Relay interface

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Data science ideas	
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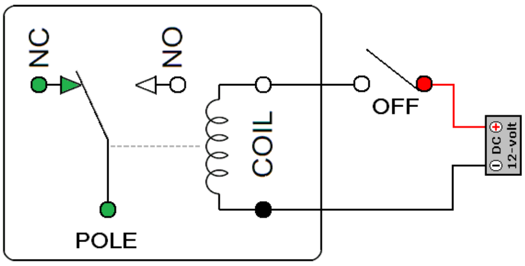
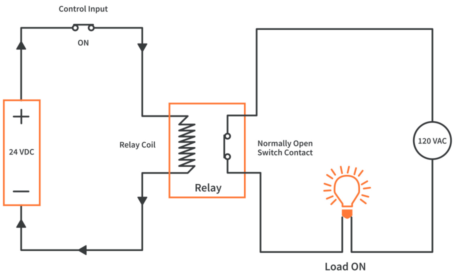
A relay is a simple electronic element made to seperate high voltage switches from low voltage circuitry. We (and many) use the relay as controllable switch.

Basic functionality



- When you turn the GPIO pin high, the relay switches connections
    - From common-nc (normally connected)
    - to common-no (normally open)

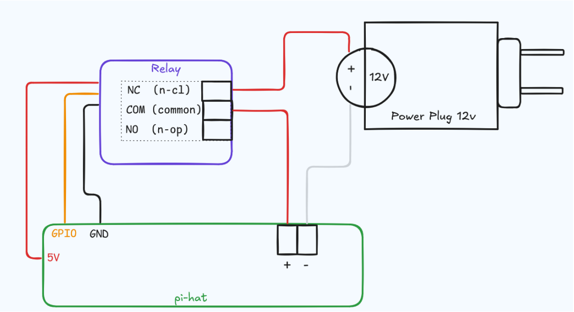
How to Connect (interface)

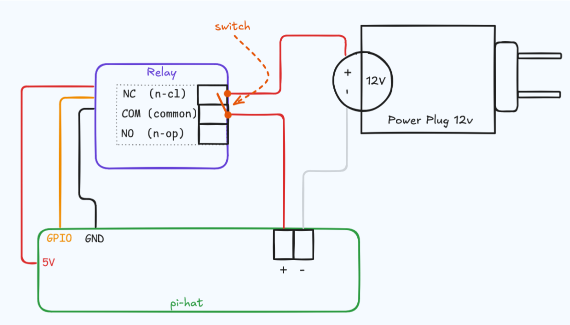


You can see a relay as a basic switch, controlled from a GPIO pin. A general connection looks as if connected to a switch.

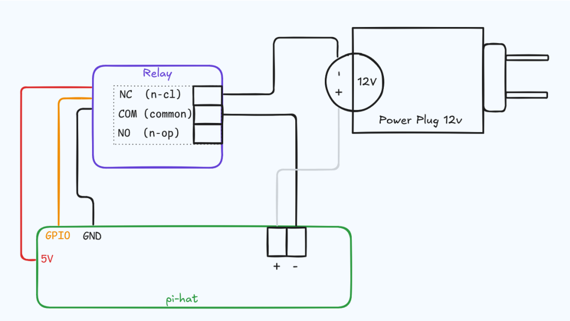
Our connect is such that in resting (low) mode the relay is connecting so we use the common-nc connection as the switch. Now when we switch GPIO-HIGH, we turn off the connection. (and vise versa)

In our case the connection looks the following: (flip slide double click)





Please note I had initially connected the ground line on the relay side; This is not necessary wrong, but could cause trouble on the electronics a bit. It is better to have the power(supply) line on the switching side.



How to Power Reset (edge code)

To run the relay reset on an edge computer (RPI CM4), you need to run a specific piece of code in the edge-code library.

The code can be found here: *edge-code/setup-plensor/Relay.py*

- *This is the standard code library open on a RPi (open terminal and type `code` and press `↵`)*

▼ Code *(unfold)*:

```
import RPi.GPIO as GPIO
import time

PIN = 21

class PihatRelay:
    def __init__(self):
        GPIO.setmode(GPIO.BCM)
        GPIO.setup(PIN, GPIO.OUT)

    def turn_off_turn_on(self, time_sleep = 30):
        GPIO.output(PIN, GPIO.LOW)
        print(" LINE OPEN ")
        time.sleep(1)

        GPIO.output(PIN, GPIO.HIGH)
        print(" LINE CLOSED ")

        time.sleep(time_sleep)

        GPIO.output(PIN, GPIO.LOW)
        print(" LINE OPEN ")

try:
    RLY = PihatRelay()
    print("RELAY POWER CYCLING ...")
    RLY.turn_off_turn_on()
except KeyboardInterrupt:
    print(" Byee ")
finally:
    GPIO.output(PIN, GPIO.LOW)
```

RUN CODE

You can just **run the code** with

```
sudo python3 edge-code/setup-plensor/Relay.py
```

- It will ask for the password of the pi;
    - `Plantenn@2022`
- This will run the reset once.

FIXES

- In current configuration the reset will take 30 seconds. you can change this if you like:

  ```
  RLY.turn_off_turn_on(time_sleep = 15)
  ```

- The configuration will make sure it sets the relay back to low at the end of the cycle;
    - if for some reason power does not come back on, you can manually run `GPIO.output(PIN, GPIO.LOW)`

Hardware Connection (on RPICM4)

[insert picture of relay on board here]

▼ Explanation of function

A relay is an electromechanical switch that uses an electromagnet to control the flow of electricity. It allows a low-power circuit to control a high-power circuit while keeping them electrically isolated from each other.

- **Electromagnetic Control:** When current flows through the relay's coil, it creates a magnetic field that moves a mechanical switch
- **Electrical Isolation:** The control circuit is completely separated from the power circuit, providing safety and preventing interference
- **Power Switching:** Relays can safely switch high-power loads on/off using a low-power control signal

Common applications include:

- Switching high-voltage or high-current devices

- Isolating sensitive electronics from power circuits
- Controlling multiple power circuits with a single control signal
- Safety disconnection of power sources

💡 Safety Note: Relays provide important isolation between control and power circuits, helping protect both equipment and users from high voltages and currents.