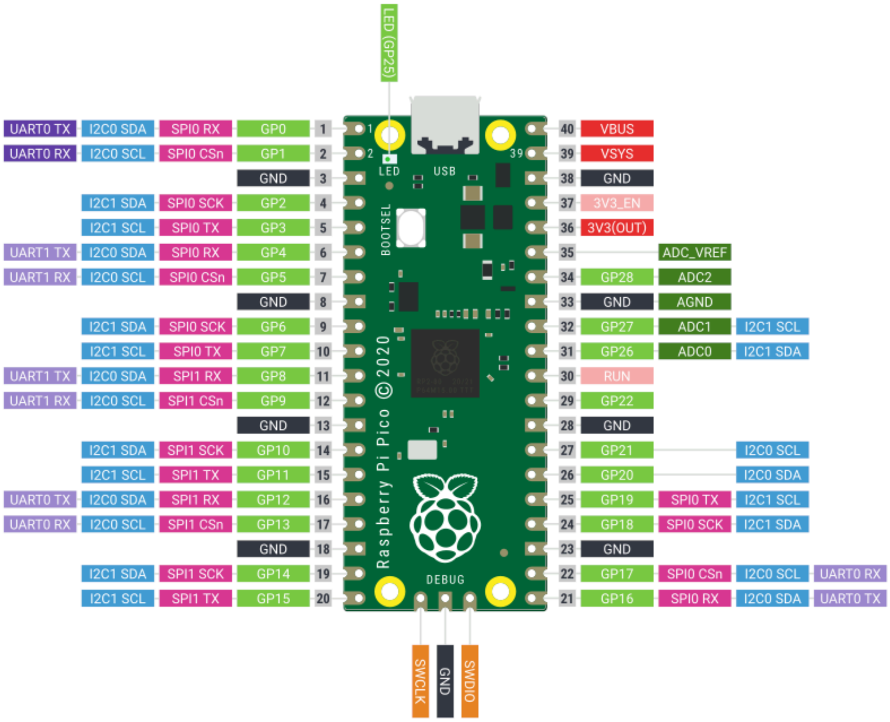
MicroPython is a full implementation of the Python 3 programming language that runs directly on embedded hardware like Raspberry Pi Pico and Raspberry Pi Pico W. To start working with a Raspberry Pi Pico board follow the *Drag-and-Drop MicroPython* manual:

www.raspberrypi.com/documentation/microcontrollers/micropython.html

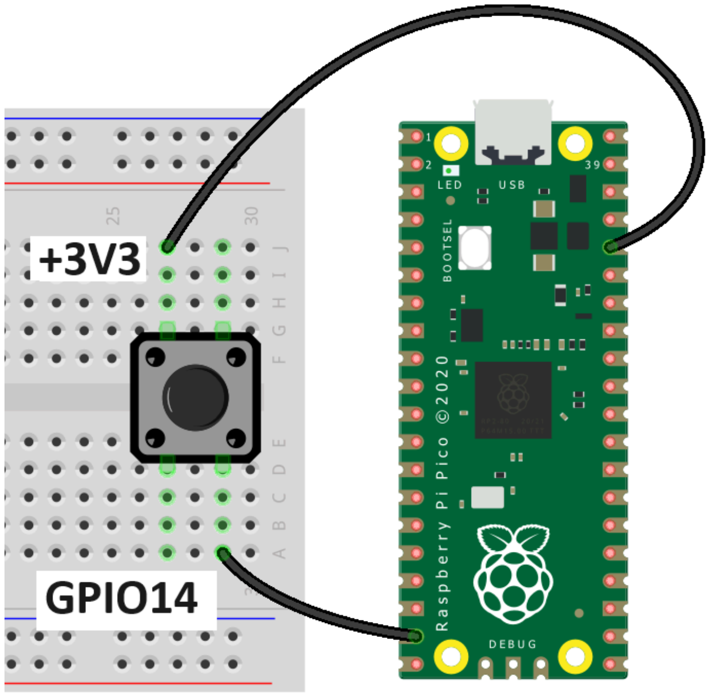


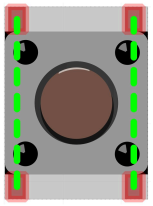
Task 1. Create a MicroPython script to blink the built-in LED every 500[ms]. The LED is connected to the GPIO 25.

```
import machine
import utime as t

led_builtin = machine.Pin(25,machine.Pin.OUT)
i = 0

while True:
     led_builtin.toggle()
     t.sleep(0.5)
```

```
    i+=1
    print(f'Current interation is {i}')
```

Task 2. Connect a tact switch to the Raspberry Pi Pico board. Use GPIO 14 (GP14). The other switch terminal should be connected to the 3V3 pin. Create a MicroPython script to send a *"Button pressed"* message to the computer after the button has been pressed.



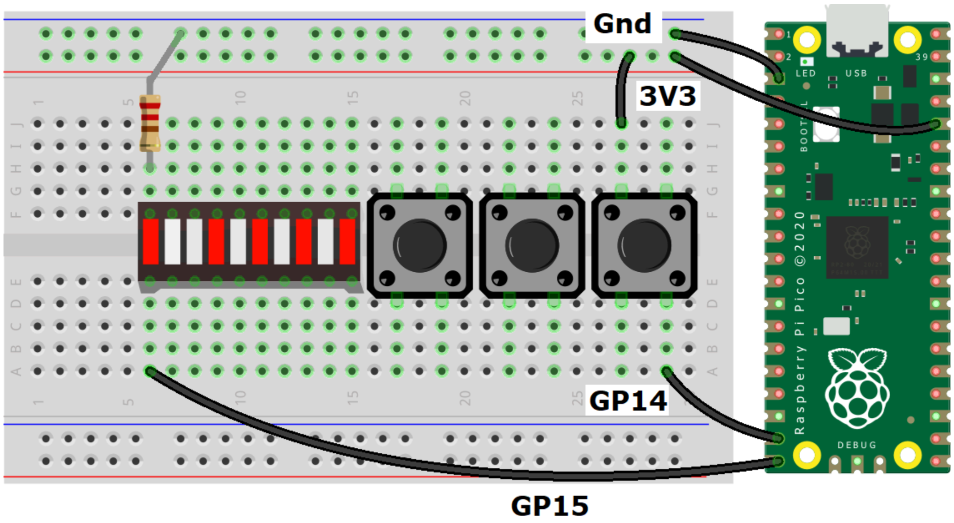


```
from machine import Pin
import utime

button = Pin(14,Pin.IN,Pin.PULL_DOWN)

while True:
    if button.value() == 1:
        print("Button pressed")
        utime.sleep(0.5)
```

Allow the user to decide about the message.

```
from machine import Pin
from utime import sleep

button = Pin(14,Pin.IN,Pin.PULL_DOWN)
message = input("Enter the message: ")
print('This is the message: ' + message)

while True:
    if button.value() == 1:
        print(message)
        sleep(0.5)
```

Task 3. Connect the following circuit. A button connected to the GPIO14 controls the built-in LED. If this button is pressed the LED should emit light. Otherwise, it should be turned off. Use a 120R current limiting resistor.



```
from machine import Pin
import utime

button = Pin(14,Pin.IN,Pin.PULL_DOWN)
led = Pin(15,Pin.OUT)
led.value(1)
```

```
while True:
    if button.value() == 1:
        led.value(0)
    else:
        led.value(1)
    utime.sleep(0.1)
```

Task 4. Use the Task 3 circuit. Create a MicroPython script to produce 4 LED blinks after the button has been pressed.

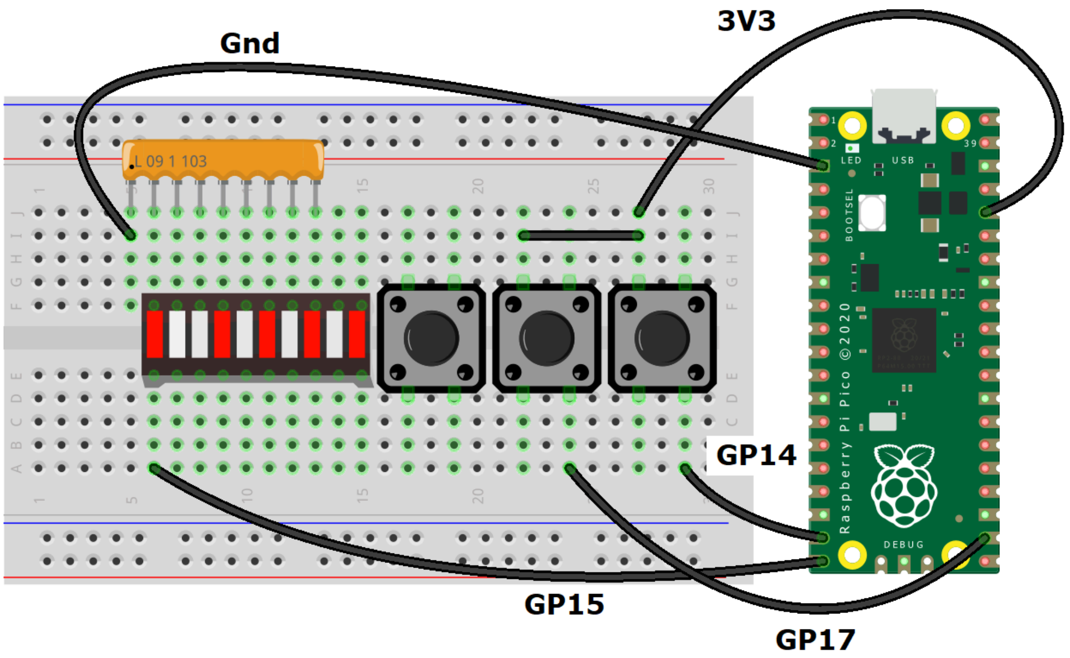
```
from machine import Pin
from utime import sleep

button = Pin(14,Pin.IN,Pin.PULL_DOWN)
led = Pin(15,Pin.OUT)

def led_blink(pin,times):
    for i in range(times):
        pin.toggle()
        sleep(0.5)
        pin.toggle()
        sleep(0.5)

led.value(0)

while True:
    if button.value() == 1:
        led_blink(led,5)
    sleep(0.1)
```

Task 5. Use the Task 3 circuit. Create a MicroPython script to implement the functionality of a monostable light switch.

```
from machine import Pin
from utime import sleep
```

```
button = Pin(14,Pin.IN,Pin.PULL_DOWN)
light = Pin(15,Pin.OUT)

def button_clicked(pin):
    if pin.value() == 1:
        sleep(0.1)
        while pin.value() == 1:
            pass
        return True
    else:
        return False

light.value(0)

while True:
    if button_clicked(button):
        light.toggle()
```

Task 6. Connect the following circuit.



Use 2 buttons (GPIO17, GPIO14) to control the LED connected to GPIO15 (GP15). The built-in LED (GPIO25) should blink every second.

```
from machine import Pin
from utime import sleep
import _thread

button_L = Pin(17,Pin.IN,Pin.PULL_DOWN)
button_R = Pin(14,Pin.IN,Pin.PULL_DOWN)
buildin_led = Pin(25,Pin.OUT)
external_led = Pin(15,Pin.OUT)
def led_blink():
    while True:
        buildin_led.toggle()
        sleep(0.5)
_thread.start_new_thread(led_blink,())

def button_clicked(pin):
    if pin.value() == 1:
        sleep(0.1)
        while pin.value() == 1:
            pass
        return True
    else:
        return False

while True:
    if button_clicked(button_R):
        external_led.value(1)
        print("R click")
    if button_clicked(button_L):
        external_led.value(0)
        print("L click")
```

Save this project in the memory of a Raspberry Pi Pico board as `main.py`. Disconnect and then reconnect the USB cable. Observe results.

Task 7. (*own work - 0.5 of a point*) Create a MicroPython script that switches off the built-in LED, after 3 seconds from the moment the user releases the button. Use another switch to reset the script. The user should also be able to define a reset message.

Task 8. (*own work - 1 point*) Create a MicroPython script to send how many times a selected button has been clicked. Use another switch to reset the counter. Present the counter value on the Node-RED-based interface.

Task 9. (*own work - 1.5 points*) Built a device prototype to measure the user's reaction time. Present the current result and the best score on the Node-RED-based interface.

To pass the Exercise no 1 You have to solve either Task 7 or Task 8 or Task 9. Presentation and sending solution afterwards is mandatory.

For those interested:

1. MicroPython web page:
   micropython.org/download/rp2-pico/
2. Python programming tutorial:
   www.programiz.com/python-programming/first-program
3. Getting started with Raspberry Pi Pico:
   projects.raspberrypi.org/en/projects/getting-started-with-the-pico/0