



INTRO TO MICROPYTHON

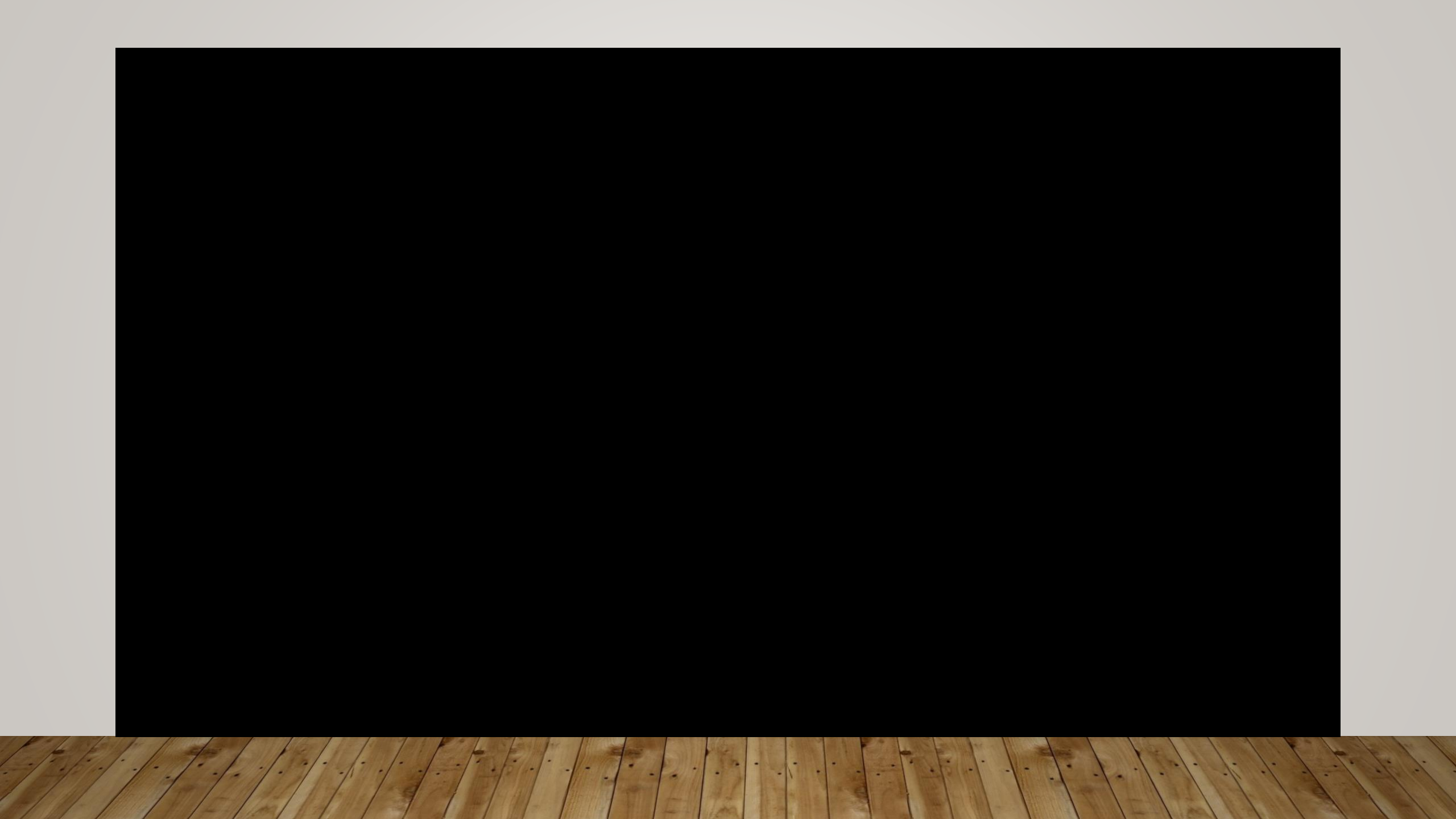
- The porting guide #1

by Simon XI

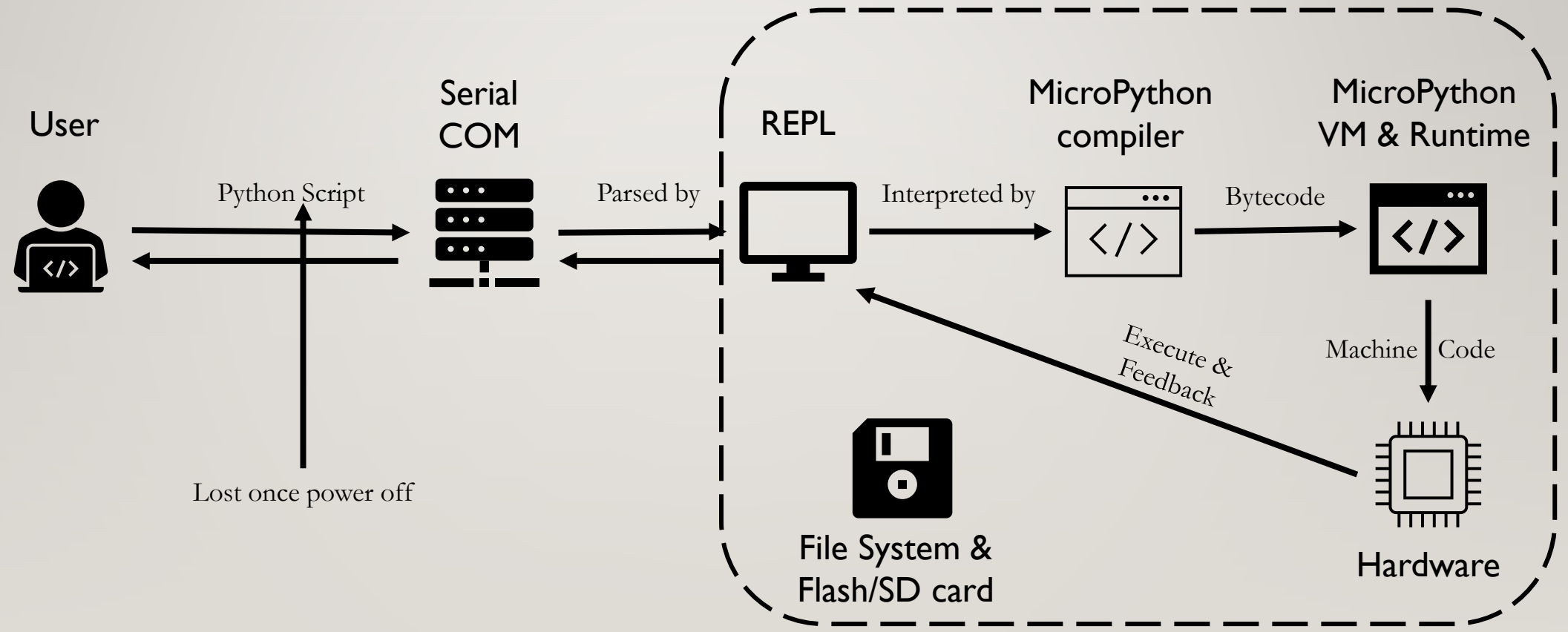
MICROPYTHON是什麼？

- MicroPython 就是一個為MCU等資源有限的設備設計的**Python 3** 語言的解釋器
- Damien George, PhD, 物理學家

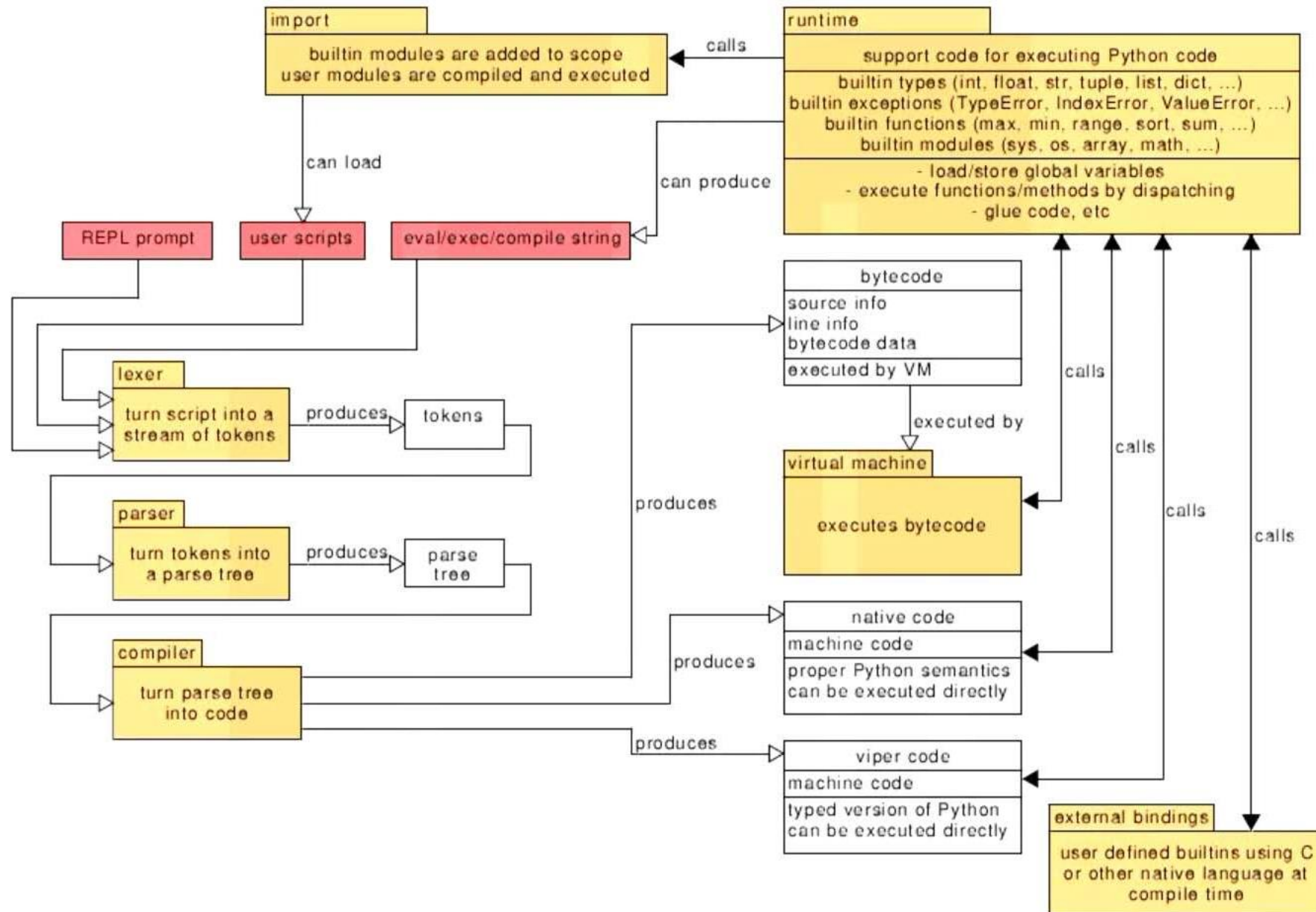




運行原理



INTERNAL ARCHITECTURE



關鍵詞匯

- **Bytecode**

A compact representation of a Python program that generated by compiling the Python source code. This is what the VM actually executes. Bytecode is typically generated automatically at runtime and is invisible to the user. Note that while [CPython](#) and MicroPython both use bytecode, the format is different. You can also pre-compile source code offline using the [cross-compiler](#).

- **QSTR**

stands for unique STRing, it's the name they give for **interned strings**, which is meant for saving RAM and ROM, every built-in variables and functions' names are QSTR, they are created at compile time and their value is an index into a linked list of QSTR pool.

EXAMPLE SCRIPT

```
def do_sleep(d):  
    print("sleep", d)  
    time.sleep(d)
```

```
00 LOAD_GLOBAL print  
03 LOAD_CONST_STRING "sleep"  
06 LOAD_FAST 0  
07 CALL_FUNCTION n=2 nkw=0  
09 POP_TOP  
10 LOAD_GLOBAL time  
13 LOAD_METHOD sleep  
16 LOAD_FAST 0  
17 CALL_METHOD n=1 nkw=0  
19 POP_TOP  
20 LOAD_CONST_NONE  
21 RETURN_VALUE
```

關鍵詞匯

- **REPL**

An acronym for “Read, Eval, Print, Loop”. This is the interactive Python prompt, useful for debugging or testing short snippets of code. Most MicroPython boards make a REPL available over a UART, and this is typically accessible on a host PC via USB.

- **Frozen Module**

A Python module that has been cross compiled and bundled into the firmware image. This reduces RAM requirements as the code is executed directly from flash.

同一個專案，不同的開發

1. MicroPython層的开发

- 比如MQTT library
- Neopixel library
- TFT LCD libraries, 等等

} Python code

2. MicroPython Port層的开发

- GPIO
- SPI
- WiFi, 等等

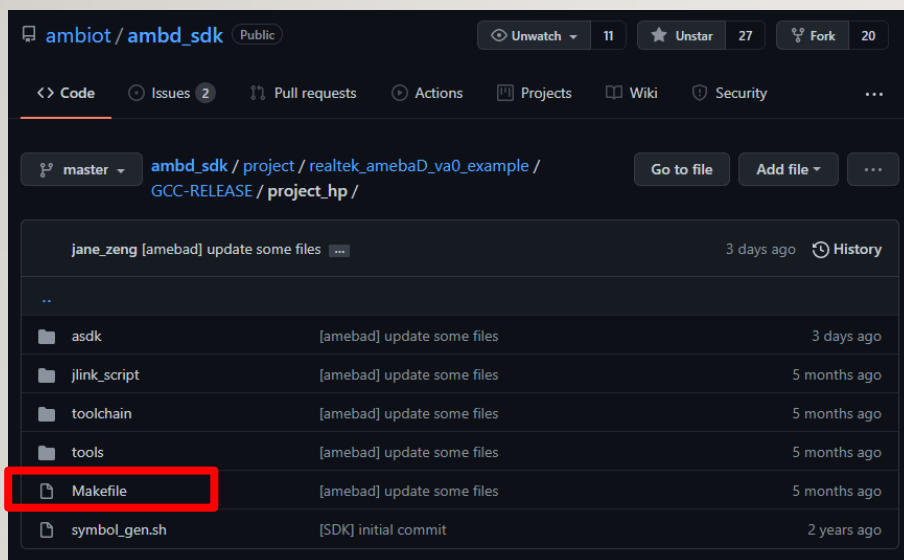
} C code

MICROPYTHON PORT的开发移植流程

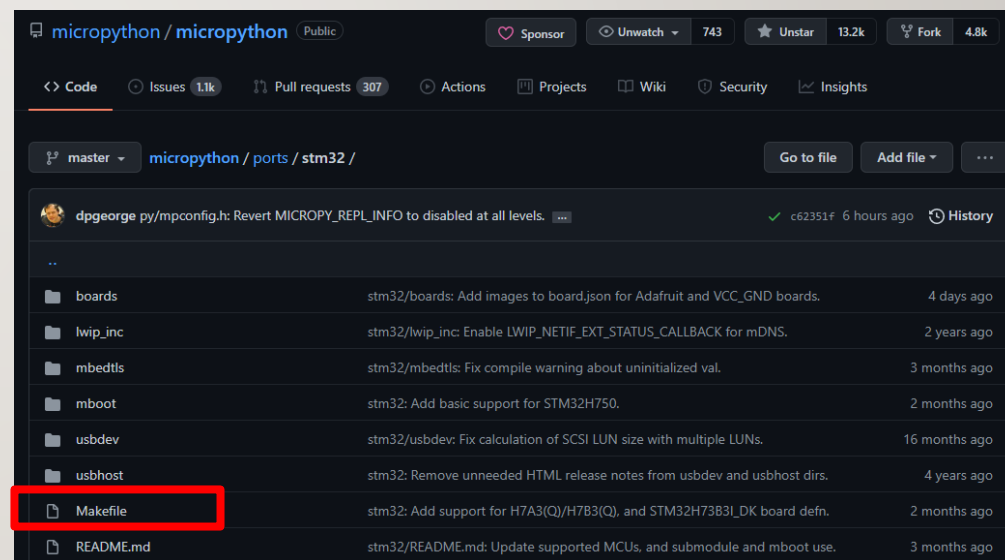
1. 研究芯片原廠**SDK**以及**MicroPython**的build system
 2. 熟知芯片原廠**SDK**以及**MicroPython**的使用方法和核心代碼
 3. 移植芯片原廠**SDK**中的核心代碼，並於**MicroPython**的核心代碼適配
 4. 實現**MicroPython REPL**作為里程碑
 5. 移植大量的外設控制**API**到**MicroPython**中
 6. 大量的適配，測試還有文檔編寫
- #1
- #2

I. 研究原廠SDK以及MICROPYTHON的BUILD SYSTEM

- Realtek RTL8722DM的原廠SDK



- MicroPython的Github Repo



GCC + Make!

GCC + MAKE

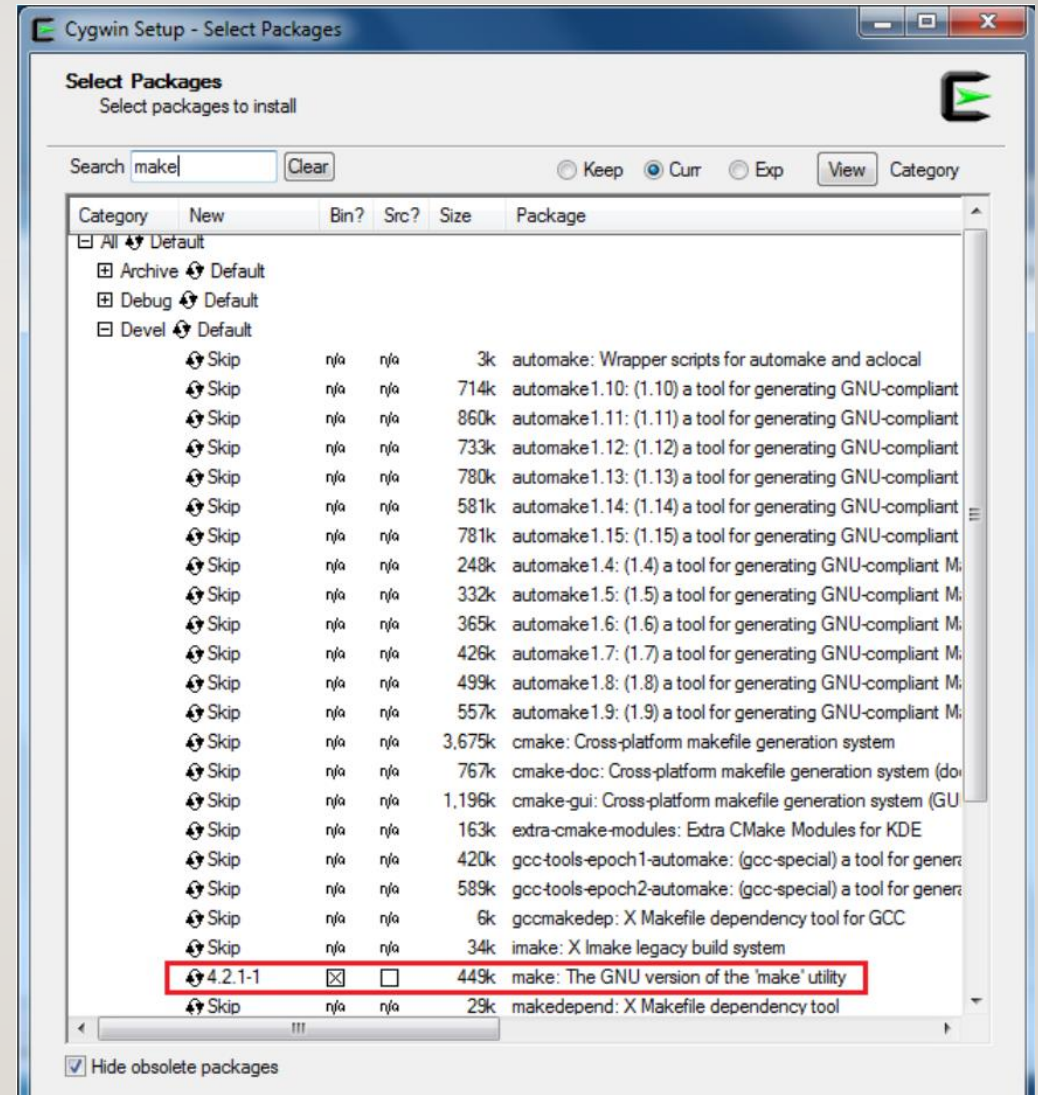
- GCC -- GNU Compiler Collection
 - 可能是最受歡迎的開源開發**Toolchain**工具鏈
- Make -- GNU Make
 - 管理並生成**executable**可執行文檔的開源工具



GNU Make

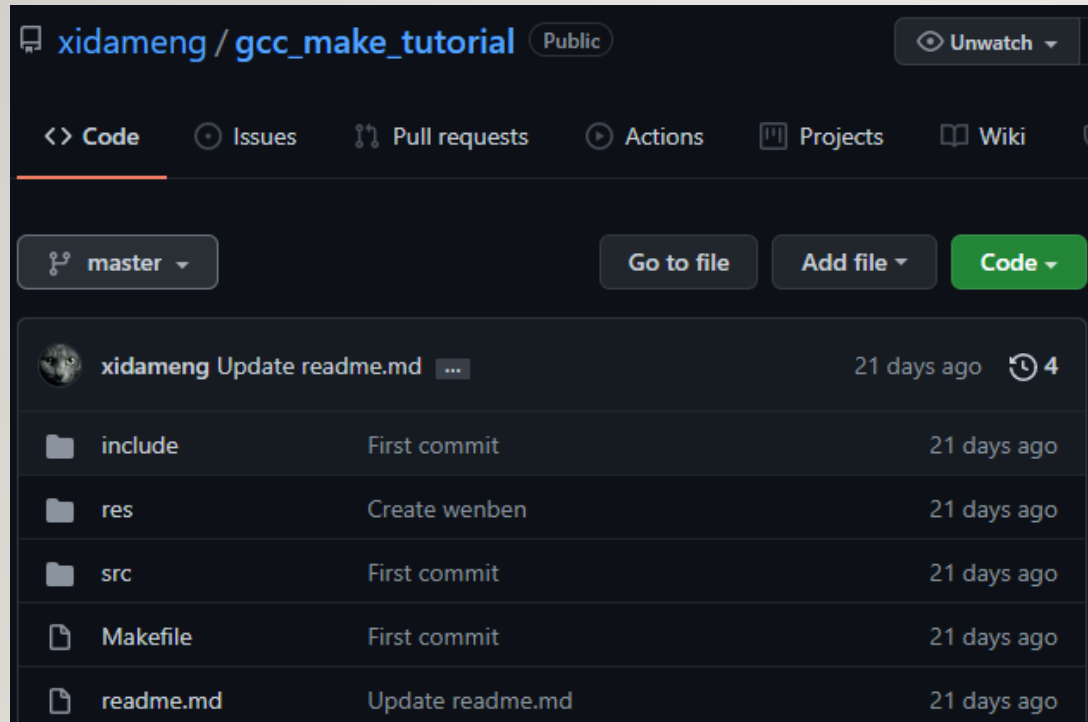
環境配置

- Cygwin
 - Cygwin is a POSIX-compatible programming and runtime environment that runs natively on Microsoft Windows.
 - make + bc
- Python 3



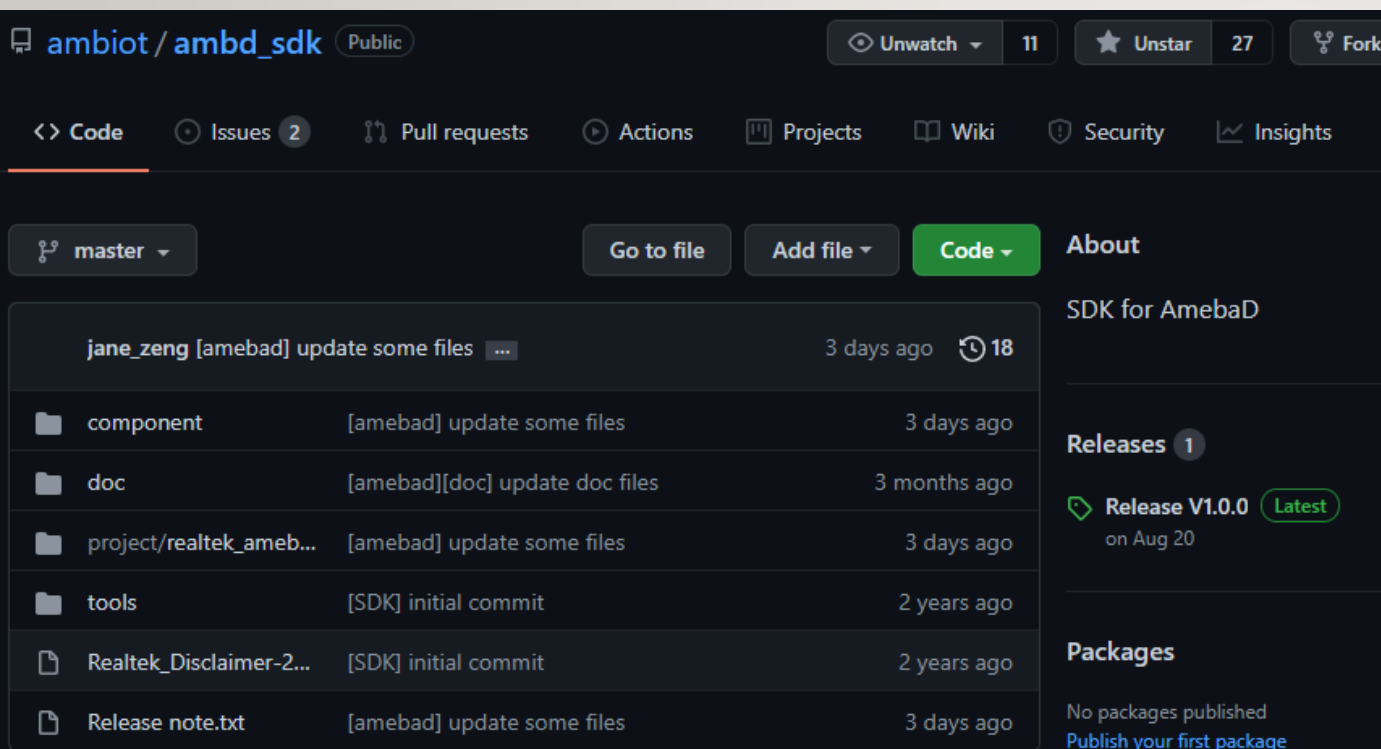
玩一下GCC+MAKE

- https://github.com/xidameng/gcc_make_tutorial



2. 熟知原廠SDK以及MICROPYTHON的使用方法和核心代碼

- Realtek RTL8722DM的原廠SDK

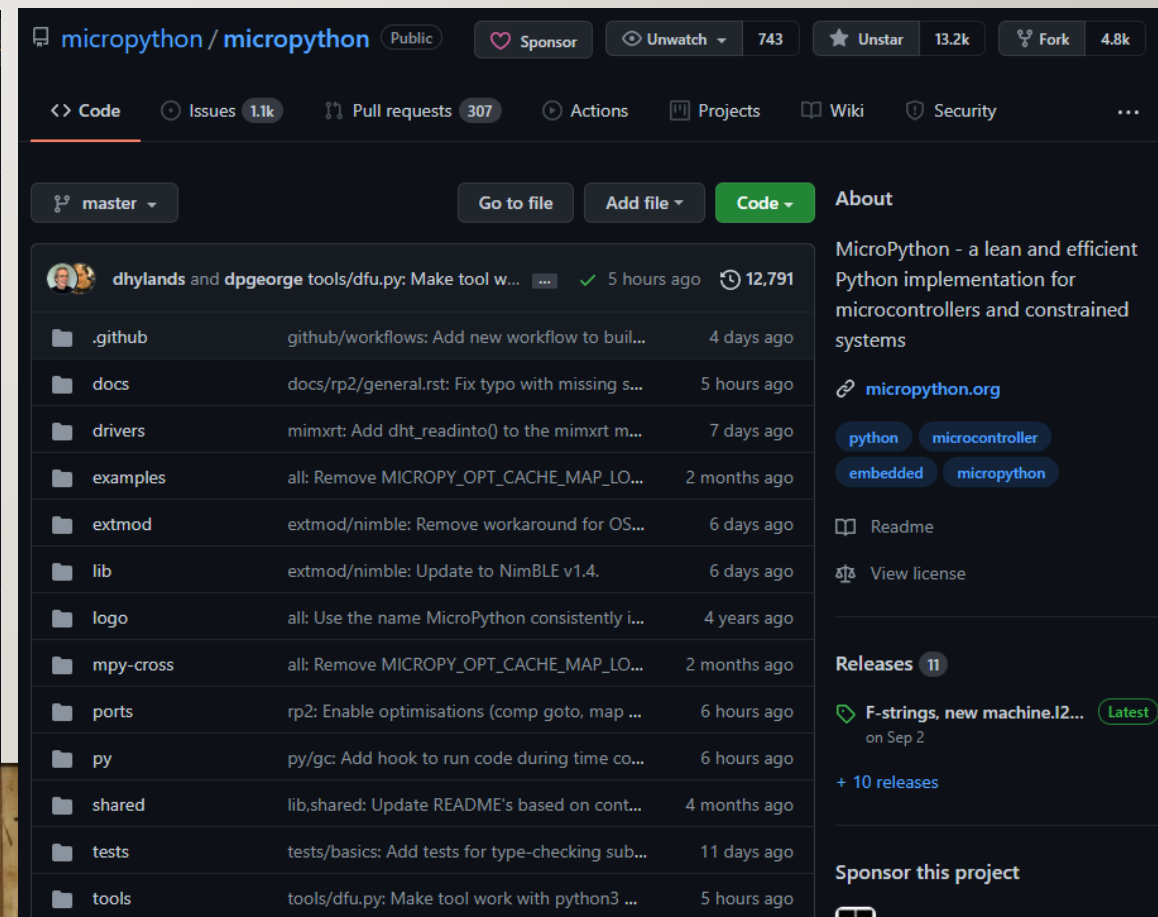


The screenshot shows the GitHub repository for `ambiot/ambd_sdk`. The repository is public and has 11 unwatchers, 27 stars, and 27 forks. The main branch is `master`. The repository contains a file tree with the following structure:

- `component` [amebad] update some files 3 days ago
- `doc` [amebad][doc] update doc files 3 months ago
- `project/realtek_ameb...` [amebad] update some files 3 days ago
- `tools` [SDK] initial commit 2 years ago
- `Realtek_Disclaimer-2...` [SDK] initial commit 2 years ago
- `Release note.txt` [amebad] update some files 3 days ago

The repository also has a release `V1.0.0` (Latest) published on Aug 20. The repository is described as "SDK for AmebaD".

- MicroPython的Github Repo



The screenshot shows the GitHub repository for `micropython/micropython`. The repository is public and has 743 unwatchers, 13.2k stars, and 4.8k forks. The main branch is `master`. The repository contains a file tree with the following structure:

- `.github` github/workflows: Add new workflow to build... 4 days ago
- `docs` docs/rp2/general.rst: Fix typo with missing s... 5 hours ago
- `drivers` mimxrt: Add dht_readinto() to the mimxrt m... 7 days ago
- `examples` all: Remove MICROPY_OPT_CACHE_MAP_LO... 2 months ago
- `extmod` extmod/nimble: Remove workaround for OS... 6 days ago
- `lib` extmod/nimble: Update to NimBLE v1.4. 6 days ago
- `logo` all: Use the name MicroPython consistently i... 4 years ago
- `mpy-cross` all: Remove MICROPY_OPT_CACHE_MAP_LO... 2 months ago
- `ports` rp2: Enable optimisations (comp goto, map ... 6 hours ago
- `py` py/gc: Add hook to run code during time co... 6 hours ago
- `shared` lib/shared: Update README's based on cont... 4 months ago
- `tests` tests/basics: Add tests for type-checking sub... 11 days ago
- `tools` tools/dfu.py: Make tool work with python3 ... 5 hours ago

The repository also has a release `F-strings, new machine.I2...` (Latest) published on Sep 2. The repository is described as "MicroPython - a lean and efficient Python implementation for microcontrollers and constrained systems".

原廠**SDK**的使用方法和核心代碼

- Components: 核心功能代碼
- Doc: 技術文檔
- Project: 已經配置好的build system
- Tools: 桌面級工具

MICROPYTHON的使用方法和核心代碼

- doc: read the docs 線上文檔的源碼
- drivers: 某些硬體的驅動程式
- examples: 示例代碼和C模塊的模板
- extmod: 非核心的C模塊
- lib: 第三方開源的C語言庫
- **mpy-cross**: MicroPython的cross compiler
- **ports**: 這種不同硬體的核心移植代碼
- **py**: MicroPython解釋器最核心的代碼
- **shared**: 與所有ports共用的核心代碼
- tests: 測試用的MicroPython代碼
- tools: 桌面級工具

核心編譯流程

- | | |
|----------------------------|------------------------|
| 1. mpy-cross | 1. cross compiler |
| 2. py/mkenv.mk | 2. 配置環境 |
| 3. py/py.mk | 3. 標明核心解釋器代碼 + 創建qstr庫 |
| 4. extmod/extmod.mk | 4. 標明額外C模塊代碼 |
| 5. ports/rtl8722/amebad.mk | 5. 編譯與硬體有關的代碼 |
| 6. py/mkrules.mk | 6. 編譯所有MicroPython代碼 |


MICROPYTHON AMEBA PORT

https://github.com/ambiot/ambd_micropython

ambiot / **ambd_micropython** Public

<> Code 4 Issues Pull requests Actions Projects ...

master ambd_micropython / MicroPython_RTL8722 / ports / rtl8722 / ...

 xidameng and ambiot [Release] Release V1.0.2 (#12) ... 18 days ago History

..

amebad_tool	18 days ago
amebad_vendor	18 days ago
mp_frozenmodules	4 months ago
mp_helper	18 days ago
mp_scripts	4 months ago
Makefile	18 days ago
README.md	4 months ago
amebad.mk	18 days ago
main.c	4 months ago
mpconfigport.h	18 days ago
mphalport.h	13 months ago
pins.c	13 months ago
readme_中文.md	12 months ago

AMEBA FORKED MICROPYTHON

The screenshot displays the GitHub interface for the repository `ambiot/micropython`, which is a public fork of `micropython/micropython`. The repository is currently on the `ameba_toolchain` branch, which is 3 commits ahead and 48 commits behind the `micropython:master` branch. The repository has 0 watches, 1 unstar, and 4.8k forks. The main navigation bar includes links for Code, Pull requests, Actions, Projects, Wiki, Security, and Insights. The file list on the left shows directories like `.github`, `docs`, `drivers`, `examples`, `extmod`, `lib`, `logo`, and `mpy-cross`, each with a brief description of the latest commit and its age. The right sidebar contains the 'About' section, which describes MicroPython as a lean and efficient Python implementation for microcontrollers and constrained systems, and provides links to the official website (micropython.org), the README, and the license. Below the 'About' section, there are sections for 'Releases' (showing 50 tags) and 'Packages' (showing no packages published).

Repository Details:

- Repository: `ambiot/micropython` (Public)
- Forked from: `micropython/micropython`
- Branch: `ameba_toolchain`
- Status: This branch is 3 commits ahead, 48 commits behind `micropython:master`.
- Contributors: `xidameng` and `ambiot` (Ameba toolchain...)
- Commits: 12,746 (3 days ago)

File List:

File	Description	Age
<code>.github</code>	tools/ci.sh: Use IDF v4.4 as part of ...	2 months ago
<code>docs</code>	docs/esp32/tutorial: Add an exam...	18 days ago
<code>drivers</code>	drivers/cyw43: Make wifi join fail if ...	2 months ago
<code>examples</code>	all: Remove MICROPY_OPT_CACHE...	2 months ago
<code>extmod</code>	extmod/vfs_posix_file: Support MP...	13 days ago
<code>lib</code>	Major Update to Ameba Port (#1)	4 days ago
<code>logo</code>	all: Use the name MicroPython con...	4 years ago
<code>mpy-cross</code>	all: Remove MICROPY_OPT_CACHE...	2 months ago


Right Sidebar:




- About:** MicroPython - a lean and efficient Python implementation for microcontrollers and constrained systems. Link to micropython.org.
- Releases:** 50 tags.
- Packages:** No packages published.

可以用ARDUINO開發MICROPYTHON嗎？

- 可以!
- 但是**非常+極其**不好用!!
- 三個原因:
 1. MicroPython編譯+上傳一次就可以了，之後的開發主要靠在文檔系統中保存和修改Python code，這點上Arduino IDE幾乎做不到
 2. Arduino IDE對Python語言的支援是負數的
 3. Arduino的Serial Monitor根本無法配合REPL使用

ICSHOP X RTL8722DM_MINI





Line
@iCshop

我的帳戶
登入

購物車:
NT\$0

商品目錄


新進商品

限量商品出清

CIRCUS PI

技術文章

Home / 開發板 / Ameba



New 減價300

Ameba RTL8722DM mini Board (AMB 23)

NT\$ ~~799~~499

產品貨號 368030501635

品牌

原廠貨號

數量 [加入購物車](#) [有庫存](#)

關鍵字 [阿米巴](#) [IOT](#) [物聯網](#)

運送方式 ☒ 7-11取貨付款 ☒ 郵寄(單一運費) ☒ 宅配 ☒ 宅配貨到付款 ☒ 外島郵寄 ☒ 順豐快速 ☒ 順豐快速貨到付款



PORT開發指南

1. Background and Project Structure

<https://forum.amebaiot.com/t/introduction-to-developing-micropython-1-background-and-structure/93>

2. Environment Setup

<https://forum.amebaiot.com/t/introduction-to-developing-micropython-2-environment-setup/99>

3. Learning the Build System

<https://forum.amebaiot.com/t/introduction-to-developing-micropython-3-getting-started/112>

4. Developing New Module for RTL8722 MicroPython Port

<https://forum.amebaiot.com/t/introduction-to-developing-micropython-4-developing-new-module-for-rtl8722-port/130>

5. MicroPython API Design and Methods

<https://forum.amebaiot.com/t/introduction-to-developing-micropython-5-micropython-api-design-and-methods/143>