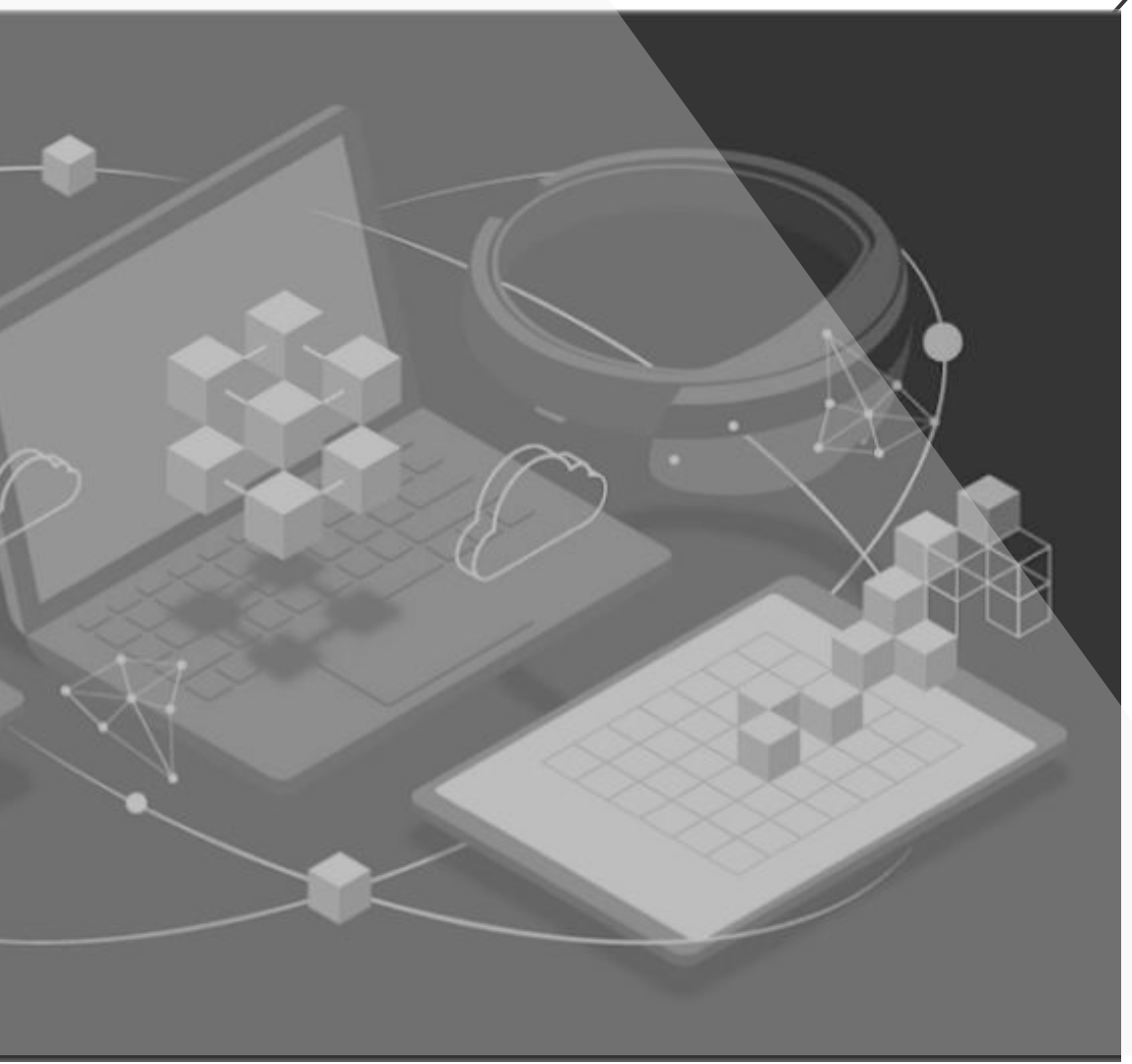
Memulai dengan IoT

TABLE OF CONTENTS



01

Pengenalan

Goal

- Memahami sistem kerja ESP32
- Membuat program dengan Platform IO (arduino framework)
- Membuat webserver dengan SPIFFS (SPI Flash File System)
- Memulai dengan Raspberry Pi

ESP32

Tentang ESP32

ESP32 Features and Specifications

- Wireless connectivity WiFi: 150.0 Mbps data rate with HT40
- Bluetooth: BLE (Bluetooth Low Energy) and Bluetooth Classic
- Processor: Tensilica Xtensa Dual-Core 32-bit LX6 microprocessor, running at 160 or 240 MHz
- ROM: 448 KB
- SRAM: 520 KB
- Low Power: ensures that you can still use ADC conversions, for example, during deep sleep.

Peripheral Input/Output:

- Peripheral interface with DMA that includes capacitive touch
- ADCs (Analog-to-Digital Converter)
- DACs (Digital-to-Analog Converter)
- I^2C (Inter-Integrated Circuit)
- UART (Universal Asynchronous Receiver/Transmitter)
- SPI (Serial Peripheral Interface)
- I^2S (Integrated Interchip Sound)
- RMII (Reduced Media-Independent Interface)
- PWM (Pulse-Width Modulation).

Program Env

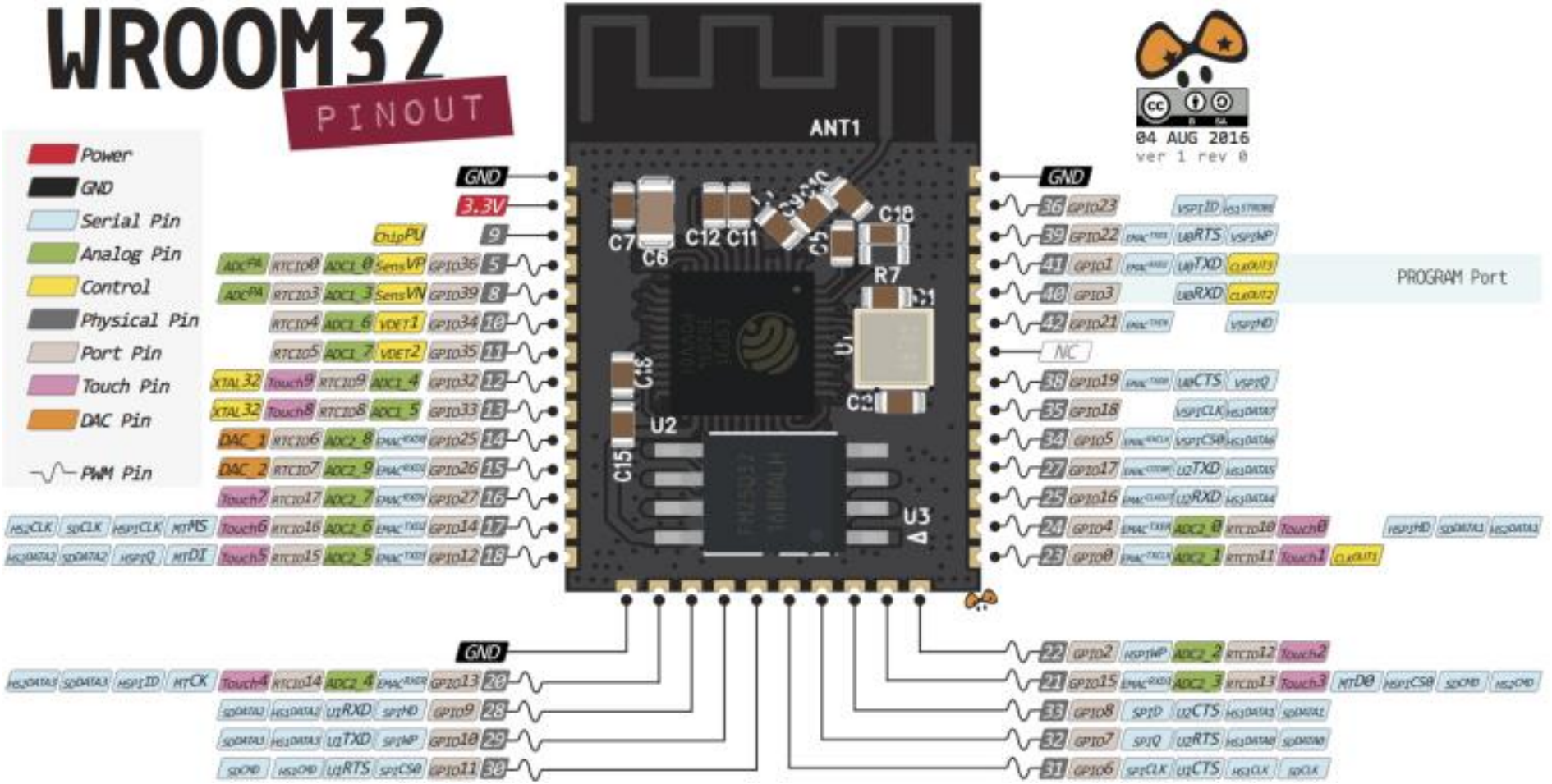
Arduino IDE
Espressif IDF
Micropython
JavaScript
LUA

(Windows, Mac OS X and Linux)

DEVELOPMENT BOARD

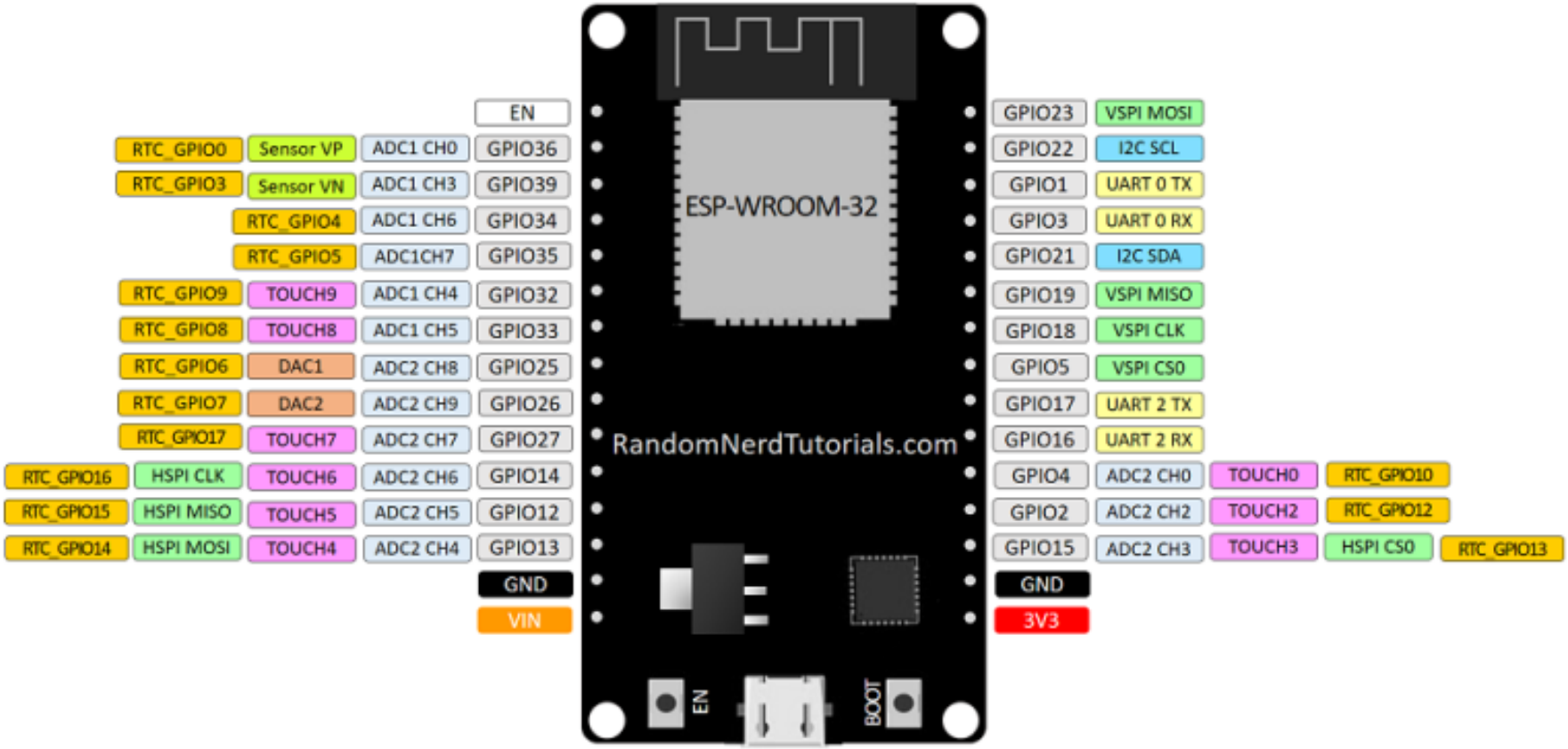
WROOM32

PINOUT



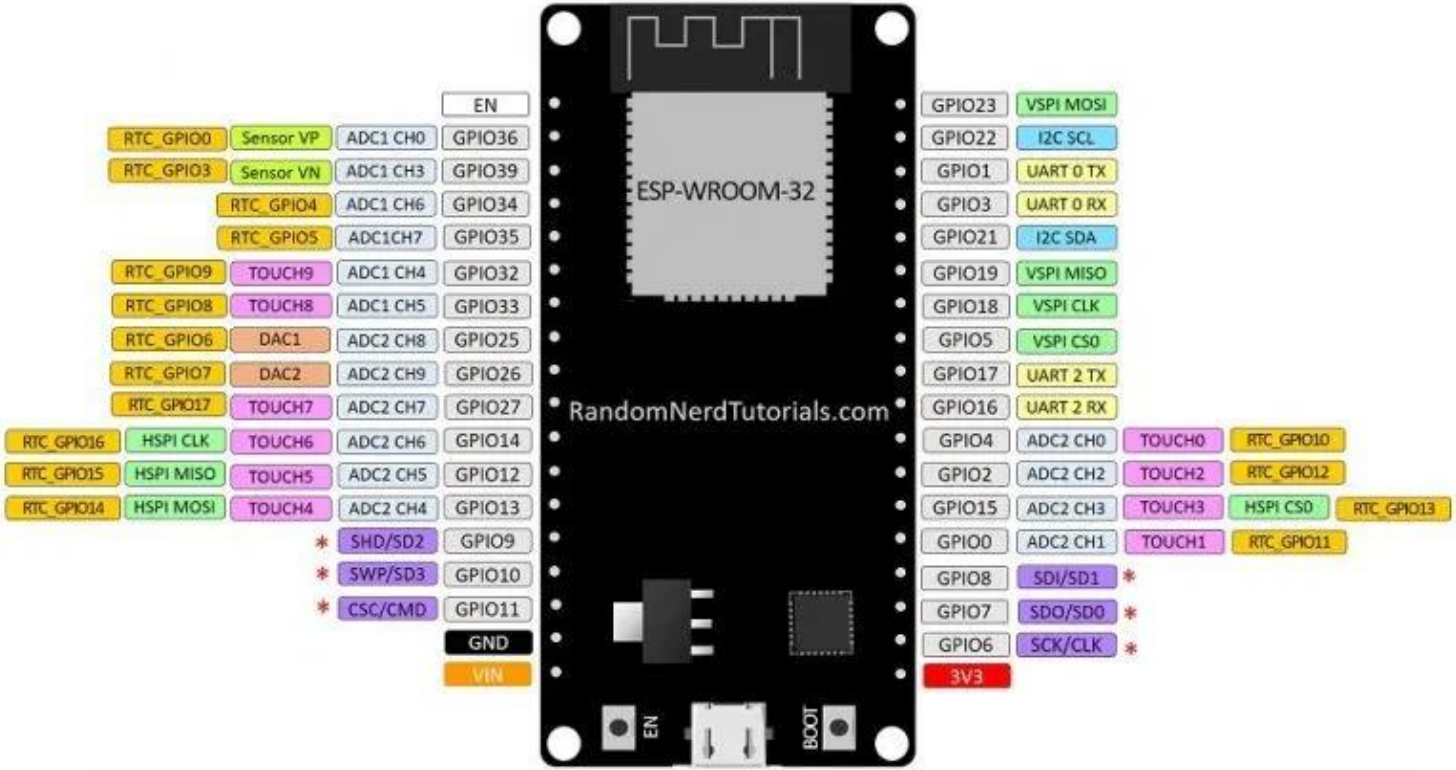
ESP32 DEVKIT V1 – DOIT

version with 30 GPIOs



ESP32 DEVKIT V1 – DOIT

version with 36 GPIOs



* Pins SCK/CLK, SDO/SD0, SDI/SD1, SHD/SD2, SWP/SD3 and SCS/CMD, namely, GPIO6 to GPIO11 are connected to the integrated SPI flash integrated on ESP-WROOM-32 and are not recommended for other uses.

ESP32 Pinout Reference

Input only pins

- GPIO 34
- GPIO 35
- GPIO 36
- GPIO 39

ESP32 has 18 x 12 bits ADC input channels (while the ESP8266 only has 1x 10 bits ADC).

- ADC1_CH0 (GPIO 36) ADC1_CH1 (GPIO 37)
- ADC1_CH2 (GPIO 38) ADC1_CH3 (GPIO 39)
- ADC1_CH4 (GPIO 32) ADC1_CH5 (GPIO 33)
- ADC1_CH6 (GPIO 34) ADC1_CH7 (GPIO 35)
- ADC2_CH0 (GPIO 4) ADC2_CH1 (GPIO 0)
- ADC2_CH2 (GPIO 2) ADC2_CH3 (GPIO 15)
- ADC2_CH4 (GPIO 13) ADC2_CH5 (GPIO 12)
- ADC2_CH6 (GPIO 14) ADC2_CH7 (GPIO 27)
- ADC2_CH8 (GPIO 25) ADC2_CH9 (GPIO 26)

There are 2 x 8 bits DAC channels on the ESP32 to convert digital signals into analog voltage signal outputs. These are the DAC channels:

- DAC1 (GPIO25)
- DAC2 (GPIO26)

ESP32 PINOUT REFERENCE

Strapping Pins

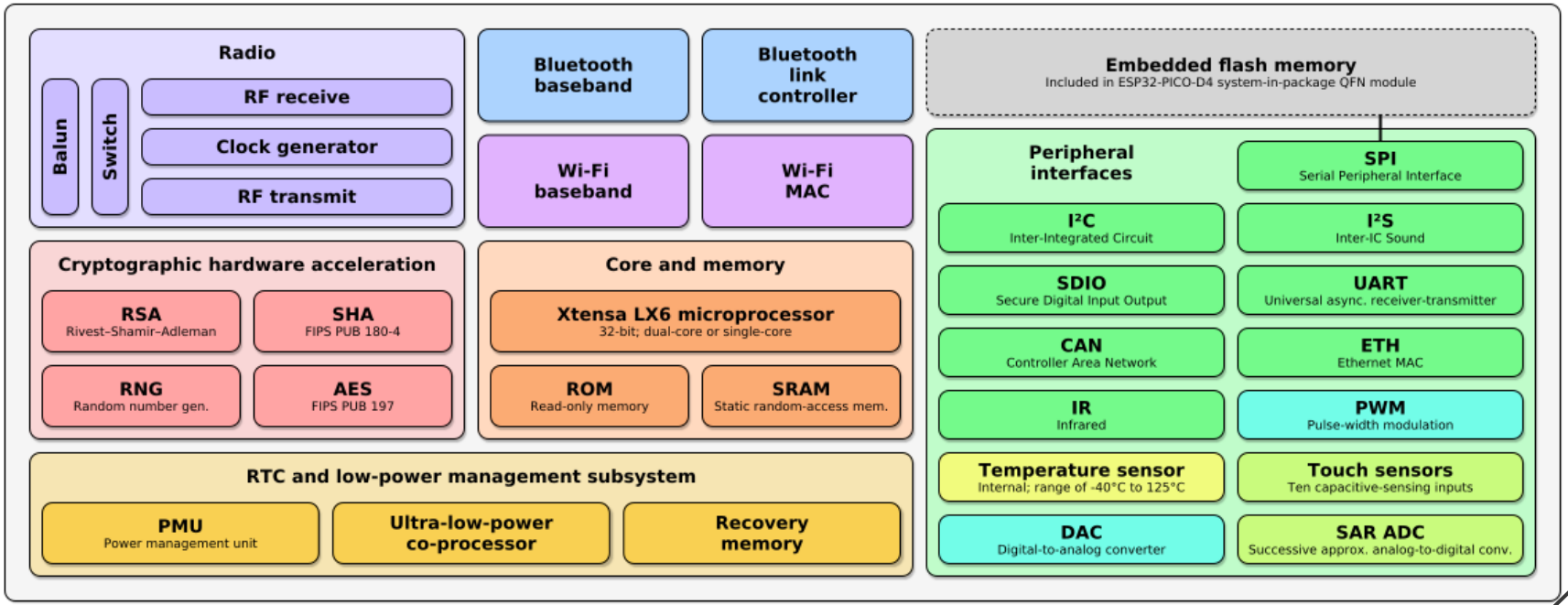
The ESP32 chip has the following strapping pins:

GPIO 0
GPIO 2
GPIO 4
GPIO 5 (must be HIGH during boot)
GPIO 12 (must be LOW during boot)
GPIO 15 (must be HIGH during boot)

Pins HIGH at Boot

GPIO 1
GPIO 3
GPIO 5
GPIO 6 to GPIO 11 (connected to the ESP32 integrated SPI flash memory – not recommended to use).
GPIO 14
GPIO 15

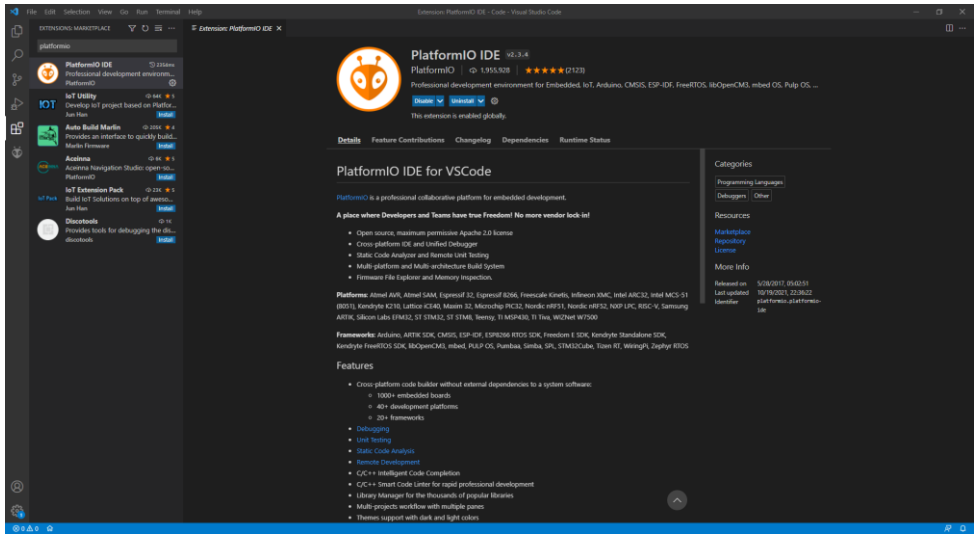
Espressif ESP32 Wi-Fi & Bluetooth Microcontroller — Function Block Diagram



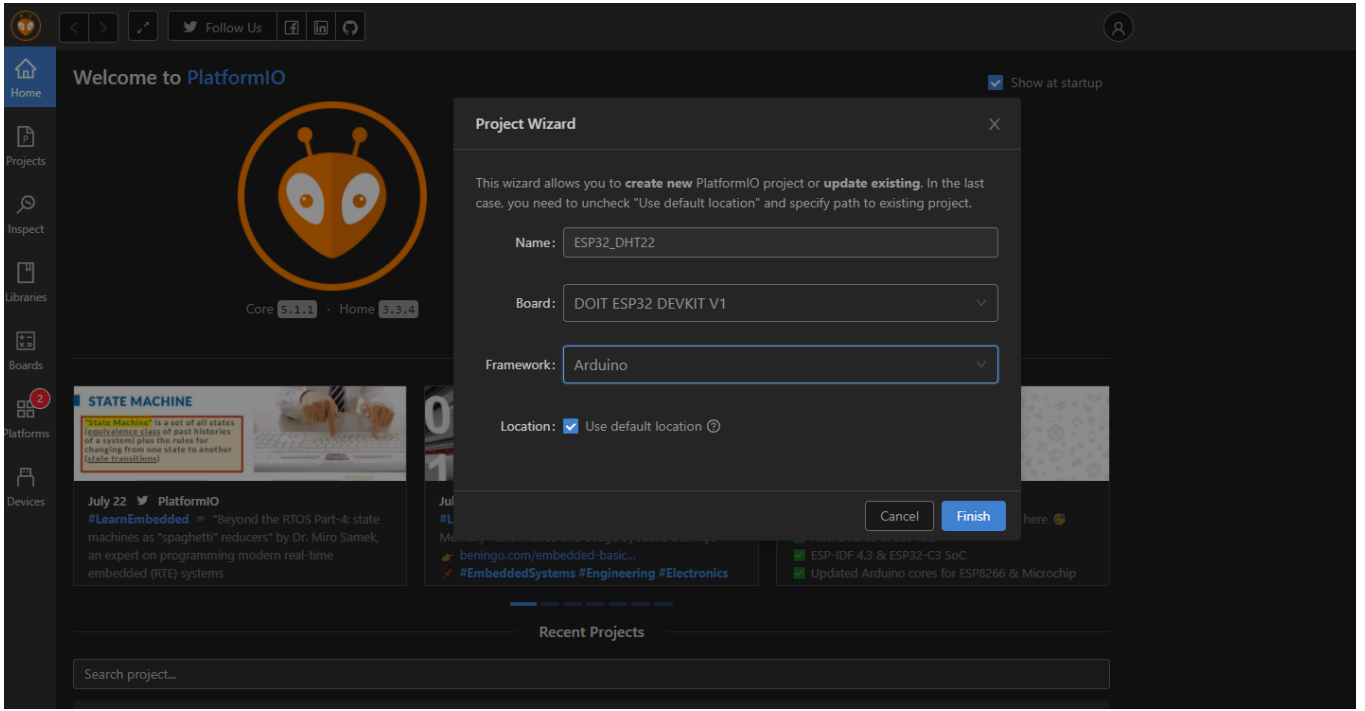
Platform IO

PLATFORM IO IDE

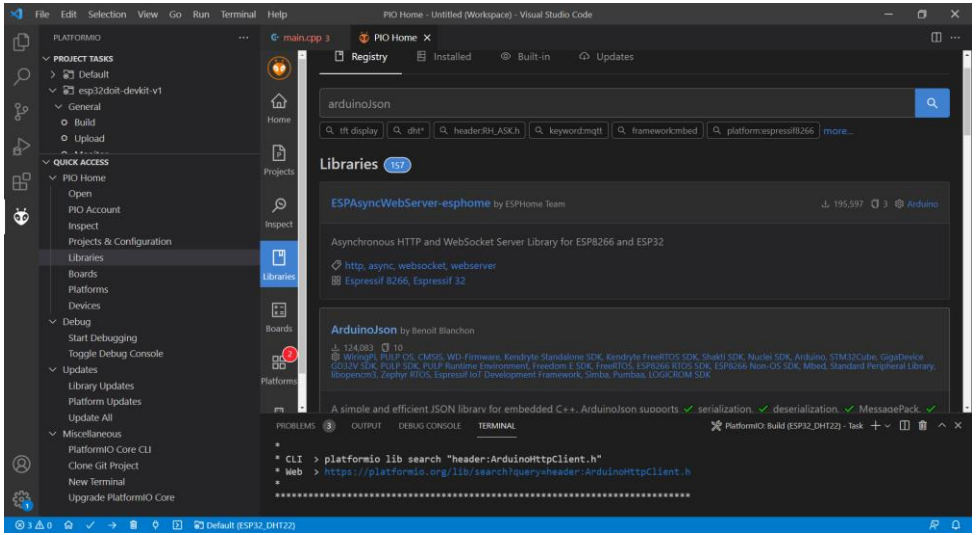
PlatformIO IDE berjalan diatas VSCode sebagai official extentions
Pada menu Extention Manager pada sidebar IDE VScode– search platformIO – pilih install



MEMBUAT PROJECT BARU

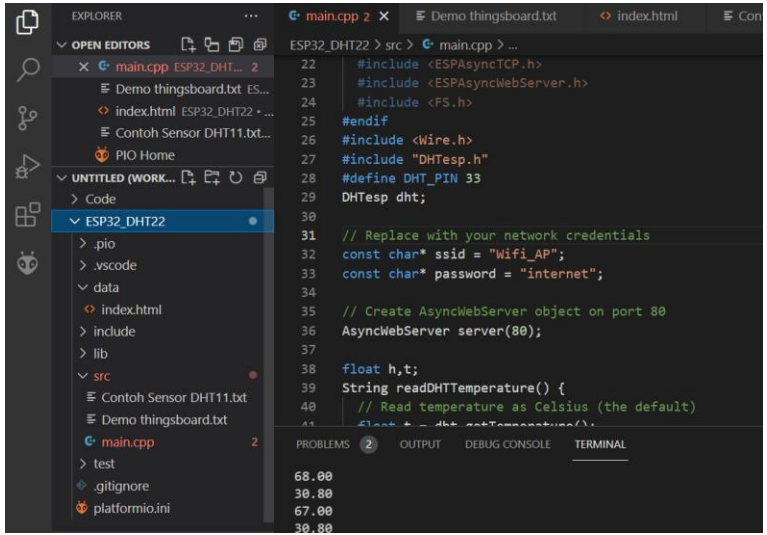


INSTALL LIBRARY UNTUK SENSOR



Webserver ESP32 dengan berbagai sensor

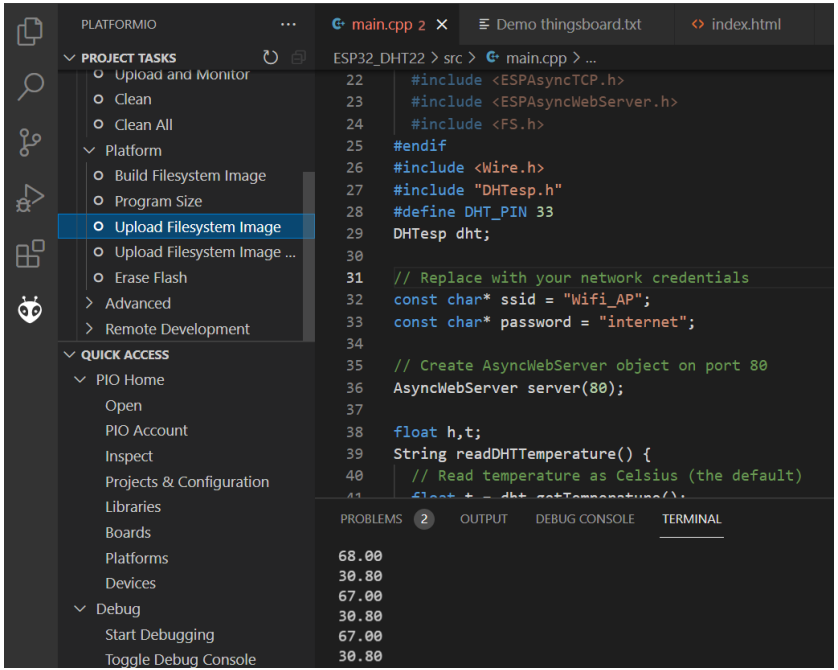
WEBSERVER ESP32 DENGAN BERBAGAI SENSOR



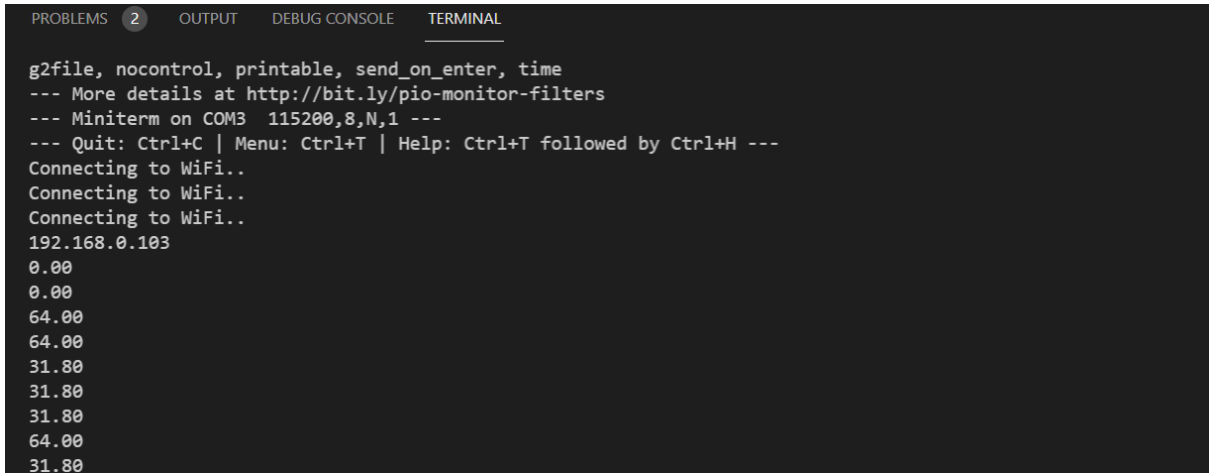
Download https://github.com/hasbiestheim/FGD-Tel-U-2021

Download program contoh dengan SPIFFS atau webserver dengan kode web disimpan ke dalam filesystem

Upload filesystem image (folder data)



UPLOAD DAN JALANKAN SERIAL MONITOR



MULTISENSOR ESP32 WEBSERVER

Install library

ottowinter/ESPAsyncWebServer-esphome@^2.0.1

bblanchon/ArduinoJson@^6.18.5

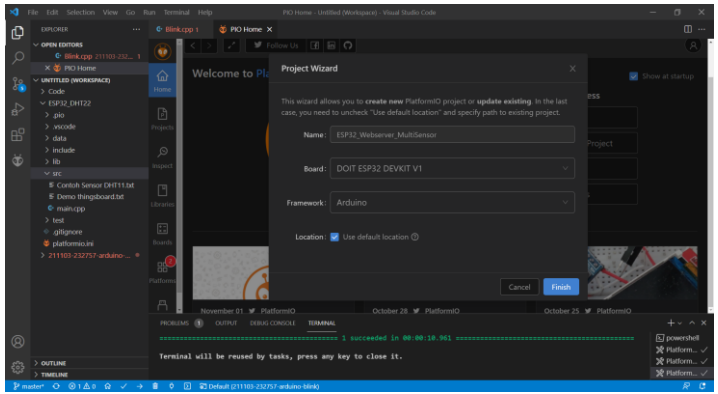
beegee-tokyo/DHT sensor library for ESPx@^1.18

adafruit/Adafruit Unified Sensor@^1.1.4

adafruit/Adafruit BMP280 Library@^2.4.2

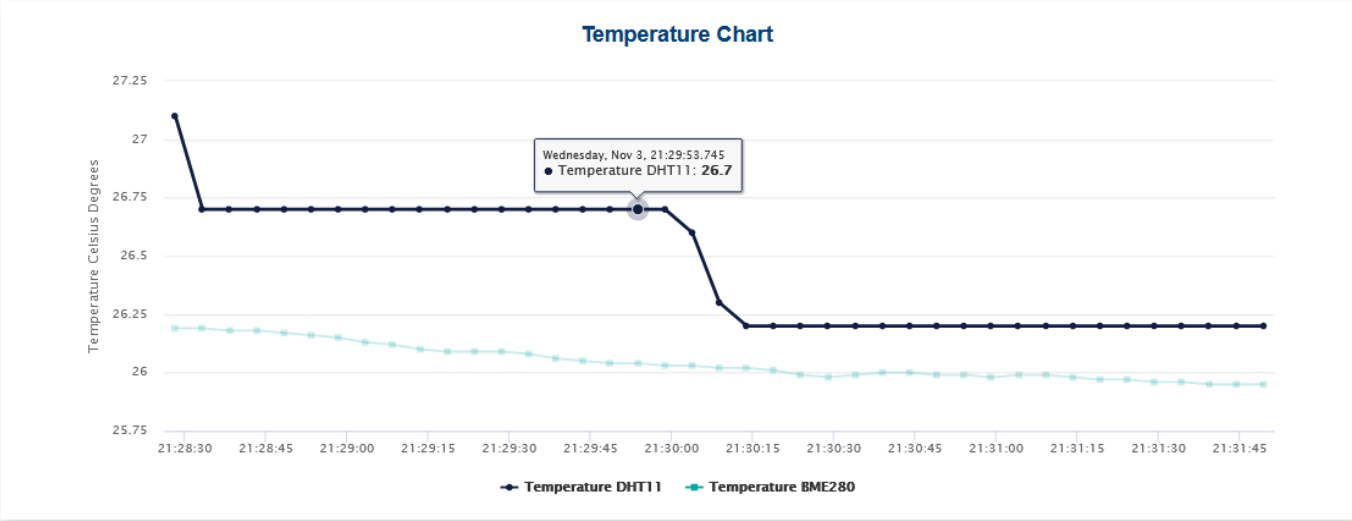
MULTISENSOR

Program dengan 4 buat sensor yang telah di coba satu persatu menjadi sebuat webserver yang lebih interaktif
Gunakan example kode https://github.com/hasbiestheim/FGD-Tel-U-2021/tree/main/Code/Modul%202 ESP32_Webserver MultiSensor



192.168.0.103

ESP WEB SERVER MULTISENSOR CHARTS



Install library untuk thingsboard

LIBRARY

Install library thingsboard dan library-library pendukung lain

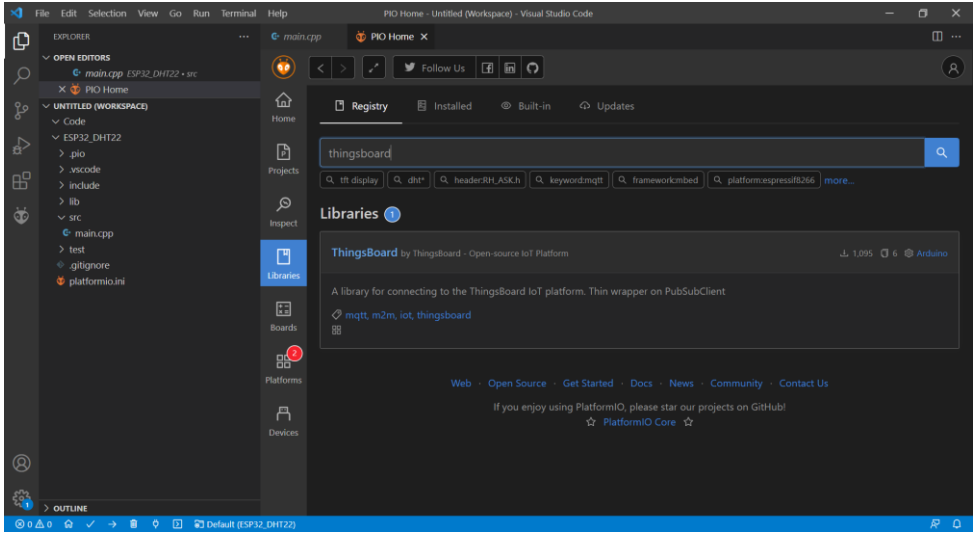
pubsubclient,

ArduinoHttpClient

ArduinoJson,

ESPAsyncWebServer-esphome

Library sensor



4. Raspberry pi

Raspberry pi

Raspberry Pi Boards

Raspberry Pi Zero

Raspberry Pi 4 Model B

Raspberry Pi 3 Model A+

Raspberry Pi 3 Model B+

Raspberry Pi 3 Model B

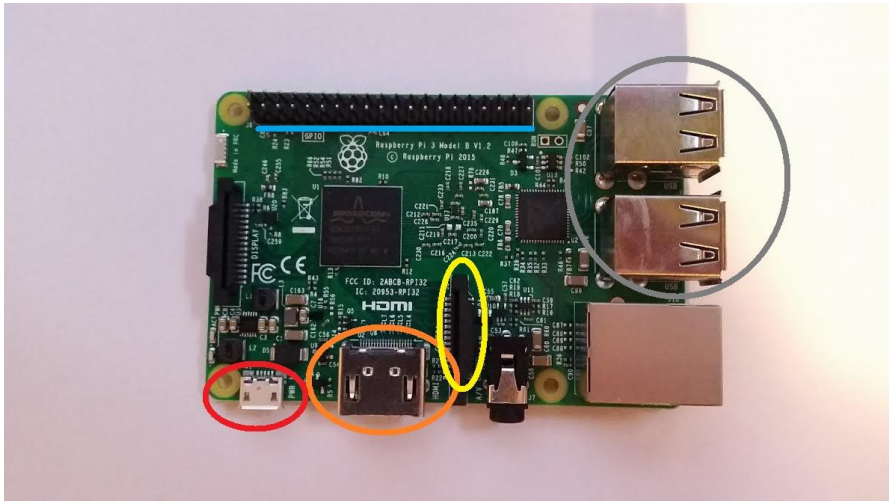
Raspberry Pi 2 Model B

Raspberry Pi 1 Model B+

Raspberry Pi 1 Model A+

Raspberry Pi Zero W

Raspberry pi 3

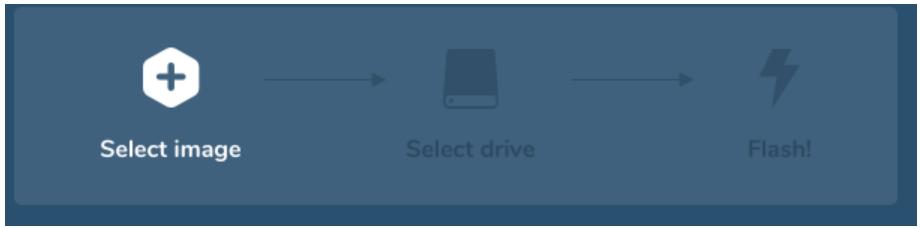


4x USB
Power micro usb
HDMI display
Camera interface
Ethernet
GPIO

Mico sd

Install sdcard

- Download image
- Connect sdcard
- Find Raspberry pi *.img
- Flash



Setting headless Rpi

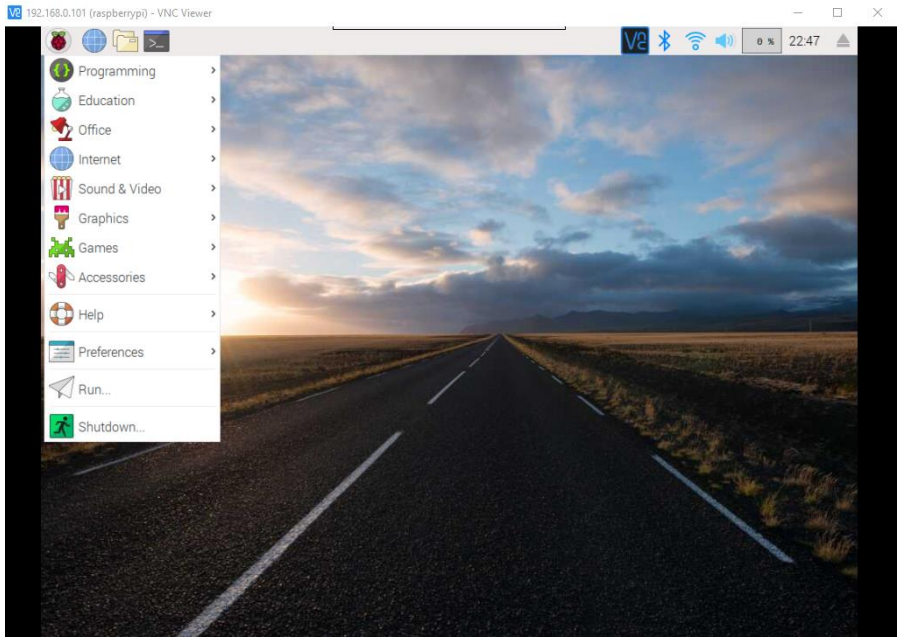
```
ctrl_interface=DIR=/var/run/wpa_supplicant GROUP=netdev
update_config=1

network={
        ssid="YOUR_SSID"
        psk="YOUR_PASSWORD"
}
```

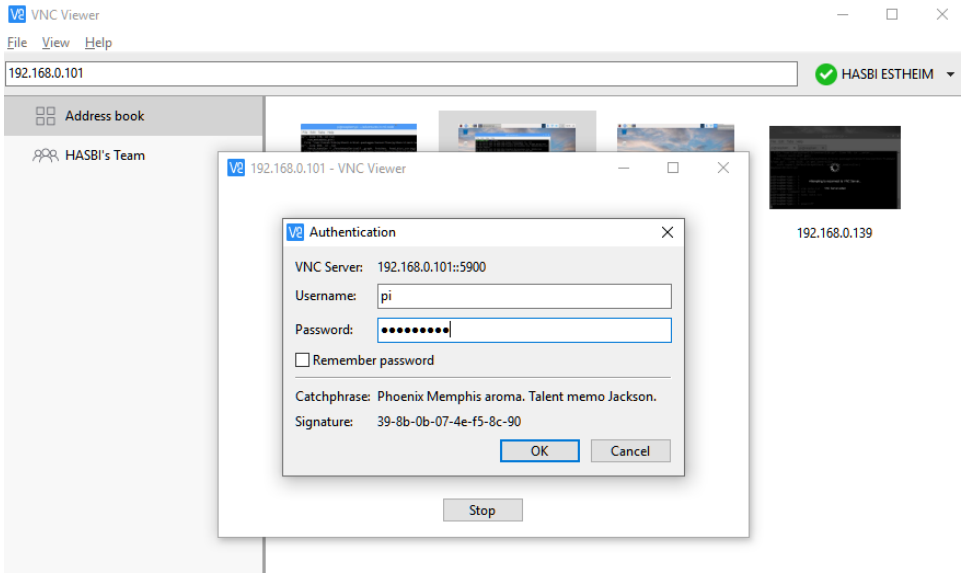
- Set Open and edit wpa_supplicant.conf
- Scan ip
- Ssh using putty

```
C:\Users\estheim>nmap -PN 192.168.0.1/24

Starting Nmap 7.60 ( https://nmap.org ) at 2019-08-04 22:36 SE Asia Standard Time
Nmap scan report for 192.168.0.101
Host is up (0.013s latency).
Not shown: 998 closed ports
PORT     STATE SERVICE
22/tcp   open  ssh
5900/tcp open  vnc
MAC Address: B8:27:EB:34:DB:6F (Raspberry Pi Foundation)
```

```
estheim@Machina:~$ ssh pi@192.168.0.101
pi@192.168.0.101's password:
Linux raspberrypi 4.14.79-v7+ #1159 SMP Sun Nov 4 17:50:20 GMT 2018 armv71

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Sun Aug  4 22:40:41 2019 from 192.168.0.100
pi@raspberrypi:~ $ lsb_release -a
No LSB modules are available.
Distributor ID: Raspbian
Description:    Raspbian GNU/Linux 9.4 (stretch)
Release:        9.4
Codename:       stretch
pi@raspberrypi:~ $
```

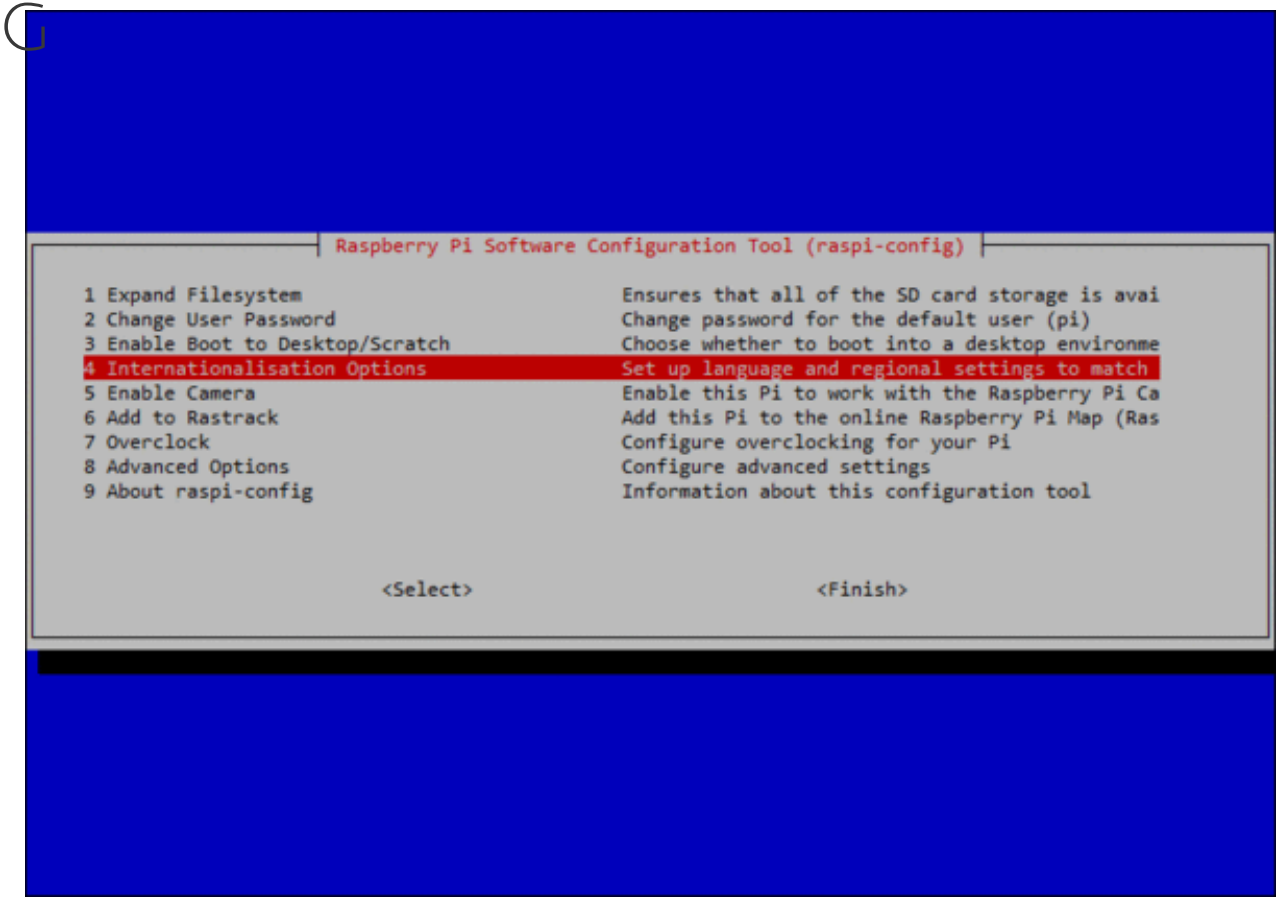
Remote desktop VNC





Raspi-config

- Sudo raspi-config



THINGSBOARD DASHBOARD

ThingsBoard is an open-source server-side platform yang memungkinkan untuk monitor dan control perangkat IoT. Gratis untuk digunakan secara personal dan commercial dan dapat digunakan dimana saja

Install Thingsboard raspberry Pi

https://thingsboard.io/docs/user-guide/install/rpi/

THANKS

Do you have any question?

hasbiida@gmail.com