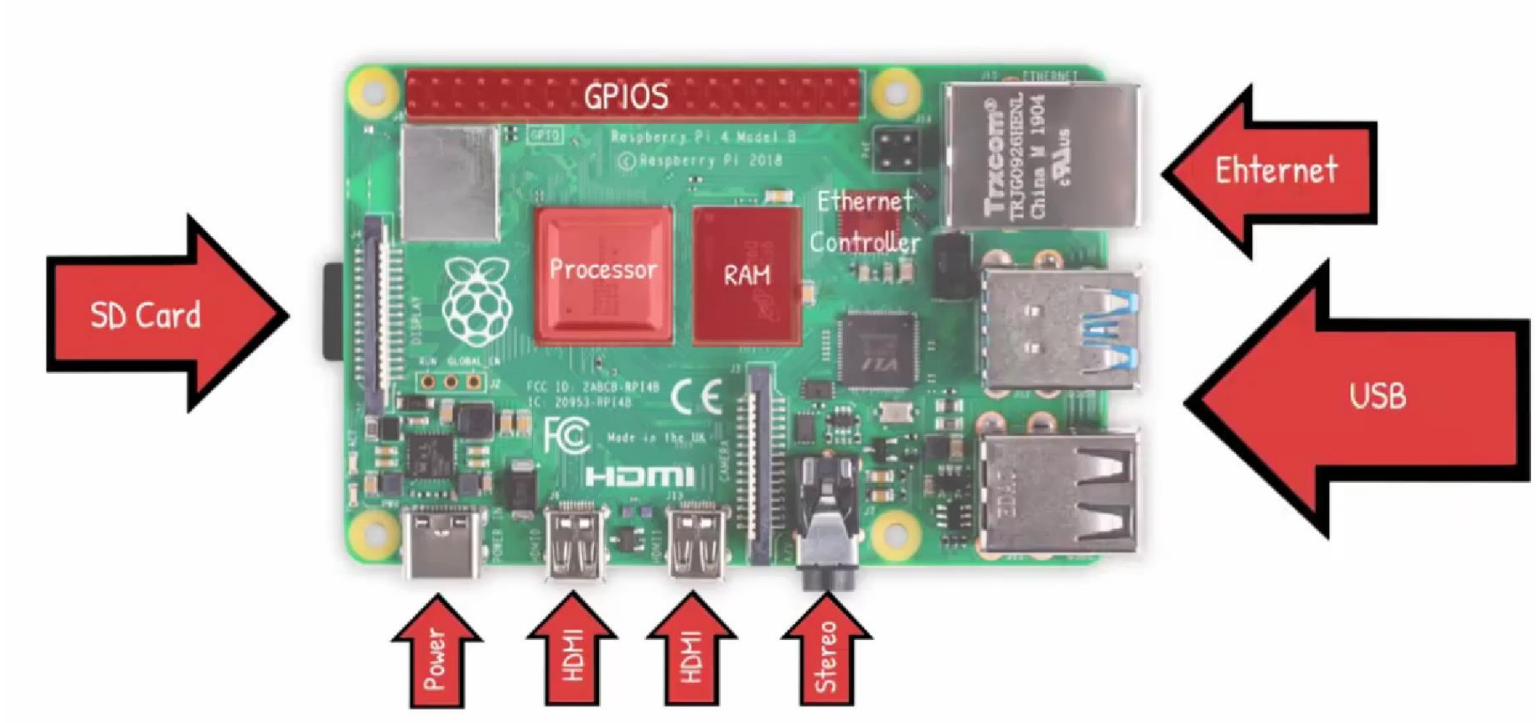
Raspberry pi



Raspberry pi vs Arduino

Raspberry Pi

Mini Computer

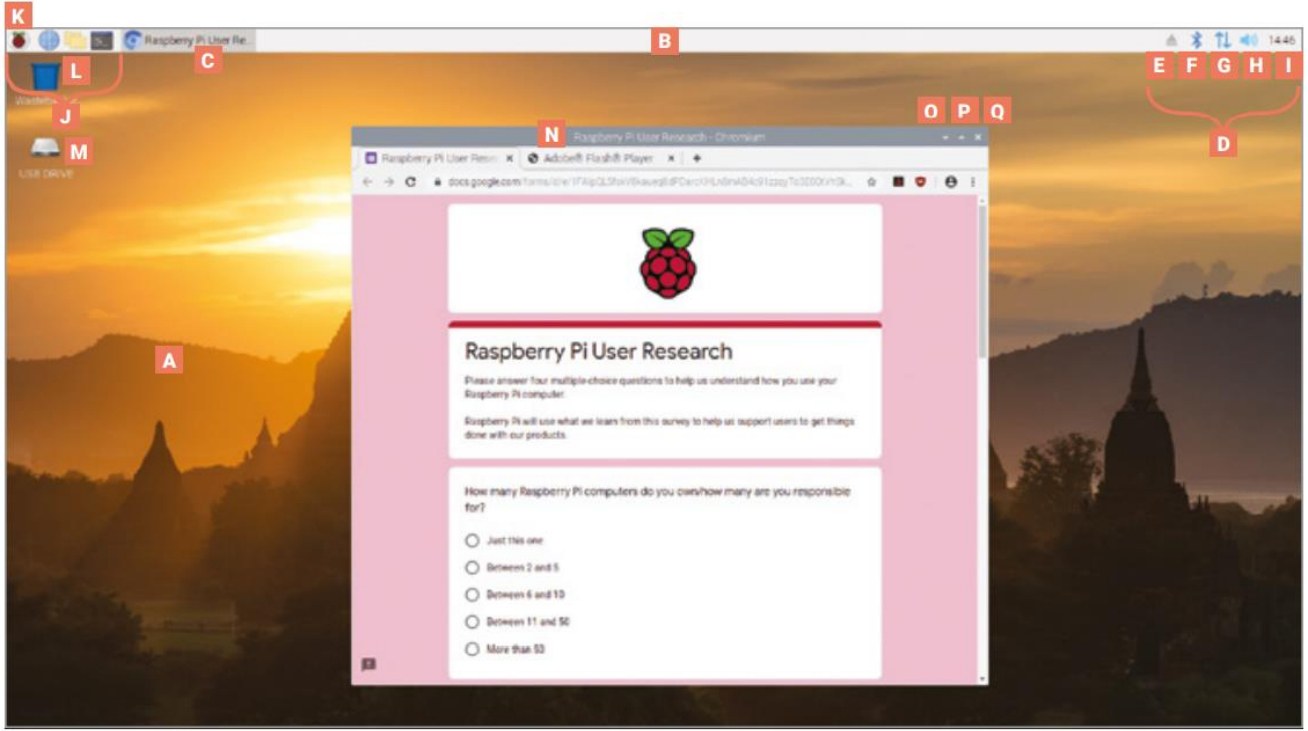
Microprocessor
GPIOS
No Analog Inputs
Only 5V
Builtin Wifi Bluetooth
Difficult Sensor Interface
Easy for Computer Vision

Arduino

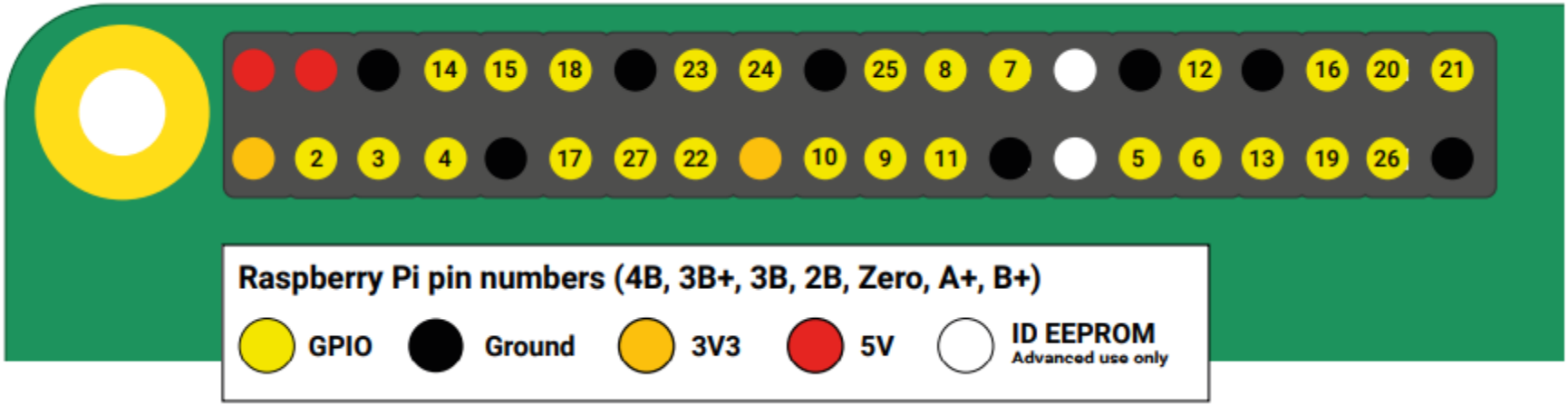
Controller

Microcontroller
GPIOS
Analog Inputs
5 to 12 V
External Wifi Bluetooth
Simple Sensor Interface
Hard for Computer Vision

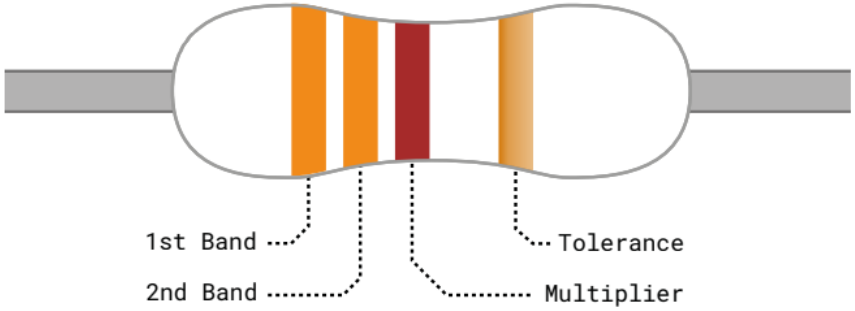
Raspberry pi screen



GPIO header


14 15 18 23 24 25 8 7 12 16 20 21
2 3 4 17 27 22 10 9 11 5 6 13 19 26
Raspberry Pi pin numbers (4B, 3B+, 3B, 2B, Zero, A+, B+)
GPIO
Ground
3V3
5V
ID EEPROM
Advanced use only

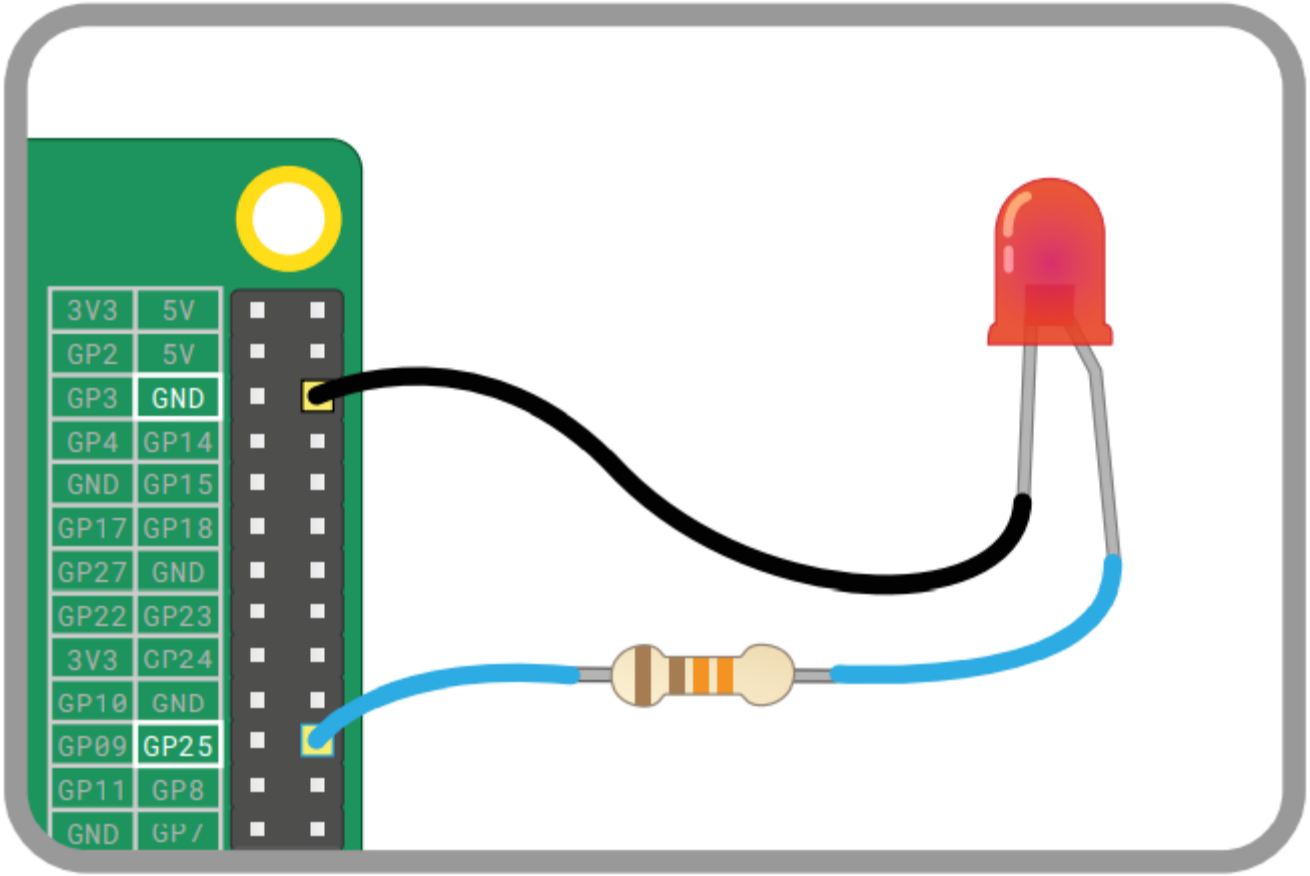
3V3	**3.3 volts power**	A permanently-on source of 3.3 V power, the same voltage Raspberry Pi runs at internally
5V	**5 volts power**	A permanently-on source of 5 V power, the same voltage as Raspberry Pi takes in at the micro USB power connector
Ground (GND)	**0 volts ground**	A ground connection, used to complete a circuit connected to power source
GPIO XX	**General-purpose input/output pin number 'XX'**	The GPIO pins available for your programs, identified by a number from 2 to 27
ID EEPROM	**Reserved special-purpose pins**	Pins reserved for use with Hardware Attached on Top (HAT) and other accessories



	1st/2nd Band	Multiplier	Tolerance
Black	0	$\times 10^{0}$	-
Brown	1	$\times 10^{1}$	±1%
Red	2	$\times 10^{2}$	±2%
Orange	3	$\times 10^{3}$	-
Yellow	4	$\times 10^{4}$	-
Green	5	$\times 10^{5}$	±0.5%
Blue	6	$\times 10^{6}$	±0.25%
Violet	7	$\times 10^{7}$	±0.1%
Grey	8	$\times 10^{8}$	±0.05%
White	9	$\times 10^{9}$	-
Gold	-	$\times 10^{-1}$	±5%
Silver	-	$\times 10^{-2}$	±10%
None	-	-	±20%

Exercise 1

Να αναβοσβήνει ένα led ανά ένα sec.

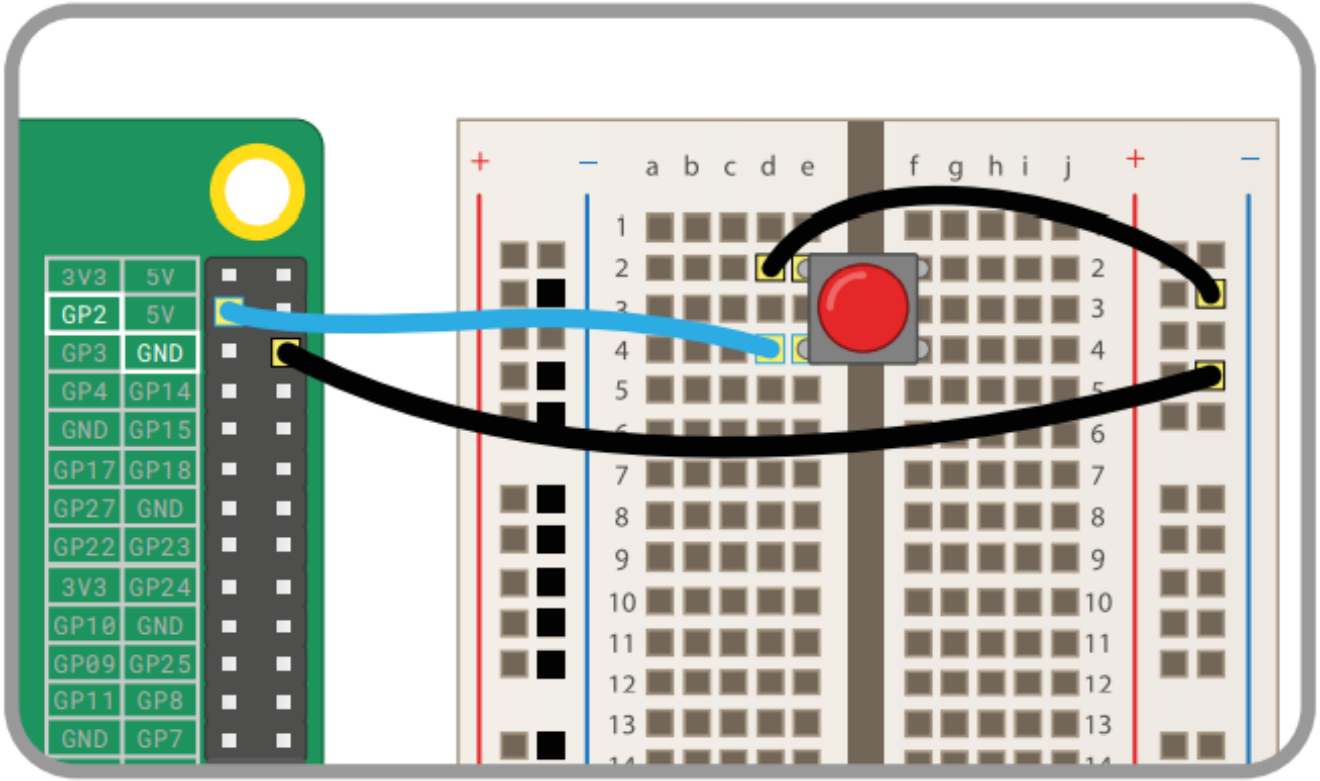

3V3
5V
GP2
5V
GP3
GND
GP4
GP14
GND
GP15
GP17
GP18
GP27
GND
GP22
GP23
3V3
GP24
GP10
GND
GP09
GP25
GP11
GP8
GND

Exercise 1

```
from gpiozero import LED
from time import sleep
led = LED(25)
while True:
    led.on()
    sleep(1)
    led.off()
    sleep(1)
''' led.toggle() // to switch between states '''
```

Exercise 2

Όταν πατάμε ένα κουμπάκι να τυπώνεται Button Pressed, αλλιώς να τυπώνεται Button Not Pressed.


3V3 5V
GP2 5V
GP3 GND
GP4 GP14
GND GP15
GP17 GP18
GP27 GND
GP22 GP23
3V3 GP24
GP10 GND
GP09 GP25
GP11 GP8
GND GP7
+ − a b c d e f g h i j + −
1 2 3 4 5 6 7 8 9 10 11 12 13

Exercise 2

```
from gpiozero import Button
button = Button(2)
while True:
    if button.is_pressed:
        print("Button Pressed")
    else:
        print("Button Not Pressed")
```

Other Commands

These don’t block the flow of the program

button.when_pressed = led.on

button.when_released = led.off

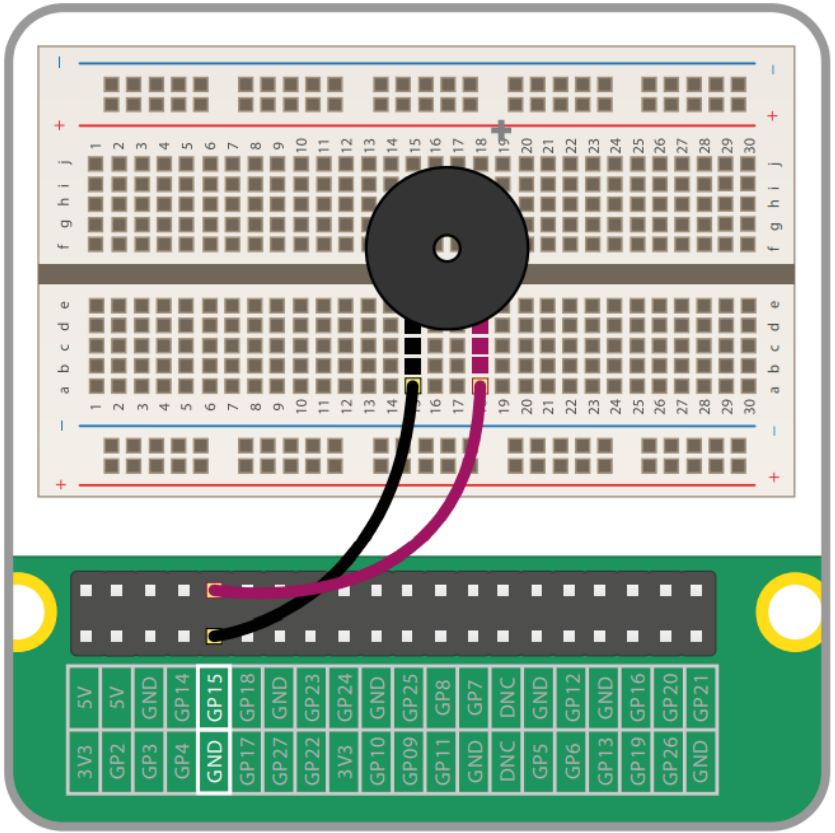
These block the flow of the program

button.wait_for_press()

button.wait_for_release()

Exercise 3

Να ανοιγοκλείνει ένα buzzer ανά ένα sec.


5V
5V
GND
GP14
GP15
GP18
GND
GP23
GP24
GND
GP25
GP8
GP7
DNC
GND
GP12
GND
GP16
GP20
GP21
3V3
GP2
GP3
GP4
GND
GP17
GP27
GP22
3V3
GP10
GP09
GP11
GND
DNC
GP5
GP6
GP13
GP19
GP26
GND

Exercise 3

```
from gpiozero import Buzzer
from time import sleep
buzzer = Buzzer(15)
while True:
    buzzer.on()
    sleep(1)
    buzzer.off()
    sleep(1)
```

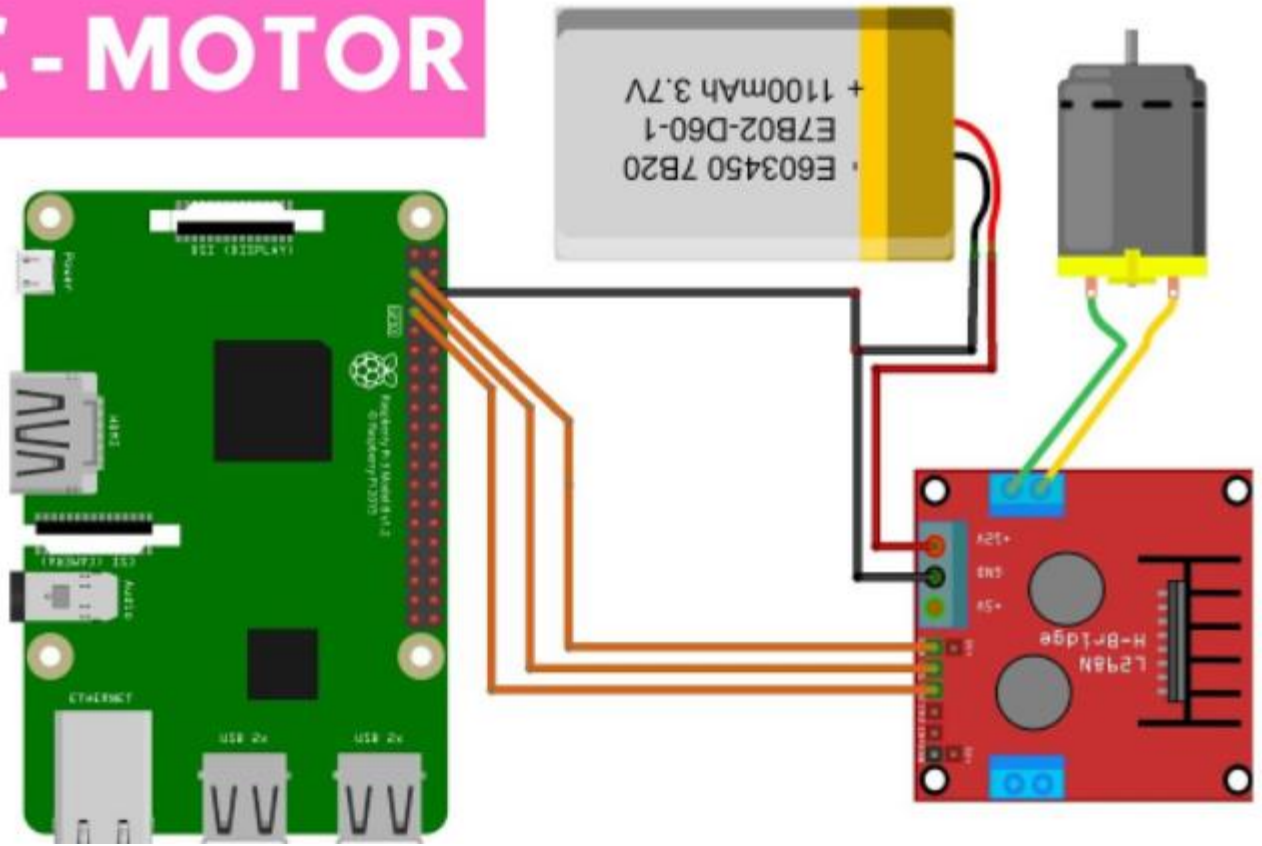
Exercise 4

Να ελέγχουμε ένα κινητήρα.

Ο κινητήρας να κινείται για 1 sec με τη μέγιστη ταχύτητα και να σταματάει για 1 sec.

Στη συνέχεια να αλλάζει κατεύθυνση περιστροφής και μετά από 1 sec να σταματάει.

DC-MOTOR



Exercise 4

```
import RPi.GPIO as GPIO
from time import sleep
GPIO.setmode(GPIO.BCM)
GPIO.setwarnings(False)
class motor():
      def __init__(self,Ena,In1,In2):
            self.Ena = Ena
            self.In1 = In1
            self.In2 = In2
            GPIO.setup(self.Ena,GPIO.OUT)
            GPIO.setup(self.In1,GPIO.OUT)
            GPIO.setup(self.In2,GPIO.OUT)
            self.pwm = GPIO.PWM(self.Ena, 100)
            self.pwm.start(0)
```

Exercise 4

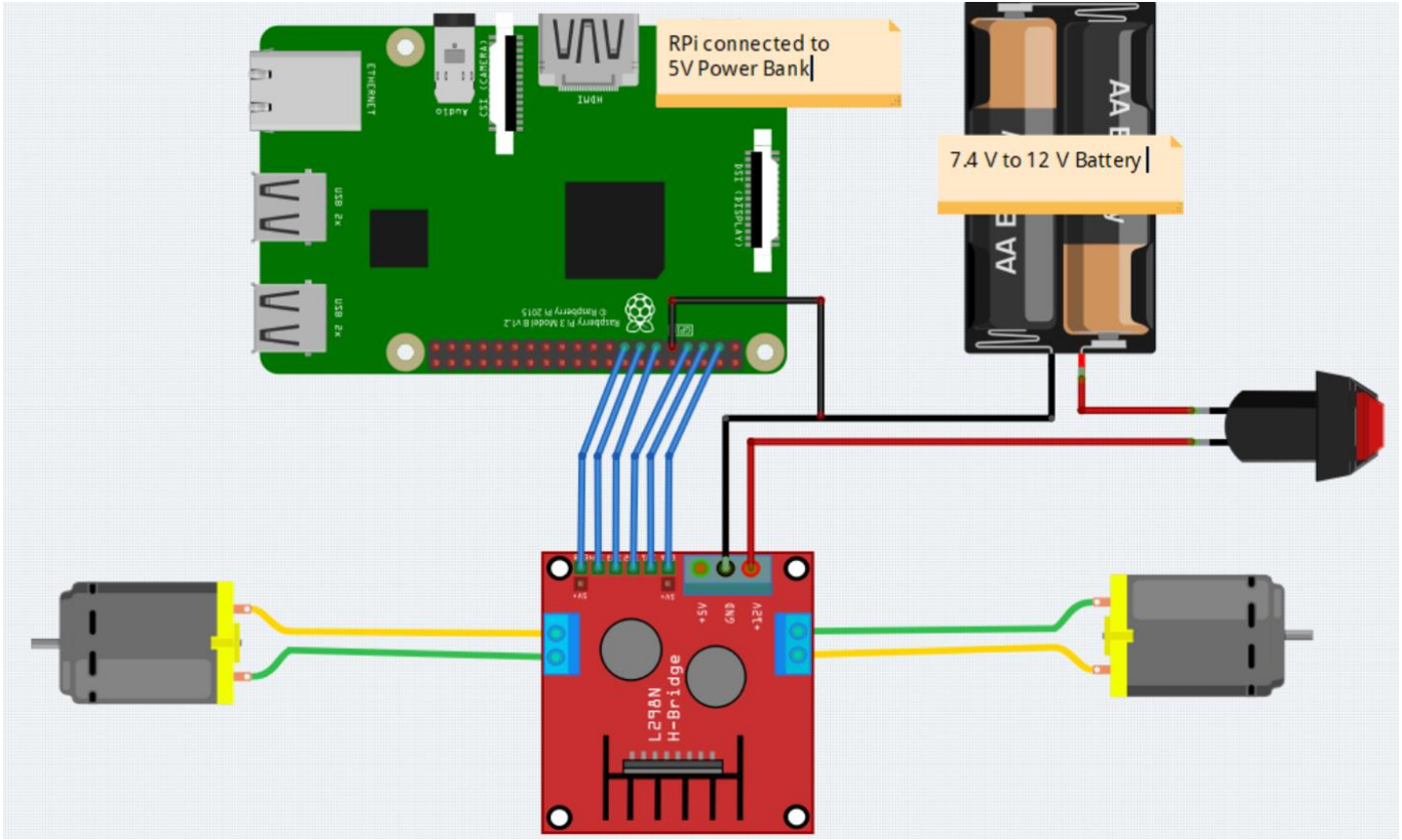
```
def moveF(self,x):
        self.pwm.ChangeDutyCycle(x)
        GPIO.output(self.In1,GPIO.HIGH)
        GPIO.output(self.In2,GPIO.LOW)
def moveB(self,x):
        self.pwm.ChangeDutyCycle(x)
        GPIO.output(self.In1,GPIO.LOW)
        GPIO.output(self.In2,GPIO.HIGH)
def stop(self):
        self.pwm.ChangeDutyCycle(0)
```

Exercise 5

Να ελέγχουμε το αυτοκινητάκι μέσω συναρτήσεων.

CAR	forward	back	stop
Left wheel	Forward	back	stop
Right wheel	Forward	back	stop

CAR	Turn left	Turn right	stop
Left wheel	back	Forward	Stop
Right wheel	forward	back	stop


RPi connected to
5V Power Bank
7.4 V to 12 V Battery
L298N
H-Bridge
+5V
GND
+12V

Next time

Έλεγχος αυτοκινήτου, μέσω πληκτρολογίου και joystick.