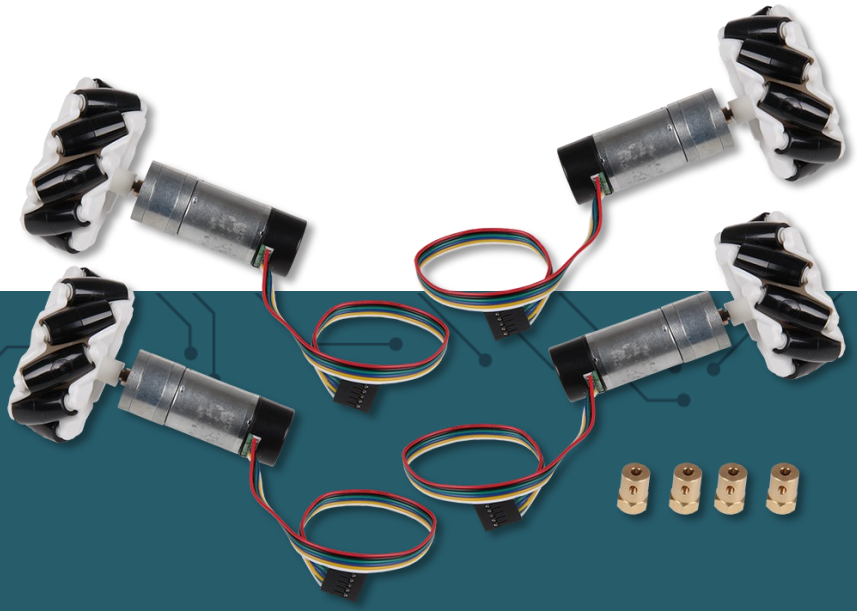


OMNIWHEELS

COM-Motor06

1. GENERAL INFORMATION

Dear customer,

thank you very much for choosing our product.
In the following, we will introduce you to what to observe while starting up and using this product.

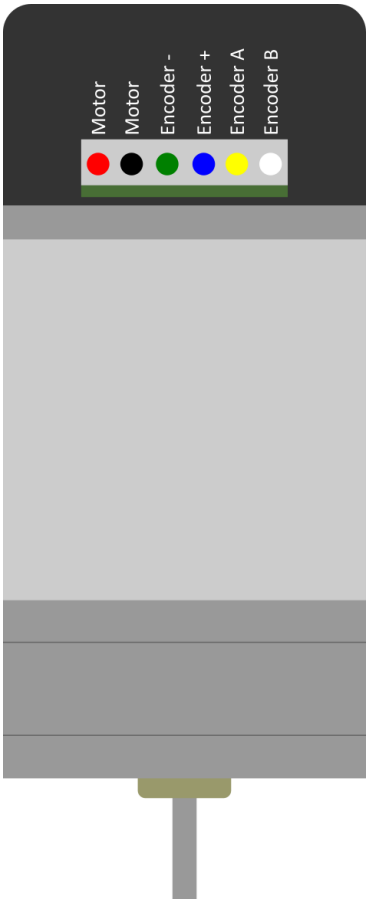
Should you encounter any unexpected problems during use, please do not hesitate to contact us.

In the following we will show you how to properly assemble, properly connect and program the omniwheels of the item COM Motor06 to be able to use them fully.

Before we get into the functionality and explanation of the product, we would like to provide you with the pinout for each required component to ensure that you do not have any difficulties when connecting it later.

Motor drivers are required for this product because microcontrollers such as the Arduino Mega are not capable of providing the power needed for the motors.

2. PIN ASSIGNMENT (COM-MOTOR06)



The 4 included motors all have the same pinout and are all connected the same way in this example.

Inside the black part of the motor there is an encoder which can be read out to obtain additional data such as the current direction of rotation or the current speed at which the wheel/motor is rotating.

Pin assignment:

Red and black cable: control of the motor, here one cable each is used to run the motor either forward or backward.

Green cable: Ground Connection of the encoder, here you should make sure to connect all motors to the same ground point.

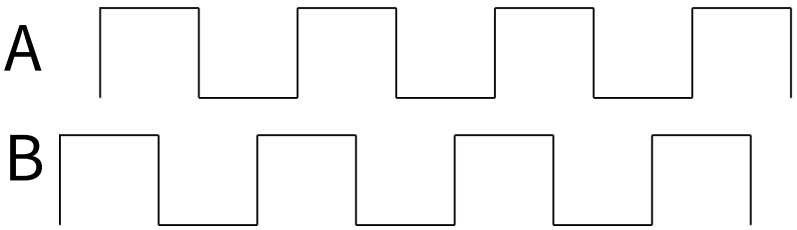
Blue cable: Power supply of the encoder, here you have to carefull to never connect more than 5V.

Yellow cable: Signal A of the encoder

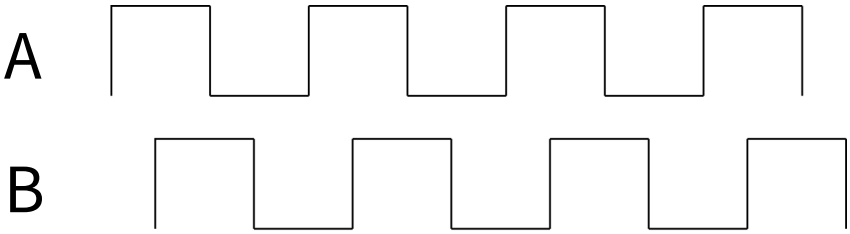
White cable: Signal B of the encoder

The encoder signals can be used to read off both the direction of rotation and the speed of rotation. The encoder outputs 11 pulses per revolution. However, the gear ratio of 21.3 must also be taken into account. The end result is 234.3 pulses per revolution.

Signal at clockwise rotation:
With falling edge at signal B, signal A must be High.



Signal for counterclockwise rotation:
With falling edge at signal B, signal A must be low.

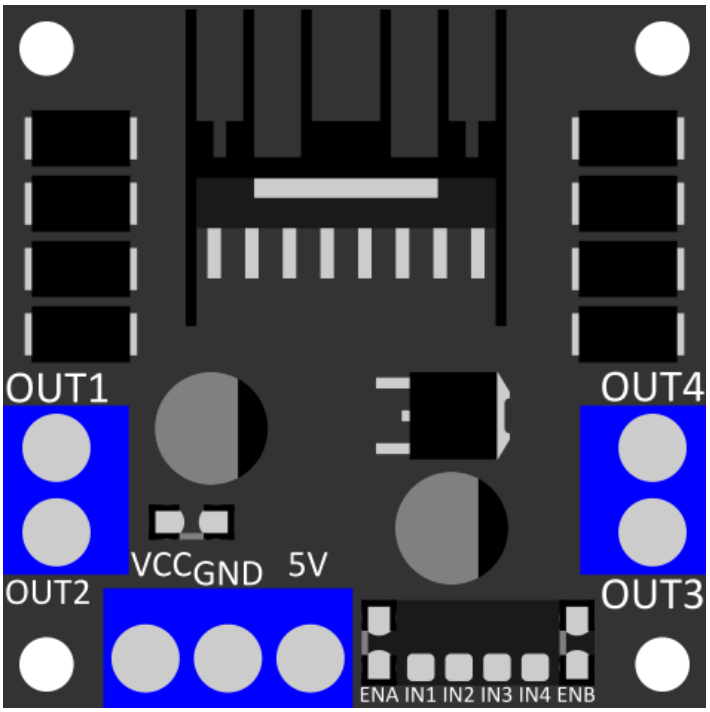


3. PIN ASSIGNMENT (SBC-MOTORDRIVER2)

The used motor driver (**SBC-MotoDriver2** from **Joy-IT**) can only drive 2 motors, which is why 2 are needed for this tutorial.

The motor driver has **4 outputs**, **2 outputs each for one motor**, these are the **OUT** connections. In addition there are the **6 inputs** which are used to control the motor driver. **ENA** and **ENB** are used to switch the respective connection ports for the motors **ON** or **OFF**. The connections **IN1 to IN4** are used to control the motors. From IN1 to IN4, two of these four pins are always used to control a motor. One of the two pins is always used to run the motor forward, while the other is always used to run the motor backward.

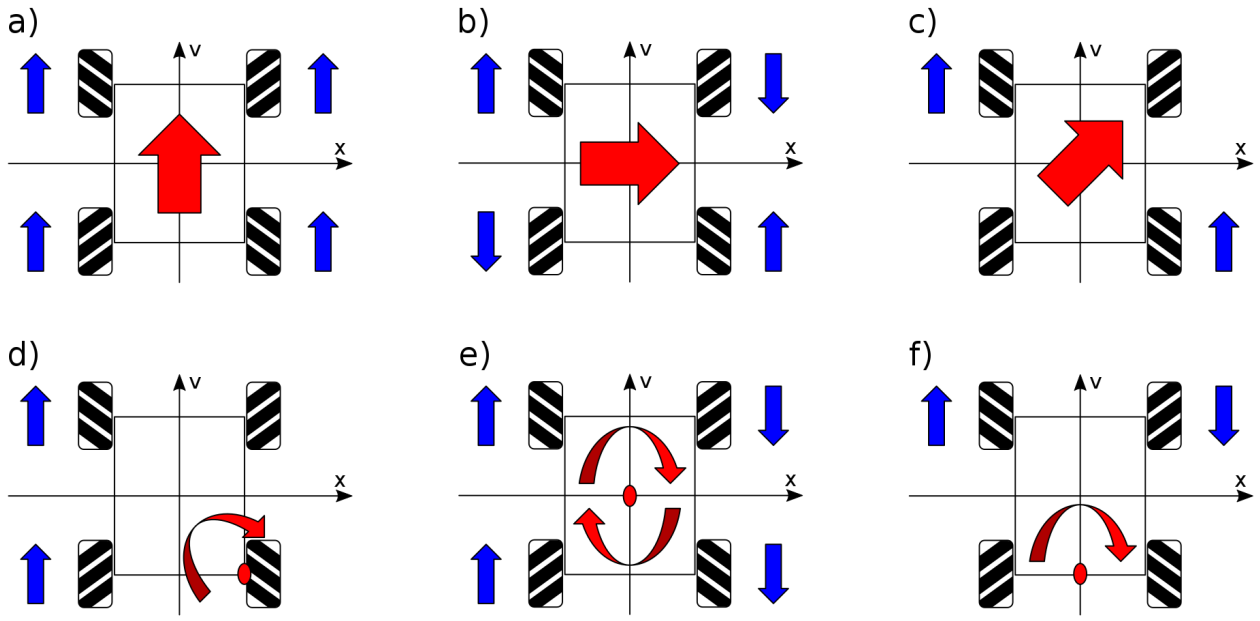
Now the supply inputs remain, here you find the connections **5 V, GND and Vcc** which serve to supply the motor driver and the motors with voltage.



4. MODE OF OPERATION

The vehicle can move in different directions depending on the direction in which the individual wheels turn.

In the diagram below you can see in which direction the wheels must turn (**blue arrows**) so that the vehicle moves as desired (**red arrows**).



5. USE WITH THE ARDUINO

5.1 Connection

In this tutorial we use the Arduino compatible microcontroller **ARD-Mega2560R3** to drive the motors. You also need a motor driver, such as the **SBC-MotoDriver2** from **Joy-IT**. Since this motor driver can only control 2 motors at a time, you will need 2 for this example.

It is important that the motor drivers are connected to PWM pins of the Arduino. The B signal of the encoders must be connected to an interrupt pin each.

The +VCC pins of the motor drivers must be connected to a 7.5 V power supply.

Motor 1 Front Left:

Motor	Arduino	Motordriver1
Motor1 + (Red)	-	Out 1
Motor1 - (Black)	-	Out 2
Encoder1 - (Green)	GND	-
Encoder1 + (Blue)	+5 V	-
Encoder1 A (Yellow)	Pin 12	-
Encoder1 B (White)	Pin 2	-

Motor 2 Rear Left:

Motor	Arduino	Motordriver1
Motor2 + (red)	-	Out 3
Motor2 - (black)	-	Out 4
Encoder2 - (green)	GND	-
Encoder2 + (blue)	+5 V	-
Encoder2 A (yellow)	Pin 13	-
Encoder2 B (white)	Pin 3	-

Motor driver 1:

External	Arduino	Motordriver1
-	Pin 8	IN 1
-	Pin 9	IN 2
-	Pin 10	IN 3
-	Pin 11	IN 4
-	-	+5 V
GND	-	GND
+7,5 V	-	Vcc

Motor 3 Front Right:

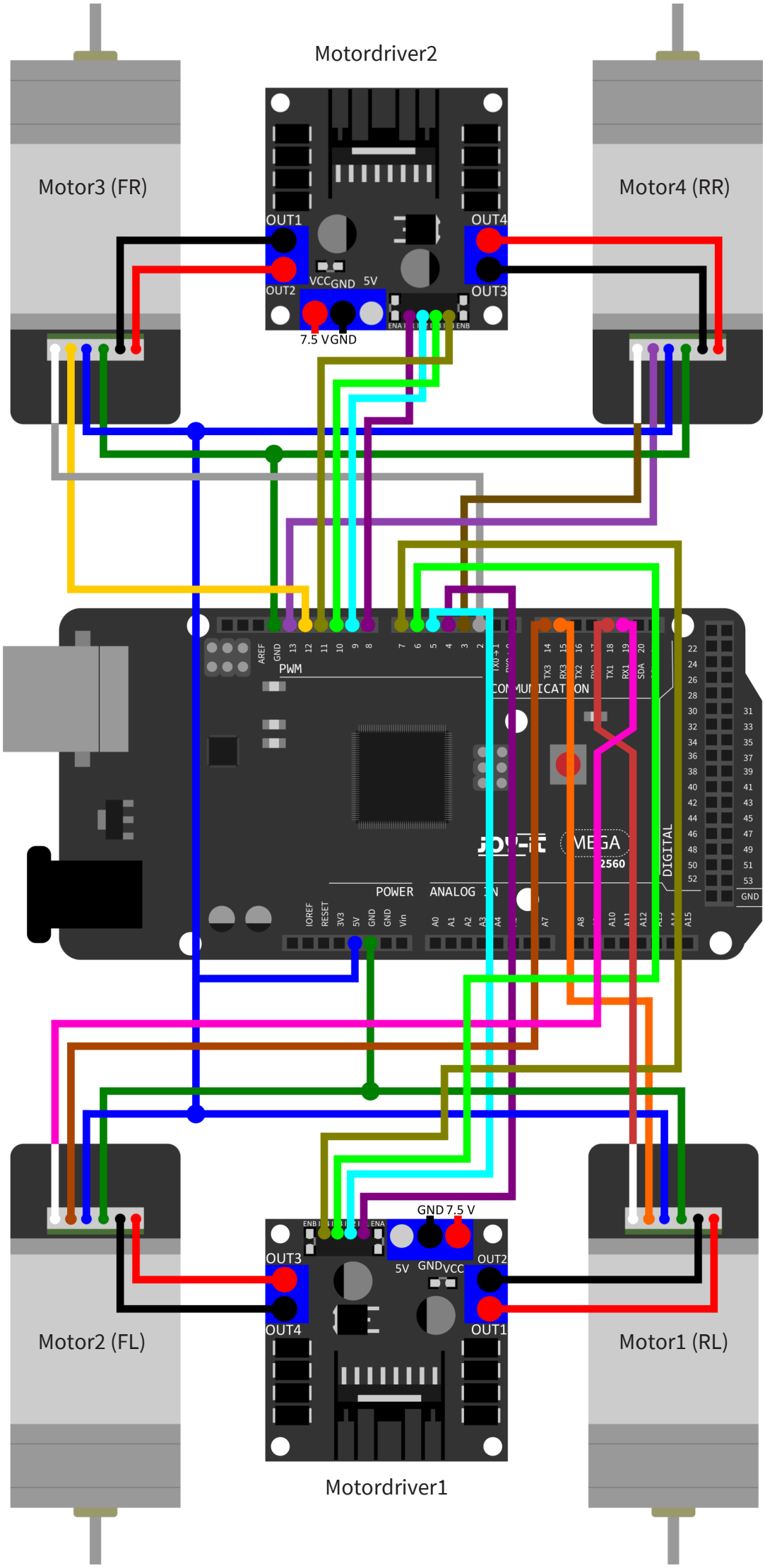
Motor3 (VR)	Arduino	Motordriver2
Motor3 + (red)	-	Out 2
Motor3 - (black)	-	Out 1
Encoder3 - (green)	GND	-
Encoder3 + (blue)	+5 V	-
Encoder3 A (yellow)	Pin 14	-
Encoder3 B (white)	Pin 18	-

Motor 4 Rear Right:

Motor4 (HR)	Arduino	Motordriver2
Motor4 + (red)	-	Out 4
Motor4 - (black)	-	Out 3
Encoder4 - (green)	GND	-
Encoder4 + (blue)	+5 V	-
Encoder4 A (yellow)	Pin 15	-
Encoder4 B (white)	Pin 19	-

Motor driver 2:

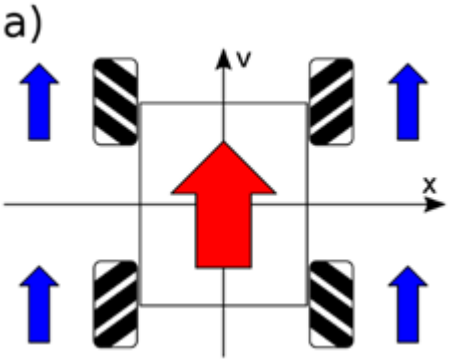
External	Arduino	Motordriver2
-	Pin 4	IN 1
-	Pin 5	IN 2
-	Pin 6	IN 3
-	Pin 7	IN 4
-	-	+5 V
GND	-	GND
+7,5 V	-	Vcc


Motordriver2
Motor3 (FR)
Motor4 (RR)
OUT1
OUT4
OUT2
OUT3
VCC GND 5V
7.5 V GND
PWM
POWER
ANALOG IN
DIGITAL
GND 7.5 V
5V GND VCC
Motor2 (FL)
Motor1 (RL)
Motordriver1

5.2 Arduino code example

With our prepared sample code you can see how to control the motors for your desired movement and how to read out the encoders.

You can download the sample code **here**.



When using the code example, please note that all four wheels must be mounted in a certain orientation.

As an example, we take here the figure a) from the subchapter **4. mode of operation**, as you can see in the figure, all 4 wheels are mounted in a certain way. This alignment of the wheels ensures that you can drive in all 4 cardinal directions without any problems.

6. USE WITH THE RASPBERRY PI

6.1 Connection

In this tutorial we will use an **Raspberry Pi** to drive the motors. You also need a motor driver, such as the **SBC-MotoDriver2** from **Joy-IT**. Since this motor driver can only control 2 motors at a time, you will need 2 for this example.

The +VCC pins of the motor drivers must be connected to a 7.5 V power supply.

Motor 1 Front Left:

Motor	Raspberry Pi	Motordriver1
Motor1 + (Red)	-	Out 1
Motor1 - (Black)	-	Out 2
Encoder1 - (Green)	GND	-
Encoder1 + (Blue)	+5 V	-
Encoder1 A (Yellow)	GPIO 22 (Pin 15)	-
Encoder1 B (White)	GPIO 23 (Pin 16)	-

Motor 2 Rear Left:

Motor	Raspberry Pi	Motordriver1
Motor2 + (Red)	-	Out 3
Motor2 - (BLack)	-	Out 4
Encoder2 - (Green)	GND	-
Encoder2 + (Blue)	+5 V	-
Encoder2 A (Yellow)	GPIO 24 (Pin 18)	-
Encoder2 B (White)	GPIO 10 (Pin 19)	-

Motor driver 1:

External	Raspberry Pi	Motordriver1
-	GPIO 2 (Pin 3)	IN 1
-	GPIO 3 (Pin 5)	IN 2
-	GPIO 4 (Pin 7)	IN 3
-	GPIO 14 (Pin 8)	IN 4
-	-	+5 V
GND	-	GND
+7,5 V	-	Vcc

Motor 3 Front Right:

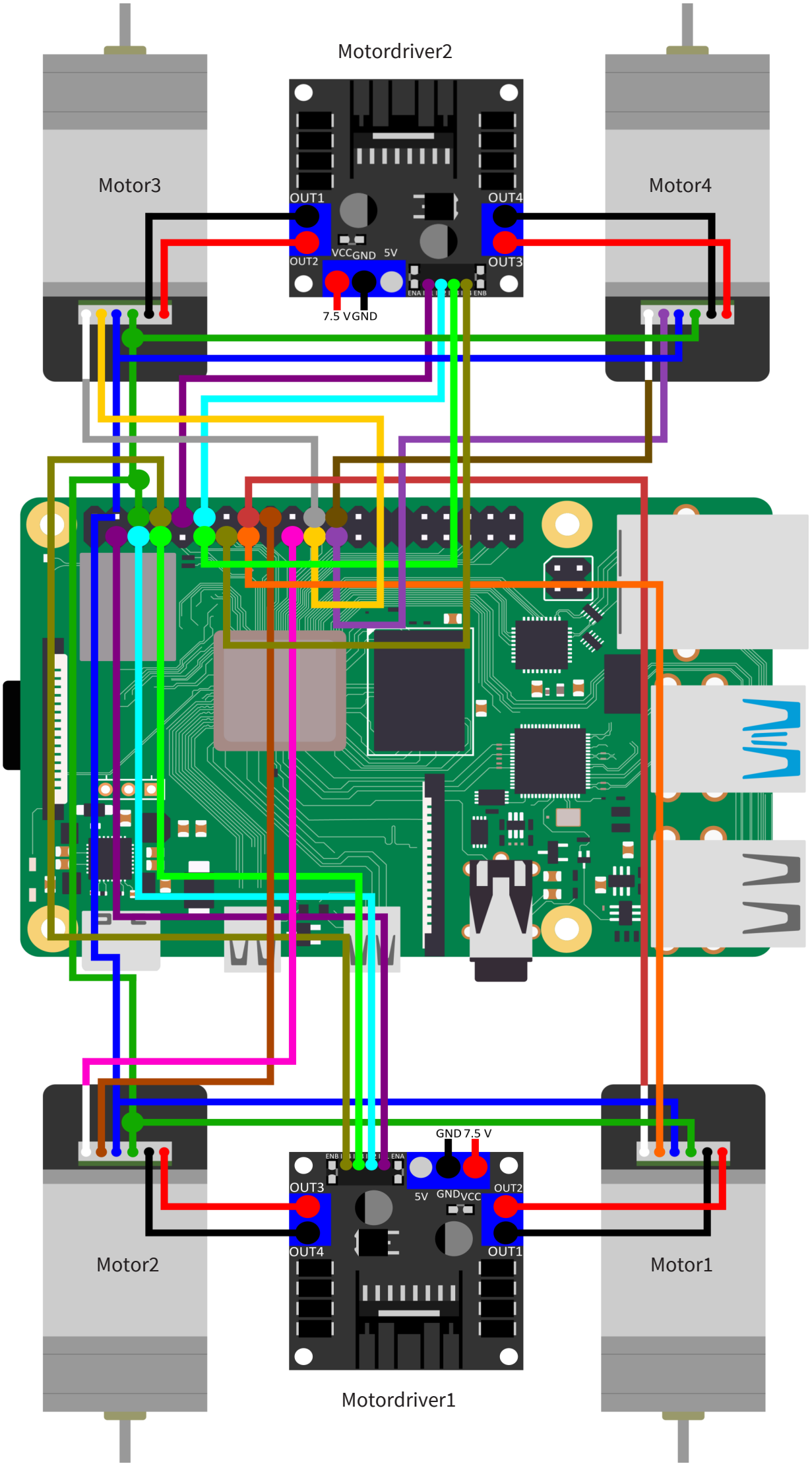
Motor3 (VR)	Raspberry Pi	Motordriver2
Motor3 + (Red)	-	Out 2
Motor3 - (Black)	-	Out 1
Encoder3 - (Green)	GND	-
Encoder3 + (Blue)	+5 V	-
Encoder3 A (Yellow)	GPIO 9 (Pin 21)	-
Encoder3 B (White)	GPIO 25 (Pin 22)	-

Motor 4 Rear Right:

Motor4 (HR)	Raspberry Pi	Motordriver2
Motor4 + (Red)	-	Out 4
Motor4 - (Black)	-	Out 3
Encoder4 - (Green)	GND	-
Encoder4 + (Blue)	+5 V	-
Encoder4 A (Yellow)	GPIO 11 (Pin 23)	-
Encoder4 B (White)	GPIO 8 (Pin 24)	-

Motor driver 2:

External	Raspberry Pi	Motordriver2
-	GPIO 15 (Pin 10)	IN 1
-	GPIO 18 (Pin 12)	IN 2
-	GPIO 17 (Pin 11)	IN 3
-	GPIO 27 (Pin 13)	IN 4
-	-	+5 V
GND	-	GND
+7,5 V	-	Vcc

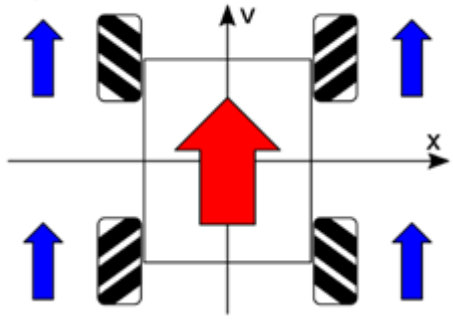

Motordriver2
Motor3
Motor4
OUT1
OUT4
OUT2
OUT3
VCC
GND
5V
7.5 V
GND
Motor2
Motor1
OUT3
OUT4
OUT2
OUT1
5V
GND
VCC
GND 7.5 V
Motordriver1

6.2 Raspberry Pi code example

With our prepared sample code you can see how to control the motors and how to read the encoders.
You can download the sample code **here**.

When using the code example, please note that all four wheels must be mounted in a certain orientation.

a)



As an example, we take here the figure a) from the subchapter **4. mode of operation**, as you can see in the figure, all 4 wheels are mounted in a certain way. This alignment of the wheels ensures that you can drive in all 4 cardinal directions without any problems.

7. ADDITIONAL INFORMATION

Our information and take-back obligations according to the Electrical and Electronic Equipment Act (ElektroG)

Symbol on electrical and electronic equipment:



This crossed-out dustbin means that electrical and electronic appliances do not belong in the household waste. You must return the old appliances to a collection point.

Before handing over waste batteries and accumulators that are not enclosed by waste equipment must be separated from it.

Return options:

As an end user, you can return your old device (which essentially fulfills the same function as the new device purchased from us) free of charge for disposal when you purchase a new device.

Small appliances with no external dimensions greater than 25 cm can be disposed of in normal household quantities independently of the purchase of a new appliance.

Possibility of return at our company location during opening hours:

SIMAC Electronics GmbH, Pascalstr. 8, D-47506 Neukirchen-Vluyn, Germany

Possibility of return in your area:

We will send you a parcel stamp with which you can return the device to us free of charge. Please contact us by email at Service@joy-it.net or by telephone.

Information on packaging:

If you do not have suitable packaging material or do not wish to use your own, please contact us and we will send you suitable packaging.

8. SUPPORT

If there are still any issues pending or problems arising after your purchase, we will support you by e-mail, telephone and with our ticket support system.

Email: **service@joy-it.net**
Ticket system: http://support.joy-it.net
Telephone: +49 (0)2845 9360-50 (10-17 o‘clock)

For further information please visit our website:
www.joy-it.net

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