

# stm32\_linux\_tutorials

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Some good STM32 & Linux examples with really useful documentations for beginners of Embedded Software developers. In this repository, you can learn these stuff step-by-step by really useful and simple examples:

## Programming Languages

- \* C
- \* C++ (basics)
- \* Python
- \* Linux Bash Script

## Concepts

- \* RTOS
- \* Linux
- \* Networks (TCP/UDP)
- \* POSIX

## Tools

- \* Platformio
- \* STM32CubeMX
- \* Docker
- \* CMake
- \* Makefile
- \* git
- \* vscode
  - vscode extensions:
    - \* C++
    - \* platformio
    - \* markdown
    - \* cmake
    - \* python
    - \* docker
    - \* git graph

## Hardware Requirements

- \* STM32 Nucleo board (you can select every type)
- \* Raspberry pi (3 or 4)

- \* A computer with at least 16GB RAM and 250GB free storage

## Hardware Protocols

- \* GPIO
- \* UART
- \* SPI
- \* CAN
- \* ETHERNET

## Roadmap

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To accomplish our goal, we will proceed with these tutorials. In each tutorial there will be one or more examples:

- [tutorial00-git-01] **Very short introduction to git**
- [tutorial01-stm32-pio-01] **Writing to GPIO (Blink a LED with STM32)**
  - [tutorial01-stm32-pio-01-01] **Without using FreeRTOS**
  - [tutorial01-stm32-pio-01-02] **With using FreeRTOS**
- [tutorial02-stm32-pio-02] **Read from GPIO (Read a push button)**
- [tutorial03-stm32-pio-03] **External interrupts**
- [tutorial04-stm32-pio-04] **Very Short introduction to Linux**
- [tutorial05-stm32-pio-05] **Very short introduction to docker**
- [tutorial06-stm32-pio-06] **Transmitting message through UART**
  - [tutorial06-stm32-pio-06-01] **Receiving message in computer via putty**
  - [tutorial06-stm32-pio-06-02] **Receiving message in computer via docker & linux command**
- [tutorial07-stm32-pio-07] **Receiving (in polling mode) & Transmitting message through UART**
  - [tutorial07-stm32-pio-07-01] **Sending & Receiving message in computer via putty**
  - [tutorial07-stm32-pio-07-02] **Sending & Receiving message in computer via docker & linux command**
  - [tutorial07-stm32-pio-07-03] **Sending & Receiving message in computer via docker & Python script**
  - [tutorial07-stm32-pio-07-02] **Sending & Receiving message in computer via docker & C code**
- [tutorial08-stm32-pio-08] **Receiving (in interrupt mode) & Transmitting message through UART**

- [tutorial08-stm32-pio-08-01] **Sending & Receiving message in computer via putty**
- [tutorial08-stm32-pio-08-02] **Sending & Receiving message in computer via docker & linux command**
- [tutorial08-stm32-pio-08-03] **Sending & Receiving message in computer via docker & python script**
- [tutorial08-stm32-pio-08-04] **Sending & Receiving message in computer via docker & C code**
- [tutorial09-linux-01] **Receiving & Transmitting message to virtual UART in linux via docker**
  - [tutorial09-linux-01-01] **using linux command**
  - [tutorial09-linux-01-01] **using Python + POSIX multithreading (different threads for TX & RX)**
  - [tutorial09-linux-01-02] **using C code + POSIX multithreading (different threads for TX & RX)**
  - [tutorial09-linux-01-02] **using C++ code + POSIX multithreading (different threads for TX & RX)**
- [tutorial10-stm32-pio-09] **Working with LED Display based on SPI protocol**
  - [tutorial10-stm32-pio-09-01] **Very short introduction to SPI (Full-duplex & Half-duplex)**
  - [tutorial10-stm32-pio-09-02] **Implementing SPI and performing self-testing (connecting MISO & MOSI together)**
  - [tutorial10-stm32-pio-09-03] **Implementing LED Display driver**
- [tutorial11-stm32-makefile-01] **Converting [tutorial01-stm32-pio-01] example to a makefile project**
- [tutorial12-stm32-cmake-01] **Converting [tutorial01-stm32-pio-01] example to a CMake project**
- [tutorial13-linux-02] **Transmitting & Receiving messages through TCP network**
  - [tutorial13-linux-02-01] **using python**
  - [tutorial13-linux-02-02] **using C code**
  - [tutorial13-linux-02-01] **using C++ code**