

Connection guide for Raspberry Pi and Arduino

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1 Motor

1.1 Material

Motor: 9V, 24V, speed changing by PWM

Raspberry Pi: Pi 4 Model B, Pi 5/Arduino Uno Rev 3

GPIO cables

Motor driver L298N

L298N Pinout:

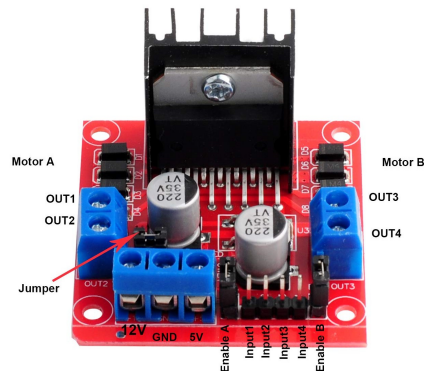


Figure 1: L298N Pin Layout

1 L298N can controll maximum 2 independent motors.

Input1 controls OUT1 and so on.

Control by H-bridge:

Low	Low	Stop
High	Low	Clockwise/Anti-Clockwise
High	Low	Clockwise/Anti-Clockwise
High	High	Brake

1.2 Connection with Raspberry Pi

1.2.1 Connection scheme

The connection scheme to connect motor to rbp using l298n

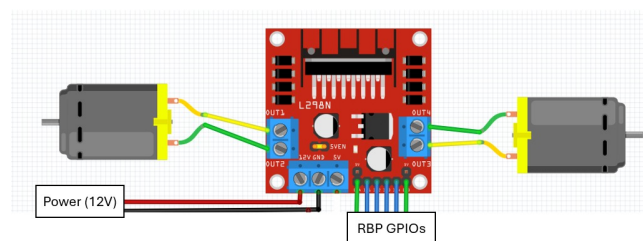


Figure 2: Connection scheme

1.2.2 Real connection image

The image of real connection

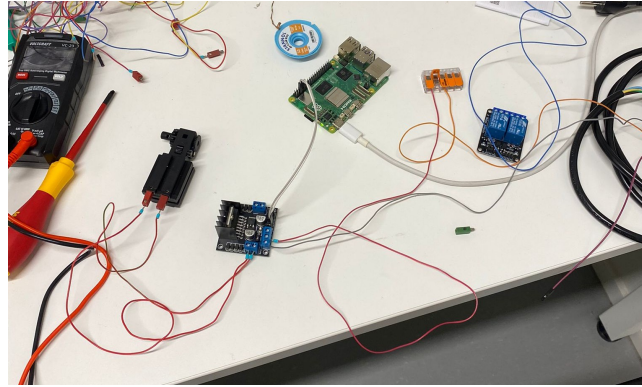


Figure 3: Real connection image

1.2.3 Code example

```
import RPi.GPIO as GPIO
import time

# Pin setup
IN1 = 17
IN2 = 27
ENA = 22 # PWM pin

GPIO.setmode(GPIO.BCM)
GPIO.setup(IN1, GPIO.OUT)
GPIO.setup(IN2, GPIO.OUT)
GPIO.setup(ENA, GPIO.OUT)

# Setup PWM at 1000 Hz
pwm = GPIO.PWM(ENA, 1000)
pwm.start(0) # start with speed 0

def motor_forward(speed):
    GPIO.output(IN1, GPIO.HIGH)
    GPIO.output(IN2, GPIO.LOW)
    pwm.ChangeDutyCycle(speed)

def motor_backward(speed):
    GPIO.output(IN1, GPIO.LOW)
    GPIO.output(IN2, GPIO.HIGH)
    pwm.ChangeDutyCycle(speed)

def motor_stop():
    GPIO.output(IN1, GPIO.LOW)
    GPIO.output(IN2, GPIO.LOW)
    pwm.ChangeDutyCycle(0)

try:
    print("Motor forward")
    motor_forward(60) # 60% speed
    time.sleep(2)

    print("Motor backward")
    motor_backward(60) # 60% speed
    time.sleep(2)

    print("Stop")
    motor_stop()
    time.sleep(1)

except KeyboardInterrupt:
    pass

finally:
    pwm.stop()
    GPIO.cleanup()
```

1.2.4 Remark for connection with RBP

- 1 L298N occupies at least 4 GPIOs on RBP (for 2 motors).
- L298N can be powered by RBP or external power source.

1.3 Connection with Arduino

1.3.1 Connection scheme

The connection scheme to connect motors to arduino uno rev 3 using l298n is the same as connection with RBP

1.3.2 Real connection image

The image of real connection

Figure 4: Real connection image

1.3.3 Code example

```
// Motor control pins
int IN1 = 7;
int IN2 = 8;
int ENA = 9;    // must be a PWM pin (~)

void setup() {
  pinMode(IN1, OUTPUT);
  pinMode(IN2, OUTPUT);
  pinMode(ENA, OUTPUT);

  // Start with motor stopped
  analogWrite(ENA, 0);
}

void motorForward(int speed) {
  digitalWrite(IN1, HIGH);
  digitalWrite(IN2, LOW);
  analogWrite(ENA, speed);    // 0-255
}

void motorBackward(int speed) {
  digitalWrite(IN1, LOW);
  digitalWrite(IN2, HIGH);
  analogWrite(ENA, speed);    // 0-255
}

void motorStop() {
  digitalWrite(IN1, LOW);
  digitalWrite(IN2, LOW);
  analogWrite(ENA, 0);
}

void loop() {
  // Forward for 2 seconds
  motorForward(150);    // about 60% speed
  delay(2000);

  // Backward for 2 seconds
  motorBackward(150);
  delay(2000);

  // Stop for 1 second
  motorStop();
  delay(1000);
}
```

1.3.4 Remark for conection with Arduino

- 1 L298N occupies at least 4 GPIOs on Arduino (for 2 motors).
- Recommend connection: Motor → L298N → Arduino → RBP

2 NFC Reader(PN532 V3)

3 Sensor

4 Compressor