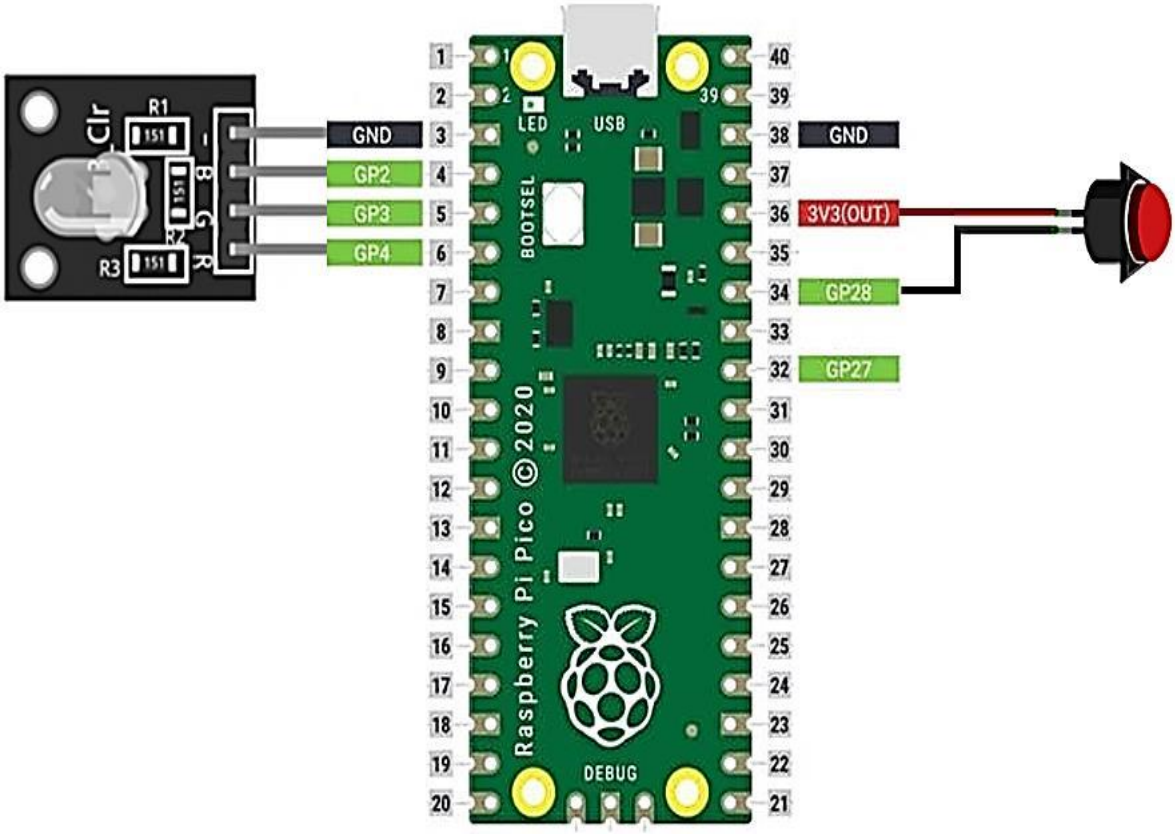
Université Ferhat Abbas Sétif 1
Faculté de Technologie, Département d'Électronique
2ème Année Master Électronique des Systèmes Embarqués
Module : Systèmes Embarqués
Année Universitaire : 2024/2025

Setif 1 University - Ferhat ABBAS

Application - Loops and Counters

The following circuit is composed of a Raspberry Pi Pico board, an RGB module and a push button.



Part 1 :

The next code is a 0 to 9 counter.

```
import time
x = 0

for y in range(0, 10):
    print(x)
    time.sleep(0.5)
    x += 1
```

1. **Replace for loop with while loop.**

```
import time
x = 0
while x < 10:
   print(x)
   time.sleep(0.5)
   x += 1
```

2. **Modify the code in order to :**

- Turn on the LED in RED (GP4) when the counter stops
- Turn on the LED in GREEN (GP3) while counting

```
import time
from machine import Pin

led_green = Pin(3, Pin.OUT)
led_red = Pin(4, Pin.OUT)

x = 0
while x < 10:
    led_green.on()
    print(x)
    time.sleep(0.5)
    x += 1
led_green.off()
led_red.on()
```

3. Modify the code to start the counter with the push button (GP28)

```
import time
from machine import Pin

led_green = Pin(3, Pin.OUT)
led_red = Pin(4, Pin.OUT)
button = Pin(28, Pin.IN, Pin.PULL_DOWN)

x = 0
while True:
    if button.value() == 1:
        while x < 10:
            led_green.on()
            print(x)
            time.sleep(0.5)
            x += 1
        led_green.off()
        led_red.on()
        break
```

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Part 2 :

```
import machine, time
from machine import Pin
led1 = Pin(4, Pin.OUT)
led2 = Pin(3, Pin.OUT)
button = Pin(28, Pin.IN, Pin.PULL_DOWN)
i=0

while True:
    if button.value():
        i=i+1

        if i==1:
            led1.on()
            led2.off()
        else:
            i=0
            led1.off()
            led2.on()

        print( "i:",i)
        time.sleep(0.5)
```

1. **Explain the next code and give its algorithm**

Explication :

Le code contrôle deux LEDs en fonction de la valeur d'un compteur incrémenté chaque fois qu'un bouton est pressé. Lorsque le bouton est pressé :

- Si `i = 1`, la première LED (led1) s'éteint et la seconde (led2) s'allume.
- Si `i = 0`, la première LED (led1) s'allume et la seconde (led2) s'éteint.

2. **Suggest an algorithm to change the state of the RGB LED (3 possible cases) every time the button is pressed :**

- RED colour if i=0
- GREEN colour if i=1
- BLUE colour if i=2

3. Convert the algorithm into a MicroPython code

```
from machine import Pin
import time

# Initialisation des LED RGB
led_red = Pin(2, Pin.OUT)
led_green = Pin(3, Pin.OUT)
led_blue = Pin(4, Pin.OUT)
button = Pin(28, Pin.IN, Pin.PULL_DOWN)

i = 0

while True:
    if button.value() == 1:  # Bouton appuyé
        time.sleep(0.2)  # Anti-rebond
        i += 1
        if i > 2:
            i = 0

        # Changer l'état de la LED RGB
        if i == 0:
            led_red.on()
            led_green.off()
            led_blue.off()
```

```
elif i == 1:
    led_red.off()
    led_green.on()
    led_blue.off()
elif i == 2:
    led_red.off()
    led_green.off()
    led_blue.on()
```