

# Configuration Manual

MSc Research Project  
MSCCYBE\_JANO23\_O

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**National College of Ireland**  
**MSc Project Submission Sheet**  
**School of Computing**



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**Programme:** MSCCYBE\_JANO23\_O **Year:** 2023  
**Module:** MSc Research Project  
**Lecturer:** Ross Spelman  
**Submission Due Date:** 12/08/2024  
**Project Title:** Lightweight Cryptography in Embedded IOT Systems  
**Word Count:** 410 **Page Count:** 4

I hereby certify that the information contained in this (my submission) is information pertaining to research I conducted for this project. All information other than my own contribution will be fully referenced and listed in the relevant bibliography section at the rear of the project.

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**Signature:** Kamal Tawfik

**Date:** 12/08/2024

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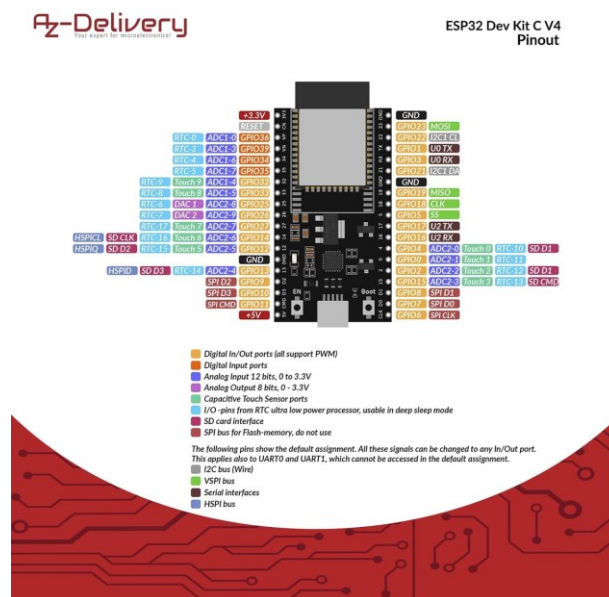
## 1 Software tools

The following software tools are used in the study:

- Visual studio code: it is a known code editor and with suitable extension can be a good choice aside for the test.
- Build tools - CMake and Ninja to build a full Application for ESP32
- ESP-IDF that essentially contains API (software libraries and source code) for ESP32 and scripts to operate the Toolchain
- Tera Term serial monitor
- The study conducted on Windows 10 environments

## 2 Hardware

- ESP32 Dev Kit NodeMCU Wroom-32 has been used which is microcontroller used in IOT applications and it comes with following features:
  - 2.4 GHz dual-mode WI-FI
  - TSMC Bluetooth chip
  - 40nm low-power technology
  - Dual high performance Xtensa 32-bit LX6 CPU cores
  - Digital input and output pins
  - Peripherals pins

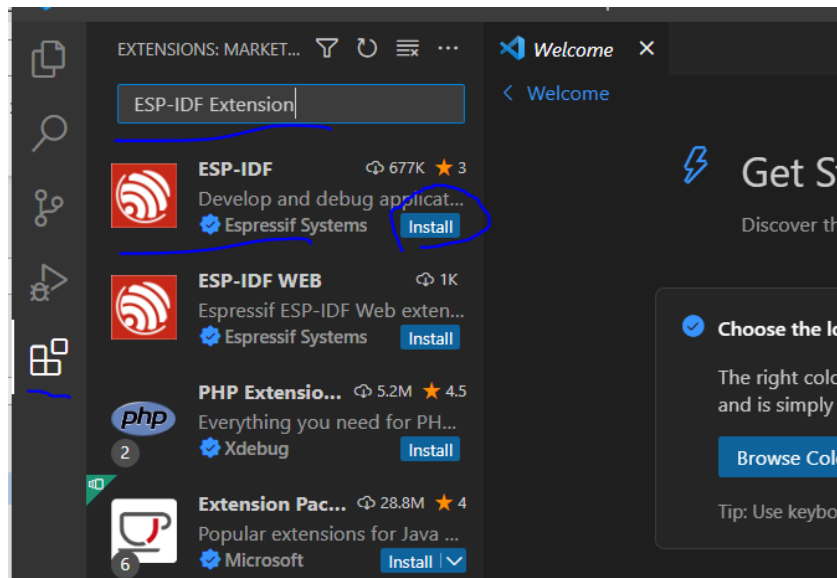


ESP32 Dev kit Cv4 Pinout

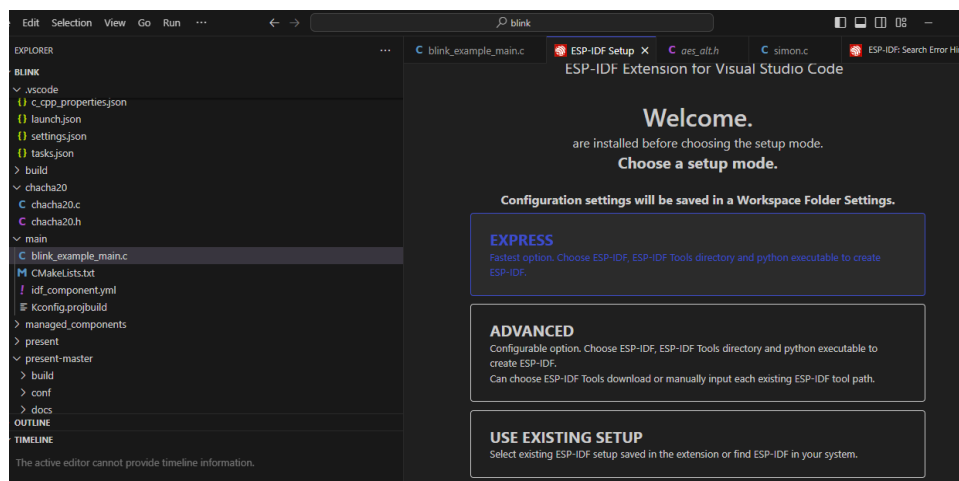
- USB cable - USB A / micro-USB B to connect the board to the computer

### 3 Installation

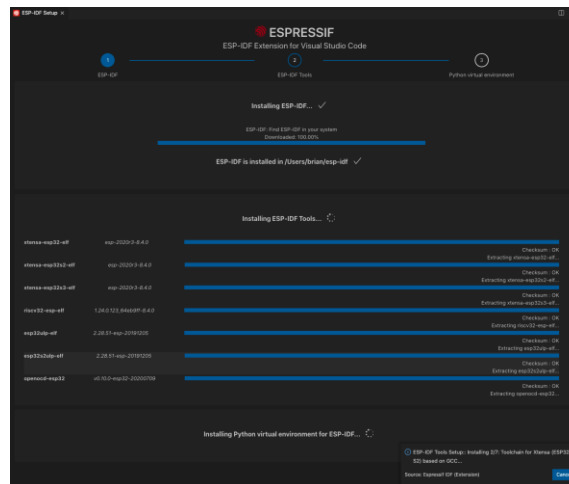
- 1- Download and install VS code
- 2- Install [ESP-IDF Extension](#)



- 3- In Visual Studio Code, select menu "View" and "Command Palette" and type [configure esp-idf extension]. After, choose the ESP-IDF: Configure ESP-IDF Extension option. I chose USE EXISTING SETUP.

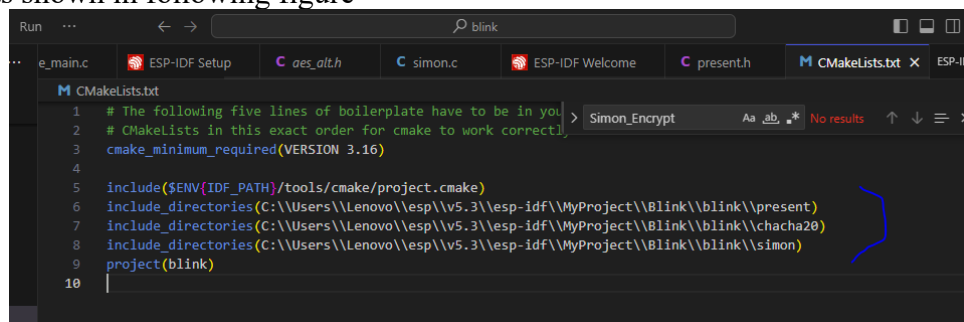


- 4- Install bar should appear with the progress status



## 4 Setup, build and flash

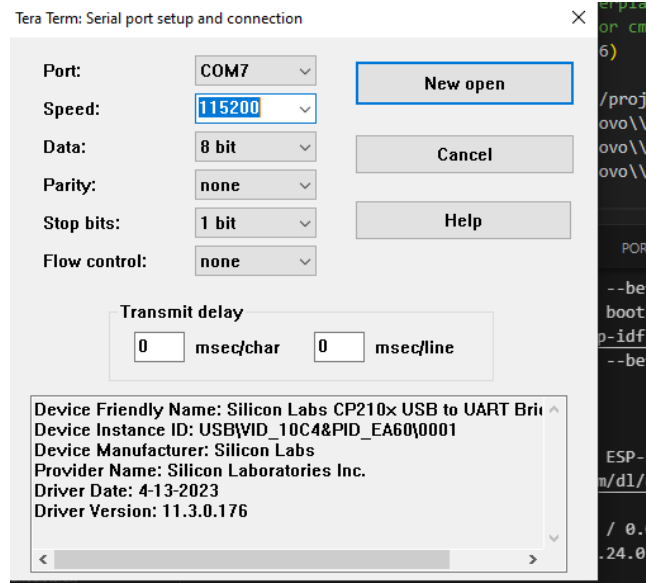
- 1- I have used Blink example as my base then add libraries, but with the artefact attached, we can just open project and open the attached project , then you can skip to go directly to build and flash the binary.
- 2- The user must add library to inclusion by adding include directory in CMakeList.txt file as shown in following figure



- 3- To build the project use press CTRL+E and then b in visual studio terminal
- 4- To flash connect the ESP32 board visa cable and press CTRL+E and then f in visual studio terminal

## 5 Test

- 1- Install TERA Term, open-source serial monitor.
- 2- Open after installation and select the correct Com port
- 3- Choose setup-> serial and choose the correct baud rate



- 4- Click file->log and select log file where data will be logged
- 5- Reset the board by pressing in Reset (or EN) button on the board
- 6- You should see data shown in Tera term serial and also saved in log file

```
COM7 - Tera Term VT
File Edit Setup Control Window Help
ets Jul 29 2019 12:21:46

rst:0x1 (POWERON RESET),boot:0x13 (SPI_FAST_FLASH_BOOT)
configsip: 0, SPIWP:0xee
clk_drv:0x00,q_drv:0x00,d_drv:0x00,cs0_drv:0x00,hd_drv:0x00,wp_drv:0x00
mode:DIO, clock div:2
load:0x3fff0030,len:7176
load:0x40078000,len:15564
ho 0 tail 12 room 4
load:0x40080400,len:4
load:0x40080404,len:3904
entry 0x40080640
I (31) boot: ESP-IDF v5.3 2nd stage bootloader
I (31) boot: compile time Aug 11 2024 22:03:26
I (31) boot: Multicore bootloader
I (35) boot: chip revision: v3.1
I (39) boot.esp32: SPI Speed      : 40MHz
I (44) boot.esp32: SPI Mode       : DIO
I (48) boot.esp32: SPI Flash Size : 2MB
I (53) boot: Enabling RNG early entropy source...
I (58) boot: Partition Table:
I (62) boot: ## Label                Usage              Type            ST Offset   Length
I (69) boot: 0 nvs                   WiFi data          01 02 00009000 00006000
I (76) boot: 1 phy_init               RF data            01 01 00001000 00001000
I (84) boot: 2 factory                factory app         00 00 00010000 00100000
I (91) boot: End of partition table
I (96) esp_image: segment 0: paddr=00010020 vaddr=3f400020 size=09a0ch ( 39436)
map
I (118) esp_image: segment 1: paddr=00019a34 vaddr=3ffb0000 size=0237ch ( 9084)
load
I (121) esp_image: segment 2: paddr=0001bdb8 vaddr=40080000 size=04260h ( 16992)
load
I (130) esp_image: segment 3: paddr=00020020 vaddr=400d0020 size=17fd0h ( 98256)
map
I (166) esp_image: segment 4: paddr=00037f18 vaddr=40084260 size=087c0h ( 34752)
load
I (186) boot: Loaded app from partition at offset 0x10000
I (186) boot: Disabling RNG early entropy source...
I (190) cpu_start: Multicore app
I (206) cpu_start: Pro cpu start user code
I (206) cpu_start: cpu freq: 160000000 Hz
I (206) app_init: Application information:
I (209) app_init: Project name:      blink
I (214) app_init: App version:      v5.3
I (218) app_init: Compile time:     Aug 11 2024 22:01:17
I (224) app_init: ELF file SHA256: b14897b45...
I (230) app_init: ESP-IDF:         v5.3
```

## References

- [1] <https://docs.espressif.com/projects/esp-idf/en/stable/esp32/get-started/index.html> Feng, G. and Buyya, R. (2016). Maximum revenue-oriented resource allocation in cloud, *IJGUC* 7(1): 12–21.
- [2] <https://github.com/espressif/vscode-esp-idf-extension/blob/master/docs/tutorial/install.md>
- [3] <https://teratermproject.github.io/index-en.html>
- [4] [ESP-IDF - Visual Studio Marketplace](#)