensure that the product is operated in a cool and well-ventilated area. Attention: Make sure the product is well ventilated to avoid overheating. Note: Use fans or heat sinks when operating the product in a closed enclosure or in an environment with limited air circulation. Attention: Mount the product on heat-resistant surfaces and in heat-resistant housings. Note: Use enclosure materials that can withstand high temperatures to avoid damage or fire hazard. Caution: Implement temperature monitoring when using an enclosure and, if necessary, protection mechanisms that shut down the product if it overheats. Note: Note: Use temperature sensors and appropriate software to monitor the temperature of the product and shut down the system if necessary. Caution: Avoid overloads that can cause excessive heating of components. Note: To prevent overheating, do not exceed the specified current and voltage limits. Caution: Short circuits can generate significant heat and cause fires. Note: Make sure that all connections are correct and secure and that no conductive objects can accidentally cause short circuits.

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Introduction

The AZ-L298N Motor Driver is a dual H-bridge motor driver integrated circuit (IC). It is a type of motor controller that allows you to control the speed and direction of two DC motors or one stepper motor. It is commonly used in robotics and other applications where DC motors need to be controlled.

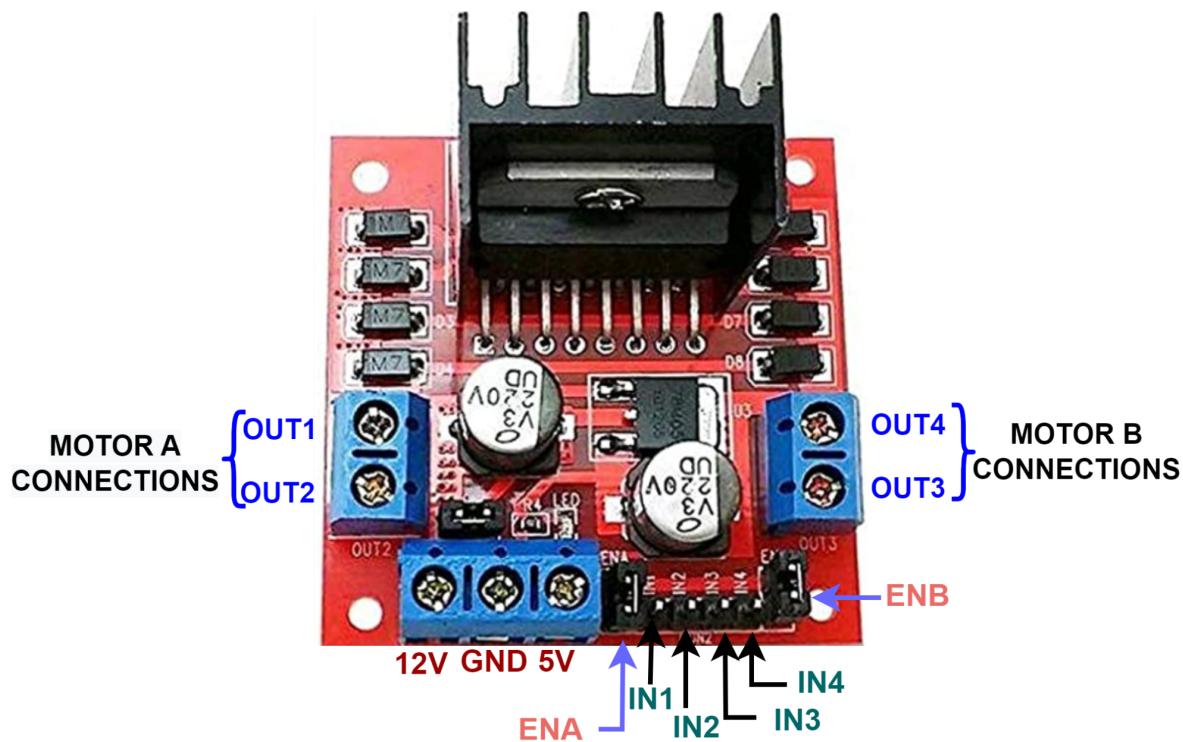
The AZ-L298N Motor Driver board is a compact, easy-to-use module that can be connected to a microcontroller, such as an Arduino board, to control DC motors. It has two H-bridge circuits, each of which can control the speed and direction of a separate DC motor. The AZ-L298N Motor Driver board also has built-in protection features, such as thermal shutdown and overcurrent protection, to ensure safe operation.

The AZ-L298N Motor Driver board is good for controlling DC motors in small and medium-sized projects. It can handle relatively high power motors (up to 2A) and can be easily controlled using simple digital logic. Its compact size, easy-to-use interface, and built-in protection features make it a popular choice for hobbyists and students in the field of robotics and other projects that require precise control over DC motors.

AZ-L298N**Specifications**

Operating Voltage	5V - 35V
Logic Level	5V
Output current	2A max.
Power	25W
Dimensions	44 x 47 x 28 mm
Weight	24g

Module Pinout



Pin name	Description
GND	This is the common ground pin
12V	This is the pin which supplies power to the motor
5V	This pin supplies the power (5V) for the internal circuit (AZ-L298N)
ENA	This pin controls the speed of the motor A by enabling the PWM signal
IN1 and IN2	These are the input pins for motor A. They control the spinning direction for that particular motor
ENB	This pin controls the speed of the motor B by enabling the PWM signal
IN3 and IN4	These are the input pins for motor B. They control the spinning direction for that particular motor
OUT1 and OUT2	OUT1: Positive terminal. OUT2: Negative terminal These are the output pins for motor A, which will be connected through these two terminals.
OUT3 and OUT4	OUT3: Positive terminal. OUT4: Negative terminal These are the output pins for motor B.

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Control Pins

There are two types of control pins found at the bottom right side of the module. One type controls the speed and the other type controls the direction of the motor.

Speed Control (ENABLE) Pins

The speed control pins labeled ENA and ENB on the module, control the speed of the dc motor and turn it ON and OFF.

ENA controls the speed of motor A and ENB controls the speed of motor B. If both of the pins are in a logic HIGH (5V) state, then both the motors are ON and spinning at maximum speed. If both of the pins are in a logic LOW (ground) state, then both the motors are OFF. Through the PWM functionality we can adjust the speed of the motor.

Direction Control (INPUT) Pins

The direction control pins are the four input pins (IN1, IN2, IN3, IN4) on the module.

Through these input pins we can determine whether to move the dc motor forward or backwards. IN1 and IN2 control motor A's spinning direction whereas IN3 and IN4 control motor B's spinning direction. The table below shows the logic signals required for the appropriate spinning action for Motor A.

IN1	IN2	Motor Action
1 (HIGH)	1	OFF
1	0 (LOW)	Backward
0	1	Forward
0	0	OFF

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As seen from the table, whenever one of the inputs is in a HIGH state (5V) then the motor will spin. Otherwise, when both the inputs are LOW (ground) state or both are in HIGH state then the motor stops. In order for motor A to spin

forward, IN1 should be LOW and IN2 should be HIGH. For backwards motion, IN1 should be HIGH and IN2 should be LOW. Motor B is also controlled in a similar way.

Installation of Arduino IDE

Download the latest version of Arduino IDE here:

<https://www.arduino.cc/en/software>

Downloads



Arduino IDE 2.0.0

The new major release of the Arduino IDE is faster and even more powerful! In addition to a more modern editor and a more responsive interface it features autocompletion, code navigation, and even a live debugger.

For more details, please refer to the [Arduino IDE 2.0 documentation](#).

Nightly builds with the latest bugfixes are available through the section below.

SOURCE CODE
The Arduino IDE 2.0 is open source and its source code is hosted on [GitHub](#).

DOWNLOAD OPTIONS

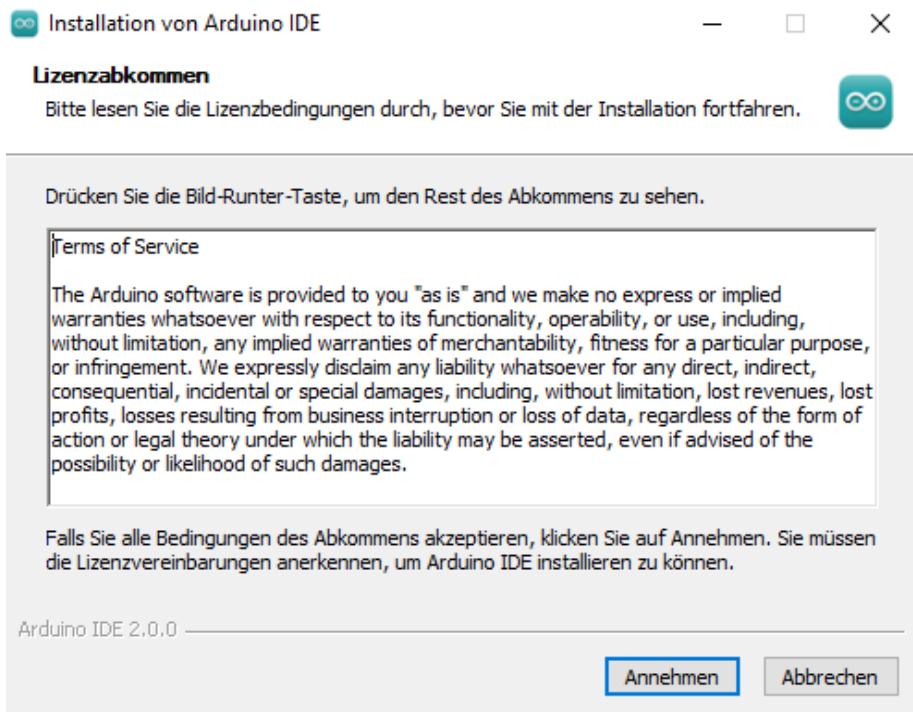
Windows Win 10 and newer, 64 bits
Windows MSI installer
Windows ZIP file

Linux AppImage 64 bits (X86-64)
Linux ZIP file 64 bits (X86-64)

macOS 10.14: "Mojave" or newer, 64 bits

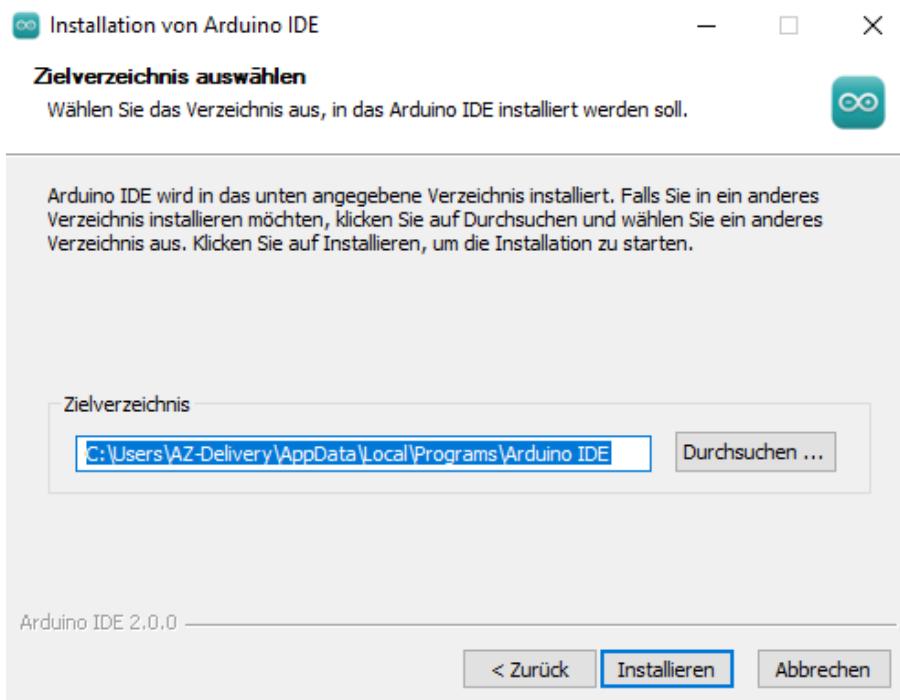
After starting the Arduino IDE installation file “arduino-ide_2.0.0_Windows_64bit.exe” the license conditions of the software must be read and accepted.

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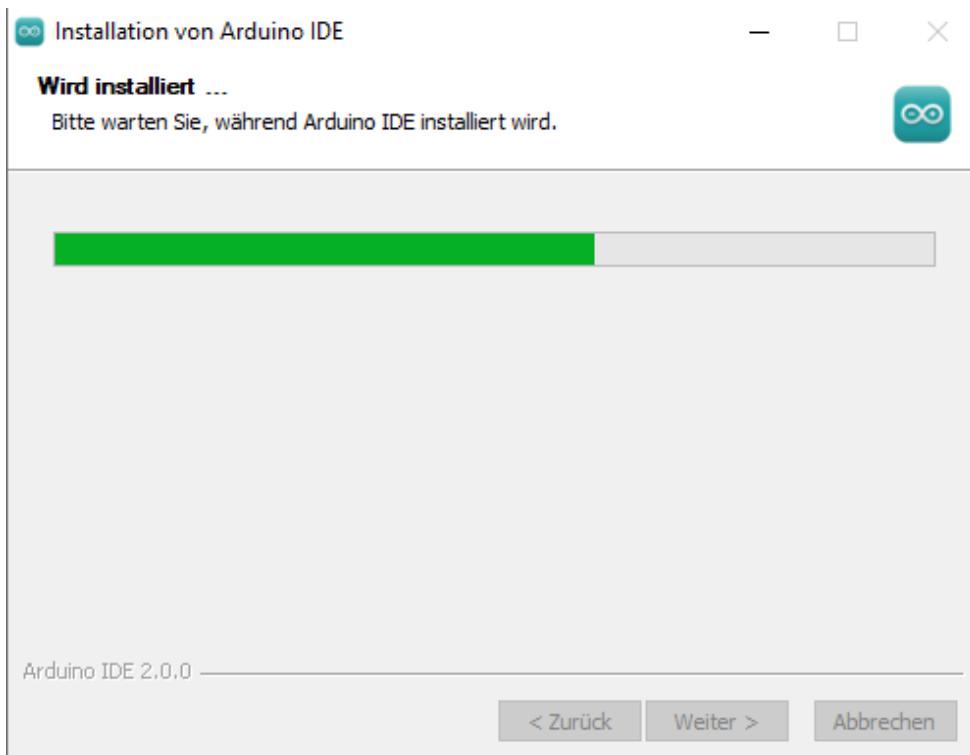
In the next step, different options can be selected for installation.

Finally, the destination folder must be specified. The installation requires approx. 500MB of free disk space.

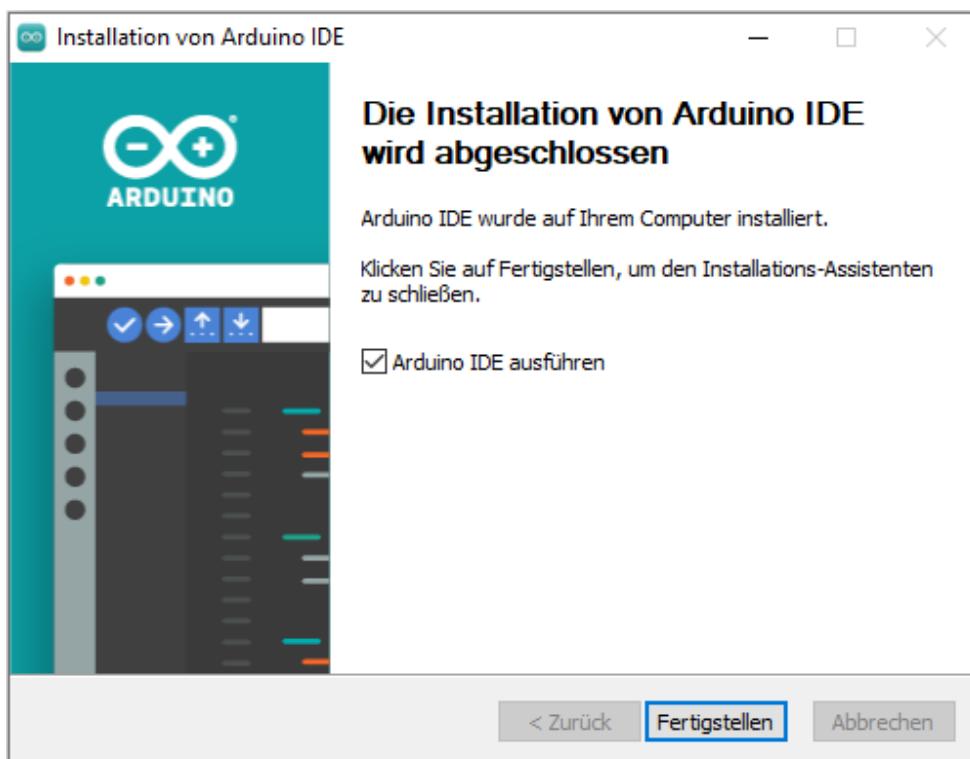


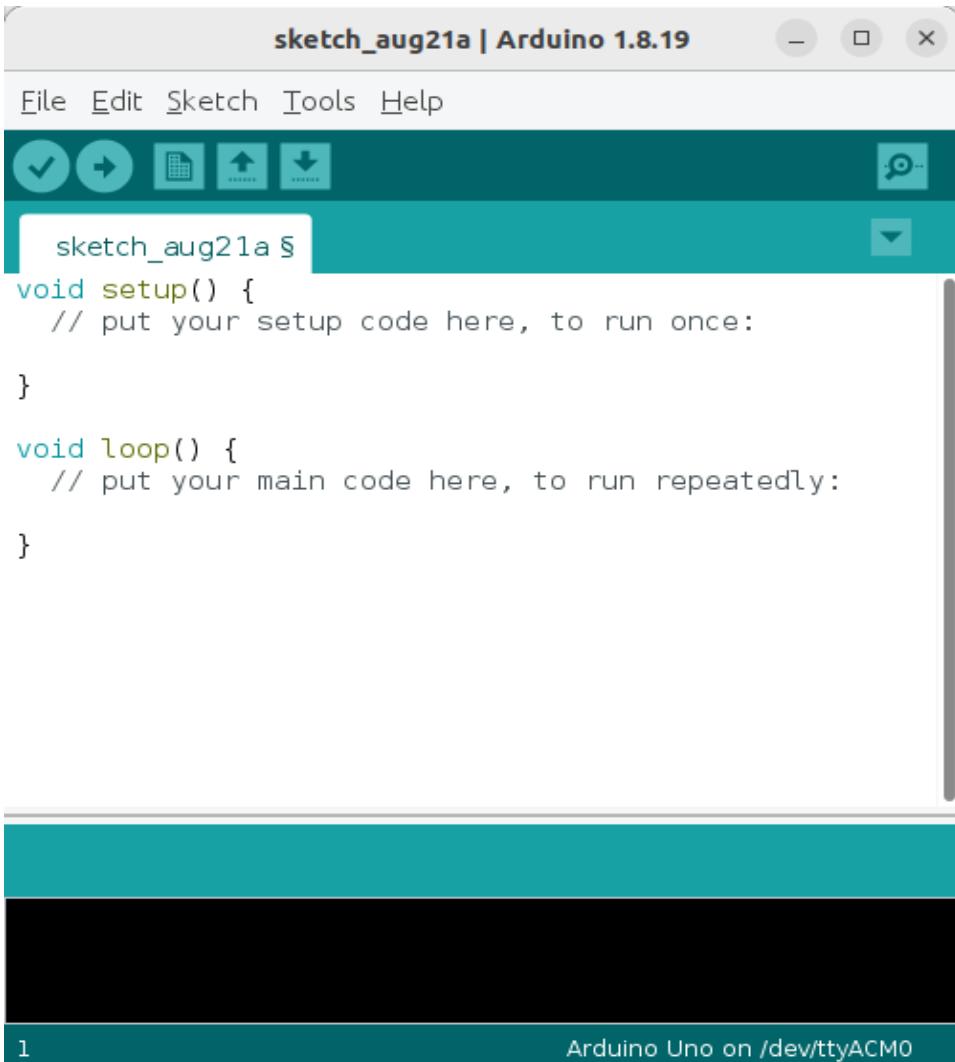
Click on "Install" to start the installation.

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After successful installation, the installation programme can be terminated via the "**Finish**" button.



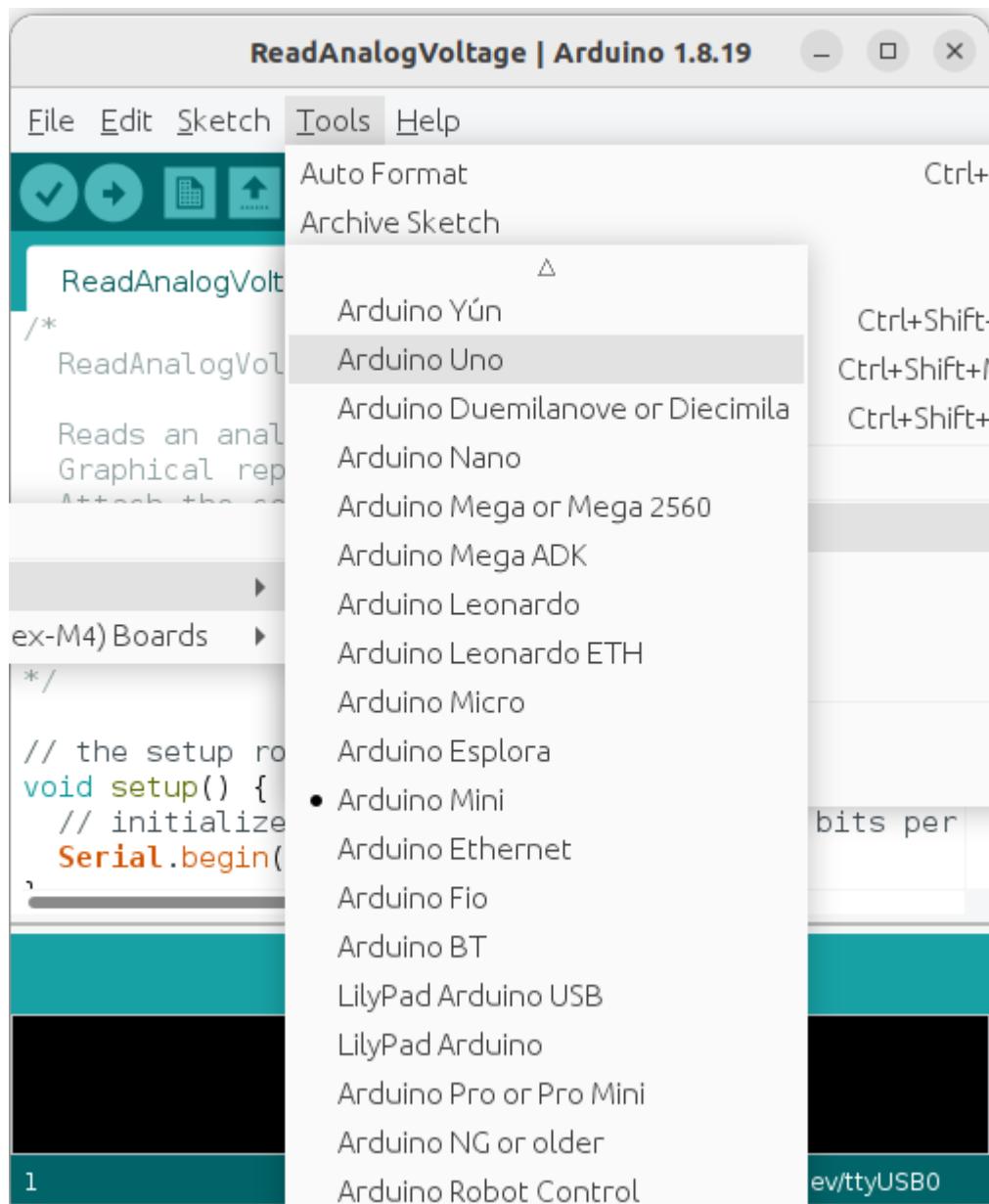
The starting window:

The screenshot shows the Arduino IDE interface. The title bar reads "sketch_aug21a | Arduino 1.8.19". The menu bar includes File, Edit, Sketch, Tools, and Help. Below the menu is a toolbar with icons for upload, download, and search. The main code editor window contains the following code:

```
void setup() {
  // put your setup code here, to run once:
}

void loop() {
  // put your main code here, to run repeatedly:
}
```

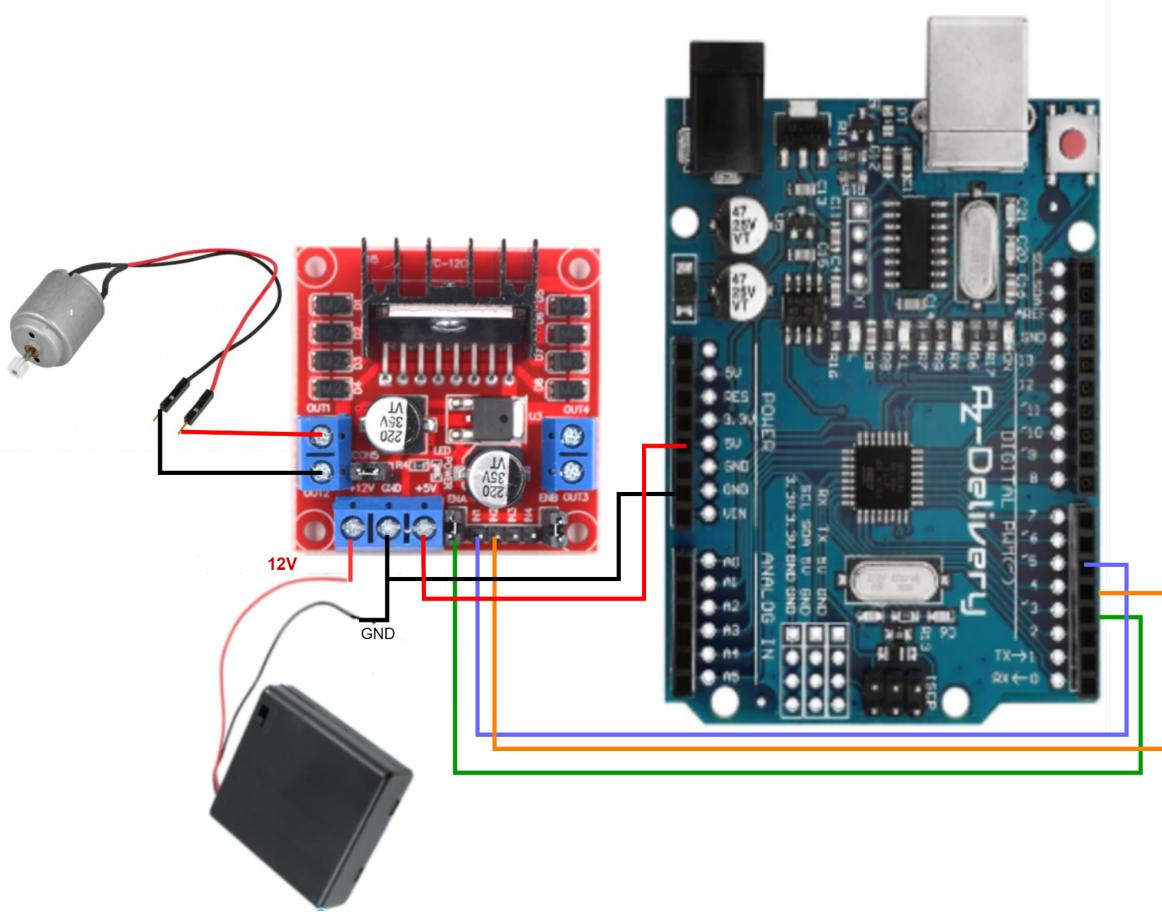
The status bar at the bottom indicates "1" and "Arduino Uno on /dev/ttyACM0".

Select the UNO Board:**Tools -> Board -> Arduino Uno**

Connection Diagram

We will be using motor A output pins to control this motor. Thus, ENA will set the speed and IN1 and IN2 will set the spinning direction of the motor.

No need to power the microcontroller board, it's already powered by an AZ-L298N driver. If you want to power your microcontroller board via USB, remove the 5V connection between the driver board and the microcontroller board.



Pins connection (Connect after programming):

Driver motor	microcontroller
ENA	pin 3 (remove the included jumper)
IN1	pin5
IN2	pin4

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+5V	5V
GND	GND

Motor	Motor Driver
positive	OUT1
negative	OUT2

12V Battery	Motor Driver
positive	12V
negative	GND

(works also with a 9V battery)

Example Sketch

```
const int in1=5;
const int in2=4;
const int ena=3;

void setup() {
    // put your setup code here, to run once:
    pinMode(in1,OUTPUT);
    pinMode(in2,OUTPUT);
    pinMode(ena,OUTPUT);
    digitalWrite(in1,LOW);
    digitalWrite(in2,LOW);
}

void Forward(){
    // set maximum speed to 255
    analogWrite(ena, 255);
    digitalWrite(in1,LOW);
    digitalWrite(in2,HIGH);
}

void Backward() {
    // set maximum speed to 255
    analogWrite(ena, 255);
    digitalWrite(in1,HIGH);
    digitalWrite(in2,LOW);
}

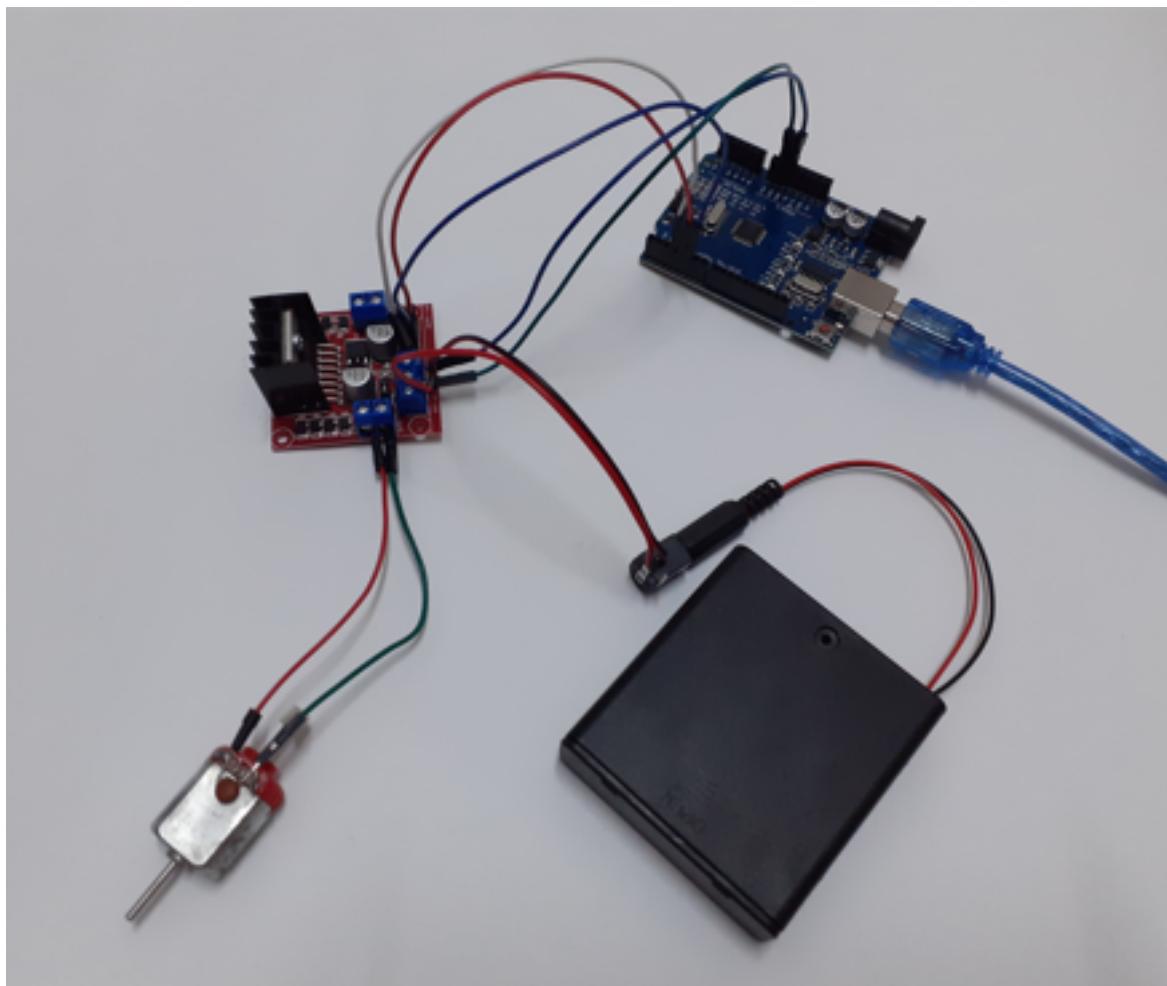
void TurnOff() {
    analogWrite(ena, 0);
    digitalWrite(in1,LOW);
    digitalWrite(in2,LOW);
}

void loop()
{
    // forward and backward motor for two second.
```

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```
Forward();  
delay(2000);  
TurnOff();  
delay(2000);  
  
Backward();  
delay(2000);  
TurnOff();  
delay(2000);  
}
```

Now you can start your own project with a motor driver board, you can connect multiple motors and apply the same logic.



Setting up the Raspberry Pi and Python

For the Raspberry Pi, the operating system must first be installed, then everything must be set up so that it can be used in headless mode. Headless mode allows remote connection to the Raspberry Pi without the need for a PC screen monitor, mouse or keyboard. The only things used in this mode are the Raspberry Pi itself, power supply and internet connection. All this is explained in detail in the free eBook:

[Raspberry Pi Quick Startup Guide](#)

Python is preinstalled on the Raspberry Pi OS.

Components Required:

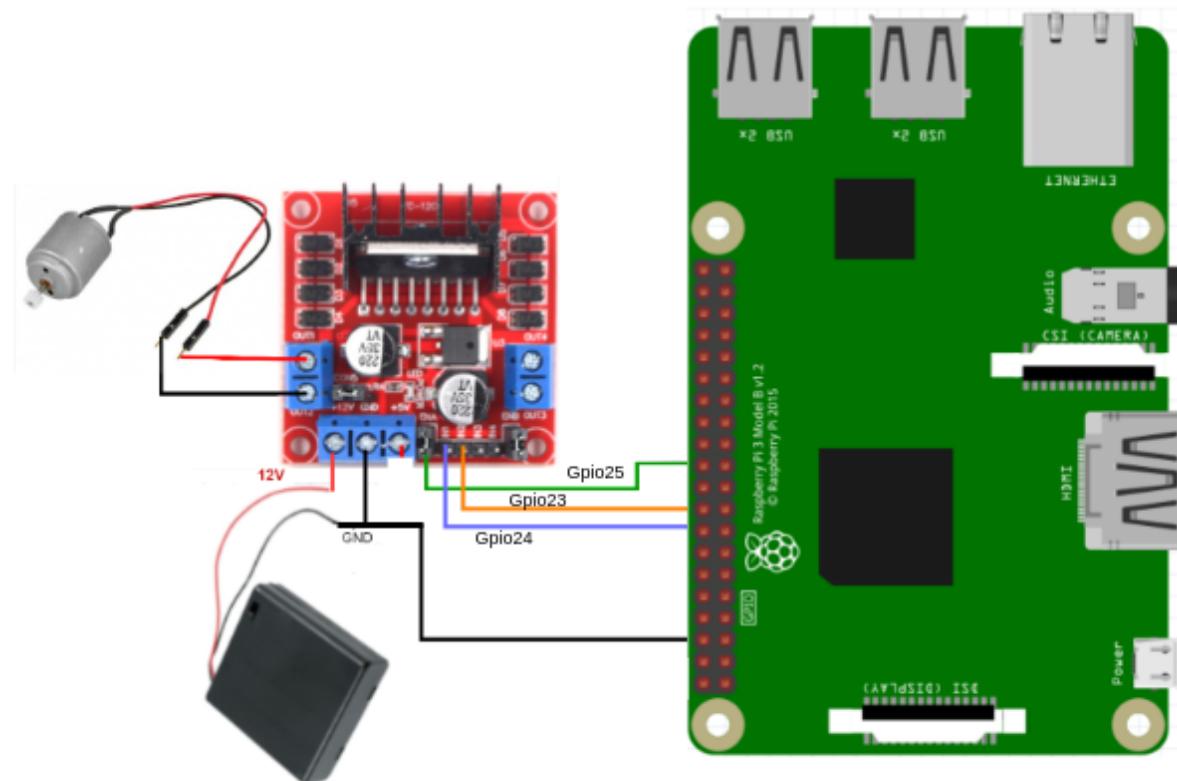
- Raspberry Pi
- AZ-L298N Motor Driver Module
- 12V DC Motor
- 12V Power Supply for Motor and Motor Driver
- Power Supply for Raspberry Pi
- Connecting Wires

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Connection diagram with Raspberry Pi

The connection between the Raspberry Pi and AZ-L298N Motor Driver Interface is very simple. Connect the ENA pin of AZ-L298N to Pin 22 (GPIO25) of Raspberry Pi, in order to control motor speed. For the Inputs of the Motor, connect the IN1 and IN2 of AZ-L298N Module to Pins 16 and 18 (GPIO23 and GPIO24).

Next connect 12V Power Supply to AZ-L298N Motor Driver Module. Then, we need a common GND between Raspberry Pi and AZ-L298N Motor Driver Module.



Pin Connection :

Motor driver	Raspberry
ENA	GPIO 24 (remove the included jumper)
IN1	GPIO 23
IN2	GPIO 25
GND	GND

Python example

```
import RPi.GPIO as GPIO
from time import sleep

in1 = 23
in2 = 25
en = 24

GPIO.setwarnings(False)
GPIO.setmode(GPIO.BCM)
#set in1/in2/en as output
GPIO.setup(in1,GPIO.OUT)
GPIO.setup(in2,GPIO.OUT)
GPIO.setup(en,GPIO.OUT)
#stop motor
GPIO.output(in1,GPIO.LOW)
GPIO.output(in2,GPIO.LOW)
# Set speed
speed=GPIO.PWM(en,100) # Set frequency to 100 hz
speed.start(100) # duty cycle between 0 and 100

def forward():
    GPIO.output(in2, GPIO.HIGH)
    print("Moving Forward")
    sleep(2)
    GPIO.output(in2, GPIO.LOW)

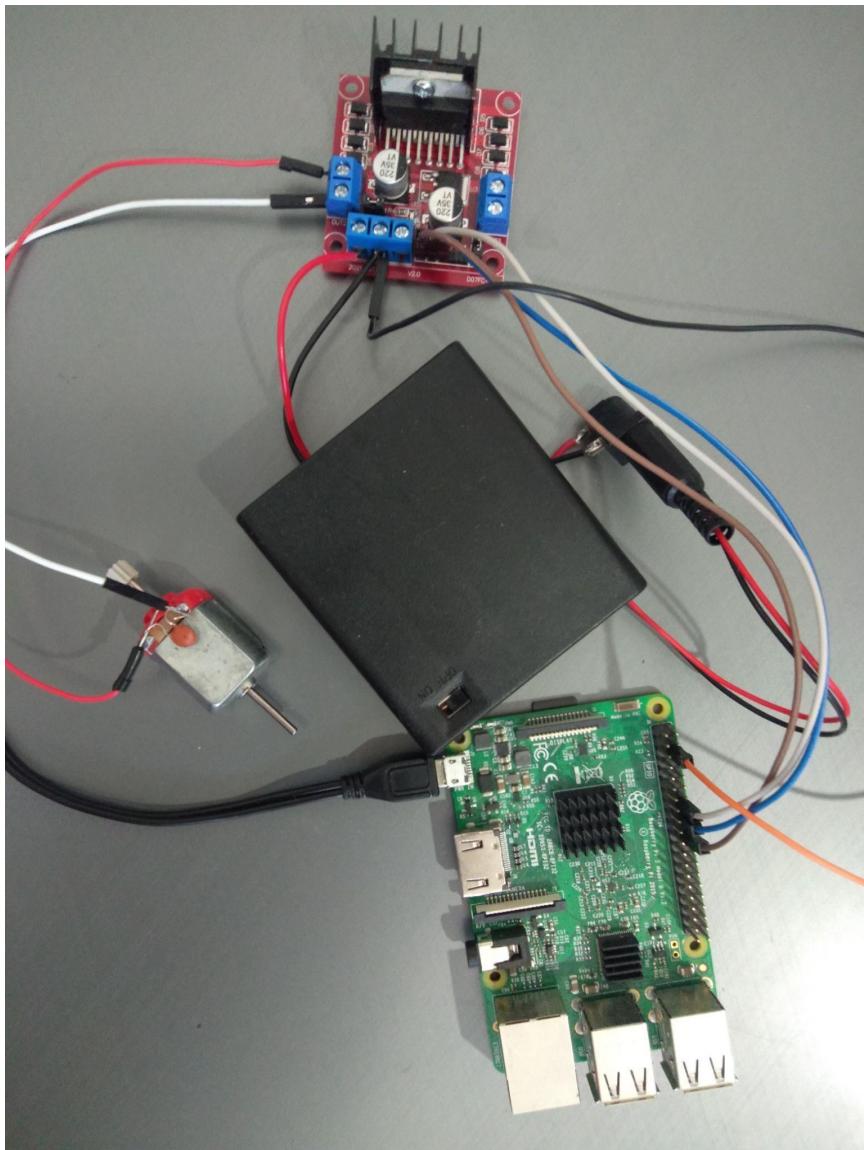
def reverse():
    GPIO.output(in1, GPIO.HIGH)
    print("Moving Backward")
    sleep(2)
    GPIO.output(in1, GPIO.LOW)

while(1):
    forward()
    sleep(2)
    reverse()
    sleep(2)
```

create new file: *sudo nano l298.py*
copy the content and save the file.

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```
pi@raspberry:~ $ python3 l298.py
Moving Forward
Moving Backward
Moving Forward
```



You've done it, you can now use your module for your projects :)

Now it is time to learn and make the Projects on your own. You can do that with the help of many example scripts and other tutorials, which you can find on the internet.

If you are looking for the high quality microelectronics and accessories, AZ-Delivery Vertriebs GmbH is the right company to get them from. You will be provided with numerous application examples, full installation guides, eBooks, libraries and assistance from our technical experts.

<https://az-delivery.de>

Have Fun!

Impressum

<https://az-delivery.de/pages/about-us>