

# Why we will use microPython

Rapid prototyping with microPython devices

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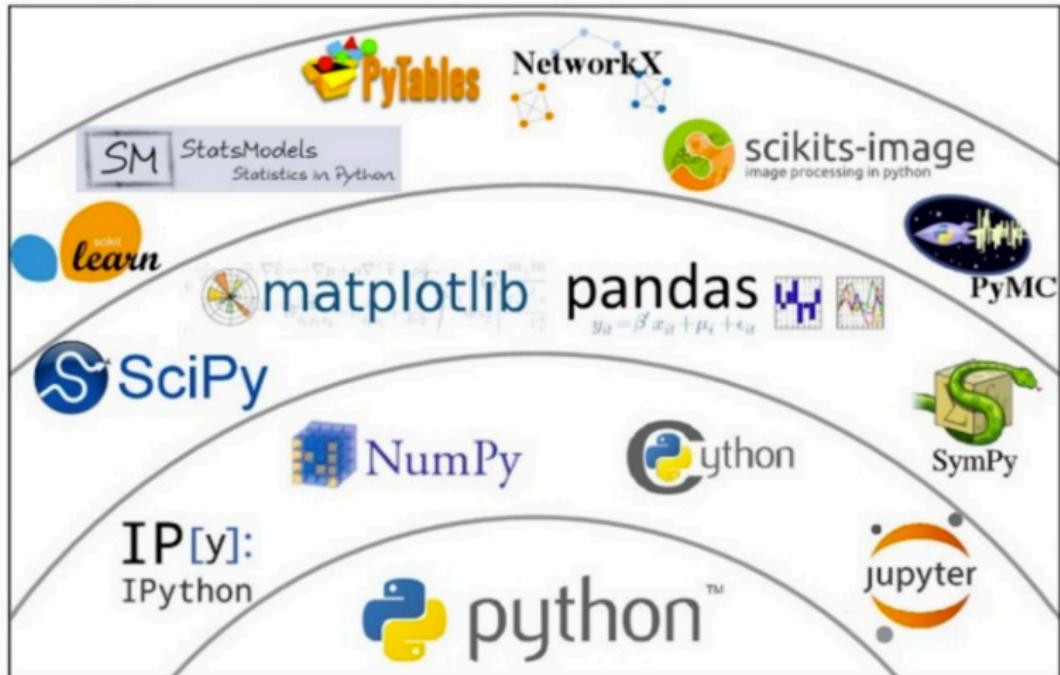
## Why micropython?

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Worldwide, Apr 2018 compared to a year ago:

| Rank | Change | Language    | Share   | Trend  |
|------|--------|-------------|---------|--------|
| 1    |        | Java        | 22.62 % | -0.8 % |
| 2    |        | Python      | 22.05 % | +5.2 % |
| 3    | ↑↑     | Javascript  | 8.56 %  | +0.2 % |
| 4    | ↓      | PHP         | 8.22 %  | -1.8 % |
| 5    | ↓      | C#          | 7.95 %  | -0.7 % |
| 6    |        | C           | 6.38 %  | -1.1 % |
| 7    | ↑      | R           | 4.26 %  | +0.4 % |
| 8    | ↓      | Objective-C | 3.7 %   | -1.0 % |

# python ecosystem



# micropython

MicroPython is a lean and fast implementation of the Python 3 programming language that is optimised to run on a microcontroller. MicroPython was successfully funded via a Kickstarter campaign and the software is now available to the public under the MIT open source license. It ensures that the memory size/microcontroller performance is optimised and fit for purpose for the application it serves. Many sensor reading and reporting applications do not require a PC based processor as this would make the total application over priced and under-efficient.

# micropython options



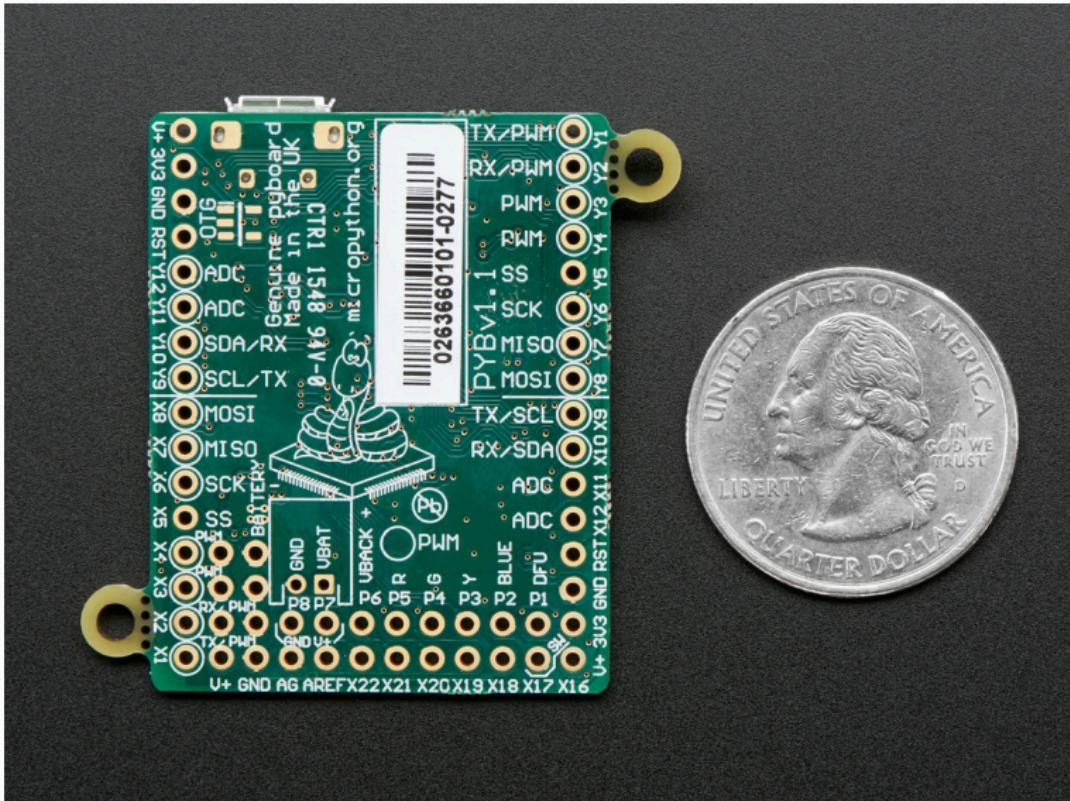
# pyboard

The MicroPython **pyboard** is a compact electronic circuit board that runs MicroPython on the bare metal, giving you a low-level Python operating system that can be used to control all kinds of electronic projects.

MicroPython is packed full of advanced features such as an interactive prompt, arbitrary precision integers, closures, list comprehension, generators, exception handling and more. Yet it is compact enough to fit and run within just 256k of code space and 16k of RAM.

MicroPython aims to be as compatible with normal Python as possible to allow you to transfer code with ease from the desktop to a microcontroller or embedded system.

# pyboard



## MicroPython pyboard feature table

| <b>BOARD</b>            |                              |   |                   |
|-------------------------|------------------------------|---|-------------------|
| description             | The original<br>pyboard v1.1 | Pyboard lite v1.0 with<br>accelerometer | Pyboard lite v1.0 |
| SKU                     | PYBv1.1                      | PYBLITEv1.0-AC                          | PYBLITEv1.0       |
| <b>PRICE</b>            |                              |   |                   |
| GBP incl. tax           | £28.00                       | £22.60                                  | £19.60            |
| approx EUR incl. tax    | €39.20                       | €31.60                                  | €27.40            |
| approx USD excl. tax    | \$35.00                      | \$28.25                                 | \$24.50           |
| <b>MICROCONTROLLER</b>  |                              |   |                   |
| MCU                     | STM32F405RGTE                | STM32F411RET6                           | STM32F411RET6     |
| CPU                     | Cortex-M4F                   | Cortex-M4F                              | Cortex-M4F        |
| internal flash          | 1024k                        | 512k                                    | 512k              |
| RAM                     | 192k                         | 128k                                    | 128k              |
| maximum frequency       | 168MHz                       | 96MHz                                   | 96MHz             |
| hardware floating point | single precision             | single precision                        | single precision  |

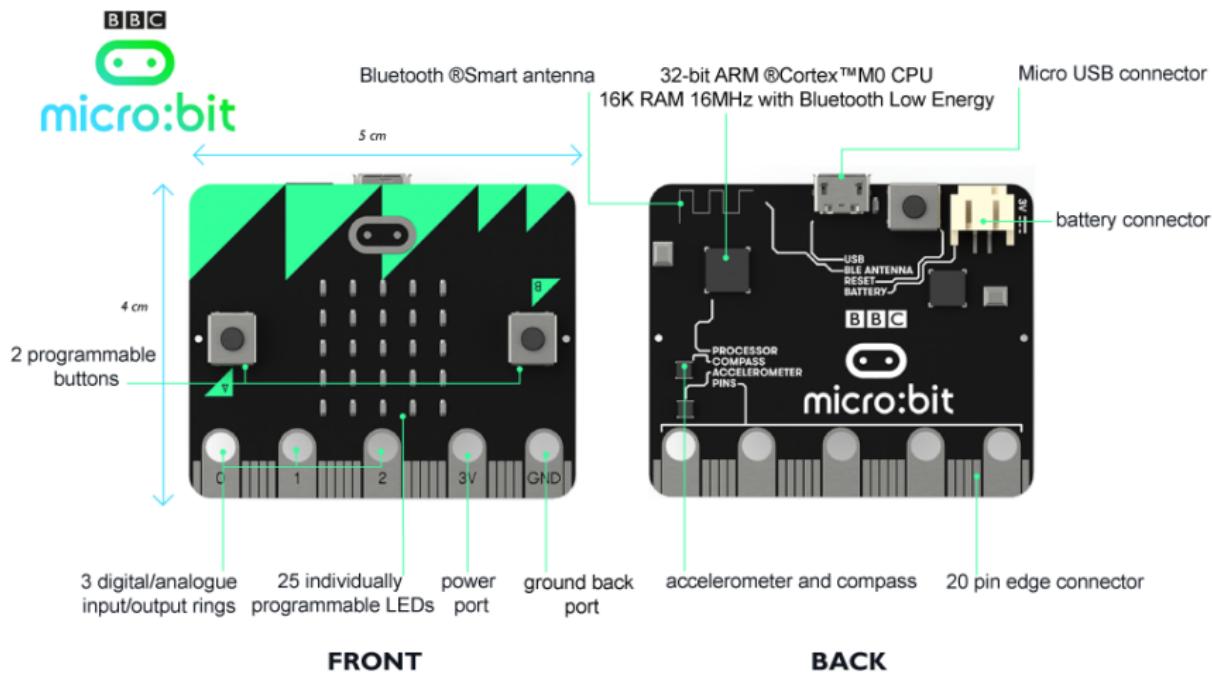
# ESP8266: low cost



## ESP8266: characteristics

- 802.11 b/g/n
- Built-in TCP / IP protocol stack
- Built-in PLL, voltage regulator and power management components
- 802.11b mode + 19.5dBm output power
- Built-in temperature sensor
- off leakage current is less than 10uA
- Built-in low-power 32-bit CPU: can double as an application processor
- SDIO 2.0, SPI, UART
- standby power consumption of less than 1.0mW

# BBC Micro:bit

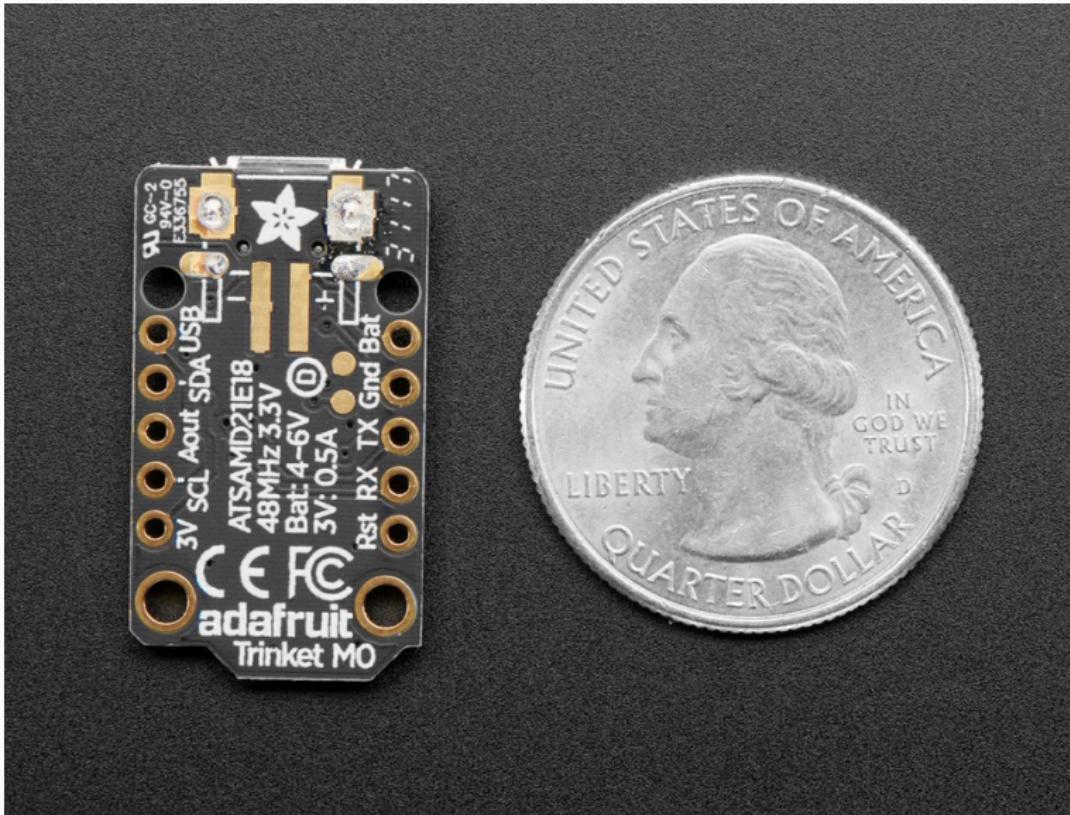


# BBC Micro:bit

The Micro Bit is an ARM-based embedded system designed by the BBC for use in computer education in the UK.

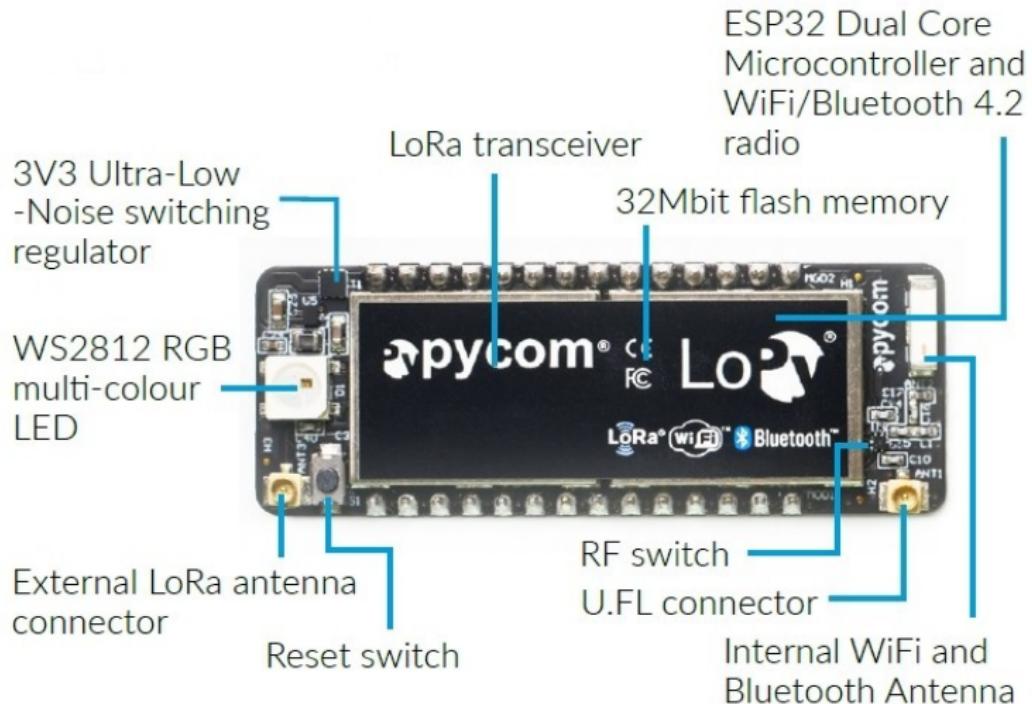
The board has an ARM Cortex-M0 processor, accelerometer and magnetometer sensors, Bluetooth and USB connectivity, a display consisting of 25 LEDs, two programmable buttons, and can be powered by either USB or an external battery pack. The device inputs and outputs are through five ring connectors that are part of the 23-pin edge connector.

# Trinket





# pycom: LoPy



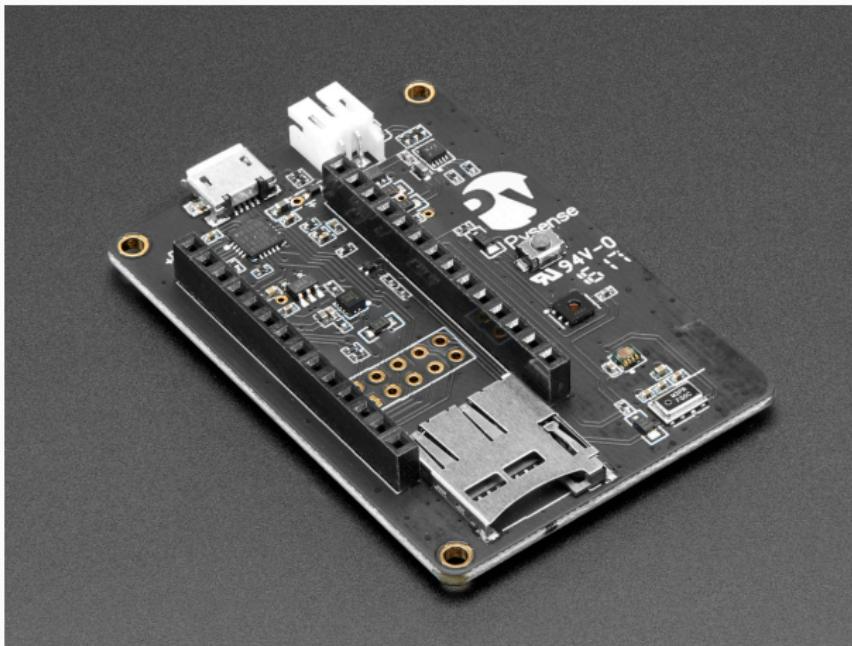
## pycom: LoPy4

- Espressif ESP32 chipset
- Quadruple network MicroPython enabled development board (LoRa, Sigfox, WiFi, Bluetooth)
- RAM: 4MB (vs 512KB)
- External flash: 8MB (vs 4MB)

## pycom: Expansion Board



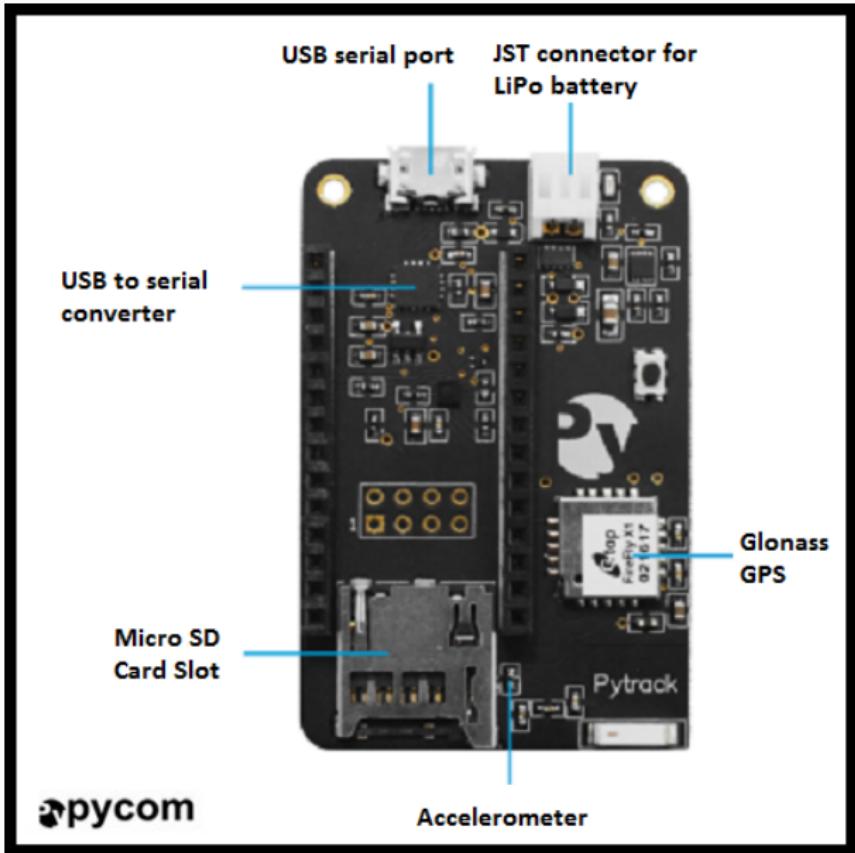
# pycom: PySense



## pycom: PySense

- Ambient light sensor
- Barometric pressure sensor
- Humidity sensor
- 3 axis 12-bit accelerometer
- Temperature sensor
- USB port with serial access
- LiPo battery charger
- MicroSD card compatibility
- Ultra low power operation ( 1uA in deep sleep)

# pycom: PyTrack



## pycom: PyTrack

- GNSS + Glonass GPS
- 3 axis 12-bit accelerometer
- USB port with serial access
- LiPo battery charger
- MicroSD ard compatibility
- Ultra low power operation ( 1uA in deep sleep)

## Our Lab equipment

- Pycom LoPy4
- PySense
- microUSB cable