eFrei PARIS Ecole d'ingénieurs du numérique **C. RODRIGUES / D. VIEIRA**	**TP** **Internet of Things**

TP 1 : Questions

Goals:

1. **Learn to manipulate a Raspberry Pi**
2. **Learn to assemble and use different devices with a Raspberry Pi**
3. **Implement simple applications in Python, using sensors and actuators connected to the Raspberry**

II – Exercises:

1. **Before proceeding to the exercises, you MUST complete the tutorial examples to understand how to assemble and manipulate the devices we are going to use during this course.**
2. **You will deliver a report that will contain the python code and a picture or sketch (preferable) of the model you assembled for each question.**

Exercise 01: Redo exercise 01, but instead of a fixed time, read the interval time from the user. Note: use the Python instruction x = input("Enter a valor:") to prompt and read a value from the user. Also, when you use the instruction int(X) you can convert any value to integer.

Exercise 02: Prototype a system with 2 LEDs and alternate the blink between them. When LED 1 is on, LED 2 is off; when LED 2 is on, LED 1 is off… and so on.

Exercise 03-a: Make a new project with a button and one LED. When the button is pressed the LED must light up.

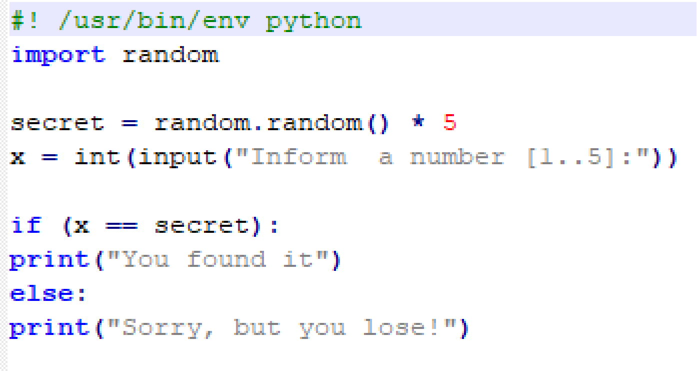
Exercise 03-b: As instructed on Exercise 04a, make a new project where the user presses the button and the LED turns on. The LED is only turned OFF after the user presses the button again. In sum: one press turns the light on, another press turns the light off.

Exercise 04: Redo Exercise 04 using 3 buttons and 3 LEDs. Each button, respectively, will turn on/off one LED.

Exercise 05: Simulate a traffic light using the red, yellow and green LEDs,

Exercise 06: Redo exercise 06 altering the functionality of the traffic light. The traffic light will have the red light on, and it will only change colors when the button is pressed.

Exercise 07: Game - Secret Number: This application defies the user to try discovery a number among 1 and 20 by the console/terminal. The user will guess any number among the values 1 and 20. The user has 4 attempts. If the user wins, the green LED will turn on. If the user informs a lower number than the secret one, the red LED blinks, and if the user informs a greater number than the secret one, the blue LED blinks. Note: the instruction random.random() returns a float number among 0 and 1. So, to take a random number among 0 and 20, follow the instruction: random.random() * 20. For more information about random command, check this link: https://docs.python.org/2/library/random.html.



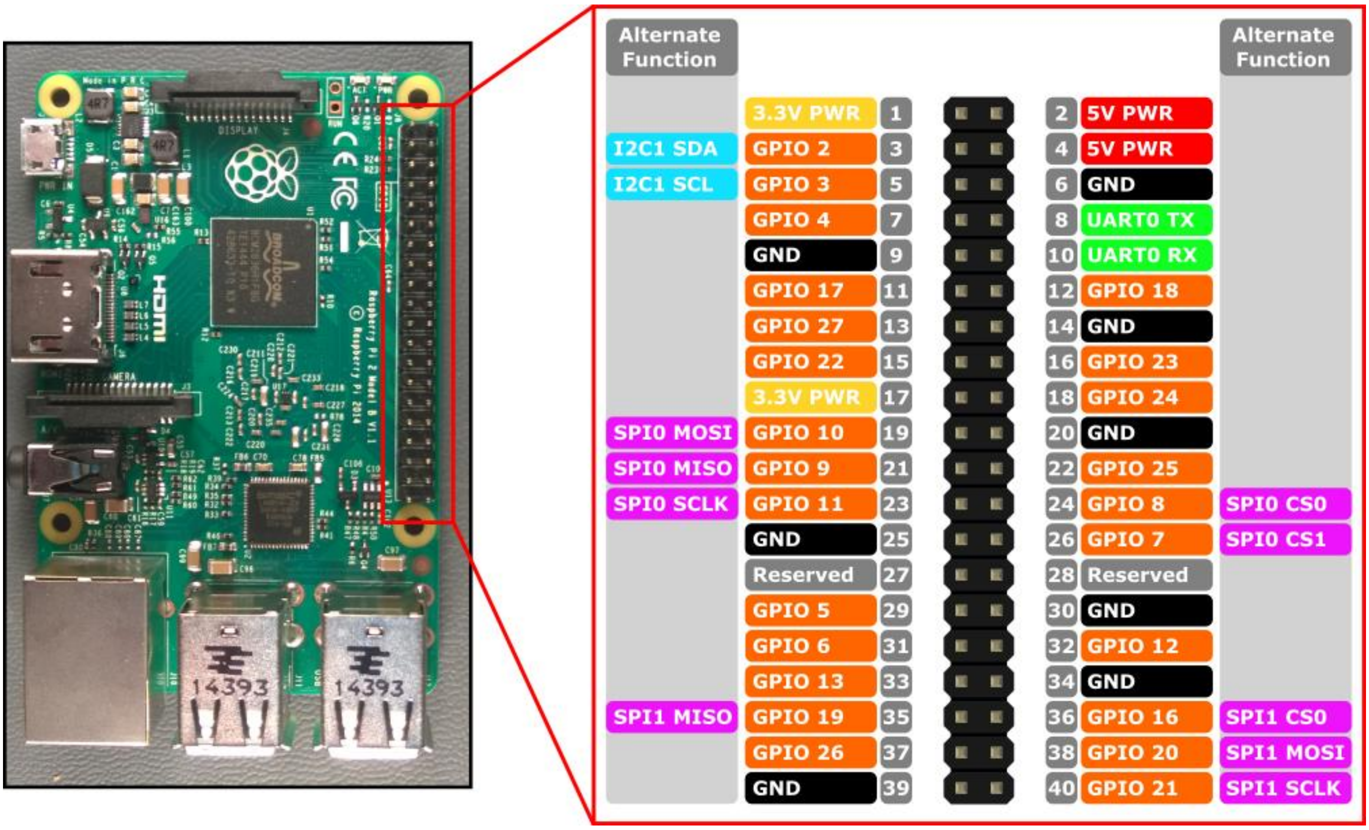
```
#! /usr/bin/env python
import random

secret = random.random() * 5
x = int(input("Inform  a number [1..5]:"))

if (x == secret):
print("You found it")
else:
print("Sorry, but you lose!")
```

Exercise 08: Redo exercise 06 adding the follow functionality: when the red LED turns on, the buzzer must beep 3 times; when a yellow LED turns on, the buzzer must beep 2 times; when a green LED turns on, the buzzer must beep one single time.

Exercise 09: Build a system composed of one LDR, one buzzer, and one LED. This system works as follows: when the environment (e.g., room, classroom, bedroom, etc.) is bright, the buzzer and LED, which are connected in the Raspberry PI, must be off. However, when the environment is dark (i) the buzzer must beep for 2 seconds and (ii) the LED must be turned on until the environment is bright again.

Exercise 10: Using the RGB LED, make a new project following the Table MENU (below). The system shows the MENU with possible colors and options. Your program must read the user choice, perform the action and go back to the MENU to wait for another user order. It ends after the user selects the option 0 from the Menu.

MENU	3.Blue ON	6. Green OFF	9. Random color
1. Red ON	4. Blue OFF	7. Turn ON ALL	0. Exit
2. Red OFF	5. Green ON	8. Turn OFF ALL	



Alternate Function						Alternate Function
	3.3V PWR	1		2	5V PWR	
I2C1 SDA	GPIO 2	3		4	5V PWR	
I2C1 SCL	GPIO 3	5		6	GND	
	GPIO 4	7		8	UART0 TX	
	GND	9		10	UART0 RX	
	GPIO 17	11		12	GPIO 18	
	GPIO 27	13		14	GND	
	GPIO 22	15		16	GPIO 23	
	3.3V PWR	17		18	GPIO 24	
SPI0 MOSI	GPIO 10	19		20	GND	
SPI0 MISO	GPIO 9	21		22	GPIO 25	
SPI0 SCLK	GPIO 11	23		24	GPIO 8	SPI0 CS0
	GND	25		26	GPIO 7	SPI0 CS1
	Reserved	27		28	Reserved	
	GPIO 5	29		30	GND	
	GPIO 6	31		32	GPIO 12	
	GPIO 13	33		34	GND	
SPI1 MISO	GPIO 19	35		36	GPIO 16	SPI1 CS0
	GPIO 26	37		38	GPIO 20	SPI1 MOSI
	GND	39		40	GPIO 21	SPI1 SCLK

For more information about Raspberry Pi GPIO ports, check:

https://pinout.xyz