Python for IoT

By Aldion Amirrul

github.com/aldamr01

linkedin.com/in/aldionamirrul

surabaya.py

Our Agenda

1. Introduction : Python programming Language
2. About Internet of Things
3. Python for Internet of Things
4. QnA Session

Introduction : Python Programming Language


It's rewind time

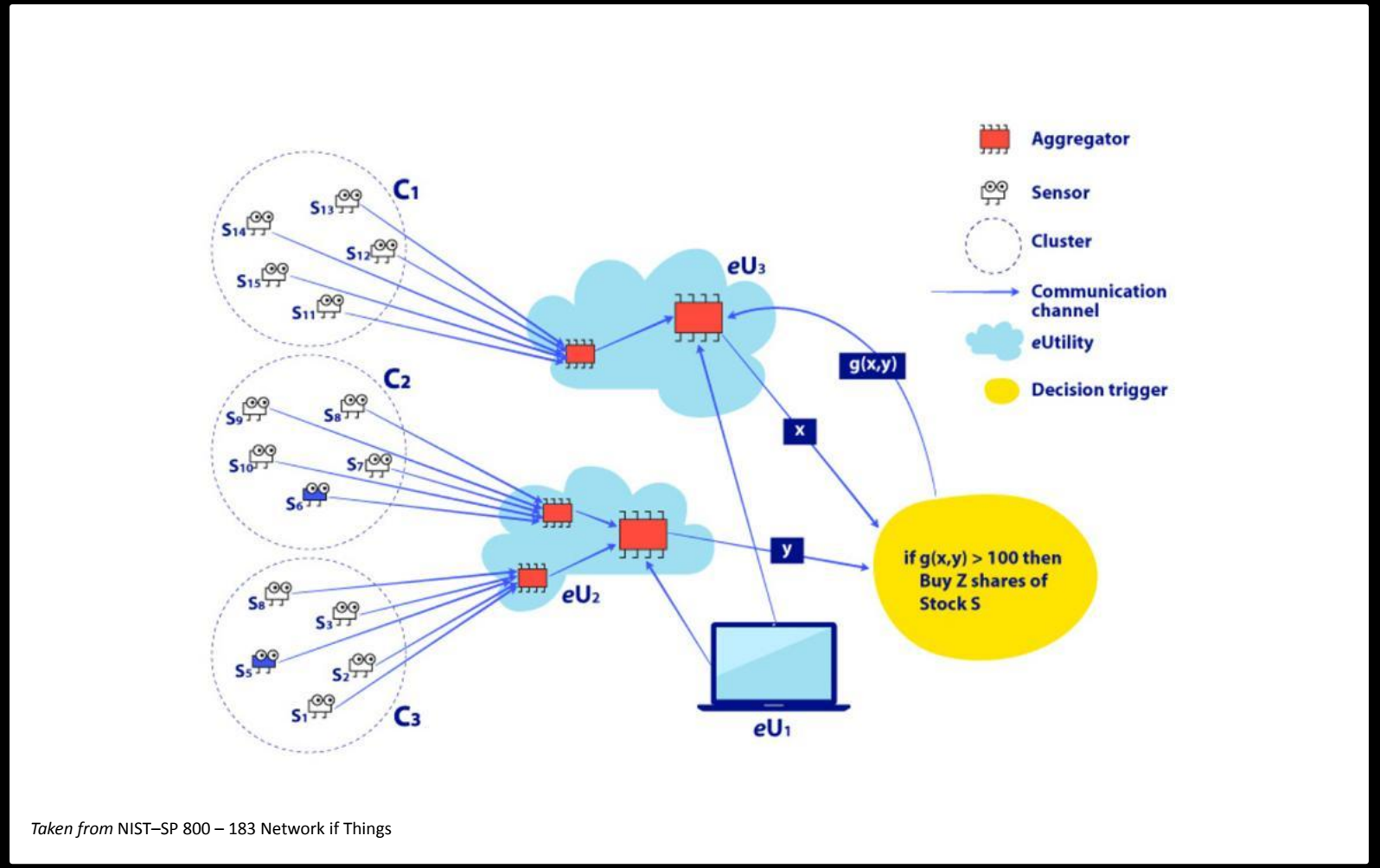
All was explained at the previous session

About Internet of Things

Internet of Things ?

The Internet of Things (IoT) describes the network of physical objects “things” that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet.

Source : Oracle

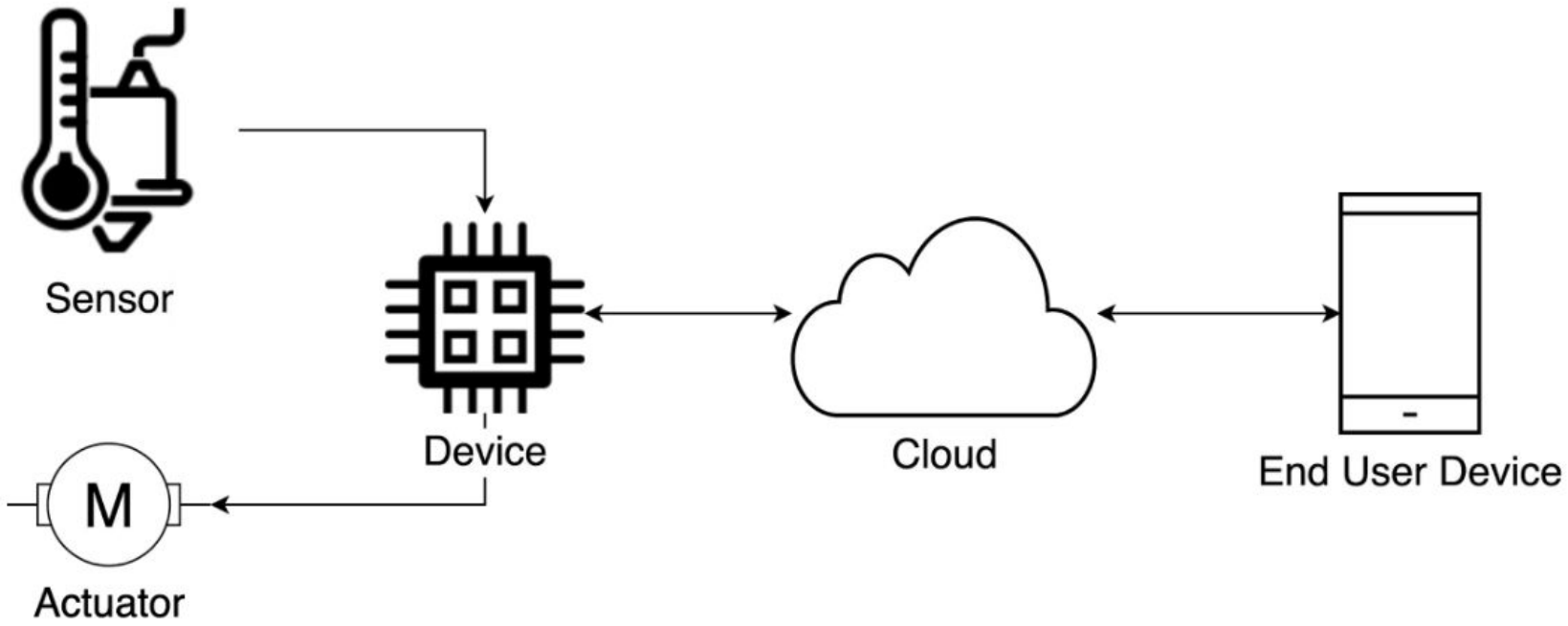


Taken from NIST–SP 800 – 183 Network if Things

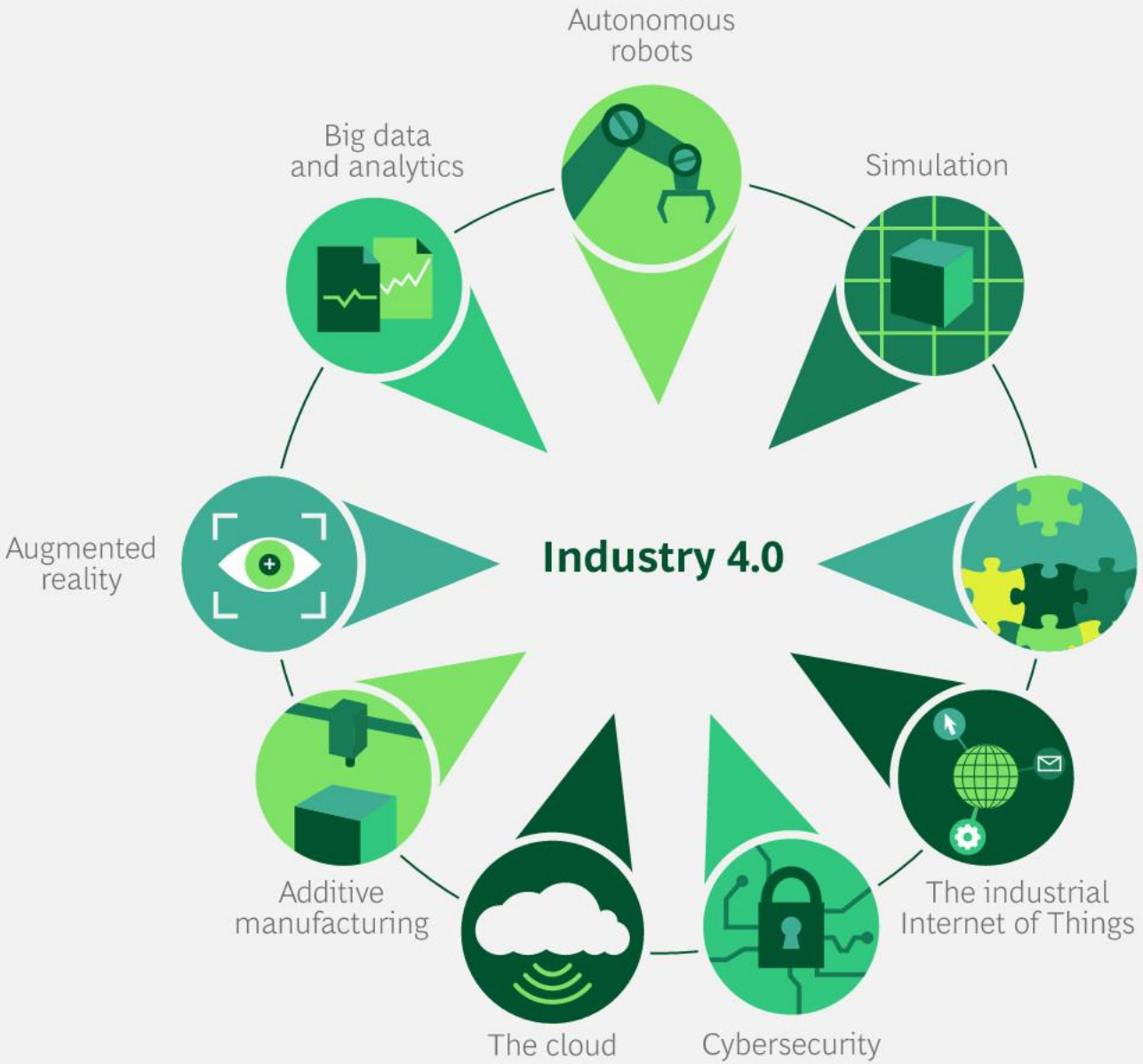
INTERNET OF THINGS

Yes it is

IoT at Glance - It’s all about digitalization



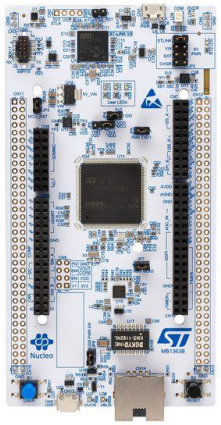
Taken from Tegar Imansyah slides.

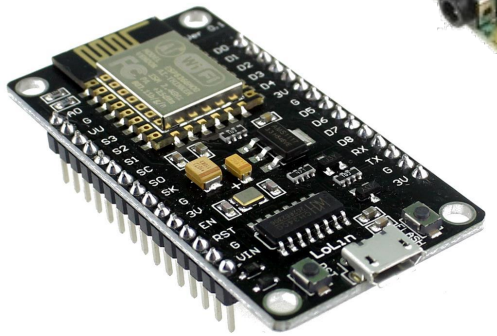


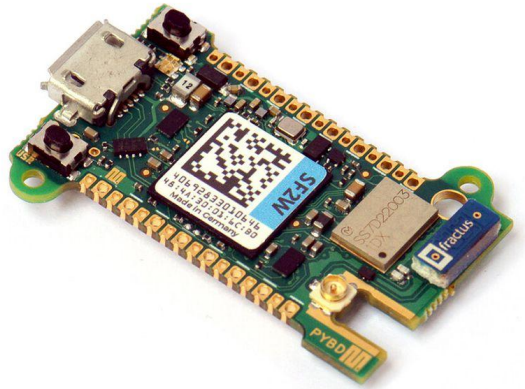
Nine Technologies Are Transforming Industrial Production

Source: BCG analysis.

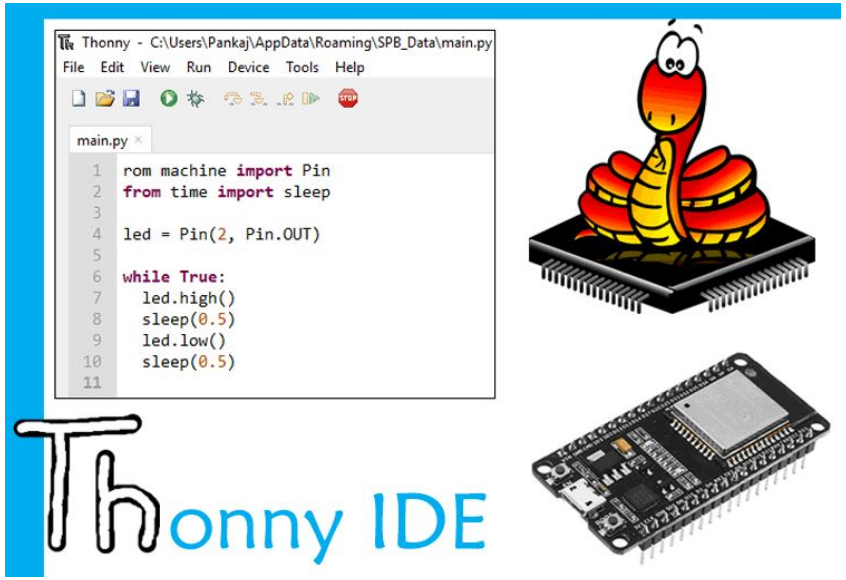
IoT Device development boards







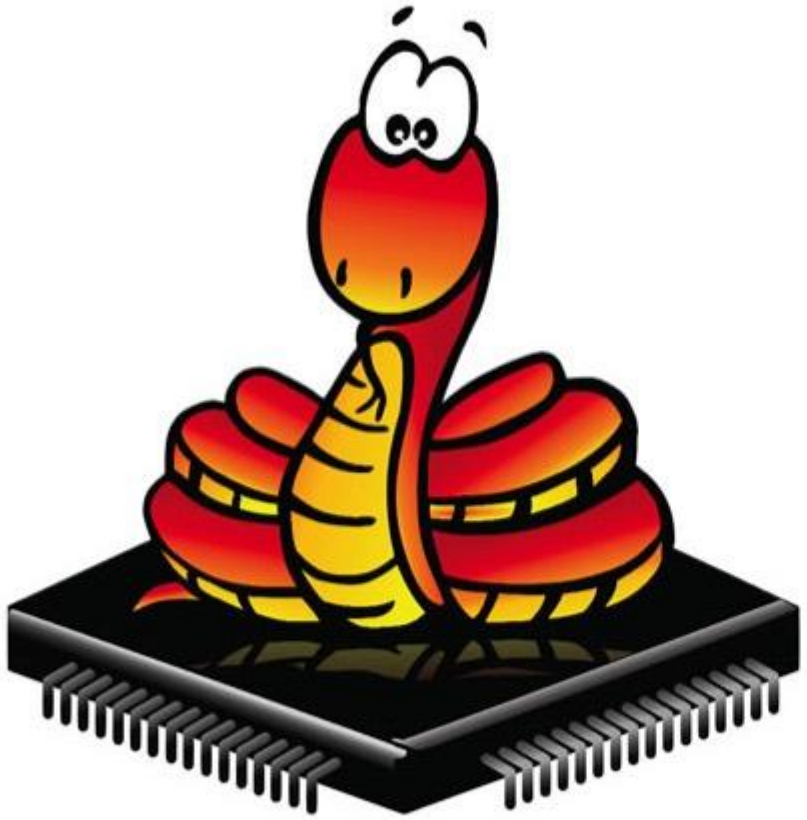
IoT Development IDEs



IoT Use Cases

Python for IoT

Introduction of Micropython



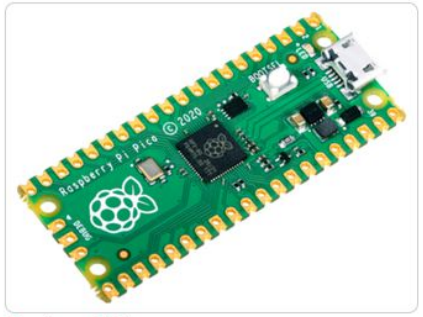
MicroPython is a lean and efficient implementation of the Python 3 programming language that includes a small subset of the Python standard library and is optimised to run on microcontrollers and in constrained environments.

Micropython

PROS (+)	CONS (-)
Human-Readable Language	**Slow than C / C++**
Built-In Exception- and Error-Handling	**Not all boards compatible with Micropython**
Open Source and Free	**Little bit Ruwet**
Object Oriented Language	
Abstracts Out the Hardware Layer	

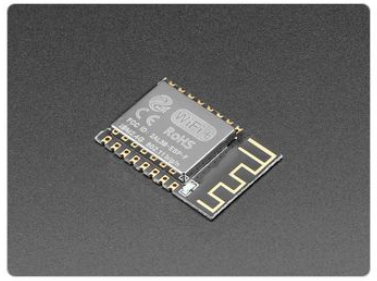
Micropython Supported Boards

Raspberry Pi RP2040 microcontroller boards



Raspberry Pi Pico

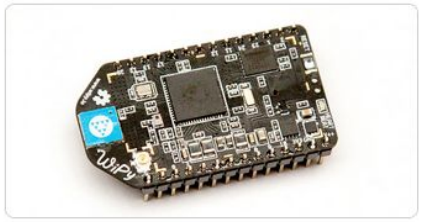
Espressif ESP-based boards



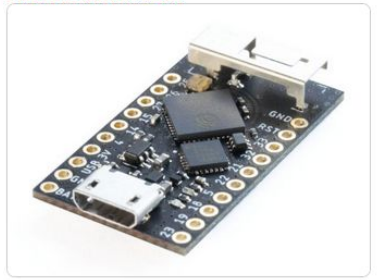
Generic ESP8266 module

Generic ESP3

TI CC3200 boards



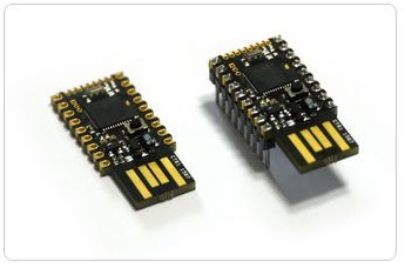
WiPy module



TinyPICO

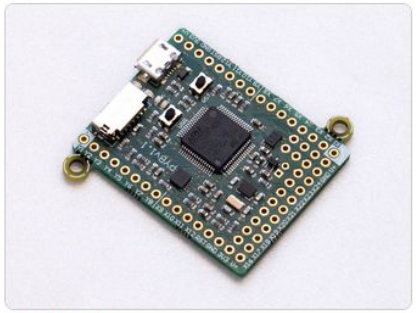
STM32 boards

STM32 Nucleo and Discovery boards



Espruino Pico

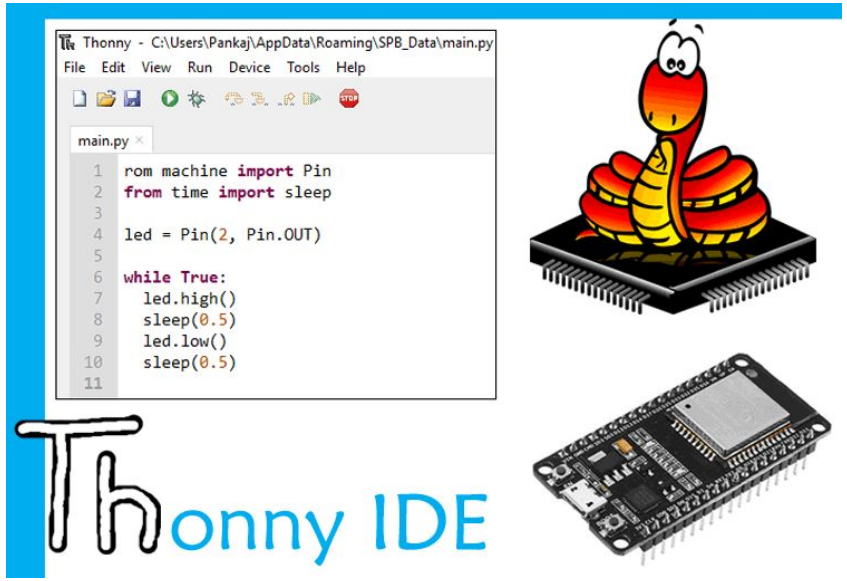
Pyboard v1 and D-series



pyboard v1

pyboard D-series

Suggested IDEs



UPyCraft

Let’s Try

Requirements

1. Install Python3.

   (https://www.python.org/downloads/)
2. Install python3 esptool.

   (https://github.com/espressif/esptool)
3. Install Thonny.

   (https://thonny.org/)
4. Install driver CH340 / CP210 drivers.
5. Download your board firmware.

   (https://micropython.org/download/)

Installing Board's Firmware

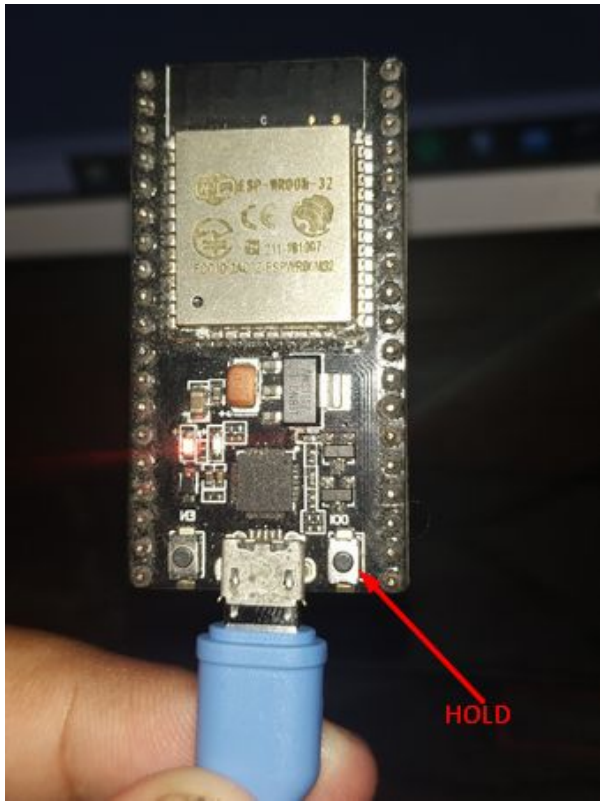
1. Check your device port address :

Installing Board’s Firmware

2. Erase device flash memory :

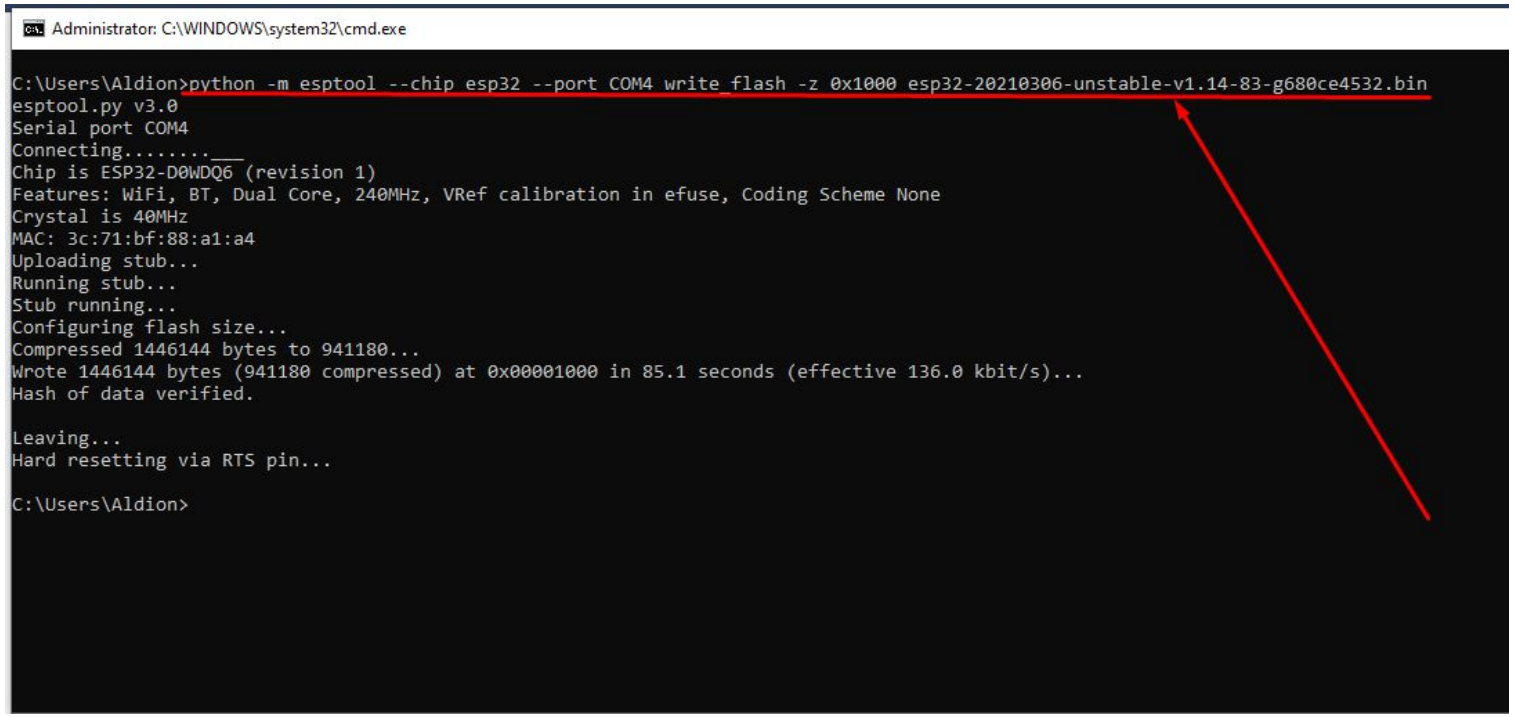
```
Administrator: C:\WINDOWS\system32\cmd.exe

C:\Users\Aldion>python -m esptool --chip esp32 --port COM4 erase_flash
esptool.py v3.0
Serial port COM4
Connecting.....____.....____.....____.....____.....__
Chip is ESP32-D0WDQ6 (revision 1)
Features: WiFi, BT, Dual Core, 240MHz, VRef calibration in efuse, Coding Scheme None
Crystal is 40MHz
MAC: 3c:71:bf:88:a1:a4
Uploading stub...
Running stub...
Stub running...
Erasing flash (this may take a while)...
Chip erase completed successfully in 7.9s
Hard resetting via RTS pin...

C:\Users\Aldion>_
```

+



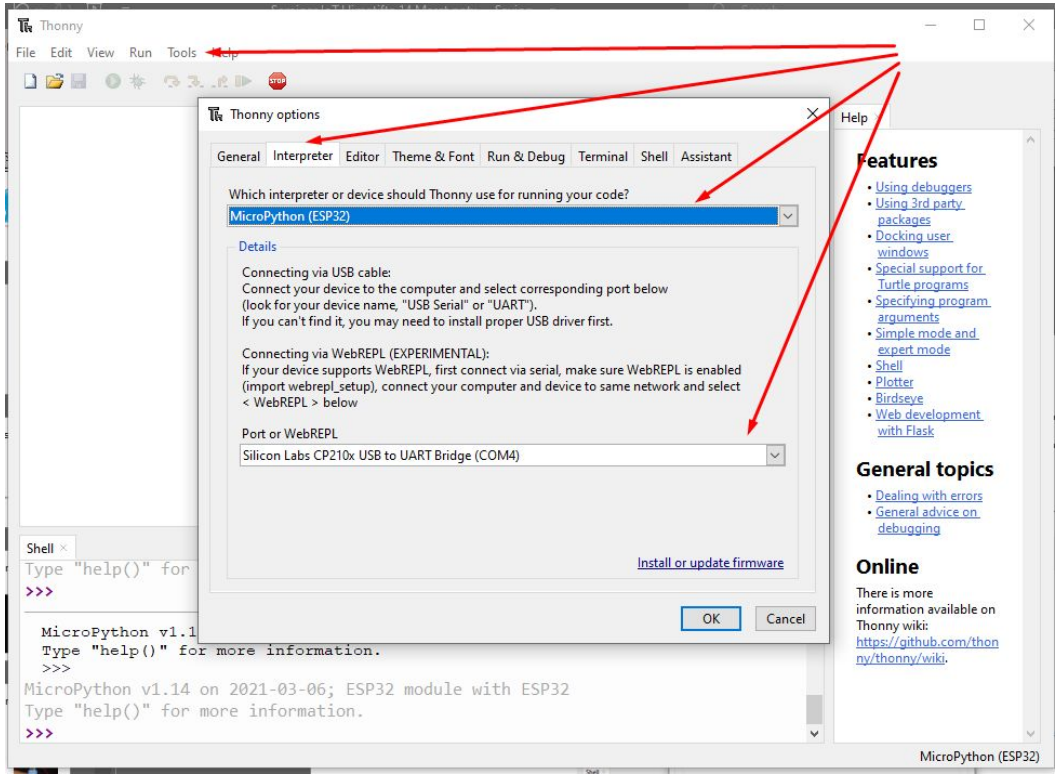
Installing Board’s Firmware

3. Install device’s firmware :



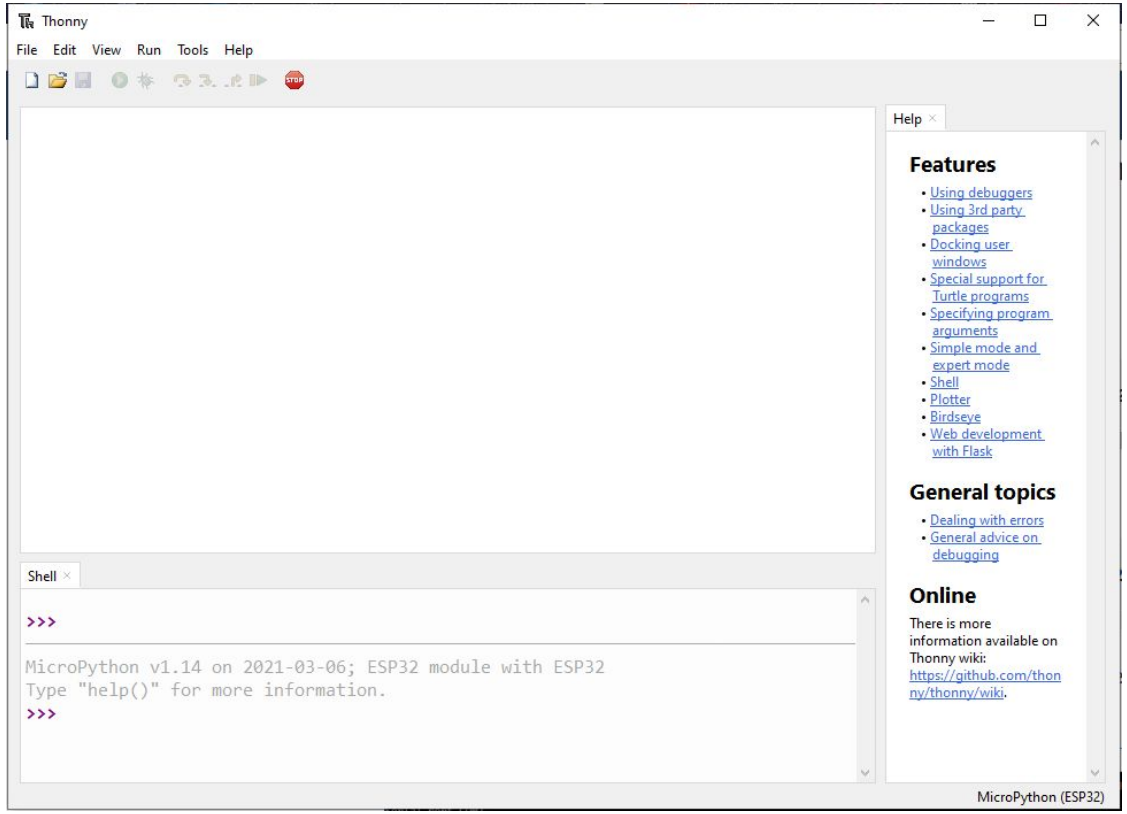
Code ESP32 with python

1. Open Thonny and set the configuration for ESP32 Device :



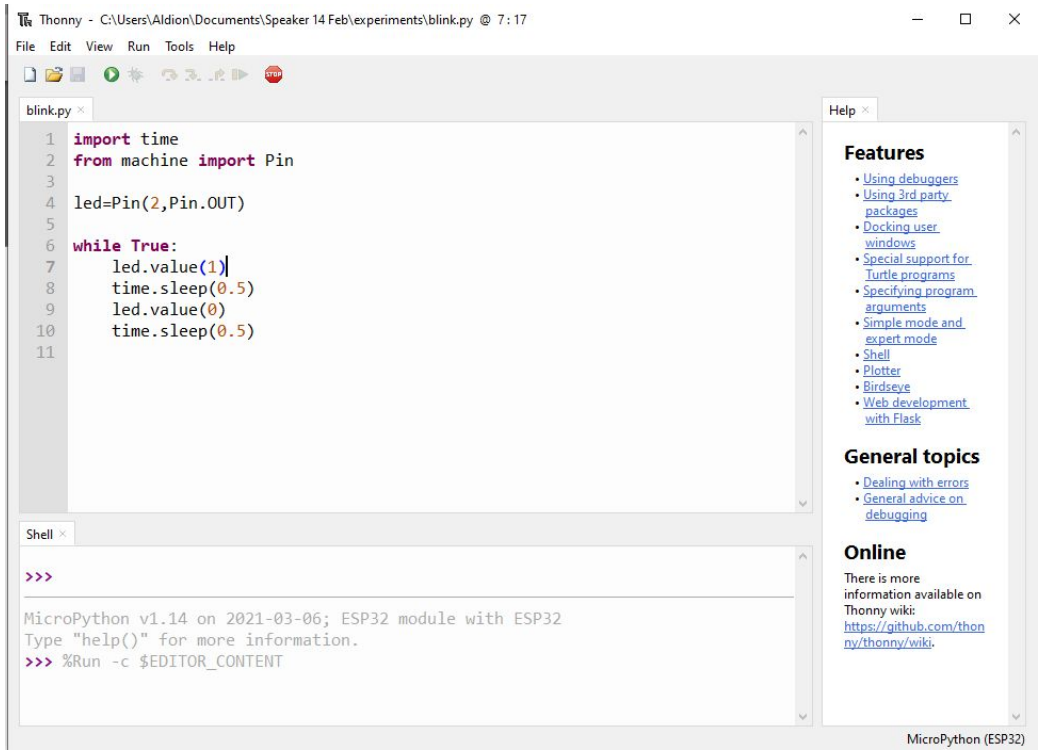
Code ESP32 with python

2. Here is your development environment :

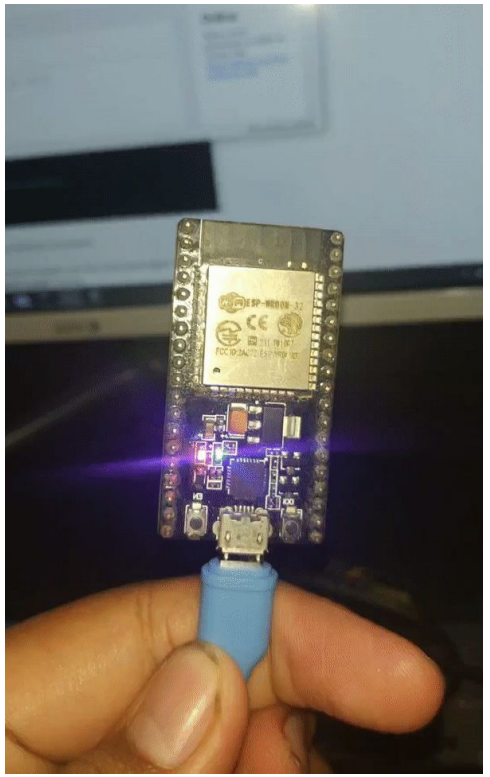


Code ESP32 with python

3. Try make Blinking LED program and Run it :

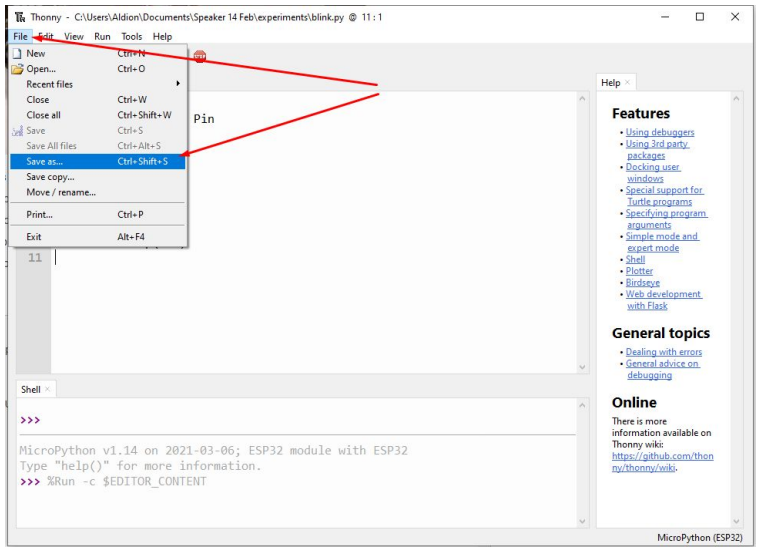


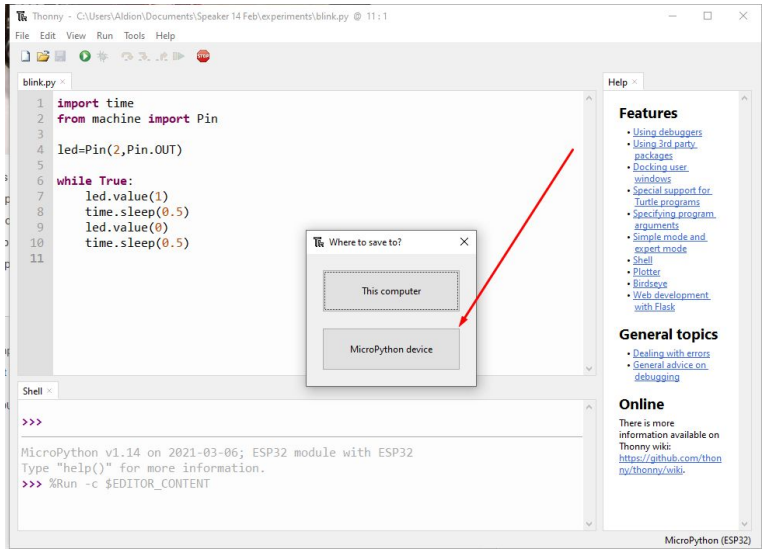
->

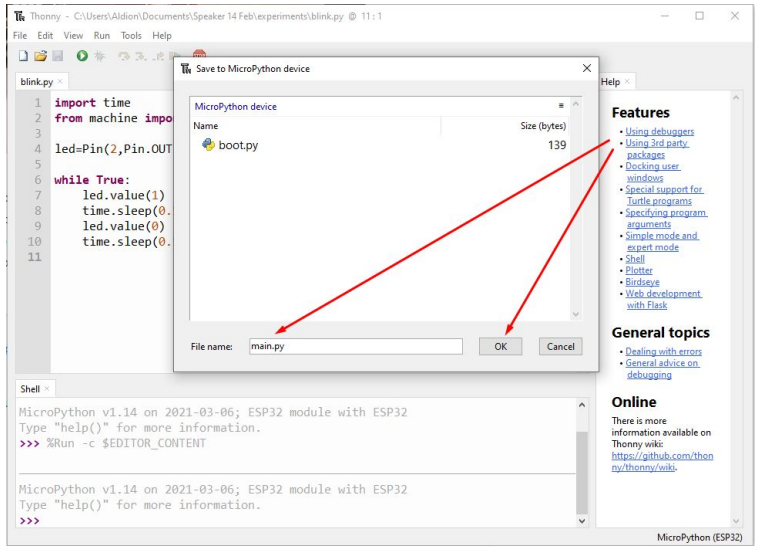


Code ESP32 with python

3b. Try make Blinking LED program and upload it :

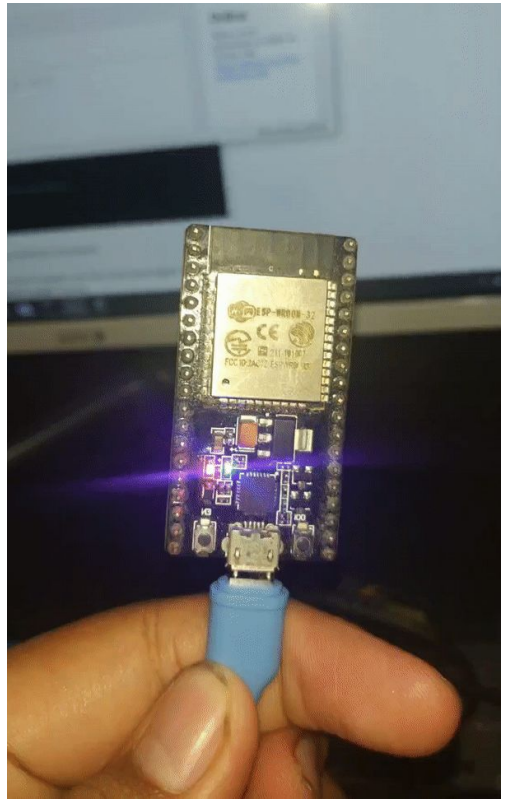






Code ESP32 with python

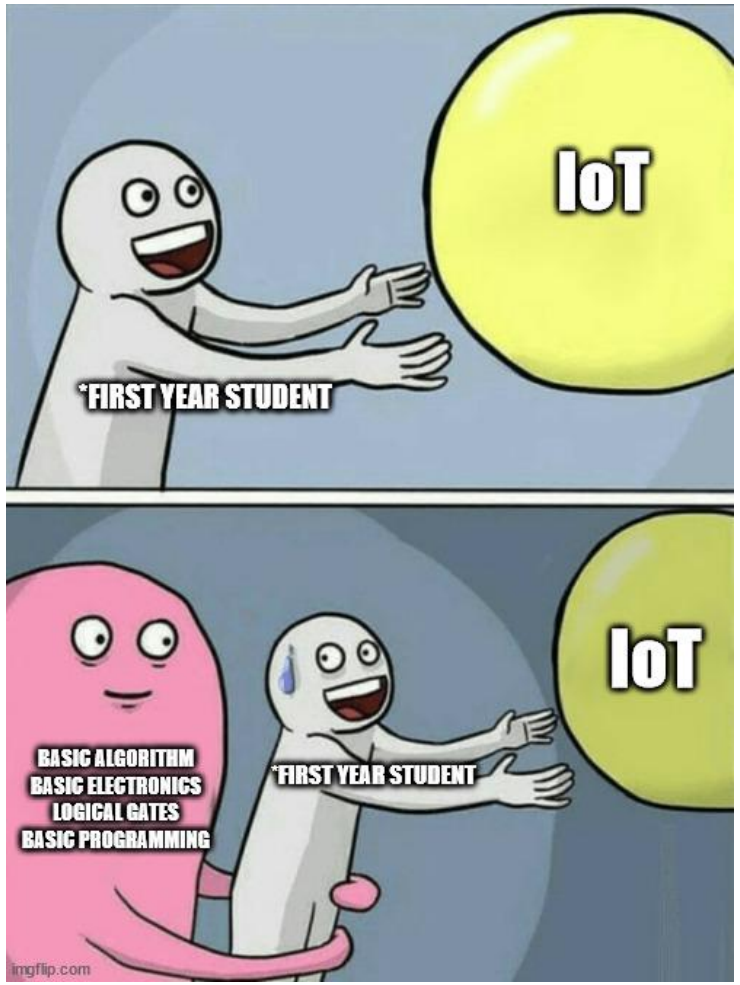
4. And this is it !



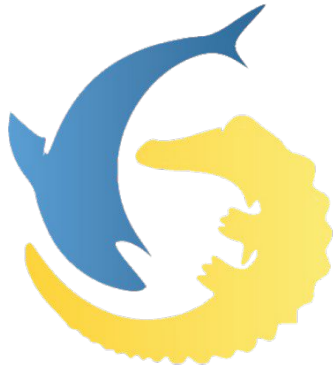
Interesting right ?

Yep, come, let's try it !

But don't forget to learn the basics first !



Let’s Discuss



surabaya.py

Telegram Group : https://t.me/surabayadotpy

You also can find me in group with mention @Squidward_Tenpoles

Big Thanks !

References

https://www.oracle.com/internet-of-things/what-is-iot/
https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-183.pdf
https://lucidworks.com/post/how-are-iot-and-industry-4-related/
https://www.slideshare.net/tegarimansyah/lessons-learned-for-internet-of-things-for-students
https://lucidworks.com/post/how-are-iot-and-industry-4-related/
https://micropython.org/
https://github.com/espressif/esptool
https://forum.micropython.org/viewtopic.php?t=7140
https://randomnerdtutorials.com/getting-started-thonny-micropython-python-ide-esp32-esp8266/