TWOWIN TW-T50103S User Guide

Smarter World, Better Life

图为信息科技(深圳)有限公司
TWOWIN INFORMATION TECHNOLOGY Co. Ltd

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Document Revision Catalog

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Version1.0

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V1.0	2024/12/16	Initial release

Preface

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Technical Support and Feedback

If you encounter issues while using our products or identify potential functional defects, please visit our official website at https://www.twowinit.com to contact customer service. For technical support guidance or feedback, please reach out via the website or phone:

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Safety Warnings and Precautions

- Safety Instructions

Before using this product, read this document carefully to understand its basic operation and comply with the safety instructions therein to ensure personal safety and avoid equipment damage. The manufacturer shall not be held liable for any issues related to equipment or personal property damage caused by improper operation.

- Personal Safety:

- Wear anti-static workwear and gloves/wrist straps before operating the device. Remove conductive items such as jewelry and watches to prevent electric shock or burns.
- In case of fire, evacuate the building/equipment area immediately, activate the fire alarm, or call the fire department. Under no circumstances should you re-enter a burning building.

- Equipment Safety:

- Securely fix the device to the floor or stable objects (e.g., walls or mounting racks) before operation.
- Do not block ventilation openings during system operation.
- Use tools to tighten screws when installing panels.
- Remove all packaging materials from the equipment area after installation.

- Supply Voltage

TW-T50103S edge computing platform input power supply is stable and reliable, power 25W
Power Range: 9-19 V DC
Current: 5A (MAX)

- Environmental Requirements

Woring Temperature: 0℃ -50℃
Ventilation Requirements: There must be good ventilation conditions around the installation of the computing platform

- Grounding Requirements

The power adapter's supply must be properly grounded. In special cases, use the grounding screw on the platform for grounding.

For grounded devices only:

- Ground the device before installation and remove the ground wire last during disassembly.
- Do not damage grounding conductors.
- Do not operate the device without a grounded conductor.

- Permanently connect the device to protective earth. Check electrical connections before operation to confirm reliable grounding.

- ESD Protection

Electronic components are sensitive to electrostatic discharge (ESD). While key interfaces on circuit boards are ESD-protected, not all components are fully shielded. Follow ESD safety measures when handling circuit boards:

- Store and transport boards in anti-static bags until deployment;
- Discharge body static (e.g., wear grounding wrist straps) before touching the device;
- Operate only in ESD-safe areas;
- Avoid moving the device on carpeted surfaces.

- Basic Installation Requirements

Only trained and authorized personnel may install, operate, or maintain the device.

- Only qualified and trained personnel are allowed to install, operate, or maintain the device.
- Only certified professionals may dismantle safety features or repair the device.
- Replacements or modifications (including software) must be performed by TwoWin-certified personne.
- Report any faults or errors that may compromise safety to the responsible person immediately

Introduction

TW-T50103S is a computing platform designed based on NVIDIA® JETSON Xavier Nx module, with built-in integrated Jetson Xavier Nx module and pre installed Ubuntu operating system. It has AI processing capability of 21 TOPS floating-point operations and is designed with ultra strong and lightweight aluminum alloy material. The shell passively dissipates heat, providing excellent heat dissipation capabilities. It has new appearance, rich IO interface types, and can be equipped with a built-in WIFI module to support wireless network connections. Reserved for sturdy installation brackets, it has the characteristics of strong computing power, high reliability, high integration, and low power consumption

TW-T50103S Overview of Edge Computing Platform

- Embedded NVIDIA® JETSON Xavier Nx
- Support M.2 KEY M (PCIEX4 NVME 2280)
- Supports multiple interfaces (such as CAN/US/Ethernet/serial/GPIO, etc.)
- Supports dual band WIFI 2.4G/5G
- Passive heat dissipation design
- Built in Ubuntu system and Jetpack SDKs
- Wide voltage 9-19V input

Product Specification

Processor and Core Module

Processor	NVIDIA Jetson Xavier NX 8GB	NVIDIA Jetson Xavier NX 16GB
AI	21 TOPS	
CPU	6-core NVIDIA Carmel Arm®v8.2 64-bit CPU 6MB L2 + 4MB L3	
CPU Max Frequency	1.9 GHz	
GPU	384-core NVIDIA Volta™ architecture GPU with 48 Tensor Cores	
GPU Max Frequency	1100 MHz	
Memory	8GB 128-bit LPDDR4x 59.7GB/s	16GB 128-bit LPDDR4x 59.7GB/s
Storage	16GB eMMC5.1 1x M.2 Key M NVMe 2280	

Interface Introduction

	Interface	Quantity	Note
Network	Ethernet	1	1*RJ45 Gigabit Independent Network Port
	WIFI	1	2.4G/5.8G Optional installation
Video output	HDMI	1	HDMI 2.0 Compatible with 1.4 (output only)
USB	USB	4	USB 3.0 TYPE-A 5V@1A
	Micro-USB	1	USB2.0 Micro Brush machine use interface
40Pin	GPIO,2xI2C,2xSPI,UART,I2S	/	/usr/share/doc/jetson-gpio-common/samples Official Routine
	5V	2	5V output
	3.3 V	2	3.3V output
12Pin	Power,reset,recovery,UART console	/	The CAN pin defaults to no CAN transceiver,It needs to be accessed and used by oneself
User Expansion	M.2	1	PCIE NVME 2280 SSD

Encoding and Decoding

Video Encode	2x 4K60 (H.265) 4x 4K30 (H.265) 10x 1080p60 (H.265) 22x 1080p30 (H.265)
Video Decode	2x 8K30 (H.265) 6x 4K60 (H.265) 12x 4K30 (H.265) 22x 1080p60 (H.265) 44x 1080p30 (H.265)

Power Supply

Power Supply	Spec
Input Type	1xDC
Input Voltage	Wide input 9-19v
Typical consumption	25W

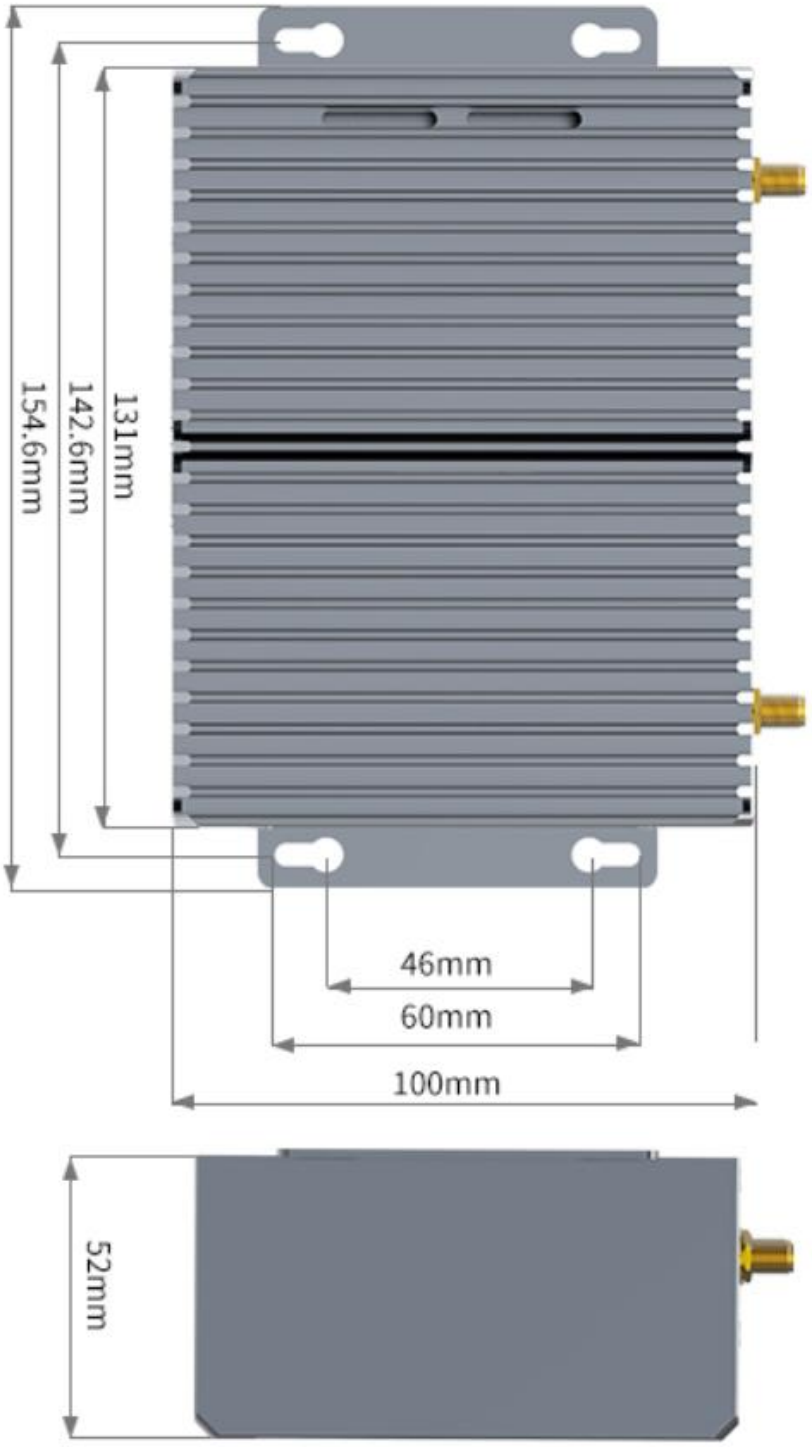
Structure

Mechanical	Spec
Dimensions (W×D×H)	142.6mm×100mm ×52mm

Environment

Environmental	Spec
Operating Temperature	0℃-50℃

Size



Service & Support

Technical Support

If you encounter issues or believe your product has defects, please visit our official website to explore the FAQs section for solutions. You may also contact us via phone or WeChat, and we will promptly arrange assistance to resolve your concerns.

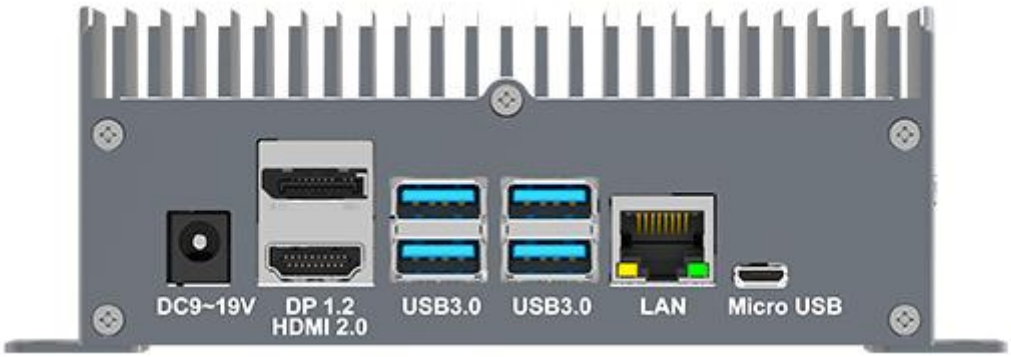
Warranty

Warranty Period: One (1) year from the date of purchase.

Warranty Terms: For products under warranty, free repairs will be provided for non-human-caused malfunctions. Contact us through the purchase platform's customer service or by phone to initiate warranty assistance (Refer to TwoWin Information Technology (Shenzhen) Co., Ltd. Warranty Terms for details).

Interface Description

Front Interface



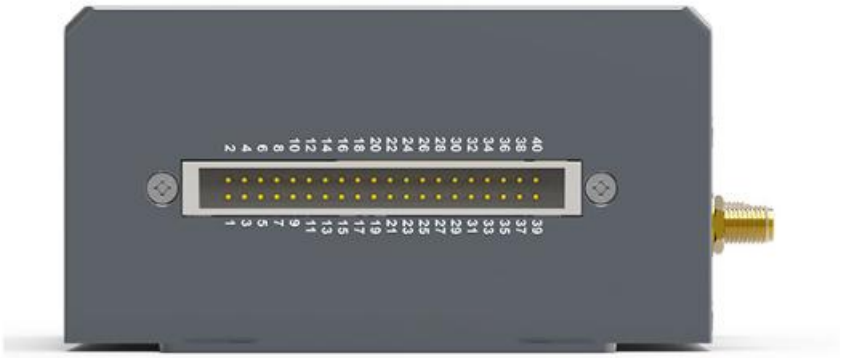
Front interface schematic picture

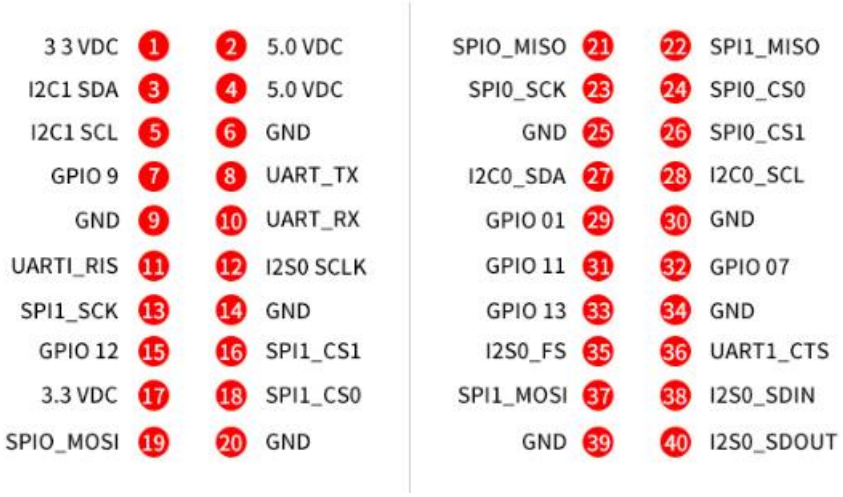
Interface Name	Quantity	Description
DC	1	DC power supply port supports wide voltage input of 9-19V
HDMI	1	HDMI 2.0 video output port (not available as input)
USB	4	5V-1A USB 3.0 (connected from internal core to 1 HUB chip, with 4 USB3.0 ports leading out, sharing 5G bandwidth) 5V-1A
LAN	1	RJ45 Gigabit Ethernet port (normal status: orange constantly on, green flashing)
MICRO USB	1	The USB 2.0 interface has the functions of external power supply and data transmission, with the most important function being the USB brush port IP：192.168.55.1

WiFi antenna connection picture

Side Interface

40 PIN Show Picture





PIN/BOARD NUM	BCM NUM	GPIO NUM	GPIO NAME	PIN/BOARD NUM	BCM NUM	GPIO NUM	GPIO NAME
7	4	436	PS.04	11	17	428	PR.04
12	18	445	PT.05	13	27	480	PY.00
15	22	433	PCC.04	16	23	484	PY.04
18	24	483	PY.03	19	10	493	PZ.05
21	9	492	PZ.04	22	25	482	PY.01
23	11	491	PZ.03	24	8	494	PZ.06
26	7	495	PZ.07	29	5	421	PQ.05
31	6	422	PQ.06	32	12	424	PR.00
33	13	393	PN.01	35	19	448	PU.00
36	16	429	PR.05	37	26	482	PY.02
38	20	447	PT.07	40	21	446	PT.06

Note:

❶ The 8&10 pins are the only UART (TTL signal) serial ports that can be used for data transmission on this device, with the serial device number "/dev/ttyTHS1"

❷ Most of the pins in the 40 PIN have multiplexing function, and their default state is GPIO. If you need to modify their default state, please refer to the following link for introduction:
https://docs.nvidia.com/jetson/archives/r36.3/DeveloperGuide/HR/ConfiguringTheJetsonExpansionHeaders.html

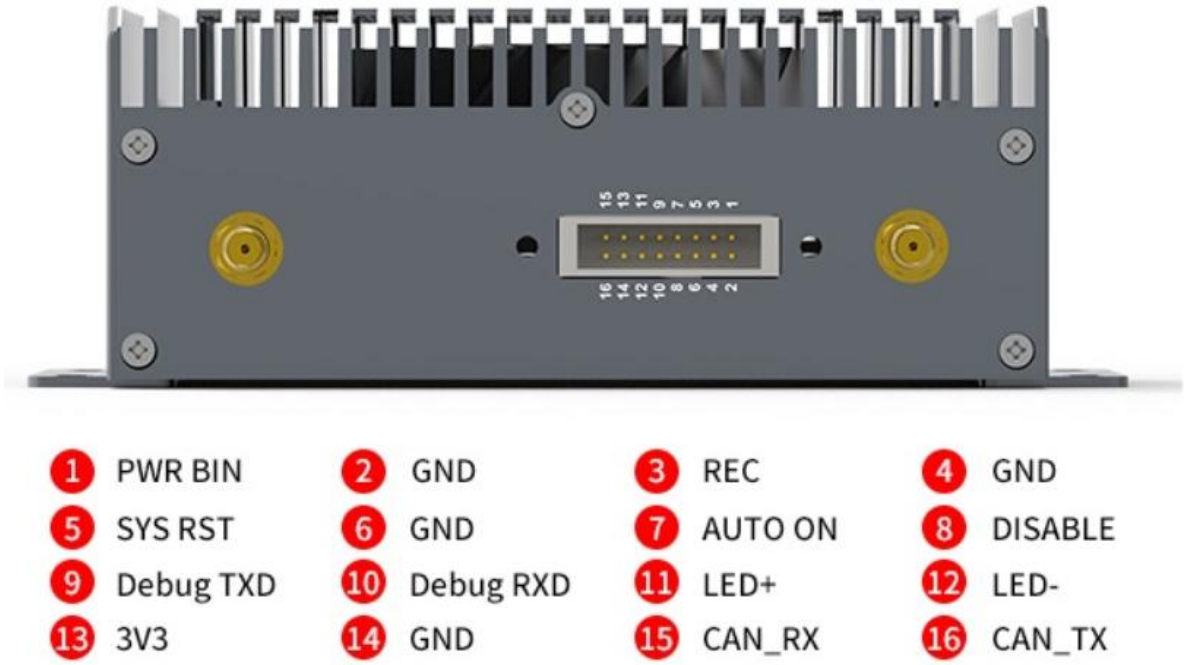
❸ GPIO Terminal Command Method Description: (The following () content is a note explanation)

#Enter root account:
sudo -s (Press enter and enter password "nvidia")
#Enter the GPIO number to be used into the/sys/class/gpio/export file (using pin 492 as an example).
echo 492（492 为 GPIO NUM） > /sys/class/gpio/export
#Enter the corresponding GPIO file
cd /sys/class/gpio/PAC.06 (PAC.06 为 GPIO NAME)
#Granting execution authority
chmod 777 value
#Granting execution authority
chmod 777 direction
#Set as input state
echo in > direction
#Set as output state
echo out > direction
#Set to output high level
echo 1 > value
#Set to output low level
echo 0 > value

❹ Application examples

Example of using Python to call GPIO:
/usr/share/doc/jetson-gpio-commmon/samples (native path)
Example of using C++to call GPIO:
https://github.com/pjueon/JetsonGPIO/tree/master (Example of github)

Back Interface



.

1	PWR BTN	Matched with DIS AUTO ON to achieve power on/off control
2	GND	
3	FC REC	Matched with GND to enter brush machine mode
4	GND	
5	SYS RST	Restart
6	GND	
7	DIS AUTO ON	Short circuit can prevent power on and self start, and can be used with PWR BTN and GND to control power on and off
8	DIS AUTO ON	
9	ART TXD	debug interface
10	ART RXD	
11	LED +	LED positive pole
12	LED -	LED nagative pole
13	3.3V	3.3V output
14	GND	
15	CAN RX	CAN communication, without resistors or transceivers, if used, requires external connection by oneself
16	CAN TX	

Usage Introduction

System Introduction

The T50103S device uses the Ubuntu system

Default Username: nvidia Password: nvidia

sudo -s Our company has not set root username and password. If you need to enter the root user, please execute the following command: sudo -s

Enter password: nvidia

Switch on and off

Power supply: Connect the device to the DC interface for power supply, and start the device when turned on

Switch on: The default power on mode of TW-T50103S device is self starting when powered on. Insert the power supply and connect the monitor to the device via HDMI interface. The graphical desktop is shown in the figure below:

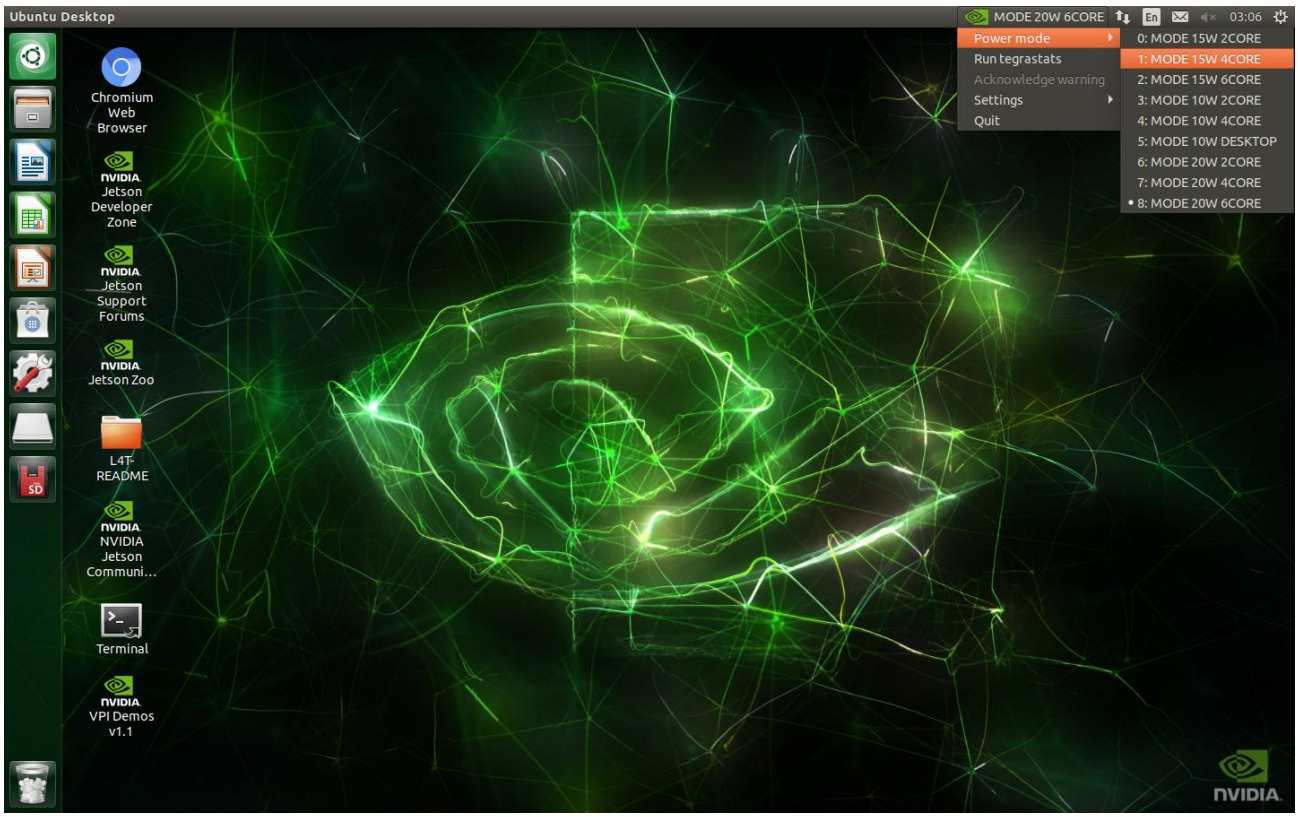
Shutdown: The system performs a shutdown internally.

Attention: Do not directly unplug the main power supply for shutdown operation, as this operation may cause damage to the disk.

Startup Desktop

Work Mode Switching

Different working modes, the use of cpu core and power is different, you can choose according to their own needs, click on the arrow to point to the option for mode selection.



Command switching

sudo nvpmodel -m 0

#Among them, 0 is optional

sudo jetson_clocks

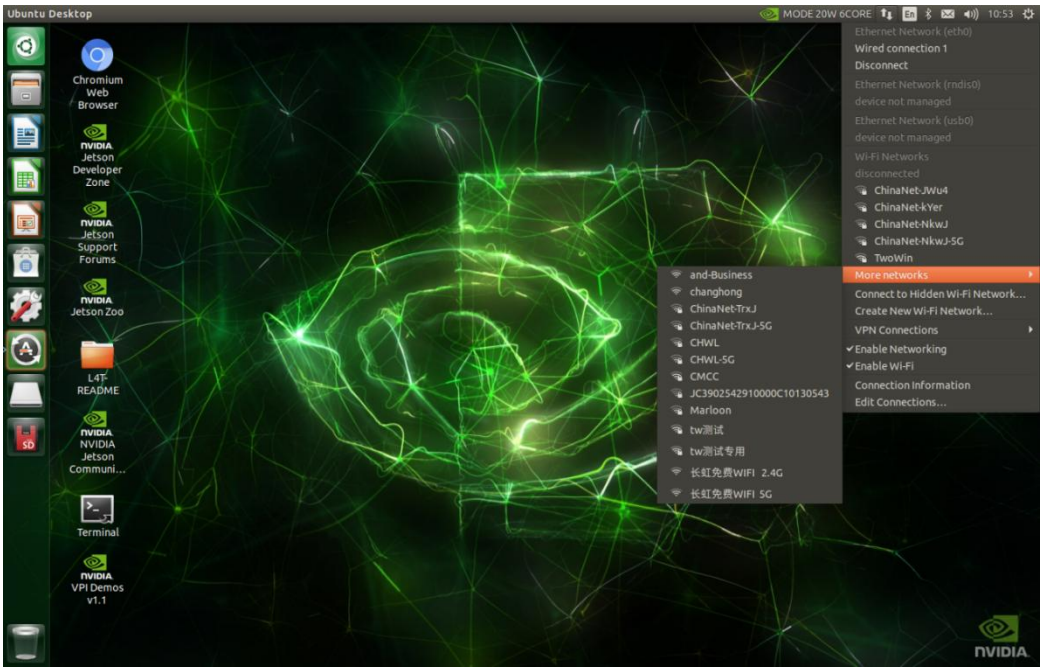
#Set the fixed CPU frequency to the maximum frequency supported by the current mode, and restart will fail.

WIFI Connection (if optional)

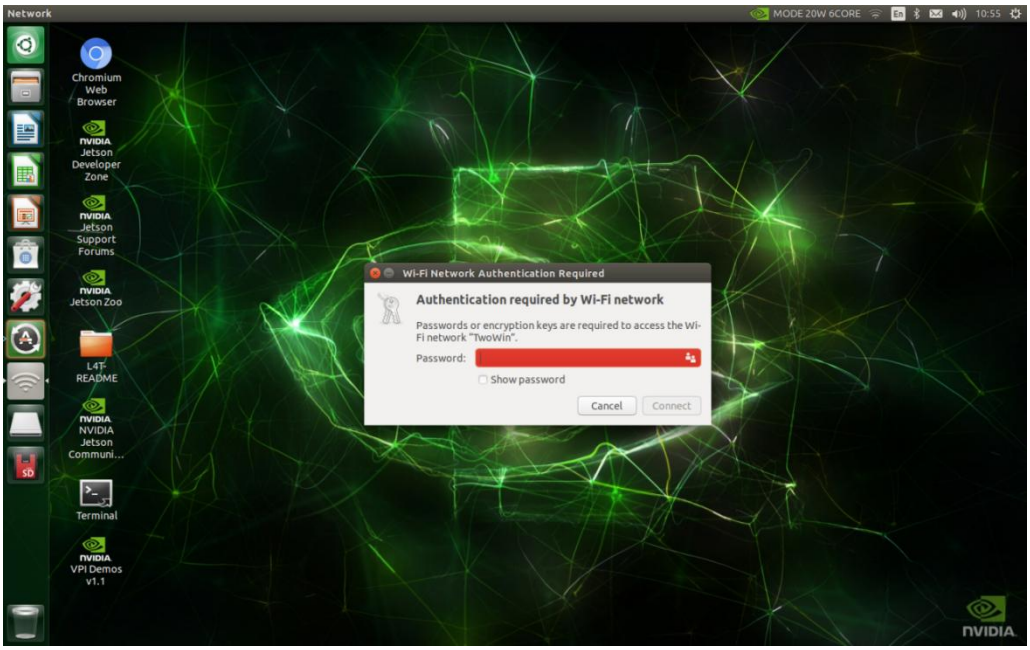
There are various ways to connect to WiFi, including using the nmcli tool on the graphical interface and the terminal command line:

1、Graphical interface to connect to wifi

Click on the network icon

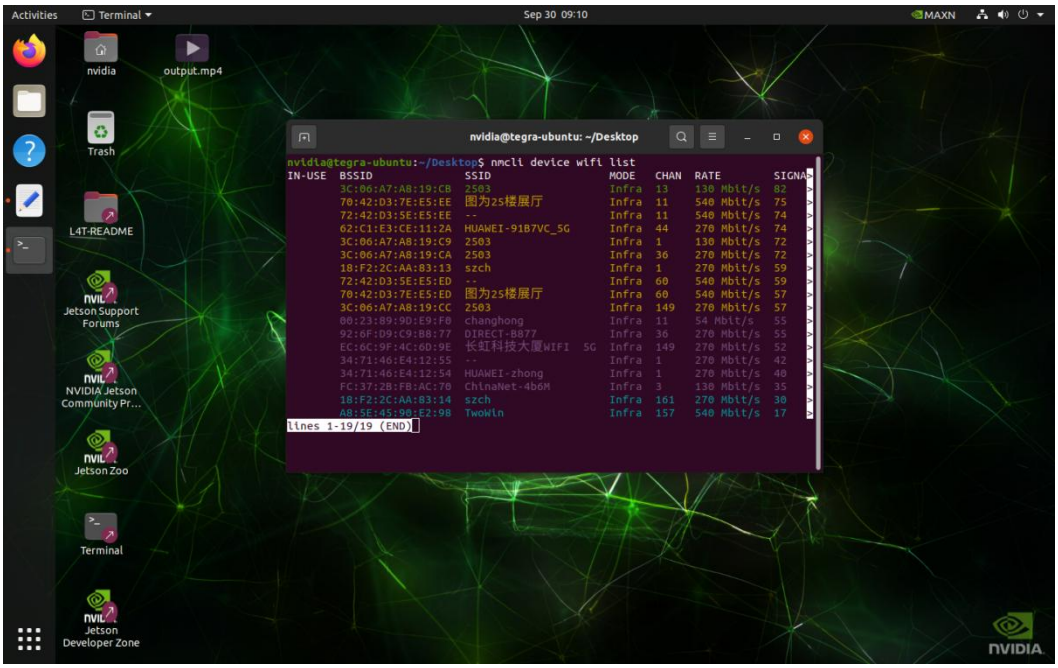


Select the wifi you want to connect to and enter the password



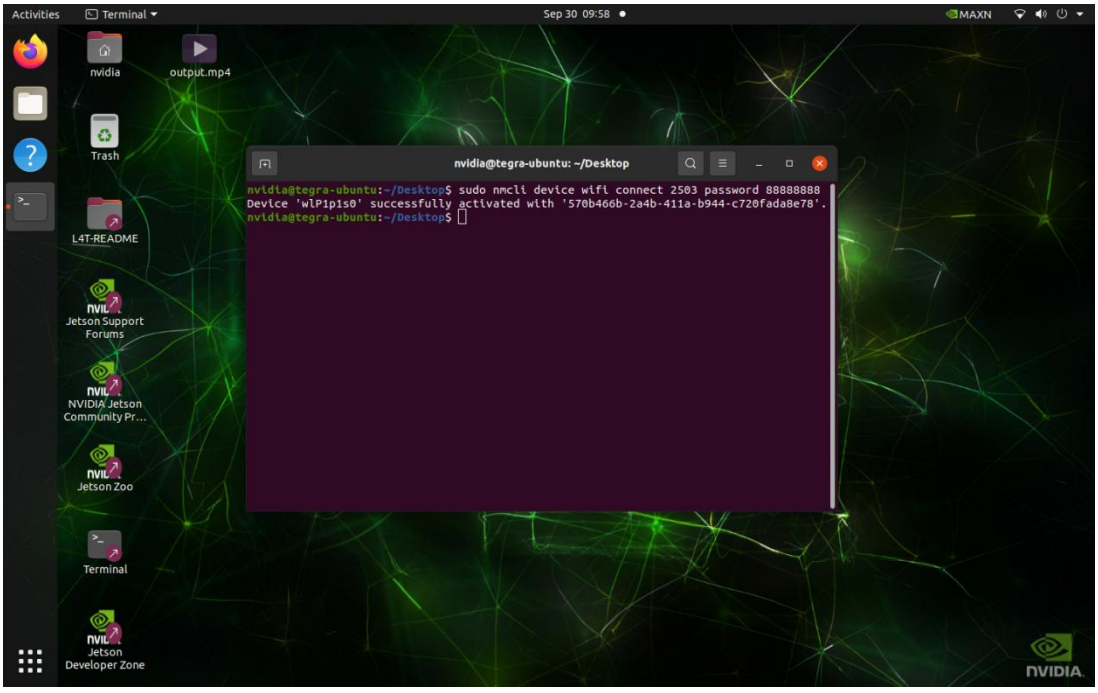
2、Terminal command to connect to WiFi

The terminal inputs the nmcli device wifi list to list the available WiFi connections:



Connect WiFi

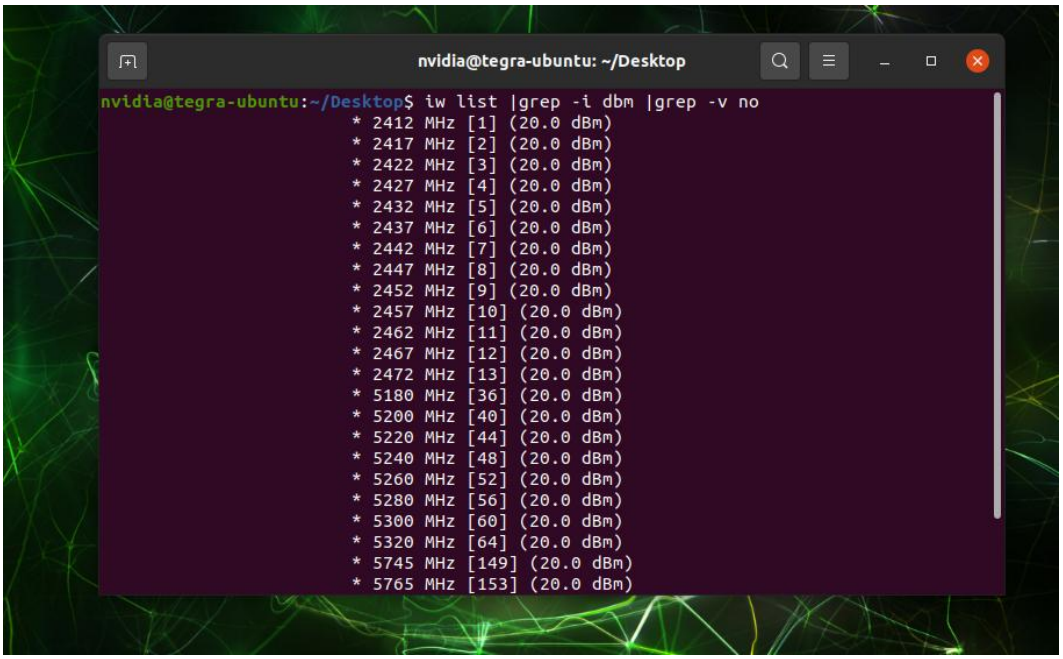
Terminal input sudo nmcli device wifi connect MyWiFiSSID password MySecretPassword



At this point, you can use the WiFi network

Configure WiFi as a hotspot

iw list | grep -i dbm | grep -v no #View the currently available channels

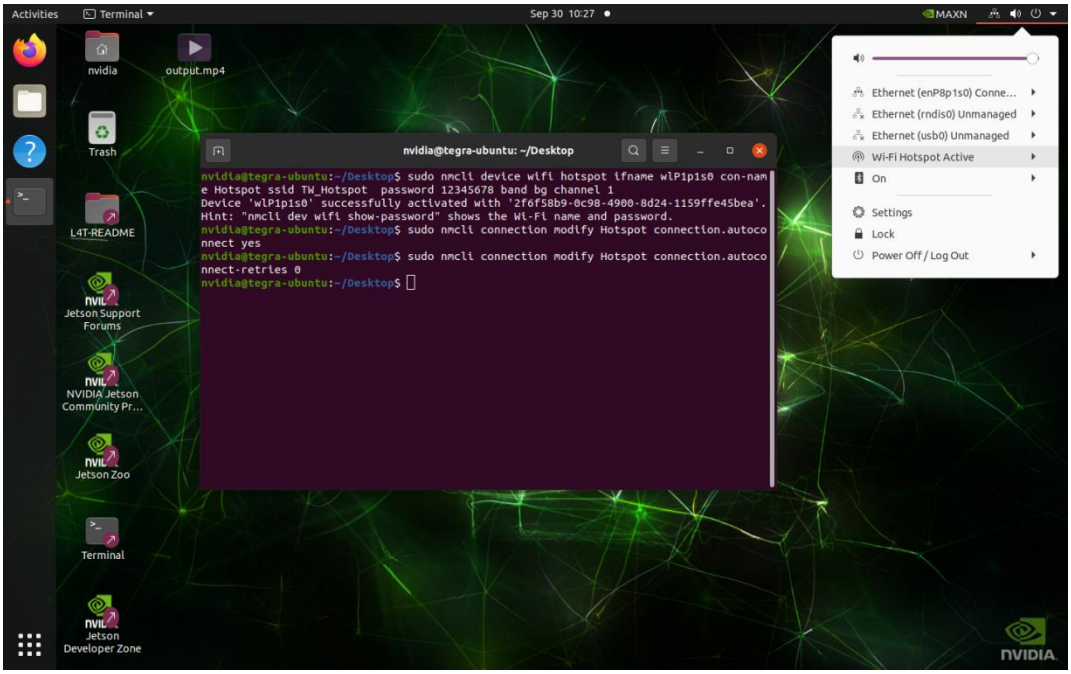


Create hotspots using the nmcli tool:

sudo nmcli device wifi hotspot ifname wlan0 con-name Hotspot ssid TW_Hotspot password 12345678 band bg channel 1

sudo nmcli connection modify Hotspot connection.autoconnect yes

sudo nmcli connection modify Hotspot connection.autoconnect-retries 0



Development environment configuration (the following operations are not mandatory, please follow personal needs for corresponding operations)

1 Update Source and Software

After installing the system, the source should be updated first, otherwise subsequent updates and upgrades will be very slow. However, as Jetson Xavier Nx uses the aarch64 architecture Ubuntu 18.04.2 LTS system, which is different from AMD's Ubuntu system, it needs to be replaced with the aarch64 source. It is important to note not to replace it with the x86-64 source.

We have chosen Tsinghua's source for updating here. Firstly, backup the original source and change the name of the source.list file for future reference:

sudo cp /etc/apt/sources.list /etc/apt/sources.list.bak

sudo vi /etc/apt/sources.list

Then delete all content, copy the following content and save it

deb http://mirrors.ustc.edu.cn/ubuntu-ports/ bionic-updates main restricted universe multiverse

deb-src http://mirrors.ustc.edu.cn/ubuntu-ports/ bionic-updates main restricted universe multiverse

deb http://mirrors.ustc.edu.cn/ubuntu-ports/ bionic-security main restricted universe multiverse

deb-src http://mirrors.ustc.edu.cn/ubuntu-ports/ bionic-security main restricted universe multiverse

deb http://mirrors.ustc.edu.cn/ubuntu-ports/ bionic-backports main restricted universe multiverse

deb-src http://mirrors.ustc.edu.cn/ubuntu-ports/ bionic-backports main restricted universe multiverse

deb http://mirrors.ustc.edu.cn/ubuntu-ports/ bionic main universe restricted

deb-src http://mirrors.ustc.edu.cn/ubuntu-ports/ bionic main universe restricted

Open the terminal and enter the following command to update

sudo apt-get update

The above update time is relatively long, and the update may fail due to network speed in the middle. At this time, do not shut down and re execute the command, as it will automatically resume from a breakpoint.

2 Set a fixed IP address with commands

(1)Create the eth0 file in the/etc/network/interfaces. d directory

sudo touch eth0

sudo vim eth0

Add the following content to the file

auto eth0

iface eth0 inet static

address 172.1.6.88(Set the static IP address according to your own needs here)

netmask 255.255.255.0

gateway 172.1.1.254

(2)Modify the interfaces file in the/etc/network directory

sudo vim interfaces

sudo vim interfaces

Add a new line

source interfaces.d/eth0

(3)Restart the device to make the settings effective

sudo reboot

Basic Algorithm Framework Installation

Pytorch Installation

Pytorch installation is closely related to the system version. Before installing different versions of Pytorch, first determine the jetpack version number of the device, and then use the following image to determine which version of Pytorch needs to be installed for normal use.

Based on Python 3.8 installation method (taking 1.8.0 as an example):

wget https://nvidia.box.com/shared/static/p57jwntv436lfrd78inwl7iml6p13fzh.whl -O torch-1.8.0-cp36-cp36m-linux_aarch64.whl
sudo apt-get install python3-pip libopenblas-base libopenmpi-dev
pip3 install Cython
pip3 install numpy torch-1.8.0-cp36-cp36m-linux_aarch64.whl

Torchvision Installation

The installation of Torchvision is closely related to the pytorch version. Before installing Torchvision, it is necessary to check the pytorch version and determine which version of Torchvision needs to be installed based on the following image in order to use it properly

sudo apt-get install libjpeg-dev zlib1g-dev libpython3-dev libavcodec-dev libavformat-dev libswscale-dev

git clone --branch v0.x.0 https://github.com/pytorch/vision torchvision

cd torchvision

export BUILD_VERSION=0.x.0 # (Fill in the version number of torchvision installation)

python3 setup.py install

Verify
python3

```
>>> import torch
>>> print(torch.__version__)
>>> print('CUDA available: ' + str(torch.cuda.is_available()))
>>> print('cuDNN version: ' + str(torch.backends.cudnn.version()))
>>> a = torch.cuda.FloatTensor(2).zero_()
>>> print('Tensor a = ' + str(a))
>>> b = torch.randn(2).cuda()
>>> print('Tensor b = ' + str(b))
>>> c = a + b>>> print('Tensor c = ' + str(c))
>>> import torchvision
>>> print(torchvision.__version__)
```

Please refer to this page for the download address and detailed installation method of Pytorch whl package:

Yolo v4 environment setup

1.First download darknet on github

```
git clone https://github.com/AlexeyAB/darknet.git
```

2.After the download is complete, you need to modify the Makefile file

```
cd darknet
sudo vim Makefile
```

3. Change the first four rows from 0 to 1

```
GPU=1
CUDNN=1
CUDNN_HALF=1
OPENCV=1
```

4.The cuda version and path also need to be changed to our actual version and path, otherwise the compilation will fail

```
Change NVCC=nvcc to
NVCC=/usr/local/cuda-10.2/bin/nvcc
```

5.After the modification is completed, compile it and input it on the terminal

```
sudo make
```

6.Using YOLOv4 for reasoning

(1)There are three basic reasoning methods: images, videos, and cameras (real-time images)

(2)Choose Yolo v4 and Yolo v4 tiny (lighter models suitable for running on Jetson Orin Nano) for testing. Firstly, it is necessary to download the weight file of the trained model

Picture Test

```
./darknet detector test cfg/coco.data cfg/yolov4.cfg yolov4.weights data/dog.jpg
```

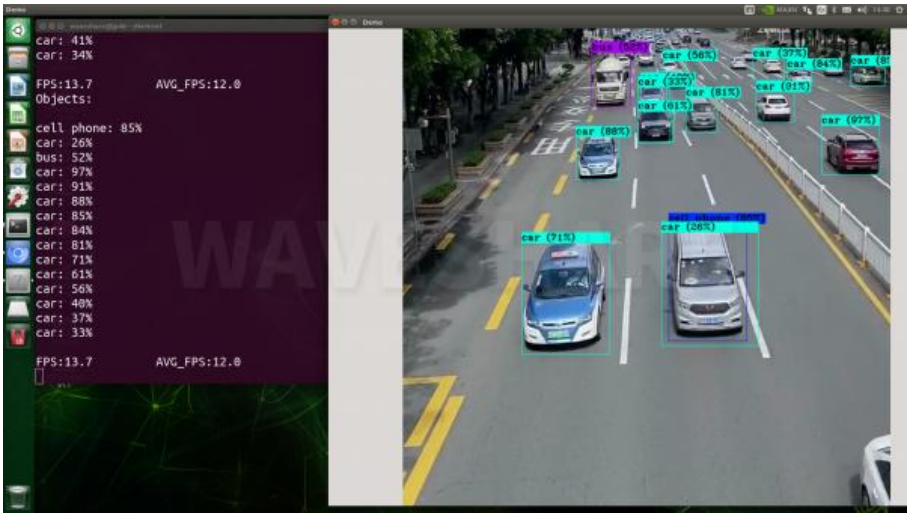
If you want to activate the image, you need to use test mode, which will ask you to input the position of the image after execution

```
./darknet detector test ./cfg/coco.data ./cfg/yolov4.cfg ./yolov4.weights
```

Video Test

Yolov4-tiny video detection (the video file is not included in the data downloaded from github, users need to upload the video file to be detected to the data folder by themselves)

```
./darknet detector demo cfg/coco.data cfg/yolov4-tiny.cfg yolov4-tiny.weights data/xxx.mp4
```



Download link for development materials

Link: https://pan.baidu.com/s/1iMEFFJu9sjLpXn6Xq1ozzw?pwd=mmkc

Warranty Policy of Twowin Information Technology (Shenzhen) Co., Ltd.

Important Notes

Twowin Information Technology (Shenzhen) Co., Ltd. warrants that each embedded product provided is free from material or manufacturing defects to the best of its knowledge and complies fully with the original factory specifications at the time of shipment.

The warranty scope of Twowin covers all original factory products. For issues with dealer-configured accessories, contact the dealer for resolution. All products carry a one-year warranty (starting from the factory shipment date). Lifetime repair services are provided for products beyond the warranty period. Repaired components receive an extended warranty of 12 months. Unless otherwise notified by Twowin, the factory shipment date on the original delivery note shall be deemed the product's shipment date.

How to Obtain Warranty Services

If your product malfunctions during the warranty period, contact Twowin or an authorized dealer to initiate warranty services. When requesting warranty services, present a purchase invoice as proof of entitlement to warranty services (this serves as your legal documentation for claiming warranty services).

Warranty Resolution Measures

When requesting warranty services, you must follow the procedures established by Twowin for issue identification and resolution. You will need to undergo an initial diagnosis via phone or email with Twowin's technical staff. During this process, you must fully complete all details in the provided repair request form to ensure accurate diagnosis of the fault cause and damage location (for out-of-warranty products, a service quotation will be provided for your confirmation).

Twowin reserves the right to either repair or replace the reported product. If the product is replaced or repaired, the replaced "defective" product or repaired components will be returned to Twowin.

Since some repaired products require shipment to the original factory, Twowin strongly advises purchasing transportation insurance to avoid accidental loss/damage. If you decline insurance, Twowin shall not be held liable for any loss or damage during transit.

For warranty-covered products:
The user bears return shipping fees for products sent to Twowin for repair.
Twowin bears return shipping fees for repaired/replaced products delivered to users.

Exclusions from Warranty:
1.Damage due to improper installation, misuse, abuse (e.g., overload), or accidental mishandling.
2.Failures caused by improper maintenance, neglect (e.g., fire, explosion), or natural disasters (e.g., lightning, earthquakes, typhoons).
3.Unauthorized modifications to the product (e.g., circuitry, mechanical components, software, three-proof treatment).
4.Faults arising from:
Voltage irregularities (overvoltage, undervoltage, floating ground voltage).
Bent/pinched pins, incorrect bus connections, component detachment.
Electrostatic discharge, excessive temperature/humidity, poor transportation.
5.Tampering, removal, or alteration of product labels or part numbers.
6.Claims submitted after the warranty period expires.

Special Provisions:

If the same fault recurs in multiple products or the same device, our company reserves the right to require users to provide peripheral devices or technical documentation (e.g., monitors, I/O devices, cables, power supplies, connection diagrams, system architecture) to diagnose root causes.

Failure to comply will result in denial of warranty claims. Repairs will incur market-rate fees and a repair deposit.