Welcome to our website!

Thank you for choosing our *8 relay module* from *AZ-Delivery*. In the following pages we will explain how to set up and use the device.

Have fun!



Areas of application
Education and teaching: Use in schools, universities and training centres 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: Use by electronics enthusiasts and hobbyists for the development and realisation of DIY projects.

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

Operating conditions
The relay may only be operated with the voltages specified in the data sheet in order to avoid damage. A stabilised direct current source is required for operation. When connecting to other electronic components and circuits, the maximum current and voltage limits must be observed in order to avoid overloads and damage.

Environmental conditions
The product should be used in a clean, dry environment to avoid damage from moisture or dust.

Intended use
The relay is designed for use in educational, research and development environments. It is used for the development, programming and prototyping of electronic projects and applications. The product is not intended as a finished consumer product, but as a tool for technically skilled users, including engineers, developers, researchers and students.

Non-intended foreseeable use
The product is not suitable for industrial use or safety-related applications. The switching of mains voltage is not permitted. Use of the product in medical devices or for aerospace purposes is not permitted.

Waste disposal
Do not dispose of with household waste! Your product must be disposed of in an environmentally friendly manner in accordance with the European directive on waste electrical and electronic equipment. The valuable raw materials it contains can then be reused.
are supplied. The application of this directive contributes to environmental and health protection. Use the collection centre set up by your local authority for the return and recycling of old electrical and electronic equipment. WEEE-Reg. No.: DE 62624346

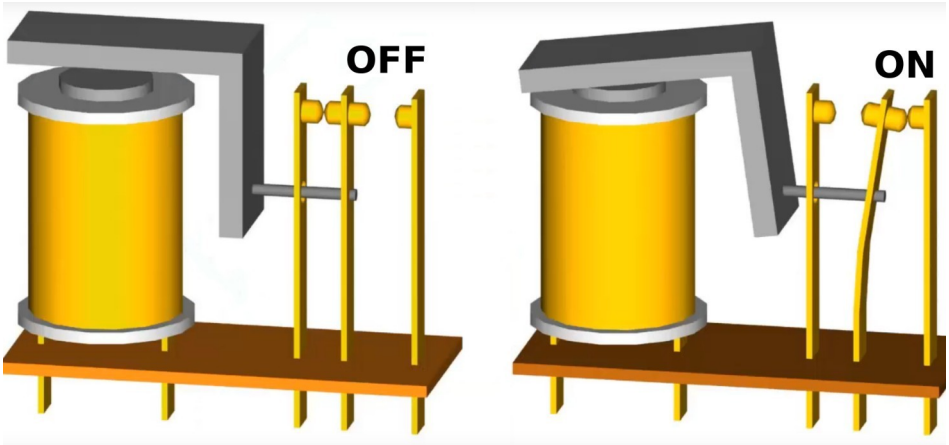
Electrostatic discharge
Caution: Electrostatic discharges can damage the product. Note: Earth yourself before touching the product, for example by wearing an antistatic wristband or touching an earthed metal surface.

Safety instructions
Caution: Some people may be sensitive to certain materials or chemicals contained in the product. Note: If skin irritation or allergic reactions occur, discontinue use and consult a doctor if necessary. Caution: Keep the product out of the reach of children and pets to avoid accidental contact and ingestion of small parts. Note: Store the product in a secure, closed container when not in use. Caution: Avoid contact of the product with food and drink. Note: Do not store or use the product near food to prevent contamination. Caution: Improper disposal of electronic components can endanger the environment and health. Note: Dispose of electronic components in accordance with local regulations and use suitable recycling facilities. Caution: Some people may be sensitive to certain materials or chemicals contained in the product. Note: If skin irritation or allergic reactions occur, discontinue use.

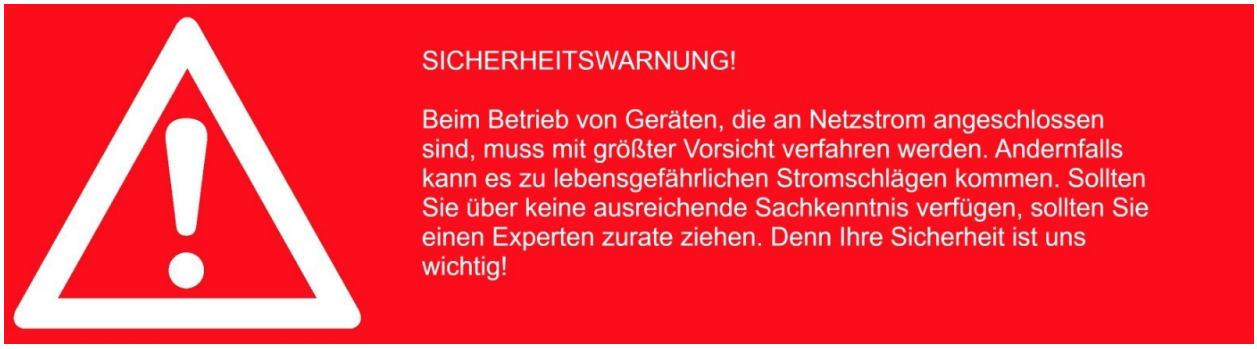
Discontinue use and consult a doctor if necessary. Caution: Keep the product out of the reach of children and pets to avoid accidental contact and ingestion of small parts. Note: Store the product in a secure, closed container when not in use. Caution: Avoid contact of the product with food and drink. Note: Do not store or use the product near food to prevent contamination. Caution: Improper disposal of electronic components can endanger the environment and health. Note: Dispose of electronic components in accordance with local regulations and use suitable recycling options. Caution: The circuit board and the connections of the product may have sharp edges. Note: Proceed with caution to avoid cutting injuries. Wear suitable protective gloves when assembling the product. Caution: Avoid excessive pressure or mechanical stress on the circuit board and components. Note: Only install the product on stable and level surfaces. Use suitable spacers and housings to minimise mechanical stress. Caution: Ensure that the product is securely fastened to prevent it from accidentally slipping or falling. Note: Use a suitable base or secure fastening in housings or on mounting plates. Caution: Only use the product with the specified voltages. Note: The power limits of the product can be found in the corresponding data sheet. Mains voltage switching is not permitted. Caution: Avoid short circuits between the connections and components of the product. Note: Ensure that no conductive objects touch or bridge the circuit board. Use insulated tools and observe the arrangement of the connections. Caution: Do not carry out any work on the product if it is connected to a power source. Note: Disconnect the product from the power supply before making any changes to the circuit or connecting or removing components. Caution: The product and the components on it can heat up during operation. Note: Only operate the product within the recommended operating temperatures. The recommended operating temperature range is typically between-40°C and +85°C. Check the specific information in the product data sheet. Caution: 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. Caution: Ensure that the product is well ventilated to prevent overheating. Note: Use fans or heat sinks if the product is operated in a closed housing or in an environment with limited air circulation.

Relays are used to control "AC" circuits and switch them ON or OFF. The relay is one of the most important control elements. It is an electrical switch that responds to a signal received from the microcontroller (such as the Atmega328P board or Raspberry Pi). Relays are widely used in remote control, communication, mechatronic devices, power electronic devices, etc. They can also be used to isolate powerful voltage/current electronics (such as "AC" or "DC" motors or any "AC" device, etc.) from microelectronics (such as microcontrollers, sensors, etc.).

Inside the relay there is a mechanical switch (three yellow metal rods, one of which is bent to the side in the centre and can be moved), which is controlled by the second element of the electromagnet (yellow cylinder), as shown in the picture below:



In the inactive state, the switch is in the OFF state, the "NC" pin is connected to the common pin and "NO" is not connected. When the current is connected to the solenoid (via transistor and rectifier diode), the switch is set to the active state, whereby the common pin is connected to the "NO" pin.



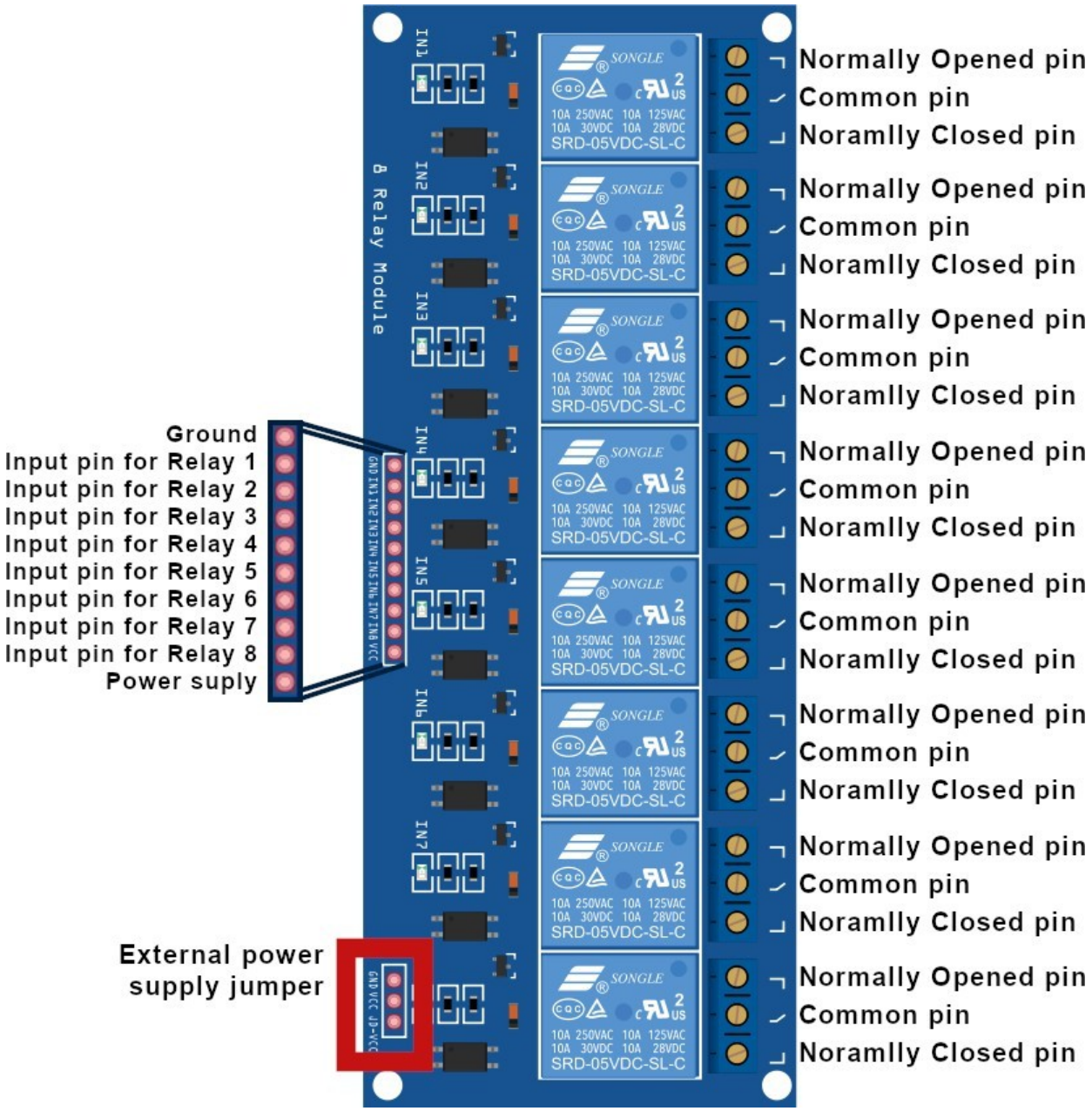
The module consists of eight relays that can process up to 5A 50V AC and 5A 30V DC. Each relay has an LED, two resistors, an NPN transistor, a rectifier diode and an optocoupler.

On the DC side of the board there are two rows of *8* pins for connection to the D1 mini board. The shield uses a *3.3V* pin, a GND pin and a digital I/O pin *5* (labelled *D1*, this is explained in more detail later in the text). To change the state of the relay, change the state of digital I/O pin *5*. On the AC side, there is a three-pin screw terminal block on which the pins are labelled as follows: Normally Closed - NC pin, Common pin and Normally Open - NO pin.

Technical data:

Maximum AC:	5A 50V
Maximum DC:	5A 30V
Contact type:	Both: Normally closed - NC, Normally open - NO
Dimensions:	50 x 140mm [1.97 x 5.5in]

The pin assignment



A jumper for the external power supply is used to select the power supply input. If it is not connected, the relays are not switched on at all, but the LEDs on the module continue to flash. If you connect the JD VCC pin and the VCC pin together (with a two-pole jumper), the module is supplied with power via the VCC pin.

If you want to use an external power supply, remove a two-pole jumper and connect the positive side of the external power supply to the JD-VCC pin and the ground pin of the external power supply to the ground pin of the module.

External energy supply

Why is there a need for an external power supply?

Firstly, it is necessary because a voltage regulator on board the Atmega328P board is sometimes not powerful enough to operate the microcontroller board and the module.

And secondly, it is better if the relay and microcontroller board power supply are separate. This is because relays are used to control AC
- or powerful DC devices, and it is a safety precaution to control electronic and powerful electronic circuits separately. One of the good sides of using relays is the protection of microelectronic circuits from powerful electronic circuits.

How to set up the Arduino IDE

If you have not yet installed the Arduino IDE, you can do so as follows. Go to: https://www.arduino.cc/en/Main/Software and download the installation file for your operating system platform.



For Windows, double-click on the downloaded ".exe" file and follow the instructions in the installation window.

For Linux, download the file with the extension "*.tar.xz*", which you then need to extract. When you extract it, go to the extracted directory and open the terminal in that directory. You will need to run two "*.sh*" scripts, the first is called "*arduino-linux- setup.sh*", the second "*install.sh*".

To run the first script in the terminal, execute the following command:

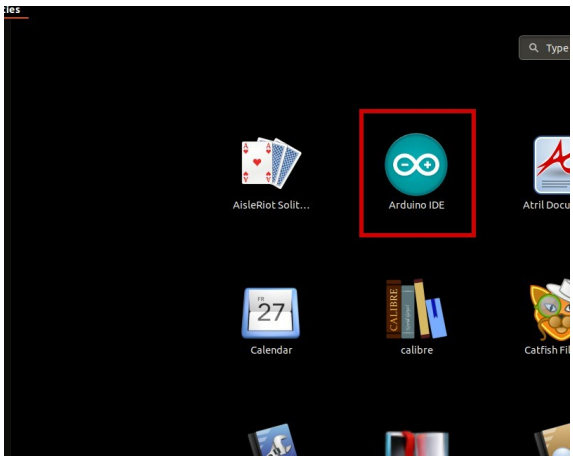
`sh arduino-linux-setup.sh user_name`

`user_name` – is the name of the superuser in the Linux operating system. You will then be asked to enter the password for the superuser. Wait a few minutes until the script has completed everything.

After installing the first script, run the second script with the name "*install.sh*". Execute the following command in the terminal:

`sh install.sh`

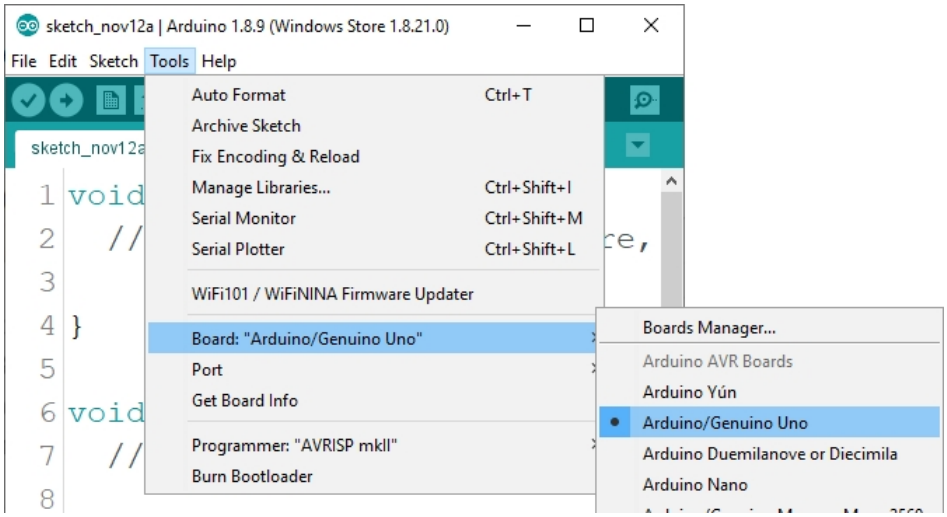
After installing these scripts, go to *All Apps to* find the installed *Arduino IDE.*



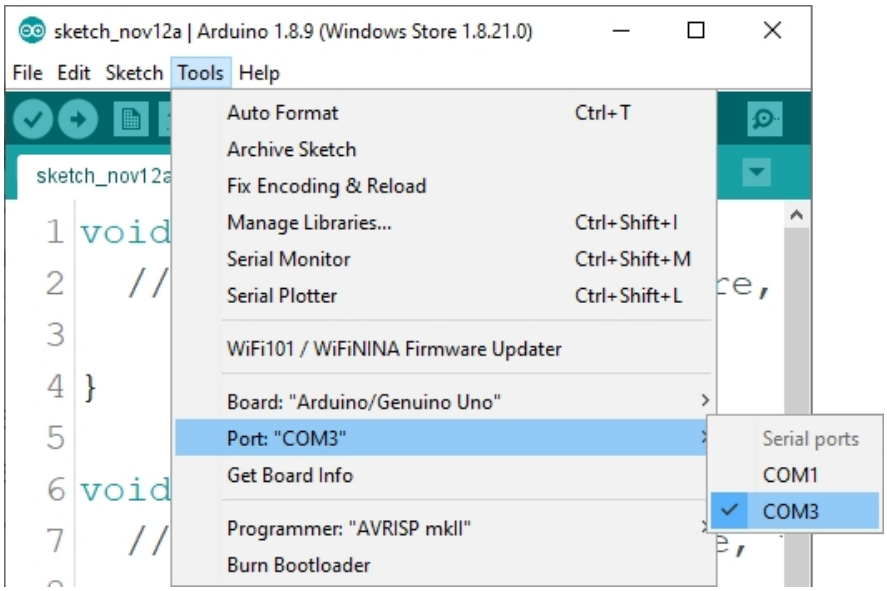
Next, you should check whether your PC can recognise the Atmega328P board. Open the freshly installed *Arduino IDE* and go to :

Tools > Board > {your board name here}

{your board name here} should be the *Arduino/Genuino Uno*, as you can see in the picture below:



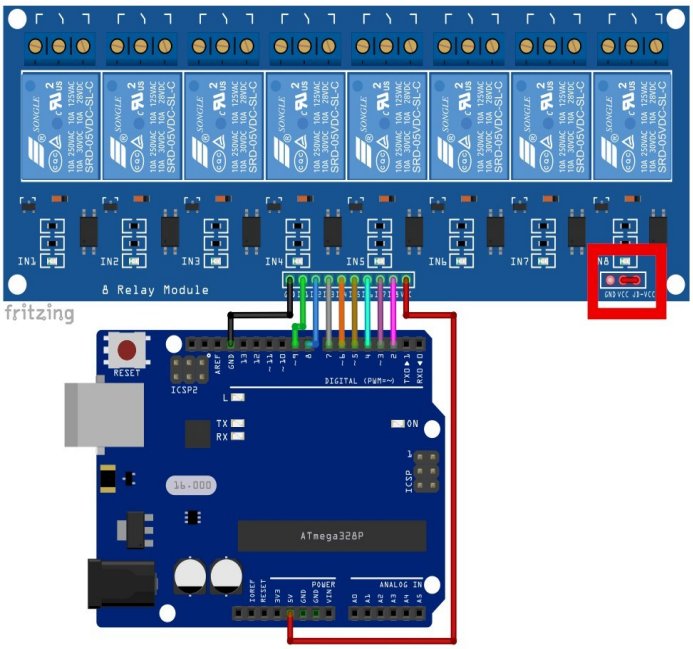
You must then select the port to which the microcontroller board is connected. Go to: *Tools > Port > {port name goes here}* If you have connected the Atmega328P board to the USB port, there should be multiple port names. Since we are using the *Arduino IDE* on *Windows*, the port names are as in the following picture.



For Linux users, the port name is "*/dev/ttyUSBx*", for example, where "*x*" is an integer between *0* and *9.*

Connect module with Atmega328P board

Close You the 8-relay module Atmega328P as in the as shown in the following connection diagram:



Module pin		>Board Pin	
IN1	>	D9	Green wire
IN2	>	D8	Blue wire
IN3	>	D7	Grey wire
IN4	>	D6	Orange wire
IN5	>	D5	Ochre wire
IN6	>	D4	Turquoise wire
IN7	>	D3	Purple wire
IN8	>	D2	Pink wire
GND	>	GND	Black wire
VCC	>	5V	Red wire

NOTE: As you can see in the red rectangle on the connection diagram, a jumper is connected for the external power supply, which connects the JD VCC pin to the VCC pin. This means that the module with 8 relays is supplied with power from the microcontroller board via the VCC pin.

Sketch example:

```
uint8_t relays[8] = {2, 3, 4, 5, 6, 7, 8, 9};
void setup() {
  for (uint8_t i = 0; i < 8; i++) {
    pinMode(relays[i], OUTPUT);
  }
}

void loop() {
  for (uint8_t i = 0; i < 8; i++) {
    digitalWrite(relays[i], HIGH); // Turn ON
  }
  delay(1000);
  for (uint8_t i = 0; i < 8; i++) {
    digitalWrite(relays[i], LOW); // Turn OFF
  }
  delay(1000);
}
```

When you upload the sketch to the microcontroller board, you should hear clicks from the relays. When the relay changes its state from active to inactive and vice versa, you will hear switching clicks.

All light bulbs connected to relays should flash every second.

We can change the NO/NC pin state through these lines of code:

`digitalWrite(2, HIGH);` - **NC** pin is not connected to common pin
NO pin is connected to common pin

`digitalWrite(2, LOW);` - **NC** pin is connected to common pin
NO pin is not connected to common pin

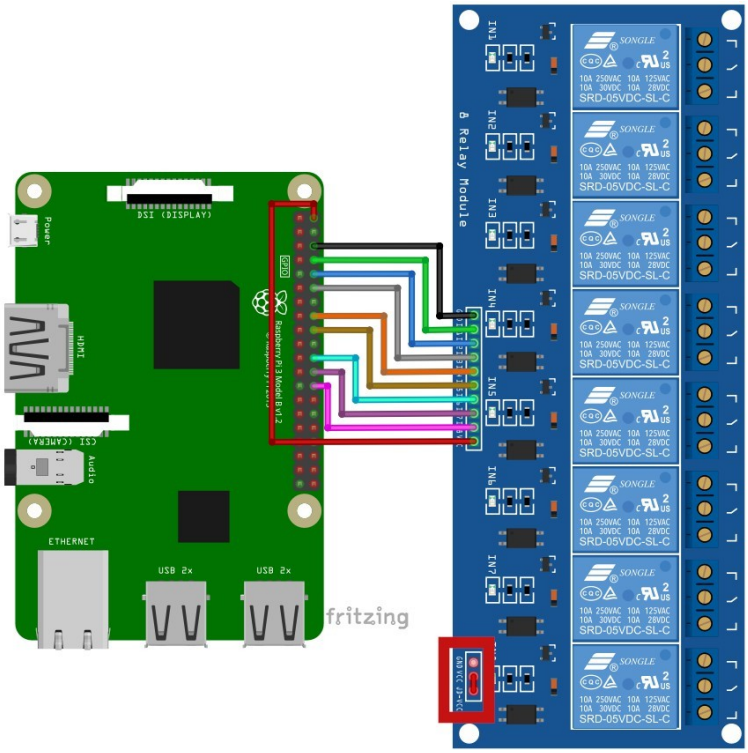
How to set up Raspberry Pi and Python

First you need to install the operating system on the Raspberry Pi, then you need to set it up so that you can use it in "*headless*" mode. *Headless* mode allows you to connect to the Raspberry Pi remotely without the need for a PC screen, mouse and keyboard. A detailed explanation can be found in the free eBook "*Raspberry Pi Quick Startup Guide*", which you can find on our website:
https://www.az-delivery.de/products/raspberry-pi-kostenfreies-e-book?ls=en

The Raspbian *operating system* is supplied with pre-installed Python.

Connecting the module with Raspberry Pi

Connect the 8-relay module to the Raspberry Pi as shown in the following connection diagram:



Module pin				
VCC	>	5V !	[pin 2]	Red wire
GND	>	GND	[pin 6]	Black wire
IN1		>GPIO14	[pin 8]	Green wire
IN2		>GPIO15	[pin 10]	Blue wire
IN3		>GPIO18	[pin 12]	Grey wire
IN4		>GPIO23	[pin 16]	Orange wire
IN5		>GPIO24	[pin 18]	Ochre wire
IN6		>GPIO25	[pin 22]	Turquoise wire
IN7	>	GPIO8	[pin 24]	Purple wire
IN8	>	GPIO7	[pin 26]	Pink wire

NOTE 1: Connect the VCC pin of the module to the 5V pin of the Raspberry Pi, as the module cannot function if less than 5V is applied to the VCC pin.

NOTE 2: As you can see in the red rectangle on the connection diagram, a jumper for the external power supply is connected, which connects the JD VCC pin to the VCC pin. This means that the module with 8 relays is supplied with power from the Raspberry Pi board via the VCC pin.

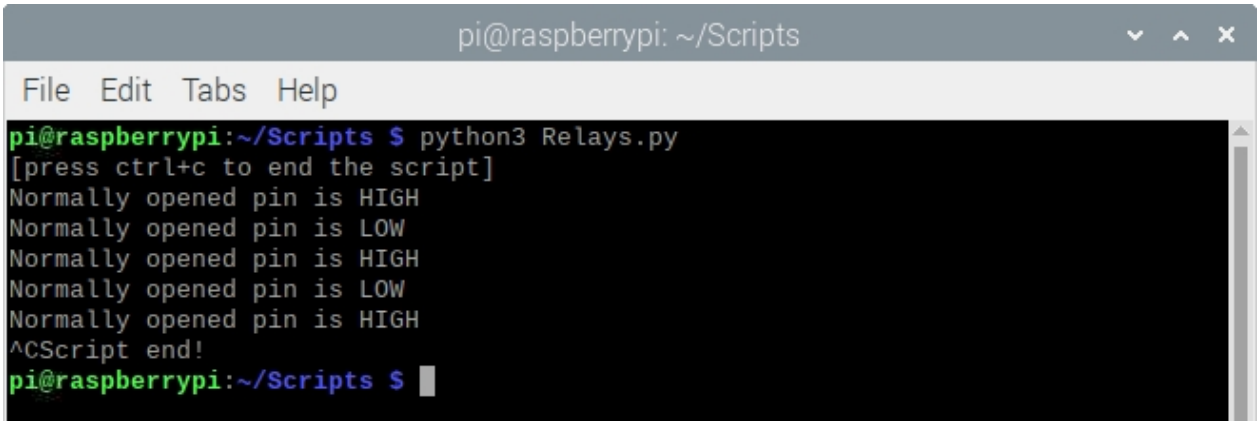
Python script:

```
import RPi.GPIO as GPIO
from time import sleep
GPIO.setmode(GPIO.BCM)
GPIO.setwarnings(False)
Relays = (14, 15, 18, 23, 24, 25, 8, 7)
for i in range(8):
    GPIO.setup(Relays[i], GPIO.OUT)
print('[press ctrl+c to end the script]')
try: # Main program loop
    while True:
        for i in range(8):
            GPIO.output(Relays[i], GPIO.HIGH)
        print('Normally opened pin is HIGH')
        sleep(1) # Waitmode for 1 second
        for i in range(8):
            GPIO.output(Relays[i], GPIO.LOW)
        print('Normally opened pin is LOW')
        sleep(1) # Waitmode for 1 second
# Scavenging work after the end of the program
except KeyboardInterrupt:
    print('Script end!')
finally:
    GPIO.cleanup()
```

Save the script under the name "*Relays.py*" in the default script directory. To execute the script, open the terminal in the directory in which you saved the script and execute the following command:

```
python3 Relays.py
```

The output should look like the output in the following image:



To end the script, press *"CTRL + C"*. The script is self-

explanatory.

You have done it. You can now use our module for your projects.

Now it's your turn! Develop your own projects and smart home installations. We will show you how to do this in an uncomplicated and understandable way on our blog. There we offer you sample scripts and tutorials with interesting small projects to get you started quickly in the world of microelectronics. The Internet also offers you countless opportunities to learn more about microelectronics.

If you are looking for more high-quality microelectronics and accessories, AZ-Delivery Vertriebs GmbH is the right place for you. We offer you numerous application examples, detailed installation instructions, ebooks, libraries and, of course, the support of our technical experts.

https://az-delivery.de

Have fun!

Imprint

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