Industrial Touch Panel PC



BLIIOT®

MAKE IIOT EASIER

TPC370 Series User Manual

Version: V1.0

Date: 2026-04-29

Shenzhen Beilai Technology Co.,Ltd

Website: https://www.bliiot.com

Table of Contents

Preface 4
1. Product Introduction 5
1.1 Overview 5
1.2 Technical Specifications 5
1.3 Device Selection 8
1.3.1 Main Model A Selection 8
1.3.2 SOM Selection Table 9
1.3.3 X-Series IO Board Selection 9
1.3.4 Y-Series IO Board Selection 10
2. Hardware Description 11
2.1 Power Interface 11
2.2 Module Port Description 11
2.2.1 X-Board Models and Port Names 11
2.2.2 Y-Board Models and Port Names 13
2.2.3 X-Board Usage 16
2.2.4 Y-Board Usage 17
2.3 DB9 Interface 20
2.4 Network Interfaces 20
2.5 USB Interface 20
2.6 Audio Interface 21
2.7 Debug Interface 21
2.8 SIM Card Slot 21
2.9 SD Card Slot 22
2.10 SW Interface 22
2.11 Reset Button 22
2.12 PCIe Interface 23
2.12.1 4G Module 23
2.12.2 Wi-Fi Module 25
2.13 Antenna Interfaces 25
2.14 Buzzer 26
2.15 Hardware Watchdog 26
2.16 Encryption Chip 27
2.17 SD Card and USB Drive Usage 27
2.18 External RTC 29
3. Ubuntu GUI Description 30
3.1 Power On/Off 30
3.2 Wi-Fi Usage 31
3.3 Wired Network Usage 32
3.4 Audio Interface Usage 39
3.5 USB2.0 Interface Usage 41
3.6 Micro SD Interface Test 42
3.7 Display Instructions 43

4. Device Login 47
4.1 USB Login 47
4.2 SSH Login 47
5.System Flashing 48
5.1 Micro SD Card Boot 49
5.1.1 Boot Card Creation 49
5.1.2 Booting from Boot Card 52
5.2 EMMC Boot 53
5.2.1 Flashing Card Creation 53
5.2.2 System Flashing 54
6. Software Support 55
7.Warranty Terms 56
8. Technical Support 56
9.Appendix 56

Preface

Thank you for choosing the TPC370 series Industrial Touch Panel PC from Shenzhen Beilai Technology Co., Ltd. This user manual will help you quickly understand the functions and usage of this product.

Copyright Notice

The ownership of this manual is held by Shenzhen Beilai Technology Co., Ltd. No individual or organization is permitted to reproduce, distribute, or republish any part of this manual in any form without prior written permission from the company. Offenders shall bear all resulting consequences.

Disclaimer

If the device can no longer be used due to carrier network upgrades, the company does not provide free upgrade services. If carrier network services are interrupted due to special circumstances, the device will not function properly, and the company assumes no responsibility for any resulting consequences.

This product is primarily designed for data transmission applications based on GPRS/3G/4G/network. Please use it according to the parameters and technical specifications provided in this manual. At the same time, please pay attention to the precautions for radio products, especially GPRS/3G/4G products. The company assumes no liability for property damage or personal injury caused by improper or incorrect use of this product.

This product can only use the system versions provided by our company. The company assumes no responsibility for software installation, usage, compatibility issues, or property/personal damage caused by using other systems.

Revision History

Update Date	Version	Description	Revision Content	Author
2026-02-27	V1.0	First Edition	-	PH

1. Product Introduction

1.1 Overview

The TPC370 Industrial Touch Panel PC is a high-performance HMI solution designed specifically for harsh industrial environments. This series is built around low-power, high-performance ARM architecture processors, featuring the Rockchip RK3562/RK3562J quad-core Cortex-A53 + Cortex-M0 processor, with a main frequency up to 1.8GHz/2.0GHz. It integrates a 1 TOPS NPU that supports multiple deep learning frameworks, making it suitable for edge computing and visualization scenarios.

The product comes with a 7-inch industrial-grade high-brightness LCD display, supporting wide temperature operation (-30°C to 70°C). The screen adopts an ultra-thin manufacturing process, offering better flush wall-mounting and flat embedding characteristics. It also features an IP66-rated front panel and IK08 impact resistance, ensuring stable operation under strong light, vibration, and harsh electromagnetic environments. The system supports multiple operating systems including Linux, Yocto, Ubuntu, Debian, and Android, with built-in development tools such as Docker, Node-RED, and Qt. It also integrates proprietary QuickConfig rapid configuration and AI-assisted programming tools, and BLRAT remote operation and maintenance tools, facilitating rapid deployment and secondary development.

The TPC370 Industrial Touch Panel PC offers flexible hardware configurations, including various memory and storage combinations, and rich interface expansion options (such as X/Y series IO boards, Mini PCIe, multiple Ethernet ports, USB, HDMI, etc.). It is widely applicable in factory automation, energy storage systems, outdoor terminals, intelligent transportation, and other fields, making it an ideal platform for industrial edge visualization and control.

1.2 Technical Specifications

Category	Parameter	Description
System	CPU Model	Rockchip RK3562J/RK3562: 4x ARM Cortex-A53 (64-bit), 1x ARM Cortex-M0

	CPU Frequency	RK3562J：normal mode 1.2GHz,overdrive mode 1.8GHz RK3562：2.0GHz ARM Cortex-M0：200MHz
	Memory	1/2/4GByte LPDDR4X
	Storage	8/16/32GByte eMMC
	NPU	1 TOPS, supports INT4/INT8/INT16/FP16 Supports TensorFlow/PyTorch/Caffe/MXNet deep learning frameworks
	GPU	Mali-G52-2EE, supports OpenGL ES 1.1/2.0/3.2, OpenCL 2.0, Vulkan 1.1
Power	Input Voltage	DC 12～24V
	Power Consumption	Normal:250mA@24V Max:800mA@24V
	Reverse Polarity Protection	Supported
Ethernet	Port Spec	2×RJ45, 2×10/100M, auto-sensing MDI/MDIX
	Protection	ESD ±2kV (Contact), ±8kV (Air)
SIM Card	Quantity	1
	Type	Drawer-type interface
USB Interface	Quantity	1*TYPE-C,2*USB 2.0 HOST
SD Card Slot	Quantity	1
	Specification	Supports SD, SDHC, and SDXC (UHS-I) cards
Antenna	Antenna Ports	1×Wi-Fi/Cellular antenna, 1×GPS antenna
	Connector Type	SMA female
SW Interface	Quantity	1
Reset Button	Quantity	1
Buzzer	Quantity	1
DB9 Interface	Serial Ports	2×DB9, optional RS232/RS485/CAN
Encryption Chip	Model	RJGT102

Storage Chip	Model	FM24V10
Phoenix Terminal	Optional Types	X0: 1xCAN, 1x485, 1xDI, 1xDO X1: 4x485 X2: 4x232 X3: 2x232, 2x485 X4: 2xCAN, 2x485 X5: 2xCAN, 2x232 X6: 2x485, 4xGPIO X7: 2x232, 4xGPIO X8: 1xCAN, 1x485, 1x232, 2xGPIO X9: 4xDI, 4xDO X09: 8xDI
4G Module (Optional)	L-E Version	GSM/EDGE:900,1800MHz WCDMA:B1,B5,B8 FDD-LTE:B1,B3,B5,B7,B8,B20 TDD-LTE:B38,B40,B41
	L-CE Version	GSM/EDGE:900,1800MHz WCDMA:B1,B8 TD-SCDMA:B34,B39 FDD-LTE:B1,B3,B8 TDD-LTE:B38,B39,B40,B41
	L-A Version	WCDMA:B2,B4,B5 FDD-LTE:B2,B4,B12
	L-AU Version	GSM/EDGE:850,900,1800MHz WCDMA:B1,B2,B5,B8 FDD-LTE:B1,B3,B4,B5,B7,B8,B28 TDD-LTE:B40
	L-AF Version	WCDMA:B2,B4,B5 FDD-LTE:B2,B4,B5,B12,B13,B14,B66,B71
	CAT-1 Version	GSM:900,1800 FDD-LTE:B1,B3,B5,B8 TDD-LTE:B34,B38,B39,B40,B41
5G Module (Optional)	Redcap Version	5G NR：N1/N3/N5/N8/N28/N41/N78/N79 LTE-FDD：B1/B3/B5/B8 LTE-TD：B34/B38/B39/B40/B41
	N-CN Version	NR：N1/28/41/78/79 LTE：FDD B1/3/5/8

		LTE：TDD B34/38/39/40/41 WCDMA：B1/8
Wi-Fi (Optional)	Interface	PCIe
	Protocol	IEEE 802.11b/g/n
	Mode	STA,AP
	Frequency Band	2.4GHz
	Channels	Ch1 ~ Ch13
	Security	Open,WPA,WPA2
	Encryption	AES,TKIP,TKIPAES
	Max Connections	8 (Max)
	Data Rate	150Mbps (Max)
	SSID Broadcast	Supported
Operating System	Options	Linux, Ubuntu20.04, Android 13
Environment	Operating Temp/Humidity	-40～85℃/0~70℃,5～95% RH
	Storage Temp/Humidity	-40～85℃,5～95% RH
Other	Enclosure	Aluminum alloy + stainless steel
	Dimensions	204.4*151.9*43mm
	Protection Rating	IP30

1.3 Device Selection

1.3.1 Main Model A Selection

Choose the number of X and Y board IO slots according to requirements.

Model	X Board Slot	Y Board Slots	Dimensions
A1	×	×	42×83×110mm
A2	1×10PIN	×	42×83×110mm
A3	1×10PIN	1×10PIN	48×83×110mm
A4	1×10PIN	2×10PIN	42×83×110mm

1.3.2 SOM Selection Table

ROM, RAM, and temperature grade can be selected according to requirements.

Model	MCU	Freq.	Cores	NPU	eMMC	DDR4	Temp. Grade
SOM370	RK3562J	1.8GHz	4 x A53 +M0	1TOPS	8GByte	1GByte	Industrial -40~85℃
SOM371	RK3562J	1.8GHz	4 x A53 +M0	1TOPS	16GByte	2GByte	Industrial -40~85℃
SOM372	RK3562J	1.8GHz	4 x A53 +M0	1TOPS	32GByte	4GByte	Industrial -40~85℃
SOM373	RK3562	2.0GHz	4 x A53 +M0	1TOPS	8GByte	1GByte	Commercial 0~70℃
SOM374	RK3562	2.0GHz	4 x A53 +M0	1TOPS	16GByte	2GByte	Commercial 0~70℃
SOM375	RK3562	2.0GHz	4 x A53 +M0	1TOPS	32GByte	4GByte	Commercial 0~70℃

1.3.3 X-Series IO Board Selection

Select the appropriate X-series IO board according to requirements.

Note: The default port on this device is X0. If other functions are needed, please inform sales.

Model	RS485	RS232	CAN	GPIO/DI/DO	PIN
X0 (Default)	1	×	1	2DI+2DO	1x10PIN
X1	4	×	×	×	1x10PIN
X2	×	4	×	×	1x10PIN
X3	2	2	×	×	1x10PIN
X4	2	×	2	×	1x10PIN
X5	×	2	2	×	1x10PIN
X6	2	×	×	4	1x10PIN
X7	×	2	×	4	1x10PIN
X8	1	1	1	2	1x10PIN
X9	×	×	×	4DI+4DO	1x10PIN
X09	×	×	×	8DI	1x10PIN

1.3.4 Y-Series IO Board Selection

Select the appropriate Y-series IO board. Y-series modules fit all Y slots.

Y-Series IO Board Selection				
Model	**Description**		**Model**	**Description**
Y01	4DI+4DO module NPN		Y41	4CH AO output 0/4~20mA
Y02	4DI+4DO module PNP		Y43	4-channel AO output 0~5/10V
Y11	8CH DI module NPN (wet contact)		Y46	4CH AO output ±5V/±10V
Y12	8CH DI module PNP (wet contact)		Y51	2CH RTD module 3-wire PT100
Y13	8CH DI module (dry contact)		Y52	2CH RTD module 3-wire PT1000
Y21	8CH DO module PNP		Y53	2CH RTD module 4-wire PT100
Y22	8CH DO module NPN		Y54	2CH RTD module 4-wire PT100
Y24	4CH DO module relay		Y58	4CH TC module
Y31	4CH AI module single-ended 0/4~20mA		Y63	4CH RS485/RS232 module
Y33	4CH AI module single-ended 0~5/10V		Y95	4CH PWM output + 4CH pulse counting (1 high-speed, 3 low-speed), NPN
Y34	4CH AI module differential 0~5/10V		Y96	4CH PWM output + 4CH pulse counting (1 high-speed, 3 low-speed), PNP
Y36	4CH AI module differential ±5V/±10V			

2. Hardware Description

2.1 Power Interface



The device provides one input channel. Supports DC 12~24V input with reverse polarity protection.

2.2 Module Port Description

Different serial ports are available depending on the X/Y board. Please refer to the relevant module manual for specific usage. Currently available board types are as follows.

2.2.1 X-Board Models and Port Names



X0 Module (2DI+2DO+1CAN+1RS485)										
Port No.	1	2	3	4	5	6	7	8	9	10
Name	DI1	DI2	CAN 1-H	CAN 1-L	GND -IOS	GND	ttyS4-A	ttyS4-B	DO1	DO2

X1 Module (4 x RS485)										
Port No.	1	2	3	4	5	6	7	8	9	10

Name	ttyS2-A	ttyS2-B	ttyS3-A	ttyS3-B	GND-IOS	GND	ttyS4-A	ttyS4-B	ttyS9-A	ttyS9-B

X2 Module (4 x RS232)										
Port No.	1	2	3	4	5	6	7	8	9	10
Name	ttyS2-TX	ttyS2-RX	ttyS3-TX	ttyS3-RX	GND-IOS	GND	ttyS4-TX	ttyS4-RX	ttyS9-TX	ttyS9-RX

X3 Module (2xRS232+2xRS485)										
Port No.	1	2	3	4	5	6	7	8	9	10
Name	ttyS2-A	ttyS2-B	ttyS3-A	ttyS3-B	GND-IOS	GND	ttyS4-TX	ttyS4-RX	ttyS9-TX	ttyS9-RX

X4 Module (2xCAN+2xRS485)										
Port No.	1	2	3	4	5	6	7	8	9	10
Name	CAN0-H	CAN0-L	CAN1-H	CAN1-L	GND-IOS	GND	ttyS4-A	ttyS4-B	ttyS9-A	ttyS9-B

X5 Module (2xCAN+2xRS232)										
Port No.	1	2	3	4	5	6	7	8	9	10
Name	CAN0-H	CAN0-L	CAN1-H	CAN1-L	GND-IOS	GND	ttyS4-TX	ttyS4-RX	ttyS9-TX	ttyS9-RX

X6 Module (2xRS485+4xGPIO)										
Port No.	1	2	3	4	5	6	7	8	9	10
Name	ttyS2-A	ttyS2-B	ttyS3-A	ttyS3-B	GND-IOS	GND	GPIO7	GPIO8	GPIO9	GPIO10

X7 Module (2xRS232+4xGPIO)

Port No.	1	2	3	4	5	6	7	8	9	10
Name	ttyS2-TX	ttyS2-RX	ttyS3-TX	ttyS3-RX	GND-IOS	GND	GPIO7	GPIO8	GPIO9	GPIO10

X8 Module (1xCAN+1xRS485+1xRS232+2xGPIO)										
Port No.	1	2	3	4	5	6	7	8	9	10
Name	CAN0-H	CAN0-L	ttyS3-A	ttyS3-B	GND-IOS	GND	ttyS4-TX	ttyS4-RX	GPIO9	GPIO10

X9 Module (4DI+4DO)										
Port No.	1	2	3	4	5	6	7	8	9	10
Name	DI1	DI2	DI3	DI4	DI_COM	GND	DO1	DO2	DO3	DO4

X09 Module (8DI dry/wet contact)										
Port No.	1	2	3	4	5	6	7	8	9	10
Name	DI1	DI2	DI3	DI4	GND	DI_COM	DI5	DI6	DI7	DI8

Note: GND is the common terminal for dry contact DI, DI_COM is the common terminal for wet contact DI.

2.2.2 Y-Board Models and Port Names



Y01 Module (4 NPN DI + 4 NPN DO)										
Port No.	1	2	3	4	5	6	7	8	9	10
Name	DO	DO	DO	DO4	GND_IO	DI_COM	DI1	DI2	DI3	DI4

	1	2	3		S					

Note: GND_IOS is the common terminal for DO wet contact, DI_COM is the common terminal for dry contact DI.

Y02 Module (4 PNP DI + 4 PNP DO)										
Port No.	1	2	3	4	5	6	7	8	9	10
Name	DO 1	DO 2	DO 3	DO 4	GND_IOS	DI_COM	DI1	DI2	DI3	DI4

Note: GND_IOS is the common terminal for DO wet contact, DI_COM is the common terminal for dry contact DI.

Y11 Module (8 NPN DI)										
Port No.	1	2	3	4	5	6	7	8	9	10
Name	DI1	DI2	DI3	DI4	DI_COM	DI_COM	DI5	DI6	DI7	DI8

Note: DI_COM is the common terminal for dry contact.

Y12 Module (8 PNP DI)										
Port No.	1	2	3	4	5	6	7	8	9	10
Name	DI1	DI2	DI3	DI4	DI_COM	DI_COM	DI5	DI6	DI7	DI8

Note: DI_COM is the common terminal for dry contact.

Y21 Module (8 PNP DO)										
Port No.	1	2	3	4	5	6	7	8	9	10
Name	DO 1	DO 2	DO 3	DO 4	GND_IOS	GND_IOS	DO 5	DO 6	DO 7	DO 8

Note: GND_IOS is the common terminal for DO wet contact.

Y22 Module (8 NPN DO)										
Port No.	1	2	3	4	5	6	7	8	9	10
Name	DO 1	DO 2	DO 3	DO 4	GND_IOS	GND_IOS	DO 5	DO 6	DO 7	DO 8

Note: GND_IOS is the common terminal for DO wet contact.

Y24 Module (4-channel relay)										
Port No.	1	2	3	4	5	6	7	8	9	10
Name	AO1+	AO1-	AO2+	AO2-	/	/	AO3+	AO3-	AO4+	AO4-

Y31 Module (4-channel 4~20mA/0~20mA analog single-ended input)										
Port No.	1	2	3	4	5	6	7	8	9	10
Name	AI1+	AI1-	AI2+	AI2-	GND	GND	AI3+	AI3-	AI4+	AI4-

Y33 Module (4-channel 0~5V/0~10V analog single-ended input)										
Port No.	1	2	3	4	5	6	7	8	9	10
Name	AI1+	AI1-	AI2+	AI2-	/	/	AI3+	AI3-	AI4+	AI4-

Y34 Module (4-channel 0~5V/0~10V analog differential input)										
Port No.	1	2	3	4	5	6	7	8	9	10
Name	AI1+	AI1-	AI2+	AI2-	/	/	AI3+	AI3-	AI4+	AI4-

Y36 Module (4-channel -5~5V/-10~10V analog differential input)										
Port No.	1	2	3	4	5	6	7	8	9	10
Name	AI1+	AI1-	AI2+	AI2-	/	/	AI3+	AI3-	AI4+	AI4-

Y41 Module (4-channel 4~20mA/0~20mA analog single-ended output)										
Port No.	1	2	3	4	5	6	7	8	9	10
Name	AO1+	AO1-	AO2+	AO2-	/	/	AO3+	AO3-	AO4+	AO4-

Y43 Module (4-channel 0~5V/0~10V analog single-ended output)										
Port No.	1	2	3	4	5	6	7	8	9	10
Name	AO1+	AO1-	AO2+	AO2-	/	/	AO3+	AO3-	AO4+	AO4-

Y46 Module (4-channel -5~5V/-10~10V analog single-ended output)										
Port No.	1	2	3	4	5	6	7	8	9	10
Name	AO1+	AO1-	AO2+	AO2-	/	/	AO3+	AO3-	AO4+	AO4-

Y51 Module (2-channel RTD 3-wire PT100)										
Port No.	1	2	3	4	5	6	7	8	9	10
Name	/	PT1+	PT1-	PT1-	/	/	/	PT2+	PT2-	PT2-

Y52 Module (2-channel RTD 3-wire PT1000)										
Port No.	1	2	3	4	5	6	7	8	9	10
Name	/	PT1+	PT1-	PT1-	/	/	/	PT2+	PT2-	PT2-

Y53 Module (2-channel RTD 4-wire PT100)										
Port No.	1	2	3	4	5	6	7	8	9	10
Name	PT1+	PT1+	PT1-	PT1-	/	/	PT2+	PT2+	PT2-	PT2-

Y54 Module (2-channel RTD 4-wire PT1000)										
Port No.	1	2	3	4	5	6	7	8	9	10
Name	PT1+	PT1+	PT1-	PT1-	/	/	PT2+	PT2+	PT2-	PT2-

Y58 Module (4-channel TC temperature measurement)										
Port No.	1	2	3	4	5	6	7	8	9	10
Name	T1+	T1-	T2+	T2-	/	/	T3+	T3-	T4+	T4-

Y63 Module										
Port No.	1	2	3	4	5	6	7	8	9	10
Name	ttyWCH0-A	ttyWCH0-B	ttyWCH1-A	ttyWCH1-B	GND	GND	ttyWCH2-A	ttyWCH2-B	ttyWCH3-A	ttyWCH3-B

2.2.3 X-Board Usage

Note: X-board port usage applies only to the selected X-board function type.

DI and DO Port Usage

Enter the/sys/class/beilai/directory and enter ls to view the controllable IO ports:

```
root@bliiot:/sys/class/beilai# ls
DI1  DI2  DI3  DI4  DO1  DO2  DO3  DO4
```

Taking DI1 (dry contact) on X9 as an example: DI status 0 = open / 0~3V, 1 = closed / 10~30V.

```
root@bliiot:/sys/class/beilai/DI1# ls
cfg  data  device  drv  power  pull  subsystem  uevent
```

Check data value to see DI1 status :

```
root@bliiot:/sys/class/beilai/DI1# cat data
0
```

For DO, change data value to change DO status. For example, writing 0 makes DO1 conduct with GND:

```
root@bliiot:/sys/class/beilai/DO1# echo  0  > data
```

GPIO Port Usage

Enter the/sys/class/gpio/directory, enter ls to view the controllable GPIO ports, and then configure them:

```
root@bliiot:/sys/class/gpio# ls
gpio116   gpio119   gpio49   gpio50   gpio51   gpio52   gpio54   gpio53
root@bliiot:# echo 116 > /sys/class/gpio/export
//Apply to the kernel to use the GPIO 116 pin
root@bliiot:# echo out > /sys/class/gpio/gpio116/direction
//Set GPIO 116 pin to output mode. In (input), out (output), high (output high level), low (output low level).
root@bliiot:# echo 1 > /sys/class/gpio/gpio116/value
//Output high level to GPIO 116 pin. 0 indicates low level, and 1 indicates high level.
```

RS232/485 Port Usage

When using the RS232/485 serial port, connect the RS232/485 cable to the port, such as the RS485-1 port. The device file is/dev/ttyS2; Set its baud rate to 115200, 8N1, without check bit.

```
stty -F /dev/ttyS2 ispeed 115200 ospeed 115200 cs8
echo 12345 > /dev/ttyS2          //Send data through RS485-1 port
cat /dev/ttyS2                   //Wait to view the received data
```

Press Ctrl+C to stop.

CAN Port Usage

Take CAN0 as an example, set the bit rate of the configured CAN bus to 1Mbps, and start the CAN bus.

```
root@bliiot:~# ifconfig can0 down
root@bliiot:~# ip link set can0 type can bitrate 1000000
root@bliiot:~# ifconfig can0 up
```

CAN0 sends data:

```
root@bliiot:~# cansend can0 123#1122334455667788
```

CAN0 waiting to receive data:

```
root@bliiot:~# candump can0
```

If CAN0 receives the data normally, it should be received if it is sent by other equipment.

```
root@bliiot:~# candump can0
 can0   123    [8]   11 22 33 44 55 66 77 88
```

2.2.4 Y-Board Usage

(1)Software Installation

The corresponding file location is in the/io folder. The actual name shall be subject to

the document.

Execute chmod+x BEILAI_IOy_RK3562_APC_V1.0.0_20251121.bin for BEILAI_IOy_RK3562_APC_V1.0.0_20251121.bin. Then install the software.

```
root@bliiot:/# chmod +x BEILAI_IOy_RK3562_APC_V1.0.0_20251121.bin
root@bliiot:/# ./BEILAI_IOy_RK3562_APC_V1.0.0_20251121.bin
Md5 verify pass!
tar: ./iolib: time stamp 2024-05-29 09:16:25 is 1716973791.042311023 s in the future
tar: ./ioy: time stamp 2024-06-25 03:05:22 is 1719284328.036465231 s in the future
tar: ./S90iolib: time stamp 2024-05-27 07:47:16 is 1716795642.036139981 s in the
future
Install complete!
Restarting iolib:
Stopping iolib: stopped iolib (pid 1568)
OK
Starting iolib: OK
```

(2)Port Usage

The corresponding file location is in the/io folder. The actual name shall be subject to the document.

Enter ioy show to view IO board info, ioy help for command help.

Enter ioy help to view the command help:

```
Usage: ioy <command> [<arguments>]

Commands:
        show
        get             <address>|<slot>.<channel>
        set             <address>|<slot>.<channel> <value>
        config          <address>|<slot>.<channel> mode <mode>,
                        <address>|<slot>.<channel> min <min-value> max <max-value>

config mode:
        ai|ao           4t20(4~20mA),0t20(0~20mA),0t5(0~5V),0t10(0~10V),
                        -5t5(-5~5V),-10t10(-10~10V)
        rtd             pt100-3(pt100 3wire),pt100-4(pt100 4wire),
                        pt1000-3(pt1000 3wire),pt1000-4(pt1000 4wire)
        tc              k,j,e,t,s,r,b,n
```

Take the DI module as an example. Short circuit DI2 and enter ioy show to view the information. Y1 and Y2 positions are distinguished according to the slot.

slot	name	channel	address	mode	value	min	max
2	Y12	1	2000	*	0	0.0000	0.0000
2	Y12	2	2001	*	1	0.0000	0.0000
2	Y12	3	2002	*	0	0.0000	0.0000
2	Y12	4	2003	*	0	0.0000	0.0000
2	Y12	5	2004	*	0	0.0000	0.0000
2	Y12	6	2005	*	0	0.0000	0.0000
2	Y12	7	2006	*	0	0.0000	0.0000
2	Y12	8	2007	*	0	0.0000	0.0000

You can also obtain the channel value through the get command:

```
root@bliiot:/# ioy get 2004       //View through address
address 2004 value 1
root@bliiot:/# ioy get 2.5        //View through<slot>.<channel>
```

slot 2 channel 5 value 1

Take the AO module as an example, enter ioy show to view information.

slot	name	channel	address	mode	value	min	max
2	Y41	1	4000	4t20	4.0000	4.0000	20.0000
2	Y41	2	4002	4t20	4.0000	4.0000	20.0000
2	Y41	3	4004	4t20	4.0000	4.0000	20.0000
2	Y41	4	4006	4t20	4.0000	4.0000	20.0000
2	Y41	5	4008	4t20	4.0000	4.0000	20.0000
2	Y41	6	4010	4t20	4.0000	4.0000	20.0000
2	Y41	7	4012	4t20	4.0000	4.0000	20.0000
2	Y41	8	4014	4t20	4.0000	4.0000	20.0000

The mode type is displayed as 4t20, which corresponds to the 4-20mA current output in the config mode of the ioy help. Set the channel value through the set command:

root@bliiot:/# ioy set 4000 10 //Output 10mA through address setting.

root@bliiot:/# ioy set 2.1 10 //Set through<slot>.<channel>

root@bliiot:~# ioy get 4000

address 4000 value 10.000000

（3）Port Configuration

Through the ioy help command, you can see the command format of config.

```
Usage: ioy <command> [<arguments>]

Commands:
        show
        get             <address>|<slot>.<channel>
        set             <address>|<slot>.<channel> <value>
        config          <address>|<slot>.<channel> mode <mode>,
                        <address>|<slot>.<channel> min <min-value> max <max-value>

config mode:
        ai|ao           4t20(4~20mA),0t20(0~20mA),0t5(0~5V),0t10(0~10V),
                        -5t5(-5~5V),-10t10(-10~10V)
        rtd             pt100-3(pt100 3wire),pt100-4(pt100 4wire),
                        pt1000-3(pt1000 3wire),pt1000-4(pt1000 4wire)
        tc              k,j,e,t,s,r,b,n
```

To change the 4-20mA range to 0-20mA, the following two commands can be realized:

root@bliiot:/# ioy config 4000 mode 0t20

root@bliiot:/# ioy config 2.1 mode 0t20 //Range changed to 0-20mA

Change the minimum value and maximum value corresponding to the range:

root@bliiot:/# ioy config 4000 min 0 max 20 //The minimum and maximum values are changed to 0 and 20

（4）Y63 Module Usage

"TtyWCHX-A" and "ttyWCHX-B" in TPC370 represent a group of RS485 serial ports. When using the RS485 serial port, connect the RS485 cable to the port. For example, there are ttyWCH0-A and ttyWCH0-B ports in the Y63 module, and the device file is/dev/ttyWCH0; Set its baud rate to 115200, 8N1, without check bit.

stty -F /dev/ttyWCH0 ispeed 115200 ospeed 115200 cs8

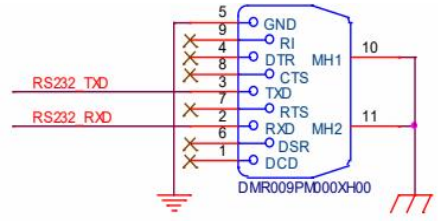
echo 12345 > /dev/ttyWCH0 //Send data through RS485-1 port

cat /dev/ttyWCH0 //Wait to view the received data

Press Ctrl+C to stop.

2.3 DB9 Interface





The device has two DB9 ports COM1 and COM2, configurable as RS485/RS232/CAN (1~2 ports each). Pinout: 2,3,5 used. For RS232: pin2=RXD, pin3=TXD, pin5=GND. For RS485: pin2=B/-, pin3=A/+. For CAN: pin2=CAN-L, pin3=CAN-H.
Note: COM1 shares functions with X-board ports 1&2; COM2 shares with X-board ports 3&4.

2.4 Network Interfaces



The device is equipped with up to two 100M Ethernet ports ETH0, ETH1.

2.5 USB Interface



As shown in the figure, the device is equipped with two USB2.0 HOST interfaces. Support FAT32 format USB flash disk.
If USB is used to read and write data to the USB stick, use the sync command to

synchronize to prevent data loss.

2.6 Audio Interface



MIC IN and SPK OUT as shown.

Microphone usage:

```
root@bliiot:/# amixer -c 0 cset name='Capture MIC Path' 'Main Mic'
//Set the recording device to Mic
root@bliiot:/# amixer -c 0 cset name='Capture Volume' 255
//Set the recording volume to 255, ranging from 0 to 255
root@bliiot:~# arecord -c 1 -f S16_LE -r 44100 -d 10 -t wav /test.wav          //Record
a 10s voice
```

The following commands can be executed when the horn is used.

```
root@bliiot:/# amixer -c 0 cset name='Playback Path' 'HP'
//Set the playback device to HP (SPK OUT)
root@bliiot:/# amixer -c 0 cset name='Playback Volume' 200
//Set the playback volume to 200, ranging from 0 to 255
root@bliiot:~# aplay /test.wav     //Play a 10s voice
```

2.7 Debug Interface



Debug port as shown, used for system access.

2.8 SIM Card Slot



SIM card slot as shown.

2.9 SD Card Slot



SD card slot is as shown in the figure, which supports FAT32 SD card.
After using this port to read and write data, use the sync command to synchronize to prevent data loss.

2.10 SW Interface



After using this port for data short connection, the first short circuit device is shut down, and the second short circuit device is restarted.

2.11 Reset Button



The restart button is shown in the figure. Press and release to restart the device.

2.12 PCIe Interface

PCIe interface supports 4G and WiFi functions.

2.12.1 4G Module

Using Quectel EC20 as example; test programs in /usr/demo/4G. Insert SIM and antenna.

(1)Network function

Turn off the other networks, leaving only the 4G module network.

```
ifconfig eth1 down
ifconfig eth2 down
udhcpc -i usb0
ifconfig
```

At this time, the network node usb0 should be generated. If there is no such node, it may be that the module does not enable the network function by default. You can try to execute the following command to configure the 4G module. (The AT command port of EC200 series module is/dev/ttyUSB1)

```
microcom /dev/ttyUSB2
AT+QCFG="USBNET",1
```

If you use the EC200 module, you need to add a command to connect to the network:

```
AT+QNETDEVCTL=3,1,1
```

After the execution, the device returns "OK", indicating that the configuration is successful. This configuration only needs to be set once. Restart the device to generate a usb 0 node, and then re execute the network shutdown and startup commands. After generating the usb 0 node, execute the following command to test whether the network function is normal.

```
ping www.baidu.com -I usb0
```

(2)SMS function

Execute the test command in the test program directory to test the SMS function:

```
./send_sms <device> <phonenumber> <text>
```

Command description:<device>is a 4G module device node. <phonenumber>is the target phone number for sending SMS. <text>Send content for SMS. No space is allowed between the characters of SMS content, or an error will be prompted.

For example:./send_sms /dev/ttyUSB2 152******** test

At this time, the corresponding number should receive a text message with the content of "test".

(3)Call function

Execute the test command in the test program directory to test the dialing function:

```
./phone_call <device> <phonenumber>
```

Command description:<device>is a 4G module device node. <phonenumber>is the target phone number to dial.

For example:./phone_call /dev/ttyUSB2 152********

At this time, the corresponding number should receive a call from the device.

(4)GPS function

Execute the test command in the test program directory to test the GPS function:

```
./get_location <device> <timeout>
```

Command description:<device>is the device node. The results of the "ls/dev/ttyUSB *" command will prevail. It may change after restarting the device. <timeout>is the time (in seconds) to wait for the return of longitude and latitude information.

For example:./get_location /dev/ttyUSB2 1

Note: It takes several minutes to acquire longitude and latitude. If the acquisition fails or times out, please check whether the antenna is connected properly and ensure that the test is conducted in an open area.

(5)4G module is used in some countries

Some countries cannot access the Internet through normal commands when using the 4G module, so the 4G module needs to be changed to USB interface mode, and the network node wan0 should be generated at this time. If there is no such node, it may be that the module does not enable the network function by default. You can try to execute the following command to configure the 4G module. (The AT command port of EC200 series module is/dev/ttyUSB1)

```
microcom /dev/ttyUSB2
AT+QCFG="usbnet",0
Then exit.
```

When using the 4G module, you need to use the APN and account password. You can use the quertel CM application in the/usr/demo/4G folder. If you do not need to set APN, you can run the program directly to access the Internet. If you want to set APN, you need to follow the following format:

```
quecteb-CM -s "your_apn" -m "your_apn_username" -v "your_apn_password"
```

Note: your_apn: operator name, your_apn_username: operator name, your_apn_password: operator password. The quotation marks are part of the parameters and are in English. For more parameters that can be entered, you can enter the following commands to view them:

```
quecteb-CM -h
```

Before use, it is required to ensure that the wwan0 network interface has been enabled. The startup command is:

```
ifconfig wwan0 up
```

When executing the quecteb CM application, you need to ensure that the application runs in the background. If the application exits, you will not be able to connect to the network normally. Set the quecteb CM program to run in the background as follows:

```
quecteb-CM -s ”your_apn” -m ”your_apn_username” -v ”your_apn_password” &
```

Note: there is an "&" at the end of the instruction.

2.12.2 Wi-Fi Module

Using BL-R8188EU2 (2.4GHz). Driver and test programs in /usr/demo/wifi. Connect antenna.

(1)STA function

Enter the test program directory, shut down other networks, keep only the Wi-Fi network, and load the WiFi driver.

```
ifconfig eth1 down
ifconfig eth2 down
insmod -f 8188eu.ko                  //Load wifi driver
ifconfig wlan0 up                    //The network card name shown in ifconfig shall prevail
```

Execute the following command to connect the device to the specified Wi-Fi network. -I is followed by the wifi name, and - p is followed by the wifi password.

```
./wifi_setup.sh -i bliiot -p bebetter
```

You can view the obtained IP address through ifconfig, and execute the following command to test whether the network function is normal.

```
ping www.baidu.com
```

(2)AP function

After restarting the system, enter the directory where the test program is located, close other networks, keep only the Wi-Fi network, and load the Wi-Fi driver.

```
ifconfig eth1 down
ifconfig eth2 down
insmod -f 8188eu.ko
ifconfig wlan0 up
```

Execute the following command to set the Wi-Fi module to AP mode.

```
./ap_setup.sh
```

The default WIF name is rtl8188eu, and the password is 88888888, which can be modified in the rtl_hostapd_2G.conf configuration file.

2.13 Antenna Interfaces



The antenna interface includes a Wi-Fi antenna interface and a 4G antenna interface.
Note: The Wi-Fi port is fixed to the Wi-Fi signal antenna. If there is no Wi-Fi, it will not be connected; The 4G port is fixed to the 4G signal antenna. If there is no 4G antenna, it will not be connected.

2.14 Buzzer

The equipment has a built-in passive buzzer, which can operate the following commands to adjust the signal cycle and duty cycle.
First, you need to "export" a PWM channel through the export file, and then you can configure the buzzer.

```
root@bliiot: echo 0 > /sys/class/pwm/pwmchip3/export
```

Execute the following commands to change the cycle and duty cycle of the signal.

```
root@bliiot:echo 1000000 > /sys/class/pwm/pwmchip3/pwm0/period
//1000000 nanoseconds (i.e. 1 millisecond) corresponds to a 1kHz PWM signal
root@bliiot:echo 500000 > /sys/class/pwm/pwmchip3/pwm0/duty_cycle
//500000 nanoseconds (i.e. 0.5 milliseconds) corresponds to 50% duty cycle of high level
root@bliiot:echo normal > /sys/class/pwm/pwmchip3/pwm0/polarity
```

Then execute the following commands to turn on and off the buzzer.

```
root@bliiot:echo 1 > /sys/class/pwm/pwmchip3/pwm0/enable    //Enable buzzer
root@bliiot:echo 0 > /sys/class/pwm/pwmchip3/pwm0/enable    //Deactivation buzzer
```

2.15 Hardware Watchdog

The hardware watchdog timeout is 30ms. If you need to turn off the hardware watchdog, you need to uninstall the bl370_watchdog.ko module:

```
root@bliiot: rmmod -f bl370_watchdog.ko
```

If you need to restart the hardware watchdog, you need to reload the bl370_watchdog.ko module in the/usr/demo/watchdog directory:

```
root@bliiot:cd /usr/demo/watchdog/
root@bliiot: insmod -f bl370_watchdog.ko
```

2.16 Encryption Chip

The encryption chip model is RJGT102. The encryption authentication algorithm based on SHA-256 provides configurable watchdog timer and external reset function, communicates with MCU through I ² C-5 serial interface, and the chip supports low power consumption mode.

The demo of the encryption chip used in the device is written to the encryption chip by/proc/sys/kernel/random/uuid, while reserving the uuid to/usr/rjgt_unique.json. When using, the data of the encryption chip is taken out for comparison. If the external data is the same as the internal data of the encryption chip, it is verified by encryption. Please modify the cross compiler path in the Makefile file and make compilation; Or refer to RJGT102 Data Manual.

Run the sample program rigt102. If the uuid is correct, the following reply will appear.

```
root@bliiot: ./rigt102
open unique file failed, create unique file!
random uuid would write rjgt102 : b6275e22-4928-4828-88fb-54a6fd8!
Contrast success
```

root@bl The encryption chip model is RJGT102. The encryption authentication algorithm based on SHA-256 provides configurable watchdog timer and external reset function, communicates with MCU through I ² C-5 serial interface, and the chip supports low power consumption mode.

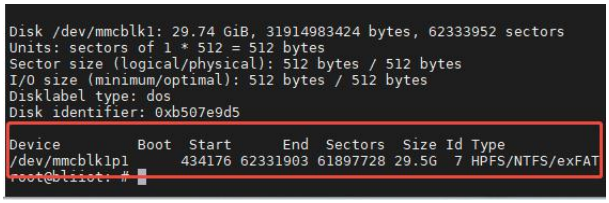
2.17 SD Card and USB Drive Usage

If the storage format of the USB flash disk and SD card is not FAT32 format, the USB flash disk and SD card need to be formatted (the data in the USB flash disk and SD card will be cleared during formatting, and it needs to be backed up in advance).

Check the hard disk attachment.

```
fdisk -l
```

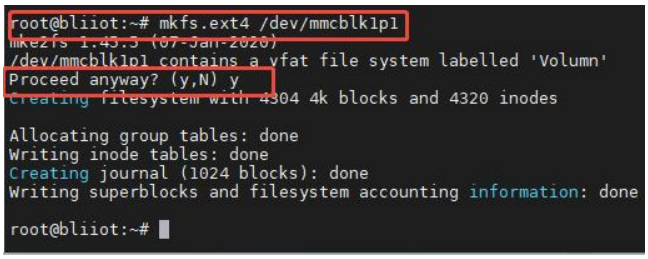
Find the unmounted USB stick and SD card.



Format the USB stick and SD card. Take the SD card mmcblk1p1 as an example to format mmcblk1p1:

```
mkfs.ext4 /dev/mmcblk1p1
```

Prompt to confirm whether to format, and enter y to start formatting:



After formatting, the USB stick and SD card can be mounted normally. Enter the following command to mount them:

```
mkdir /mnt/data
mount /dev/mmcblk1p1 /mnt/data
```

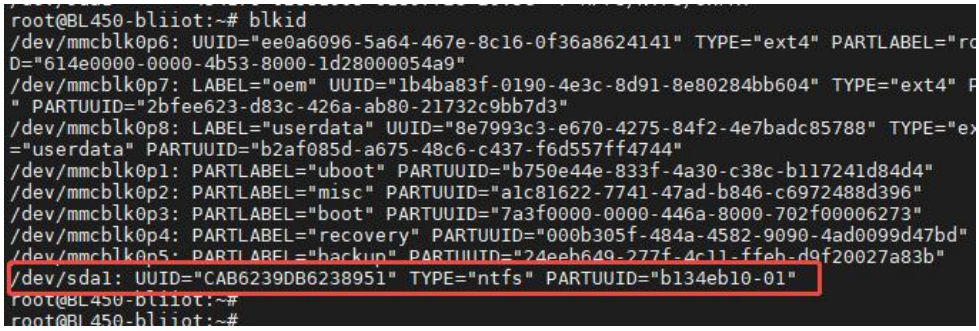
The USB stick and SD card can be used normally after the mount is successful.

The USB stick and SD card need to be uninstalled after use. Enter the following command to uninstall:

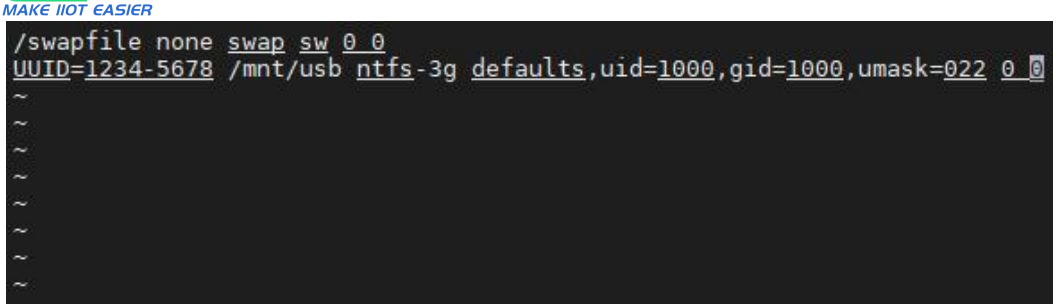
```
umount /mnt/data
```

If permanent mounting is required, perform the following steps:

1. Determine the device: Insert the device and use the following command to view it: sudo fdisk - l or lsblk - f. Record the UUID and file system type of the device (such as ext4, ntfs, vfat, etc.).
2. Create a mount point: For example, if we want to mount to/mnt/usb, then: sudo mkdir - p/mnt/usb
3. Obtain UUID: Use the blkid command or view the output of lsblk - f to find the UUID of the corresponding device.



4. Edit/etc/fstab: sudo nano/etc/fstab to add a line at the end of the file. The format is as follows: UUID=<UUID of the device><mount point><file system type><mount options><dump backup settings><file system check order>For example, an NTFS formatted USB flash drive can be written as follows: UUID=1234-5678/mnt/usb ntfs-3g defaults, uid=1000, gid=1000, umask=022 0 0 For the ext4 file system commonly used in Linux: UUID=abcd1234/mnt/ssd ext4 defaults 0 2 For FAT32 format (vfat): UUID=1234-5678/mnt/sd vfat defaults, uid=1000, gid=1000, umask=000 0 0 Note: uid and gid set users and groups, and umask set permission masks (for example, 000 means all users can read and write).



5. If you do not want to specify a user, you can omit the uid, gid, umask and other options and use only defaults.
6. For NTFS, you need to install ntfs-3g (usually installed) and use ntfs-3g as the file system type, or write ntfs directly (some systems may be symlinked to ntfs-3g).
7. For exFAT, you need to install exfat fuse and exfat utils, and then use exfat as the file system type.
8. Test: After saving/etc/fstab, run the following command to test whether there are errors: sudo mount - a If there is no error message, the mount succeeds, and the file can be seen at the mount point.
9. Permission settings: If the permissions do not meet the requirements after mounting, you can adjust them in the mounting options, or use the chown and chmod commands to modify them after mounting. Important: If the/etc/fstab configuration is incorrect, the system may fail to start. Therefore, you must use sudo mount - a to test before restarting. If the test mount fails, correct/etc/fstab according to the error message. In addition, for removable devices (such as USB flash drives and SD cards), if you want to mount them only when they are inserted and allow users to unload them safely, you can consider using the udisks2 and udev rules to achieve automatic mounting (but this is not permanent, but plug and play). The way of/etc/fstab is to mount it every time it is started, which is applicable to fixed connected devices. Therefore, if the USB flash drive and SD card are not always connected to the system, it may not be appropriate to use/etc/fstab for permanent mounting, because if the device does not exist during startup, the system will report an error and enter the emergency mode. To avoid this situation, you can add the nofail option to the mount option, so that the system will continue to start even if the device does not exist. For example: UUID=1234-5678/mnt/usb ntfs-3g defaults, nofail 0 0, even if the device is not connected during startup, the system startup will not be affected.

2.18 External RTC

This equipment contains an external RTC clock.
View RTC node:

```
root@bliiot:~# ls /dev/rtc*
```

```
/dev/rtc     /dev/rtc0
root@bliiot:~# dmesg | grep rtc0
[ 4.319167] rtc-isl1208 5-006f: rtc core: registered rtc-isl1208 as rtc0
```

Check system time:

```
root@bliiot:~# date
Tue Jul 05 01:22:15 UTC 2024
```

Set system time and write to RTC:

```
root@bliiot:~# date -s "2025-7-05 09:24:00" && hwclock -w -f /dev/rtc0
root@bliiot:~# hwclock -f /dev/rtc0
```

Sync system to RTC:

```
root@bliiot:~# hwclock --systohc -u
root@bliiot:~# hwclock -u
```

Sync RTC to system:

```
root@bliiot:~# hwclock --hctosys -u
```

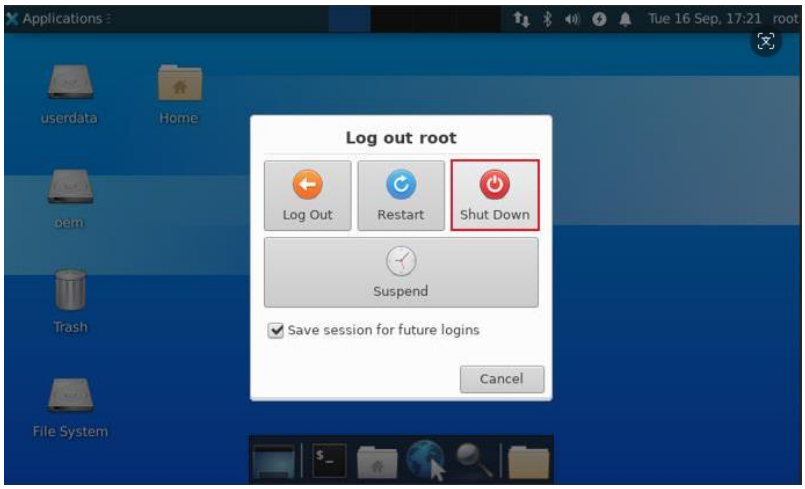
After the instruction is executed, the system will synchronize the RTC clock as the system clock.

3. Ubuntu GUI Description

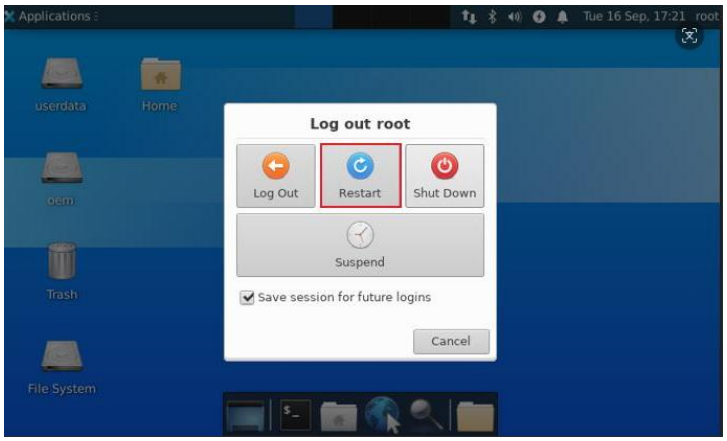
3.1 Power On/Off

Click the "root" on the top right corner of the desktop, select the "Log Out" option, and the "Log Out root" interface pops up. Click the "Shut Down" button, and the screen displays "Shutdown". The system enters the shutdown state.



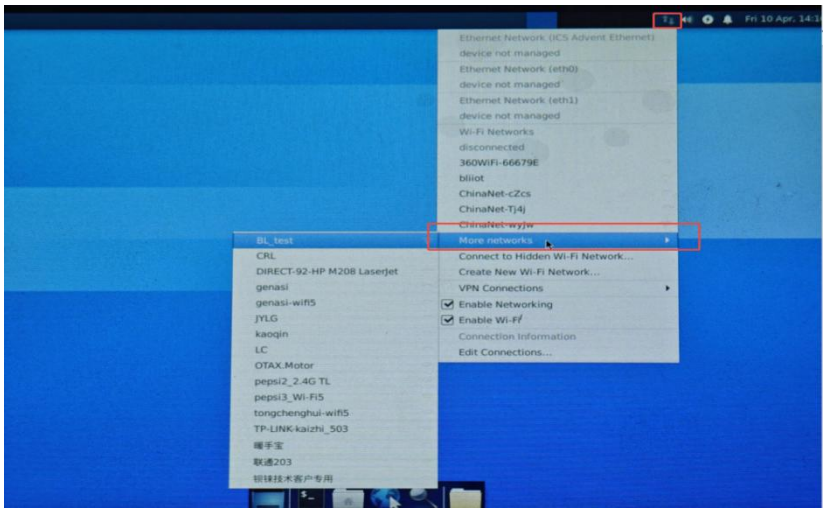


If you click "Restart" in the "LogOutroot" interface that pops up, the screen displays "Shutdown" and the device restarts.



3.2 Wi-Fi Usage

If the equipment is installed with Wi-Fi module, please connect the Wi-Fi antenna adapter cable to the Wi-Fi interface of the equipment. Then select the Wi Fi name you want to connect to, and enter the password to connect to Wi Fi.



After the connection is successful, the following window will pop up, and you can view the connected Wi Fi name in bold. At this time, click the taskbar icon to open the desktop browser to access the website normally.

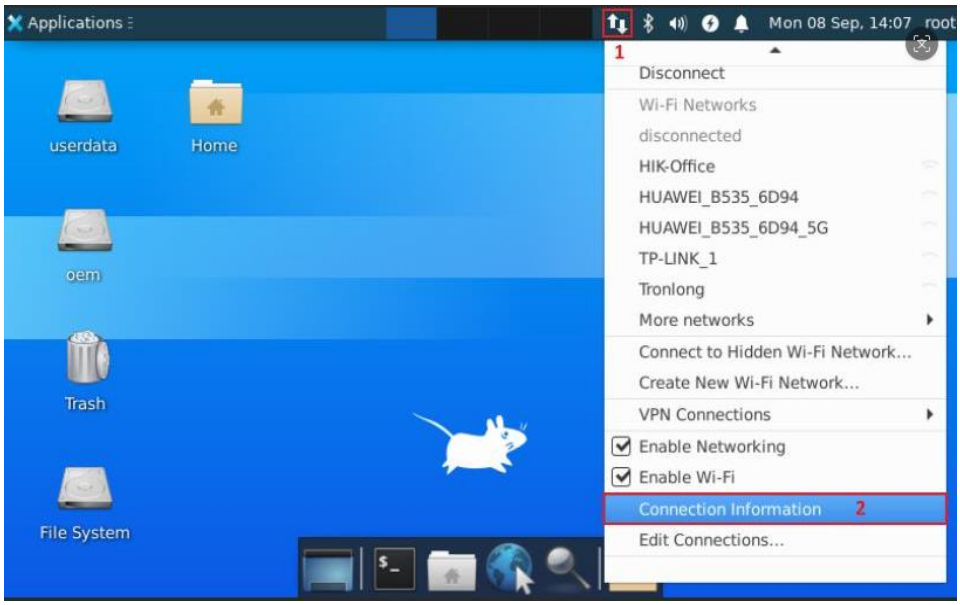


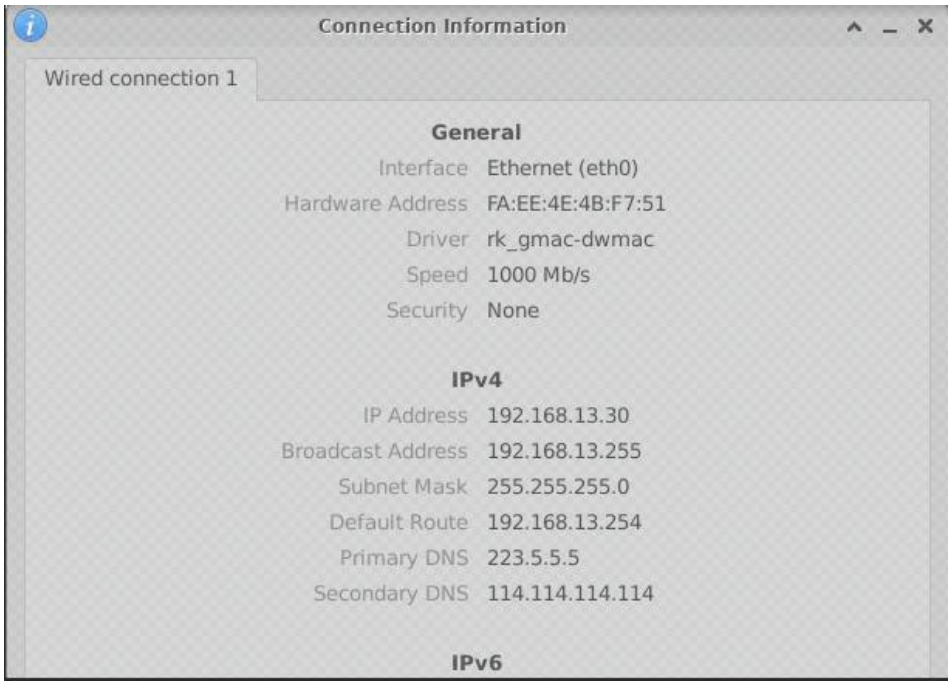
3.3 Wired Network Usage

This section is based on the equipment ETH0, and the ETH1 test method is the same. Please use the network cable to connect the device network port and PC to the same router, and then start the device. You can see that the green LED (connection status indicator) of the standard RJ45 interface is always on, and the yellow LED (communication status indicator) is flashing. All LEDs are off after disconnecting the network.

(1) Dynamic IP usage

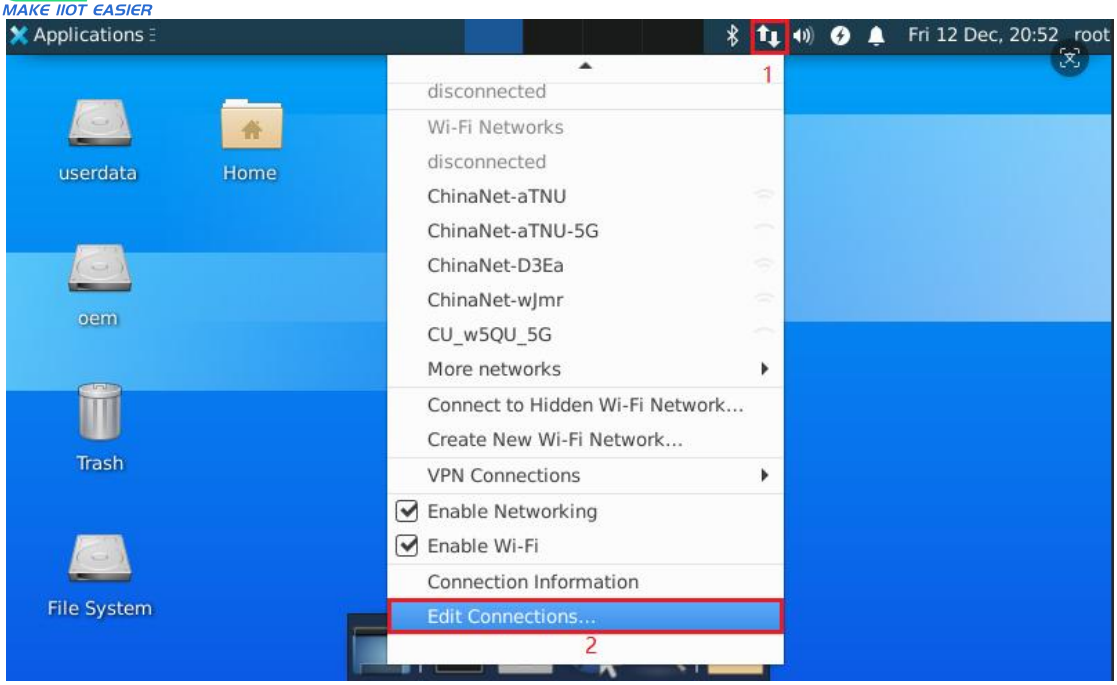
Click the icon in the upper right corner of the main interface, and then select "Connection Information" to view the dynamic IP of the device network interface in the pop-up window.



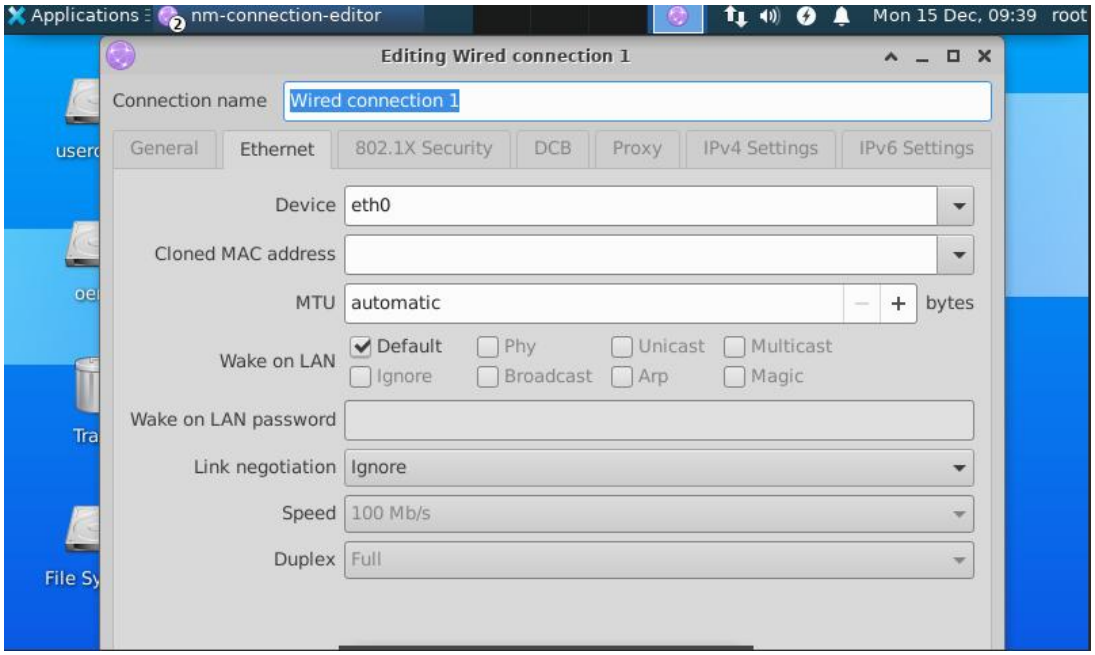


(2) Static IP usage

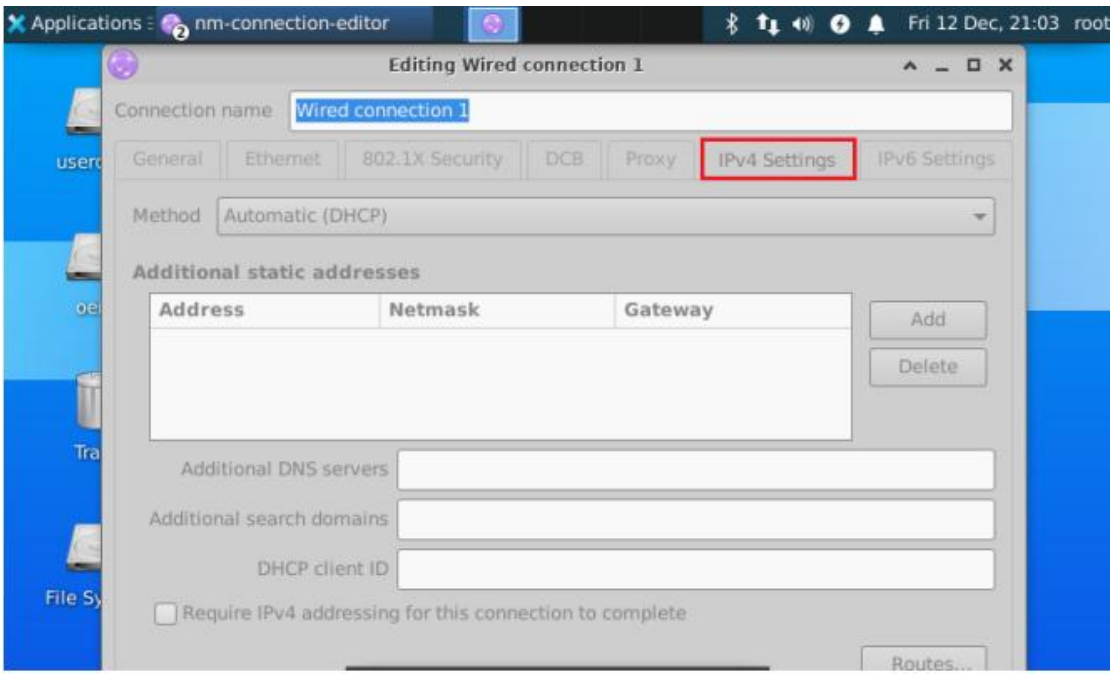
Click the device network interface in the upper right corner of the main interface.

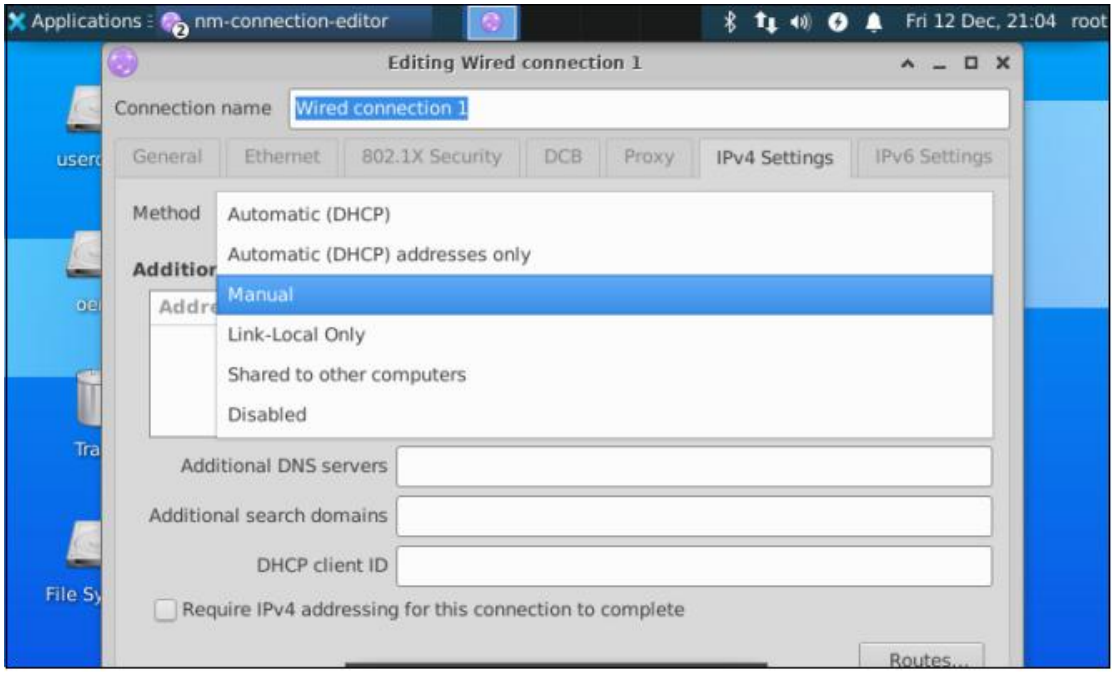


The device represented by "Wired connection 1" is eth0, and the device represented by "Wired connection 2" is eth1. Please choose according to the actual situation. This demonstration shows the configuration method of LAN1 network interface. Double click "Wired connection 1" to enter the configuration interface.

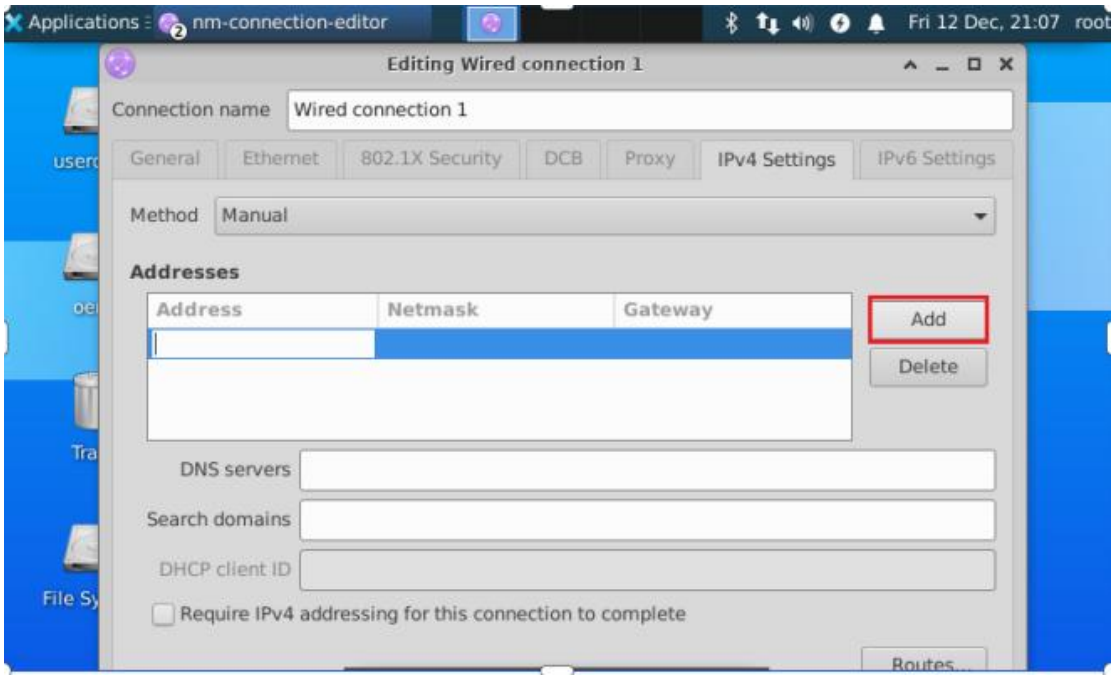


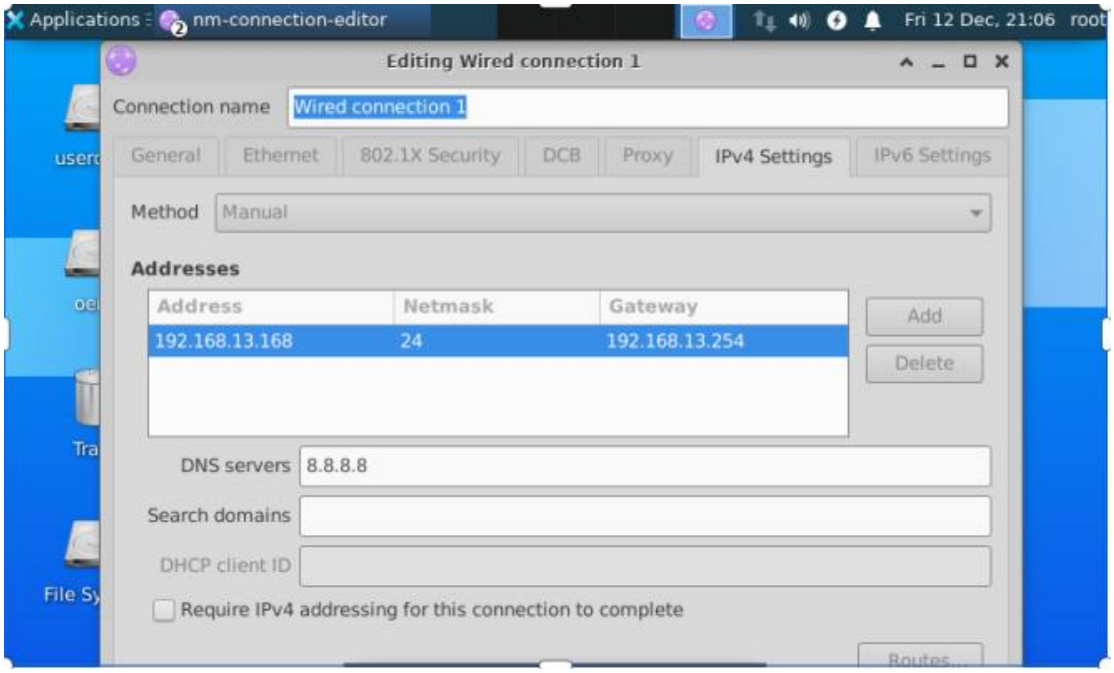
Click the "IPV4 Setting" option to enter the IPV4 setting interface.





Click the "Add" item in the "Address" column to add the IP address, subnet mask, gateway and other configuration information.

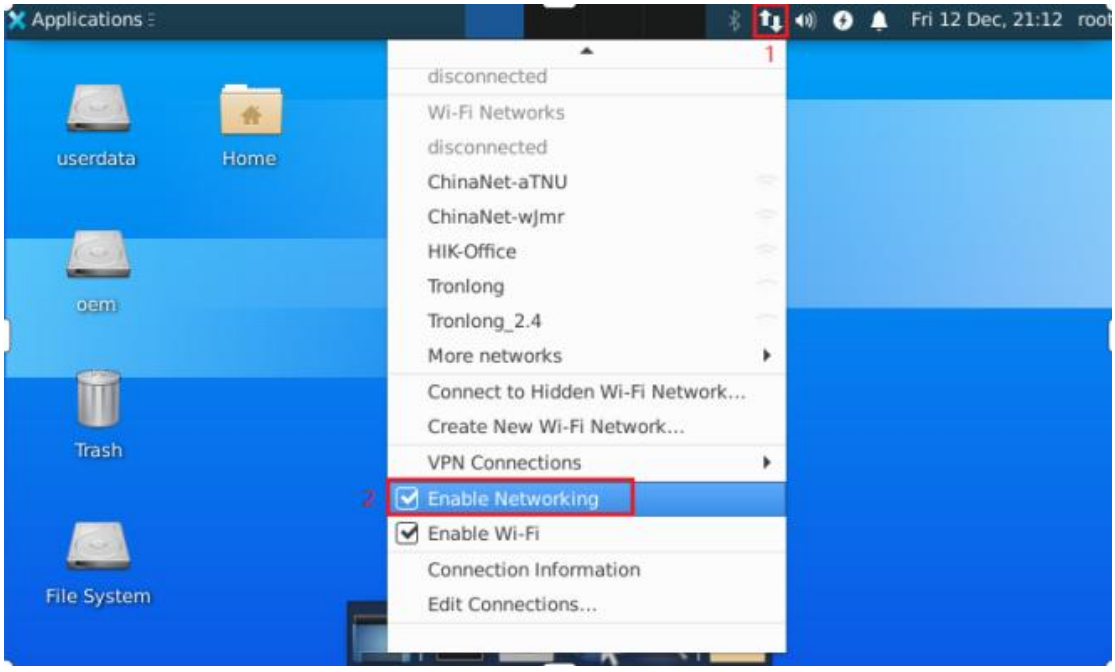




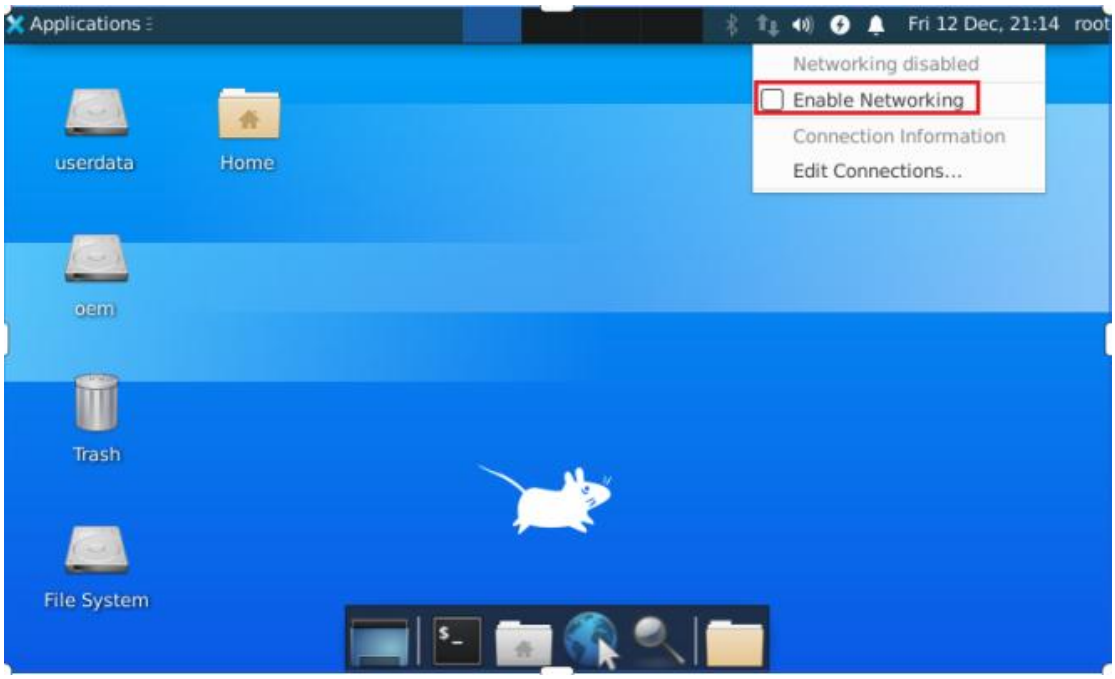
Press "Alt+S" on the keyboard to save and exit to the following interface.



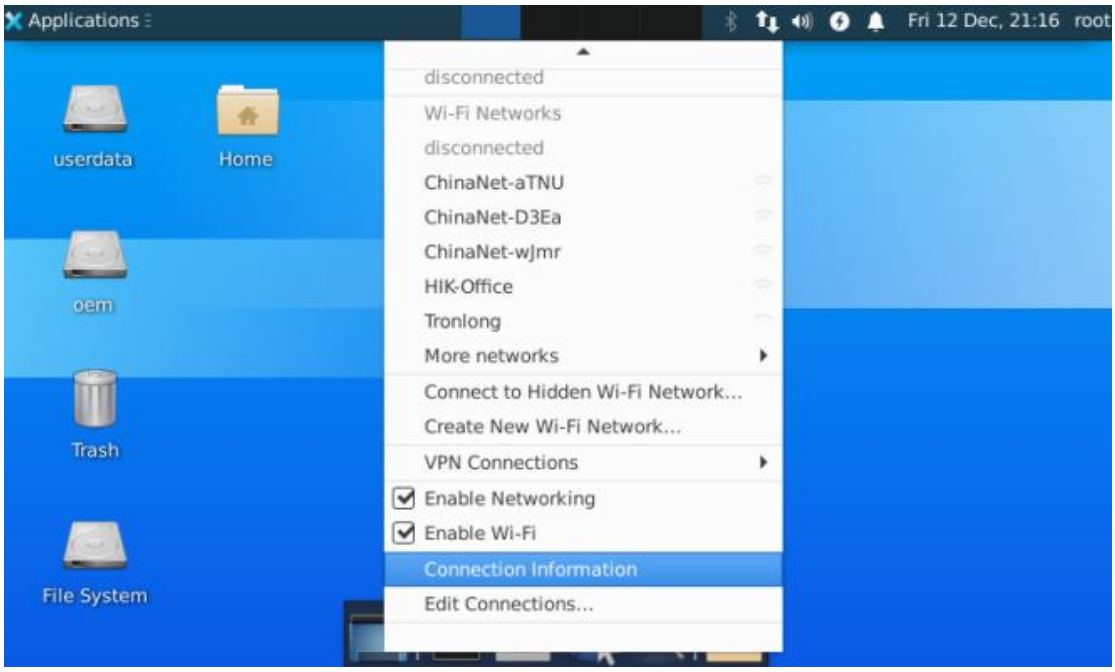
Click the icon in the upper right corner of the main interface, and then click "Enable Networking" to close the network.



Restart the network after about 30s.



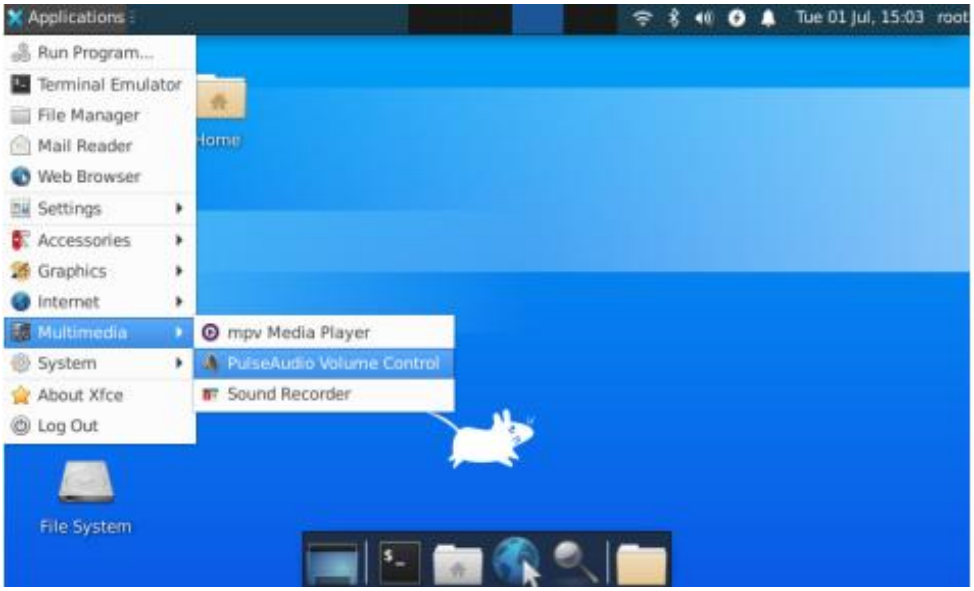
Click the icon in the upper right corner of the main interface, and then select "Connection Information" to check whether the static IP is successfully configured.



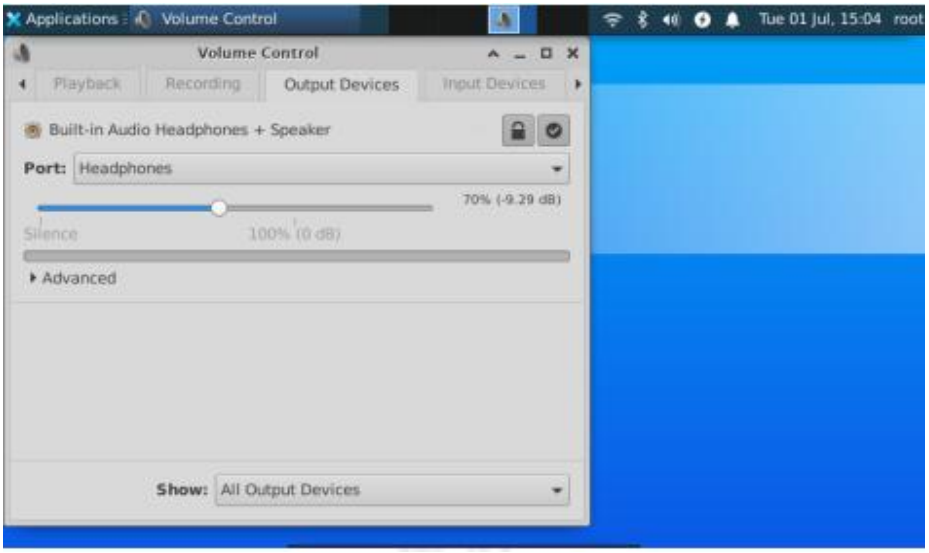


3.4 Audio Interface Usage

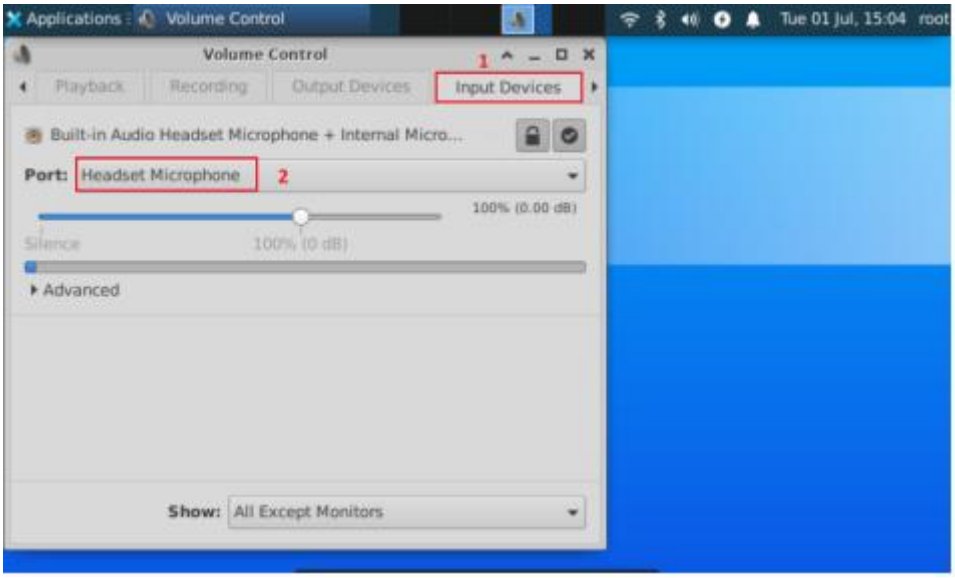
On board MIC IN and SPK OUT interfaces. Please prepare a speaker to access the SPK OUT interface of the device and a microphone to access the MIC IN.
Click the "Applications" icon in the upper left corner of the desktop, and then click "Multimedia ->PulseAudio Volume Control" to enter the output audio device configuration interface.

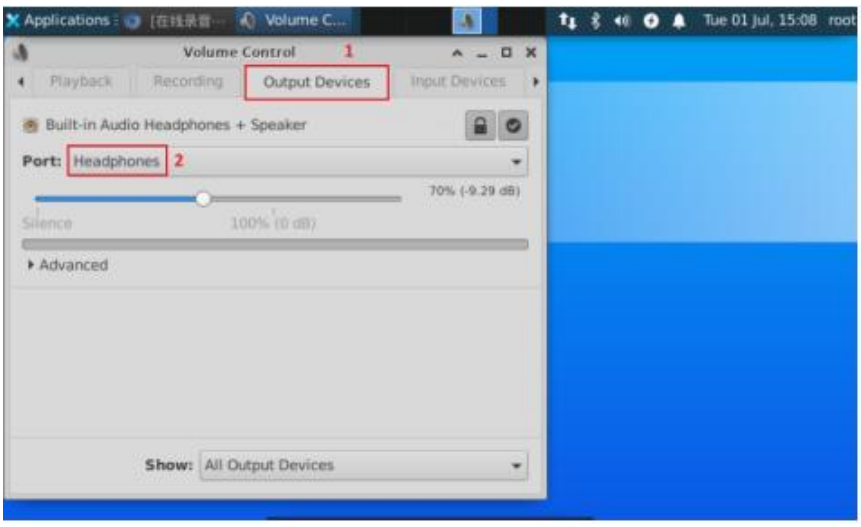


Click "Input Devices" and select the corresponding microphone device.

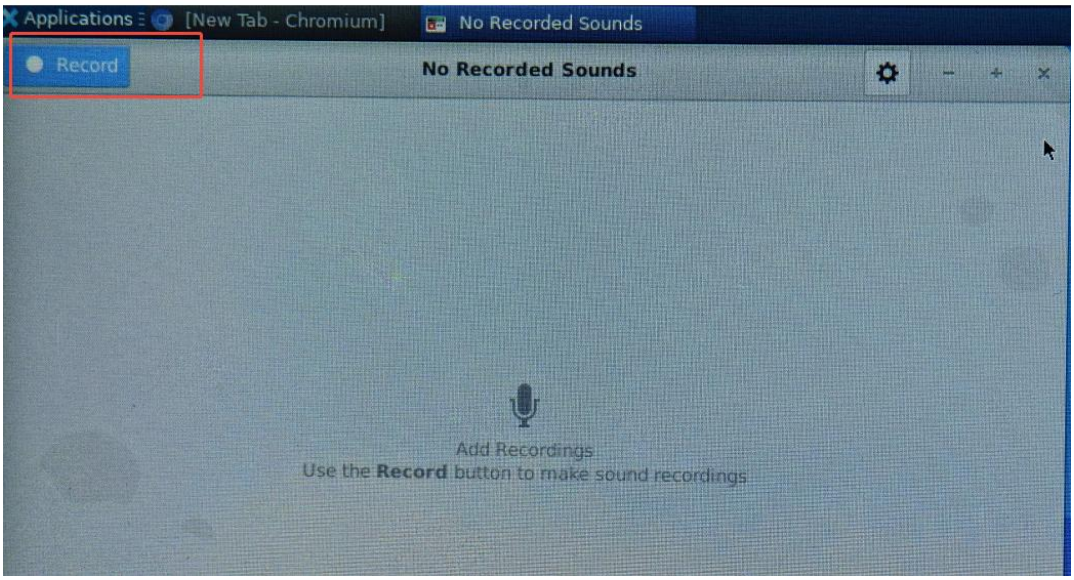


In the Output Devices interface, select Port and change it to Headphones.



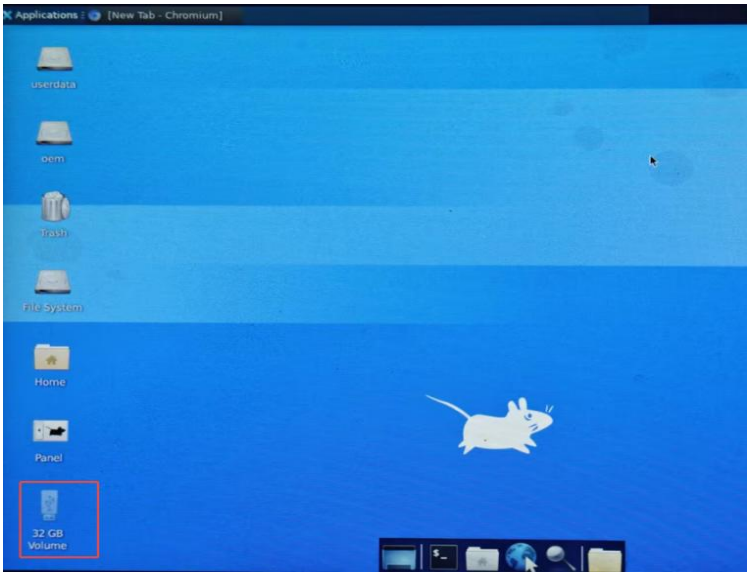


In the "Recorded Sounds" interface, select "Record" to record and play.

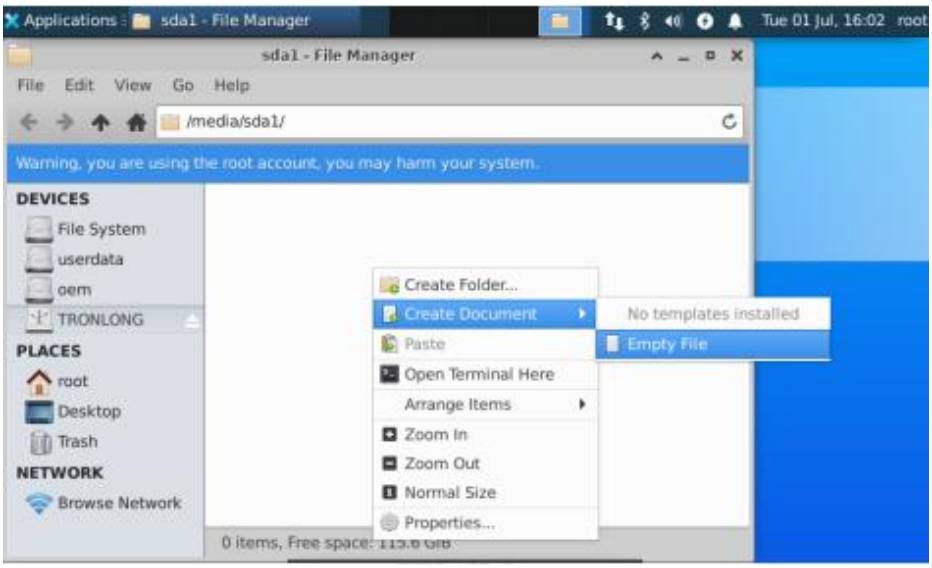


3.5 USB2.0 Interface Usage

Connect the USB flash disk to the USB 2.0 interface of the single board computer. After the single board computer is powered on and started, the following icon will appear on the screen desktop, and the name of the USB flash disk will also appear below the icon.



Click the desktop icon to enter the USB flash disk folder, and click the right mouse button in the blank area of the folder to create a file.



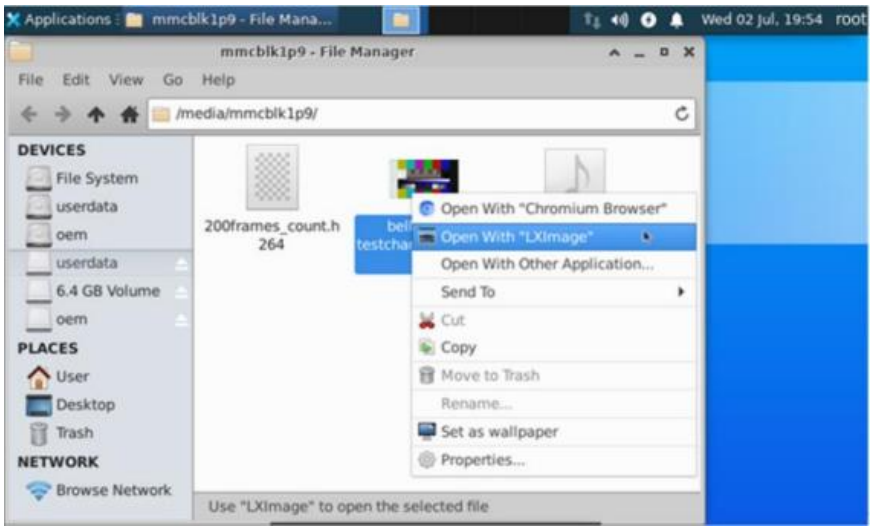
Double click the created file with the mouse. By default, the system uses the Vim editor to edit the file. Press the "I" key on the keyboard to enter the editing mode. After entering the content, save and exit.

3.6 Micro SD Interface Test

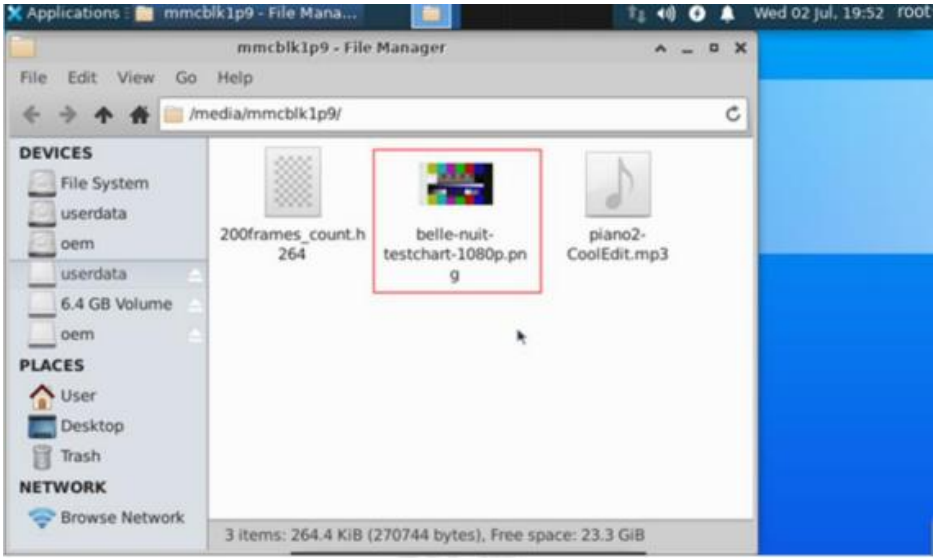
Please insert the solidified system image Micro SD card into the single board computer Micro SD card slot, and the following icon will appear on the display desktop.



Double click the desktop icon, open the user space folder in the Micro SD card file system, and select the picture file.

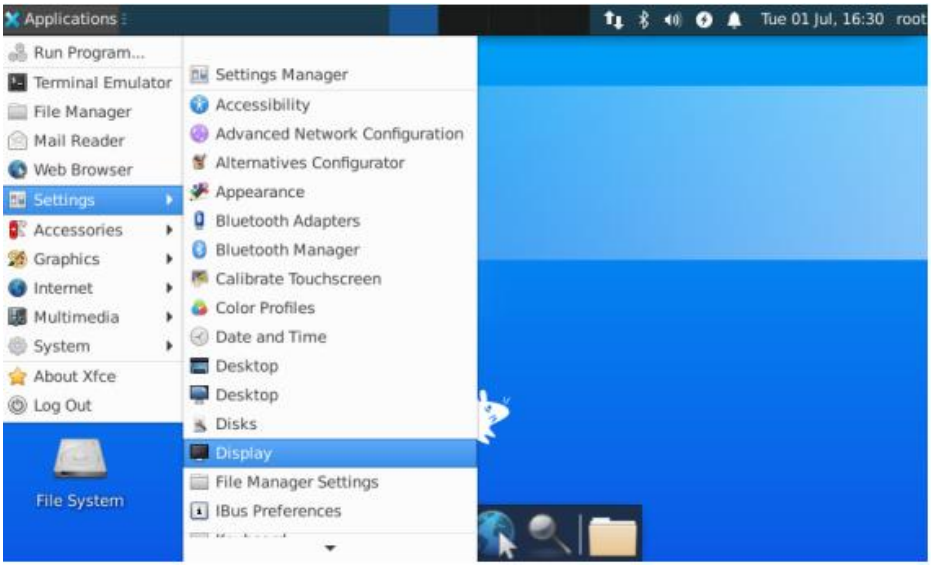


Right click the mouse and use "LXImage" to open the picture to view the picture content.



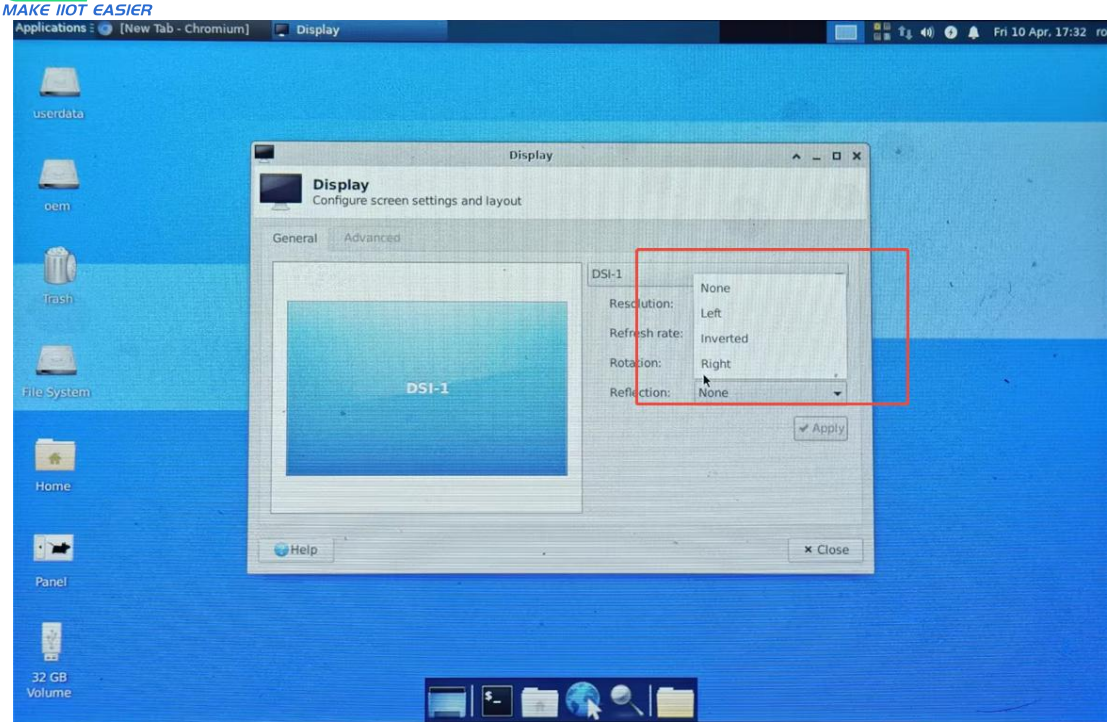
3.7 Display Instructions

You can directly touch and click the icon, and then click "Applications ->Settings ->Display" in order to display the following interface. You can view the resolution.



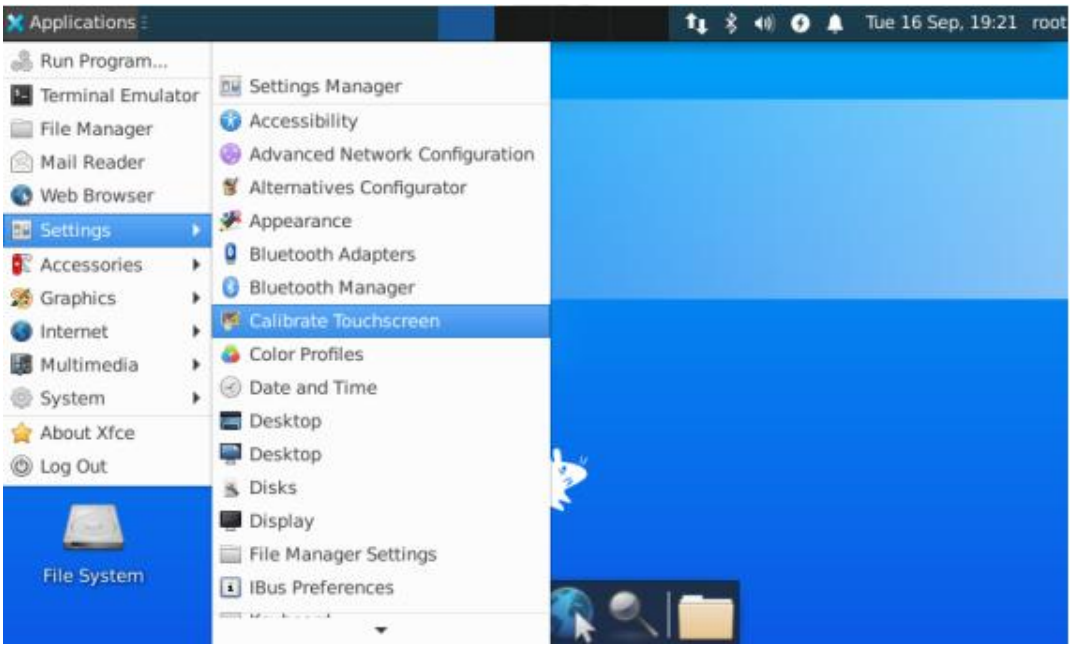


Please click the icon in the upper right corner of the screen. After clicking, a window as shown in the figure will pop up. Select the slider of window "Rotation" to adjust the horizontal and vertical display directions of the screen.



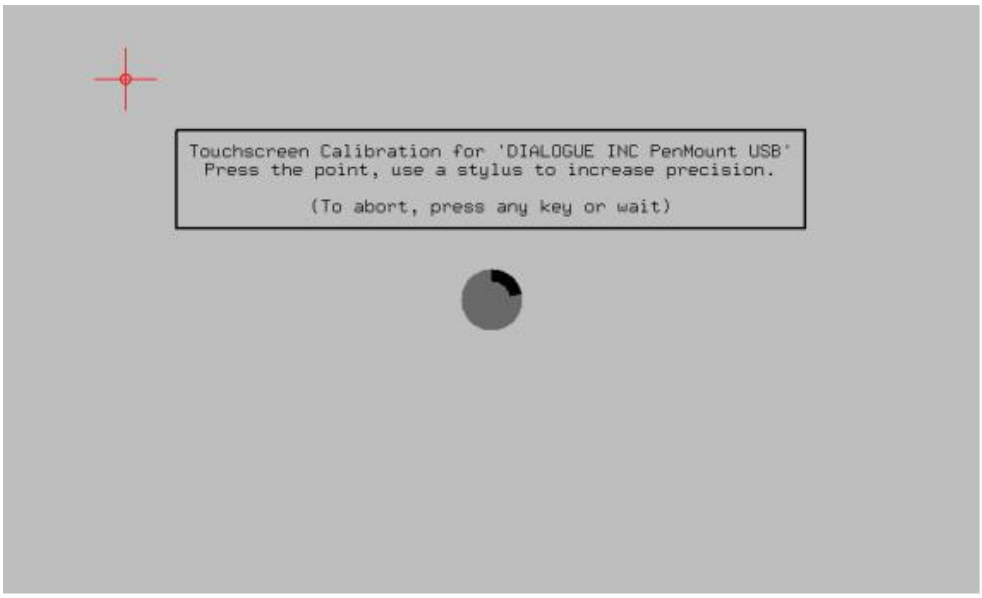
Note: The provided screen has the touch screen automatic synchronization function. When the display screen rotates in the direction, the system will automatically touch the coordinates, and the synchronization process is completed in about 5 seconds. Since xinput_calibrator does not support automatic adaptation of screen rotation, if you need to calibrate the screen after rotating the interface, please switch back to the horizontal screen state before calibration.

Click "Applications ->Settings ->Calibrate TouchScreen" to enter the following screen calibration interface.

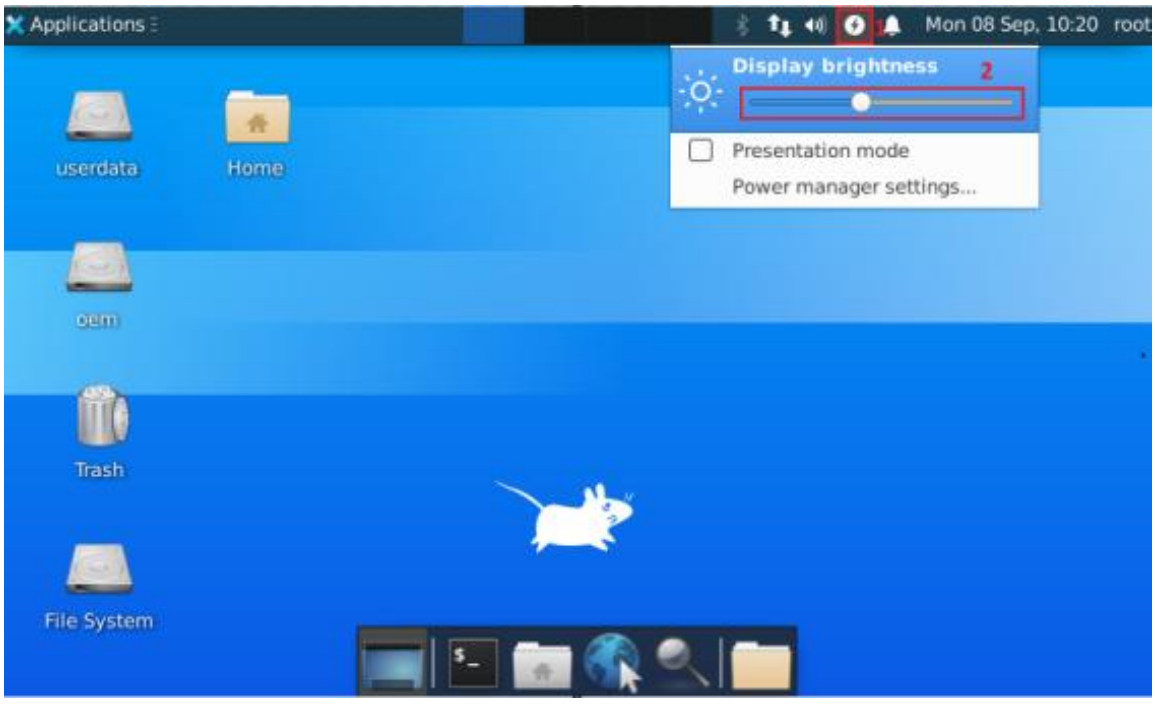


Click the four red calibration points popped up on the screen according to the prompt. After the calibration is completed, the calibration interface will automatically exit and

the terminal will automatically pop up with the following information.



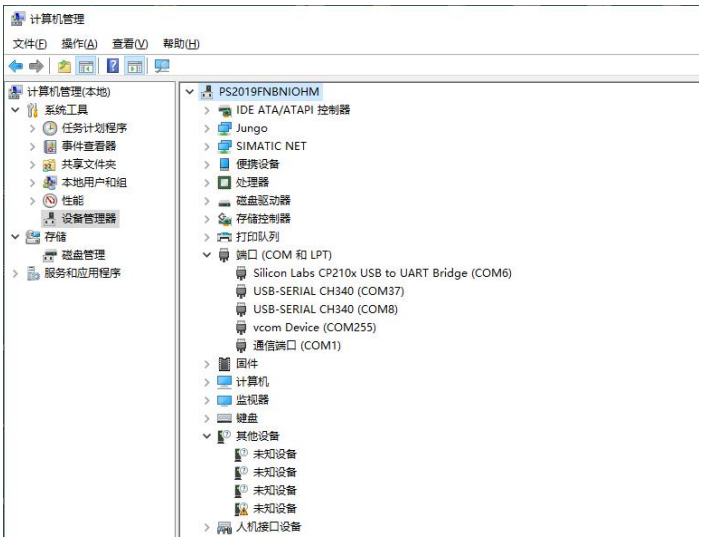
Click the icon in the upper right corner of the screen, and a window as shown in the figure will pop up. Drag the slider of the window "Display brightness" to adjust the backlight brightness of the screen.



4. Device Login

4.1 USB Login

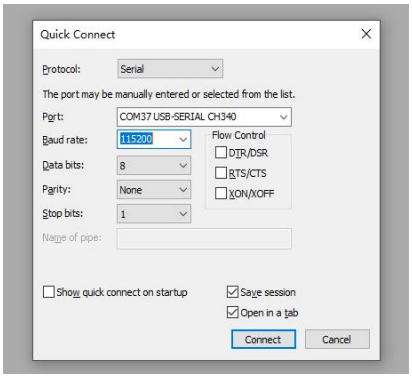
Enter the computer - management - device manager, open the port, insert the USB cable to the micro USB, and the refreshed port is the port to connect the device.



Taking SecureCRT as an example, create a new connection in the software, select serial port login, select the corresponding port, baud rate 115200, data bit 8, check bit None, stop bit 1. Click connect to enter the device.

Linux system has no default login password.

Ubuntu system default login: root / password: root



4.2 SSH Login

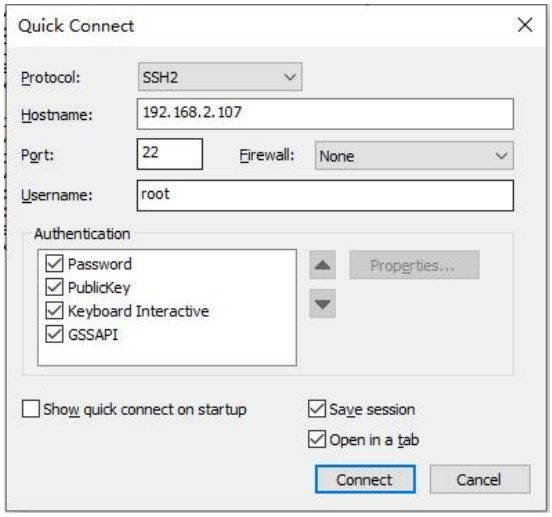
Before using the network port to log in, you need to set the IP address of the corresponding network port. Here, take ETH2 as an example. Here ETH2 has connected to the router, and the IP address obtained is 192.168.2.107. The computer IP address is in network segment 2.

```
docker0   Link encap:Ethernet  HWaddr 02:42:3D:E2:6F:88
          inet addr:172.17.0.1  Bcast:172.17.255.255  Mask:255.255.0.0
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

eth2      Link encap:Ethernet  HWaddr 00:E0:99:CD:55:B9
          inet addr:192.168.2.107  Bcast:192.168.2.255  Mask:255.255.255.0
          inet6 addr: fd5f:4184:3ad4:4:66ee:75b9:2b9:476d/64 Scope:Global
          inet6 addr: fe80::5d2c:48eb:826c:7f6/64 Scope:Link
          inet6 addr: fd5f:4184:3ad4:4::74e/128 Scope:Global
          inet6 addr: fd2f:fd7:7cda::74e/128 Scope:Global
          inet6 addr: fd2f:fd7:7cda:0:15d3:ffef:f05a:3ebf/64 Scope:Global
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:240 errors:0 dropped:18 overruns:0 frame:0
          TX packets:80 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:24541 (23.9 KiB)  TX bytes:8407 (8.2 KiB)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:146 errors:0 dropped:0 overruns:0 frame:0
          TX packets:146 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1
          RX bytes:10796 (10.5 KiB)  TX bytes:10796 (10.5 KiB)
```

Click Create Connection, select SSH2 as the protocol, fill in the host name as Device IP: 192.168.2.107, Port 22, User Name root, and click Connect to connect.



Select Accept to connect successfully.



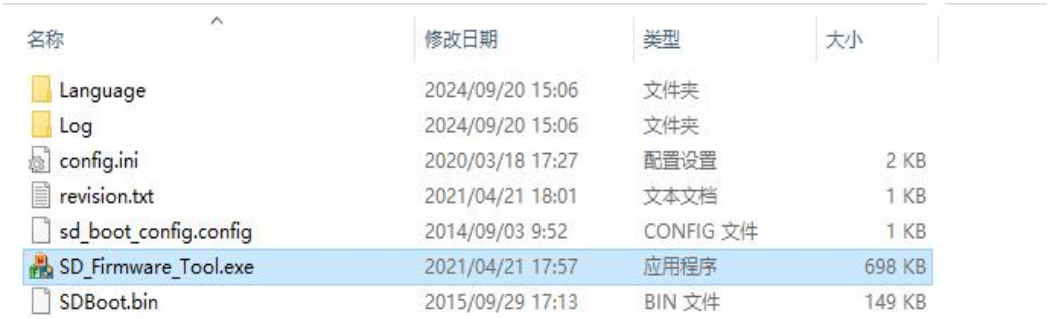
5.System Flashing

Debug serial baud rate 115200.

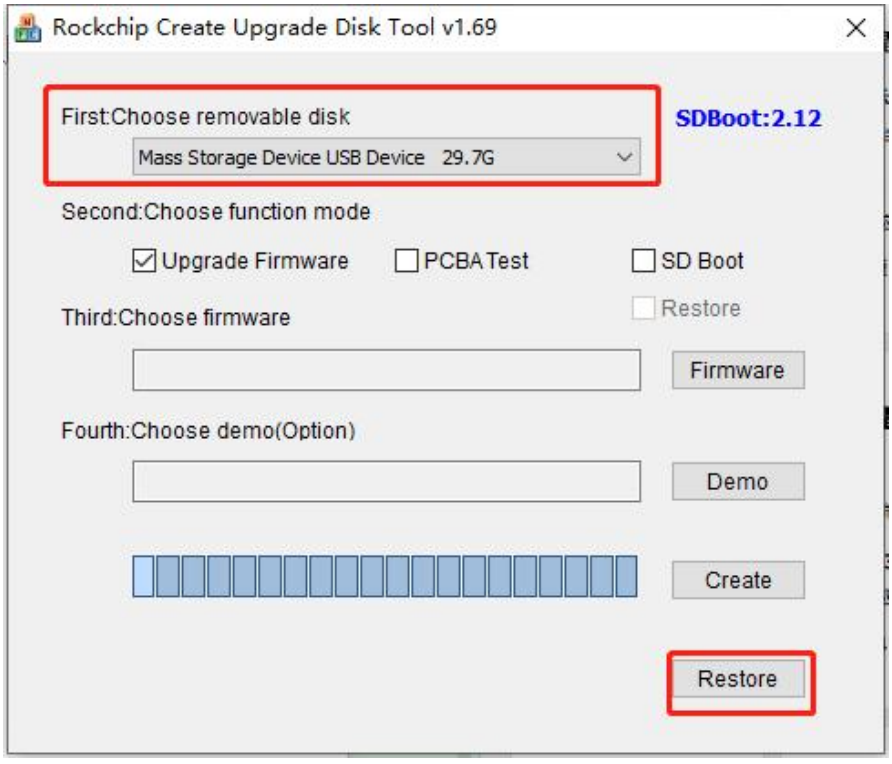
5.1 Micro SD Card Boot

5.1.1 Boot Card Creation

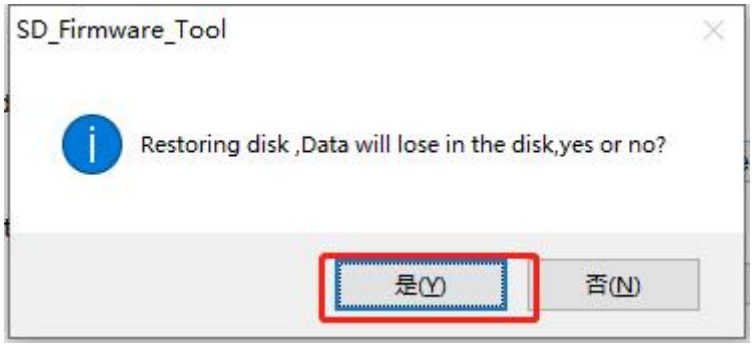
Connect the blank Micro SD card to the computer, open the "SDDiskTool_v1.69" folder, right-click "SD_Firmware_Tool.exe" and click "Run as administrator (A)".

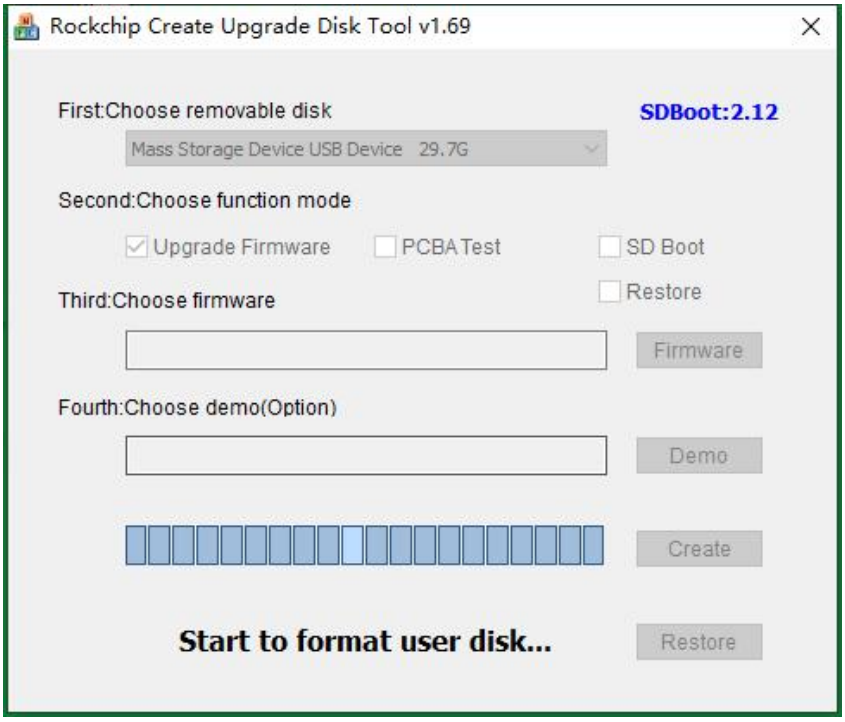


Select a removable disk device in "Step 1: Select a removable device", and then click "Restore Disk" to format, as shown in the following figure.

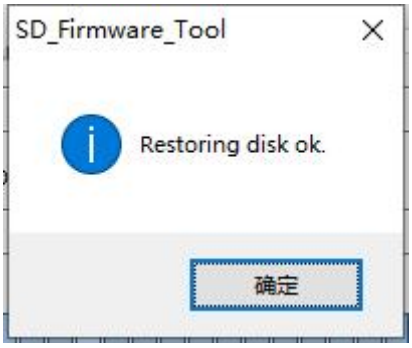


Please confirm that the selected removable disk device is correct, and click "Yes (Y)" in the pop-up window to format it.

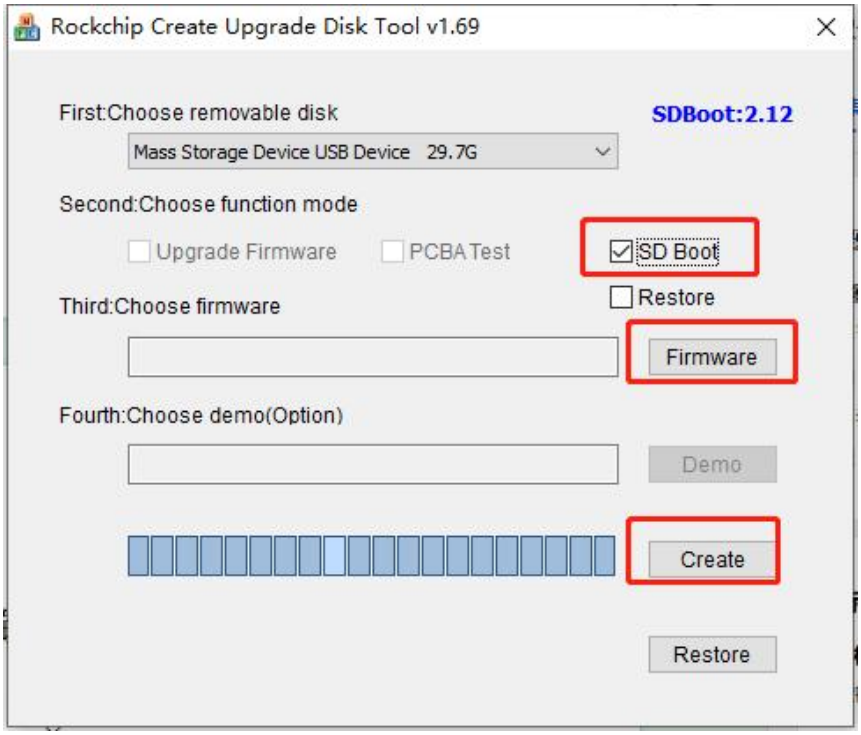


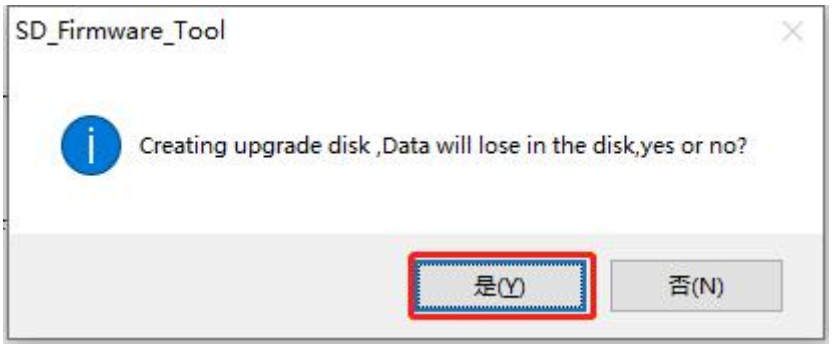


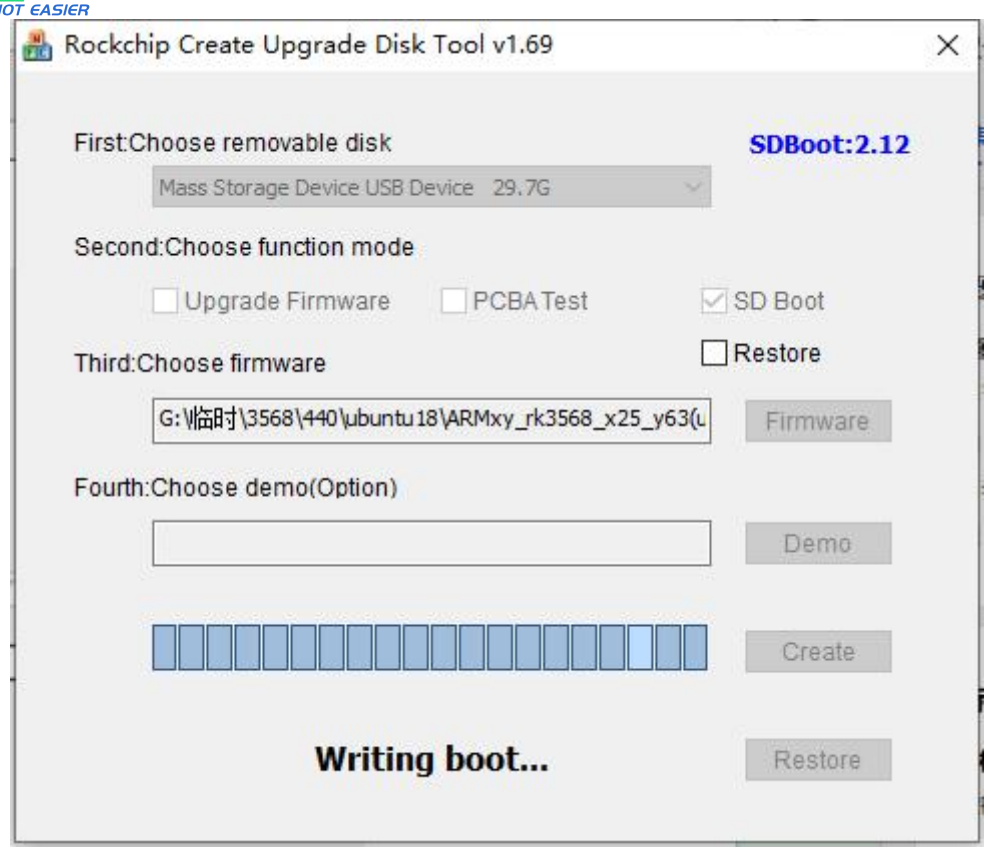
After formatting, click "OK" in the pop-up window.



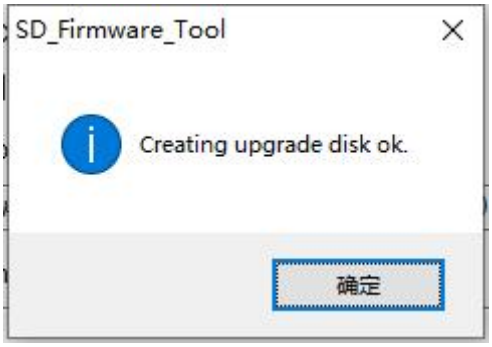
Check the "SD Startup" option, click "Select Firmware" to select the target system image file, click "Start Creation", and click "Yes (Y)" in the pop-up window to create the SD Startup Card.


Rockchip Create Upgrade Disk Tool v1.69
First:Choose removable disk
SDBoot:2.12
Mass Storage Device USB Device 29.7G
Second:Choose function mode
Upgrade Firmware
PCBA Test
SD Boot
Restore
Third:Choose firmware
Firmware
Fourth:Choose demo(Option)
Demo
Create
Restore


SD_Firmware_Tool
Creating upgrade disk ,Data will lose in the disk,yes or no?
是(Y)
否(N)



Click "OK" in the pop-up window, and the SD startup card is completed.



5.1.2 Booting from Boot Card

Insert the boot card into the device's Micro SD slot and power on. The system will boot from the SD card and automatically log in as root. The serial debug terminal will print boot information. Bootdev(atags): mmc 1 indicates boot from Micro SD.



5.2 EMMC Boot

5.2.1 Flashing Card Creation

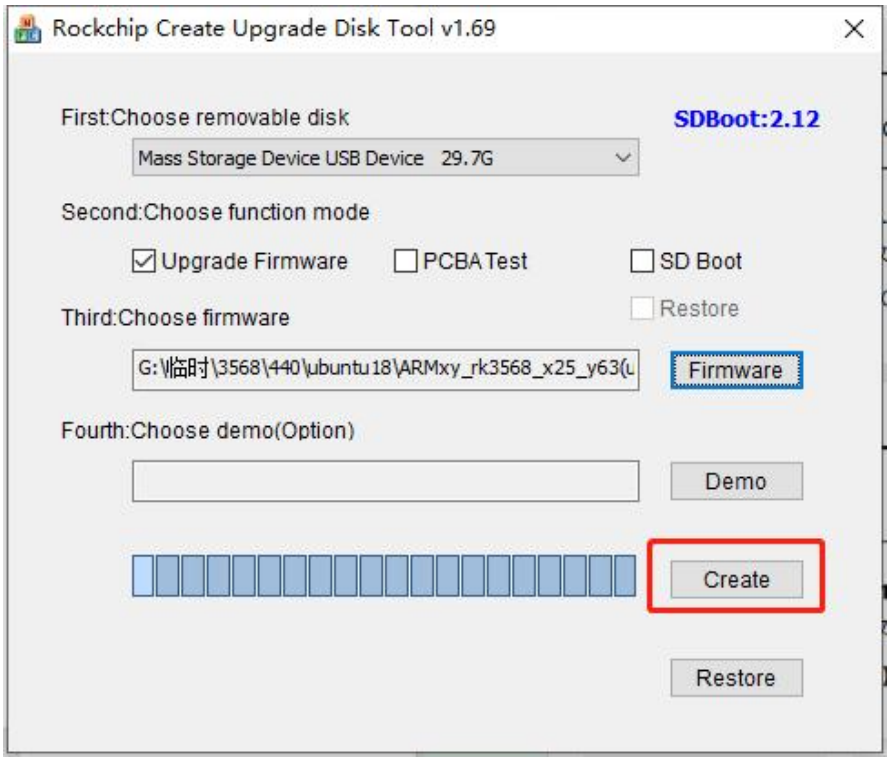
1.After running the tool, you need to manually select the Micro SD card. Note that the selected SD card will be formatted, so it is recommended to back up the files in the SD card before use. Frequent flashing of the system to the SD card may cause damage to the SD card; it is recommended not to change the system easily after flashing.

2.After selecting the disk, first click "Restore" to ensure smooth system flashing.

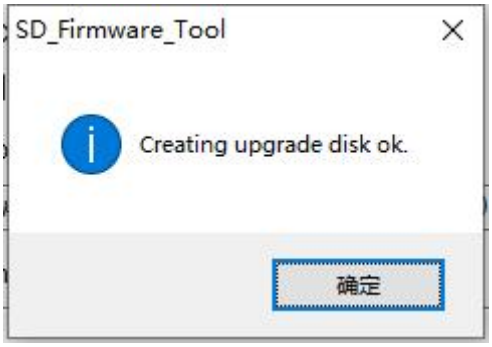
3.Wait for the prompt "Restore disk successfully" and then select the "Upgrade Firmware" option.

4.Click "Firmware" and find the system image to be flashed.

5.Click "Create".

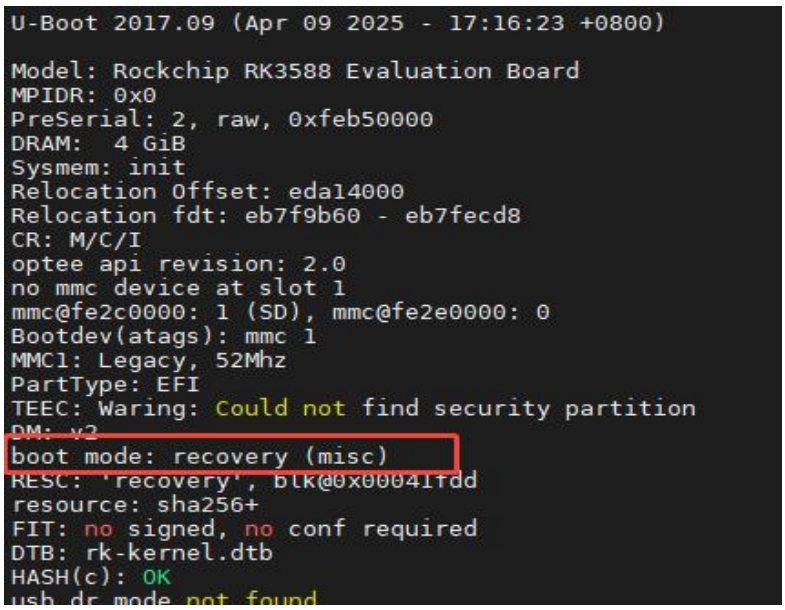


6.The prompt "Creating upgrade disk ok" indicates that the system flashing is complete. If other prompts appear, you need to start over from step 1.

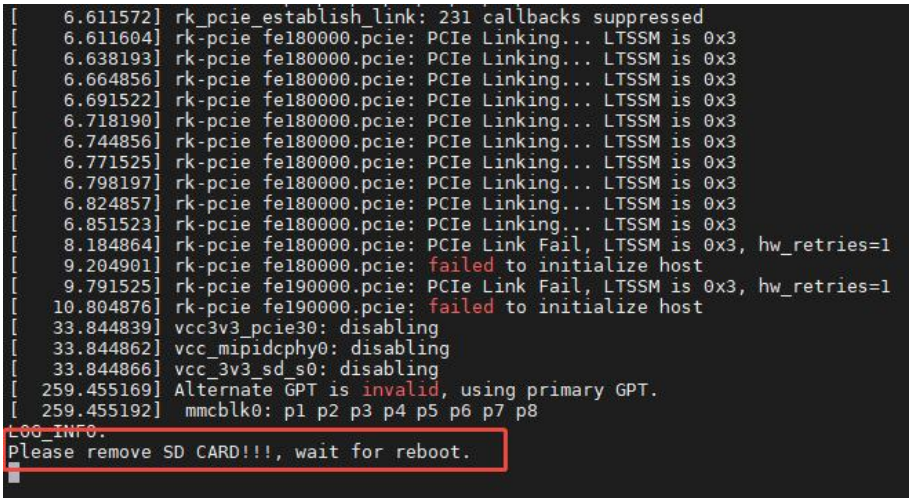


5.2.2 System Flashing

Insert the prepared SD card into the device's Micro SD card slot. After power-on, the system will boot from the SD card. When you see "boot mode: recovery (misc)", it indicates that the flashing program has started.



When the prompt "Please remove SD CARD!!!, wait for reboot." appears, the flashing is complete. Remove the SD card, and the device will automatically restart.



6. Software Support

- BLRAT
- Node-red
- Docker
- QT
- Codesys
- IgnitionSCADA
- Ubuntu 20.04
- Android 13

For more support, please feel free to contact us.

7.Warranty Terms

1) This device is covered by a one-year free repair warranty from the date of purchase for any material or quality defects.

2) This one-year warranty does not cover product failures caused by human damage, improper operation, or other misuse.

8. Technical Support

Shenzhen Beilai Technology Co., Ltd
Website: https://www.bliiot.com

9.Appendix

Port Number	Actual Pin Number
GPIO1	GPIO116
GPIO2	GPIO119
GPIO3	GPIO49
GPIO4	GPIO50
GPIO5	GPIO51
GPIO6	GPIO52
GPIO7	GPIO54
GPIO8	GPIO53