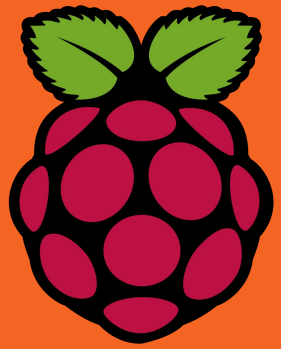
Creating a driver for Raspberry pi 4



Joan Manuel Muñoz Monroy

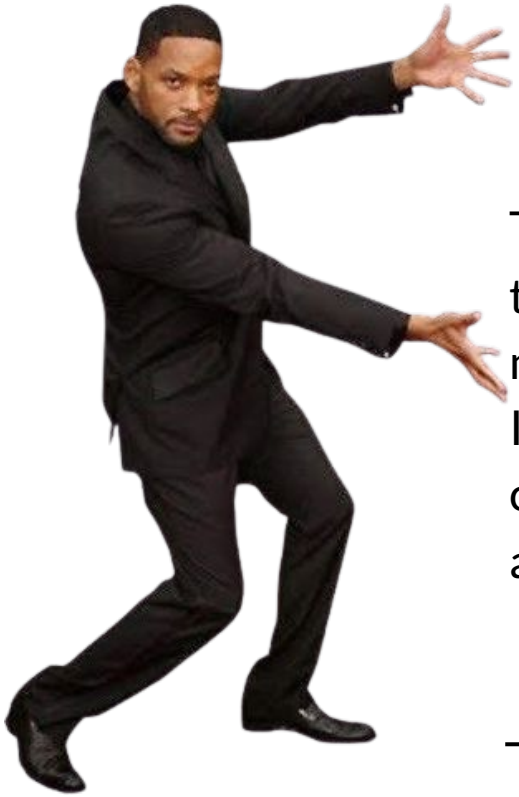
Anderson Saldarriaga Castaño

Daniel Loaiza Noreña

What is a driver ?

is a software program that tells your computer's operating system how to communicate with a certain piece of hardware.

What is raspberry pi?



The Raspberry Pi is a low-cost computer with a compact size, the size of a credit card, it can be connected to a computer monitor or TV, and used with a standard mouse and keyboard. It is a small computer that runs a Linux operating system capable of allowing people of all ages to explore computing and learn to program languages such as Scratch and Python.

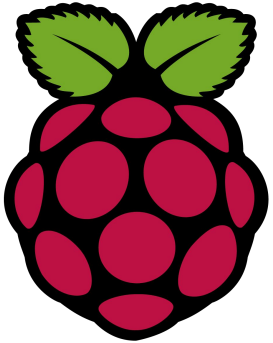
What do we need?

We need a series of steps which allow us to create a driver for raspberry pi

Step 1

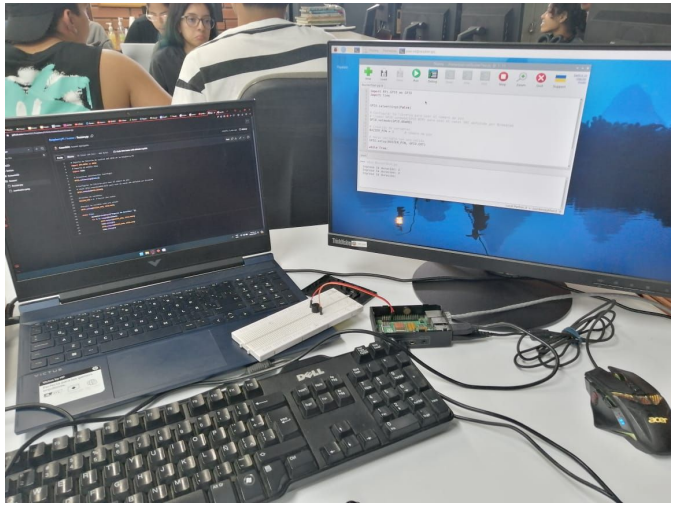
Knowledge:

We need to make a big research about what is?, how it works? and what we need to use ?



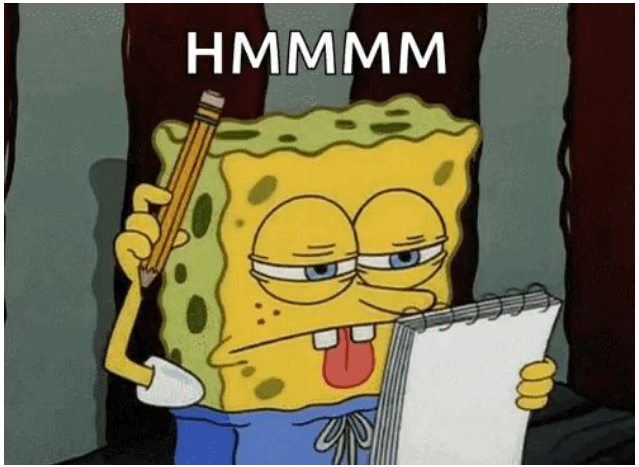
Results

after research we identify the things that we need to make a driver for raspberry pi

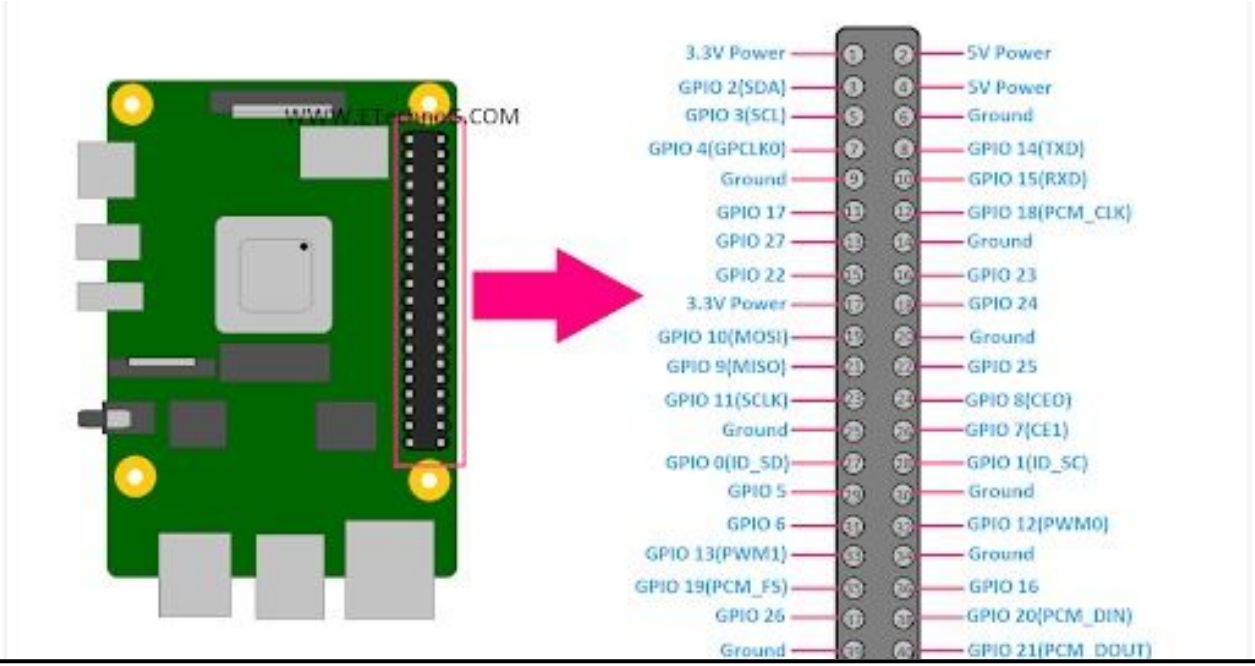


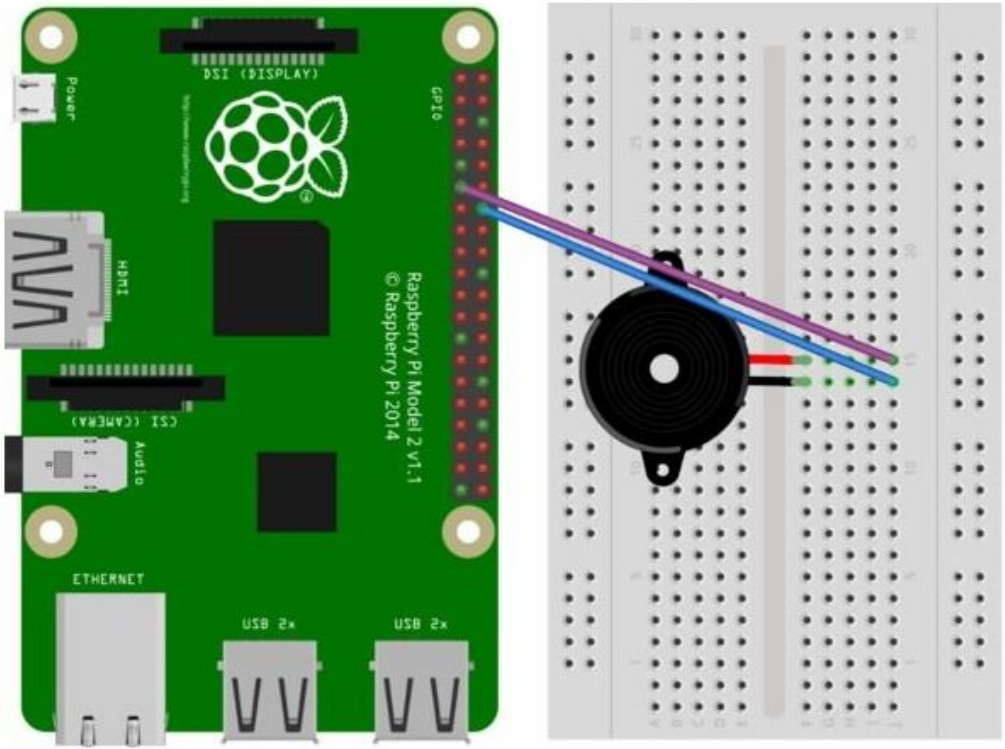
Step 2

when you identify the things that you need for the driver, you need to know the good way to connect the raspberry with the buzzer



Results


3.3V Power
GPIO 2(SDA)
GPIO 3(SCL)
GPIO 4(GPCLK0)
Ground
GPIO 17
GPIO 27
GPIO 22
3.3V Power
GPIO 10(MOSI)
GPIO 9(MISO)
GPIO 11(SCLK)
Ground
GPIO 0(ID_SD)
GPIO 5
GPIO 6
GPIO 13(PWM1)
GPIO 19(PCM_FS)
GPIO 26
Ground
5V Power
5V Power
Ground
GPIO 14(TXD)
GPIO 15(RXD)
GPIO 18(PCM_CLK)
Ground
GPIO 23
GPIO 24
Ground
GPIO 25
GPIO 8(CE0)
GPIO 7(CE1)
GPIO 1(ID_SC)
Ground
GPIO 12(PWM0)
Ground
GPIO 16
GPIO 20(PCM_DIN)
GPIO 21(PCM_DOUT)


GPIO
Raspberry Pi Model 2 v1.1
© Raspberry Pi 2014
DSI (DISPLAY)
Power
HDMI
CSI (CAMERA)
Audio
ETHERNET
USB 2x
USB 2x

Step 3

Now we have the connection of raspberry pi with the buzzer

so we need to test how it works the buzzers, using python we take one pin using gpio

Results

we create the next code

```python
import RPi.GPIO as GPIO
import time

# Define los pines GPIO para el zumbador y la duración de cada nota
buzzer_pin = 17
note_duration = 0.3

# Define las frecuencias de las notas musicales para "Feliz Cumpleaños"
C = 261
D = 294
E = 329
F = 349
G = 392
A = 440

# Función para reproducir una nota
def play_note(note, duration):
    GPIO.output(buzzer_pin, GPIO.HIGH)
    time.sleep(duration)
    GPIO.output(buzzer_pin, GPIO.LOW)
    time.sleep(0.01)  # Breve pausa entre notas
```

```python
# Función para reproducir la melodía de "Feliz Cumpleaños"
def play_happy_birthday():
    melody_notes = [
        (C, 1), (C, 1), (D, 1), (C, 1), (F, 1), (E, 2),  # Feliz
        (C, 1), (C, 1), (D, 1), (C, 1), (G, 1), (F, 2),  # Cumpleaños
        (C, 1), (C, 1), (C * 2, 1), (A, 1), (F, 1), (E, 1), (D, 1),  # Querido/a
        (B, 1), (B, 1), (A, 1), (F, 1), (G, 1), (F, 2)  # Nombre
    ]

    for note, beats in melody_notes:
        duration = note_duration * beats
        play_note(note, duration)

# Configuración inicial de GPIO
GPIO.setmode(GPIO.BCM)
GPIO.setup(buzzer_pin, GPIO.OUT)

try:
    # Reproducir "Feliz Cumpleaños"
    play_happy_birthday()
finally:
    # Limpiar GPIO
    GPIO.cleanup()
```

6:52 p. m.

Step 4

so we test the buzzer and it works next step is create a c code based in the python code, why c?

because we need to access the memory, use th memory and write in there.

Results

We create c archive with the requirements:

https://github.com/5inko/SOFinalProject.git

Step 5

put the archive in modules to use the driver

to do this we create a makeFile that generates a ko archive, this archive is the archive that controls the driver and is the archive that we put in modules.

Results

```
obj-m += Imperial_March_Driver.o

all:
	make -C /lib/modules/$(shell uname -r)/build M=$(PWD) modules

clean:
	make -C /lib/modules/$(shell uname -r)/build M=$(PWD) clean
```

Step 6

now we create the makefile and create the ko file, the idea is put the ko in modules to finally get the driver.

Result

to put the file in modules we follow the next steps

[1] In the project path, run: make

[2] Then run the following line: sudo insmod Imperial_March_Driver.ko

[3] And finally: echo 1 > /dev/etx_device

Final step

Pray to dieguito maradona that the driver works like we want

Final Results

https://drive.google.com/file/d/1gtd3DtuzCalutWH0wqZsTaVyRpDqIrYI/view?usp=sharing

Thank you sexys