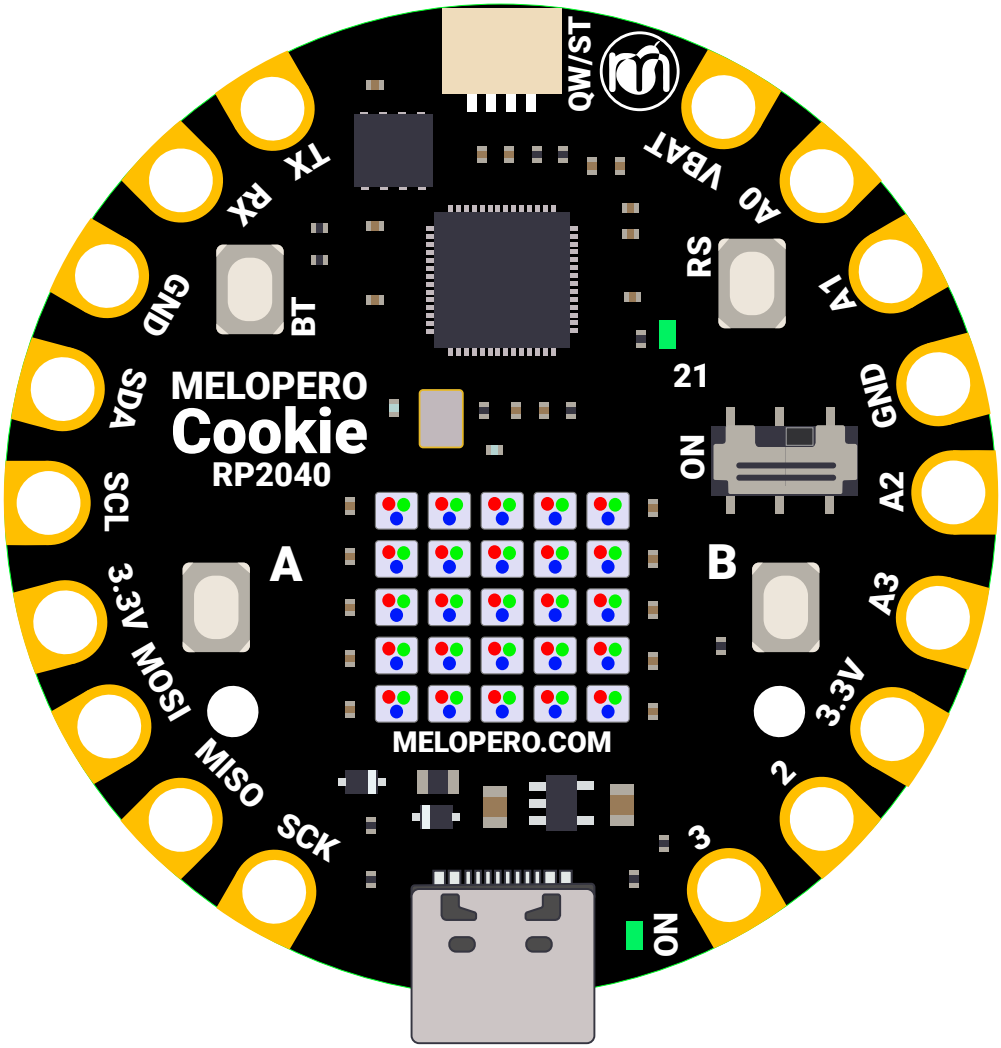
Getting started with Melopero Cookie RP2040



Getting started with Melopero Cookie RP2040
Version 1.0.3 - 20 October 2022

This guide is constantly updated with corrections and new content.
When a new version is released, we also update the version number:

Version **1.0.3**
20 October 2022

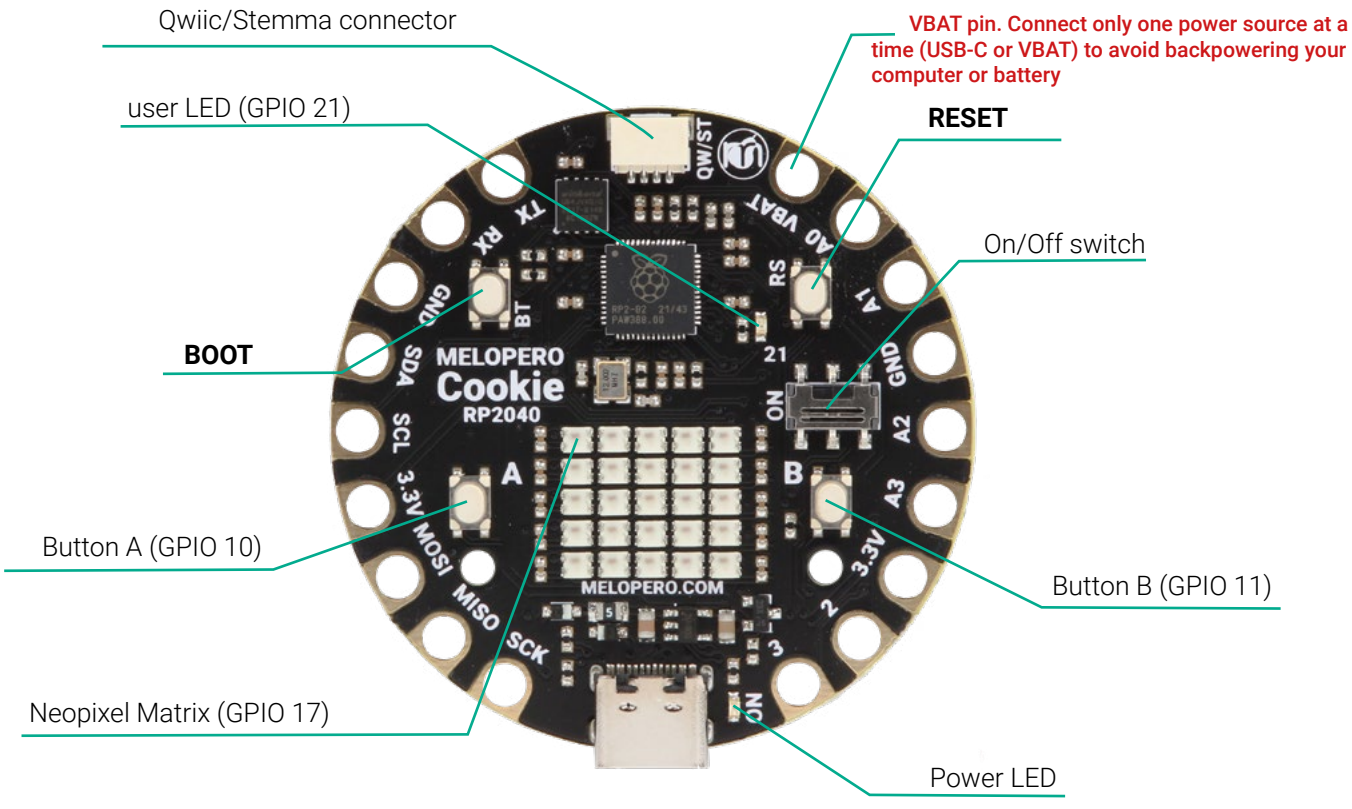
Contents

1. Hardware overview

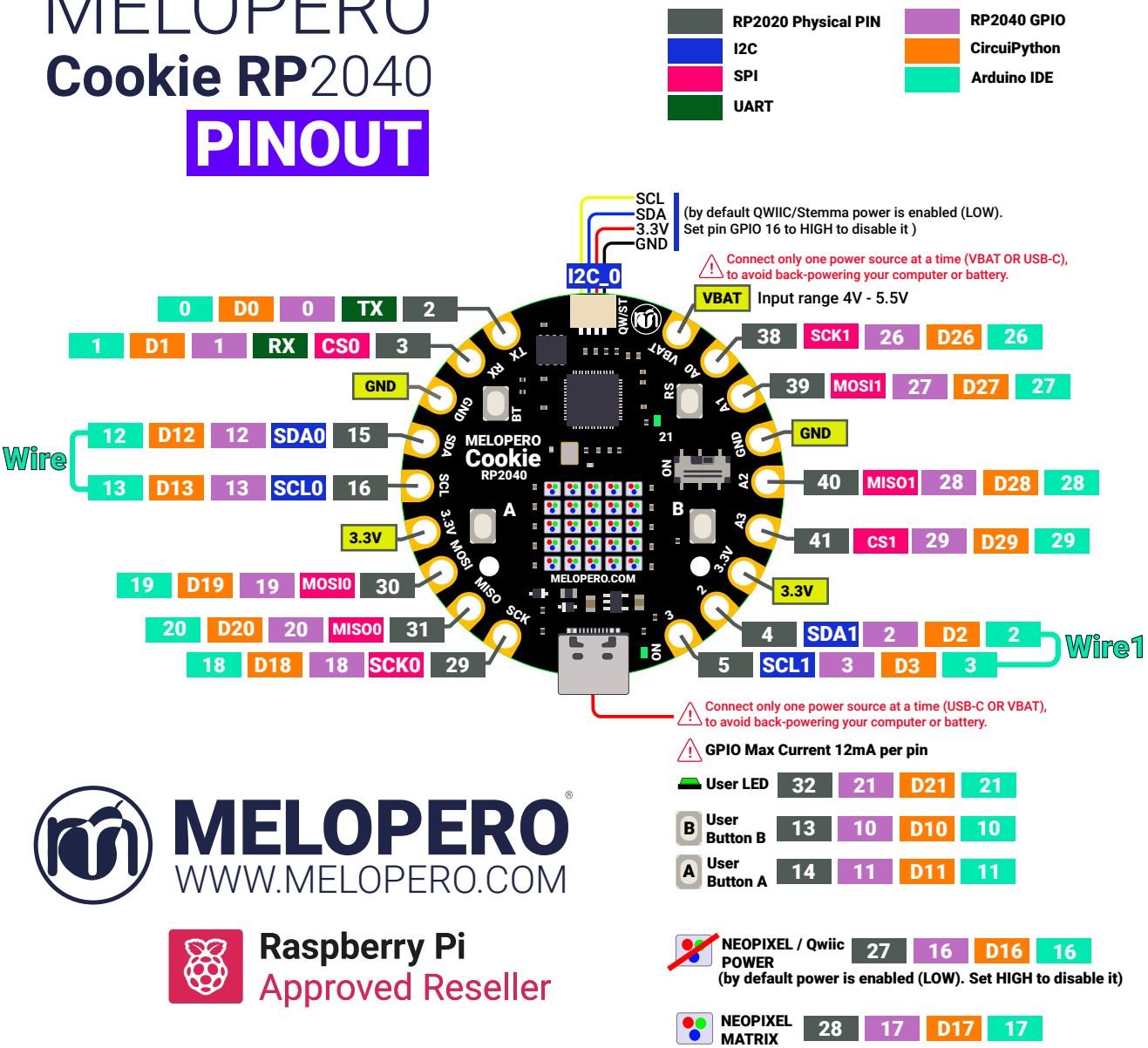
The Melopero Cookie RP2040 is a development board based on the Raspberry Pi RP2040 micro-controller, programmable in C/C++, MicroPython, CircuitPython and with the Arduino IDE.
The board features:

- 8MB of FLASH Memory
- Reset and boot buttons (no need to detach/attach the board to enter boot mode)
- Qwiic/Stemma QT connector for attaching lots of Melopero, Adafruit and SparkFun sensors
- USB-C connector for powering, programming and charging
- Green user LED on pin 21
- WS2812 (aka NeoPixel) Matrix Display
- Green Power LED
- 2 mounting holes
- Programmable in C/C++, MicroPython, CircuitPython and with the Arduino IDE.

Dimensions: 50.8mm x 50.8mm



2. Pinout



The pinout chart above is useful to quickly find the right name of a specific pin, depending on the language and IDE. As example, note how the pins labeled as 28 and 29 change name depending on which platform you are using to program the board:

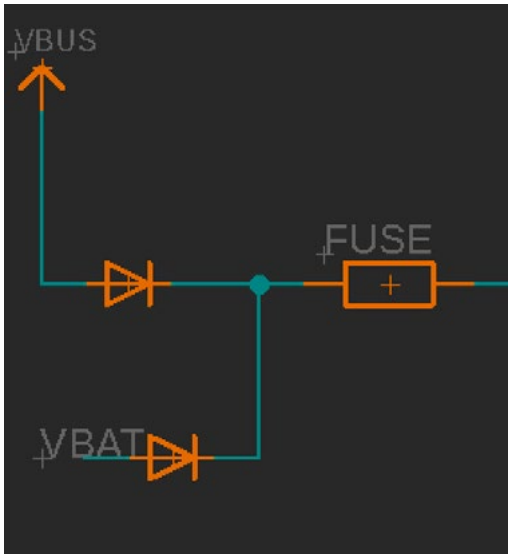
- CircuitPython refer to those pins as D28 and D29
- In the Arduino IDE they are 28 and 29 (check the green labels)
- For use with MicroPython, they are called with the number you find on the GPxx labels (only the number)

3. Powering the Cookie RP2040

There are two input connectors that can be used, **one at a time and not together**, to supply power to the Cookie RP2040:

1. USB-C connector (also used for programming the board)
2. VBAT pad

The applied input voltage must be in the range 4-5.5V.
Both inputs are protected with diodes and a resetable fuse limits the input current to 500mA:

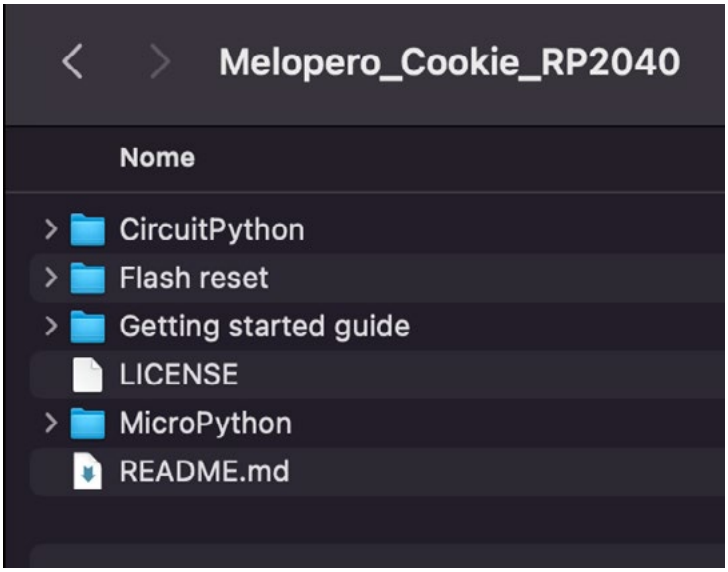


WARNING

Despite the presence of diodes, we strongly reccomend to power only one of the above connectors at a time, for best safety and to avoid backpowering your battery or computer

4. Cookie software pack

The Cookie software pack contains all the files needed to install CircuitPython or MicroPython, the flash reset file, demo scripts and libraries.



4.1 Download the software pack

First of all, downlad the zip file with all the software and demo code for your Cookie:

www.melopero.com/Melopero_Cookie_RP2040.zip

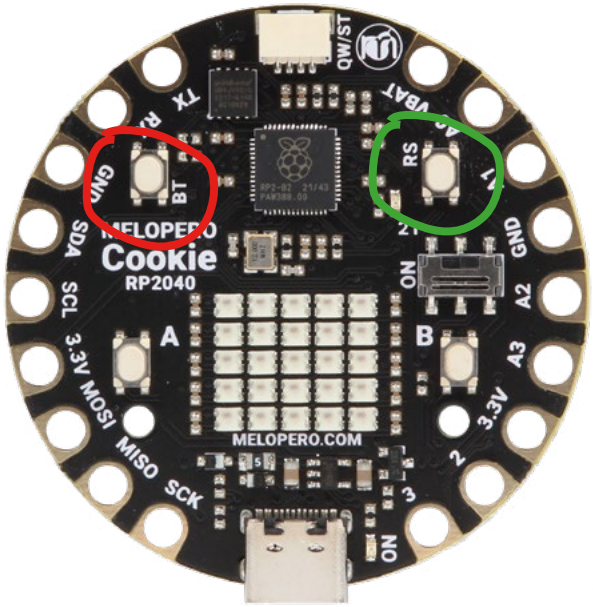
5. Installing CircuitPython

CircuitPython is a derivative of MicroPython designed to simplify experimentation and education on low-cost microcontrollers. Simply copy and edit files on the CIRCUITPY drive to iterate. CircuitPython is developed and maintained by Adafruit Industries, along with many sensors libraries to start your project in the blink of an eye.

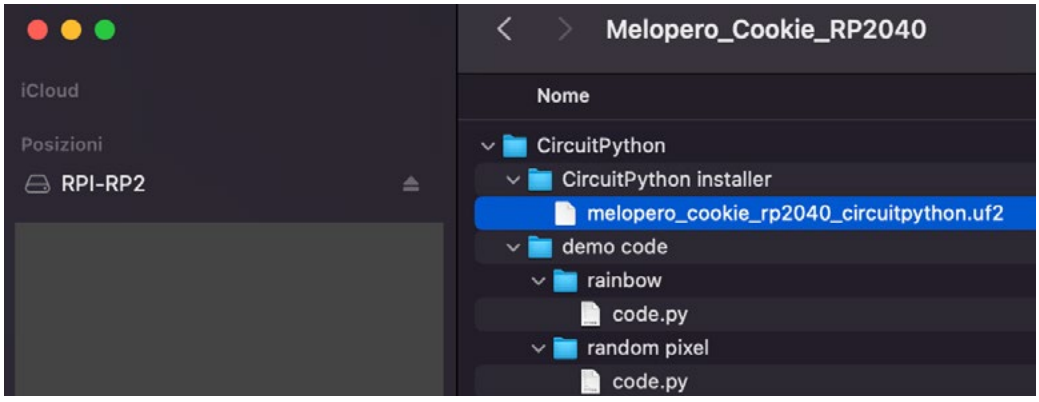
After downloading the latest version of Cookie software pack (see section 3 of this guide), activate the bootloader mode on your Cookie (a drive called RPI-RP2 will appear on your computer) and copy the circuitpython .uf2 file to it.

To activate the bootloader mode, when the Cookie is already connected to your computer's USB port, press and hold the BOOT / BT button (circled in red in the image below), then press and release the reset button (circled in green). Continue holding the BOOT / BOOTSEL button until the RPI-RP2 appears.

You can also start with your board unplugged from USB, press and hold the BT button on your Cookie RP2040. While holding the button, connect the other end of the USB cable to the Cookie board. This will cause Cookie to load his bootloader. You should see RPI-RP2 appearing as a new drive on your computer.



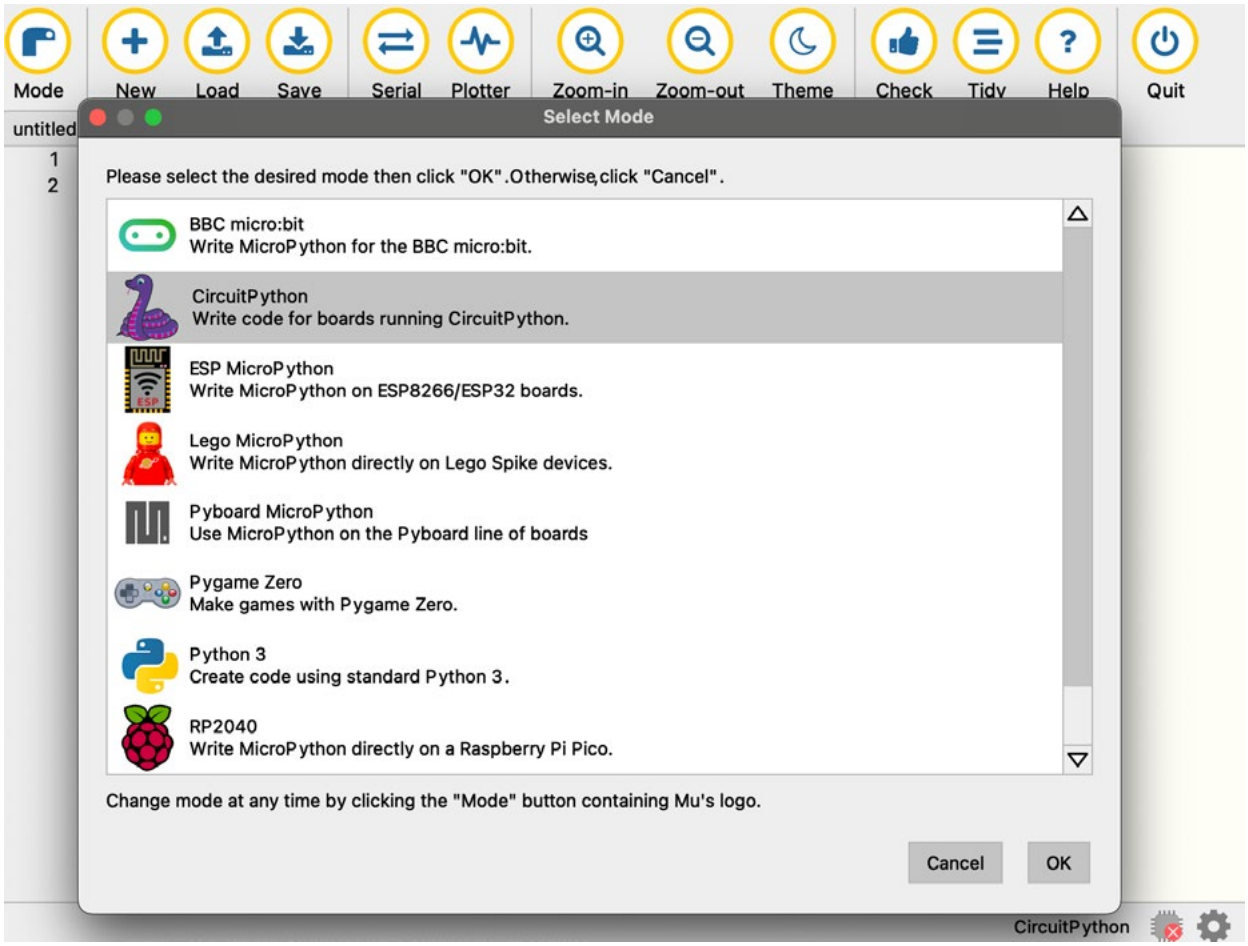
Drag and drop (or copy and paste) melopero_cookie_rp2040_circuitpython.uf2 file to RPI-RP2. The RPI-RP2 drive will disappear and after a few seconds a new disk drive called CIRCUITPY will appear.



5.1 Install Mu editor

Mu is a Python code editor for beginner programmers and it's the recommended editor for programming in CircuitPython.
It's available for Windows, Mac and Linux at the following address:
https://codewith.mu/en/download

The first time you'll run Mu editor, it should ask for which mode you want to load.
Select "CircuitPython". You can always change mode by clicking on "mode" in the upper menu and selecting your favourite one.



5.2 Mu quick start

Mu will auto-detect your CircuitPython board.
On the upper menu, clicking “new”, you’ll create a new file.
Once you have connected the Melopero Cookie RP2040, click “Load“, then select the CIRCUITPY driver, and open code.py. After editing this file, click “Save“, and it’ll be loaded on your board.
The script should run automatically, otherwise click on the RESET button.

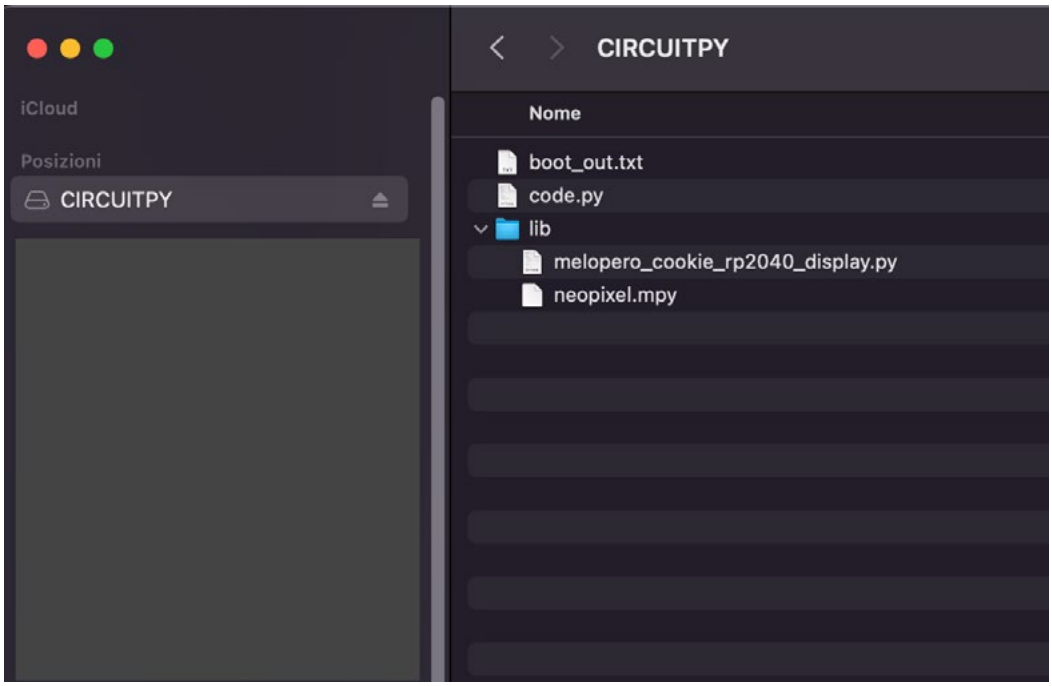
5.3 The REPL

The REPL, Read-Evaluate-Print-Loop, allows you to execute lines of code directly in the console and get an immediate result.
Click “Serial“ to open the serial console and then press any key to enter the REPL.
Use CTRL-D to reload.

Try to run the command print(“hello world“) and press enter.
The REPL will interpret the line of code and get you the result, in this case it’ll print “hello world”.

5.4 How to run demo code for Circuitpyhon

In order to run circuitython demo code, you must copy the realtive demo **code.py** file in the root directory of your Cookie and the library files into the **/lib** directory, as shown in the picture below. After copying all the files, if the demo doesn't start automatically, push the reset button once.



6. Installing MicroPython

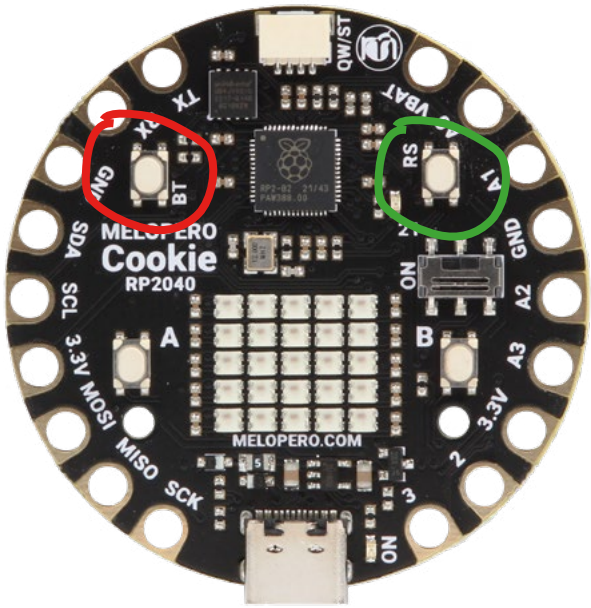
MicroPython is a lean and efficient implementation of the Python 3 programming language that includes a small subset of the Python standard library and is optimised to run on microcontrollers and in constrained environments.
MicroPython is a full Python compiler and runtime that runs on the bare-metal. You get an interactive prompt (the REPL) to execute commands immediately, along with the ability to run and import scripts from the built-in filesystem. The REPL has history, tab completion, auto-indent and paste mode for a great user experience.

6.1 Download MicroPython

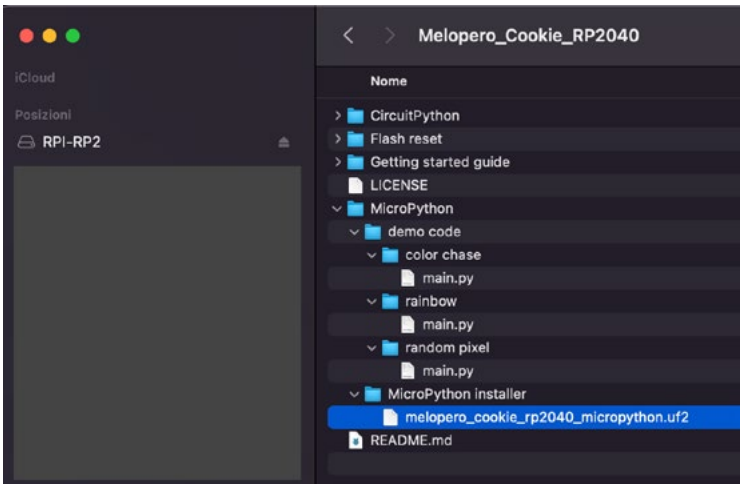
After downloading the latest version of **Cookie software pack** (see chapter 3 of this guide), activate the bootloader mode on your board and copy the micropython .uf2 file to it.

To activate the bootloader mode, when the Cookie is already connected to your computer's USB port, press and hold the BOOT / BT button (circled in red in the image below), then press and release the reset button (circled in green). Continue holding the BOOT / BOOTSEL button until the RPI-RP2 drive appears.

You can also start with your board unplugged from USB, press and hold the BOOTSEL button on your Cookie RP2040. While holding the button, connect the other end of the USB cable to the Cookie board. This will cause Cookie to load his bootloader. You should see RPI-RP2 appearing as a new drive on your computer.



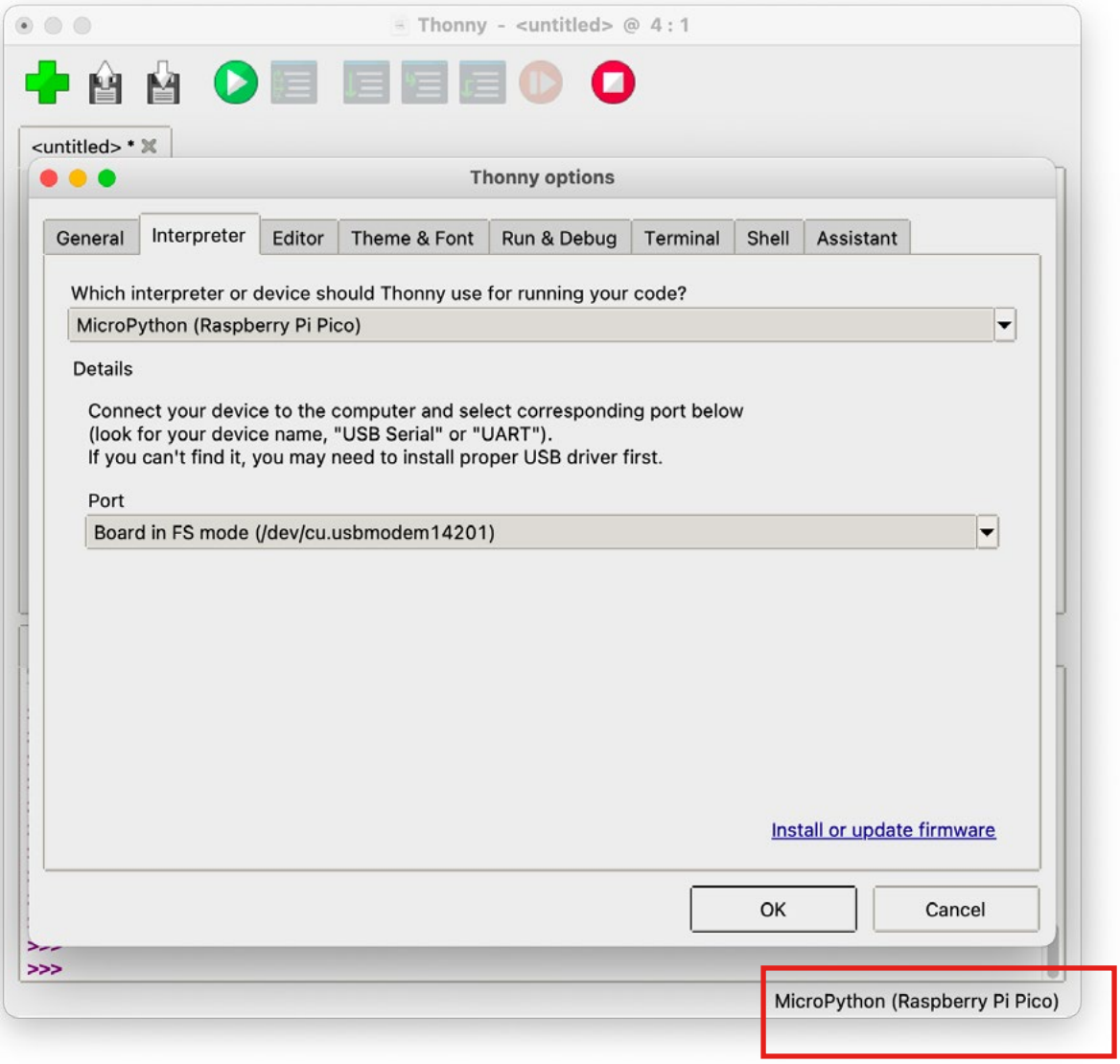
Drag (or copy and paste) the melopero_cookie_rp2040_micropython.uf2 file to RPI-RP2.
The RPI-RP2 drive will disappear and you'll be ready to write your micropython code using Thonny (see next chapter).



6.2 Install Thonny editor

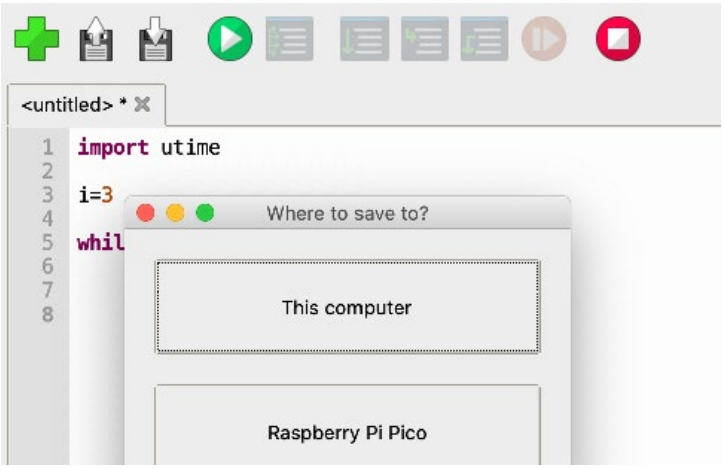
Thonny is a Python code editor for beginner programmers and it's the recommended editor for programming in RP2040 based boards with MicroPython.
It's available for Windows, Mac and Linux at the following address:
https://thonny.org

The first time you'll run Thonny editor, you should set MicroPython on Raspberry Pi Pico and select the right port fo your connected device.
Go to Preferences (should be options/settings on windows), click "Interpreter" tab and then select Micropython (Raspberry Pi Pico) and the right port from the port menu (your board must be connected and with MicroPython already installed)
If you are using Thonny in simple mode, you can access the interpreter configuration panel clicking on the lower right corner of Thonny window (circled in red below).



6.3 Thonny quick start

Write some code in the script area of Thonny or copy and paste the micropython demo code included in the Cookie Software pack (see chapter 3 to download the software pack).
When ready, you can click RUN or SAVE, Thonny will promt you to select where you want to run or save the script: select “Raspberry Pi Pico”. In case you are saving the file, give it a name including the .py extension, for example myfile**.py** . If you save the file as main.py, your code will be executed automatically when powering the Cookie.
Now that your file has been saved, execute your program clicking on RUN (green PLAY button).
If your code includes some prints, you’ll see them in the Shell.
Before saving a new file, remember to click on the “stop/restart“ button if your Cookie is already running a program.



6.4 The REPL

The REPL, Read-Evaluate-Print-Loop, allows you to execute lines of code directly in the console and get an immediate result.
In the Shell, try to run the command print(“hello world“) and press enter.
The REPL will interpret the line of code and get you the result, in this case it’ll print “hello world”.

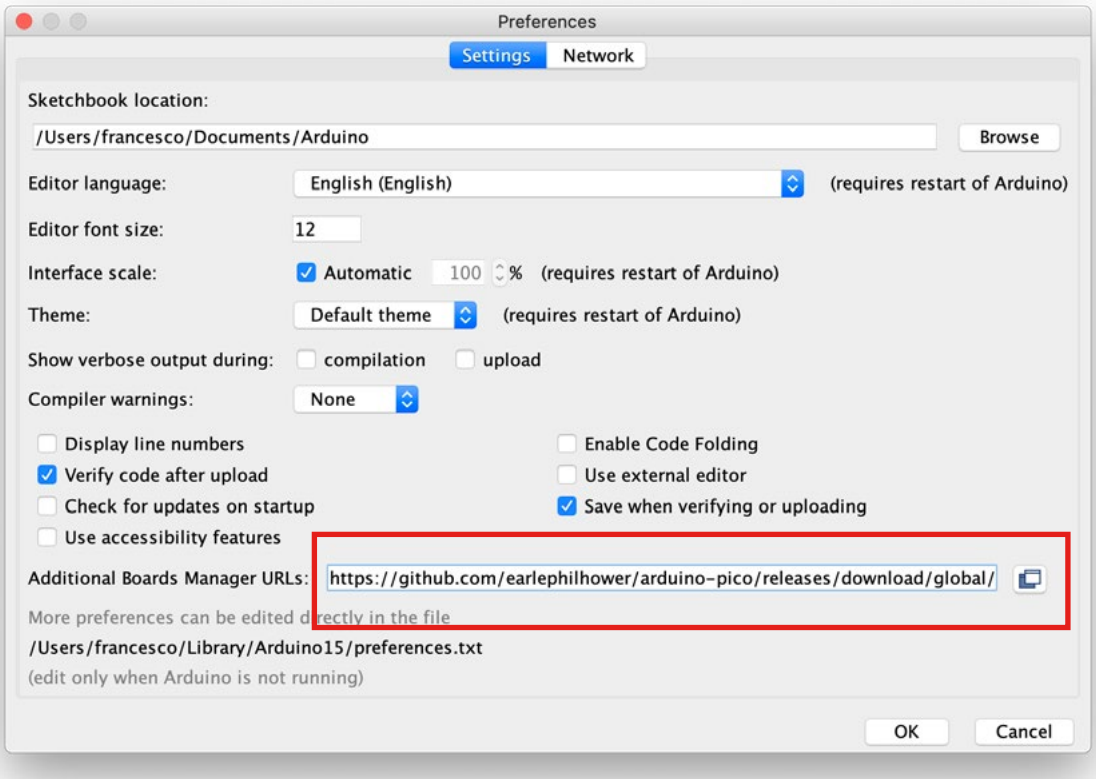
7. Setting up Arduino IDE

7.1 Download the Arduino IDE

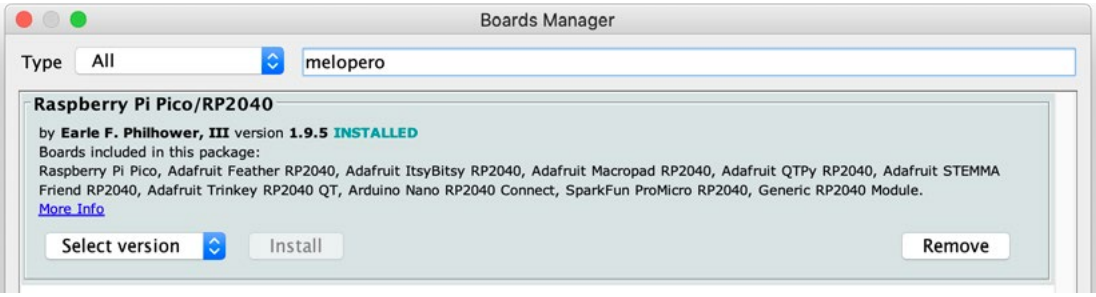
To download the Arduino IDE for your favourit OS go to:
https://www.arduino.cc/en/software

7.2 Add Cookie RP2040 to Arduino IDE

We use the port of the RP2040 developed by Earle F. Philhower, III (earlephilhower on GitHub)
Go to File>Preferences and enter the following URL in the "Additional Boards Manager URLs" field:
https://github.com/earlephilhower/arduino-pico/releases/download/global/package_rp2040_index.json



Once the URL has been added, go to Tools>Board>Boards Manager and search "Melopero"



After the installation, you'll be able to select Melopero Cookie RP2040,
going to Tools>Board>Raspberry Pi RP2040 boards>Melopero Cookie RP2040

7.3 Uploading an Arduino Sketch

In order to upload a sketch from the Arduino IDE, the Cookie must be in bootloader mode.

To activate the bootloader mode, when the Cookie is already connected to your computer's USB port, press and hold the BOOT / BT button (circled in red in the image below), then press and release the reset button (circled in green). Continue holding the BOOT / BOOTSEL button until the RPI-RP2 drive appears.

After using the Cookie with Arduino IDE, if you want to go back programming it with MicroPython or CircuitPython, a flash memory reset is necessary, see section 8.

8. Clear the Flash memory

If you need to do a deep clean of the flash memory, active the bootloader mode on the Cookie and drag and drop (or copy and paste) the flash nuke file available in the Cookie Software pack (see chapter 3 to downalod it) onto the RPI-RP2 drive as you did for CircuitPython or MicroPython (see sections 5.1 and 4):

To activate the bootloader mode, when the Cookie is already connected to your computer's USB port, press and hold the BOOT / BT button (circled in red in the image below), then press and release the reset button (circled in green). Continue holding the BOOT / BOOTSEL button until the RPI-RP2 drive appears.