TWOWIN TW-T201 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

Document Version

Version 1.0

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V1.0	2024/12/16	Initial release

Foreword

Before using this manual, please carefully read the following usage license agreement. Only by agreeing to the following usage license agreement can you use the products introduced in this manual.

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Technical Support and Information Feedback

If you encounter any problems while using our product, or if you believe that our product has certain functional defects, please visit our official website https://www.twowintech.com contact our customer service and we will solve your problems and provide feedback; If you need technical support guidance or have any valuable opinions, please contact us through our official website or phone.

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Contact Person：Twowin Technical Support
Phone：15889570076
Tel：0755-82840481
Website：https://www.twowintech.com
Address： RM2512, Changhong Science and Technology Building, Keji South 12th Road, Nanshan District, Shenzhen, Guangdong 518057 China

Safety Warning and Precautions for Use

- Safety Instructions

Before using this product, it is necessary to consult this document to have a preliminary understanding and knowledge of the product, and to comply with the safety instructions in the product manual to ensure your personal safety and avoid damaging the equipment. If blind operation causes loss or injury, the manufacturer is not responsible for any problems related to the safety of the equipment and personal life and property caused by its incorrect operation

Personal Safety

- Before operating the equipment, wear anti-static work clothes, anti-static gloves or wristbands, and remove conductive objects such as jewelry and watches to avoid electric shock or burns.
- If a fire occurs, evacuate the building or equipment area and press the fire alarm bell, or call the fire alarm number. Under no circumstances should one re-enter a burning building.

Equipment Safety

- Before operation, the equipment should be reliably fixed on the floor or other stable objects, such as walls or mounting brackets.
- Do not block the air vent during system operation.
- When installing the panel, if the screws need to be tightened, tools must be used for operation.
- After installing the equipment, please clear the empty packaging materials in the equipment area.

- Supply Voltage

TW-T201 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 supply of the power adapter must have good grounding, and in special cases, grounding screws on the calculation platform must be installed for grounding
The following requirements only apply to equipment that requires grounding:

- When installing equipment, it must be grounded first; When dismantling the equipment, finally remove the grounding wire.
- It is prohibited to damage the grounding conductor.
- It is prohibited to operate the equipment without installing a grounding conductor.

- The equipment should be permanently connected to the protective ground. Before operating the equipment, the electrical connections of the equipment should be checked to ensure that it is reliably grounded.

- Electrostatic Protection

Electronic components and circuits are sensitive to electrostatic discharge. Although our company designs circuit board products with anti-static protection for the main interfaces on the board, it is difficult to achieve anti-static safety protection for all components and circuits. Therefore, it is recommended to follow anti-static safety protection measures when handling any circuit board components. Anti static safety protection measures include, but are not limited to, the following:

- During transportation and storage, the box should be placed in an anti-static bag until installation and deployment before removing the board
- Before touching the box, the static electricity stored inside the body should be discharged: wear a discharge grounding wristband
- Operate the box only within the safe area of the static discharge point
- Avoid moving boxes in carpeted areas.

- Basic Installation Requirements

The personnel responsible for installing and maintaining the equipment must undergo strict training, understand various safety precautions, and master the correct operating methods before installing, operating, and maintaining the equipment.

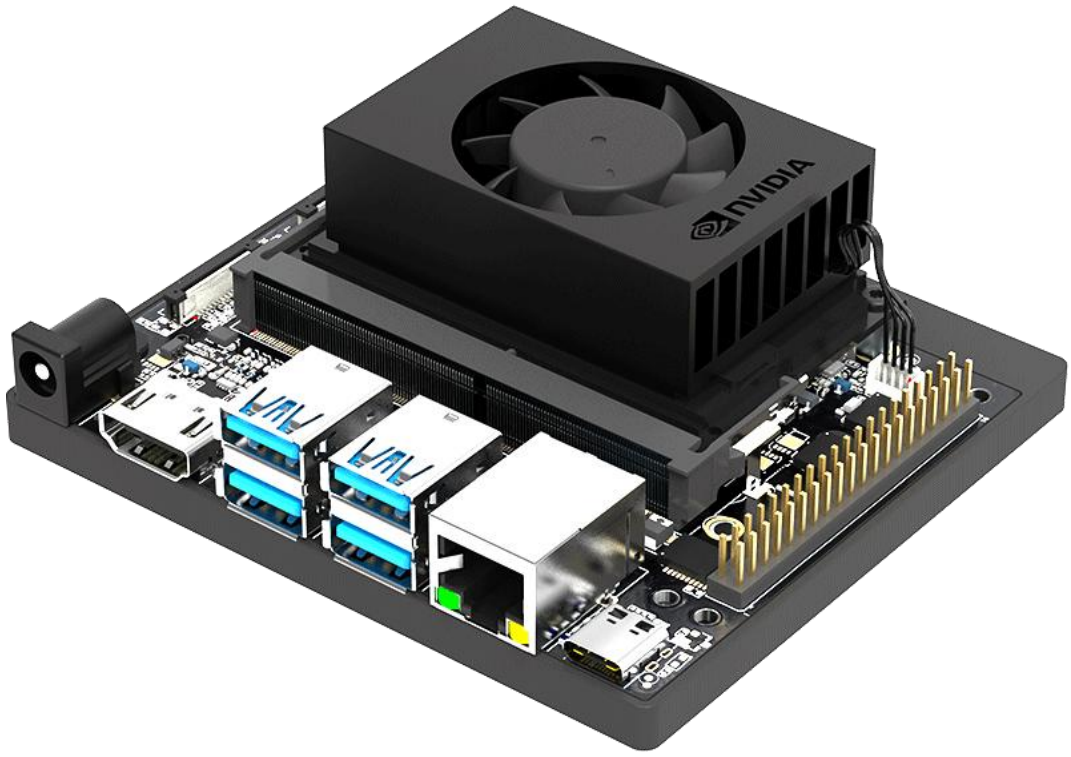
- Only qualified and trained personnel are allowed to install, operate, and maintain equipment.
- Only qualified professionals are allowed to dismantle safety facilities and repair equipment.
- Replacement and modification of equipment or components (including software) must be completed by personnel certified or authorized by the Twowin.
- Operators should promptly report any faults or errors that may cause safety issues to the responsible person.

Introduction

TW-T201 is a computing platform designed based on NVIDIA® JETSON ORIN Nano module, with built-in integrated ORIN Nano module and pre installed Ubuntu operating system. It has AI processing capability for 20/40 TOPS floating-point operations, a compact appearance, excellent heat dissipation, rich sensor interfaces, and outstanding performance, bringing new features to all your embedded AI and edge systems. It has the characteristics of strong computing power, high reliability, high integration, and low power consumption, and can be applied to commercial robots, medical instruments, intelligent cameras, high-resolution sensors, automatic optical inspection, smart factories, and other AIoT embedded systems..

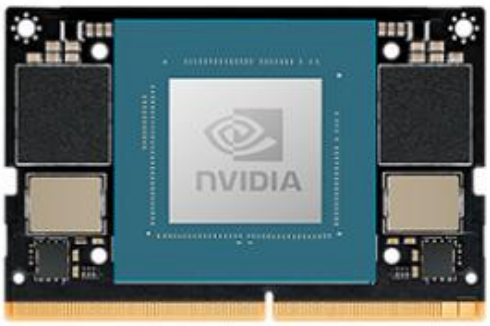
TW-T201 Overview of Edge Computing Platform:

- Embedded NVIDIA® JETSON ORIN Nano
- 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
- Fan active cooling design
- Built in Ubuntu system and Jetpack SDKs
- Wide voltage 9-19V input



Product Specification

Processor and Core Module



Processor	NVIDIA Jetson Orin Nano	
AI	40 TOPS	20 TOPS
CPU	6-core Arm® Cortex®-A78AE v8.2 64-bit CPU 1.5MB L2 + 4MB L3	
CPU Max Frequency	1.5 GHz	
GPU	1024-core NVIDIA Ampere architecture GPU with 32 Tensor Cores	512-core NVIDIA Ampere architecture GPU with 16 Tensor Cores
GPU Max Frequency	625 MHz	
Memory	8GB 128-bit LPDDR5 68 GB/s	4GB 64-bit LPDDR5 34GB/s
Storage	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
	Type-C	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	1080p30 supported by 1-2 CPU cores
Video Decode	1x 4K60 (H.265) 2x 4K30 (H.265) 5x 1080p60 (H.265) 11x 1080p30 (H.265)

Power Supply

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

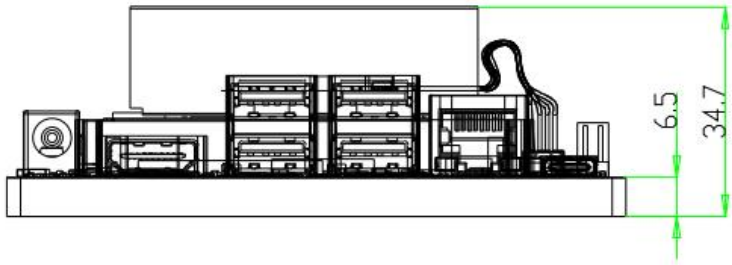
Structure

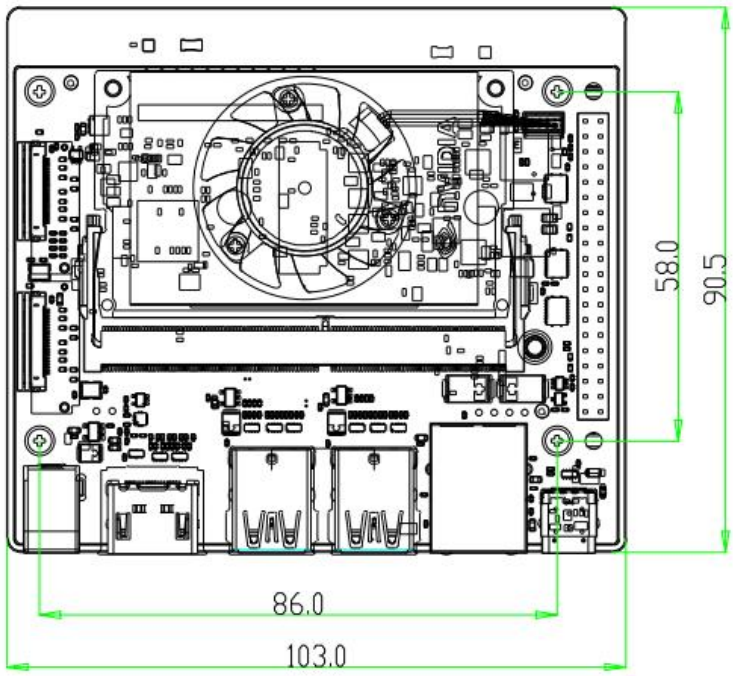
Mechanical	Spec
Dimensions (W×D×H)	103mm×90.5mm ×34.7mm

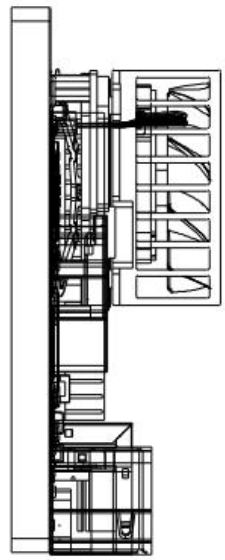
Environment

Environmental	Spec
Operating Temperature	0℃-50℃

Size







Service and Support

Technical Support

If you encounter any problems or believe that your product has defects, please visit our official website with your questions and browse our common problem section to find solutions to common problems. You can also contact us by phone or WeChat, and we will make corresponding work arrangements according to your needs in a timely manner to solve your problems.

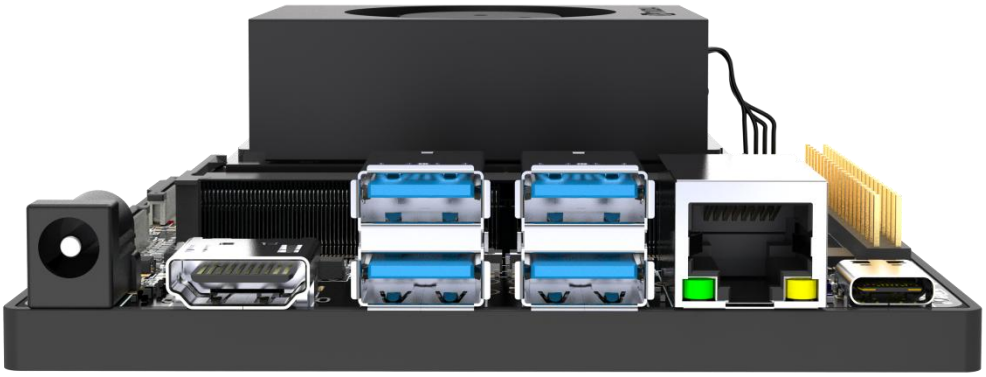
Warranty

Warranty period: The warranty period for our equipment is one year from the date of purchase.

Warranty Regulations: During the warranty period, if there is any non-human damage to the product, Twowin will provide free warranty. Please obtain warranty assistance through customer service dialogue and phone contact on the purchasing platform. (For details, please refer to the warranty regulations of Twowin Technology Co., Ltd.

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	USB 3.0 5V@1A
LAN	1	RJ45 Gigabit Ethernet port (normal status: orange constantly on, green flashing)
TYPE-C	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

Side Interface

40 PIN Show Picture

NAME	PIN	PIN	NAME
Jetson orin Nano header			
3.3 VDC	1	2	5.0 VDC
I2C1_SDA	3	4	5.0 VDC
I2C1_SCL	5	6	GND
GPIO 9	7	8	UART_TX
GND	9	10	UART_RX
UART1_RTS	11	12	I2S0_SCLK
SPI1_SCK	13	14	GND
GPIO 12	15	16	SPI1_CS1
3.3 VDC	17	18	SPI1_CS0
SPI0_MOSI	19	20	GND
SPI0_MISO	21	22	SPI1_MISO
SPI0_SCK	23	24	SPI0_CS0
GND	25	26	SPI0_CS1
I2C0_SDA	27	28	I2C0_SCL
GPIO 01	29	30	GND
GPIO 11	31	32	GPIO 07
GPIO 13	33	34	GND
I2S0_FS	35	36	UART1_CTS
SPI1_MOSI	37	38	I2S0_SDIN
GND	39	40	I2S0_SDOUT

PIN/BOARD NUM	BCM NUM	GPIO NUM	GPIO NAME	PIN/BOARD NUM	BCM NUM	GPIO NUM	GPIO NAME
7	4	492	PAC.06	11	17	460	PR.04
12	18	398	PH.07	13	27	470	PY.00
15	22	433	PN.01	16	23	474	PY.04
18	24	473	PY.03	19	10	483	PZ.05
21	9	482	PZ.04	22	25	471	PY.01
23	11	481	PZ.03	24	8	484	PZ.06
26	7	485	PZ.07	29	5	453	PQ.05
31	6	454	PQ.06	32	12	389	PG.06
33	13	391	PH.00	35	19	401	PI.02
36	16	461	PR.05	37	26	472	PY.02
38	20	400	PI.01	40	21	399	PI.00

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

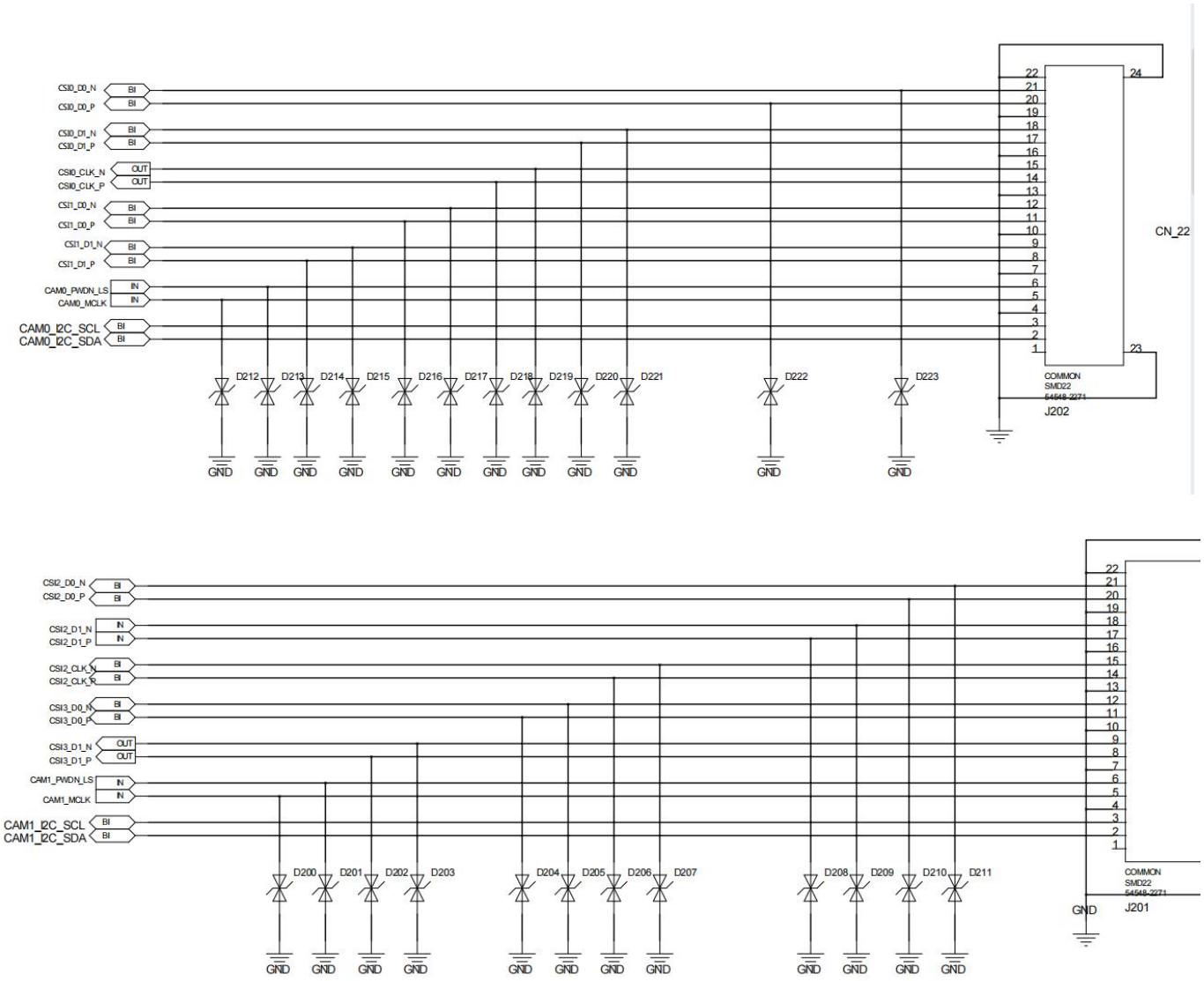
❸ GPIO Terminal Command Method Description: (The following () content is a note explanation)

#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)

MIPI CAM



1-pin 3.3V power supply

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	.3V output
14	GND	
15	CAN RX	CAN communication, without resistors or transceivers, if used, requires external connection by oneself
16	CAN TX	

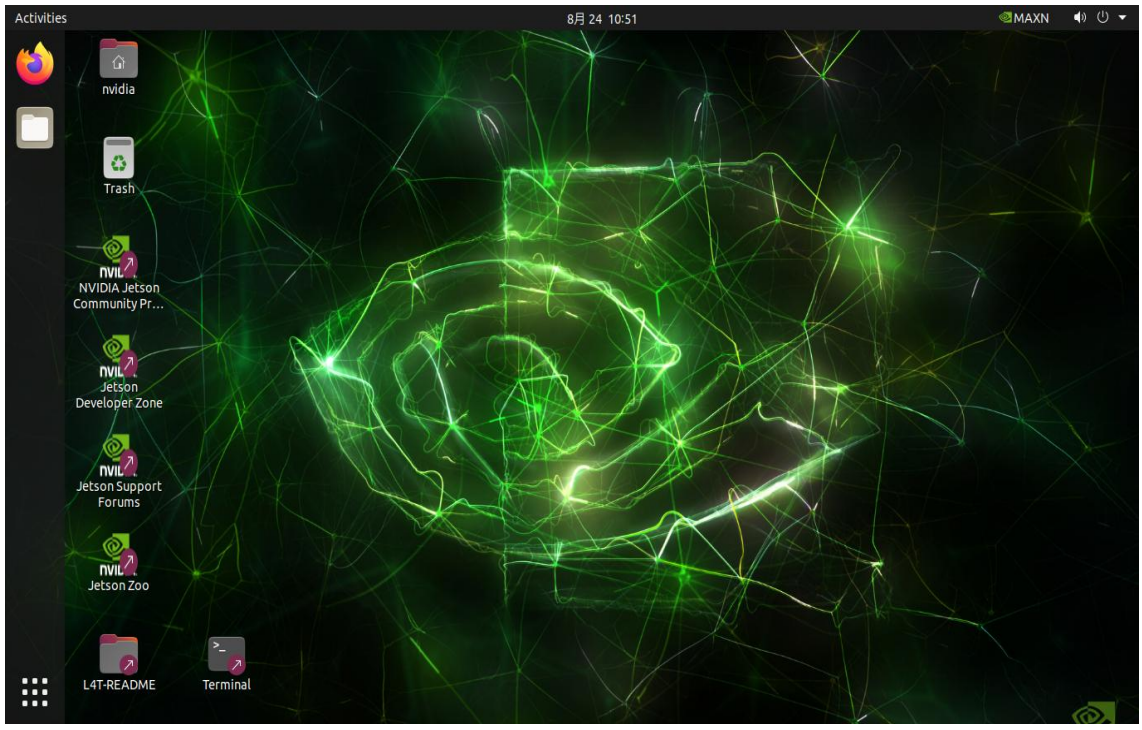
Usage Introduction

System Introduction

The T201 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

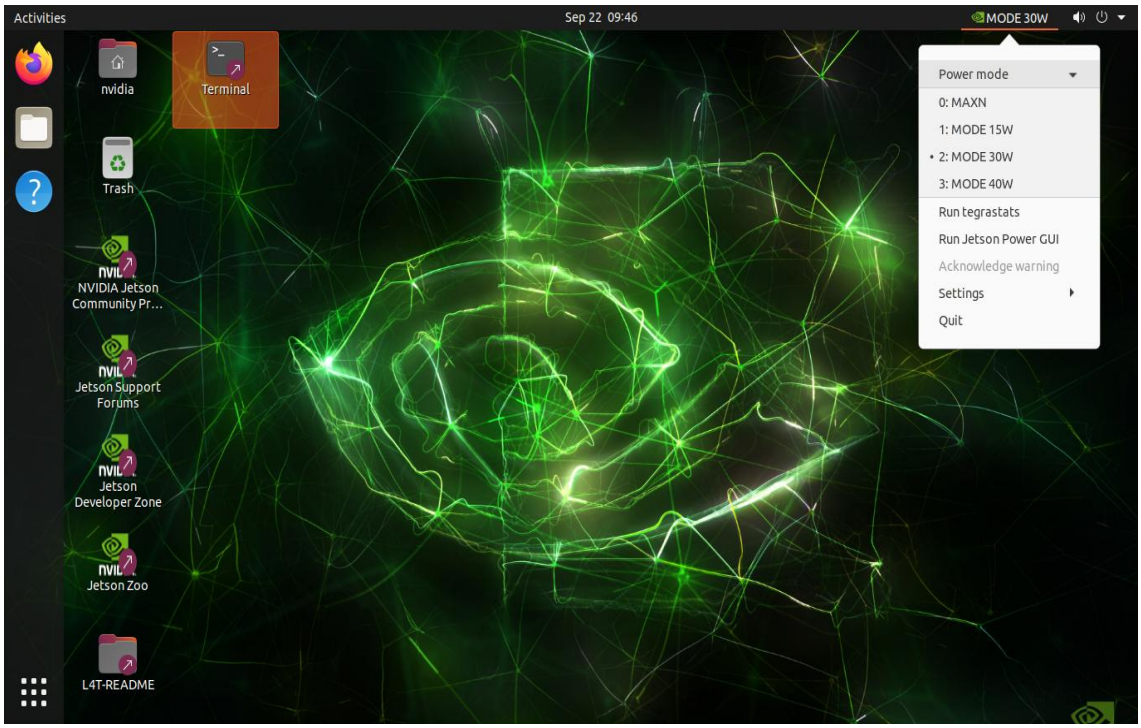
Switch on: The default power on mode of TW-T201 device is self starting when powered on. Insert the power supply and connect the monitor to the device via HDMI interface. The graphical desktop is shown in the figure below:
Shutdown: The system performs a shutdown internally.
Attention: Do not directly 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.

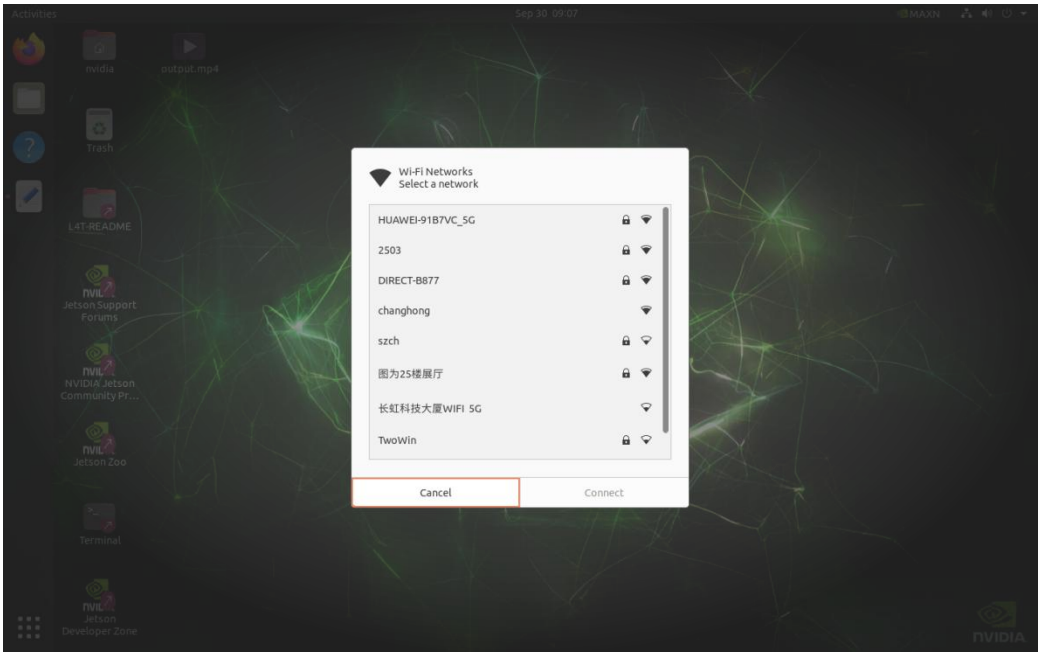
WIFI Connection (if optional)

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

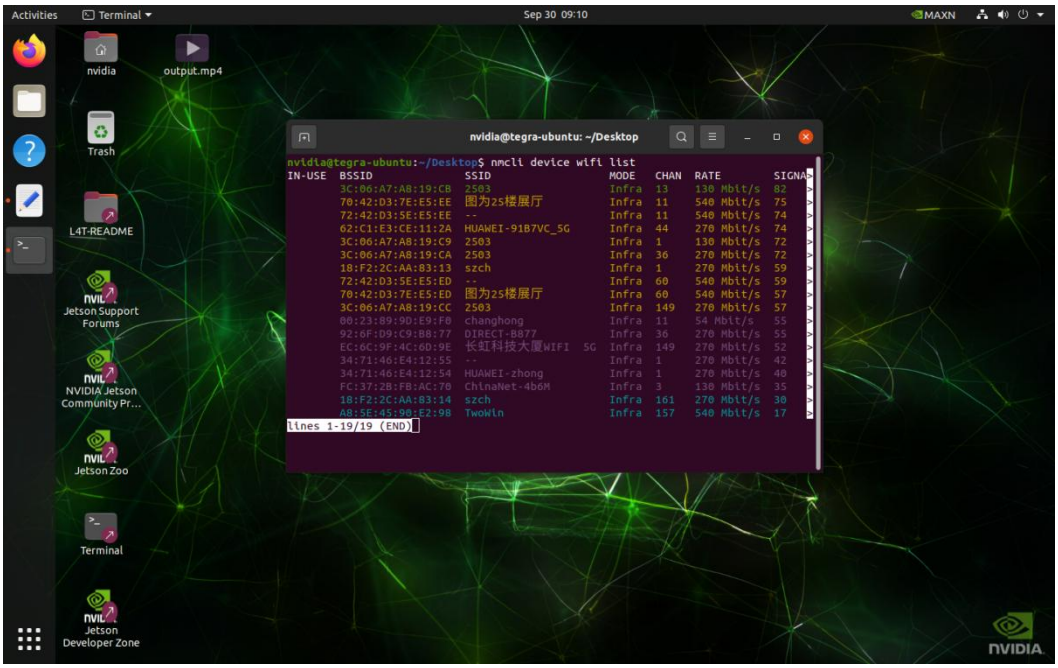
Click on the network icon

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



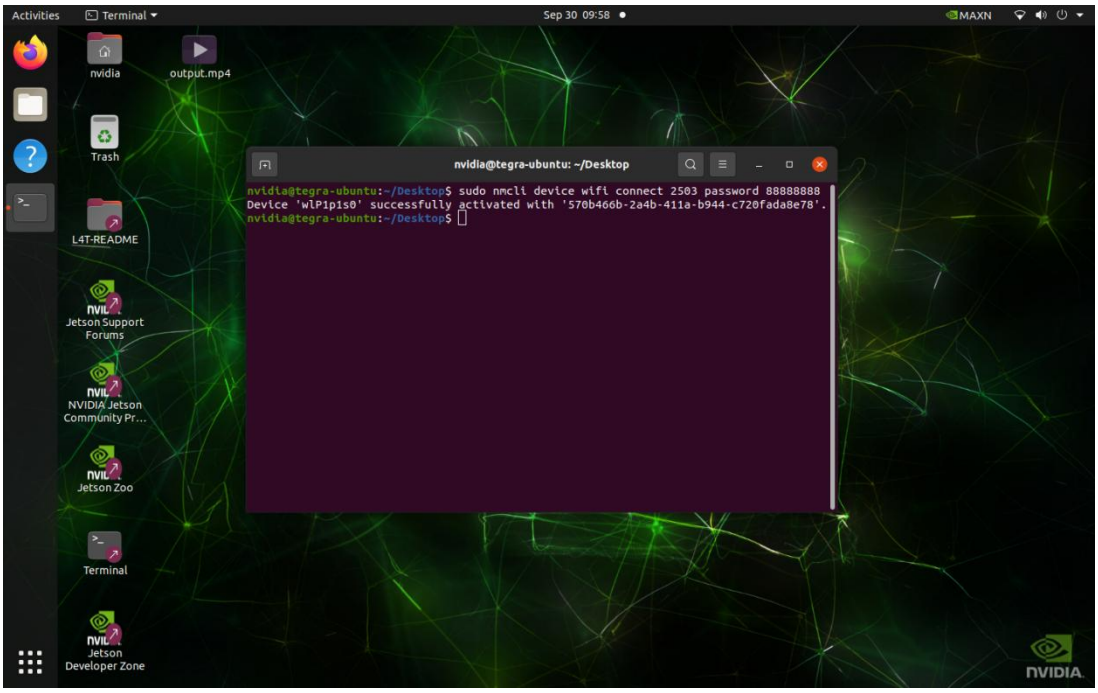
2、Terminal command to connect to WiFi

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



Connect WiFi

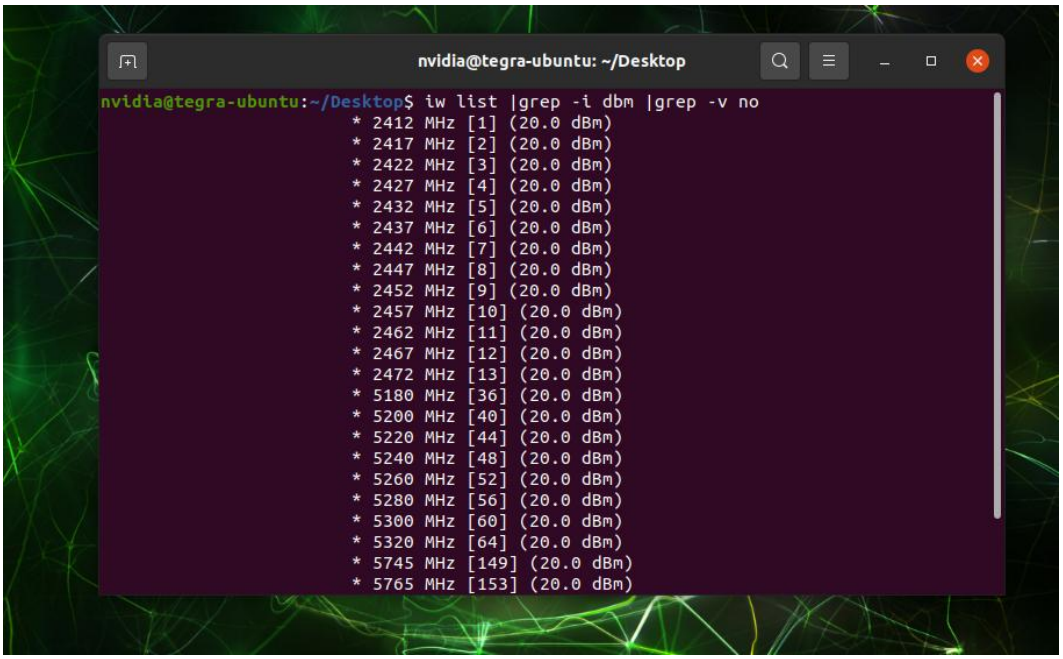
Terminal input sudo nmcli device wifi connect MyWiFiSSID password MySecretPassword



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

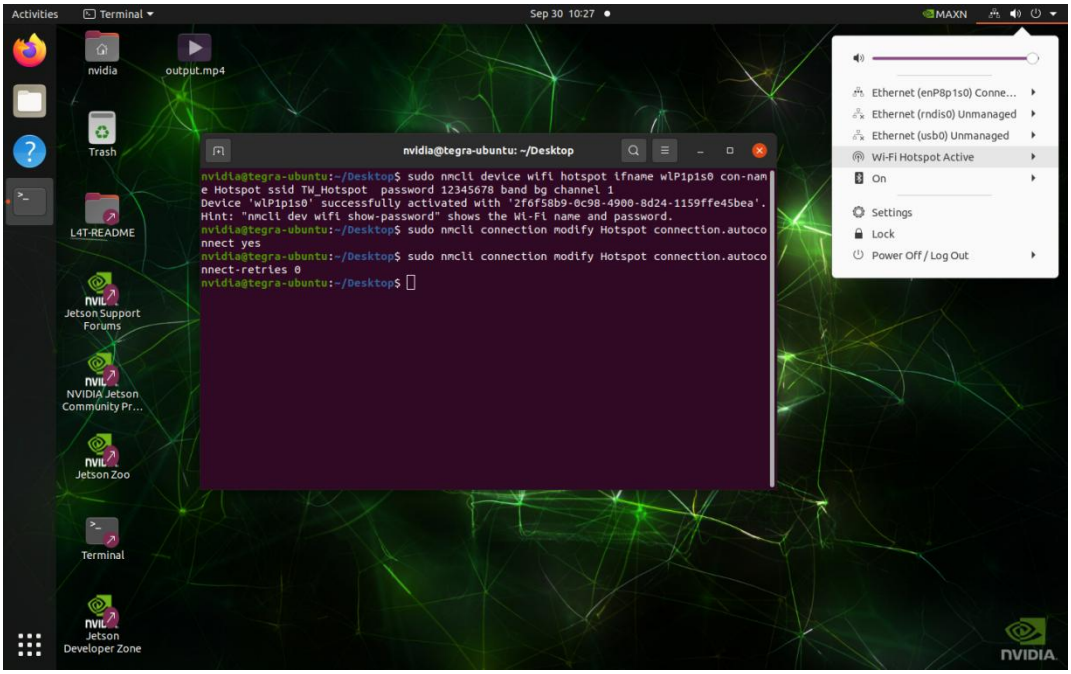


Create hotspots using the nmcli tool:

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

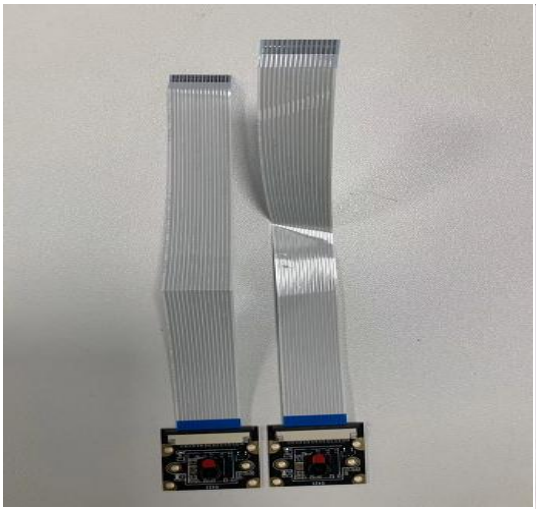
sudo nmcli connection modify Hotspot connection.autoconnect-retries 0

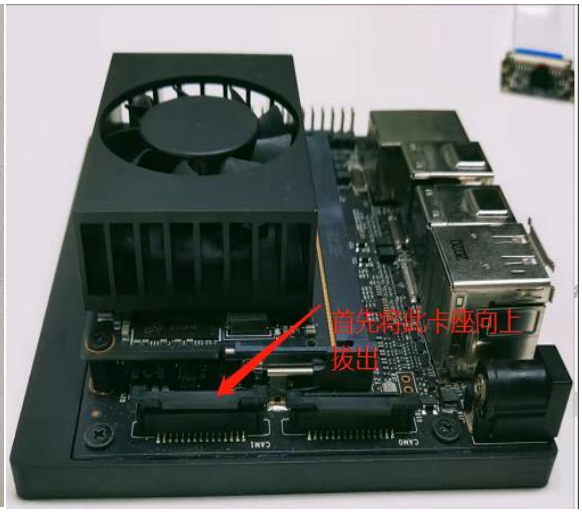


CSI Camera

Note: Please install the OpenCV on Target component first, which is included in the NVIDIA JETPACK SDK.

Connect the CSI camera to the Jetson Orin Nano domestic kit, which does not support hot swapping. Please operate before powering on.

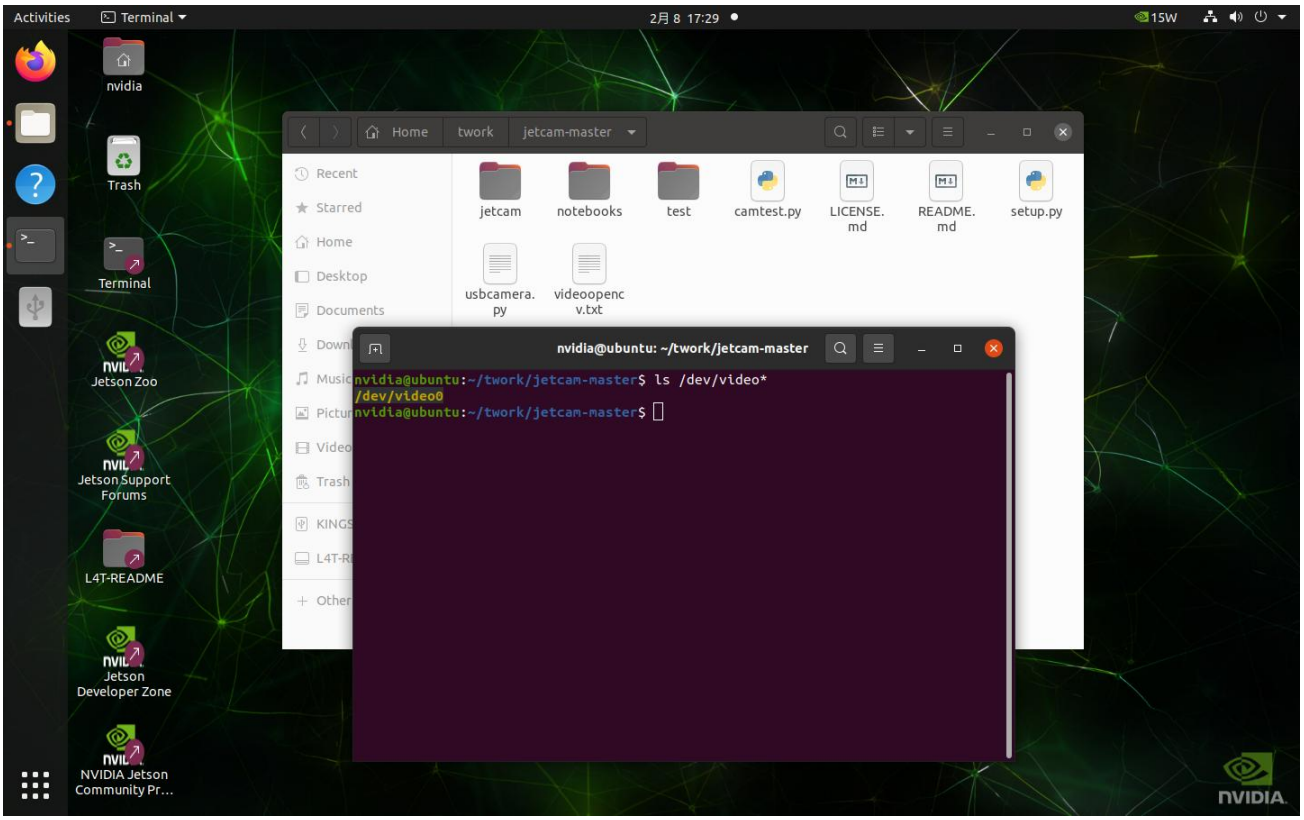




(This image is for reference only. Please refer to the specifications above for the actual product specifications.)

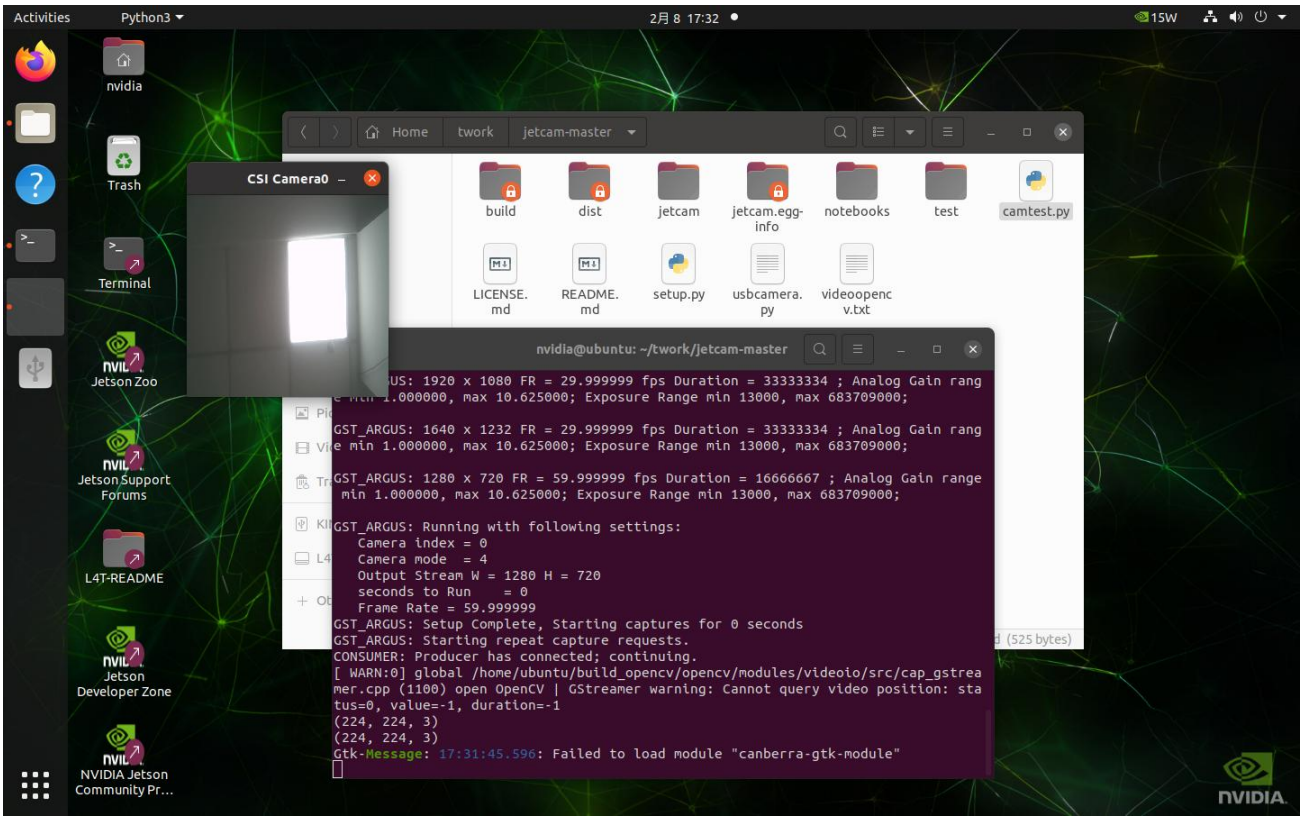
Check if the camera has been read

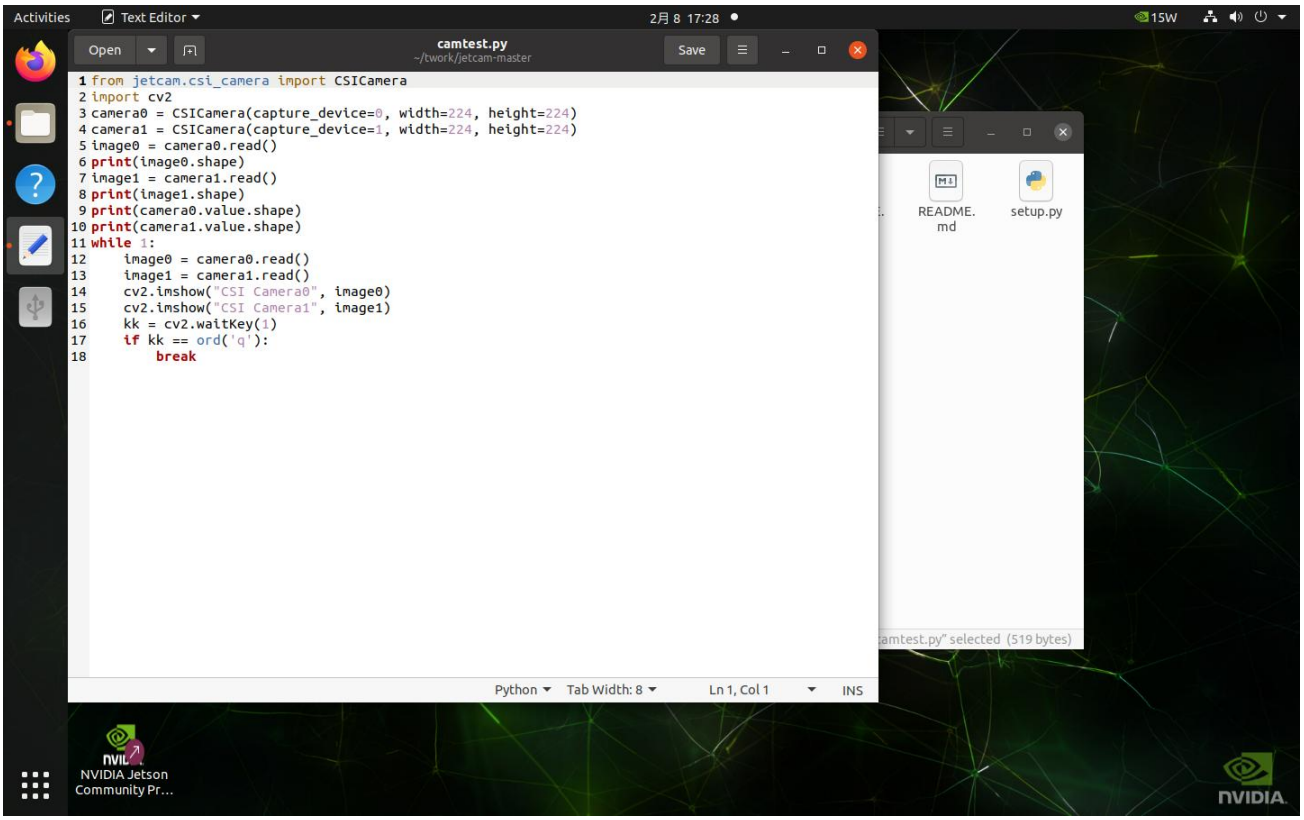
```
ls /dev/video*
```



In the directory/twork/jetcam master; Open the terminal to use commands

sudo python3 camtest.py





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 Nano uses the aarch64 architecture Ubuntu 20.04.2 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 https://mirror.tuna.tsinghua.edu.cn/ubuntu-ports/ focal main restricted universe multiverse

deb https://mirror.tuna.tsinghua.edu.cn/ubuntu-ports/ focal-updates main restricted universe multiverse

deb https://mirror.tuna.tsinghua.edu.cn/ubuntu-ports/ focal-backports main restricted universe multiverse

deb https://mirror.tuna.tsinghua.edu.cn/ubuntu-ports/ focal-security main restricted universe multiverse

deb https://mirror.tuna.tsinghua.edu.cn/ubuntu-ports/ focal-proposed main restricted universe multiverse

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

Install netplan.io

sudo apt install netplan.io

Modify configuration file

sudo vi /etc/netplan/99_config.yaml

Add the following content

```
network:
  version: 2
  renderer: networkd
  ethernets:
    enp0s25:
      addresses:
        - 192.168.0.100/24 (Set the static IP address according to your own needs here)
      routes:
        - to: default
          via: 192.168.0.1 (Fill in the IP segment)
      nameservers:
          search: [example.com, sales.example.com, dev.example.com]
          addresses: [1.1.1.1, 8.8.8.8, 4.4.4.4] (No need to change)
```

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.

PyTorch pip wheels

▼ PyTorch v1.10.0

- JetPack 4.4 (L4T R32.4.3) / JetPack 4.4.1 (L4T R32.4.4) / JetPack 4.5 (L4T R32.5.0) / JetPack 4.5.1 (L4T R32.5.1) / JetPack 4.6 (L4T R32.6.1)
  - Python 3.6 - `torch-1.10.0-cp36-cp36m-linux_aarch64.whl` 1.6k

▼ PyTorch v1.9.0

- JetPack 4.4 (L4T R32.4.3) / JetPack 4.4.1 (L4T R32.4.4) / JetPack 4.5 (L4T R32.5.0) / JetPack 4.5.1 (L4T R32.5.1) / JetPack 4.6 (L4T R32.6.1)
  - Python 3.6 - `torch-1.9.0-cp36-cp36m-linux_aarch64.whl` 3.7k

▼ PyTorch v1.8.0

- JetPack 4.4 (L4T R32.4.3) / JetPack 4.4.1 (L4T R32.4.4) / JetPack 4.5 (L4T R32.5.0) / JetPack 4.5.1 (L4T R32.5.1) / JetPack 4.6 (L4T R32.6.1)
  - Python 3.6 - `torch-1.8.0-cp36-cp36m-linux_aarch64.whl` 6.4k

▼ PyTorch v1.7.0

- JetPack 4.4 (L4T R32.4.3) / JetPack 4.4.1 (L4T R32.4.4) / JetPack 4.5 (L4T R32.5.0) / JetPack 4.5.1 (L4T R32.5.1) / JetPack 4.6 (L4T R32.6.1)
  - Python 3.6 - `torch-1.7.0-cp36-cp36m-linux_aarch64.whl` 5.7k

▼ PyTorch v1.6.0

- JetPack 4.4 (L4T R32.4.3) / JetPack 4.4.1 (L4T R32.4.4) / JetPack 4.5 (L4T R32.5.0) / JetPack 4.5.1 (L4T R32.5.1) / JetPack 4.6 (L4T R32.6.1)
  - Python 3.6 - `torch-1.6.0-cp36-cp36m-linux_aarch64.whl` 7.6k
  - The JetPack 4.4 production release (L4T R32.4.3) only supports PyTorch 1.6.0 or newer, due to updates in cuDNN.
  - This wheel of the PyTorch 1.6.0 final release replaces the previous wheel of PyTorch 1.6.0-rc2.

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
```

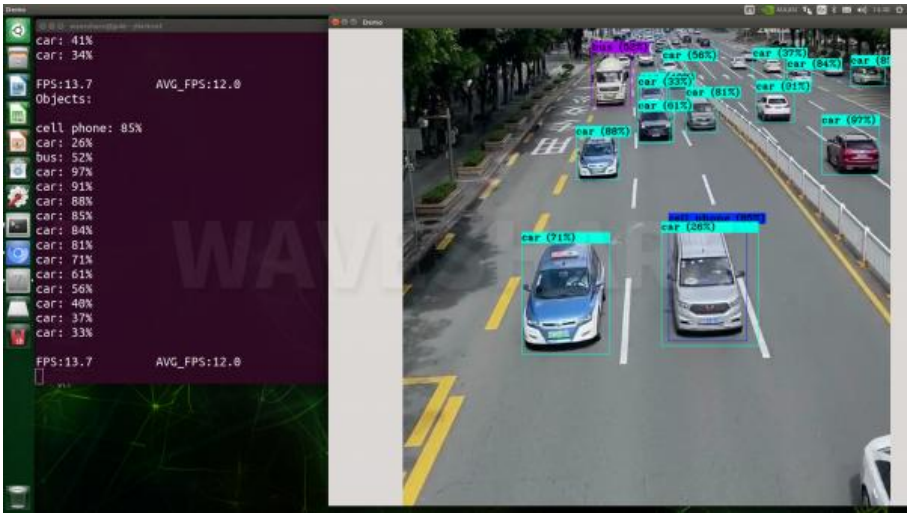
If you want to activate the image, you need to use test mode, which will ask you to input the position of the image after execution

```
./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

Twowin Technology Co., Ltd Warranty Regulations

Important Note

Twowinit Information Technology (Shenzhen) Co., Ltd guarantees that each embedded product provided has no defects in materials and processes to the best of our knowledge, and fully complies with the specifications officially shipped from the original factory.

Twowinit Information Technology (Shenzhen) Co., Ltd warranty coverage includes all original products. If the accessories configured by the dealer malfunction, please consult with the dealer to resolve it. The warranty period for all products provided by the technology is one year (lifetime repair service is provided for products beyond the warranty period), and the warranty period starts from the date of manufacture. For products repaired during the warranty period, the warranty for the repaired part is extended by 12 months. Unless otherwise notified by Technology, the date on your original shipping order is the factory date

How to obtain warranty service

If the product cannot operate normally during the warranty period, please contact Twowinit Information Technology (Shenzhen) Co., Ltd or the dealer to obtain warranty service. When the product is under warranty, please present the purchase invoice as proof of your right to receive warranty service.

Warranty Solution Measures

When you request warranty service, you need to follow the problem determination and resolution procedures outlined in the technology regulations. You need to receive the first diagnosis from our technical personnel via phone or email. At that time, you will need to cooperate and fill in all the issues on the repair form we provide in detail to ensure that we accurately determine the cause of the fault and the location of the damage (we will also provide a fee list for products that are out of warranty and require your confirmation). The technology has the right to "repair" or "replace" the reported product. If the product is "replaced" or "repaired", the replaced "faulty" product or the repaired "faulty" part will be returned to the technology. Due to the need to send some repaired products to the original factory, in order to avoid accidental losses, the picture shows Technology requesting that you purchase transportation insurance. If the user abandons the insurance, the shipped items will be damaged or lost during transportation, and Technology will not be held responsible. For products within the warranty period, the user is responsible for the shipping cost when the repaired product is returned to the manufacturer. The picture shows that Technology is responsible for the shipping cost of returning the repaired product to the user.

The following situations are not covered by the warranty:

1、 Inappropriate installation, improper use, misuse, and abuse of products (such as exceeding work load, etc.)

2、 Product failure or damage caused by improper maintenance and storage (such as fire, explosion, etc.) or natural disasters (such as lightning, earthquake, typhoon, etc.)

3、 Changes to the product (such as circuit characteristics, mechanical characteristics, software characteristics, three proof treatment, etc.)

4、 Other faults that are clearly caused by improper use (such as high voltage, low voltage, high floating voltage, reversed polarity, bent or broken pins, wrong bus connection, device detachment, electrostatic breakdown, external compression, falling under impact, high temperature, high humidity, poor transportation, etc.)

5、 Markings and part numbers on the product have been redacted or removed.

6、 Product out of warranty

Special Note:

If multiple products experience the same malfunction or multiple occurrences of the same malfunction or damage on the same device, it is necessary to identify the cause and confirm responsibility. Our company has the

right to request users to provide physical or technical information on peripheral devices, such as monitors, I/O devices, cables, power supplies, connection diagrams, system architecture diagrams, etc. Otherwise, we have the right to refuse to fulfill the warranty, and repair fees will be charged at market prices and a repair deposit will be collected.