

INTRODUCTION TO MICROPYTHON

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OSHCamp, WUTHERING BYTES, 2023

Slides: see <https://github.com/holdenweb/OSHC23>

INTRODUCTIONS

- Programmer since 1967
- Trained as a computational scientist - early OOP enthusiast
 - Interested in hardware, but definitely a hobbyist
- Came across Python in 1994 (v1.4, now at 3.11!)
- Former chair/director of the Python Software Foundation
- Founding chairman of PyCon 2003 - conference is still running
- Author of *Python Web Programming*, *Python in a Nutshell*

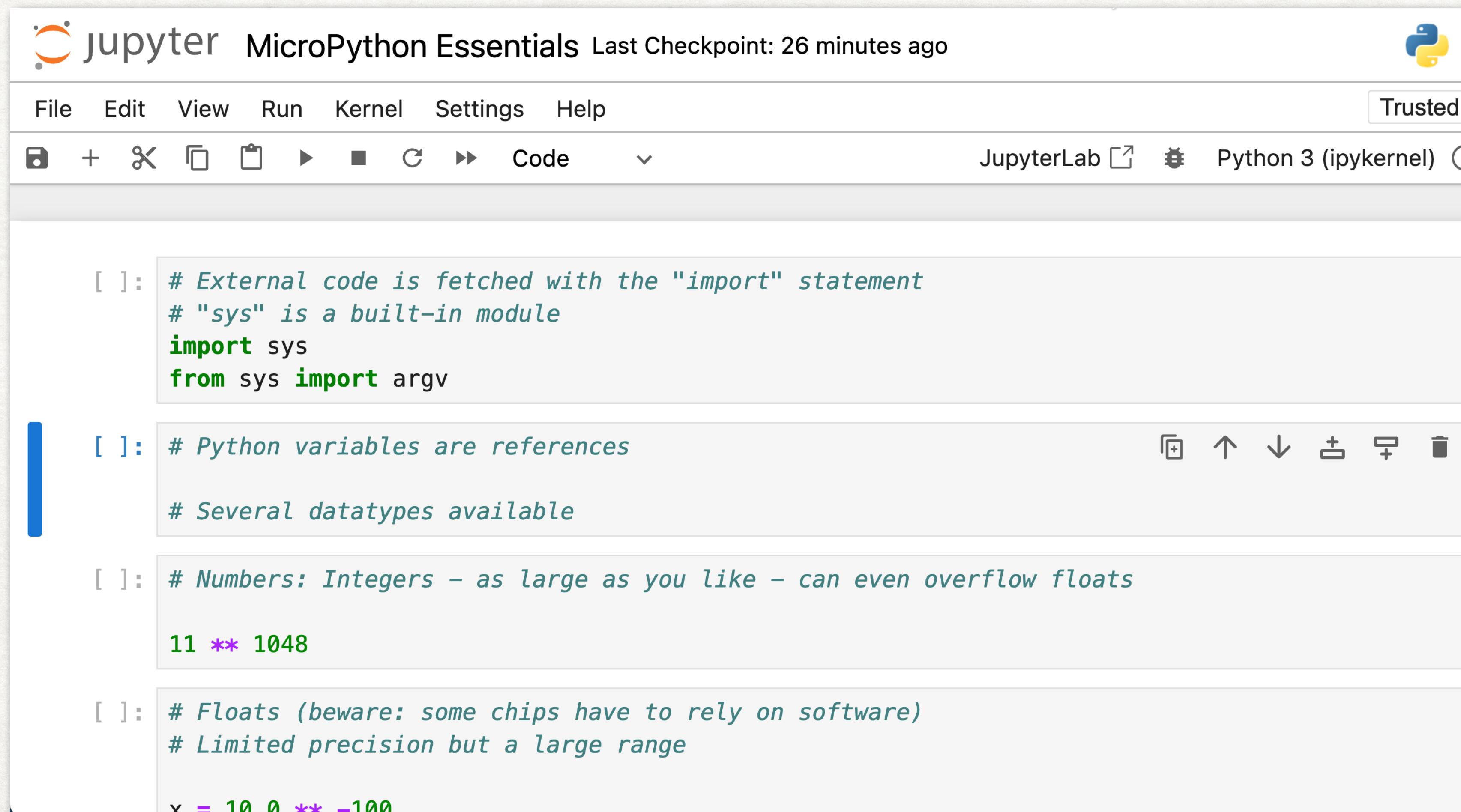
WHY MICROPYTHON?

IT MIGHT HAVE BEEN INVENTED FOR THE MICROCONTROLLER

- Much easier to learn and use than C
- An interactive REPL (Read, Evaluate, Print Loop)
- Equally good for procedural and object-oriented code
- Designed for readability
 - Reading other people's code is a great way to learn
- Modular, makes re-using code much easier

A QUICK LOOK AT PYTHON

USING A JUPYTER NOTEBOOK



The screenshot shows a Jupyter Notebook interface with the title "jupyter MicroPython Essentials Last Checkpoint: 26 minutes ago". The notebook has a "Trusted" status and is using the "Python 3 (ipykernel)" kernel. There are four code cells displayed:

- []:

```
# External code is fetched with the "import" statement
# "sys" is a built-in module
import sys
from sys import argv
```
- []:

```
# Python variables are references

# Several datatypes available
```
- []:

```
# Numbers: Integers – as large as you like – can even overflow floats

11 ** 1048
```
- []:

```
# Floats (beware: some chips have to rely on software)
# Limited precision but a large range

x = 10.0 ** -100
```

DRIVING HARDWARE IS STRAIGHTFORWARD

PUTTING IT TOGETHER? LESS SO ...

- The kits use the *Grove* interconnect system
 - Four-wire connections: two for power, 1 or 2 data lines
- Four types of port (all use the same connector!)
 - Digital I/O ports
 - Analogue I/O ports
 - UART ports
 - I2C ports

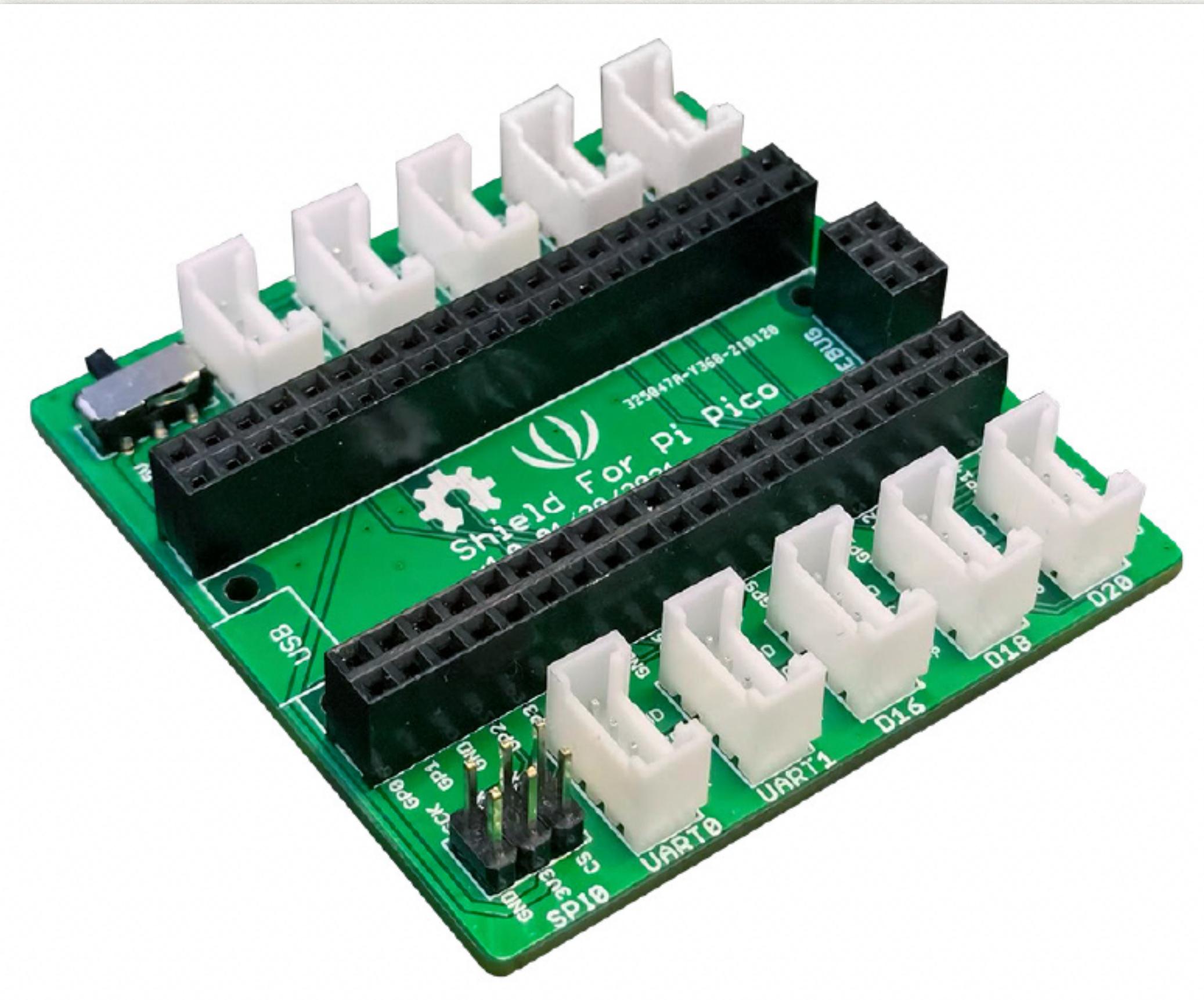
AVAILABLE PERIPHERALS

TIME TO PLAY WITH THEM ALL!

- Light Sensor
- Sound Sensor
- Mini PIR Motion Sensor
- Temperature and Humidity Sensor
- Rotary Angle Sensor (potentiometer)
- Button
- LED Pack (removable LEDs)
- RGB LED
- Passive Buzzer
- Relay
- 16 x 2 LCD Display
- Servo
- Mini Fan

THE HARDWARE

SEEED GROVE STARTER KIT FOR RASPBERRY PI PICO

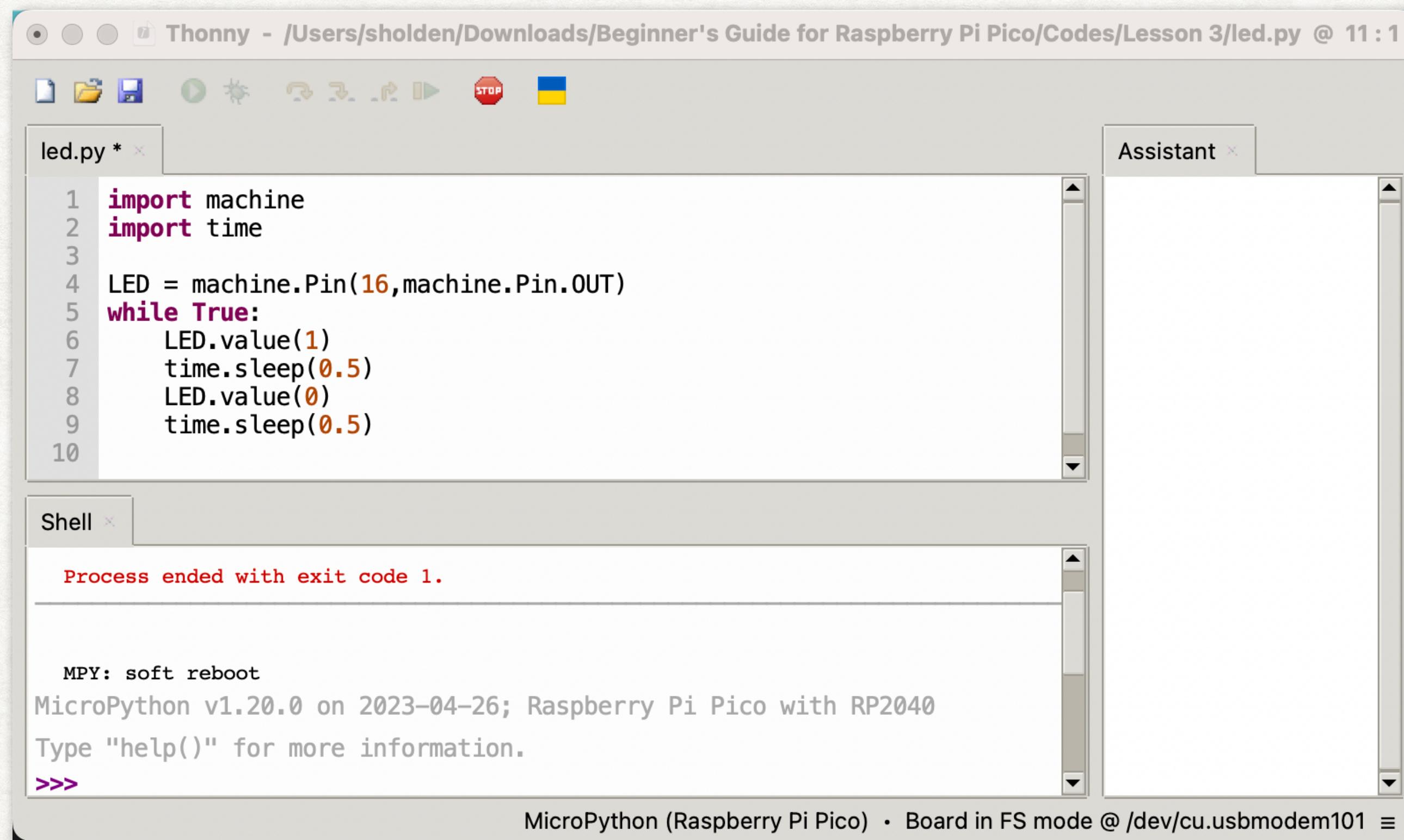


- Three digital ports
- Three analogue ports
- Two UART ports
- Two I2C ports
- I've installed a Pico W in each one, with MicroPython pre-loaded

DEVELOPMENT IDE: THONNY

SPECIFICALLY FOR MICROPYTHON

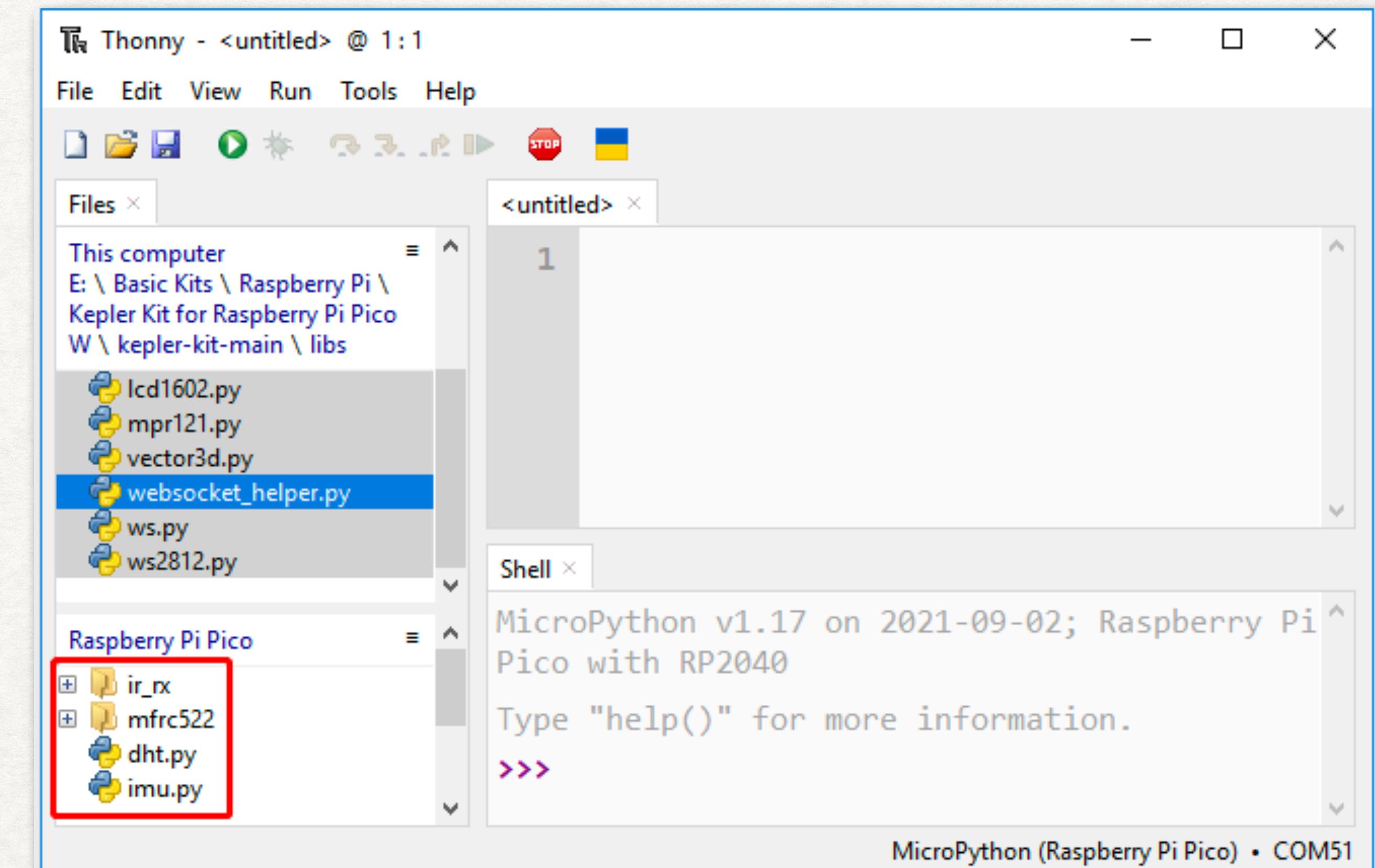
- Available for Windows, Mac OS and Linux



TRANSFERRING FILES TO/FROM THE PICO

"USE THE BOOT BUTTON, LUKE"

- Disconnect your Pico from the USB
- Reconnect it *while holding down the boot button*
 - You should see the Pico's file store mapped into your filesystem
 - Libraries you load become available to import



MICROPYTHON HAS MANY LIBRARIES

SOME BUILT-IN, LOTS EXTERNAL

- A few specific drivers are needed for some of the devices
- dht11.py - temperature & humidity sensor
- lcd1602.py - 16 x 2 LCD display driver
- dh20.py -
- ws2812.py - colour LED controller