

# Orange Pi CM4 User Manual



# Catalog

1. Basi	c features of Orange Pi CM4	9
1.1.	What is Orange Pi CM4	9
1.2.	Usage of Orange Pi CM4	9
1.3.	Hardware specifications of Orange Pi CM4	10
	1. 3. 1. Hardware specifications of Orange Pi CM4 core board	10
	1. 3. 2. Hardware specifications of Orange Pi CM4 baseboard	12
1.4.	Top view and bottom view of Orange Pi CM4	13
	1. 4. 1. Top view and bottom view of Orange Pi CM4 core board	13
	1. 4. 2. Top and bottom views of the Orange Pi CM4 base board	14
1.5.	The interface details of Orange Pi CM4	16
	1. 5. 1. Interface details of Orange Pi CM4 core board	16
	1. 5. 2. Interface details of Orange Pi CM4 base board	18
2. Intro	duction to the use of the development board	20
2.1.	Prepare the required accessories	20
2.2.	Download the image of the development board and related materials	23
2.3.	Method of burning Linux image to TF card based on Windows PC	25
	2. 3. 1. How to use balenaEtcher to burn Linux image	25
	2. 3. 2. How to use RKDevTool to burn Linux image to TF card	
	2. 3. 3. How to burn Linux image using Win32Diskimager	36
2.4.	Method of burning Linux image to TF card based on Ubuntu PC	39
2.5.	Methods for burning Linux images to eMMC	43
	2.5.1. Methods for burning Linux images to eMMC using RKDevTool	43
	2. 5. 2. How to burn a Linux image to eMMC using the dd command	51
2.6.	Method of burning Linux image to SPIFlash+NVMe SSD	53
	2. 6. 1. Method of burning using RKDevTool	53
	2. 6. 2. Method of burning using dd command	63
	2. 6. 3. Method of burning using balenaEtcher software	
2.7.	Method of burning Android image to TF card	84

2.7.1. Method of burning Android image to TF card through USB2.0 burning
port
2. 8. 1. Method of burning Android image into eMMC through USB2.0 burning
port
2. 8. 2. How to burn the Android11 image into EMMC through the TF card 98
2. 9. How to burn Android image to SPIFlash+NVMe SSD
2. 10. How to clear SPIFlash using RKDevTool109
2.11. How to clear eMMC using RKDevTool115
2. 12. Boot the Orange Pi development board
2. 13. How to use the debugging serial port123
2. 13. 1. Connection instruction of debugging serial port
2. 13. 2. How to use the debugging serial port on Ubuntu platform 124
2. 13. 3. How to use the debugging serial port on Windows platform
2.14. Instructions for using the 5v pin in the 40pin interface of the development board to
supply power 131
3. Ubuntu/Debian Server and Xfce desktop system instructions
3. 1. Supported Linux image types and kernel versions
3. 2. Linux system adaptation situation
3. 3. Linux command format description in this manual
3. 4. Linux system login instructions135
3. 4. 1. Linux system default login account and password
3. 4. 2. How to set up automatic login of Linux system terminal 135
3. 4. 3. Instructions for automatic login of the Linux desktop version system 136
3.4.4. The setting method of root user automatic login in Linux desktop
version system
3. 4. 5. How to disable the desktop in Linux desktop system
3. 5. Onboard LED light test instructions
3. 6. Network connection test
3. 6. 1. Ethernet port test

3. 6. 2. WIFI connection test	. 142
3. 6. 3. How to set a static IP address	. 150
3. 6. 4. Method to create WIFI hotspot through create_ap	158
3. 7. SSH remote login development board	165
3. 7. 1. SSH remote login development board under Ubuntu	166
3. 7. 2. SSH remote login development board under Windows	. 167
3. 8. Method of uploading files to the development board Linux system	168
3.8.1. How to upload files from Ubuntu PC to development board L	linux
system	. 168
3. 8. 2. The method of uploading files to the Linux system of the develop	
board in Windows PC	
3. 9. HDMI test	1//
3. 9. 1. HDMI display test	. 177
3. 9. 2. HDMI resolution setting method	178
3. 10. How to use Bluetooth	180
3. 10. 1. Test method for desktop image	180
3. 11. USB interface test	183
3. 11. 1. Connect USB mouse or keyboard to test	183
3. 11. 2. Connect USB storage device to test	. 184
3. 11. 3. USB wireless network card test	184
3. 11. 4. USB camera test	. 189
3. 12. Audio test	191
3. 12. 1. Testing audio methods on desktop systems	191
3. 12. 2. How to use commands to play audio	193
3. 12. 3. How to test recording using commands	. 194
3. 13. Temperature sensor	195
3. 14. 40 Pin interface pin description	195
3. 15. How to install wiringOP	197
3. 16. 40pin interface GPIO, I2C, UART, SPI and PWM test	199
3. 16. 1. 40pin GPIO port test	199
3. 16. 2. How to set the pull-up and pull-down resistance of 40pin GPIO po	

	3. 16. 3. 40pin SPI test	202
	3. 16. 4. 40pin I2C test	205
	3. 16. 5. 40pin UART test	
	3. 16. 6. PWM test method	212
3.17.	How to install and use wiringOP-Python	215
	3. 17. 1. 3.17.1. How to install wiringOP-Python	
	3. 17. 2. 40pin GPIO port test	217
	3. 17. 3. 40pin SPI test	
	3. 17. 4. 40pin I2C test	223
	3. 17. 5. 40pin UART test	
3. 18.	Hardware watchdog test	230
3.19.	Check the serial number of RK3566 chip	231
3.20.	How to install Docker	231
3.21.	How to download and install arm64 version balenaEtcher	232
3.22.	How to install BaoTa Linux panel	234
3.23.	Setting Chinese environment and installing Chinese input method	237
	3. 23. 1. How to install Debian system	237
	3. 23. 2. How to install Ubuntu 20.04 system	
	3. 23. 3. How to install Ubuntu 22.04 system	
3.24.	How to remotely log in to the desktop of the Linux system	254
	3. 24. 1. 3.24.1. Remote login using NoMachine	
	3. 24. 2. Use VNC to log in remotely	
3.25.	Some programming language tests supported by Linux system	260
	3. 25. 1. Debian Bullseye System	
	3. 25. 2. Debian Bookworm System	
	3. 25. 3. Ubuntu Focal system	
	3. 25. 4. Ubuntu Jammy system	265
3.26.	How to install QT	
3.27.	How to install ROS	275
	3. 27. 1. How to install ROS 1 Noetic on Ubuntu 20.04	275
	3. 27. 2. How to install ROS 2 Galactic on Ubuntu 20.04	279

	3. 27. 3. How to install ROS 2 Humble on Ubuntu 22.04	282
3.28.	How to install kernel header files	284
3.29.	Use of Raspberry Pi 5 Inch screen	287
ŝ	3. 29. 1. How to assemble the Raspberry Pi 5 Inch screen	287
ç	3. 29. 2. How to open Raspberry Pi 5-inch screen configuration	288
	3. 29. 3. The method of server version image rotation display direction	291
	3. 29. 4. Method of rotating display and touch direction of desktop ve	ersion
i	image	292
3.30.	How to use the eDP screen	294
	3. 30. 1. Assembly method of eDP screen	294
	3. 30. 2. How to open the eDP screen configuration	295
3.31.	Instructions for using the switch logo	299
3.32.	How to use the ZFS file system	299
	3. 32. 1. How to install ZFS	299
ç	3. 32. 2. Methods of creating ZFS pools	301
ŝ	3. 32. 3. Test the data deduplication function of ZFS	302
	3. 32. 4. Test the data compression function of ZFS	303
3.33.	How to shut down and restart the development board	304
4. Linux S	SDK——orangepi-build instructions	305
4.1. C	ompilation system requirements	305
Z	4. 1. 1. Compile with the Ubuntu22.04 system of the development board	305
	iet the source code of Linux sdk	
	<ul><li>4. 2. 1. Download orangepi-build from github</li><li>4. 2. 2. Download the cross-compilation toolchain</li></ul>	
	4. 2. 3. orangepi-build complete directory structure description	
	ompile u-boot	
4.4. C	ompile the Linux kernel	315
4.5. C	ompile rootfs	320
4.6. C	ompile Linux image	323
5. Instruc	tions for using the Orange Pi OS Arch system	327

5.1.	Orange Pi OS Arch system function adaptation	
5.2.	Orange Pi OS Arch System User Guide Instructions	
5.3.	How to set DT overlays	
5.4.	Use of Raspberry Pi 5-inch screen	336
	5. 4. 1. How to assemble the Raspberry Pi 5-inch screen	
	5. 4. 2. How to open Raspberry Pi 5-inch screen configuration	
5.5.	How to use the eDP screen	336
	5. 5. 1. Assembly method of eDP screen	
	5. 5. 2. How to open eDP screen configuration	
5.6.	How to install the software	337
6. And	roid 11 operating system instructions	
6.1.	Supported Android versions	
6.2.	Android Function Adaptation	
6.3.	WIFI connection test method	
6.4.	How to use Wi-Fi hotspot	
6.5.	Bluetooth test method	
6.6.	How to use Raspberry Pi 5-inch screen	347
6.7.	How to use the eDP screen	348
6.8.	40pin interface GPIO, UART, SPI and PWM test	350
	6. 8. 1. 40pin GPIO port test	
	6. 8. 2. 40pin UART test	
	6. 8. 3. 40pin SPI test	
	6. 8. 4. 40pin PWM test	
6.9.	How to use ADB	
	6. 9. 1. The method of USB OTG mode switching	
	6. 9. 2. Use the data cable to connect to adb debugging	
	6. 9. 3. Use network connection adb debugging	
7. Hov	v to compile Android11 source code	
7.1.	Download the source code of Android 11	

7.2.	Compile the source code of Android 11	.370
8. App	pendix	.372
8.1.	User Manual Update History	.372
8.2.	Image Update History	372

### 1. Basic features of Orange Pi CM4

#### 1.1. What is Orange Pi CM4

Orange Pi CM4 uses Rockchip RK3566 quad-core 64-bit Cortex-A55 processor, using 22nm process, with a main frequency of up to 1.8GHz, integrated ARM Mali-G52 GPU, embedded high-performance 2D image acceleration module, built-in 0.8 The AI accelerator NPU of Tops computing power can choose 1GB, 2GB, 4GB or 8GB memory, and has up to 4K display processing capability.

Orange Pi CM4 brings out quite a lot of interfaces, including Micro HDMI output, M.2 PCIe2.0x1, Gigabit Ethernet port, USB2.0, USB3.0 interface and 40pin expansion pin header, etc. It can be widely used in high-end tablet, edge computing, artificial intelligence, cloud computing, AR/VR, smart security, smart home and other fields, covering various AIoT industries.

Orange Pi CM4 supports Android11, Ubuntu22.04, Ubuntu20.04, Debian11, Debian12, open source Hongmeng 4.0 Beta1, Orange Pi OS (Arch), Orange Pi OS (OH) based on open source Hongmeng and other operating systems.

#### 1.2. Usage of Orange Pi CM4

We can use it to achieve:

- A Linux desktop computer
- A Linux network server
- Android tablet
- Android game console, etc.

Of course, there are more functions. Relying on a powerful ecosystem and a variety of expansion accessories, Orange Pi can help users easily achieve delivery from ideas to prototypes to mass production. It is an ideal choice for makers, dreamers, and hobbyists. An ideal creative platform for readers.

#### 1.3. Hardware specifications of Orange Pi CM4

## 1. 3. 1. Hardware specifications of Orange Pi CM4 core board

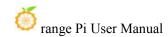
Hardware specifications			
Master chip	Rockchip RK3566		
СРИ	CPU Quad-core 64-bit Cortex-A55 processor, 22nm advanced process clocked at up to 1.8GHz		
GPU	<ul> <li>ARM Mali G52 2EE graphics processor</li> <li>Support OpenGL ES 1.1/2.0/3.2, OpenCL 2.0, Vulkan 1.1</li> <li>Embedded high-performance 2D acceleration hardware</li> </ul>		
NPU	<ul> <li>Integrated RKNN NPU AI accelerator, 0.8Tops@INT8 performance</li> <li>Supports one-click conversion of Caffe/TensorFlow/TFLite/ONNX/PyTorch/Keras/Darknet architecture models</li> </ul>		
VPU	<ul> <li>4K@60fps H.265/H.264/VP9 video decoding</li> <li>1080P@60fps H.265/H.264 video encoding</li> </ul>		
PMU	Rockchip RK809-5		
Memory	2GB/4GB/8GB (LPDDR4/4x)		
Storage	<ul> <li>Onboard eMMC: 16GB/32GB/64GB/128GB</li> <li>SPI Flash: default blank paste</li> </ul>		
Wi-Fi+BT	Wi-Fi 5+BT 5.0, BLE (AP6256)		



Ethernet transceiver	10/100/1000Mbps Ethernet (onboard PHY chip: YT8531C)
Core board interface	<ul> <li>2 x 100PIN, 1 x 24PIN, including the following signals:</li> <li>10/100/1000Mbps Ethernet MDI signal</li> <li>1x HDMI 2.0 interface, up to 4K@60fps</li> <li>1x 4-lane MIPI DSI display interface</li> <li>1x 4-lane MIPI CSI camera interface</li> <li>eDP</li> <li>SATA3 or PCIe</li> <li>1 x USB3.0</li> <li>3 x USB2.0</li> <li>RESET, MASKROM, RECOVERY</li> <li>Headphone jack audio input and output signals</li> <li>DC 5V input power supply, DC3.3V and 1.8V output power supply</li> </ul>
Supported OS	Android11, Ubuntu22.04, Ubuntu20.04, Debian11, Debian12, open source Hongmeng 4.0 Beta1, Orange Pi OS (Arch), Orange Pi OS (OH) based on open source Hongmeng and other operating systems.
	Introduction of Appearance Specifications
PCB Size 55x40mm	

#### 1. 3. 2. Hardware specifications of Orange Pi CM4 baseboard

CM4 Base Board Hardware Specifications			
Storage	<ul> <li>M.2 M-KEY slot: SATA3 or PCIe2.0 NVME SSD</li> <li>TF card slot</li> </ul>		
Ethernet interface	10/100/1000Mbps Ethernet RJ45 socket		
Display	<ul> <li>1x Micro HDMI TX 2.0, maximum support 4K@60FPS</li> <li>1xMIPI DSI 2 Lane</li> <li>eDP1.3</li> </ul>		
Camera	2xMIPI CSI 2 Lane		
USB	<ul> <li>1xUSB 2.0 supports Device or HOST mode</li> <li>1xUSB 3.0 HOST</li> <li>2xUSB 2.0 HOST</li> </ul>		
Audio	3.5mm headphone jack audio input/output		
Button	1xMaskROM key, 1xRECOVERY key, 1x reset key		
FAN	4Pin 2.54mm 5V fan interface		
40Pin	40Pin function expansion interface, supports the following interface types: GPIO、UART、I2C、SPI、PWM		

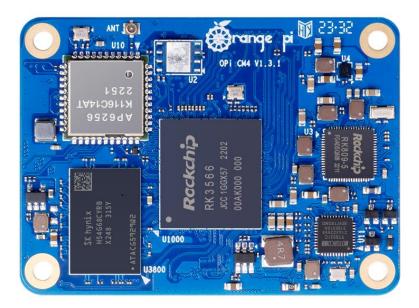


Power Source	Power Source Type-C 5V3A	
	Android11, Ubuntu22.04, Ubuntu20.04, Debian11, Debian12,	
Supported OS	open source Hongmeng 4.0 Beta1, Orange Pi OS (Arch),	
Supported OS	Orange Pi OS (OH) based on open source Hongmeng and other	
	operating systems.	
Introduction of Appearance Specifications		
PCB Size 85x56mm		

#### 1.4. Top view and bottom view of Orange Pi CM4

#### 1.4.1. Top view and bottom view of Orange Pi CM4 core board

Top view:

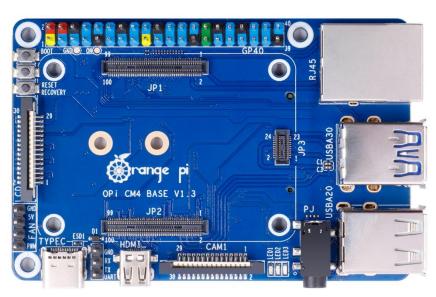


**Bottom view:** 



#### 1. 4. 2. Top and bottom views of the Orange Pi CM4 base board

Top view:

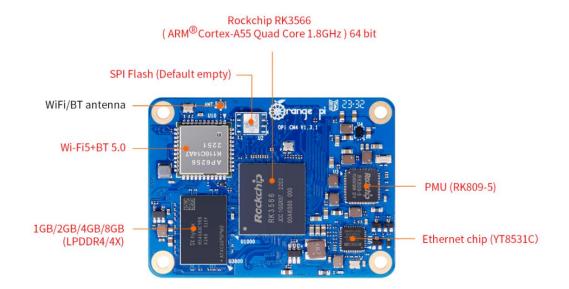


#### **Bottom view:**

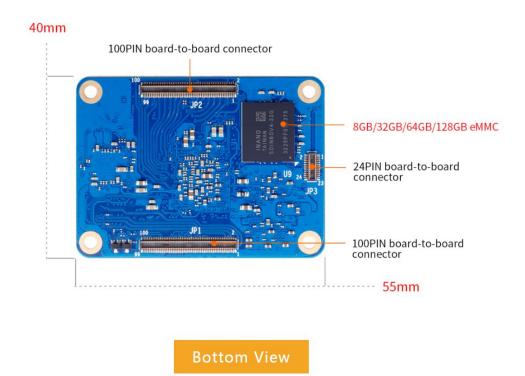


#### 1.5. The interface details of Orange Pi CM4

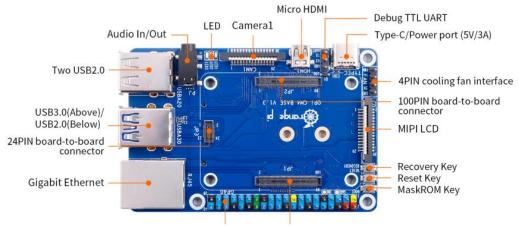
#### 1.5.1. Interface details of Orange Pi CM4 core board



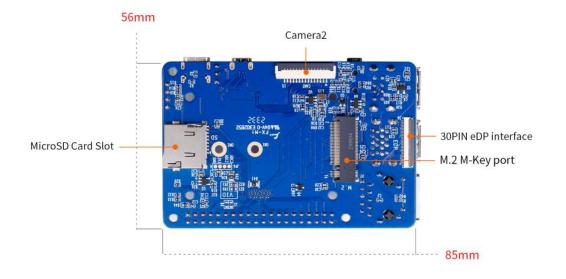
Top View

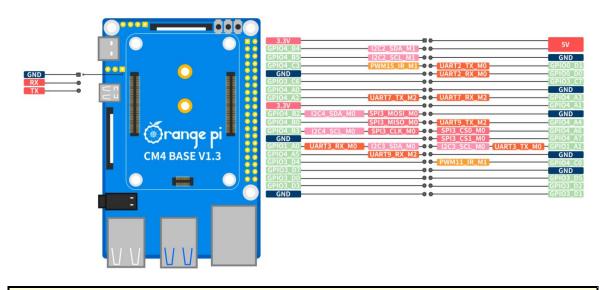


#### 1. 5. 2. Interface details of Orange Pi CM4 base board



40PIN headers 100PIN board-to-board connector





The diameter of the three positioning holes on the base plate is 2.6mm, the diameter of the M.2 PICE device fixing hole is 2.7mm, and the diameter of the four positioning holes on the core board is 2.7mm.

#### 2. Introduction to the use of the development board

#### 2.1. Prepare the required accessories

1) TF card, a class 10 or above high-speed SanDisk card with a minimum capacity of 16GB (32GB or above recommended)



2) TF card reader, used to burn the image into the TF card



3) Display with HDMI interface



4) Micro HDMI to HDMI cable, used to connect the development board to an HDMI monitor or TV for display



# Note, if you want to connect a 4K monitor, make sure the HDMI cable supports 4K video output.

5) Power adapter. Orange Pi CM4 is recommended to use a 5V/3A Type-C power supply.



6) The mouse and keyboard of the USB interface, as long as the mouse and keyboard of the standard USB interface are acceptable, the mouse and keyboard can be used to control the Orange Pi development board



7) USB camera



8) PCIe NVMe SSD, the development board supports SSDs with M.2 2230 and M.2 2242 specifications. M.2 2280 is also supported, but it cannot be fixed with screws.

The development board does not come with an SPI Flash chip by default. You need to buy it yourself and then solder it on. The SPI Flash chip model we recommend is XM25QU128CWIQT08Q.

Please pay special attention to this point if you need to use SPIFlash+NVMe SSD to start the system.

9) 100M or 1000M network cable, used to connect the development board to the Internet



10) USB2.0 male-to-male data cable, used for burning images to eMMC, TF card, etc.



11) **3.3V** USB to TTL module and DuPont line, when using serial port debugging function, need USB to TTL module and DuPont line to connect the development board

and computer





12) Personal computer with Ubuntu and Windows operating systems installed

1	Ubuntu22.04 PC	Optional, used to compile Linux source code
2	Windows PC	For burning Android and Linux images

# 2. 2. Download the image of the development board and related materials

1) The website for downloading the English version is:

http://www.orangepi.org/html/hardWare/computerAndMicrocontrollers/service-and -support/Orange-Pi-CM4.html

🔘 <sub>range</sub> P	i User Manual	Copyrigl	ht reserved b	y Shenzhen Xunlong Soft	ware Co., Ltd
	Deveload		upute Module 4	[Allergenes Store Bir/] Amagon Store Bir/	
	Orange P Module 4	i Compute			
	User Manual Desentant	Official R Schematic	desources		
		Official	Images		
	Orange Pi OS(Ar Demotion Demotion Demotion Android Image Demotion	[Coverficaely	Ubuntu Image Detertische Detertische Linux Source code Detertische	Debian Image Tromtath	

- 2) The information mainly includes
  - a. Android source code: saved on Google Cloud Disk
  - b. Linux source code: saved on Github
  - c. User manual and schematic diagram: saved on Google Cloud Disk
  - d. **Official tools**: mainly include the software that needs to be used during the use of the development board
  - e. Android image: saved on Google Cloud Disk
  - f. Ubuntu image: saved on Google Cloud Disk
  - g. Debian image: saved on Google Cloud Disk
  - h. Orange Pi OS Arch image: saved on Google Cloud Disk

#### 2.3. Method of burning Linux image to TF card based on Windows PC

Note that the Linux images mentioned here specifically refer to Linux distribution images such as Debian, Ubuntu and OPi OS Arch downloaded from the Orange Pi's data download page.

#### 2. 3. 1. How to use balenaEtcher to burn Linux image

1) First prepare a TF card with a capacity of 16GB or larger. The transmission speed of the TF card must be class 10 or above. It is recommended to use TF cards from SanDisk and other brands.

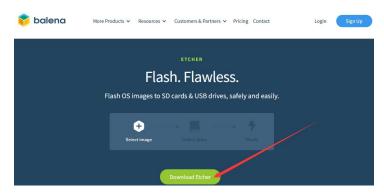
2) Then use the card reader to insert the TF card into the computer

3) Download the Linux operating system image file compression package that you want to burn from the Orange Pi's data download page, and then use the decompression software to decompress it. Among the decompressed files, the file ending with ".img" is the image file of the operating system. The size is generally above 2GB.

4) Then download the Linux image burning software-**balenaEtcher**, the download address is:

https://www.balena.io/etcher/

5) After entering the balenaEtcher download page, click the green download button to jump to the place where the software is downloaded

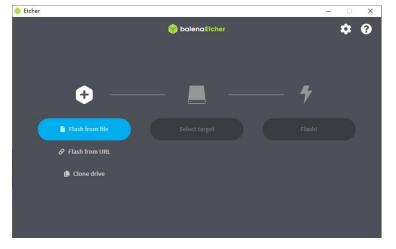


6) Then you can choose to download the Portable version of balenaEtcher software. The

Portable version does not need to be installed, and you can use it by double-clicking to open it

#### DOWNLOAD **Download Etcher** ASSET os ARCH ETCHER FOR WINDOWS (X86|X64) (INSTALLER) WINDOWS X86|X64 Download ETCHER FOR WINDOWS (X86|X64) (PORTABLE) WINDOWS X86|X64 Download ETCHER FOR WINDOWS (LEGACY 32 BIT) (X86|X64) (PORTABLE) WINDOWS X86|X64 Download ETCHER FOR MACOS MACOS X64 Download ETCHER FOR LINUX X64 (64-BIT) (APPIMAGE) LINUX X64 Download ETCHER FOR LINUX (LEGACY 32 BIT) (APPIMAGE) LINUX X86 Download Looking for Debian (.deb) packages or Red Hat (.rpm) packages? 🐇 OSS hosting by cloudsmith

7) If you downloaded the version of balenaEtcher that needs to be installed, please install it first and then use it. If you downloaded the Portable version of balenaEtcher, just double-click to open it. The balenaEtcher interface after opening is as shown below:

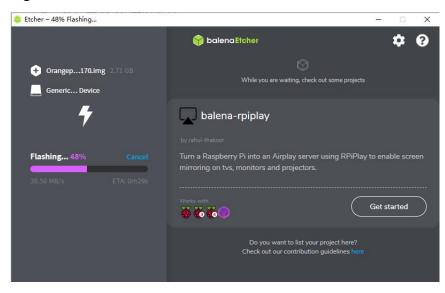


If the following error is	prompted when opening baler	aEtcher:
	Attention	
	Something went wrong. If it is a compressed	
	image, please check that the archive is not corrupted.	
	User did not grant permission.	
	Cancel Retry	
Please select balenaEtc	her, right-click, and select Run	as administrator.
	开( <b>0)</b> 管理员身份运行(A)	

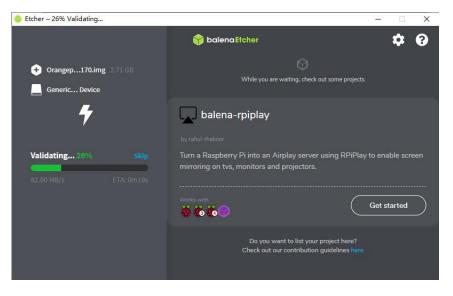
- 8) The specific steps to use balenaEtcher to burn a Linux image are as follows
  - a. First select the path of the Linux image file to be burned
  - b. Then select the drive letter of the TF card
  - c. Finally click Flash and it will start burning the Linux image to the TF card.

💝 Etcher		– 🗆 X
	🜍 balena Etcher	¢ 0
+ Flash from file	Select target	Flash!
<ul> <li>Flast from URL</li> <li>Clove drive</li> <li>A fieldent that Linear strange to Team</li> </ul>	2 Select 17 disk.	2 Click Flash to start barning

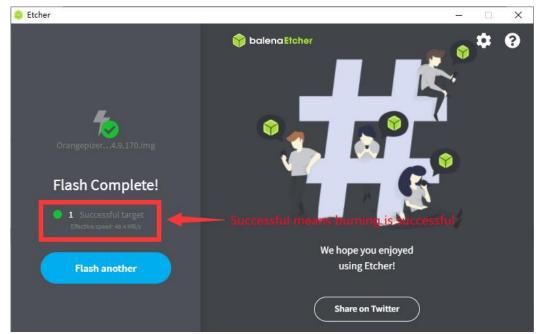
9) The interface displayed in the process of burning the Linux image by balenaEtcher is shown in the figure below, and the progress bar displays purple, indicating that the Linux image is being burned into the TF card



10) After burning the Linux image, balenaEtcher will also verify the image burned into the TF card by default to ensure that there is no problem in the burning process. As shown in the figure below, a green progress bar indicates that the image has been burnt, and balenaEtcher is verifying the burnt image



11) After successful burning, the display interface of balenaEtcher is as shown below. If the green indicator icon is displayed, it means that the image burning is successful. At this time, you can exit balenaEtcher, then pull out the TF card and insert it into the TF card slot of the development board for use.



2. 3. 2. How to use RKDevTool to burn Linux image to TF card

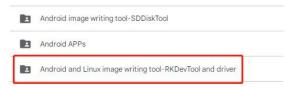
1) First you need to prepare a good quality USB2.0 male-to-male data cable



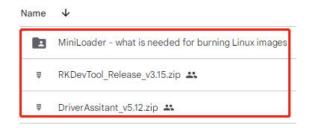
2) You also need to prepare a TF card with a capacity of 16GB or larger. The transmission speed of the TF card must be **class 10** or above. It is recommended to use TF cards from SanDisk and other brands.

3) Then download the Rockchip driver **DriverAssitant\_v5.12.zip** and **MiniLoader** and the burning tool **RKDevTool\_Release\_v3.15.zip** from the **Orange Pi's data download page** 

a. On the **Orange Pi's data download page**, first select the official tool, and then enter the folder below



b. Then download all the files below



Note that the "MiniLoader-things needed to burn Linux images" folder will be referred to as the MiniLoader folder below.

4) Then download the compressed package of the Linux operating system image file you want to burn from the **Orange Pi information download page**, and then use the decompression software to decompress it. In the decompressed file, the file ending with "**.img**" is the image file of the operating system. , the size is generally above 2GB

5) Then use decompression software to decompress **DriverAssitant\_v5.12.zip**, then find the **DriverInstall.exe** executable file in the decompressed folder and open it.

名称 ^	修改日期	类型	大小	
ADBDriver	2022/12/1 15:07	文件夹		
📙 bin	2022/12/1 15:07	文件夹		
Driver	2022/12/1 15:07	文件夹		
🔄 config	2014/6/3 15:38	配置设置	1 KB	
🥞 DriverInstall	2022/2/28 14:11	应用程序	491 KB	
Readme	2018/1/31 17:44	文本文档	1 KB	
i revison	2022/2/28 14:14	文本文档	1 KB	

- 6) Open **DriverInstall.exe** and install the Rockchip microdriver as follows
  - a. Click the "Driver Installation" button

🧟 瑞芯微驱动助手 v5.12	×
驱动安装	驱动卸载

b. After waiting for a period of time, a window will pop up prompting "Driver installation successful", then click the "OK" button.



7) Then unzip **RKDevTool\_Release\_v3.15.zip**. This software does not need to be installed. Just find **RKDevTool** in the unzipped folder and open it.

修改日期	类型	大小
2022/12/1 15:07	文件夹	
2022/12/1 15:07	文件夹	
2022/3/23 9:11	CFG 文件	7 KB
2021/11/30 11:04	配置设置	2 KB
2022/5/27 9:09	文本文档	3 KB
2022/5/27 9:06	应用程序	1,212 KB
2021/8/27 10:28	Foxit PDF Reade	450 KB
	2022/12/1 15:07 2022/12/1 15:07 2022/3/23 9:11 2021/11/30 11:04 2022/5/27 9:09 2022/5/27 9:06	2022/12/1 15:07       文件夹         2022/12/1 15:07       文件夹         2022/3/23 9:11       CFG 文件         2021/11/30 11:04       配置设置         2022/5/27 9:09       文本文档         2022/5/27 9:06       应用程序

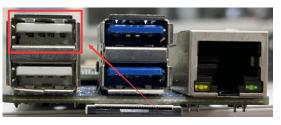
8) After opening the **RKDevTool** 

burning tool, because the computer has not

connected to the development board through the USB2.0 male-to-male data cable at this time, the lower left corner will prompt "**No device found**"

0x00 0x00		Loader Parameter Vhoot				
0x00						6.8.07
	0000000	Uboot				
						1
UxUU	0000000	trust				
0x00	0000000	Misc				
0x00						
0x00	0000000	Kernel				
0x00	0000000	Boot				
0x00	0000000	Recovery				
0x00	0000000	System				
0x00	0000000	Backup				
	0x0 0x0 0x0 0x0 0x0 0x0	0x00000000 0x00000000 0x00000000	0x0000000         Resource           0x00000000         Kernel           0x00000000         Boot           0x00000000         Recovery           0x00000000         System	0x0000000         Resource           0x00000000         Kernel           0x00000000         Bost           0x00000000         Bost           0x00000000         System	0x00000000 Resource 0x00000000 Kernel 0x00000000 Boot 0x00000000 Recovery 0x00000000 System	0x0000000         Besource           0x00000000         Kernel           0x00000000         Boot           0x00000000         Recovery           0x00000000         Recovery           0x00000000         System

- 9) Then start burning the Linux image to the TF card
  - a. First, connect the development board to the Windows computer through a USB2.0 male-to-male data cable. The location of the USB2.0 programming port on the development board is as shown in the figure below.



- b. Make sure the TF card slot is not inserted into the TF card
- c. Then press and hold the MaskROM button on the development board, the position of the MaskROM button on the development board is shown in the figure below:



d. Then connect the development board to the power supply of the Type-C interface, power it on, and then release the MaskROM button.



e. If the previous steps are successful, the development board will enter the **MASKROM** mode at this time, and the interface of the burning tool will prompt "found a MASKROM device"

	-	存储 地址	名字	路径	
	-	0x000000			
	-	0x000000			
	-	0x000000	C		
	-	0x000000			
	-	0x000000			
	는	0x000000			
	+	0x000000			
	-	0x00000			
	+	0x00000			
0		0x000000			
1	Г	0x000000	0 Backup		

- f. At this time, please insert the TF card into the TF card slot
- g. Then place the mouse cursor in the area below

#		存储	地址 0x00000000	名字 Loader	路径 …	
2			0x00000000	Parameter		
3	Ē		0x00000000	Uboot		
4	Г		0x00000000	trust		
5			0x00000000	Misc		
6	Г		0x00000000	Resource		
7	Г		0x00000000	Kernel		
8	Г		0x00000000	Boot	-	
9	Г		0x00000000	Recovery		
10			0x00000000	System		
11			0x00000000	Backup		
Load	er:		执行 ]强制按地址写	切换	设备分区表 清空	Place the mouse cursor in this are

h. Then click the right mouse button and the selection interface shown in the figure below will pop up

🧐 range Pi User Manual

:		存储 地址	名字	路径				
1	Г	0x00000	00 Loader					
2	Г	0x00000	00 Parameter					
3	Г	0x00000	00 Vboot					
4		0x00000	00 trust		添加项			
5		0x00000	00 Misc					
6		0x00000	00 Resource		删除项			
7	Г	0x00000	00 Kernel		清空所有项			
8	Г	0x00000	00 Boot		上移			
9	Г	0x00000	00 Recovery					
10	Г	0x00000	00 System		下移			
11	Г	0x00000	00 Backup		导入配置			
Load	ler:	执行 □ 强制技地	切换	设备分	导出配置       区表     清空			

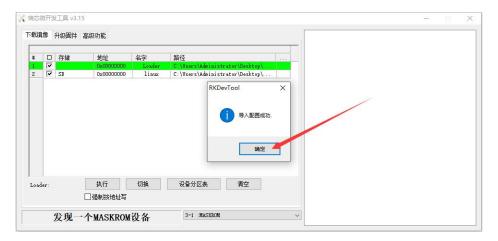
i. Then select the **import configuration** option

#		存储	地址	名字	路径						
1	Г		0x00000000	Loader							
2	Г		0x00000000	Parameter							
3			0x00000000	Uboot			-				
4			0x00000000	trust		添加项					
5			0x00000000	Misc		删除项					
6			0x00000000	Resource							
7	Г		0x00000000	Kernel		清空所有项					
8	Г		0x00000000	Boot		上移					
9	Г		0x00000000	Recovery		下移					
10	Г		0x00000000	System							
11			0x00000000	Backup		导入配置					
Load	ler :		执行 □强制按地址写	切换	设备分区	与出配置       (表)       清空					

j. Then select the **rk356x\_linux\_tfcard.cfg** configuration file in the **MiniLoader** folder downloaded earlier, and click **Open** 

打开				×
	ai → MiniLoader-烧录Linux镜像才需要用到的东西	~ C	在 MiniLoader-烧录Lin	ux ዖ
组织 ▼ 新建文件夹			≣ •	
🔷 WPS云盘	名称	修改日期	类型	大小
↑ 主文件夹	rk356x_linux_emmc.cfg	2023/8/18 11:17	txtfile	2
OneDrive	rk356x_linux_pcie.cfg	2023/8/18 11:17	txtfile	2
	rk356x_linux_spiflash.cfg	2023/8/18 11:17	txtfile	2
🧾 桌面	rk356x_linux_tfcard.cfg	2023/8/18 11:17	txtfile	2
业 下载	*			
■ 文档	*			
🔁 图片	*			
④ 音乐	*			
文件名(N): rk356x_linux_tf	card.cfg	~	ConfigFile(*.cfg)	~

k. Then click **OK** 



1. Then click the position shown in the figure below

口存储	地址	名字	路径
V SD	0x00000000 0x00000000	Loader linux	C:\Users\Administrator\Desktop\ C:\Users\Administrator\Desktop\

m. Then select **MiniLoaderAll.bin** in the **MiniLoader** folder downloaded earlier, and then click to **open** 

← → ∽ ↑ 🛅 > 桌面	→ orangepi →	MiniLoader-烧录Linux镜像才需要用到的东	西 ~ C 在	MiniLoader-烧录Linux	Q
组织 ▼ 新建文件夹				≣ • □	0
> 🔷 WPS云盘	1	名称	修改日期	类型	大小
		🔮 MiniLoaderAll.bin	2023/8/18 11:17	BIN 文件	45
> 🦲 OneDrive		rk356x_linux_emmc.cfg	2023/8/18 11:17	txtfile	
		rk356x_linux_pcie.cfg	2023/8/18 11:17	txtfile	
三 桌面	*	🗋 rk356x_linux_spiflash.cfg	2023/8/18 11:17	txtfile	
业 下载	*	rk356x_linux_tfcard.cfg	2023/8/18 11:17	txtfile	
■ 文档	*	rkspi_loader.img	2023/8/18 11:17	DAEMON.Tools	4,09
🔀 图片	*				
🕑 音乐	*				-

n. Then click on the location shown in the picture below

orange Pi User Manual

	□ 存储	地址 0x00000000	名字		
2	SD	0x00000000	Loader linux	C:\Users\lee\Desktop\Android祖L C:\Users\Administrator\Desktop\	
	r Ver:1.11	执行	切换	设备分区表 清空	

o. Then select the path of the Linux image you want to burn, and then click Open

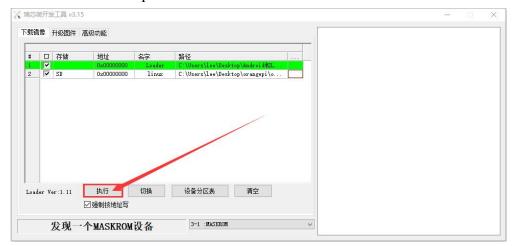
Before burning the image, it is recommended to rename the Linux image to be burned to orangepi.img or another shorter name, so that you can see the percentage of the burning progress when burning the image.

镜像 🔀 打开		×
← → • 1	🔪 📙 > 此电脑 > 桌面 > orangepi >	✓ ひ ク 在 orangepi 中搜索
4织 ▼ 寿	建文件夹	## - 🛄 💡
<ul> <li>■ 此电脑</li> <li>③ 3D 对象</li> <li>■ 视频</li> <li>■ 图片</li> <li>☆ 首</li> <li>☆ 村</li> <li>↓ 下載</li> <li>♪ 音乐</li> </ul>		
■ 桌面		

p. Then please check the option to force writing by address.

下载镜像 升级固件 高级功能          ■ □ 存储       地址       名字       路径       …         1 ▼       0x00000000       Loader       C:\Users\Lee\Desktop\&ndroidHUL       …         2 ▼       SD       0x00000000       linux       C:\Users\Lee\Desktop\or angepi\c	
1 Øx00000000 Loader C:\Users\lee\Desktop\Android∄IL	
Loader Ver:1.11 执行 切换 设备分区表 清空	

q. Click the execute button again and it will start burning the Linux image to the tf card of the development board.



r. The display log after the r.Linux image is burned is as shown below

	数开发工具 v 像 升级固定	3.15 牛 高级功能			ー 口 下戦Boot开始 下戦Boot成功	>
# 1 2	□ 存储 ✓ 5D	地址 0x00000000 0x00000000	名字 Loader linux	路径 Desktop \orangepi \orangepi WiniL Desktop \orangepi \orangepi \orange	等待Maskron开始 等待Maskron成功 测试设备开始 测试设备成功	
					<ul> <li>一 校验芯片开始</li> <li>校验芯片成功</li> <li>获取F1 = shlaf 6开始</li> <li>获取F1 = shlaf 6成功</li> <li>准备TID6成功</li> <li>准备TID6成功</li> <li>下载TID6开始</li> <li>汇备TM6</li> <li>下载TD6开始</li> <li>下载TD6开始</li> <li>下载TD6开始</li> <li>下载TD6开始</li> <li>下载TD6开始</li> <li>示载TD6开始</li> <li>项值设备开始</li> <li>项值设备开始</li> <li>可加记录后达助</li> <li>开始切换存储到SD</li> </ul>	
Load	er Ver:1.11	执行 ✓ 强制按地址写	切换	设备分区表 清空	开始下载orangepi 正在下载 orangepi(100%) 下载完成	
_		没有发现设备				

s. After burning the Linux image to the TF card, the Linux system will start automatically.

#### 2. 3. 3. How to burn Linux image using Win32Diskimager

1) First prepare a TF card with a capacity of 16GB or larger. The transmission speed of the TF card must be class 10 or above. It is recommended to use TF cards from SanDisk and other brands.

2) Then use the card reader to insert the TF card into the computer

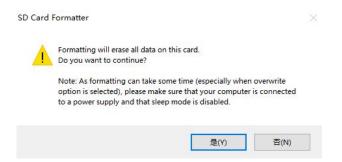
- 3) Then format the TF card
  - a. **SD Card Formatter** can be used to format the TF card. The download address is:

https://www.sdcard.org/downloads/formatter/eula\_windows/SDCardFormatterv5\_WinEN.zip

- b. After downloading, unzip and install directly, and then open the software
- c. If only the TF card is inserted into the computer, the drive letter of the TF card will be displayed in the "Select card" column. If multiple USB storage devices are inserted into the computer, you can select the drive letter corresponding to the TF card through the drop-down box.

Type SDHC Capacity 14.84	22
Type SDHC Capacity 14.84	52
Capacity 14.84	22
Capacity 14.84	22
Capacity 14.84 Formatting options	GB
Formatting options	
Quick format	
Overwrite format	
CHS format size adjustment	t
Volume label	
1	

d. Then click "Format". A warning box will pop up before formatting. After selecting "Yes (Y)", formatting will begin.



e. After formatting the TF card, the information shown in the figure below will pop up, click OK

🍏 range Pi User Manual	Copyright reserved by Sh	enzhen Xunlong Software Co., Ltd
	SD Card Formatter	×
	Formatting was successfully completed. Volume information: File system: FAT32 Capacity: 14.83 GB (15,923,150,848 bytes) Free space: 14.83 GB (15,923,118,080 bytes) Cluster size: 32 kilobytes Volume label:	
	福宁	

4) Download the compressed package of the Linux operating system image file you want to burn from the Orange Pi information download page, and then use the decompression software to decompress it. In the decompressed file, the file ending with ".img" is the image file of the operating system. The size is generally above 2GB

5) Use Win32Diskimager to burn the Linux image to the TF card

a. The download page of Win32Diskimager is

http://sourceforge.net/projects/win32diskimager/files/Archive/

- b. After downloading, you can install it directly. The Win32Diskimager interface is as follows
  - a) First select the path to the image file

b) Then confirm that the drive letter of the TF card is consistent with what is displayed in the "Device" column

c) Finally click "Write" to start burning

映像文件	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	设备
	18	[/: N]
核給催		1
无 • 生疝 質利		
无 • 生病 原则 Select the im	age file Select t	he TF ca
Language and the second s	age file Select t	he TF ca
Select the im 口 仅成取已分配分区 任务通常	age me	he TF ca
Select the im	age me	he TF ca
Select the im 口 仅读取已分配分区 任务道理	age me	he TF ca

c. After the image writing is completed, click the "**Exit**" button to exit, and then you can pull out the TF card and insert it into the development board to start

# 2. 4. Method of burning Linux image to TF card based on Ubuntu PC

Note that the Linux images here refer specifically to the images of Linux distributions like Debian, Ubuntu, and OPi OS Arch downloaded from the Orange Pi's data download page, and Ubuntu PC refers to a personal computer with Ubuntu installed.

1) First prepare a 16GB or larger capacity TF card, TF card transmission speed must be class10 or above, it is recommended to use Sandisk and other brands of TF card

2) Then use the card reader to insert the TF card into the computer

Download the balenaEtcher software, the download address is
 https://www.balena.io/etcher/

4) After entering the balenaEtcher download page, click the green download button to jump to the place where the software is downloaded



5) Then choose to download the Linux version of the software

Look



## **Download Etcher**

ASSET	os	ARCH	
ETCHER FOR WINDOWS (X86 X64) (INSTALLER)	WINDOWS	X86 X64	Download
ETCHER FOR WINDOWS (X86 X64) (PORTABLE)	WINDOWS	X86 X64	Download
ETCHER FOR WINDOWS (LEGACY 32 BIT) (X86 X64) (PORTABLE)	WINDOWS	X86 X64	Download
ETCHER FOR MACOS	MACOS	X64	Download
ETCHER FOR LINUX X64 (64-BIT) (APPIMAGE)	LINUX	X64	Download
ETCHER FOR LINUX (LEGACY 32 BIT) (APPIMAGE)	LINUX	X86	Download

6) Download the compressed Linux operating system image file you want to burn from **Orange Pi's data download page**, and then use the decompression software to decompress it. Files ending with "**.img** "in the decompressed files are the image files of the operating system, and the size is generally more than 2GB

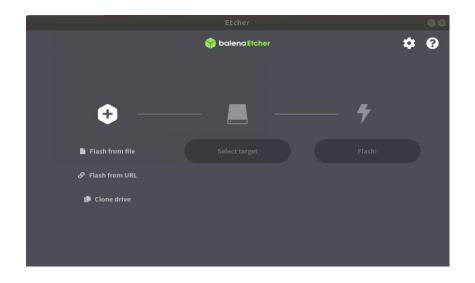
The following command is used to decompress the compressed package ending in 7z test@test:~\$ 7z x Orangepicm4\_1.0.0\_debian\_bullseye\_desktop\_xfce\_linux5.10.160.7z test@test:~\$ ls Orangepicm4\_1.0.0\_debian\_bullseye\_desktop\_xfce\_linux5.10.160.7z Orangepicm4\_1.0.0\_debian\_bullseye\_desktop\_xfce\_linux5.10.160.7z Orangepicm4\_1.0.0\_debian\_bullseye\_desktop\_xfce\_linux5.10.160.sha #Checksum file Orangepicm4\_1.0.0\_debian\_bullseye\_desktop\_xfce\_linux5.10.160.img #Image file

7) After decompressing the image, you can first use the **sha256sum -c \*.sha** command to calculate whether the checksum is correct, if the success indicates that the downloaded image is not wrong, you can rest assured to burn to the TF card, if the **checksum does not match** that there is a problem with the downloaded image, please try to re-download

test@test:~\$ sha256sum -c \*.sha

Orangepicm4\_1.0.0\_debian\_bullseye\_desktop\_xfce\_linux5.10.160.img: OK

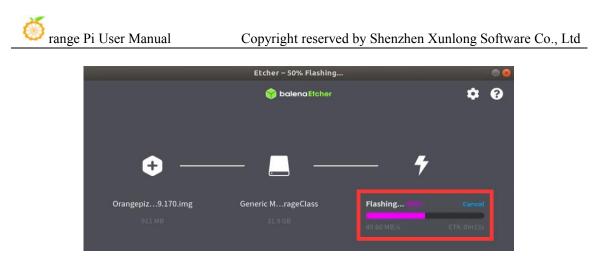
8) Then double-click **balenaEtcher-1.5.109-x64.AppImage** in the graphical interface of Ubuntu PC to open balenaEtcher (**no installation required**), and the interface after balenaEtcher is opened is shown as the following figure



- 9) The specific steps to burn a Linux image using balenaEtcher are shown below
  - a. Select the path of the Linux image file to be burned
  - b. Then select the drive letter of the TF card
  - c. Finally, clicking Flash will start burning the Linux image to the TF card



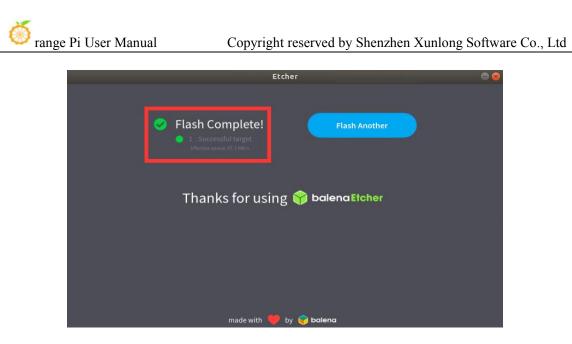
10) The interface displayed during balenaEtcher burning the Linux image is as shown in the following figure. In addition, the progress bar showing purple indicates that the Linux image is burning to the TF card



11) After the Linux image is burned, balenaEtcher will also verify the image burned to the TF card by default to ensure that there is no problem in the burning process. As shown in the following figure, the green progress bar indicates that the image has been burned, and balenaEtcher is verifying the burned image



12) The display interface of balenaEtcher after the successful burning is shown as the following figure. If the green indicator icon is displayed indicating that the image is burned successfully, you can exit balenaEtcher at this time, and then pull out the TF card and insert it into the TF card slot of the development board



- 2. 5. Methods for burning Linux images to eMMC
- 2.5.1. Methods for burning Linux images to eMMC using RKDevTool

Note that all of the following actions are performed on a Windows computer.

Note that the Linux images here specifically refer to the images of Linux distributions such as Debian, Ubuntu, and OPi OS Arch downloaded from the Orange Pi's data download page.

1) First of all, you need to prepare a good quality USB2.0 public-to-public data cable



2) Then download the Rockchip **DriverAssitant\_v5.12.zip** and **MiniLoader** and the burning tool **RKDevTool\_Release\_v3.15.zip** from **Orange Pi's data download page** 

a. On the **Orange Pi's data download page**, first select the official tool and then go to the following folder



b. Then download all the files below

Name	$\downarrow$
	MiniLoader - what is needed for burning Linux images
Ŧ	RKDevTool_Release_v3.15.zip
Ŧ	DriverAssitant_v5.12.zip 🚢

Note that the folder "MiniLoader- What you Need to burn Linux images" is hereinafter referred to as the MiniLoader folder.

3) Download the compressed Linux operating system image file you want to burn from the **Orange Pi's data download page**, and then use the decompression software to decompress it. After decompressing the file, the file ending with "**.img** "is the image file of the operating system, and the size is generally more than 2GB

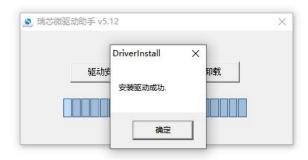
4) Then use the decompression software to decompress **DriverAssitant\_v5.12.zip**, and then find the **DriverInstall.exe** executable file in the decompressed folder and open it

修改日期	类型	大小
2022/12/1 15:07	文件夹	
2022/12/1 15:07	文件夹	
2022/12/1 15:07	文件夹	
2014/6/3 15:38	配置设置	1 KB
2022/2/28 14:11	应用程序	491 KB
2018/1/31 17:44	文本文档	1 KB
2022/2/28 14:14	文本文档	1 KB
	2022/12/1 15:07 2022/12/1 15:07 2022/12/1 15:07 2014/6/3 15:38 2022/2/28 14:11 2018/1/31 17:44	2022/12/1 15:07 文件夹 2022/12/1 15:07 文件夹 2022/12/1 15:07 文件夹 2014/6/3 15:38 配置设置 2022/2/28 14:11 应用程序 2018/1/31 17:44 文本文档

- 5) Open **DriverInstall.exe** and install the SWick micro driver as follows
  - a. Click the "Driver Installation" button



b. Wait for a period of time, the pop-up window will prompt "Driver installation successful", and then click the "OK" button



6) Then decompress **RKDevTool\_Release\_v3.15.zip**, this software does not need to be installed, find **RKDevTool** in the decompressed folder and open it

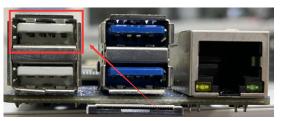
修改日期	类型	大小
2022/12/1 15:07	文件夹	
2022/12/1 15:07	文件夹	
2022/3/23 9:11	CFG 文件	7 KB
2021/11/30 11:04	配置设置	2 KB
2022/5/27 9:09	文本文档	3 KB
2022/5/27 9:06	应用程序	1,212 KB
2021/8/27 10:28	Foxit PDF Reade	450 KB
	2022/12/1 15:07 2022/12/1 15:07 2022/3/23 9:11 2021/11/30 11:04 2022/5/27 9:09 2022/5/27 9:06	2022/12/1 15:07       文件夹         2022/12/1 15:07       文件夹         2022/3/23 9:11       CFG 文件         2021/11/30 11:04       配置设置         2022/5/27 9:09       文本文档         2022/5/27 9:06       应用程序

7) After opening the **RKDevTool** burning tool, because the computer has not connected to the development board through the USB2.0 public-to-public data cable at this time, the lower left corner will indicate "**no device found**".

orange Pi User Manual

		存储	地址	名字	路径		
	Г		0x00000000	Loader			
	Г		0x000000000	Parameter			
	Г		0x00000000	Uboot			
			0x00000000	trust			
			0x00000000	Misc			
	Π		0x00000000	Resource			
	Г		0x00000000	Kernel			
	Г		0x00000000	Boot			
	Г		0x00000000	Recovery			
	Г		0x00000000	System			5
	Г		0x00000000	Backup			
łe	r:	[	执行	切换	设备分区表	清空	

- 8) Then start burning the Linux image into eMMC
  - a. First, connect the development board to the Windows computer through the USB2.0 male-to-public data cable. The position of the USB2.0 burning port on the development board is shown in the figure below



- b. Ensure that no TF card is inserted into the development board and no power supply is connected
- c. Then press and hold the MaskROM button on the development board. The position of the MaskROM button on the development board is shown as follows:



d. Then connect the Type-C interface to the development board, and power on, and then you can release the MaskROM button

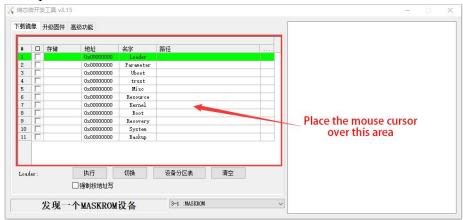


e. If the previous steps are smooth, the development board will enter

**MASKROM** mode at this time, and the interface of the burning tool will prompt "Found a MASKROM device".

0x00000000 0x00000000	Loader Parameter						
	Parameter						
0x00000000	Uboot						
0x00000000	trust						
0x00000000	Misc			/			
0x00000000	Resource						
0x00000000	Kernel						
0x00000000	Boot						
0x00000000	Recovery						
0x00000000	System						
0x00000000	Backup						
	0x0000000 0x0000000 0x0000000 0x0000000 0x000000	0x0000000         Misc           0x0000000         Resource           0x0000000         Kenel           0x0000000         Benel           0x0000000         Reovery           0x0000000         System	0x00000000         Nisc           0x00000000         Resource           0x00000000         Kernel           0x00000000         Boot           0x00000000         Boot           0x00000000         Recovery           0x00000000         System	0x00000000         Nisc           0x00000000         Resource           0x00000000         Resnel           0x00000000         Boot           0x00000000         Boot           0x00000000         Recovery           0x00000000         System	0x00000000         Misc           0x00000000         Resurce           0x00000000         Bost           0x00000000         Bost           0x00000000         Resvery           0x00000000         System	0x00000000         Miso           0x00000000         Resurve           0x00000000         Boot           0x00000000         Boot           0x00000000         Boot           0x00000000         Boot           0x00000000         Boot           0x00000000         System	0x00000000         Niso           0x00000000         Resource           0x00000000         Resnal           0x00000000         Boot           0x00000000         Boot           0x00000000         Resorery           0x00000000         System

f. Then place the mouse cursor on the field below



g. Then click the right mouse button to pop up the selection interface as shown in the following figure

#		存储	地址	名字	路径				
1	Г		0x00000000	Loader					
2	Г		0x00000000	Parameter	1.1				
3			0x00000000	Uboot					
4	Г		0x00000000	trust	1 T	添加项			
5			0x00000000	Misc					
6			0x00000000	Resource		删除项			
7	Г		0x00000000	Kernel		清空所有项			
3	Г		0x00000000	Boot		上移			
9	Г		0x00000000	Recovery					
10	Г		0x00000000	System		下移			
11			0x00000000	Backup		导入配置			
Load	ler:		执行 □ 强制按地址写	切换	设备分[	与出配置 区表 清空			

h. Then select the Import configuration option

🛞 range Pi User Manual

#		存储:	地址	名字	路径					
1	Г		0000000000	Loader						
2	Г	0	0x00000000	Parameter						
3	Г	(	0x0000000x0	Uboot						
4	Г		0x0000000x0	trust		添加项				
5		(	0x0000000x0	Misc			-			
6		0	0000000000000	Resource		删除项				
7	Г	(	0x0000000x0	Kernel		清空所有项				
8	Г	(	0x0000000x0	Boot		上移				
9	Г	(	0x0000000x0	Recovery		下移				
10	Г	(	0x0000000x0	System						
11	Г	(	0x0000000x0	Backup		导入配置				
Load	ler :		丸行 制按地址写	切换	设备分区	导出配置 表 清空				

i. Then select the **rk356x\_linux\_emmc.cfg** configuration file in the **MiniLoader** folder downloaded earlier and click **Open** 

载 🔀 打开					>
• ← → ~ ↑	늘 › 桌面 › orangepi	→ MiniLoader-烧录Linux镜像才需要用到的	<b>东西 ∨ C 在</b>	MiniLoader-烧录L	inux 🔎
1 2 组织 ▼ 新建文·	件夹			≣ •	
3 4 > <b>今</b> WPS云盘		名称 ^	修改日期	类型	大小
5 6 <b>六</b> 主文件夹 7 0 0 D ·		rk356x_linux_emmc.cfg	2023/8/18 11:17	txtfile	
7 >  OneDrive		rk356x_linux_pcie.cfg	2023/8/18 11:17	txtfile	
9		rk356x_linux_spiflash.cfg	2023/8/18 11:17	txtfile	
1(	1	rk356x_linux_tfcard.cfg	2023/8/18 11:17	txtfile	
业 下载	*				
■ 文档	1	•••			
▶ 图片	4				
1 音乐	,				
	文件名(N): rk356x_linux_em	mc.cfg	~ C	onfigFile(*.cfg)	~
			[	打开(0)	取消

j. Then click **OK** 

		存储	地址	名字	路径
1	•		0x00000000	Loader	C:\Users\Administrator\Desktop\
2	~	EMMC	0x00000000	linux	C:\Users\Administrator\Desktop\
					1 导入配置成功.

k. Then click on the location shown in the image below

1	

1. Select MiniLoaderAll.bin from the MiniLoader folder downloaded earlier, and then click Open

← → ∽ ↑ 🛅 > 桌面 >	orangepi > MiniLoader-烧录Linux镜像才需要用到的	<b>东西 ~ C 在</b>	MiniLoader-烧录Linux	Q
组织 ▼ 新建文件夹			≣ • □	0
> 👝 WPS云盘	名称 ^	修改日期	美型	大小
☆ 主文件夹	🤣 MiniLoaderAll.bin	2023/8/18 11:17	BIN 文件	45
> 🙆 OneDrive	rk356x_linux_emmc.cfg	2023/8/18 11:17	txtfile	1
	rk356x_linux_pcie.cfg	2023/8/18 11:17	txtfile	
<b>三</b> 桌面		2023/8/18 11:17	txtfile	1
业 下载	* rk356x_linux_tfcard.cfg	2023/8/18 11:17	txtfile	8
■ 文档		2023/8/18 11:17	DAEMON.Tools	4,09
▶ 图片	э.			
④ 音乐				

m. Then click on the location shown in the image below

	开发工具 v3 象 升级固件				
<b>#</b> 1 2	□ 存储 ✓ ✓ BMMC	地址 0x00000000 0x00000000	名字 Loader linux	路径 C. Weers Liee Decktop Verangep i M. Tre C: Wsers Vadmini strator Wesktop V	
		执行	切换	设备分区表 清空	

n. Then select the path of the Linux image you want to burn and click Open

Before burning the image, it is recommended to rename the Linux image to

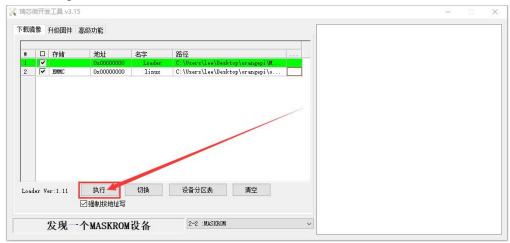
orangepi.img or something shorter so that you can see the percentage of the burn progress when burning the image.

像 人打开	×
← → ~ ↑ 📙 > 此电脑 > 桌面 > orangepi >	✓ ひ ク 在 orangepi 中搜索
Y 组织 ▼ 新建文件夹	BB - 🔟 💡
此电脑     「」     MiniLoader-焼录Linux镜像才需要用到	的东西
③ orangepi ③ angepi ④ orangepi	
■ 2000	
圖 文档	
➡ 下載	
▶ 音乐	
■ 桌面 ▲ 本地磁盘 (C:)	
夏 夏 夏 夏 日 日 日 日 日 日 日 日 日 日 日 日 日 日 日 日	

#### o. Then check the Force write to address option

成現	.118 ;	升级固件)	高級功能				
ŧ		存储	地址	名字	路径		
1 2	2	EMMC	0x00000000 0x00000000	Loader linux	C:\Users\Lee\Desktop\orangepi\M C:\Users\Lee\Desktop\orangepi\o		

p. Click the Execute button again to start burning the Linux image to eMMC on the development board



q. The following figure shows the display log after the Linux image is burned

						下载Boot成功 等待Maskrom开始
#	口,存储	地址	名字	路径		等待Maskron成功
2	EMMC	0x0000	Loader linux	C:\Users\hhl77\Desktop\ora C:\Users\hhl77\Desktop\ora		测试设备开始
	, and the second				- Lunnard	测试设备成功
						校验芯片开始
						校验芯片成功
						获取FlashInfo开始 获取FlashInfo成功
						准备IDB开始
						准备 IDB成功
						下载IDB开始
						下载IDB成功
						等待Maskrom开始
						等待Maskron成功
						测试设备开始 测试设备成功
		执行	切地	與 设备分区表	清空	开始切换存储到EMMC
Loa	der Ver:1.11				/HT	开始下载orangepi
		☑强制按地	北宮			正在下载 orangepi (100%)

r. After the Linux image is burned into eMMC, the Linux system automatically starts

#### 2. 5. 2. How to burn a Linux image to eMMC using the dd command

Note that by Linux images, I specifically mean images of Linux distributions such as Debian, Ubuntu, or OPi OS Arch downloaded from the Orange Pi's data download page.

1) Using dd command to burn Linux image to eMMC needs TF card to complete, so first need to burn Linux image to TF card, and then use TF card to start the development board into the Linux system. For the method of burning a Linux image to a TF card, see the two sections for the method of burning a Linux image to a TF Card based on a Windows PC and the method of burning a Linux image to a TF card based on an Ubuntu PC.

2) After starting the Linux system with the TF card, we first upload the decompressed Linux image file (Debian, Ubuntu image or OPi OS (Arch) image downloaded from the official website) to the TF card. For details about how to upload a Linux image file to the development board, see section **Uploading Files to the Linux system on the Development Board**.

3) After uploading the image to the Linux system of the development board, we can enter the storage path of the image file in the command line of the Linux system of the development board. For example, I saved the Linux image of the development board in the directory **/home/orangepi/Desktop**. Then go to the **/home/orangepi/Desktop** directory and you will see the uploaded image file.

orangepi@orangepi:~\$ cd /home/orangepi/Desktop orangepi@orangepi:~/Desktop\$ ls Orangepicm4 x.x.x debian bullseye desktop xfce linux5.10.160.img

How to enter the development board Linux system command line?

**1.** For details about how to log in to the terminal through the serial port, see section **Debugging Serial Port.** 

2. For details about how to remotely log in to the Linux operating system over ssh, see section "Logging In to the Development Board over SSH".

**3.** If you are connected to a display screen such as HDMI or LCD, you can open a command line terminal on the desktop.

4) Next, we first use the following command to identify the eMMC device node orangepi@orangepi:~/Desktop\$ ls /dev/mmcblk\*boot0 | cut -c1-12

/dev/mmcblk0

5) Then we can use the dd command to clear eMMC, pay attention to the of= parameter after please fill in the output result of the above command

orangepi@orangepi:~/Desktop\$ sudo dd bs=1M if=/dev/zero of=/dev/mmcblk0 count=1000 status=progress orangepi@orangepi:~/Desktop\$ sudo sync

6) You can then use the dd command to burn the Linux image of the development board into eMMC

- a. if = parameter in the command is to fill in behind the Linux + Linux mirror mirror to store the full path name (such as/home/orangepi/Desktop/Linux image name). Since we have entered the path of the Linux image above, we only need to fill in the name of the Linux image.
- b. Do not copy the Linux image name in the following command. Replace it with the actual image name (because the version of the image may be updated).

sudo dd bs=1M if=Orangepicm4\_x.x.x\_debian\_bullseye\_desktop\_xfce\_linux5.10.160.img of=/dev/mmcblk0 status=progress

sudo sync

Note that if you are uploading a.7z or.xz Linux image file, please decompress it before using the dd command to burn it.

A detailed description of all the parameters of the dd command and more usage can be seen by running the man dd command on Linux.

7) After successfully burning the Linux image of the development board to eMMC, you can use the poweroff command to shut down. Then pull out the TF card, power it on again, and the Linux system in eMMC will be started.

### 2. 6. Method of burning Linux image to SPIFlash+NVMe SSD

Before starting to burn the image, it is necessary to ensure that the SPI Flash chip has been affixed to the development board, because the development board does not have SPI Flash chip when it is shipped, so it is necessary to purchase and weld it by itself. We suggest that the SPI Flash chip model be XM25QU128CWIQT08Q

eMMC has a higher boot priority than NVMe SSDS. Therefore, you need to clear the eMMC system before burning the image. For details about how to clear eMMC, see section "Clearing eMMC using RKDevTool"

Note that the Linux images here specifically refer to the images of Linux distributions such as Debian, Ubuntu, and OPi OS Arch downloaded from the Orange Pi's data download page.

#### Note that all of the following actions are performed on a Windows computer.

#### 2. 6. 1. Method of burning using RKDevTool

1) First of all, you need to prepare an NVMe SSD. The PCIe supported by the M.2 slot on the development board is PCIe2.0x1, and the theoretical maximum speed is 500MB/s. Pci 3.0 and PCI 4.0 NVMe SSDS are also available, but the speed is only up to the speed of PCI 2.0x1.

a. M.2 2230 SSD specifications are as follows



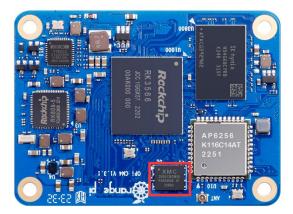
b. M.2 2242 SSDS are described as follows



2) Insert the NVMe SSD into the M.2 PCIe port on the development board and secure it



3) Please ensure that the SPI Flash is affixed to the development board. The position of SPI Flash on the development board is shown in the figure below. No other Settings are required before burning

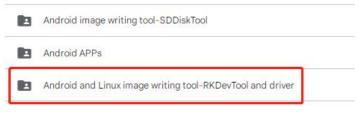


4) Then you need to prepare a good quality USB2.0 public-to-public data cable

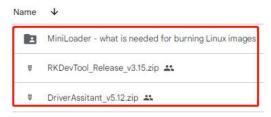


5) Then download the Rockchip **DriverAssitant\_v5.12.zip** and **MiniLoader** and the burning tool **RKDevTool\_Release\_v3.15.zip** from **Orange Pi's data download page** 

a. On the **Orange Pi's data download page**, first select the **official tool** and then go to the following folder



b. Then download all the files below



Note that the folder "MiniLoader- What you Need to burn Linux images" is hereinafter referred to as the MiniLoader folder.

6) Download the compressed Linux operating system image file you want to burn from the **Orange Pi's data download page**, and then use the decompression software to decompress it. In the decompressed file, the file ending with "**.img** "is the image file of the operating system, and the size is generally more than 2GB

7) Then use the decompression software to decompress **DriverAssitant\_v5.12.zip**, and then find the **DriverInstall.exe** executable file in the decompressed folder and open it

Copyright reserved	by Shenzhen	Xunlong Software Co., Lt	d
修改日期	类型	大小	
2022/12/1 15:07	文件夹		
2022/12/1 15:07	文件夹		
2022/12/1 15:07	文件夹		
2014/6/3 15:38	配置设置	1 KB	
2022/2/28 14:11	应用程序	491 KB	
2018/1/31 17:44	文本文档	1 KB	
2022/2/28 14:14	文本文档	1 KB	
	修改日期 2022/12/1 15:07 2022/12/1 15:07 2022/12/1 15:07 2014/6/3 15:38 2022/2/28 14:11 2018/1/31 17:44	修改日期         类型           2022/12/1 15:07         文件夹           2022/12/1 15:07         文件夹           2022/12/1 15:07         文件夹           2022/12/1 15:07         文件夹           2014/6/3 15:38         配置设置           2022/2/28 14:11         应用程序           2018/1/31 17:44         文本文档	2022/12/1 15:07       文件夹         2022/12/1 15:07       文件夹         2022/12/1 15:07       文件夹         2014/6/3 15:38       配置设置       1 KB         2022/2/28 14:11       应用程序       491 KB         2018/1/31 17:44       文本文档       1 KB

- 8) Open **DriverInstall.exe** and install the Rockchip driver as follows
  - a. Click the "Driver Installation" button

驱动安装	驱动卸载
30-40 5 22	364/06934

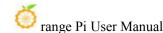
b. Wait for a period of time, the pop-up window will prompt "Driver installation successful", and then click the "OK" button



9) Then decompress **RKDevTool\_Release\_v3.15.zip**, this software does not need to be installed, find **RKDevTool** in the decompressed folder and open it

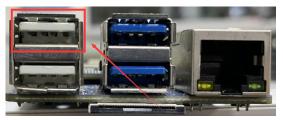
名称 ^	修改日期	类型	大小
bin	2022/12/1 15:07	文件夹	
📙 Language	2022/12/1 15:07	文件夹	
🗋 config.cfg	2022/3/23 9:11	CFG 文件	7 KB
🔊 config	2021/11/30 11:04	配置设置	2 KB
revision	2022/5/27 9:09	文本文档	3 KB
KDevTool	2022/5/27 9:06	应用程序	1,212 KB
🧟 开发工具使用文档_v1.0	2021/8/27 10:28	Foxit PDF Reade	450 KB

10) After opening the **RKDevTool** burning tool, because the computer has not connected to the development board through the USB2.0 public-to-public data cable at this time, the lower left corner will indicate "**No device found**".



	0x00000000 0x00000000 0x00000000	Loader Parameter		
				_
		Uboot		
	0x000000x0	trust		_
5	0x00000000	Misc		 _
	0x000000x0	Resource		 _
	0x000000000	Kernel		
	0x00000000	Boot		
	0x00000000	Recovery		
0	0x00000000	System		
1	0x00000000	Backup		

- 11) Then start burning the Linux image to the SSD
  - a. First, connect the development board to the Windows computer through the USB2.0 male-to-public data cable. The position of the USB2.0 burning interface on the development board is shown in the figure below



- b. Ensure that no TF card is inserted into the development board and no power supply is connected
- c. Then press and hold the MaskROM button on the development board. The position of the MaskROM button on the development board is shown as follows:



d. Then connect the Type-C interface to the development board, and power on, and then you can release the MaskROM button



e. If the previous steps are smooth, the development board will enter **MASKROM** mode at this time, and the interface of the burning tool will prompt "Found a

#### MASKROM device".

	口存储	地址	名字	路径			
2		0x00000000	Loader				
<u>.</u>		0x00000000 0x00000000	Parameter Uboot				
		0x00000000					
		0x00000000	trust Misc				
5		0x00000000	Resource				
		0x00000000	Kernel	-			
3	-	0x00000000	Boot				
3		0x00000000	Recovery				
11		0x00000000					
10		0x00000000	System Backup				

f. Then place the mouse cursor on the field below

		存储	地址 0x00000000	名字 Loader	路径		
	-		0x00000000	Parameter			
	-		0x00000000	Uboot			
	-		0x00000000	trust			
	Ê		0x00000000	Misc			
	Ē		0x00000000	Resource			
	Ē		0x00000000	Kernel			
	Γ		0x00000000	Boot		10.00	
	Г		0x00000000	Recovery		Place the mouse cursor	
)	Г		0x00000000	System		over this area	
1	Γ		0x00000000	Backup		over this area	
			0x00000000	Backup		over this area	

g. Then click the right mouse button to pop up the selection interface as shown in the following figure

		存储	地址	名字	路径						
	-		0x00000000 0x000000000	Loader Parameter							
2 3	1		0x00000000	Tarameter							
1	1		0x00000000	trust	-						
5	i E		0x00000000	Misc		添加项					
6	i E		0x00000000	Resource		删除项					
7	Ē		0x00000000	Kernel		清空所有项					
8	Ē		0x00000000	Boot							
9	Г		0x00000000	Recovery		上移					
10	Г		0x00000000	System		下移	1 2 2				
11	Г		0x00000000	Backup		导入配置					
.0 8 0	ler:		执行 ] 强制按地址写	切换	设备分区	导出配置 IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	J				

h. Then select the Import configuration option

🥮 range Pi User Manual

#		存储 地址	名字	路径					
1	Г	0x00000	00 Loader			1.00			
2	Г	0x00000	00 Parameter	21.0					
3		0x00000	00 Vboot						
1		0x00000	00 trust		添加项				
5		0x00000	00 Misc						
3		0x00000	00 Resource		删除项				
7		0x00000	00 Kernel		清空所有项				
3	Г	0x00000	00 Boot		上移				
3	Г	0x00000	00 Recovery		下移				
10	Г	0x00000	00 System	24					
11		0x00000	00 Backup		导入配置				
.0 8.0	er:	执行 □ 强制按地	切换	设备分区	与出配置				

i. Then go to the previously downloaded MiniLoader folder, select the rk356x\_linux\_pcie.cfg configuration file, and click Open

	⇒ orangepi → M	iniLoader-烧录Linux镜像才需要用到的东	西 ~ C 在	MiniLoader-烧录I	Linux P
组织 ▼ 新建文件夹				≣ •	· 🔲 🔞
> 💧 WPS云盘	1	名称 个	修改日期	类型	大小
☆ 主文件夹		rk356x_linux_emmc.cfg	2023/8/18 11:17	txtfile	
> 🙆 OneDrive		rk356x_linux_pcie.cfg	2023/8/18 11:17	txtfile	
		rk356x_linux_spiflash.cfg	2023/8/18 11:17	txtfile	
🧾 桌面	*	rk356x_linux_tfcard.cfg	2023/8/18 11:17	txtfile	
业 下载	*				
■ 文档	*				
🔀 图片	*				
🕑 音乐	*				

j. Then click **OK** 

 		1			
	存储	地址	名字	路径	
<ul><li></li></ul>	SPINOR	0x00000000 0x00000000	Loader uboot	C:\Users\Administrator\Desktop\ C:\Users\Administrator\Desktop\	
Ramphy	PCIE	0x000000000	linux	C:\Users\Administrator\users\andreaktop\ C:\Users\Administrator\users\andreaktop\ RKDevTool	
				RKDevTool X ] 导入配置成功.	

k. Then click on the location shown in the image below

	-		1.14-1.1		22/7	
#		存储	地址 0x00000000	名字 Loader	路径 C:\Users\Administrator\Desktop\	
2	V	SPINOR	0x00000000	uboot	C:\Users\Administrator\Desktop\	
2 3	V V	PCIE	0x00000000	linux	C:\Users\Administrator\Desktop\	

1. Select MiniLoaderAll.bin from the MiniLoader folder downloaded earlier, and then click Open

	orangepi >	MiniLoader-烧录Linux镜像才需要用到的东	西 ~ C 7	E MiniLoader-烧录Linux	٩
组织 ▼ 新建文件夹				≣ • □	1 0
> 🙆 WPS云盘	1	名称	修改日期	类型	大小
↑ 主文件夹		😏 MiniLoaderAll.bin	2023/8/18 11:17	BIN 文件	455
> 🤷 OneDrive		rk356x_linux_emmc.cfg	2023/8/18 11:17	txtfile	1
		🗋 rk356x_linux_pcie.cfg	2023/8/18 11:17	txtfile	2
- 真面	*	🗋 rk356x_linux_spiflash.cfg	2023/8/18 11:17	txtfile	ć
业 下载	*	rk356x_linux_tfcard.cfg	2023/8/18 11:17	txtfile	2
■ 文档	*	rkspi_loader.img	2023/8/18 11:17	DAEMON.Tools	4,096
🔀 图片	*				
🕜 音乐	*				-

m. Then click on the location shown in the image below

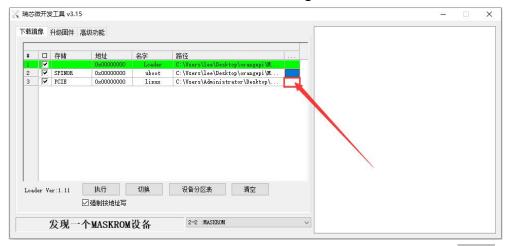
		存储	地址	名字	路径	
	~		0x00000000	Loader	C:\Users\Lee\Desktop\orangepiVM	
2 1	00004 ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) (	SPINOR	0x00000000	uboot	C:\Users\Administrator\Desktop\	
3 .	~	PCIE	0x00000000	linux	C:\Users\Administrator\Desktop\	

n. Then go to the previously downloaded MiniLoader folder, select rkspi\_loader.img, and click Open

🛞 range Pi User Manual

← → × ↑	› orangepi ›	MiniLoader-烧录Linux镜像才需要用到的东西	~ C 3	在 MiniLoader-烧录Linux	Q
组织 ▼ 新建文件夹				≣ -	0
→ WPS云盘		名称	修改日期	类型	大小
		😏 MiniLoaderAll.bin	2023/8/18 11:17	BIN 文件	455
🔷 OneDrive		🗋 rk356x_linux_emmc.cfg	2023/8/18 11:17	txtfile	2
		🗋 rk356x_linux_pcie.cfg	2023/8/18 11:17	txtfile	2
▲ 桌面	*	🗋 rk356x_linux_spiflash.cfg	2023/8/18 11:17	txtfile	2
业 下载	#	rk356x_linux_tfcard.cfg	2023/8/18 11:17	txtfile	2
■ 文档	*	🗋 rkspi_loader.img	2023/8/18 11:17	DAEMON.Tools	4,096
🔀 图片	*				
🕖 音乐	*	h			
文件名(N): rks	ni loaderima		~	All File(*.*)	

o. Then click on the location shown in the image below



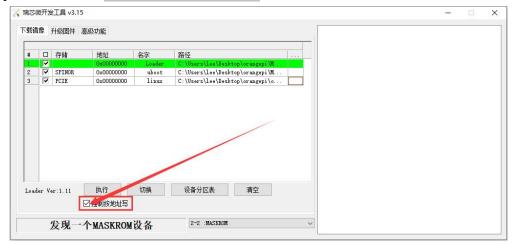
p. Then select the path of the Linux image you want to burn and click Open

Before burning the image, it is recommended to rename the Linux image to orangepi.img or something shorter so that you can see the percentage of the burn progress when burning the image.

🧭 range Pi User Manual

<b>瀢像</b>	入 打开	×
	← → < ↑ 📙 > 此电脑 > 桌面 > orangepi >	✓ O た orangepi 中搜索
	组织 ▼ 新建文件夹	BB - 🔟 🕐
ader	<ul> <li>■ 此电脑</li> <li>③ 3D 对象</li> <li>圖 视频</li> <li>圖 型片</li> <li>① 文档</li> <li>● 下载</li> <li>③ 首乐</li> <li>■ 重面</li> <li>二 重面</li> <li>二 本地磁曲(C)</li> <li>③ C 20 第25年 (D)</li> </ul>	
	文件名(N): orangepi	✓ All File(*.*) ✓
_		打开(O) 取消

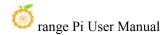
#### q. Then select Force Write to address



r. Click the Run button again to start burning the Linux image to the SSD

		-to-the	like L. L	يدريل	bb //7
#		存储	地址 0x00000000	名字 Loader	路径
2	V	SPINOR	0x00000000	uboot	C:\Users\lee\Desktop\orangepiVM
	V.	PCIE	0x00000000	linux	C:\Users\lee\Desktop\orangepi\o
oade	or Va	r:1,11	执行	切换	设备分区表 清空

s. The display log of the S.lux image after burning is shown in the following figure



载镜	像 升级固件	高级功能			等待Maskrom开始 等待Maskrom成功
# 1	□ 存储	地址 0x0000000	名字 Loader	路径 C、\Vsers\osy\Desktop\orangepi\M	测试设备开始 测试设备成功 预验芯片开始 检验芯片成功
2 3	SPINOF PCIE	0x00000000 0x00000000	uboot linux	C:\Users\osy\Desktop\orangepi\M T:\test\orangepi-build\output\i	·····································
					下载IDB开始 下载IDB成功 等情地站ros开始 等情地站ros成功 测试设备成功 <u>测试设备成功</u> 开始切掉存载到SFINO8 开始了载rk3666_rkspi_loader 正在下载rk5666_rkspi_loader(100%)

If you have problems with burning, please clear the SPIFlash first and then burn the test. For instructions on how to clear SPIFlash, refer to the section on how to clear SPIFlash using RKDevTool.

t. After the image is burned, the Linux system in the SPIFlash+PCIe SSD automatically starts. If it does not start properly, power it on again.

#### 2. 6. 2. Method of burning using dd command

1) First of all, you need to prepare an NVMe SSD. The PCIe supported by the M.2 slot on the development board is PCIe2.0x1, and the theoretical maximum speed is 500MB/s. Pci 3.0 and PCI 4.0 NVMe SSDS are also available, but the speed is only up to the speed of PCI 2.0x1.

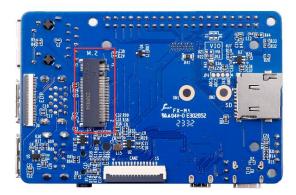
a. M.2 2230 SSDS are as follows



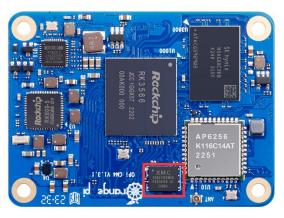
b. M.2 2242 SSDS are described as follows



2) Insert the NVMe SSD into the M.2 PCIe port on the development board and secure it



3) Please ensure that the SPI Flash is affixed to the development board. The position of SPI Flash on the development board is shown in the figure below. No other Settings are required before burning

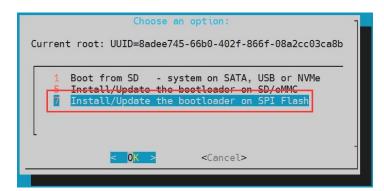


4) Burning Linux image to SPIFlash+NVMe SSD requires TF card to complete, so first need to burn Linux image to TF card, and then use the TF card to start the development board into the Linux system. For the method of burning a Linux image to a TF card, see the two sections on the method of burning a Linux image to a TF card based on a Windows PC and the method of burning a Linux image to a TF card based on an Ubuntu PC.

5) After starting the Linux system with TF card, we first burn the u-boot image into SPI Flash

a. Run nand-sata-install first. Ordinary users remember to add sudo permission

b. Then select 7 Install/Update ther bootloader on SPI Flash



c. Then select <Yes>



d. Then please wait patiently for the burning to complete, after the burning is completed, it will be displayed as follows (a **Done** will be displayed in the lower left corner) :



6) Then upload the Linux image file (Debian or Ubuntu image downloaded from the official website) to the TF card. For details about how to upload a Linux image file to the development board, see section **Uploading Files to the Linux system on the Development Board**.

7) After uploading the image to the Linux system of the development board, we can enter the storage path of the image file in the command line of the Linux system of the development board. For example, I saved the Linux image of the development board in

the directory **/home/orangepi/Desktop**. Then go to the **/home/orangepi/Desktop** directory and you will see the uploaded image file.

orangepi@orangepi:~\$ cd /home/orangepi/Desktop

orangepi@orangepi:~/Desktop\$ ls

Orangepi3b\_x.x.x\_debian\_bullseye\_desktop\_xfce\_linux5.10.160.img

How to enter the development board Linux system command line?

**1.** For details about how to log in to the terminal through the serial port, see section **Debugging Serial Port.** 

2. For details about how to remotely log in to the Linux operating system over ssh, see section "Logging In to the Development Board over SSH".

**3.** If you are connected to a display screen such as HDMI or LCD, you can open a command line terminal on the desktop.

8) Next, let's first make sure that NVMe SSD has been properly recognized by Linux development board. If the NVMe SSD is correctly identified, run the **sudo fdisk -l** command to view information about the **nvme** 

orangepi@orangepi:~/Desktop\$ **sudo fdisk -l | grep "nvme0n1"** Disk /dev/nvme0n1: 1.86 TiB, 2048408248320 bytes, 4000797360 sectors

Use the lspci command to see an NVME-related PCI device

orangepi@orangepi:~/Desktop\$ lspci

00:00.0 PCI bridge: Fuzhou Rockchip Electronics Co., Ltd Device 3566 (rev 01)

01:00.0 Non-Volatile memory controller: Realtek Semiconductor Co., Ltd. Device 5765 (rev 01)

9) Then we can use the dd command to empty the NVMe SSD (optional)

orangepi@orangepi3b:~/Desktop\$ sudo dd bs=1M if=/dev/zero of=/dev/nvme0n1 count=2000 status=progress orangepi@orangepi3b:~/Desktop\$ sudo sync

10) You can then use the dd command to burn the Linux image of the development board into the NVMe SSD

a. if = parameter in the command is to fill in behind the Linux + Linux mirror image to store the full path name (such as/home/orangepi/Desktop/Linux image name). Since we have entered the path of the Linux image above, we only need to fill in the name of the Linux image.

b. Do not copy the Linux image name in the following command. Replace it with the actual image name (because the version of the image may be updated).

sudo dd bs=1M if=Orangepi3b\_x.x.x\_debian\_bullseye\_desktop\_xfce\_linux5.10.160.img of=/dev/nvme0n1 status=progress

sudo sync

Note that if you are uploading a.7z or.xz or.gz Linux image file, remember to decompress it before burning it with the dd command.

A detailed description of all the parameters of the dd command and more usage can be seen by running the man dd command on Linux.

11) After successfully burning the Linux image of the development board to the NVMe SSD, you can use the **poweroff** command to shut down. Then, pull out the TF card, press the power button again, and then start the Linux system in the SPIFlash+NVMe SSD.

12) After starting the system in the NVMe SSD, run the **df** -**h** command to view the actual hard disk capacity

a. 128GB N	VMe SS	SD				
orangepi@orangepi:~\$ df -h						
Filesystem	Size U	Jsed Av	ail Use%	Mounted on		
udev	3.8G	8.0K	3.8G	1% /dev		
tmpfs	769M	1.4M	768M	1% /run		
/dev/nvme0n1p2	118G	<b>5.8G</b>	111G	5% /		
tmpfs	3.8G	0	3.8G	0% /dev/shm		
tmpfs	5.0M	4.0K	5.0M	1% /run/lock		
tmpfs	3.8G	16K	3.8G	1% /tmp		
/dev/nvme0n1p1	256M	90N	1 166N	1 36% /boot		
/dev/zram1	194M	9.9M	170M	6% /var/log		
tmpfs	769M	60K	769M	1% /run/user/1000		
tmpfs	769M	48K	769M	1% /run/user/0		
b. 2TB NVI	Me SSD					

orangepi@orange	epi:~\$ ai	-n		
Filesystem	Size U	Jsed Av	ail Use%	Mounted on
udev	3.8G	8.0K	3.8G	1% /dev

🔘 range Pi User Manual			Copyright reserved by Shenzhen Xunlong Software Co., Ltd			
tmpfs	769M	1.4M	768M	1% /run		
/dev/nvme0n1p2	<b>1.9T</b>	<b>4.1G</b>	<b>1.8</b> T	1% /		
tmpfs	3.8G	0	3.8G	0% /dev/shm		
tmpfs	5.0M	4.0K	5.0M	1% /run/lock		
/dev/zram2	3.7G	76K	3.5G	1% /tmp		
/dev/nvme0n1p1	256M	90N	1 166N	1 36% /boot		
/dev/zram1	194M	15M	165M	9% /var/log		
tmpfs	769M	60K	769M	1% /run/user/1000		
tmpfs	769M	48K	769M	1% /run/user/0		

13) When the TF card and NVMe SSD burn exactly the same system, if the TF card and NVMe SSD are inserted in the development board, power on the development board at this time, u-boot will give priority to start the system in the TF card. However, since the TF card and the NVMe SSD system are identical, the UUID of the /boot partition and rootfs partition in the two storage devices are the same, which will cause the TF card may load the NVMe SSD partition when it is started. Run the following script to solve this problem.

orangepi@orangepi:~\$ sudo fix\_mmc\_ssd.sh

10

An identical system means that the mirror name is exactly the same. Even if it is a Debian11 system, the version is different.

#### 2. 6. 3. Method of burning using balenaEtcher software

1) First of all, you need to prepare an NVMe SSD. The PCIe supported by the M.2 slot on the development board is PCIe2.0x1, and the theoretical maximum speed is 500MB/s. Pci 3.0 and PCI 4.0 NVMe SSDS are also available, but the speed is only up to the speed of PCI 2.0x1.

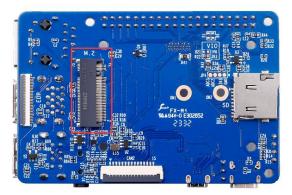
a. M.2 2230 SSDS are as follows



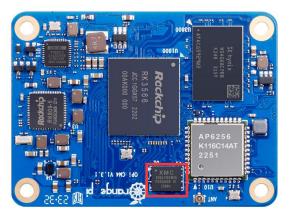
b. M.2 2242 SSDS are described as follows



2) Insert the NVMe SSD into the M.2 PCIe port on the development board and secure it



3) Please ensure that the SPI Flash is affixed to the development board. The position of SPI Flash on the development board is shown in the figure below. No other Settings are required before burning



4) Burning Linux image to SPIFlash+NVMe SSD requires TF card to complete, so first need to burn Linux image to TF card, and then use the TF card to start the development board into the Linux system. For the method of burning a Linux image to a TF card, see the two sections on the method of burning a Linux image to a TF card based on a Windows PC and the method of burning a Linux image to a TF card based on an Ubuntu PC.

5) After starting the Linux system in the TF card, please make sure that the NVMe SSD has been properly recognized by Linux on the development board. If the NVMe SSD is correctly identified, run the **sudo fdisk -l** command to view information about the **nvme** orangepi@orangepi:~/Desktop\$ **sudo fdisk -l** | grep "nvme0n1"

Disk /dev/nvme0n1: 1.86 TiB, 2048408248320 bytes, 4000797360 sectors

Use the **lspci** command to see an NVME-related PCI device orangepi@orangepi:~/Desktop\$ **lspci** 00:00.0 PCI bridge: Fuzhou Rockchip Electronics Co., Ltd Device 3566 (rev 01) 01:00.0 Non-Volatile memory controller: Realtek Semiconductor Co., Ltd. Device 5765 (rev 01)

6) balenaEtcher has been pre-installed in the Linux image, and the opening method is as follows:



If the balenaEtcher arm64 version is not pre-installed, for details about how to download and install the balenaEtcher arm64 version, see section How to Download and Install the balenaEtcher arm64 version.

7) The interface after balenaEtcher is opened is as follows:



8) The method of using balenaEtcher to burn u-boot to SPI Flash on the development board is as follows:

a. First click Flash from file



b. Go to /usr/lib/linux-u-boot-legacy-orangepi3b\_1.x.x\_arm64, select rkspi\_loader.img, and click Open

• Cancel				٩	Dpen 📴
🕑 Recent	Usr lib linux-u-boot-legacy-orangepi5_1.0.2_arm64				
🔂 Home	Name	v	Size	Туре	Modified
	idbloader.img		292.9 kB	Raw disk image	13:16
Desktop	📑 rkspi_loader.img		16.8 MB	Raw disk image	13:16
Documents					

c. Open **rkspi\_loader.img**. The following interface is displayed:



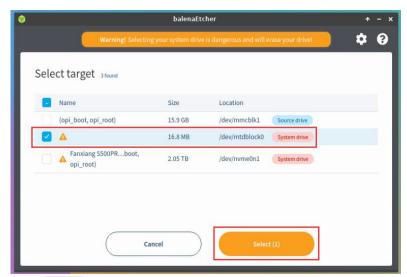
d. Then click Select target



e. Then click **Show 2 hidden** to open the option for more storage devices

	🌍 bale	naEtcher	\$	6
Select target 3 found				
Select target 3 found	Size	Location		

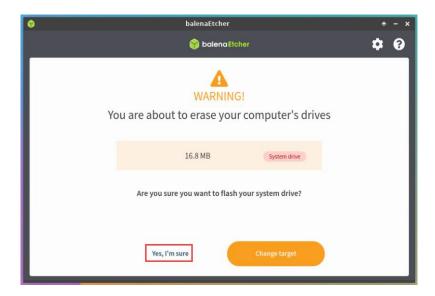
f. Then Select the SPI Flash device name /dev/mtdblock0 and click Select



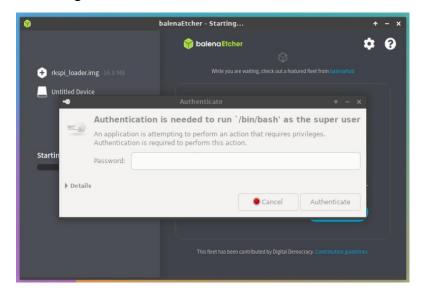
g. Then click Flash



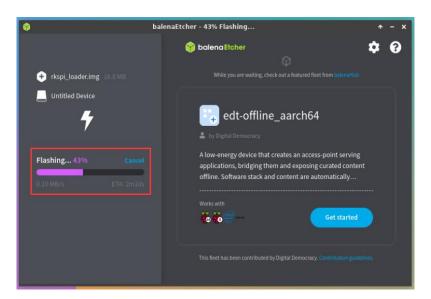
h. Then click Yes, I'm sure



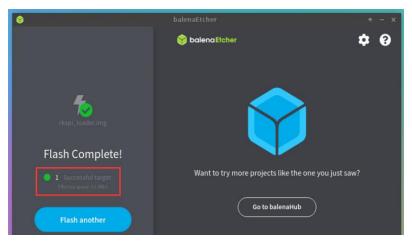
i. Then enter the password **orangepi** of the development board Linux system, and the u-boot image will be burned to the SPI Flash



j. The burning process is displayed as follows:



k. The display after burning is as follows:



9) Method of burning the Linux system in the TF card to the NVMe SSD (this method is equivalent to cloning the system in the TF card to the NVMe SSD)

- a. First click **Clone drive**

b. Then select the device name of the TF card /dev/mmcblk1

		balenaEtcher			
		🜍 balena Et	cher		\$ 8
Select source 3f	found				
Name	S	ize	Location		
(opi_boot, opi_roo	ot) 1:	5.9 GB	/dev/mmcblk1	Source drive	
✓ Show 2 hidden					

c. The interface after opening the TF card is as follows:

۲	balenaEtcher	↑ - ×
balenaEtcher Edit View Window Help		
	😚 balena Etcher	¢0
<b>\$</b>	*	
(opi_boot, opi_root) Remove 159.68	Select target Flash!	P

d. Then click Select target



e. Then click **Show 2 hidden** to open the option for more storage devices



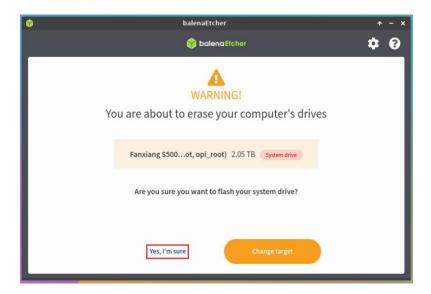
f. Then Select the device name for the NVMe SSD /dev/nvme0n1 and click Select

٢		balenaEte	cher	↑ - ×
	Warning! Selecting	your system drive	is dangerous and will erase your drive	<b>\$ 6</b>
Se	lect target 3 found			
	- Name	Size	Location	- 1
	(opi_boot, opi_root)	15.9 GB	/dev/mmcblk1 Source drive	
	Δ	16.8 MB	/dev/mtdblock0 Too small	
	<ul> <li>Fanxiang S500PRboot, opi_root)</li> </ul>	2.05 TB	/dev/nvme0n1 System drive	
	Can	cel	Select (1)	

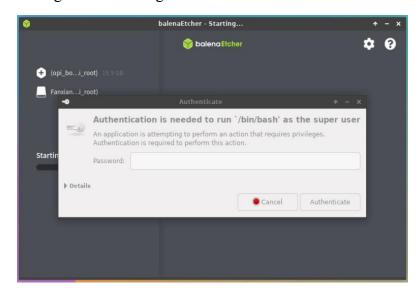
g. Then click Flash



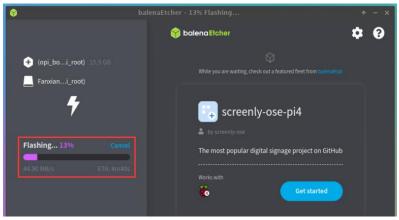
h. Then click Yes, I'm sure

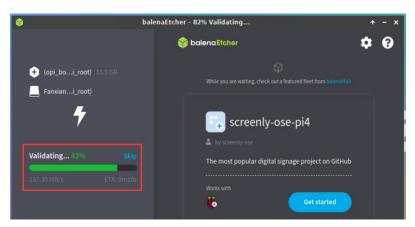


i. Then enter the password orangepi for the development board Linux system and start burning the Linux image to the SSD



j. The burning process is shown as follows:

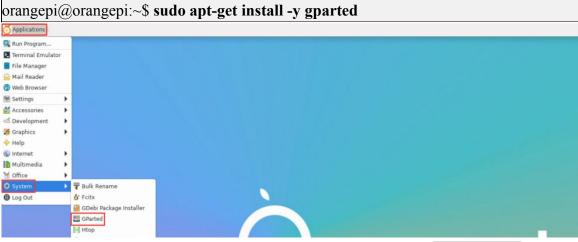




k. The display after burning is as follows:

٥	balenaEtcher	+ - ×
	😚 balena Etcher	¢ 0
tash Complete!		
Successful target     Effective spend: 48,8 MB/s	Want to try more projects like the o	one you just saw?
Flash another	Go to balenaHub	

- 1. To expand the capacity of the rootfs partition on the NVMe SSD, perform the following steps:
  - a) First, open **GParted**. If Gparted is not pre-installed, run apt command to install it



b) Then enter the password orangepi for Linux and click Authenticate



c) Then click Fix

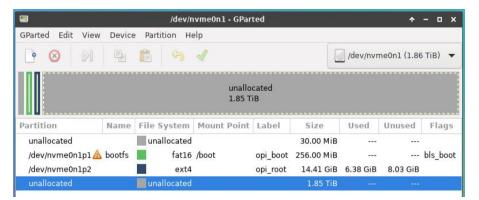
	GParted View Device Partition Help			<b>↑ - □</b>
Partition Nam	e File System Mount Point Label	Size Used	Unused	Flags
	Libparted Not all of the space available be used, you can fix the GPT extra 3969681072 blocks) or o setting?	to /dev/nvme0n1 appear o use all of the space (ar	n	
	Fix	Ignore		

d) Then select NVMe SSD

8		/dev/r	nmcblk1 - GPar	ted			<b>^</b> ·	- ¤ ×
GParted Edit Vi	ew Device	e Partition He	elp					
· 🙁 📎		6	1		6	/dev/mm	cblk1 (14	4.84 GiB)
			/dev/mmcl 14.41 GiB	olk1p2		/dev/nvm	neOnl (1.	86 TiB)
Partition	Name	File System	Mount Point	Label	Size	Used	Unused	Flags
unallocated		unallocated			30.00 MiB			
/dev/mmcblk1p1 /dev/mmcblk1p2		_	/boot /, /var/log.hdd	opi_boot opi_root	256.00 MiB 14.41 GiB		165.78 MiB 9.50 GiB	bls_boo

e) The following information is displayed after the NVMe SSD is selected:

🥮 range Pi User Manual



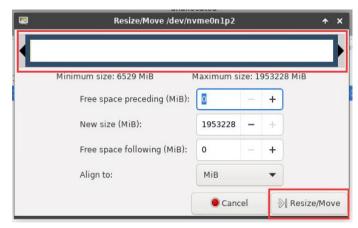
f) Then select the /dev/nvme0n1p2 partition, right-click, and select
 Resize/Move

			vme0n1 - GPar	ted			*	- 0 ×
GParted Edit View	Device	Partition He	elp					
P 😣 🕅			2		[	/dev/nvr	me0n1 (1.8	6 TiB) 🔻
			unallo 1.85 T					
Partition	Name	File System	Mount Point	Label	Size	Used	Unused	Flags
unallocated		unallocated			30.00 MiB			
/dev/nvme0n1p1🛕	bootfs	fat16	/boot	opi_boot	256.00 MiB		222	bls_boot
/dev/nvme0n1p2		ext4		opi_root	• New	c on cin	Insert	
unallocated		unallocated			🛞 Delete		Delete	
					Resize/N	love		
					탄 Copy	Sec.	Ctrl+C	
					📳 Paste		Ctrl+V	
					Format 1	to	•	
					Open En	cryption		
					Mount			
					Name Pa	artition		
0 operations pending					Manage	Flags		
Ference Ferraria					Check			_
					Label Fil	e System		
					New UU	ID		
					💡 Informa	tion		

g) Then drag the capacity to the maximum as shown in the image below

🔤 Resize/M	Resize/Move /dev/nvme0n1p2						
4⊾							
tinimum size: 6529 Mi	B Max	imum si	ze: 19	953228 N	1iB		
Free space preced	ling (MiB): 🧧			+			
New size (MiB):	1	4754	-	+			
Free space follow	ing (MiB):	938474	-	+			
Align to:	N	1iB		•			
		Canc	el	R	esize/Mo	ve	

h) Then click Resize/Move



i) Then click on the green  $\sqrt{}$  in the picture below

		/dev/n	vme0n1 - GPar	ted			<b>^</b>	
GParted Edit View	Device	Partition He	elp					
🕑 😣 🔊		6	1			/dev/nvn	ne0nl (1.80	6 Тів) 🔻
			/dev/nvm 1.86 TiB	eOnlp2				
Partition	Name	File System	Mount Point	Label	Size	Used	Unused	Flags
unallocated /dev/nvme0n1p1 🛕	bootfs	unallocated	/boot	opi_boot	30.00 MiB 256.00 MiB			bls_boot
/dev/nvme0n1p2		ext4		opi root	1.86 TiB	6.38 GiB	1.86 TiB	

j) Then click Apply

unallocated Are you sure you want to apply the		₽ 💼 🥱 🖌	/de	v/nvme0n1 (1.86 TiB) 🔻
unallocated     Apply operations to device				
	unallocated /dev/nvme0n1p1🛕	Are you sure you pending operation Editing partitions has the pote	want to apply the is? ential to cause LOSS of DATA.	bls_boo
Cancel Apply		Cancel		

k) Then click Close to close it

	/dev/nvme0n1 - GParted	* - ¤ ×
GParted Edit View Device P	artition Help	
🕒 😣 🕅 🖣 🛍	( <del>)</del>	/dev/nvme0n1 (1.86 TiB) 🔻
	/dev/nvme0n1p2 1.86 TiB	
Part S	Applying pending operations	+ □ ×
	nd type of operations this might take	a long time.
/di		poot
/di	All operations successfully comple	ted
▶ Details		
SI G		Save Details X Close

m. At this point, you can shut it down using the sudo poweroff command. Then, pull out the TF card, press the power button again, and then start the Linux system in the SPIFlash+NVMe SSD.

10) The 9) step is to clone the system in the TF card to the NMVe SSD, we can also directly burn the Linux image file to the NVMe SSD, here roughly say the following steps:

- Upload the Linux image file to the Linux operating system on the development a. board
  - Then use balenaEtcher to burn balenaEtcher 😚 balena Etcher ? . + 🛕 Fanxiang ...opi\_root) Orangepi5...0.110.img
- b.

There is no need to manually expand the capacity after burning the image c. using this method. The first startup will automatically expand the capacity.

### 2.7. Method of burning Android image to TF card

# 2.7.1. Method of burning Android image to TF card through USB2.0 burning port

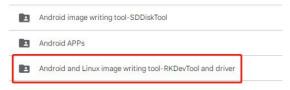
1) First prepare an 8GB or larger capacity TF card, TF card transmission speed must be class10 or above, it is recommended to use Sandisk and other brands of TF card

2) Also need to prepare a good quality USB2.0 public to public data cable

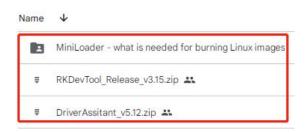


3) Then download the Rockchip **DriverAssitant\_v5.12.zip** and the burning tool **RKDevTool\_Release\_v3.15.zip** from **Orange Pi's data download page** 

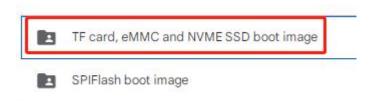
a. On the **Orange Pi's Data download page**, first select the official tool and then go to the following folder



b. Then download all the files below



- 4) Then download the Android image from Orange Pi's Data download page.
  - After opening the download link of Android image, you can see the following two types of Android image. Please select **TF card and eMMC image** folder to start the image download



- b. After entering the **TF card and eMMC to start the image** folder, you can see the following two images, their differences are:
  - a) The first image is dedicated to HDMI display and supports 4K display, if you do not use LCD screen, please download the image without lcd
  - b) If you want to use an lcd screen, select an image with lcd



5) Then use the decompression software to decompress the compressed package of the downloaded Android image. In the decompressed file, the file ending with ".img "is the Android image file, the size of which is more than 1GB

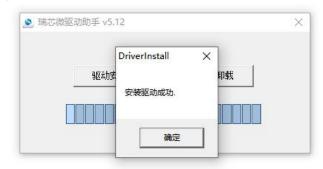
6) Then use the decompression software to decompress **DriverAssitant\_v5.12.zip**, and then find the **DriverInstall.exe** executable file in the decompressed folder and open it

名称 个	修改日期	类型	大小	
ADBDriver	2022/12/1 15:07	文件夹		
📙 bin	2022/12/1 15:07	文件夹		
Driver	2022/12/1 15:07	文件夹		
🔄 config	2014/6/3 15:38	配置设置	1 KB	
le DriverInstall	2022/2/28 14:11	应用程序	491 KB	
Readme	2018/1/31 17:44	文本文档	1 KB	
revison	2022/2/28 14:14	文本文档	1 KB	

- 7) Open **DriverInstall.exe** and install the SWick micro driver as follows
  - a. Click the "Driver Installation" button



b. Wait for a period of time, the pop-up window will prompt "Driver installation successful", and then click the "OK" button



8) Then decompress **RKDevTool\_Release\_v3.15.zip**, this software does not need to be installed, find **RKDevTool** in the decompressed folder and open it

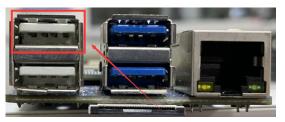
名称	修改日期	类型	大小
📙 bin	2022/12/1 15:07	文件夹	
Language	2022/12/1 15:07	文件夹	
🗋 config.cfg	2022/3/23 9:11	CFG 文件	7 KB
🔄 config	2021/11/30 11:04	配置设置	2 KB
revision	2022/5/27 9:09	文本文档	3 KB
🔀 RKDevTool	2022/5/27 9:06	应用程序	1,212 KB
☑ 开发工具使用文档_v1.0	2021/8/27 10:28	Foxit PDF Reade	450 KB

9) After opening the **RKDevTool** burning tool, because the computer has not connected to the development board through the USB2.0 public-to-public data cable at this time, the lower left corner will display "**No device found**".

orange Pi User Manual

		存储地址	名字	路径				
1	Г	0x0000000	0 Loader					
2		0x0000000	0 Parameter					
3		0x000000	0 Vboot					
1		0x000000	0 trust					
5		0x000000	0 Misc					
ŝ		0x0000000	0 Resource					
7	Г	0x0000000	0 Kernel					
3	Г	0x0000000	0 Boot					
3	Г	0x000000	0 Recovery					
10	Г	0x0000000	0 System					
11	Г	0x0000000	0 Backup					
	er:			设备分区表 清空				

- 10) Then start burning Android image to TF card
  - a. First, connect the development board to the Windows computer through the USB2.0 male-to-public data cable. The position of the USB2.0 burning interface on the development board is shown in the figure below



- b. Then make sure that no TF card is inserted into the development board and no power is connected
- c. Then press and hold the MaskROM button on the development board. The position of the MaskROM button on the development board is shown as follows:



d. Connect the development board to the Type-C port, and power on the development board



e. If the previous steps are smooth, the development board will enter MASKROM mode at this time, and the interface of the burning tool will prompt "Found a MASKROM device".



- f. Then insert the TF card into the development board
- g. Then select Advanced features

はおけ	¢开发工	具 v3.15					-
载镜	像升	级固件	高级功能				
#		存储	1 Juli	名字	路径		
1			0:0000000	Loader		and the second	
2			0x0000000	Parameter			
3			0x0000000	Uboot			
4	Г		0x00000000	trust			
5			0x00000000	Misc			
6			0x00000000	Resource			
7			0x00000000	Kernel			
8	Г		0x00000000	Boot			
9	Г		0x00000000	Recovery			
10			0x00000000	System			
11			0x00000000	Backup			

h. Then click on the location shown in the image below

遺像 升级固件	: 高级切能				
oot:				下载	
件:				解包	
读取FlashID	读取Flash信息	读取Chip信息	读取Capability	1. Flash 2. EMMC 3. SD 4. SD1	
测试设备	重启设备	进入Maskron	切换存储	5. SPINOR 6. SPINAND 7. RAM	
清空序列号	检测安全模式	导出串口日志	获取当前存储	8. USB 9. SATA 10. PCIE	
导出镜像	擦除扇区	擦除所有			
已始扇区:					
舅区数:					

i. Select **MiniLoaderAll.bin** from the **MiniLoader** folder downloaded earlier and click Open

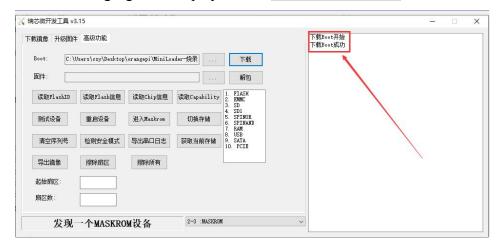
🥏 range Pi User Manual

← → ∽ ↑ 🛅 > 桌面 >	orangepi > MiniLoader-烧录Linux镜像才需要用到的	<b>东西 ~ C</b> 在	MiniLoader-烧录Linux	Q
组织 ▼ 新建文件夹			≣ • □	0
> 🔷 WPS云盘	名称 ^ ^	修改日期	类型	大小
☆ 主文件夹	6 MiniLoaderAll.bin	2023/8/18 11:17	BIN 文件	455
> 🦲 OneDrive	rk356x_linux_emmc.cfg	2023/8/18 11:17	txtfile	â
	rk356x_linux_pcie.cfg	2023/8/18 11:17	txtfile	2
🧾 桌面		2023/8/18 11:17	txtfile	2
业 下载		2023/8/18 11:17	txtfile	2
■ 文档	🖈 🗋 rkspi_loader.img	2023/8/18 11:17	DAEMON.Tools	4,096
▶ 團片	*			
④ 音乐				-

### j. Then click **Download**

喘芯微开发工具 v3.	.15				- 0
載镜像 升级固件 Boot: C:\[	高级功能 Jsers\hh177\Deskto	op\orangepi\Winil	.oader焼	下载	
固件:				解包	
读取FlashID	读取Flash信息	读取Chip信息		1. FLASH 2. EDUC 3. SD	
测试设备	重启设备	进入Maskron	切换存储	4. SD1 5. SPINOR 3. SPINAND 7. RAU	
清空序列号	检测安全模式	导出串口日志	获取当前存储	B. USB 9. SATA 10. PCIE	
导出镜像	擦除扇区	擦除所有	Ĺ		
起始扇区: 扇区数:					
发现一	一个MASKRO	M设备	1-2-3 :MASKRO	<u>M</u> ~	

k. The following figure is displayed after MiniLoaderAll.bin is downloaded



1. Then select the storage device as **SD** and click **Switch storage** 

🥏 range Pi User Manual

誌微开发工具 v3 載遺像 升级固件	= 高级功能					下载Boot开始 下载Boot成功		
Boot: C:\1	Users\csy\Desktop	\orangepi\MiniLo	ader-烧录	下载				
固件:				解包				
读取FlashID	读取Flash信息	读取Chip信息	读取Capability	1. Flash 2. EMMC 3. SD				
测试设备	重启设备	进入Maskrom	切换存储	4. SD1 5. SPINOR 6. SPINAND 7. RAM				
清空序列号	检测安全模式	导出串口日志	<b>获取当前存储</b>	8. USB 9. SATA 10. PCIE				
导出镜像	擦除扇区	擦除所有	l					
起始扇区:								
扇区数:								
化品	一个MASKRO	<b>11</b> . 11 11 11	2-3 :MASKROM		~			

m. If the switchover is successful, the following figure is displayed

	‡ 高级功能					下载Boot开始 下载Boot成功			
Boot: C:\1	Vsers\csy\Desktop	\orangepi (MiniLo	ader一院求	下载					
固件:			19.9.	解包					
读取FlashID	读取Flash信息	读取Chip信息	读取Capability	1. Flash 2. EMMC 3. SD	RKDevTool	×	1		
测试设备	重启设备	进入Maskrom	切换存储	3. SD 4. SD1 5. SPINOR 6. SPINAND 7. RAM					
清空序列号	检测安全模式	导出串口日志	<b>蔡</b> 取当前存储	8. USB 9. SATA 10. PCIE		刀换存储成功.			
导出镜像	擦除扇区	擦涂所有				确定			
起始扇区:						1			
扇区数									

n. Then click on the "Upgrade Firmware" section of the burning tool

芯微开发工具 v3.15		-	
dl 并级固件 高级功能			
固件 升级 切换			
固件版本: Loader版本:	芯片信息:		
固件:			
发现一个MASKROM设备	1-2-3 :MASKROM ~		

o. Then click the "**Firmware**" button to select the path of the Android image that you want to burn

🤌 range Pi User Manual

誌芯微开发工具 v3.15		- 0
战镜像「升级固件」高级功能		
固件 升级 切换		
固件版本: Loader版本:	芯片信息:	
固件:		
会中国 AMAGYDOULLA	1-2-3 :MASKROM	
发现一个MASKROM设备	1-2-3 :JRASKRON V	

p. Finally, click the "**Upgrade**" button to start burning. The log in the burning process is shown below. The Android system will start automatically after the burning is complete.

	固件 高级功	86				下载Boot开始 下载Boot成功	
固件	升级	切换				等待Maskrom开始 等待Maskrom成功 测试设备开始	
固件版本:	11.0.00	Loader版本:	1.01	芯片信息:	RK3568	测试设备成功 校验芯片开始	
固件:	C:\Users\	shiyan\Desktop\(	OrangePiCM4_RK3	566_Android	11_v1.0.0.in	校验芯片成功 获取FlashInfo开始 获取FlashInfo成功	
						准备IDB开始 准备IDB成功 下载IDB开始	
						下载IDB成功 下载固件开始	
						正在下载固件(100%) 下载固件成功	

#### 2.8. Method of burning Android image into eMMC

## 2.8.1. Method of burning Android image into eMMC through USB2.0 burning port

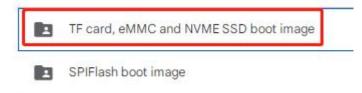
Note that all operations below are performed on a Windows computer.

1) First you need to prepare a good quality USB2.0 male-to-male data cable



2) Then download Rockchip driver **DriverAssitant\_v5.12.zip** and burning tool **RKDevTool\_Release\_v3.15.zip** from **Orange Pi's data download page** 

- 3) Then download the Android image from the **Orange Pi download page**.
  - a. After opening the download link of the Android image, you can see the following two types of Android images. Please select the image in the TF card and eMMC boot image folder to download.



- b. After entering the **TF card and eMMC boot image** folders, you can see the following two images. The difference between them is:
  - a) The first image is dedicated to HDMI display and supports 4K display. If you don't use LCD screen, please download the image without lcd
  - b) If you want to use an LCD screen, please choose the image with LCD



4) Then use decompression software to decompress the compressed package of the downloaded Android image. In the decompressed file, the file ending with ".img" is the Android image file, with a size of more than 1GB.

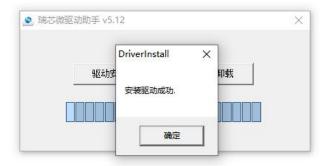
5) Then use decompression software to decompress **DriverAssitant\_v5.12.zip**, then find the **DriverInstall.exe** executable file in the decompressed folder and open it.

of range Pi User Manual	Copyright reserved by	/ Shenzhen Xunlo	ng Software Co., Ltd
名称 ^	修改日期	类型	大小
ADBDriver	2022/12/1 15:07	文件夹	
📙 bin	2022/12/1 15:07	文件夹	
Driver	2022/12/1 15:07	文件夹	
config	2014/6/3 15:38	配置设置	1 KB
🔩 DriverInstall	2022/2/28 14:11	应用程序	491 KB
Readme	2018/1/31 17:44	文本文档	1 KB
revison	2022/2/28 14:14	文本文档	1 KB

- 6) Open DriverInstall.exe and install the Rockchip microdriver as follows
  - a. Click the "Driver Installation" button

驱动安装	驱动卸载	

b. After waiting for a period of time, a window will pop up prompting "Driver installation successful", then click the "OK" button.

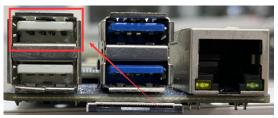


7) Then unzip **RKDevTool\_Release\_v3.15.zip**. This software does not need to be installed. Just find **RKDevTool** in the unzipped folder and open it.

名称 ^	修改日期	类型	大小
bin	2022/12/1 15:07	文件夹	
Language	2022/12/1 15:07	文件夹	
🗋 config.cfg	2022/3/23 9:11	CFG 文件	7 KB
🔄 config	2021/11/30 11:04	配置设置	2 KB
revision	2022/5/27 9:09	文本文档	3 KB
🔀 RKDevTool	2022/5/27 9:06	应用程序	1,212 KB
🤬 开发工具使用文档_v1.0	2021/8/27 10:28	Foxit PDF Reade	450 KB

8) After opening the **RKDevTool** burning tool, because the computer has not connected to the development board through the USB2.0 male-to-male data cable at this time, the lower left corner will prompt "**No device found**"

- 9) Then start burning the Android image into eMMC
  - a. First, connect the development board to the Windows computer through a USB2.0 male-to-male data cable. The location of the development board's USB2.0 burning interface is as shown in the figure below.



- b. Then make sure that the development board is not inserted into the TF card and not connected to the power supply
- c. Then press and hold the MaskROM button on the development board, the position of the MaskROM button on the development board is shown in the figure below:



d. Then connect the development board to the power supply of the Type-C interface and power on



e. If the previous steps are successful, the development board will enter the **MASKROM** mode at this time, and the interface of the burning tool will prompt

#### "found a MASKROM device"

		存储	地址	名字	路径				
	Г		0x00000000	Loader					
	Г		0x00000000	Parameter					
	Г		0x00000000	Uboot					
	Г		0x00000000	trust					
			0x00000000	Misc			1		
			0x00000000	Resource					
	Г		0x00000000	Kernel					
	Г		0x00000000	Boot					
	Г		0x00000000	Recovery					
)	Г		0x00000000	System		/			
L			0x00000000	Backup					
		ſ	执行	切换	设备分回表 清空				

#### f. Then please select advanced functions

戦績	t像	升级固件	高級功能			
#		存储	地	名字	路径	
1			0:0000000	Loader		
2	Г		0x00000000	Parameter		
3	Г		0x00000000	Uboot		
4	Г		0x00000000	trust		
5			0x00000000	Misc		
3	Г		0x00000000	Resource		
7			0x00000000	Kernel		
3	Г		0x00000000	Boot		
9	Г		0x00000000	Recovery		
10	Г		0x00000000	System		
11			0x00000000	Backup		

g. Then click the position shown in the figure below

竟像 升级固件	: 高级功能				
iot:				下载	
件:				解包	
读取FlashID	读职Flash信息	读取Chip信息		1. FlASH 2. EMMC 3. SD 4. SD1	
则试设备	重启设备	进入Naskron	切换存储	5. SPINOR 3. SPINAND 7. RAM	
清空序列号	检测安全模式	导出串口日志	获取当前存储	3. USB 9. SATA 10. PCIE	
导出镜像	擦除扇区	擦除所有			
始扇区:					
呕数:					

h. Then select **MiniLoaderAll.bin** in the **MiniLoader** folder downloaded earlier, and then click Open

← → ~ ↑ 🚞 > 眞面 >	orangepi > I	MiniLoader-烧录Linux镜像才需要用到的东	西 ~ C 在	MiniLoader-烧录Linux	Q
组织 ▼ 新建文件夹				≣ • □	1 🕜
> 🔷 WPS云盘	1	名称 ^	修改日期	类型	大小
☆ 主文件夹		😏 MiniLoaderAll.bin	2023/8/18 11:17	BIN 文件	455
> 📥 OneDrive		rk356x_linux_emmc.cfg	2023/8/18 11:17	txtfile	2
		rk356x_linux_pcie.cfg	2023/8/18 11:17	txtfile	2
(二) 「 (二)	*	🗋 rk356x_linux_spiflash.cfg	2023/8/18 11:17	txtfile	2
业 下载	*	rk356x_linux_tfcard.cfg	2023/8/18 11:17	txtfile	2
■ 文档	*	rkspi_loader.img	2023/8/18 11:17	DAEMON.Tools	4,096
▶ 图片	*				
🚯 音乐	*				-

#### i. Then click **Download**

芯微开发工具 v3 < え镜像 升级固件 3oot: C:\I			and and the company	T	- 0
	JSETS (NNI // DESKT	op (or angepi (stini)	.oader-%2	解包	
读取FlashID	读取Flash信息	读取Chip信息		. FlASH 2. EMMC 3. SD 4. SD1	
测试设备	重启设备	进入Maskron	切换存储	. SPINOR . SPINAND . RAM . USB	
清空序列号	检测安全模式	导出串口日志	获取当前存储	. SATÀ IO. PCIE	
导出镜像	擦除扇区	搬除所有	L		
起始扇区: 扇区数:					
发现一	一个MASKRO	M设备	1-2-3 :MASKRO	<u>«                                    </u>	

j. The display after downloading MiniLoaderAll.bin is shown in the figure below

竟像 升级固件 pot: C:\	Users\hh177\Deskt		, <i>i</i> -te			下載日	Boot成功	
	USEIS (NNI ( ) DESKT	op (orangepi (mini)	.oader-/R		下载			
件:					解包			
读取FlashID	读取Flash信息	读取Chip信息	读取Caps		1. Flash 2. EMMC 3. SD 4. SD1			
测试设备	重启设备	进入Maskrom	切换7	宇储	5. SPINOR 5. SPINAND 7. RAM 3. USB			
清空序列号	检测安全模式	导出串口日志	获取当前	前存储	9. SATA 10. PCIE			
导出镜像	擦除扇区	擦除所有		L				
2始扇区:								
嗣区数:							1	

k. Then select the storage device as EMMC, and then click Switch Storage

💮 range Pi User Manual

< 瑞芯微开发工具 v3	.15					-	×
下载镜像升级固件	= 高级功能				下载Boot开始 下载Boot成功		
Boot: C: \1	Jsers\csy\Desktop'	\orangepi\MiniLo	ader-烧录	下载			
固件:				解包			
读取FlashID	读取Flash信息	读取Chip信息	3.	FLASH EMAC SD			
测试设备	重启设备	进入Maskrom	6. 7.	SD1 SPINOR SPINAND RAM			
清空序列号	检测安全模式	导出串口日志	茲則当前存储 9.	USB SATA PCIE			
导出镜像	擦除扇区	擦除所有					
起始扇区							
扇区数:							
发现	一个MASKRO	M设备	2-3 :MASKROM		~		

1. The successful switching is displayed as shown below

議會 升级固作	# 高级功能				下载Boot开 下载Boot成			
Boot: C:\	Users\csy\Desktop	\orangepi\MiniLo	ader一烧录	下载				
固件:				解包				
读取FlashID	读取Flash信息	读取Chip信息	194 ANC apability	1. Flash 2. EMMC 3. SD				
测试设备	重启设备	进入Maskrom	切换存储	4. SD1 5. SPINOR 6. SPINAND 7. RAM	RKDevTool	×		
清空序列号	检测安全模式	导出串口日志	获取当前存储	8. USB 9. SATA 10. PCIE				
导出镜像	擦除扇区	擦除所有	l		切换存储成3	л.	0	
起始扇区:					确定			
扇区数:								

m. Then click the "Upgrade Firmware" column of the burning tool

芯微开发工具 v3.15				- 0
鐵鏡像 <mark>开缆固件</mark> 高级功能				
固件 升级 切换				
固件版本: Loader	版本: 芯片信息:			
固件:				
发现一个MASKRO	1-2-3 :IIASI	KROM	~	

n. Then click the "**Firmware**" button to select the path of the Android image that needs to be burned.

👂 range Pi User Manual

誌芯微开发工具 v3.15		- 0
战镜像「升级固件」高级功能		
固件 升级 切换		
固件版本: Loader版本:	芯片信息:	
固件:		
会中国 AMAGYDOULLA	1-2-3 :MASKROM	
发现一个MASKROM设备	1-2-3 :JRASKRON V	

o. Finally, click the "**Upgrade**" button to start burning. The log during the burning process is as shown below. After burning is completed, the Android system will start automatically.

		-	下载Boot成功 等待Maskrom开始	
固件	升级切换		等待Maskrom成功	
固件版本:	11.0.00 Loader	版本: 1.01 芯片信息:	测试设备开始 测试设备成功 KK3568	
의(十 <b>)</b> ((4))。			校验芯片成功	
固件:	C:\Users\shiyan\Des	ktop\OrangePiCM4_RK3566_Android	ll1_v1.0.0.is 获取FlashInfo开始 获取FlashInfo成功	
			准备IDB开始 准备IDB成功	
			下载IIB开始 下载IIB成功	
			下载国件开始 正在下载固件(100%)	
			下载固件成功	

## 2. 8. 2. How to burn the Android11 image into EMMC through the TF card

Note that all of the following operations are performed in Windows computers.

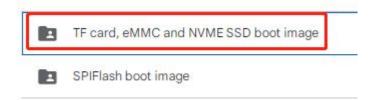
1) It is also necessary to prepare a 8GB or larger TF card. The transmission speed of the TF card must be **class10** or more. It is recommended to use TF cards from brands such as SanDisk.

2) Then use the card reader to insert the TF card into the computer

3) Then download the SDDiskTool burn tool from Orange PI's data download page, please make sure that the version of the SDDiskTool tool is the latest V1.72

4) Then download the image of Android from Orange Pi's data download page

a. After turning on the download link of the Android image, you can see the two types of Android images below. Please select the image in the TF card and EMMC startup image folder for download



- b. After entering the **TF card and EMMC startup image** folder, you can see the following two mirrors. The difference between them is:
  - a) The first image is specifically used for HDMI display. It supports 4K display. If you do not use the LCD screen, download the image without LCD
  - b) If you want to use the LCD screen, select the image with LCD

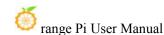


5) Then use the decompression software to decompress the downloaded Android image compressed package. In the files that are decompressed, the file ending with ".img" is the Android image file with a memory of more than 1GB

6) Then use the decompression software to decompress the **SDDiskTool\_v1.72.zip**. This software does not need to be installed. Find the **SD\_Firmware\_Tool.exe** in the unzipped folder and open it.

📕 Language	2022/9/5 15:04	文件夹	
config	2020/3/18 17:27	配置设置	2 KB
revision	2021/4/21 18:01	文本文档	1 KB
sd_boot_config.config	2014/9/3 9:52	CONFIG 文件	1 KB
B SD_Firmware_Tool	2021/4/21 17:57	应用程序	698 KE
SDBoot.bin	2015/9/29 17:13	BIN 文件	149 KB

7) After opening **SDDiskTool**, if the TF card is recognized normally, the inserted disk device will be displayed in the "**Select Removable Disk Device**" column. **Please make sure that the displayed disk device is consistent with the drive letter of the TF card you want to burn**. If there is no display, you can try to unplug the TF card



Generic MassStorageClass USB Device 29.7G 第二步: 选择功能模式	~
第二步:选择功能模式	
□ 固件升级 □ PCBA测试	☑SD启动
第三步:选择升级固件	□修复
	选择固件
第四步:选择Demo数据(可选)	
	选择Demo
	开始创建

8) After confirming the drive letter, you can format the TF card first and click the **Recover Disk** button in **SDDiskTool**. You can also use the **SD Card Formatter** mentioned earlier to format the TF card

第一步	:选择可移动磁盘;	设备	SDBoot:2.1
	Generic MassStora	ageClass USB Device 29.7G	~
第二步	:选择功能模式		
	固件升级	PCBANIt	」 ✓SD启动
第三步	:选择升级固件	SD_Firmware_Tool >	< □修复
			选择固件
第四步	:选择Demo数据(石	恢复磁盘成功.	
			选择Demo
		确定	
			开始创建

- 9) Then start writing the Android image to the TF card
  - a. First confirm that the displayed drive letter is the drive letter corresponding to the TF card under "Select Removable Disk Device"
  - b. Then select "Firmware Upgrade" in "Select Function Mode"
  - c. Then select the path of the Android firmware in the "Select Upgrade Firmware" column
  - d. Finally, click the "Start Creating" button to start burning.

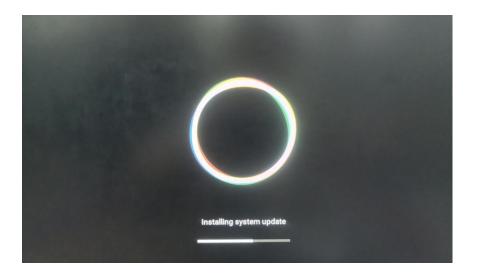
🏭 瑞芯微创建升级磁盘工具 v1.72	×
第一步:选择可移动磁盘设备	SDBoot:2.12
NORELSYS 1081CS0 USB Device 14.8G ~	
第二步:选择功能模式	
☑ 固件升级 □ PCBA测试 [	SD启动
第三步:选择升级固件	修复
	选择固件
第四步:选择Demo数据(可选)	
	选择Demo
	开始创建
	恢复磁盘

10) After the burning is completed, the display is as shown below, and then you can exit SDDiskTool

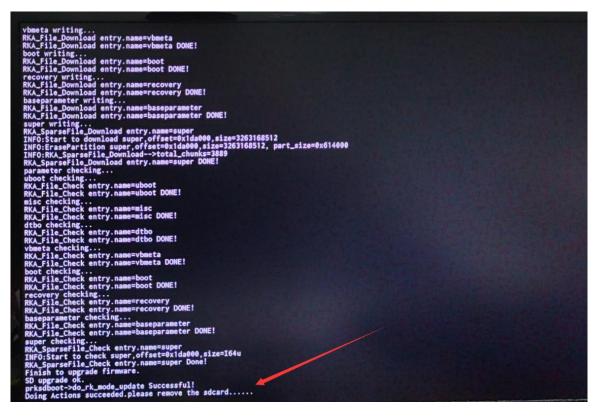
第一步: 选择可移动磁盘设备 NORELSYS (1921-220-105-20-11-02-11-00-10-11-02-11-00-10-124-10-02-10-10-11-02-100-10-11-02-10-10-10-11-02-10-10-10-10-10-10-10-10-10-10-10-10-10-	SDBoot:2.12
SD_Firmware_Tool 第二步:选择功能模	×
☑ 固件升级 1 创建升级磁盘成功。	口印启动
第三步:选择升级固	□修复
i\orangepi\C 确定	·img 选择固件
第四步:选择Demo数	
	选择Demo
	开始创建
	JINH GINE

11) Then pull out the TF card from the computer and insert it into the development board. After the development board is powered on, it will automatically start burning the Android image in the TF card into the eMMC of the development board.

12) If the development board is connected to an HDMI display, you can also see the progress bar of burning the Android image to eMMC from the HDMI display



13) When the HDMI monitor displays the following information, it means that the burning of the Android image into the eMMC has been completed. At this time, the TF card can be pulled out, and then the Android system in the eMMC will start.



### 2.9. How to burn Android image to SPIFlash+NVMe SSD

Before starting to burn the image, you must make sure that the development board has been pasted with the SPI Flash chip, because the development board is not pasted with the SPI Flash chip when it leaves the factory, so it needs to be purchased and soldered on by yourself. The SPI Flash chip model we recommend is XM25QU128CWIQT08Q

Since the startup priority of eMMC is higher than that of NVMe SSD, the system of eMMC needs to be cleared before burning the image. For the method of clearing eMMC, please refer to the instructions in the section "How to Clear eMMC Using RKDevTool"

Note that all the following operations are performed on a Windows computer

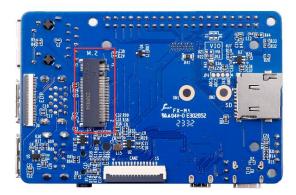
- 1) First you need to prepare an NVMe SSD solid state drive
  - a. The M.2 2230 SSD is as follows



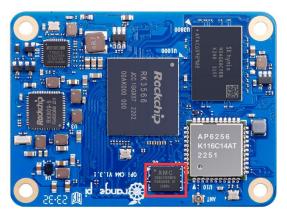
b. The M.2 2242 specification SSD is as follows



2) Then insert the NVMe SSD into the M.2 PCIe interface of the development board and fix it



3) Please make sure that the SPI Flash has been attached to the development board. The location of the SPI Flash on the development board is as shown in the picture below. No other settings are required before starting burning



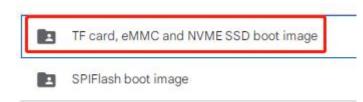
4) You also need to prepare a good quality USB2.0 male-to-male data cable



5) Then download the Rockchip microdriver **DriverAssitant\_v5.12.zip** and the burning tool **RKDevTool\_Release\_v3.15.zip** from the **Orange Pi data download page**.

- 6) Then download the image of Android11
  - a. After opening the download link of the Android image, you can see the following two types of Android images. Please select the image in the

#### SPIFlash-NVME SSD boot image folder to download



- b. After entering the **SPIFlash-NVME SSD boot image** folder, you can see the following two images. The difference between them is:
  - a) The image without lcd is specially used for HDMI display and supports 4K display. If you don't use the LCD screen, please download the image without lcd
  - b) If you want to use an LCD screen, please choose the image with lcd



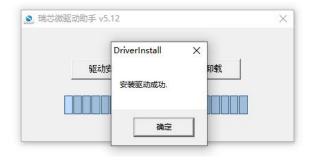
 Then use decompression software to decompress DriverAssitant\_v5.12.zip, then find the DriverInstall.exe executable file in the decompressed folder and open it.

名称	修改日期	类型	大小
ADBDriver	2022/12/1 15:07	文件夹	
📙 bin	2022/12/1 15:07	文件夹	
Driver	2022/12/1 15:07	文件夹	
🔄 config	2014/6/3 15:38	配置设置	1 KB
👒 DriverInstall	2022/2/28 14:11	应用程序	491 KB
📃 Readme	2018/1/31 17:44	文本文档	1 KB
revison	2022/2/28 14:14	文本文档	1 KB

- 8) The steps to install the Rockchip driver after opening **DriverInstall.exe** are as follows
  - a. Click the "Driver Installation" button

_				-	
	驱动安装		驱动卸载		
		<b>_</b>			

b. After waiting for a period of time, a window will pop up prompting "Driver installation successful", then click the "OK" button



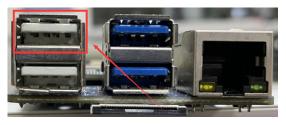
9) Then unzip **RKDevTool\_Release\_v3.15.zip**. This software does not need to be installed. Just find **RKDevTool** in the unzipped folder and open it

名称	修改日期	类型	大小
, bin	2022/12/1 15:07	文件夹	
Language	2022/12/1 15:07	文件夹	
🗋 config.cfg	2022/3/23 9:11	CFG 文件	7 KB
📓 config	2021/11/30 11:04	配置设置	2 KB
revision	2022/5/27 9:09	文本文档	3 KB
🔀 RKDevTool	2022/5/27 9:06	应用程序	1,212 KB
🤬 开发工具使用文档_v1.0	2021/8/27 10:28	Foxit PDF Reade	450 KB

10) After opening the **RKDevTool** burning tool, because the computer has not yet connected to the development board through the USB2.0 male-to-male data cable, a message "**No device found**" will appear in the lower left corner.

:		存储	地址	名字	路径				
	Г		0x00000000	Loader					
2			0x00000000	Parameter					
3			0x00000000	Uboot					
1			0x00000000	trust					
5			0x00000000	Misc		0.00			
3			0x00000000	Resource					
7			0x00000000	Kernel					
з			0x00000000	Boot					
9			0x00000000	Recovery					
10	Г		0x00000000	System					
11			0x00000000	Backup					
	er:		执行	切換	设备分区表 清空				

- 11) Then start burning the Android image to SPIFlash+NVMe SSD
  - a. First, connect the development board to the Windows computer through a USB2.0 male-to-male data cable. The location of the USB2.0 programming port on the development board is as shown in the figure below.



- b. Make sure that the development board is not inserted into the TF card and not connected to the power supply
- c. Then press and hold the MaskROM button on the development board. The location of the MaskROM button on the development board is as shown in the figure below:



d. Then connect the development board to the power supply of the Type-C interface, power it on, and then release the MaskROM button



 e. If the previous steps are successful, the development board will enter the MASKROM mode at this time, and the interface of the burning tool will prompt "Found a MASKROM device "

		存储	地址	名字	路径			
1	1		0x00000000	Loader				
2	1		0x00000000	Parameter				
3	-		0x00000000	Vboot				
1	늗		0x00000000	trust				
5	1		0x00000000	Misc				
8	는		0x00000000	Resource				
7 3	÷		0x00000000 0x00000000	Kernel Boot				
3	는	-	0x00000000					
, 10	1		0x00000000	Recovery				
	는			System				
11			0x00000000	Backup				

f. Then click the "Upgrade Firmware" column of the burning tool

range Pi User Manual

芯微开发工具 v3.15		- 0
b镜像 开级固件 高级功能		
固件 升级 切换		
固件版本: Loader版本:	芯片信息:	
固件:		
发现一个MASKROM设备	1-2-3 :MASKROM	

g. Then click the "**Firmware**" button to select the Android image that needs to be burned

<ul> <li></li></ul>		-	×
下載鏡像「升级固件」高级功能			
国件 升级 切换			
固件版本: Loadez版本:	芯片信息:		
固件:			
发现一个MASKROM设备	1-2-3 :MASKROM ~		

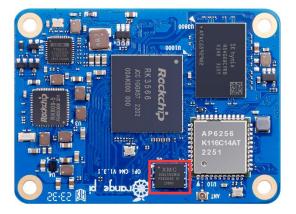
h. Finally, click the "**Upgrade**" button to start burning. The burning process is shown in the figure below. You can see that the firmware will be burned into SPIFlash first, and then burned into PCIE. The Android system will start automatically after burning.

410-6101-	固件 高级功能		获取FlashInfo 获取FlashInfoF		
固件	升级切换		准备IDB开始 准备IDB成功		
			下载IDB所切		
固件版本:	11.0.00 Loader版本:	1.01 芯片信息:	下载IDB成功		
	Loader Mg.dr.		RK.3568 下载固件开始 正在下载固件(1	00%)	
固件:	U: \RK3566 \RK356X_Android1	1\OrangePi3B RK3566 Andro		000/	
回1+:			等待Loader开始		
			等待Loader成功 正在下载PCIE		
			测试设备开始		
			测试设备成功		
			校验芯片开始		
			校验芯片成功 获取FlashInfo	T#4	
			获取FlashInfo 获取FlashInfo 准备IDB开始		
			获取FlashInfo 准备IDB开始 准备IDB成功		
			获取FlaskInfo 准备IDB开始 准备IDB成功 下载IDB开始		
			获取FlashInfo 准备IDB开始 准备IDB成功		

## 2. 10. How to clear SPIFlash using RKDevTool

There is no SPI Flash chip on the development board when it leaves the factory, so it needs to be pasted by yourself. The model of the SPI Flash chip we recommend is XM25QU128CWIQT08Q

1) The location of SPI Flash on the development board is shown in the figure below

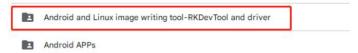


2) First of all, you need to prepare a good quality USB2.0 male-to-male data cable

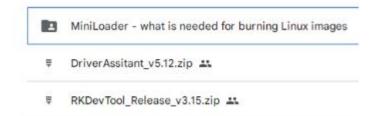


3) Then download the Rockchip driver **DriverAssitant\_v5.12.zi** and **MiniLoade** and the burning tool **RKDevTool\_Release\_v3.15.zip** from the **Orange Pi data download page** 

a. On the **Orange Pi data download page**, first select the official tool, and then enter the folder below



b. Then download all the files below



Note that the "MiniLoader-things needed to burn Linux images" folder will be referred to as the MiniLoader folder below

4) Then use decompression software to decompress **DriverAssitant v5.12.zip**, then find

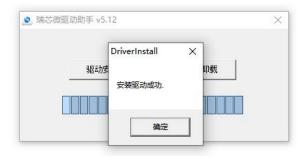
the DriverInstall.exe executable file in the decompressed folder and open it

名称	修改日期	类型	大小
ADBDriver	2022/12/1 15:07	文件夹	
📙 bin	2022/12/1 15:07	文件夹	
Driver	2022/12/1 15:07	文件夹	
🔄 config	2014/6/3 15:38	配置设置	1 KB
🥞 DriverInstall	2022/2/28 14:11	应用程序	491 KB
Readme	2018/1/31 17:44	文本文档	1 KB
📄 revison	2022/2/28 14:14	文本文档	1 KB

- 5) The steps to install the Rockchip driver after opening **DriverInstall.exe** are as follows
  - a. Click the "Driver Installation" button

瑞芯微驱动助手	VJ.12			×
- BE	动安装	31	动卸载	

b. After waiting for a period of time, a pop-up window will prompt "Driver installed successfully", and then click the "OK" button.



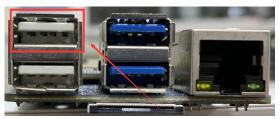
6) Then unzip **RKDevTool\_Release\_v3.15.zip**. This software does not need to be installed. Just find **RKDevTool** in the unzipped folder and open it.

名称 ^	修改日期	类型	大小
📙 bin	2022/12/1 15:07	文件夹	
Language	2022/12/1 15:07	文件夹	
🗋 config.cfg	2022/3/23 9:11	CFG 文件	7 KB
📓 config	2021/11/30 11:04	配置设置	2 KB
revision	2022/5/27 9:09	文本文档	3 KB
KKDevTool	2022/5/27 9:06	应用程序	1,212 KB
🤬 开发工具使用文档_v1.0	2021/8/27 10:28	Foxit PDF Reade	450 KB

7) After opening the **RKDevTool**burning tool, because the computer has not yet connected to the development board through the USB2.0 male-to-male data cable, a message "**No device found**" will appear in the lower left corner.

:		存储	地址	名字	路径		-		
			0x00000000	Loader					
2			0x00000000	Paraneter					
3			0x00000000	Uboot		_			
			0x00000000	trust					
5			0x00000000	Misc		_			
3			0x00000000	Resource					
1			0x000000000	Kernel					
3			0x00000000	Boot					
9	Г		0x00000000	Recovery					
0			0x000000000	System					
1			0x00000000	Backup					
oad	ler:		执行 □ 强制按地址写	切換	设备分区表 清空				

- 8) Then you can start to clear the contents of the SPI FLASH
  - a. First, connect the development board to the Windows computer through a USB2.0 male-to-male data cable. The location of the USB2.0 programming port on the development board is as shown in the figure below.



- b. Make sure that the development board is not inserted into the TF card and not connected to the power supply
- c. Then press and hold the MaskROM button on the development board. The location of the MaskROM button on the development board is as shown in the figure below:



d. Then connect the development board to the power supply of the Type-C interface, power it on, and then release the MaskROM button.



e. If the previous steps are successful, the development board will enter the **MASKROM** mode at this time, and the interface of the burning tool will prompt "found a MASKROM device"

		存储	地址	名字	路径				
	Г		0x00000000	Loader					
2	Г		0x00000000	Parameter					
3	Г		0x00000000	Uboot					
1			0x00000000	trust					
5			0x00000000	Misc			1		
5			0x00000000	Resource		1			
7	Г		0x00000000	Kernel					
3	Г		0x00000000	Boot					
3	Г		0x00000000	Recovery					
10	Г		0x00000000	System					
11			0x00000000	Backup					
			执行	切换	设备分区表 清空				

f. Then please select advanced functions

	好开发工具 v3.15 像 升级固件				
;	口存储		名字	路径	
1		0:0000000	Loader		
2		0x0000000	Parameter		
3		0x00000000	Uboot		
4	Г	0x0000000	trust		
5		0x00000000	Misc		
5	Г	0x00000000	Resource		
7		0x00000000	Kernel		
3	Г	0x00000000	Boot		
9	Г	0x00000000	Recovery		
10		0x00000000	System		
11		0x00000000	Backup		

g. Then click the position shown in the figure below

🔀 瑞芯微开发工具 v3	1.15				- 🗆 X
下載镜像 升级固件	: 高级功能				
Boot:				下载	
固件:				解包	
读取FlashID	读职Flash信息	读取Chip信息		1. FlASH 2. ENOIC 3. 5D 4. 5D1	
测试设备	重启设备	j∰∧Maskron	切换存储	5. SPINOR 6. SPINAND 7. RAM	
清空序列号	检测安全模式	导出串口日志	获取当前存储	8. USB 9. SATA 10. PCIE	
导出镜像	擦除扇区	擦除所有	l		
起始扇区:					
扇区数:					
发现	一个MASKRC	M设备	1-2-3 :MASKRO	M	

h. Then select **MiniLoaderAll.bin** in the **MiniLoader** folder downloaded earlier, and then click Open

← → ∽ ↑ 📩 > 眞面	→ orangepi → Minil	.oader-烧录Linux镜像才需要用到的东	西 ~ C 在	MiniLoader-烧录Linux	Q
组织 ▼ 新建文件夹				≣ • □	0
> 🔷 WPS云盘	1	名称 ^	修改日期	类型	大小
↑ 主文件夹		🕽 MiniLoaderAll.bin	2023/8/18 11:17	BIN 文件	45
> 🔷 OneDrive		] rk356x_linux_emmc.cfg	2023/8/18 11:17	txtfile	
		] rk356x_linux_pcie.cfg	2023/8/18 11:17	txtfile	i i
<b>三</b> 桌面	*	] rk356x_linux_spiflash.cfg	2023/8/18 11:17	txtfile	ă ă
业 下载	*	] rk356x_linux_tfcard.cfg	2023/8/18 11:17	txtfile	
主 文档	*	] rkspi_loader.img	2023/8/18 11:17	DAEMON.Tools	4,09
🔀 图片	*				
🕜 音乐				2	-

i. Then click **Download** 

	oborto (initi i i (pobli i	op (or angept (atmin	WChip信息     读取Capability     1. FlASH 2. EMBC       AMaskron     切換存储     1. SPLASH 2. EMBC       AMaskron     切換存储     1. SPLASH 2. EMBC       L地口日志     获取当前存储     9. USB 10. FCTE				
固件:    <     解包       读取FlashID     读取Flash信息     读取Chip信息.     读取Chip信息.       测试设备     重启设备     进入Taskron     切换存储       2     空声测试       達字原列号     約減安全權式     景出集口日表							
读取FlashID	读取Flash信息	读取Chip信息	读取Capability	2. EMMC 3. SD			
则试设备	重启设备	进入Maskron	切换存储	5. SPINOR 6. SPINAND 7. RAM			
			获取当前存储	<ol><li>SATA</li></ol>			
	擦除扇区	擦除所有					
	擦除扇区	擱除所有					

j. The display after downloading MiniLoaderAll.bin is shown in the figure below

🥯 range Pi User Manual

瑞芯微开发工具 v3	1.15						- 0
下載镜像 升级固件	: 高级功能					下载Boot开始 下载Boot成功	
Boot: C:\	Users\hh177\Deskt	op\orangepi\Minil	Loader-烧	•••	下载		
固件:					解包		
读取FlashID	读取Flash信息	读取Chip信息	读取Capal	1	1. Flash 2. EMMC 3. SD 4. SD1		
测试设备	重启设备	进入Maskrom	切换有	储	5. SPINOR 6. SPINAND 7. RAM 8. USB		
清空序列号	检测安全模式	导出串口日志	获取当前	存储	9. SATA 10. PCIE		
导出镜像	擦除扇区	擦除所有					
起始扇区:							
扇区数:						1	
发现	一个MASKRO	M设备	1-2-3	:MASKRC	M	~	

k. Then select the storage device as **SPINOR** 

議像 升级固件	ionac 2010	a弦功能 ers\hh177\Desktop\orangepi\MiniLoader之後 下载 读取Flash信息 读取Chip信息 读取Capability 1. FIASH 重启设备 进入Markron 切块存储 5. SPINNE 7. RM 检测安全模式 导出单口日志 获取当前存储 9. SATA 10. PCIE			
Boot: C:\	Users\hh177\Deskt	op\orangepi\Minil	Loader-烧	. 下载	
固件:				. 解包	
读取FlashID	读取Flash信息	读取Chip信息	读取Capabili	3. SD	
测试设备	重启设备	进入Maskron	切换存储	5. SPINOR 6. SPINAND 7. RAM	
清空序列号	检测安全模式	导出串口日志	获取当前存储	8. USB # 9. SATA	
导出镜像	擦除扇区	擦除所有			
起始扇区:					
扇区数:					

l. Then click switch storage

镜像 升级固件	高级功能						下载Boot开始 下载Boot成功	
oot: C:\	Users\hh177\Deskt	op\orangepi\MiniI	.oader-烧	] [	下载			
副件:				[	解包	/		
读取FlashID	读取Flash信息	读取Chip信息	读取Capab	ility 1. 2.	FlASH EXOLO SD			
测试设备	重启设备	进入Maskron	切换存	4. 6.	SD1 SPINOR SPINAND RAM			
清空序列号	检测安全模式	导出串口日志	获取当前	存储 9.	USB SATA PCIE			
导出镜像	攔除扇区	攔除所有						
起始扇区:								
扇区数:								

m. Then click **Erase All** and it will start erasing SPIFlash.

< 瑞芯微开发工具 v3	.15						- C	×
下载镜像 升级固件	高级功能					下载Boot开始 下载Boot成功		
Boot: C:\U	Jsers\hh177\Deskt	op\orangepi\Minil	.oader-烧	•••	下载			
固件:				•••	解包			
读取FlashID	读取Flash信息	读取Chip信息	读取Cap		1. Flash 2. EMMC 3. SD			
测试设备	重启设备	进入Maskron	切换	宇储	4. SD1 5. SPINOR 3. SPINAND 7. RAM			
清空序列号	检测安全模式	导出串口日志	获取当前	前存储	B. USB 9. SATA 10. PCIE			
导出镜像	擲除扇区	擦除所有						
起始扇区:								
扇区数:								
发现一	一个MASKRO	M设备	1-2-3	3 :MASKRO	n	~		

n. The display log after erasing SPIFlash is shown in the figure below

遺像 升级固件						正在攧除(100%) 擦除扇区成功	
C:\1	Users\hh177\Deskt	op\orangepi\Minil	.oader-烧	•••	下载	1900/00022/00/01	
]件:					解包		
读取FlashID	读取Flash信息	读取Chip信息	读取Capa	bility	1. Flash 2. EMMC 3. SD		
测试设备	重启设备	进入Maskron	切换有	宇储	4. SD1 5. SPINOR 6. SPINAND		
清空序列号	检测安全模式	导出串口日志	获取当前	前存储	7. RAM 8. USB 9. SATA 10. PCIE		
导出镜像	擦除扇区	擦除所有					
已始扇区:							
扇区数:							

## 2.11. How to clear eMMC using RKDevTool

1) First you need to prepare a good quality USB2.0 male-to-male data cable

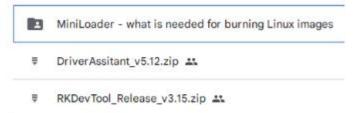


 Then download the Rockchip microdriver DriverAssitant\_v5.12.zip and MiniLoader and the burning tool RKDevTool\_Release\_v3.15.zip from the Orange Pi data download page

a. On the **Orange Pi data download page**, first select the **official tool**, and then enter the folder below



b. Then download all the files below



Note that the "MiniLoader-things needed to burn the Linux image" folder is hereinafter referred to as the MiniLoader folder.

3) Then use the decompression software to decompress **DriverAssitant\_v5.12.zip**, and then find the **DriverInstall.exe** executable file in the decompressed folder and open it

名称 ^	修改日期	类型	大小
ADBDriver	2022/12/1 15:07	文件夹	
📑 bin	2022/12/1 15:07	文件夹	
Driver	2022/12/1 15:07	文件夹	
🔄 config	2014/6/3 15:38	配置设置	1 KB
🥞 DriverInstall	2022/2/28 14:11	应用程序	491 KB
Readme	2018/1/31 17:44	文本文档	1 KB
revison	2022/2/28 14:14	文本文档	1 KB

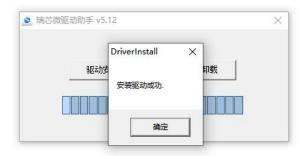
4) After opening **DriverInstall.exe**, the steps to install the Rockchip driver are as follows

a. Click the "Driver Installation" button

驱动安装	驱动卸载
11100000000000000000000000000000000000	3区4月1月1年以

b. After waiting for a period of time, a window will pop up prompting "Driver

installation successful", then click the "OK" button.



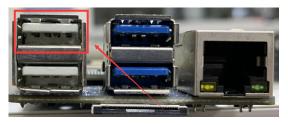
5) Then unzip **RKDevTool\_Release\_v3.15.zip**. This software does not need to be installed. Just find **RKDevTool** in the unzipped folder and open it.

名称	修改日期	类型	大小
🔄 bin	2022/12/1 15:07	文件夹	
📙 Language	2022/12/1 15:07	文件夹	
🗋 config.cfg	2022/3/23 9:11	CFG 文件	7 KB
🔄 config	2021/11/30 11:04	配置设置	2 KB
revision	2022/5/27 9:09	文本文档	3 KB
🔀 RKDevTool	2022/5/27 9:06	应用程序	1,212 KB
☑ 开发工具使用文档_v1.0	2021/8/27 10:28	Foxit PDF Reade	450 KB

6) After opening the **RKDevTool** burning tool, because the computer has not connected to the development board through the USB2.0 male-to-male data cable at this time, the lower left corner will prompt "**No device found**"

*		存储	地址	名字	路径	
1	Г		0x00000000	Loader		
2	Г		0x00000000	Parameter		
3			0x00000000	Uboot		
4			0x00000000	trust		
5			0x000000x0	Misc		
8			0x000000x0	Resource		
7	Г		0x00000000	Kernel		
3	Г		0x00000000	Boot		
3	Г		0x00000000	Recovery		
10			0x00000000	System		
11	Г		0x00000000	Backup		
.oad	ler:		执行 强制按地址写	切换	设备分区表 清空	

- 7) Then you can start to clear the content in eMMC
  - a. First, connect the development board to the Windows computer through a USB2.0 male-to-male data cable. The location of the USB2.0 programming port on the development board is as shown in the figure below.



- b. Make sure that the development board is not inserted into the TF card and not connected to the power supply
- c. Then press and hold the MaskROM button on the development board. The location of the MaskROM button on the development board is as shown in the figure below:



d. Then connect the development board to the power supply of the Type-C interface, power it on, and then release the MaskROM button



e. If the previous steps are successful, the development board will enter the **MASKROM** mode at this time, and the interface of the burning tool will prompt "found a MASKROM device"

#		存储	地址	名字	路径		
1			0x00000000	Loader			
2			0x00000000	Parameter			
3			0x00000000	Uboot			
4			0x00000000	trust			
5			0x00000000	Misc			
6			0x000000000	Resource			
7			0x00000000	Kernel			
8			0x000000000	Boot			
9			0x000000000	Recovery			
10			0x00000000	System			
11			0x00000000	Backup			
.0ad	er:		执行 □ 强制按地址写	切换	设备分历表 清空		

f. Then please select advanced functions

芯ぎ	数开发	工具 v3.15	(			
		升级固件 ;				
#		存储	土地	名字	路径	
1			0:0000000	Loader		
2			0x00000000	Parameter		
3			0x00000000	Uboot		
1	Г		0x00000000	trust		
5			0x00000000	Misc		
3			0x00000000	Resource		
7			0x00000000	Kernel		
3			0x00000000	Boot		
)			0x00000000	Recovery		
10			0x00000000	System		
11			0x00000000	Backup		

g. Then click the position shown in the figure below

oot:				下载			
]件:				解包			
读取FlashID	读取Flash信息	读取Chip信息	读取Capability	1. F1ASH 2. EMMC 3. SD 4. SD1	]		
测试设备	重启设备	进入Maskron	切换存储	5. SPINOR 6. SPINAND 7. RAM 8. USB			
清空序列号	检测安全模式	导出串口日志	获取当前存储	9. SATA 10. PCIE			
导出镜像	擦除扇区	擦除所有					
3始扇区:							
扇区数:							

h. Then select **MiniLoaderAll.bin** in the **MiniLoader** folder downloaded earlier, and then click Open

← → ∽ ↑ 🚞 > 桌面 >	orangepi > MiniLoader	烧录Linux镜像才需要用到的	东西 -	壬 MiniLoader-烧录Linux	Q
组织▼ 新建文件夹				≣ ▾ □	0
> 🔷 WPS云盘	名称	^	修改日期	类型	大小
☆ 主文件夹	😏 Mini	LoaderAll.bin	2023/8/18 11:17	BIN 文件	45
> 🔷 OneDrive	🗋 rk35	бх_linux_emmc.cfg	2023/8/18 11:17	txtfile	1
	rk35	бх_linux_pcie.cfg	2023/8/18 11:17	txtfile	1
<b>三</b> 桌面	* 🗋 rk35	бх_linux_spiflash.cfg	2023/8/18 11:17	txtfile	i
业 下载		6x_linux_tfcard.cfg	2023/8/18 11:17	txtfile	3
	🖌 🗋 rksp	i_loader.img	2023/8/18 11:17	DAEMON.Tools	4,09
🚬 图片	*				
🕖 音乐	*				
文件名(N): MiniL	.oaderAll.bin		~	All File(*.*)	$\sim$

i. Then click **Download** 

🧼 range Pi User Manual

瑞芯微开发工具 v3	.15				- 0
	高级功能 Jsers\hh177\Deskt	op\orangepi\Minil	.oader-焼	下载	
固件:				解包	
读取FlashID	读取Flash信息	读取Chip信息	读取Capability	1. FlASH 2. EDUC 3. SD 4. SD1	
测试设备	重启设备	进入Maskron	切换存储	4. SDI 5. SPINAND 7. RAM 8. USB	
清空序列号	检测安全模式	导出串口日志	获取当前存储	0. 038 9. SATA 10. PCIE	
导出镜像	擦除扇区	攔除所有			
起始扇区:					
扇区数:					
发现	一个MASKRO	M设备	1-2-3 :MASKR	M ~	

j. The display after downloading MiniLoaderAll.bin is shown in the figure below

3 瑞芯微开发工具 v3 下载镜像 升级固件						下载Boot开始 下载Boot成功	- • ×
Boot: C:\l	Jsers\hh177\Deskt	op\orangepi\Minil	.oader-烧	•••	下载	1.#4600(1)84)	
读取FlashID	读取Flash信息	读取Chip信息	读取Capa		1. FLASH 2. EMMC 3. SD 4. SD1		
测试设备	重启设备	进入Maskrom	切换有	評储	5. SPINOR 6. SPINAND 7. RAM 8. USB		
清空序列号	检测安全模式	导出串口日志	获取当前	前存储	9. SATA 10. PCIE		
导出镜像 起始扇区: 扇区数:	擦除扇区	擦除所有					
发现一	一个MASKRO	M设备	1-2-3	:MASER	MC	~	

k. Then select the storage device as **eMMC** 

找镜像 升级固件					下载Boot成功		
Boot: D:\/	CM4\MiniLoaderAll.	.bin		下载			
固件:				解包			
读取FlashID	读取Flash信息	读取Chip信息	读取Capability	1. Flash 2. EMMC 3. SD			
测试设备	重启设备	进入Maskron	切换存储	4. SD1 5. SPINOR 6. SPINAND 7. RAM			
清空序列号	检测安全模式	导出串口日志	获取当前存储	8. USB 9. SATA 10. PCIE			
导出镜像	擦除扇区	擦除所有					
起始扇区:							
扇区数:							

l. Then click switch storage

orange Pi User Manual

< 瑞芯微开发工!	具 v3.15				— —	×
下载镜像 升级	固件 高级功能			下载Boot开始 下载Boot成功		 
Boot:	D:\CM4\MiniLoaderAll	bin		下载		
固件:				解包		
读取Flash	ID 读取Flash信息	读取Chip信息	1994XCapability	1. FlASH 2. EMIC		
测试设备	重启设备	进入Maskron	切换存储	3. SD 4. SCD 5. SPINOR 5. SPINAND 7. RAM		
清空序列	号 检测安全模式	导出串口日志	获取当前存储	B. USB B. SATA 10. PCIE		
导出镜像	擲涂扇区	擲涂所有				
起始扇区:						
扇区数:						
发	现一个MASKRO	M设备	1-1 :MASKROM	~		

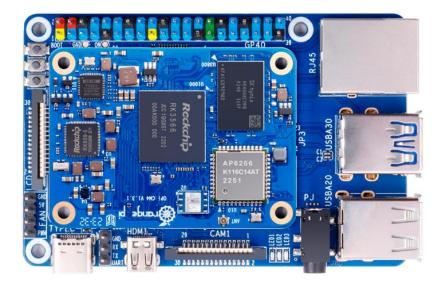
m. Then click **Erase All** to start erasing the eMMC.

🔀 瑞芯微开发工具 v3	8.15					-	×
下载镜像 升级固件	: 高级功能				下载Boot开始 下载Boot成功		
Boot: D:\(	CM4\MiniLoaderAll	.bin		下载			
固件:				解包			
读取FlashID	读取Flash信息	读取Chip信息	读职Capabi	ity 1. FLASH 2. ELMC 3. SD			
测试设备	重启设备	进入Maskron	切换存储	4. SD1			
清空序列号	检测安全模式	导出串口日志	获取当前有	8. USB			
导出镜像	擦除扇区	擲除所有					
起始扇区:							
扇区数:							
发现	一个MASKRO	M设备	1-1 :MA:	KROM	~		

n. The display log after erasing eMMC is as shown below

鏡像 升级固件						正在擦除(100%)	
oot: D:\(	CM4\MiniLoaderAll.	.bin			下载	擲除扇区成功	
副件:					解包		
读取FlashID	读取Flash信息	读取Chip信息	读取Capabilit	y 2.	FLASH		
测试设备	重启设备	进入Maskron	切换存储	4. 5. 6.	SD SD1 SPINOR SPINAND RAM		
清空序列号	检测安全模式	导出串口日志	获取当前存储	8.	USB SATA PCIE		
导出镜像	擲除扇区	擦除所有					
起始扇区:							
翁区数:							

## 2.12. Boot the Orange Pi development board



1) First install the Orange Pi CM4 core board on the base board

2) Then insert the TF card with the burned image into the TF card slot of the Orange Pi development board.

3) The development board has a Micro HDMI interface, and the development board can be connected to a TV or HDMI display through a Micro HDMI to HDMI cable. If you have purchased an LCD screen, you can also use the LCD screen to display the system interface of the development board

4) Connect a USB mouse and keyboard to control the Orange Pi development board

5) The development board has an Ethernet port, which can be plugged into a network cable to access the Internet

6) Connect a high-quality power adapter with a 5V/3A USB Type-C interface.

Remember not to plug in a power adapter with a voltage output greater than 5V, it will burn out the development board.

Many unstable phenomena during system power-on and startup are basically caused by power supply problems, so a reliable power adapter is very important. If you find that you are constantly restarting during the startup process, please replace the power supply or Type-C data cable and try again. Type-C power interface does not support PD negotiation.

In addition, please do not connect to the USB interface of the computer to power the development board.

7) Then turn on the switch of the power adapter. If everything is normal, you can see the startup screen of the system on the HDMI monitor or LCD screen.

8) If you want to view the output information of the system through the debugging serial port, please use the serial port cable to connect the development board to the computer. For the connection method of the serial port, please refer to the section on how to use the debugging serial port

## 2.13. How to use the debugging serial port

### 2.13.1. Connection instruction of debugging serial port

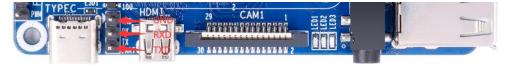
1) First, you need to prepare a **3.3V**USB to TTL module, and then insert the USB interface end of the USB to TTL module into the USB interface of the computer.

For better compatibility, it is recommended to use CH340 USB to TTL module, please do not use CP2102, PL2303 type USB to TTL module.

Before purchasing a USB to TTL module, please confirm that the module supports a baud rate of 1500000.



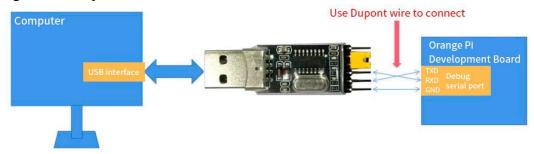
2) The corresponding relationship between the GND, RXD and TXD pins of the development board's debugging serial port is as shown in the figure below



3) The GND, TXD and RXD pins of the USB to TTL module need to be connected to the debugging serial port of the development board through Dupont lines

- a. Connect the GND of the USB to TTL module to the GND of the development board
- b. The RX of the USB to TTL module is **connected to the TX of the development board**
- c. The TX of the USB to TTL module is **connected to the RX of the development board**

4) The schematic diagram of connecting the USB to TTL module to the computer and Orange Pi development board is as shown below



Schematic diagram of connecting the USB to TTL module to the computer and the Orange Pi development board

The TX and RX of the serial port need to be cross-connected. If you don't want to carefully distinguish the order of TX and RX, you can connect the TX and RX of the serial port casually. If there is no output in the test, then exchange the order of TX and RX, so that there is always a The order is correct

#### 2. 13. 2. How to use the debugging serial port on Ubuntu platform

There are many serial port debugging software that can be used under Linux, such as putty, minicom, etc. The following demonstrates how to use putty.

1) First insert the USB to TTL module into the USB interface of the Ubuntu computer. If the USB to TTL module is connected and recognized normally, you can see the corresponding device node name under /dev of the Ubuntu PC. Remember this node name and set the serial port later. software will be used.

test@test:~\$ **ls /dev/ttyUSB\*** /dev/ttyUSB0

2) Then use the following command to install putty on Ubuntu PC test@test:~\$ sudo apt-get update

#### test@test:~\$ sudo apt-get install -y putty

### 3) Then run putty, remember to add sudo permissions

#### test@test:~\$ sudo putty

4) After executing the putty command, the following interface will pop up

Category:	Basic options for your	PuTTY sessi	on
- Session	Specify the destination you want to co	nnect to	
Logging	Host <u>N</u> ame (or IP address)		Port
▼ Terminal			22
Keyboard Bell	Connection type: Raw <u>T</u> elnet Rlogin	0 <u>s</u> sh	◯ Se <u>r</u> ial
Features • Window Appearance	Load, save or delete a stored session Sav <u>e</u> d Sessions		
Behaviour Translation	Default Settings		Load
<ul> <li>Selection</li> <li>Colours</li> </ul>			Sa <u>v</u> e
Fonts • Connection			Delete
Data			
Proxy Telnet Rlogin	Close window on exit: Always Never	Only on clear	n exit
► SSH			
About		Open	Cancel

5) First select the serial port setting interface

	PuTTY Configuration	e 🛛 😣
Category: Logging ▼ Terminal	Options controllin Select a serial line	g local serial lines
Keyboard	Seria <u>l</u> line to connect to	/dev/ttyUSB0
Bell Features	Configure the serial line	
▼ Window	<u>S</u> peed (baud)	1500000
Appearance Behaviour	Data <u>b</u> its	8
Translation	S <u>t</u> op bits	1
Selection Colours	<u>P</u> arity	None 🔹
Fonts	<u>F</u> low control	None 🔻
<ul> <li>Connection</li> <li>Data</li> <li>Proxy</li> <li>Telnet</li> <li>Rlogin</li> <li>SSH</li> <li>Serial</li> </ul>		
About		<u>O</u> pen <u>C</u> ancel

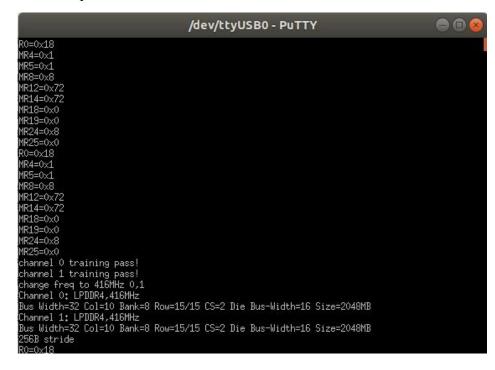
- 6) Then set the parameters of the serial port
  - a. Set the **Serial line to connect to** to **/dev/ttyUSB0** (modify to the corresponding node name, usually **/dev/ttyUSB0**)
  - b. Set **Speed(baud)** to 1500000 (the baud rate of the serial port)
  - c. Set Flow control to None

	PuTTY Configuration	00
Category: Logging Terminal Keyboard Bell 2. Enter th	Options controlling Select a serial line Serial line to connect to device node name of the serial Configure the serial line	/dev/ttyUSB0
Features	speed(Babat) to 1 500000	1500000
Appearance Behaviour	Data <u>b</u> its	8
Translation	S <u>t</u> op bits	1
Selection Colours	<u>P</u> arity	None
Fonts	<u>F</u> low control	None 🔹
<ul> <li>✓ Connection</li> <li>Data</li> <li>Proxy</li> <li>Telnet</li> <li>Rlogin</li> <li>&gt; SSH</li> <li>Serial</li> </ul>	4. Set Flow control to None 1. Select the setting inter	face of the serial port
About		<u>O</u> pen <u>C</u> ancel

- 7) After setting up the serial port setting interface, return to the Session interface.
  - a. First select the Connection type as Serial
  - b. Then click the Open button to connect to the serial port

	PuTTY Configuration	00					
Category: 🖌 1.	Go back to the Session interface Basic options for your PuTTY ses	sion					
<ul> <li>Session</li> </ul>	Specify the destination you want to connect						
Logging	Serial li <u>n</u> e	Speed					
▼ Terminal	/dev/ttyUSB0	1500000					
Keyboard	2. Select Serial						
Bell	○ Ra <u>w</u> ○ <u>T</u> elnet ○ Rlog <u>i</u> n ○ <u>S</u> SH	Se <u>r</u> ial					
Features	Load, save or delete a stored session						
▼ Window	Sav <u>e</u> d Sessions						
Appearance Behaviour							
Translation	Default Settings	Load					
Selection	beraulesettings	Loau					
Colours		Sa <u>v</u> e					
Fonts		Delete					
<ul> <li>Connection</li> </ul>							
Data							
Proxy							
Telnet	Close window on e <u>x</u> it: Always Never Only on cle	an exit					
Rlogin		unente					
	3. Finally click the Open button						
Abaub		Canad					
About	<u>O</u> pen	Cancel					

8) After starting the development board, you can see the Log information output by the system from the open serial terminal.



#### 2. 13. 3. How to use the debugging serial port on Windows platform

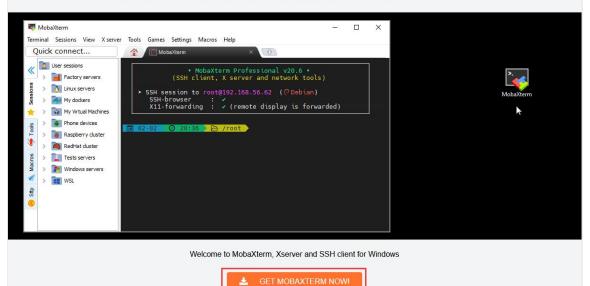
There are many serial port debugging software that can be used under Windows, such as SecureCRT, MobaXterm, etc. The following demonstrates how to use MobaXterm. This software has a free version and can be used without buying a serial number.

- 1) Download MobaXterm
  - a. Download MobaXterm website as follows

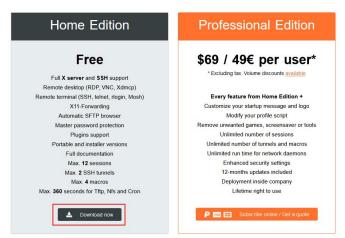
#### https://mobaxterm.mobatek.net

b. After entering the MobaXterm download page, click GET XOBATERM NOW! MobaXterm

Enhanced terminal for Windows with X11 server, tabbed SSH client, network tools and much more



c. Then choose to download the Home version



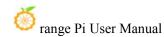
d. Then select the Portable version. There is no need to install it after downloading. You can open it directly and use it.

Г	MobaXterm Home Edition v22.2	MobaXterm Home Edition v22.2
	(Portable edition)	(Installer edition)
Journload prov	ious stable version: MobaXterm Portable v22.1 Mo	she Ytom Installer v22.4
Jownioad prev		
By downloading	g MobaXterm software, you accept MobaXterm terms a	and conditions
You can downlo	oad the third party plugins and components sources he	<u>ere</u>
		subscribing to Moha Vterm Professional Edition: your subscription will
If yo	ou use MobaXterm inside your company, you should consider	subscribing to mobal centre rolessional Editori. your subscription will
give give		software. This customizer will allow you to generate personalized

2) After downloading, use decompression software to decompress the downloaded compressed package to get the MobaXterm executable software, and then double-click to open it.

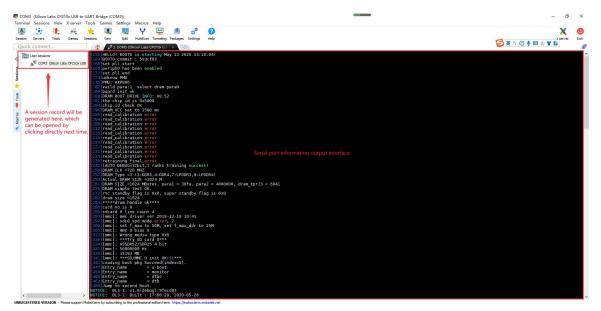
名称	修改日期	类型	大小
CygUtils.plugin	2022/9/24 20:16	PLUGIN 文件	17,484 KB
MobaXterm_Personal_22.2	2022/10/22 16:53	应用程序	16,461 KB

- 3) After opening the software, the steps to set up the serial port connection are as follows
  - a. Open the session settings interface
  - b. Select the serial port type
  - c. Select the port number of the serial port (select the corresponding port number according to the actual situation). If you cannot see the port number, please use 360 Driver Master to scan and install the driver for the USB to TTL serial port chip.
  - d. Select the baud rate of the serial port to be **1500000**
  - e. Finally click the "**OK**" button to complete the setup



aion 1	Servers	Nools	Games :	🚖 Sessions	View	Split M	Y AultiExec 1		Packages	settings	Help				
uick (	connect				¢			-		-					
S 🔝	Session set	tings													
	SSH	Telnet	Rsh	Xdmcp	RDP	VNC	<b>S</b> FTP	SFTF	Seria	I File	Shell	Browser	Mosh	Nws S3	WSL
	💉 Ba	asic Seria	al settings							-	2. Select	the serial	port		
		Serial p		ose at sess				~		Speed (	bps) * 150	0000 ~			
	A 🔊	dvanced S	CON Serial setti	13 (Silicon		P210x US		- And	rk settings		1				
			3. Sel	ect the po	ort numb	per of the	serial p	ort	4. Se	lect the b	aud rate	as 150000	0		
						Serial (	COM) s	ession						Ń	ſ
					5. F	inally clic	k OK								

4) After clicking the "**OK**" button, you will enter the following interface. At this time, you can see the output information of the serial port



# 2. 14. Instructions for using the 5v pin in the 40pin interface of the development board to supply power

The power supply method we recommend for the development board is to use the 5V/3A Type C interface power cord to plug into the Type-C power interface of the development board. If you need to use the 5V pin in the 40-pin interface to power the development board, please ensure that the power cord and power adapter used can meet the power supply requirements of the development board. If the use is unstable, please switch to Type-C power supply.

1) First you need to prepare a power cord as shown in the picture below



The power cord shown in the figure above can be bought on Taobao, please search for purchase by yourself.

2) Use the 5V pin in the 40pin interface to power the development board. The power cord connection is as follows

- a. The USB A port of the power cord shown in the picture above needs to be plugged into the 5V/3A power adapter connector. (Please do not plug it into the USB port of your computer for power supply)
- b. The red DuPont line needs to be plugged into the 5V pin of the development board 40pin
- c. The black DuPont wire needs to be plugged into the GND pin of the 40pin interface
- d. The position of the 40Pin interface 5V pin and GND pin in the development board is shown in the figure below, **Remember not to reverse**



# 3. Ubuntu/Debian Server and Xfce desktop system

## instructions

The content of this chapter is written based on the Linux server version image and the xfce desktop version image.

## 3.1. Supported Linux image types and kernel versions

Linux image type	Kernel	server version	desktop
	version		version
Debian 11 - Bullseye	Linux5.10	support	support
Debian12 - Bookworm	Linux5.10	support	support
Ubuntu 20.04 - Focal	Linux5.10	support	support
Ubuntu 22.04 - Jammy	Linux5.10	support	support

## 3.2. Linux system adaptation situation

Function	Debian11	Debian12	Ubuntu20.04	Ubuntu22.04	
USB2.0x3	ОК	OK	ОК	OK	
USB3.0x1	ОК	OK	ОК	ОК	
M.2 NVMe SSD Boot	OK, you need to attach SPI Flash to it for normal use.				
WIFI	ОК	ОК	ОК	ОК	
Bluetooth	OK	ОК	ОК	OK	
GPIO (40pin)	ОК	OK	ОК	ОК	
UART (40pin)	OK	ОК	ОК	ОК	
SPI (40pin)	ОК	ОК	ОК	ОК	

🧭 range Pi User Manual

I2C (40pin)	ОК	ОК	ОК	ОК		
PWM (40pin)	ОК	ОК	ОК	ОК		
PWM fan interface	ОК	ОК	ОК	ОК		
3pin debugging serial	ОК	ОК	ОК	ОК		
port						
ЕММС	ОК	ОК	ОК	ОК		
TF card startup	ОК	ОК	ОК	ОК		
HDMI video	ОК	ОК	ОК	ОК		
HDMI audio	ОК	ОК	ОК	ОК		
OV5647 camera	Kernel driver is OK, 3A is not adjusted					
LCD	ОК	ОК	ОК	ОК		
eDP display	ОК	ОК	ОК	ОК		
Gigabit Ethernet port	ОК	ОК	ОК	ОК		
Network port status light	ОК	ОК	ОК	ОК		
Headphone playback	ОК	ОК	ОК	ОК		
headphone recording	OK	ОК	ОК	ОК		
LED light	ОК	ОК	ОК	ОК		
GPU	ОК	ОК	ОК	ОК		
NPU	OK	OK	ОК	ОК		
VPU	OK	OK	ОК	ОК		
watchdog test	OK	OK	ОК	ОК		
Chromium hard	OK	ОК	ОК	ОК		
decryption video						
decryption video						

## 3. 3. Linux command format description in this manual

1) All commands that need to be entered in the Linux system in this manual will be enclosed in the following boxes

As shown below, the content in the yellow box indicates the content that needs special attention, except for the commands in it

- 2) Description of the prompt type in front of the command
  - a. The prompt in front of the command refers to the content of the red part in the box below. This part of the content is not part of the Linux command, so when entering the command in the Linux system, please do not enter the content of the red font part.

orangepi@orangepi:~\$ sudo apt update root@orangepi:~# vim /boot/boot.cmd test@test:~\$ ssh root@192.168.1.xxx root@test:~# ls

- b. **root@orangepi:~**\$ The prompt indicates that this command is entered in the Linux system of the development board. The \$ at the end of the prompt indicates that the current user of the system is an ordinary user. When executing a privileged command, **sudo** needs to be added.
- c. root@orangepi:~# The prompt indicates that this command is entered in the Linux system of the development board, and the # at the end of the prompt indicates that the current user of the system is the root user, who can execute any desired command
- d. test@test:~\$ The prompt indicates that the command was entered in the Ubuntu PC or Ubuntu virtual machine, not the Linux system of the development board. The \$ at the end of the prompt indicates that the current user of the system is an ordinary user. When executing privileged commands, sudo needs to be added.
- e. root@test:~# The prompt indicates that the command was entered in the Ubuntu PC or Ubuntu virtual machine, not the Linux system of the development board. The # at the end of the prompt indicates that the current user of the system is the root user and can execute any command you want to execute.
- 3) What are the commands that need to be entered?
  - a. As shown below, **the bold black part** is the command that needs to be input. The content below the command is the output content (some commands have output, and some may not output). This part of the content does not need to be input

root@orangepi:~# cat /boot/orangepiEnv.txt verbosity=7 bootlogo=false

#### console=serial

b. As shown below, some commands cannot be written in one line and will be placed on the next line. As long as the black and bold parts are all commands that need to be input. When these commands are entered into one line, the last "\" of each line needs to be removed, this is not part of the command. In addition, there are spaces in different parts of the command, please don't miss it

orangepi@orangepi:~\$ echo \

"deb [arch=\$(dpkg --print-architecture) \ signed-by=/usr/share/keyrings/docker-archive-keyring.gpg] \ https://download.docker.com/linux/debian \ \$(lsb release -cs) stable" | sudo tee /etc/apt/sources.list.d/docker.list > /dev/null

## 3. 4. Linux system login instructions

#### 3. 4. 1. Linux system default login account and password

account	password
root	orangepi
orangepi	orangepi

Note that when entering a password, the specific content of the entered password will not be displayed on the screen. Please do not think that there is something wrong. Just press Enter after entering it.

When you are prompted for an incorrect password or there is a problem with the ssh connection, please note that as long as you are using the Linux image provided by Orange Pi, please do not suspect that the above password is incorrect, but look for other reasons..

#### 3. 4. 2. How to set up automatic login of Linux system terminal

1) The Linux system automatically logs in to the terminal by default. The default login user name is **orangepi**.



2) Use the following command to set the root user to automatically log in to the terminal orangepi@orangepi:~\$ sudo auto\_login\_cli.sh root

3) Use the following command to disable automatic login to the terminal

orangepi@orangepi:~\$ sudo auto\_login\_cli.sh -d

4) Use the following command to set the orangepi user to automatically log in to the terminal again

orangepi@orangepi:~\$ sudo auto\_login\_cli.sh orangepi

## 3. 4. 3. Instructions for automatic login of the Linux desktop version system

1) The desktop version system will automatically log in to the desktop after startup without entering a password.



2) Run the following command to prevent the desktop system from automatically logging into the desktop

orangepi@orangepi:~\$ sudo disable\_desktop\_autologin.sh

3) Then restart the system and a login dialog box will appear. At this time, you need to enter a **password** to enter the system



## 3. 4. 4. The setting method of root user automatic login in Linux desktop version system

1) Execute the following command to set the desktop version of the system to automatically log in using the root user

orangepi@orangepi:~\$ sudo desktop login.sh root

2) Then restart the system, it will automatically use the root user to log in to the desktop



Note that if you use the root user to log in to the desktop system, you cannot use pulseaudio in the upper right corner to manage audio devices.

Also note that this is not a bug, since pulseaudio is not allowed to run as root.

3) Execute the following command to set up the desktop version of the system again to use orangepi user to automatically log in

orangepi@orangepi:~\$ sudo desktop\_login.sh orangepi

#### **3. 4. 5.** How to disable the desktop in Linux desktop system

1) First enter the following command in the command line, **please remember to add sudo permission** 

orangepi@orangepi:~\$ sudo systemctl disable lightdm.service

2) Then restart the Linux system and you will find that the desktop will not be displayed. orangepi@orangepi:~\$ sudo reboot

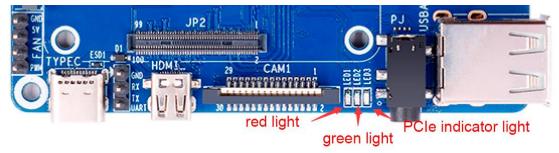
- 3) The steps to reopen the desktop are as follows:
  - a. First enter the following command in the command line, **please remember to** add sudo permission

orangepi@orangepi:~\$ sudo systemctl start lightdm.service

b. After the command is executed, the desktop will be displayed

## 3. 5. Onboard LED light test instructions

1) There are three LED lights on the development board, one green light, one red light, and one PCIe light. The location is shown in the figure below:



## 2) As long as the development board is powered on, the red LED light will always be on, which is controlled by the hardware and cannot be turned off by the software

3) The green LED light will keep flashing after the kernel is started, which is controlled by software

4) The PCIe indicator light will flash when there is data transmission on the PCIe interface.

5) The method of setting the green light to turn on and off and flash is as follows

Note that the following operations should be performed under the root user					
a.	First enter the setting directory of the green light				
root@orangepi:~# cd /sys/class/leds/status_led					
b.	The command to set the green light to stop flashing is as follows:				
root@o	root@orangepi:/sys/class/leds/status_led# echo none > trigger				
c.	The command to set the green light to be always on is as follows:				
root@o	root@orangepi:/sys/class/leds/status_led# echo default-on > trigger				
d.	The command to set the green light flashing is as follows:				
root@orangepi:/sys/class/leds/status_led# echo heartbeat > trigger					

## **3. 6.** Network connection test

#### **3. 6. 1. Ethernet port test**

1) First, plug one end of the network cable into the Ethernet interface of the development board, and the other end of the network cable into the router, and make sure the network is open.

2) After the system starts, it will automatically assign an IP address to the Ethernet card through **DHCP**., **No other configuration is required** 

3) The command to view the IP address in the Linux system of the development board is as follows

orangepi@orangepi:~\$ ip addr show eth0

2: eth0: <BROADCAST,MULTICAST,UP,LOWER\_UP> mtu 1500 qdisc mq state UP group default qlen 1000

link/ether 4a:fe:2b:3d:17:1c brd ff:ff:ff:ff:ff:ff

inet **192.168.1.150**/24 brd 192.168.1.255 scope global dynamic noprefixroute eth0 valid\_lft 43150sec preferred\_lft 43150sec

inet6 fe80::9a04:3703:faed:23be/64 scope link noprefixroute

valid\_lft forever preferred\_lft forever

When using ifconfig to check the IP address, if the following information is prompted, it is caused by not adding sudo. The correct command is: sudo ifconfig

orangepi@orangepi:~\$ ifconfig

Command 'ifconfig' is available in the following places

\* /sbin/ifconfig

\* /usr/sbin/ifconfig

The command could not be located because '/sbin:/usr/sbin' is not included in the PATH environment variable.

This is most likely caused by the lack of administrative privileges associated with your user account.

ifconfig: command not found

There are three ways to check the IP address after the development board is started.:

1. Connect the HDMI display, then log in to the system and use the ip addr show eth0 command to view the IP address.

2. Enter the **ip addr show eth0** command in the debugging serial terminal to view the IP address.

3. If there is no debugging serial port and no HDMI display, you can also check the IP address of the development board network port through the management interface of the router. However, in this method, some people often cannot see the IP address of the development board normally. If you can't see it, the debugging method is as follows:

A) First, check whether the Linux system has started normally. If the green light of the development board is flashing, it usually means that it has started normally. If only the red light is on, it means that the system has not started normally.;

B) Check whether the network cable is plugged in tightly, or try another network cable;

C) Try another router (I have encountered many problems with routers, such as the router being unable to assign an IP address normally, or the IP address being assigned normally but not visible in the router);

D) If there is no router to replace, you can only connect an HDMI display or use the debugging serial port to check the IP address.

In addition, it should be noted that the development board's DHCP automatic allocation of IP addresses does not require any settings.

4) The command to test the network connectivity is as follows, the **ping** command can be interrupted through the shortcut key of **Ctrl+C** 

orangepi@orangepi:~\$ ping www.baidu.com -I eth0 PING www.a.shifen.com (14.215.177.38) from 192.168.1.12 eth0: 56(84) bytes of data. 64 bytes from 14.215.177.38 (14.215.177.38): icmp\_seq=1 ttl=56 time=6.74 ms 64 bytes from 14.215.177.38 (14.215.177.38): icmp\_seq=2 ttl=56 time=6.80 ms 64 bytes from 14.215.177.38 (14.215.177.38): icmp\_seq=3 ttl=56 time=6.26 ms 64 bytes from 14.215.177.38 (14.215.177.38): icmp\_seq=4 ttl=56 time=7.27 ms ^C --- www.a.shifen.com ping statistics ----

4 packets transmitted, 4 received, 0% packet loss, time 3002ms rtt min/avg/max/mdev = 6.260/6.770/7.275/0.373 ms

## 3. 6. 2. WIFI connection test

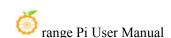
Please do not connect to WIFI by modifying the /etc/network/interfaces configuration file. There will be problems in connecting to the WIFI network in this way.

#### 3. 6. 2. 1. The server image connects to WIFI through commands

When the development board is not connected to Ethernet, not connected to HDMI display, but only connected to the serial port, it is recommended to use the commands demonstrated in this section to connect to the WIFI network. Because nmtui can only display characters in some serial port software (such as minicom) and cannot display the graphical interface normally. Of course, if the development board is connected to an Ethernet or HDMI display, you can also use the commands demonstrated in this section to connect to the WIFI network.

- 1) First log in to the Linux system, there are three ways:
  - a. If the development board is connected with a network cable, you can remotely log in to the Linux system through ssh
  - a. If the development board is connected to the debugging serial port, you can use the serial port terminal to log in to the Linux system
  - b. If the development board is connected to the HDMI display, you can log in to the Linux system through the terminal displayed on the HDMI

2) First use the **nmcli dev wifi** command to scan the surrounding WIFI hotspots orangepi@orangepi:~\$ nmcli dev wifi



root@orangepi:-# nmcli dev wifi								
IN-USE	BSSID	SSID	MODE	CHAN	RATE	SIGNAL	BARS	SECURITY
	28:6C:07:6E:87:2E	orangepi	Infra		260 Mbit/s	97		WPA1 WPA2
	D8:D8:66:A5:BD:D1		Infra	10	270 Mbit/s	90		WPA1 WPA2
	A0:40:A0:A1:72:20		Infra		405 Mbit/s	82		WPA2
	28:6C:07:6E:87:2F	orangepi 5G	Infra	149	540 Mbit/s	80		WPA1 WPA2
	CA:50:E9:89:E2:44	Chinalist TC15	Infra	1	130 Mbit/s	79		WPA1 WPA2
	A0:40:A0:A1:72:31		Infra	100	405 Mbit/s	67		WPA2
	D4:EE:07:08:A9:E0		Infra		130 Mbit/s	55		WPA1 WPA2
	88:C3:97:49:25:13		Infra		130 Mbit/s	52	_	WPA1 WPA2
	00:BD:82:51:53:C2		Infra		130 Mbit/s			WPA1 WPA2
	C0:61:18:FA:49:37		Infra		270 Mbit/s	47		WPA1 WPA2
	04:79:70:8D:0C:B8		Infra	153	270 Mbit/s	47		WPA2
	04:79:70:FD:0C:B8		Infra	153	270 Mbit/s	47		WPA2
	9C:A6:15:DD:E6:0C		Infra			45		WPA1 WPA2
	B4:0F:3B:45:D1:F5		Infra		270 Mbit/s	45		WPA1 WPA2
	E8:CC:18:4F:7B:44		Infra	157	135 Mbit/s	45		WPA1 WPA2
	B0:95:8E:D8:2F:ED		Infra		405 Mbit/s			WPA1 WPA2
	C0:61:18:FA:49:36		Infra	11	270 Mbit/s	24		WPA1 WPA2
root@or	angepi:~#							

- 3) Then use the **nmcli** command to connect to the scanned WIFI hotspot,
  - a. **wifi\_name** needs to be replaced with the name of the WIFI hotspot you want to connect to
  - b. **wifi\_passwd** needs to be replaced with the password of the WIFI hotspot you want to connect to

orangepi@orangepi:~\$ nmcli dev wifi connect wifi\_name password wifi\_passwd Device 'wlan0' successfully activated with 'cf937f88-ca1e-4411-bb50-61f402eef293'.

4) You can check the IP address of the wifi through the **ip addr show wlan0** command

orangepi@orangepi:~\$ ip addr show wlan0

11: wlan0: <BROADCAST,MULTICAST,UP,LOWER\_UP> mtu 1500 qdisc pfifo\_fast state UP group default qlen 1000

link/ether 23:8c:d6:ae:76:bb brd ff:ff:ff:ff:ff:ff

inet **192.168.1.11**/24 brd 192.168.1.255 scope global dynamic noprefixroute wlan0 valid\_lft 259192sec preferred\_lft 259192sec

inet6 240e:3b7:3240:c3a0:c401:a445:5002:ccdd/64 scope global dynamic noprefixroute

valid\_lft 259192sec preferred\_lft 172792sec

inet6 fe80::42f1:6019:a80e:4c31/64 scope link noprefixroute

valid\_lft forever preferred\_lft forever

5) Use the **ping** command to test the connectivity of the wifi network, and the **ping** command can be interrupted through the shortcut key **Ctrl+C** 

orangepi@orangepi:~\$ **ping www.orangepi.org -I wlan0** PING www.orangepi.org (182.92.236.130) from 192.168.1.49 wlan0: 56(84) bytes of data. 64 bytes from 182.92.236.130 (182.92.236.130): icmp\_seq=1 ttl=52 time=43.5 ms 64 bytes from 182.92.236.130 (182.92.236.130): icmp\_seq=2 ttl=52 time=41.3 ms 64 bytes from 182.92.236.130 (182.92.236.130): icmp\_seq=3 ttl=52 time=44.9 ms 64 bytes from 182.92.236.130 (182.92.236.130): icmp\_seq=4 ttl=52 time=45.6 ms 64 bytes from 182.92.236.130 (182.92.236.130): icmp\_seq=5 ttl=52 time=45.8 ms ^C --- www.orangepi.org ping statistics ---5 packets transmitted, 5 received, 0% packet loss, time 4006ms rtt min/avg/max/mdev = 41.321/44.864/48.834/2.484 ms

### 3. 6. 2. 2. Server version image connects to WIFI graphically

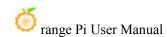
1) First log in to the Linux system, there are three ways:

- a. If the development board is connected with a network cable, you can **remotely** log in to the Linux system through ssh
- b. If the development board is connected to the debugging serial port, you can use the serial port terminal to log in to the Linux system (please use MobaXterm for the serial port software, the graphical interface cannot be displayed using minicom)
- c. If the development board is connected to the HDMI display, you can log in to the Linux system through the terminal displayed on the HDMI

2) Then enter the nmtui command in the command line to open the wifi connection interface

orangepi@orangepi:~\$ nmtui

3) Enter the nmtui command to open the interface as shown below





4) Select Activate a connect and press Enter



5) Then you can see all the searched WIFI hotspots

2 4. COM3 (Silicon Labs CP21	Wired * Wired connection 1 Wi-Fi orangepi orangepi s s i 4 i j i t i i i i i i i i i i i i i	**** **** *** *** *** *** *** ***		cnal received
		** ** ** ** ** ** ** ** ** ** ** ** **	<back></back>	

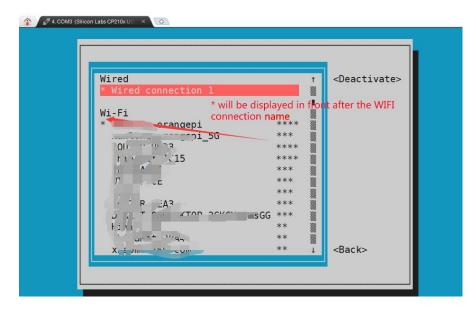
6) Select the WIFI hotspot you want to connect to, then use the Tab key to position the cursor on **Activate** and press Enter

Wired		<activate></activate>	
* Wired connection 1		ACCIVACE>	
Wi-Fi	ī ;		
orangepi_5			
	**** **** ****		
Jrangepi	****		
( <sup>1</sup> , [ 2 <sup>1</sup> 2 <sup>1</sup> 2 <sup>1</sup> )	****		
( cve 1 ct			and the
1. Cr		iFi you want to c	official
N T AR O			
H H	*** ** **		
E E	** 🚟		
( Service Serv	** 👹		
1.00	** 1	<back></back>	

7) Then a dialog box for entering the password will pop up. Enter the corresponding **Password** in Password and press Enter to start connecting to WIFI.

<u></u> 4. com	<pre>9 (Silcon Labs CP210x UE X Wired * Wired connection 1 Wi-Fi Authentication required by wireless network Passwords or encryption keys are required to access the wireless network 'orangepi'. 1. Enter the WiFi password Password Cancel&gt; &lt;0K&gt; 2. Press Enter </pre>
	ETWIFI ** + <back></back>

8) After the WIFI connection is successful, a "\*" will be displayed in front of the connected WIFI name.



9) You can check the IP address of the wifi through the **ip addr show wlan0** command orangepi@orangepi:~\$ **ip addr show wlan0** 

11: wlan0: <BROADCAST,MULTICAST,UP,LOWER\_UP> mtu 1500 qdisc pfifo\_fast state UP group default qlen 1000

link/ether 24:8c:d3:aa:76:bb brd ff:ff:ff:ff:ff:ff

inet **192.168.1.11**/24 brd 192.168.1.255 scope global dynamic noprefixroute wlan0 valid\_lft 259069sec preferred\_lft 259069sec

inet6 240e:3b7:3240:c4a0:c401:a445:5002:ccdd/64 scope global dynamic noprefixroute

valid\_lft 259071sec preferred\_lft 172671sec

inet6 fe80::42f1:6019:a80e:4c31/64 scope link noprefixroute

valid\_lft forever preferred\_lft forever

10) Use the **ping** command to test the connectivity of the wifi network. The **ping** command can be interrupted by pressing the **Ctrl+C** shortcut key

orangepi@orangepi:~\$ ping www.orangepi.org -I wlan0 PING www.orangepi.org (182.92.236.130) from 192.168.1.49 wlan0: 56(84) bytes of data.

64 bytes from 182.92.236.130 (182.92.236.130): icmp\_seq=1 ttl=52 time=43.5 ms

64 bytes from 182.92.236.130 (182.92.236.130): icmp\_seq=2 ttl=52 time=41.3 ms

64 bytes from 182.92.236.130 (182.92.236.130): icmp\_seq=3 ttl=52 time=44.9 ms

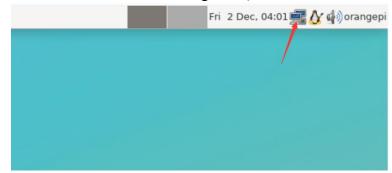
64 bytes from 182.92.236.130 (182.92.236.130): icmp\_seq=4 ttl=52 time=45.6 ms

64 bytes from 182.92.236.130 (182.92.236.130): icmp\_seq=5 ttl=52 time=48.8 ms

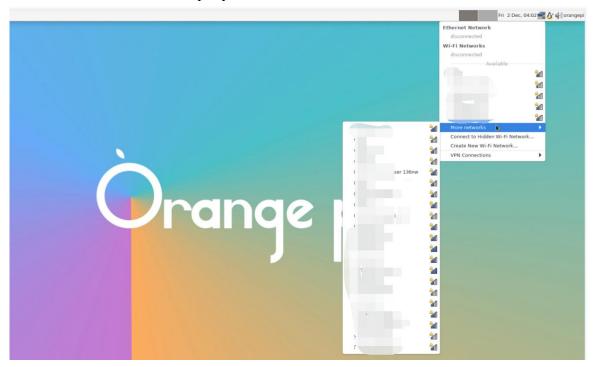
^C --- www.orangepi.org ping statistics ---5 packets transmitted, 5 received, 0% packet loss, time 4006ms rtt min/avg/max/mdev = 41.321/44.864/48.834/2.484 ms

### 3. 6. 2. 3. Test method of desktop image

1) Click the network configuration icon in the upper right corner of the desktop (please do not connect the network cable when testing WIFI)



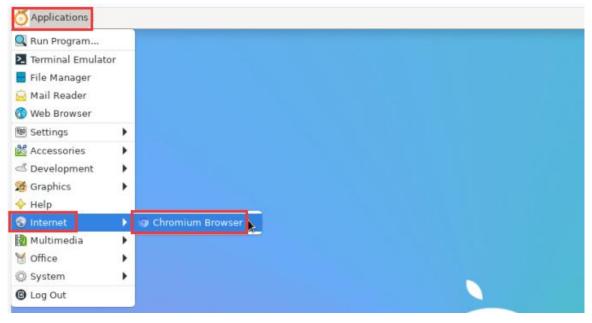
2) Click **More networks** in the pop-up drop-down box to see all scanned WIFI hotspots, and then select the WIFI hotspot you want to connect to.



3) Then enter the password of the WIFI hotspot, and then click **Connect** to start connecting to WIFI



4) After connecting to WIFI, you can open the browser to check whether you can access the Internet. The entrance of the browser is shown in the figure below



5) If you can open other web pages after opening the browser, it means the WIFI connection is normal



#### 3. 6. 3. How to set a static IP address

Please do not set a static IP address by modifying the /etc/network/interfaces configuration file

#### 3. 6. 3. 1. Use the nmtui command to set a static IP address

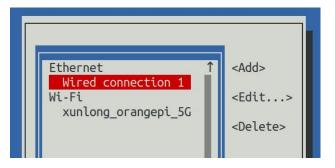
1) First run the nmtui command

orangepi@orangepi:~\$ nmtui

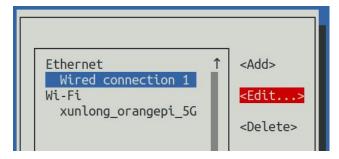
2) Then select Edit a connection and press Enter

Please select an option Edit a connection Activate a connection
Activate a connection
Set system hostname
Quit
<0K>

3) Then select the network interface for which a static IP address needs to be set. For example, to set the static IP address of the Ethernet interface, select Wired connection 1.



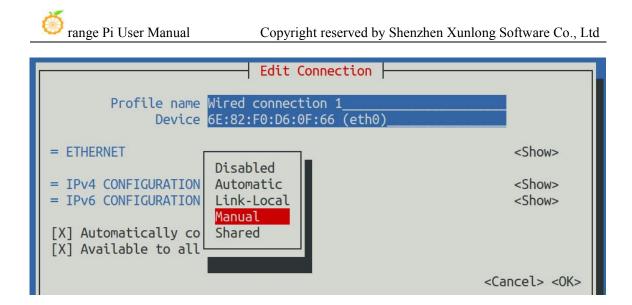
4) Then select **Edit** via the **Tab** key and press the Enter key



5) Then use the Tab key to move the cursor to the **Automatic>** position shown in the figure below to configure IPv4

Edit Connection	]
Profile name Wired connection 1 Device 6E:82:F0:D6:0F:66 (eth0)	
= ETHERNET	<show></show>
<pre>= IPv4 CONFIGURATION <automatic> = IPv6 CONFIGURATION <automatic></automatic></automatic></pre>	<show> <show></show></show>
[X] Automatically connect [X] Available to all users	
	<cancel> <ok></ok></cancel>

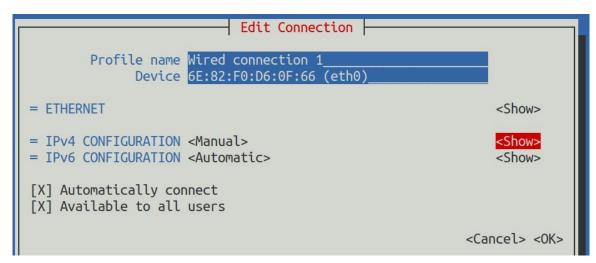
6) Then press Enter, select **Manual** through the up and down arrow keys, and then press Enter to confirm.



7) The display after selection is as shown below

Edit Connection	]
Profile name Wired connection 1 Device 6E:82:F0:D6:0F:66 (eth0)	
= ETHERNET	<show></show>
<pre>= IPv4 CONFIGURATION <manual> = IPv6 CONFIGURATION <automatic></automatic></manual></pre>	<show> <show></show></show>
[X] Automatically connect [X] Available to all users	
	<cancel> <ok></ok></cancel>

8) Then move the cursor to **<Show>** via the Tab key



9) Then press Enter. After pressing Enter, the following setting interface will pop up.

Edit Connection	
Profile name Wired connection 1	
Device 6E:82:F0:D6:0F:66 (eth0)	
= ETHERNET	<show></show>
= IPv4 CONFIGURATION <manual></manual>	<hide></hide>
Addresses <add></add>	NILUE>
Gateway	
DNS servers <add></add>	
Search domains <add></add>	
Douting (No sustan soutes) . Edit	
Routing (No custom routes) <edit></edit>	
[ ] Never use this network for default route	
[ ] Ignore automatically obtained routes	
[ ] Ignore automatically obtained DNS parameters	
[ ] Require IPv4 addressing for this connection	
= IPv6 CONFIGURATION <automatic></automatic>	<show></show>
[X] Automatically connect	
[X] Available to all users	
	<cancel> <ok></ok></cancel>

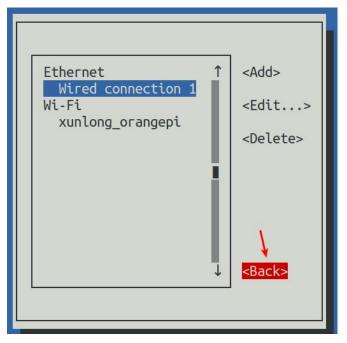
10) Then you can set the IP address (Addresses), gateway (Gateway) and DNS server address as shown in the figure below (there are many other setting options, please explore by yourself), Please set it according to your specific needs. The value set in the picture below is just an example.

Edit Connection	
Profile name Wired connection 1 Device eth0 (86:F2:85:2C:81:CE)	
= ETHERNET	<show></show>
= IPv4 CONFIGURATION <manual></manual>	<hide></hide>
Addresses 192.168.1.177/24 <remove></remove>	
Gateway 192.168.1.1 DNS servers 8.8.8.8 <remove></remove>	
<add> Search domains <add></add></add>	

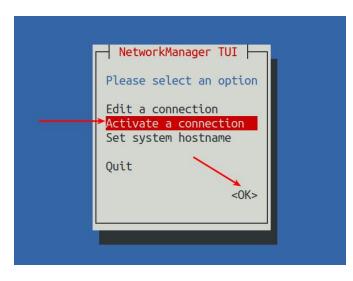
11) After setting, move the cursor to **<OK>** in the lower right corner, and then press Enter to confirm.



12) Then click **<Back>** to return to the previous level selection interface



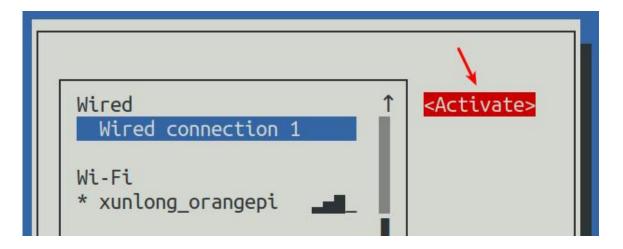
13) Then select **Activate a connection**, then move the cursor to **<OK>**, and finally click Enter



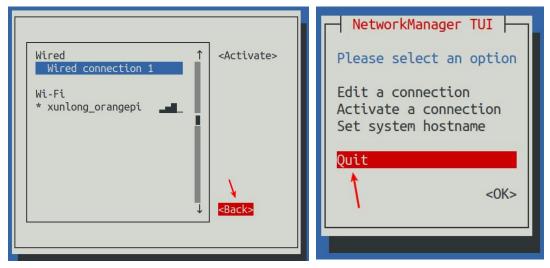
14) Then select the network interface that needs to be set, such as **Wired connection 1**, then move the cursor to **<Deactivate>**, and press Enter to disable **Wired connection 1** 

	1
Wired ↑ * Wired connection 1	<deactivate></deactivate>
Wi-Fi * xunlong_orangepi	

15) Then please do not move the cursor, and then press the Enter key to re-enable **Wired connection 1**, so that the static IP address set earlier will take effect



16) Then you can exit nmtui through the **<Back>**and **Quit** buttons



17) Then through **ip addr show eth0**, you can see that the IP address of the network port has changed to the static IP address set earlier

orangepi@orangepi:~\$ **ip addr show eth0** 3: eth0: <BROADCAST,MULTICAST,UP,LOWER\_UP> mtu 1500 qdisc pfifo\_fast state UP group default qlen 1000

link/ether 5e:ac:14:a5:92:b3 brd ff:ff:ff:ff:ff:ff

inet **192.168.1.177**/24 brd 192.168.1.255 scope global noprefixroute eth0

valid\_lft forever preferred\_lft forever

```
inet6 241e:3b8:3240:c3a0:e269:8305:dc08:135e/64 scope global dynamic noprefixroute
```

valid\_lft 259149sec preferred\_lft 172749sec

inet6 fe80::957d:bbbe:4928:3604/64 scope link noprefixroute

valid\_lft forever preferred\_lft forever

18) Then you can test the network connectivity to check whether the IP address is configured OK. The ping command can be interrupted by using the **Ctrl+C** shortcut key.

orangepi@orangepi:~\$ ping 192.168.1.47 -I eth0 PING 192.168.1.47 (192.168.1.47) from 192.168.1.188 eth0: 56(84) bytes of data. 64 bytes from 192.168.1.47: icmp\_seq=1 ttl=64 time=0.233 ms 64 bytes from 192.168.1.47: icmp\_seq=2 ttl=64 time=0.263 ms 64 bytes from 192.168.1.47: icmp\_seq=3 ttl=64 time=0.273 ms 64 bytes from 192.168.1.47: icmp\_seq=4 ttl=64 time=0.269 ms 64 bytes from 192.168.1.47: icmp\_seq=5 ttl=64 time=0.275 ms ^C --- 192.168.1.47 ping statistics ---5 packets transmitted, 5 received, 0% packet loss, time 4042ms rtt min/avg/max/mdev = 0.233/0.262/0.275/0.015 ms

#### 3. 6. 3. 2. Use the nmcli command to set a static IP address

1) If you want to set the static IP address of the network port, please insert the network cable into the development board first. If you need to set the static IP address of WIFI, please connect the WIFI first, and then start to set the static IP address

2) Then you can view the name of the network device through the **nmcli con show** command, as shown below

- a. **orangepi** is the name of the WIFI network interface (the name is not necessarily the same)
- b. Wired connection 1 is the name of the Ethernet interface

orangepi@orangepi:~\$ nmcli con show				
NAME	UUID	TYPE	DEVICE	
orangepi	cfc4f922-ae48-46f1-84e1-2f19e9ec5e2a	wifi	wlan0	
Wired connection 1	9db058b7-7701-37b8-9411-efc2ae8bfa30	ethernet	eth0	

3) Then enter the following command,

a. "Wired connection 1" It means to set the static IP address of the Ethernet port. If you need to set the static IP address of WIFI, please modify it to the corresponding name of the WIFI network interface (you can get it through the **nmcli con show**)

- b. **ipv4.addresses** Behind is the static IP address to be set, which can be modified to the value you want to set.
- c. ipv4.gateway Indicates the address of the gateway

```
orangepi@orangepi:~$ nmcli con mod "Wired connection 1" \
ipv4.addresses "192.168.1.110" \
ipv4.gateway "192.168.1.1" \
ipv4.dns "8.8.8.8" \
ipv4.method "manual"
```

4) Then restart the Linux system

orangepi@orangepi:~\$ sudo reboot

5) Then re-enter the Linux system and use the **ip addr show eth0** command to see that the IP address has been set to the desired value

orangepi@orangepi:~\$ ip addr show eth0

3: eth0: <BROADCAST,MULTICAST,UP,LOWER\_UP> mtu 1500 qdisc pfifo\_fast state UP group default qlen 1000

link/ether 5e:ae:14:a5:91:b3 brd ff:ff:ff:ff:ff:ff

inet 192.168.1.110/32 brd 192.168.1.110 scope global noprefixroute eth0

valid\_lft forever preferred\_lft forever

inet6 240e:3b7:3240:c3a0:97de:1d01:b290:fe3a/64 scope global dynamic noprefixroute

valid\_lft 259183sec preferred\_lft 172783sec

inet6 fe80::3312:861a:a589:d3c/64 scope link noprefixroute

valid\_lft forever preferred\_lft forever

#### 3. 6. 4. Method to create WIFI hotspot through create\_ap

create\_ap is a script that helps quickly create WIFI hotspots on Linux, and supports bridge and NAT modes. It can automatically combine hostapd, dnsmasq and iptables to complete the setting of WIFI hotspots, avoiding users from making complicated configurations. The github address is as follows:

https://github.com/oblique/create\_ap

If you are using the latest image, the create\_ap script has been pre-installed. You

can create a WIFI hotspot through the create\_ap command. The basic command format of create ap is as follows:

create\_ap [options] <wifi-interface> [<interface-with-internet>] [<access-point-name> [<passphrase>]]

\* options: You can use this parameter to specify the encryption method, frequency band of WIFI hotspot, bandwidth mode, network sharing method, etc. You can get the options through create\_ap -h.

\* wifi-interface: The name of the wireless network card

\* interface-with-internet: The name of the network card that can connect to the Internet, usually eth0

\* access-point-name: Hotspot name

\* passphrase: hotspot password

#### 3. 6. 4. 1. create\_ap method to create WIFI hotspot in NAT mode

1) Enter the following command to create a WIFI hotspot with the name **orangepi** and password **orangepi** in NAT mode

Note that in the following command, Debian12 needs to modify eth0 to end1.

orangepi@orangepi:~\$ sudo create\_ap --no-virt -m nat wlan0 eth0 orangepi orangepi

2) If the following information is output, it means that the WIFI hotspot is successfully created.

orangepi@orangepi:~\$ sudo create\_ap --no-virt -m nat wlan0 eth0 orangepi orangepi Config dir: /tmp/create\_ap.wlan0.conf.Ji9Coeqo

PID: 5526

Network Manager found, set wlan0 as unmanaged device... DONE

Sharing Internet using method: nat

hostapd command-line interface: hostapd\_cli -p

/tmp/create ap.wlan0.conf.Ji9Coeqo/hostapd ctrl

wlan0: interface state UNINITIALIZED->ENABLED

wlan0: AP-ENABLED

3) At this time, take out your mobile phone and find the WIFI hotspot named orangepi

created by the development board in the searched WIFI list. Then you can click **orangepi** to connect to the hotspot. The password is **orangepi** set above



4) The display after successful connection is as shown below

<b>〈</b> 设	置 无线局域网	编辑
	无线局域网	
~	orangepi	🔒 🗢 i

5) In NAT mode, the wireless device connected to the development board's hotspot requests an IP address from the development board's DHCP service, so there will be two different network segments. For example, the development board's IP here is 192.168.1.X

```
orangepi@orangepi:~$ ifconfig eth0
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
inet 192.168.1.150 netmask 255.255.255.0 broadcast 192.168.1.255
inet6 fe80::938f:8776:5783:afa2 prefixlen 64 scopeid 0x20<link>
ether 4a:a0:c8:25:42:82 txqueuelen 1000 (Ethernet)
RX packets 25370 bytes 2709590 (2.7 MB)
RX errors 0 dropped 50 overruns 0 frame 0
TX packets 3798 bytes 1519493 (1.5 MB)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
device interrupt 83
```

The DHCP service of the development board will assign the IP address of **192.168.12.0/24** to the device connected to the hotspot by default. At this time, click on the connected WIFI hotspot **orangepi**, and then you can see that the IP address of the mobile phone is **192.168.12.X** 

orange Pi User Manual	Сор	yright reserved by	y Shenzhen X	Kunlong Software Co., Ltd
<	设置	无线局域网	编辑	
	无线局域网	9		
	🗸 orangepi		🕯 🗢 i	
	IPV4地址			
	配置IP		自动 >	
	IP地址	192.1	68.12.249	
	子网掩码	255.	255.255.0	
	路由器	19	2.168.12.1	

6) If you want to specify a different network segment for the connected device, you can specify it through the -g parameter. For example, use the -g parameter to specify the network segment of the access point AP as 192.168.2.1.

Note that in the following command, Debian12 needs to modify eth0 to end1.	
orangepi@orangepi:~ <b>\$ sudo create_apno-virt -m nat wlan0 eth0 orangepi orangepi -g 192.168.2.1</b>	

At this time, after connecting to the hotspot through the mobile phone, click on the connected WIFI hotspot **orangepi**, and then you can see that the IP address of the mobile phone is **192.168.2.X** 



IPV4 地址	
配置IP	自动 >
IP地址	192.168.2.249
子网掩码	255.255.255.0
路由器	192.168.2.1

7) Without specifying the --freq-band parameter, the hotspot created by default is in the 2.4G frequency band. If you want to create a hotspot in the 5G frequency band, you can specify it through the --freq-band 5 parameter. The specific command is as follows

Note that in the following command, Debian12 needs to modify eth0 to end1.

orangepi@orangepi:~\$ sudo create\_ap --no-virt -m nat wlan0 eth0 orangepi orangepi --freq-band 5

8) If you need to hide the SSID, you can specify the **--hidden** parameter. The specific command is as follows

Note that in the following command, Debian12 needs to modify eth0 to end1.

orangepi@orangepi:~\$ sudo create\_ap --no-virt -m nat wlan0 eth0 orangepi orangepi --hidden

At this time, the mobile phone cannot search for WIFI hotspots. You need to manually specify the WIFI hotspot name and enter the password to connect to the WIFI hotspot.



# 3. 6. 4. 2. create\_ap method to create WIFI hotspot in bridge mode

1) Enter the following command to create a WIFI hotspot with the name **orangepi** and password **orangepi** in bridge mode

Note that in the following command, Debian12 needs to modify eth0 to end1.

orangepi@orangepi:~\$ sudo create\_ap --no-virt -m bridge wlan0 eth0 orangepi orangepi

2) If the following information is output, it means that the WIFI hotspot is successfully created.

orangepi@orangepi:~\$ sudo create\_ap --no-virt -m bridge wlan0 eth0 orangepi orangepi [sudo] password for orangepi: Config dir: /tmp/create\_ap.wlan0.conf.hXrfLdof PID: 8372 Network Manager found, set wlan0 as unmanaged device... DONE Sharing Internet using method: bridge Create a bridge interface... br0 created. hostapd command-line interface: hostapd\_cli -p /tmp/create\_ap.wlan0.conf.hXrfLdof/hostapd\_ctrl wlan0: interface state UNINITIALIZED->ENABLED

3) At this time, take out your mobile phone and find the WIFI hotspot named **orangepi** created by the development board in the searched WIFI list. Then you can click **orangepi** to connect to the hotspot. The password is **orangepi** set above.



4) The display after successful connection is as shown below

<b>〈</b> 设置	无线局域网	编辑
Ŧ	记线局域网	
✓ o	rangepi	🔒 🗢 🚺

5) In bridge mode, the wireless device connected to the hotspot of the development board also requests an IP address from the DHCP service of the main router (the router to which the development board is connected). For example, the IP of the development board here is **192.168.1.X** 

orangepi@orangepi:~\$ ifconfig eth0
eth0: flags=4163 <up,broadcast,running,multicast> mtu 1500</up,broadcast,running,multicast>
inet <b>192.168.1.150</b> netmask 255.255.255.0 broadcast 192.168.1.255
inet6 fe80::938f:8776:5783:afa2 prefixlen 64 scopeid 0x20 <link/>
ether 4a:a0:c8:25:42:82 txqueuelen 1000 (Ethernet)
RX packets 25370 bytes 2709590 (2.7 MB)
RX errors 0 dropped 50 overruns 0 frame 0
TX packets 3798 bytes 1519493 (1.5 MB)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
device interrupt 83

The IP of the device connected to the WIFI hotspot is also assigned by the main router, so the mobile phone connected to the WIFI hotspot and the development board are in the same network segment. At this time, click on the connected WIFI hotspot **orangepi**, and then you can see the IP address of the mobile phone. Also **192.168.1.X**.





6) Without specifying the **--freq-band** parameter, the hotspot created by default is in the 2.4G frequency band. If you want to create a hotspot in the 5G frequency band, you can specify it through the **--freq-band 5** parameter. The specific command is as follows

Note that in the following command, Debian12 needs to modify eth0 to end1.

orangepi@orangepi:~\$ sudo create\_ap --no-virt -m bridge wlan0 eth0 orangepi orangepi --freq-band 5

7) If you need to hide the SSID, you can specify the **--hidden** parameter. The specific command is as follows

Note that in the following command, Debian12 needs to modify eth0 to end1.
orangepi@orangepi:~\$ sudo create_apno-virt -m bridge wlan0 eth0 orangepi orangepihidden

At this time, the mobile phone cannot search for WIFI hotspots. You need to manually specify the WIFI hotspot name and enter the password to connect to the WIFI hotspot.

	输入网络信息	
取消	其他网络	加入
名称	orangepi	
安全性	ŧ	WPA >
密码		

## 3.7. SSH remote login development board

Linux systems enable ssh remote login by default and allow root users to log in

to the system. Before ssh login, you first need to ensure that the Ethernet or wifi network is connected, and then use the ip addr command or obtain the IP address of the development board by checking the router.

#### 3. 7. 1. SSH remote login development board under Ubuntu

1) Obtain the IP address of the development board

2) Then you can remotely log in to the Linux system through the ssh command					
test@test:~\$ ssh root@192.168.1.	.xxx (Need to be replaced with the IP address				
of the development board)					
root@192.168.1.xx's password:	(Enter the password here, the default password				
	is orangepi)				

Note that when entering the password, the specific content of the entered password will not be displayed on the screen, please do not think that there is any fault, just press Enter after inputting.

If you are prompted to refuse the connection, as long as you are using the image provided by Orange Pi, please do not suspect that the password orangepi is wrong, but find other reasons

3) After successfully logging into the system, the display is as shown below



If ssh fails to log in to the Linux system normally, first check whether the IP address of the development board can be pinged. If there is no problem with the ping, you can log in to the Linux system through the serial port or HDMI display, and then enter the following command on the development board and try again. Is it

#### possible to connect:

root@orangepi:~# reset\_ssh.sh

If it still doesn't work, please try again by resetting the system.

#### 3. 7. 2. SSH remote login development board under Windows

1) First obtain the IP address of the development board

2) Under Windows, you can use MobaXterm to remotely log in to the development board, first create a new ssh session

- a. Open Session
- b. Then select **SSH** in **Session Setting**
- c. Then enter the IP address of the development board in the **Remote host**
- d. Then enter the username root or orangepi of the Linux system in Specify username
- e. Finally click **OK**

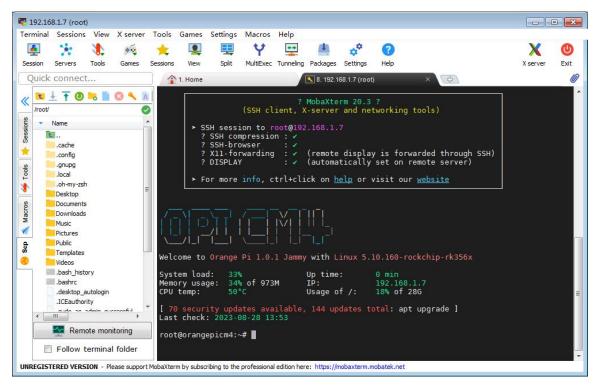
Terminal Sessions View Xisener Tools Games Settings Macros Help 🚳 🎌 🐮 🕫 🗶 🗒 👹 🌱 🕎 🛔 🔗	X a
Server and Server Server Server Server Server Franka Hullbert Unrehe Andages Settings Held	X server Ex
Quek contest / 🖉 🔞	
C December 2. Select serial port SSH	1
1. Choose Session	
SSH Talmet Ruh Xidmop RDP VNC FTP Sirtial File Shell Browser Mosh Aws SJ WSL	
Start Televit Ruh Xidnop RCP V/IC FTP SFTP Serial File Shell Deviser Mush AverS3 WSL	
Remote host * 192 16& 1.36	
🖼 Advanced SSH settings 🗰 Terminal settings 🌟 Network settings 😁 Belgemark settings	
3. Enter the IP address of the development board 4. Enter the username of the Linux system, Orangepi or root	
Secure Shell (SSH) session	
5. Finally click OK	
© OK © Cancel	

3) Then you will be prompted to enter a password. The default passwords for root and orangepi users are orangepi

Note that when entering a password, the specific content of the entered password will not be displayed on the screen. Please do not think that there is something wrong. Just press Enter after entering it.

Ŏ	range	Pi U	ser M	anua	1		Copy	yright	reserv	ved by	Shenzhen Xunlong Software Co.,	Ltd
<b>W</b> 192.1	68.31.1 <mark>1</mark> (re	oot)										
Terminal	Sessions	View	X server	Tools	Games	Settings	Macros	Help				
	1.0	1		*			Y	**		**	2	
Session	Servers	Tools	Games	Sessions	View	Split	MultiExec	Tunneling	Packages	Settings	Help	
Quick of	connect.				8	. 192.168.31	.11 (root)		×	2		
	User session	ns		1 🙀	root@19	2.168.3	1.11's p	assword	1: 🔳 🥿			
× _	192.16	58.31.11	(root)									
1										N		
×								Enter	nassw	ord her	e: orangepi	
1												

4) After successfully logging into the system, the display is as shown below



- 3.8. Method of uploading files to the development board Linux system
- 3. 8. 1. How to upload files from Ubuntu PC to development board Linux system

#### 3. 8. 1. 1. How to upload files using scp command

1) Use the scp command to upload files from the Ubuntu PC to the Linux system of the

development board. The specific commands are as follows

- a. **file\_path:** Need to be replaced with the path of the file to be uploaded
- b. **orangepi:** This is the username of the Linux system of the development board. It can also be replaced with another one, such as root.
- c. **192.168.xx.xx:** It is the IP address of the development board, please modify it according to the actual situation
- d. /home/orangepi: The path in the Linux system of the development board can also be modified to other paths

test@test:~\$ scp file\_path orangepi@192.168.xx.xx:/home/orangepi/

2) If you want to upload a folder, you need to add the -r parameter

test@test:~\$ scp -r dir path orangepi@192.168.xx.xx:/home/orangepi/

3) There are more usages of scp, please use the following command to view the man manual

test@test:~\$ man scp

#### 3. 8. 1. 2. How to upload files using filezilla

1) First install filezilla in Ubuntu PC test@test:~**\$ sudo apt install -y filezilla** 

2) Then use the following command to open filezilla

test@test:~\$ filezilla

3) The interface after opening filezilla is as shown below. At this time, the remote site on the right is empty.

# orange Pi User Manual

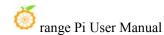
#### Copyright reserved by Shenzhen Xunlong Software Co., Ltd

文件(F) 编辑(E) 查看(V) 作	专输(T) 服务器(S) -			Zilla	
	· · · · · · · · · · · · · · · · · · ·	书签(B) 帮助(H)			
	# O 119 6	) 🗼 🤳 🔳 🕺	o 🔥		
Е机(н):	用户名(U):	密码(w):	端口	I(P): 快速连接(Q) ▼	
本地站点:			~	远程站点:	
> bin > boot cdrom					
	牛大小 文件类型	最近修改			
lib32	日录	2022年11月06…			
lib64	目录	2022年08月09…			
libx32	目录	2022年11月06…			
lost+found	目录	2022年11月05…		文件名 个 文件大小 文件类型 最近修改 权限	所有者/组
media	目录	2022年12月03…			
mnt	目录	2022年08月09…		没有连接到任何服务器	
opt	目录	2022年11月06…		汉有足过到江西加以为福	
ргос	目录	2022年12月03…			
root	目录	2022年12月03…			
run	目录	2022年12月03…			
 个文件 和 26 个日录。大小总·	计: 2.2 GB			未连接。	
最多器/本地文件 方	向 远程文件	大小 优先	级状态		

#### 4) The method of connecting the development board is as shown in the figure below

3.Password: orangepi 5.Click Quick Connect	- • ×
文件(F) 编辑(E) 查看(V) 传输(T) 服务器(S) 书签(B) 帮助(H)	
主机(H): 192.168.1.100 用户名(U): root 密码(W): 端口(P): 22 快速连接(Q) -	
1.IP address 2.Username 4.Port number 22	

5) Then choose to save the password, and then click OK



	记住密码?	×
您想让 FileZilla 记住密码	吗?	
如果允许 FileZilla 记住密	码,重启 FileZilla 后重新连接无	需再次输入密码。
● 保存密码(E)		
○ 不要保存密码(O)		
〇保存主密码保护的密码	马(V)	
主密码(M):		
再次输入密码(R):		
主密码一旦丢失无法恢	恢复!请牢记您的密码。	
	取消	确定(O)

6) Then select Always trust this host and click OK

	未定义的快捷键		×
D	该服务器的主机密匙是未知的。不能保证该服务器 认定的那台计算机。 详细资料 主机: 主机密匙算法: 指纹:	就是您所	
	信任该主机并继续连接?	取消	确定

7) After the connection is successful, you can see the directory structure of the development board's Linux file system on the right side of the filezilla software.

		sftp://roo	ot@192.10	68.31.11 - FileZill	a			-	
文件(F) 编辑(E) 查看(\	V) 传输(T) 服务器(S) =	书签(B) 帮助(H)							
	<b>- # 0</b> ik 0	) 🗼 🖫 🖉 🦉	o 🔥						
主机(H): tp://192.168.31	1.11 用户名(U): root	密码(W): ••••••	端口	](P):	快速连接(Q) ▼				
态: Connected to 192 态: 读取目录列表 态: Listing directory / 态: 列出"/root"的目录	/root								
×地站点: /			~	远程站点: /roo	t				
	→ ( + 小 → ( * 元 * 元 * 元 * 元 * 元 * 元 * 元 * 元 * 元 *	是沂修改	140	~ 🤨 / > 🔤 root					
 文件名 <b>^</b>	文件大小 文件类型 目录 目录	最近修改 2022年11月06 2022年08月09							
(件名 へ lib32 lib64 libx32	目录 目录 目录	2022年11月06… 2022年08月09… 2022年11月06…		> <mark> </mark>	文件大小 文	件类型 最近修改	权限	所有主	÷/48
件名 へ lib32 lib64 libx32 lost+found	目录 目录 目录 目录	2022年11月06… 2022年08月09… 2022年11月06… 2022年11月05…		→ ■root 文件名 ^	文件大小 文	件类型 最近修改	权限	所有者	行组
件名 へ lib52 lib64 libx32 lost+found media	目录 目录 目录 目录 目录 目录	2022年11月06… 2022年08月09… 2022年11月06… 2022年11月05… 2022年11月05… 2022年12月03…		→ ■ root 文件名 ▲					
t件名 へ lib32 lib64 libx32 lost+found media mnt	目录 目录 目录 目录 目录 目录 目录 目录	2022年11月06… 2022年08月09… 2022年11月06… 2022年11月05… 2022年11月05… 2022年12月03… 2022年08月09…		> ■ root 文件名 へcache	目:	录 2022年12月…	drwx	rootro	oot
(件名 へ Lib32 Lib54 Libx32 Lost+found mmt opt	目录 目录 目录录 日录 录 录 录 目录 录 目录 录 目录 目录 目录 目录 目录 目录 目录 目	2022年11月06… 2022年08月09… 2022年11月06… 2022年11月05… 2022年12月03… 2022年00月09… 2022年11月06…		文件名 ▲ </td <td>日 日 月 月</td> <td>录 2022年12月… 录 2022年12月…</td> <td>drwx drwxr-xr-x</td> <td>root ro</td> <td>oot</td>	日 日 月 月	录 2022年12月… 录 2022年12月…	drwx drwxr-xr-x	root ro	oot
件名 へ lib32 lib64 libx32 lost+found media mnt opt proc	目 录 录 录 录 录 录 录 录 录 录 录 录 录 录 录 录 录 录 录	2022年11月06… 2022年08月09… 2022年11月06… 2022年12月03… 2022年12月03… 2022年11月06… 2022年11月06… 2022年11月06…		文件名 ▲ ○ ○.cache ○.config ○.oh-my-zsh	目 5 日 5	录 2022年12月… 录 2022年12月… 录 2022年12月… 录 2022年12月…	drwx drwxr-xr-x drwxr-xr-x	root ro root ro root ro	oot oot
2件名 へ lib32 lib64 lib63 lost+found media mnt opt proc root		2022年11月06… 2022年08月09… 2022年11月06… 2022年11月05… 2022年12月03… 2022年08月09… 2022年11月06… 2022年11月06… 2022年12月03…		文件名 ▲  .cache .config .oh-my-zsh .pip	目 3 目 5 目 5	录 2022年12月··· 录 2022年12月··· 录 2022年12月··· 录 2022年12月··· 录 2022年12月···	drwx drwxr-xr-x drwxr-xr-x drwxr-xr-x	root ro root ro root ro root ro	oot oot oot
文件名 へ ib32 lib64 libx32 lost+found media mnt opt proc root run	目目目目目目目目目目目目目目目目目目目目目目目目目目目目目目目目目目目目目目目	2022年11月06… 2022年08月09… 2022年11月06… 2022年12月03… 2022年12月03… 2022年08月09… 2022年11月06… 2022年12月03… 2022年12月03… 2022年12月03…		<ul> <li>文件名 へ</li> <li></li> <li>.cache</li> <li>.conFig</li> <li>.oh-my-zsh</li> <li>.pip</li> <li>.Xauthority</li> </ul>	目 日 日 55 B 文(	录 2022年12月··· 录 2022年12月··· 录 2022年12月··· 录 2022年12月··· 录 2022年12月··· 件 2022年12月···	drwx drwxr-xr-x drwxr-xr-x drwxr-xr-x	root ro root ro root ro root ro root ro	oot oot oot oot
libx32 lost+found media mnt	目目目目目目目目目目目目目目目目目目目目目目目目目目目目目目目目目目目目	2022年11月06… 2022年08月09… 2022年11月06… 2022年11月05… 2022年12月03… 2022年08月09… 2022年11月06… 2022年11月06… 2022年12月03…		<ul> <li>文件名 へ</li> <li></li> <li>.conFig</li> <li>.oh-my-zsh</li> <li>.pip</li> <li>.Xauthority</li> <li>.bash history</li> </ul>	目 日 日 55 B 文(	录 2022年12月··· 录 2022年12月··· 录 2022年12月··· 录 2022年12月··· 录 2022年12月··· 牛 2022年12月··· 牛 2022年12月···	drwx drwxr-xr-x drwxr-xr-x drwxr-xr-x	root ro root ro root ro root ro	oot oot oot oot

8) Then select the path to be uploaded to the development board on the right side of the

filezilla software, select the file to be uploaded in Ubuntu PC on the left side of the filezilla software, right-click the mouse, and click the upload option to start uploading the file to the development board.

		sftp://root@	192.1	68.31.11 - FileZilla	1		- • ×
文件(F) 编辑(E) 查看(V) 传输	俞(T) 服务器(S) 书签(B) ₹	帮助(H)					
	C 18 O 🗽	) T Q 🧕	*				
主机(H): tp://192.168.31.11 月	用户名(U): root 密	码(w): ••••••	端口	](P):	央速连接(Q) ▼		
状态:列出"/home"的目录成功 状态:读取"/home/orangepi"的 状态:Listing directory /home/o 状态:列出"/home/orangepi"的	orangepi						
本地站点: /home/test/Downloa	ds/test/		~	远程站点: /home	/orangepi		~
<ul> <li>test</li> <li>Music</li> <li>Pictures</li> <li>Public</li> <li>Templates</li> <li>Videos</li> <li>VirtualBox VMs</li> <li>bin</li> </ul>	-			2 boot 2 dev 2 etc 2 etc 2 etc 2 etc 2 .cac 2 .cac 2 .cac	he namon		
	小 文件类型 最近修	8改		文件名 ^	文件大小 文件类型	最近修改 权限	所有者/组
nomachine_8.2.3_3	上传(U) 本 本 本 本 本 本 本 本 本 本 本 本 本 本 本 本 本 本 本	12月03… 】		.bashrc .profile .viminfo .xscreensaver .xsession-error	3.6 KB 文件 807 B 文件 3.5 KB 文件 20 B 文件 5 7.6 KB 文件	2022年12月···· -rw-rr 2022年12月···· -rw-rr 2022年12月···· -rw 2022年12月···· -rw-rw 2022年12月···· -rw	orangepi orangepi orangepi orangepi orangepi
	打开( <u>O</u> ) 编辑( <u>E</u> )			.xsession-error	s 7.7 KB old-文件 4.0 KB 文件	2022年12月 ··· ·rw 2022年12月··· ·rw-rw-r	orangepi
选择了1个文件。大小总共:0B 服务器/本地文件 方(	创建目录( <u>C</u> ) 创建目录并进入( <u>Y</u> ) 刷新( <u>F</u> )	大小 优先级	状态	13个文件和16个	日录。大小总计: 6.2 GB		
	删除( <u>D</u> ) 重命名( <u>R</u> )						
<b>列队的文件</b> 传输失败 成功的	传输						••//

9) After the upload is complete, you can go to the corresponding path in the Linux system of the development board to view the uploaded files

10) The method of uploading a folder is the same as the method of uploading a file, so I won't go into details here.

# 3. 8. 2. The method of uploading files to the Linux system of the development board in Windows PC

#### 3. 8. 2. 1. How to upload files using filezilla

1) First download the installation file of the Windows version of the filezilla software. The download link is as follows

https://filezilla-project.org/download.php?type=client

FileZilla The free FTP solution



Standard FIP	Yes	Yes	Yes	Yes
FTP over TLS	Yes	Yes	Yes	Yes
SFTP	Yes	Yes	Yes	Yes
Comprehensive PDF manual	-	Yes	Yes	Yes
Amazon S3	-	-	Yes	Yes
Backblaze B2	-	-	Yes	Yes
Dropbox	-	-	Yes	Yes
Microsoft OneDrive	-	-	Yes	Yes
Google Drive	-	-	Yes	Yes
Google Cloud Storage	-	-	Yes	Yes
Microsoft Azure Blob + File Storage	-	-	Yes	Yes
WebDAV	-	-	Yes	Yes
OpenStack Swift	-	-	Yes	Yes
Box	-	-	Yes	Yes
Site Manager synchronization	-	-	Yes	Yes
Command-line interface	-	-	-	Yes
Batch transfers	-	-	-	Yes
	Download	Select	Select	Select

2) The downloaded installation package is as shown below, then double-click to install it directly

FileZilla Server 1.5.1 win64-setup.exe

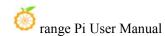
During the installation process, please select **Decline** on the following installation interface, and then select <**Next>** 



3) The interface after opening filezilla is as shown below. At this time, the remote site on the right is empty.

↓ <b>除了了## Ø</b> ((H): 用#	110 W X -2 =								
l(H): 用户	-		-						
	*名(U):	密码(W):	鎊口(P):	快速连接(Q) *	•				
									_
线点: C:\Users\test			~	远程站点					-
重直			^	Constant of Control of					7
一個 文档			- 11						
🖻 🔜 此电脑			- 8						
🛱 🏪 C:									
			*					1.000	
*	文件大小 文件类型	最近惨改	^	文件名	文件大小 文件类型	最近修改	权限	所有者/	8
	文件夹	2022/12/3 20:06:							
	文件夹	2022/11/6 0:23:28	- 10		没有连接到	千可國名號			
10.00	文件夹	2022/11/19 1:30:			(XH/E)(2)	11930039988			
	文件夹	2022/12/3 15:40:							
	文件夹	2022/12/3 19:41:							
	文件夹	2022/12/3 20:05:							
	文件夹	2022/11/6 0:23:28							
	文件夹	2022/11/6 0:23:28							
	文件夹	2022/12/3 20:06:							
	文件夹	2022/11/6 0:23:28							
	文件夹	2022/12/3 19:41:							
	文件夹	2019/12/7 17:14:							
and the second se	文件夹	2022/11/6 0:25:57							
				+ 14 10					
· · · · · · · · · · · · · · · · · · ·	-								
<sup>、</sup> 文件 和 27 个目录。大小总计:	-			未连接。					
	-	大小 优先	级 状态	木进步。					Ī

4) The method of connecting the development board is shown in the figure below:



	FileZilla 3.Password: orangepi	5.Click Quick Connect	- • ×
文件(F) 编辑(E) 查看(V) 传输(T) 服务器(S) =	签(B) 帮助(H)	(	
# • <b>• • • • •</b> • • •	🕵 🤹 🎟 😣 🤗 💩		
E机(H): 192.168.1.100 用户名(U): root	密码(W): 端口(P): 22	快速连接(Q) ▼	
1.IP address			
2.Userna	4.Port	number 22	

5) Then choose to save the password, and then click OK

	×
leZilla <mark>后重新连接无</mark> 器	需再次输入密码。
已您的密码。	
	leZilla 后重新连接无 已您的密码。

6) Then select Always trust this host and click OK

HAR ATTO STORE A	
详细资料	
主机:	192.168.31.11:22
主机密匙算	法:ssh-ed25519 255
指纹:	SHA256:cHNLFRmncAMrQoietFlAyEfdRQcewhWpgodyPs

7) After the connection is successful, you can see the directory structure of the development board's Linux file system on the right side of the filezilla software.

主机(H): sftp://192.168.31	用户名(U): root	密码(W): •••••	](P):	快速连接(Q) *						
大态: Connected to 192.1	58.31.11			Provide and the second second second						-
大杰: 读取目录列表										
える: Listing directory /ro	ot									
状态:列出"/root"的目录成	b									
本地站点: C:\			~	远程站点: /root						
B 😓 C:			^	B-?/						
Binney (a)	101			i root						
	the second s									
	and the second se									
	100 Mar									
				The directory stru	cture of t	the Linux	file system o	f the deve	elopment bo	ard
2件名	文件大小 文件类型	最近修改	-							
X1+0	X1+ A/11 X1+9414									_
and the second se	and the owner of the owner owne	2022/12/3 18:57:		文件名	文件大小	文件类型	最近惨改	权限	所有者/祖	
		2022/12/3 18:57:		文件名 ^	文件大小	文件类型	最近惨改	权限	所有者/祖	
-	100	2022/12/3 18:57:	- 1		文件大小	文件类型	最近惨改 2022/12/3 16		所有者/组 root root	
	<b>文</b> 任李	2022/12/3 18:57: 2022/12/3 18:57:	- 1		文件大小	文件夹	2022/12/3 16	drwx		
	文件夹	2022/12/3 18:57: 2022/12/3 18:57: 2022/11/11 1:48:			文件大小			drwx drwxr-xr-x	root root	
-	文件夹 文件夹	2022/12/3 18:57: 2022/12/3 18:57: 2022/11/11 1:48: 2022/12/3 18:55:		 .cache .config .oh-my-zsh	文件大小	文件夹 文件夾 文件夹	2022/12/3 16 2022/12/3 4: 2022/12/3 5:	drwx drwxr-xr-x drwxr-xr-x	root root root root	
	文件夹 文件夹 文件夹	2022/12/3 18:57: 2022/12/3 18:57: 2022/11/11 1:48: 2022/12/3 18:55: 2022/12/3 0:17:04		 .cache .config .oh-my-zsh .pip		文件夹 文件夾 文件夹 文件夹	2022/12/3 16 2022/12/3 <b>4</b> :	drwx drwxr-xr-x drwxr-xr-x drwxr-xr-x	root root root root root root	
	文件夹 文件夹 文件夹 文件夹	2022/12/3 18:57: 2022/12/3 18:57: 2022/11/11 148: 2022/12/3 18:55: 2022/12/3 0:17:04 2022/11/13 0:14:		- .config .oh-my-zsh .pip .bash_history	793	文件夹 文件夾 文件夹 DASH_HIS	2022/12/3 16 2022/12/3 4: 2022/12/3 5: 2022/12/3 16 2022/12/3 18	drwx drwxr-xr-x drwxr-xr-x -rw	root root root root root root root root root root	
	文件夹 文件夹 文件夹 文件夹 文件夹	2022/12/3 18:57: 2022/12/3 18:57: 2022/11/11 1:48: 2022/12/3 18:55: 2022/12/3 0:17:04 2022/11/13 0:14: 2022/12/3 19:57:			793 3,523	文件类 文件夹 文件夹 BASH_HIS BASHRC	2022/12/3 16 2022/12/3 4: 2022/12/3 5: 2022/12/3 16 2022/12/3 18 2022/12/3 4:	drwx drwxr-xr-x drwxr-xr-x drwxr-xr-x -rw	root root root root root root root root root root root root	
	文件夹 文件夹 文件夹 文件夹	2022/12/3 18:57: 2022/12/3 18:57: 2022/11/11 148: 2022/12/3 18:55: 2022/12/3 0:17:04 2022/11/13 0:14:		- .config .oh-my-zsh .pip .bash_history	793 3,523 0	文件夹 文件夾 文件夹 BASH_HIS BASHRC DESKTOP	2022/12/3 16 2022/12/3 4: 2022/12/3 5: 2022/12/3 16 2022/12/3 18	drwx drwxr-xr-x drwxr-xr-x drwxr-xr-x -rw-r -rw-r -rw-rw-r	root root root root root root root root root root	
	文件类 文件类 文件类 文件夹 文件夹 文件夹 文件夹	2022/12/3 18:57 2022/12/3 18:57 2022/11/1 1:48 2022/12/3 18:55 2022/12/3 18:55 2022/12/3 0:17:04 2022/12/3 19:57 2022/11/26 19:2			793 3,523 0 1,375	文件夹 文件夹 文件夹 BASH_HIS BASHRC DESKTOP VIMINFO	2022/12/3 16 2022/12/3 4 2022/12/3 5 2022/12/3 16 2022/12/3 18 2022/12/3 4 2022/12/3 4	drwx drwxr-xr-x drwxr-xr-x drwxr-xr-x -rw-rw- -rw-rw-r -rw-rw-r -rw-rw-r	root root root root root root root root root root root root root root	
	文件来 文件来 文件来 文件来 文件来 文件来 文件来 文件来	2022/12/3 18:57t 2022/12/3 18:57t 2022/11/1 14:8t 2022/12/3 18:55t 2022/12/3 18:55t 2022/12/3 19:57t 2022/12/3 19:57t 2022/12/3 19:52t 2022/12/3 20:06t		" " cache config oh-my-zsh pip bash history desktop_autologin viminfo	793 3,523 0 1,375 169	文件夹 文件夹 文件夹 BASH_HIS BASHRC DESKTOP VIMINFO WGET-HS	2022/12/3 16 2022/12/3 4 2022/12/3 5 2022/12/3 16 2022/12/3 18 2022/12/3 4 2022/12/3 4 2022/12/3 17	drwx drwxr-xr-x drwxr-xr-x drwxr-xr-x -rw-rw- -rw-rw-r -rw-rw-r -rw-rw-r	reat root root root root root root root root root root root root root	
	文件 <del>英</del> 文件 <del>英</del> 文件 <del>英</del> 文件 <del>英</del> 文件 <del>英</del> 文件 <del>英</del> 文件 <del>英</del> 文件 <del>英</del> 文件 <del>英</del>	2022/12/3 18:57 2022/12/3 18:57 2022/12/3 18:55 2022/12/3 18:55 2022/12/3 18:55 2022/12/3 19:57 2022/11/3 0:14 2022/12/3 19:57 2022/12/3 19:57 2022/12/3 19:57 2022/12/3 19:57			793 3,523 0 1,375 169 55	文件夹 文件夹 文件夹 ASH_HIS BASH_C DESKTOP VIMINFO WGET-HS XAUTHOR	2022/12/3 16 2022/12/3 4 2022/12/3 5 2022/12/3 16 2022/12/3 18 2022/12/3 4 2022/12/3 4 2022/12/3 16	drwx drwxr-xr-x drwxr-xr-x -rwrw -rw-rw-r -rw-rw-r -rw -rw	root root root root root root root root root root root root root root root root root root	
	文件类 文件类 文件类 文件学类 文件学类 文件学类 文件类 文件类 文件类 文件类	2022/12/3 18:57 2022/12/3 18:57 2022/12/1 18:55 2022/12/3 18:55 2022/12/3 01:704 2022/12/3 01:704 2022/11/3 01:42 2022/12/3 20:706 2019/12/7 17:142 2022/12/3 18:55			793 3,523 0 1,375 169 55	文件夹 文件夹 文件夹 ASH_HIS BASH_C DESKTOP VIMINFO WGET-HS XAUTHOR	2022/12/3 16 2022/12/3 4 2022/12/3 5 2022/12/3 16 2022/12/3 18 2022/12/3 4 2022/12/3 4 2022/12/3 17 2022/12/3 16 2022/12/3 18	drwx drwxr-xr-x drwxr-xr-x -rwrw -rw-rw-r -rw-rw-r -rw -rw	root root root root root root root root root root root root root root root root root root root root	
· · · · · · · · · · · · · · · · · · ·	文件典 文件典 文件典 文件科典 文件科典 文件中典 文件中典 文件中典 文件中典 文件中典 文件中典	2022/12/3 18-57 2022/12/3 18-57 2022/11/1 148 2022/12/3 18-55 2022/12/3 18-55 2022/12/3 01704 2022/12/3 19-57 2022/12/3 19-57 2022/12/3 19-57 2022/12/3 19-55 2022/12/3 18-55			793 3,523 0 1,375 169 55 3,979	文件夹 文件夹 文件夹 BASH_HIS BASHRC DESKTOP VIMINFO WGET-HS XAUTHOR ZSHRC 文件	2022/12/3 16 2022/12/3 4 2022/12/3 5 2022/12/3 16 2022/12/3 18 2022/12/3 4 2022/12/3 4 2022/12/3 17 2022/12/3 16 2022/12/3 18	drwx drwxr-xr-x drwxr-xr-x -rwrw -rw-rw-r -rw-rw-r -rw -rw	root root root root root root root root root root root root root root root root root root root root	
) 小文中和11 个社委、大公 展著体态文件	文件典 文件典 文件典 文件科典 文件科典 文件中典 文件中典 文件中典 文件中典 文件中典 文件中典	2022/12/3 18-57 2022/12/3 18-57 2022/11/1 148 2022/12/3 18-55 2022/12/3 18-55 2022/12/3 01704 2022/12/3 19-57 2022/12/3 19-57 2022/12/3 19-57 2022/12/3 19-55 2022/12/3 18-55	v Xo	- cache cache config .ch-my-zah epip bash history Jash history Jash history .desktop,autologin .wimirfo .wimirfo Jaubrity zache	793 3,523 0 1,375 169 55 3,979	文件夹 文件夹 文件夹 BASH_HIS BASHRC DESKTOP VIMINFO WGET-HS XAUTHOR ZSHRC 文件	2022/12/3 16 2022/12/3 4 2022/12/3 5 2022/12/3 16 2022/12/3 18 2022/12/3 4 2022/12/3 4 2022/12/3 17 2022/12/3 16 2022/12/3 18	drwx drwxr-xr-x drwxr-xr-x -rwrw -rw-rw-r -rw-rw-r -rw -rw	root root root root root root root root root root root root root root root root root root root root	

8) Then select the path to be uploaded to the development board on the right side of the filezilla software, select the file to be uploaded on the Windows PC on the left side of the filezilla software, right-click the mouse, and then click the upload option to start uploading the file to the development board.

초: Connected to 192.168			端口(P):	快速连接(Q) ▼							
	.31.11			to and the second se							-
5: 读取目录列表											
5: Listing directory /root											
态:列出"/root"的目录成功											
地站点: C:\			~	远程站点: /root							_
			~								
			^	i root							
1 IIIIIII				B. NOOL							
The second se	and a second sec										
				1							
<u> </u>				- 	<del>*//++</del> -/>	六世業期	思いに終われ	10788	<u>彩白来</u> //0		-
<b>₽</b>				文件名	文件大小	文件类型	最近修改	权限	所有者/组		
		用) C Mary			文件大小				所有者/组		
	文件大小 文件美型	最近修改	~		文件大小	文件类型 文件夹	2022/12/3 16	drwx	所有者/组 root root	l	
	文件夹	2022/11/11 1:48:			文件大小	文件夹 文件夹	2022/12/3 16 2022/12/3 4:	drwx drwxr-xr-x			
件名	<u>文件</u> 夹 文件夹	2022/11/11 1:48: 2022/12/3 18:55:			文件大小	文件夹 文件夹 文件夹	2022/12/3 16 2022/12/3 4: 2022/12/3 5:	drwx drwxr-xr-x drwxr-xr-x	root root		
件名 ▲ ★ 上传(U)	文件夹           文件夹           文件夹           文件夹	2022/11/11 1:48: 2022/12/3 18:55: 2022/12/3 0:17:04			文件大小	文件夹 文件夹	2022/12/3 16 2022/12/3 4:	drwx drwxr-xr-x drwxr-xr-x	root root root root		
(件名	文件夹           文件夹           文件夹           文件夹           文件夹           文件夹	2022/11/11 1:48: 2022/12/3 18:55:				文件夹 文件夹 文件夹	2022/12/3 16 2022/12/3 4: 2022/12/3 5: 2022/12/3 16	drwx drwxr-xr-x drwxr-xr-x drwxr-xr-x	root root root root root root		
<ul> <li>(件名</li> <li>▲ 上传(U)</li> <li>▲ 法师文件到队列(A)</li> <li>进入目录(N)</li> <li>打开(O)</li> </ul>	文件夹           文件夹           文件夹           文件夹	2022/11/11 1:48: 2022/12/3 18:55: 2022/12/3 0:17:04			793	文件夹 文件夾 文件夹 文件夾	2022/12/3 16 2022/12/3 4: 2022/12/3 5: 2022/12/3 16 2022/12/3 18	drwx drwxr-xr-x drwxr-xr-x drwxr-xr-x -rw	root root root root root root root root		
<ul> <li>注传(U)</li> <li>注传(U)</li> <li>添加文件到队列(A)</li> <li>进入目录(N)</li> </ul>	文件夹           文件夹           文件夹           文件夹           文件夹           文件夹	2022/11/11 1:48 2022/12/3 18:55 2022/12/3 0:17:04 2022/11/13 0:14:			793 3,523	文件夹 文件夹 文件夹 文件夹 BASH_HIS	2022/12/3 16 2022/12/3 4: 2022/12/3 5: 2022/12/3 16 2022/12/3 18 2022/12/3 4:	drwx drwxr-xr-x drwxr-xr-x drwxr-xr-x -rw	root root root root root root root root root root		
<ul> <li>由</li> <li>(†名</li> <li>上传(U)</li> <li>添加文件到队列(A)</li> <li>进入目录(N)</li> <li>打开(O)</li> <li>编辑(C)</li> </ul>	文件类           文件类           文件类           文件类           文件类           文件类           文件类	2022/11/11 1:48: 2022/12/3 18:55: 2022/12/3 0:17:04 2022/11/13 0:14: 2022/12/3 19:57:			793 3,523 0	文件夹 文件夹 文件夹 BASH_HIS BASHRC DESKTOP	2022/12/3 16 2022/12/3 4 2022/12/3 5 2022/12/3 16 2022/12/3 18 2022/12/3 4 2022/12/3 4	drwx drwxr-xr-x drwxr-xr-x drwxr-xr-x -nw-r -nw-r	root root root root root root root root root root root root root root		
<ul> <li>(+名)</li> <li>↓ 上传(U)</li> <li>↓ 添加文件到队列(A)</li> <li>进入目录(N)</li> <li>打开(O)</li> <li>编纸(C)</li> <li>約建目录(C)</li> </ul>	文件表           文件类	2022/11/11 1:48: 2022/12/3 18:55: 2022/12/3 0:17:04 2022/11/13 0:14: 2022/12/3 19:57: 2022/11/26 19:2			793 3,523 0 1,375	文件夹 文件夹 文件夹 BASH_HIS BASHRC DESKTOP VIMINFO	2022/12/3 16 2022/12/3 4 2022/12/3 5 2022/12/3 16 2022/12/3 18 2022/12/3 4 2022/12/3 4 2022/12/3 17	drwxr-xr-x drwxr-xr-x drwxr-xr-x drwxr-xr-x -rw-r-x- -rw-r -rw-rw-r -rw-rw-r	root root root root root root root root root root root root root root root root		
	文件共	2022/11/11 1:48 2022/12/3 18:55 2022/12/3 0:17:04 2022/11/13 0:14 2022/11/26 19:57 2022/12/3 20:06 2019/12/7 17:14			793 3,523 0 1,375 169	文件夹 文件夹 文件夹 BASH_HIS BASHRC DESKTOP VIMINFO WGET-HS	2022/12/3 16 2022/12/3 4 2022/12/3 5 2022/12/3 16 2022/12/3 18 2022/12/3 4 2022/12/3 4 2022/12/3 17 2022/12/3 16	drwxr-xr-x drwxr-xr-x drwxr-xr-x drwxr-xr-x -rw-r-x -rw-r -rw-rw-r -rw-r	root root root root root root root root root root root root root root root root root root		
<ul> <li>(件名</li> <li>         上传(U)         添加文件到队列(A)         进入目录(N)         打开(O)         鋼蛋(C)     </li> </ul>	文件共	2022/11/11 1:48 2022/12/3 18:55 2022/12/3 0:17:04 2022/11/3 0:14 2022/12/3 19:57 2022/12/3 19:57 2022/12/3 20:06 2019/12/7 17:14 2022/12/3 18:55		 .config .config .bsh history .bshrc .desktop_autologin .wimino .wet-hsts .Xauthority	793 3,523 0 1,375 169 55	文件夹 文件夹 文件夹 BASH_HIS BASHRC DESKTOP VIMINFO WGET-HS XAUTHOR	2022/12/3 16 2022/12/3 4 2022/12/3 5 2022/12/3 16 2022/12/3 18 2022/12/3 4 2022/12/3 4 2022/12/3 17 2022/12/3 16 2022/12/3 18	drwx drwxr-xr-x drwxr-xr-x -rw-r-x -rw-rw-r -rw-rw-r -rw-rw-r -rw-rw-r	root root root root root root root root root root root root root root root root root root root root		
(+名 ▲ 上作(0) ▲ 上作(0) 単入目表(N) ガ研(0) 場照(E) ・ ・ ・ ・ ・ ・ ・ ・ ・ ・ ・ ・ ・	文件共	2022/11/11 148 2022/12/3 18:55 2022/12/3 0:17:04 2022/11/13 0:14 2022/12/3 19:57 2022/12/3 19:57 2022/12/3 20:06 2019/12/7 17:14 2022/12/3 18:55 2022/11/10 10:3			793 3,523 0 1,375 169 55	文件夹 文件夹 文件夹 BASH_HIS BASHRC DESKTOP VIMINFO WGET-HS XAUTHOR	2022/12/3 16 2022/12/3 4 2022/12/3 5 2022/12/3 16 2022/12/3 18 2022/12/3 4 2022/12/3 4 2022/12/3 17 2022/12/3 16	drwx drwxr-xr-x drwxr-xr-x -rw-r-x -rw-rw-r -rw-rw-r -rw-rw-r -rw-rw-r	root root root root root root root root root root root root root root root root root root		
(件名 ) ) ) ) ) ) ) ) ) ) ) ) )	文件共	2022/11/11 1:48 2022/12/3 18:55 2022/12/3 0:17:04 2022/11/3 0:14 2022/12/3 19:57 2022/12/3 19:57 2022/12/3 20:06 2019/12/7 17:14 2022/12/3 18:55		 .config .config .bsh history .bshrc .desktop_autologin .wimino .wet-hsts .Xauthority	793 3,523 0 1,375 169 55	文件夹 文件夹 文件夹 BASH_HIS BASHRC DESKTOP VIMINFO WGET-HS XAUTHOR	2022/12/3 16 2022/12/3 4 2022/12/3 5 2022/12/3 16 2022/12/3 18 2022/12/3 4 2022/12/3 4 2022/12/3 17 2022/12/3 16 2022/12/3 18	drwx drwxr-xr-x drwxr-xr-x -rw-r-x -rw-rw-r -rw-rw-r -rw-rw-r -rw-rw-r	root root root root root root root root root root root root root root root root root root root root		
(牛名 ▲ 上作(0) 注(N) 注(N) 打开(O) 場場(E) 約建日表(C) 約建目表(C) 約建目表(C) 約建目表(C) 約建目表(C) 期齢(D) 重命(R)	文件共	2022/11/11 148 2022/12/3 18:55 2022/12/3 0:17:04 2022/11/13 0:14 2022/12/3 19:57 2022/12/3 19:57 2022/12/3 20:06 2019/12/7 17:14 2022/12/3 18:55 2022/11/10 10:3	^	 .config .config .bsh history .bshrc .desktop_autologin .wimino .wet-hsts .Xauthority	793 3,523 0 1,375 169 55 3,979	文件夹 文件夹 文件夹 BASH_HIS BASHRC DESKTOP VIMINFO WGET-HS XAUTHOR ZSHRC 文件	2022/12/3 16 2022/12/3 4 2022/12/3 5 2022/12/3 16 2022/12/3 18 2022/12/3 4 2022/12/3 4 2022/12/3 17 2022/12/3 16 2022/12/3 18	drwx drwxr-xr-x drwxr-xr-x -rw-r-x -rw-rw-r -rw-rw-r -rw-rw-r -rw-rw-r	root root root root root root root root root root root root root root root root root root root root	1	
	文/供卖           文/供卖           文/件卖	2022/11/11 148 2022/12/3 18:55 2022/12/3 18:55 2022/12/3 19:57 2022/11/13 0:14 2022/12/3 19:57 2022/12/3 20:06 2019/12/7 17:14 2022/12/3 18:55 2022/11/10 10:3 2022/11/10 10:3	~		793 3,523 0 1,375 169 55 3,979	文件夹 文件夹 文件夹 BASH_HIS BASHRC DESKTOP VIMINFO WGET-HS XAUTHOR ZSHRC 文件	2022/12/3 16 2022/12/3 4 2022/12/3 5 2022/12/3 16 2022/12/3 18 2022/12/3 4 2022/12/3 4 2022/12/3 17 2022/12/3 16 2022/12/3 18	drwx drwxr-xr-x drwxr-xr-x -rw-r-x -rw-rw-r -rw-rw-r -rw-rw-r -rw-rw-r	root root root root root root root root root root root root root root root root root root root root		
(件名 ) ) ) ) ) ) ) ) ) ) ) ) )	文件共	2022/11/11 148 2022/12/3 18:55 2022/12/3 0:17:04 2022/11/13 0:14 2022/12/3 19:57 2022/12/3 19:57 2022/12/3 20:06 2019/12/7 17:14 2022/12/3 18:55 2022/11/10 10:3	~		793 3,523 0 1,375 169 55 3,979	文件夹 文件夹 文件夹 BASH_HIS BASHRC DESKTOP VIMINFO WGET-HS XAUTHOR ZSHRC 文件	2022/12/3 16 2022/12/3 4 2022/12/3 5 2022/12/3 16 2022/12/3 18 2022/12/3 4 2022/12/3 4 2022/12/3 17 2022/12/3 16 2022/12/3 18	drwx drwxr-xr-x drwxr-xr-x -rw-r-x -rw-rw-r -rw-rw-r -rw-rw-r -rw-rw-r	root root root root root root root root root root root root root root root root root root root root		

9) After the upload is complete, you can go to the corresponding path in the Linux system of the development board to view the uploaded files

10) The method of uploading a folder is the same as the method of uploading a file, so I won't go into details here.

#### 3.9. HDMI test

#### 3. 9. 1. HDMI display test

1) Use Micro HDMI to HDMI cable to connect the Orange Pi development board and HDMI display



2) After starting the Linux system, if there is image output on the HDMI display, it means that the Micro HDMI interface is working normally.

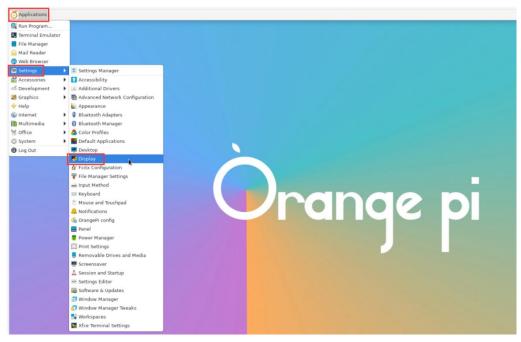
Note that although many laptops have HDMI interfaces, the HDMI interface of the laptop generally only has the output function and does not have the HDMI in function, which means that the HDMI output of other devices cannot be displayed on the laptop screen.

When you want to connect the Micro HDMI of the development board to the HDMI port of the laptop, please make sure that your laptop supports the function HDMI in

When HDMI does not display, please first check whether the Micro HDMI cable is plugged in tightly. After confirming that the wiring is OK, you can try a different screen to see if there is a display.

#### 3. 9. 2. HDMI resolution setting method

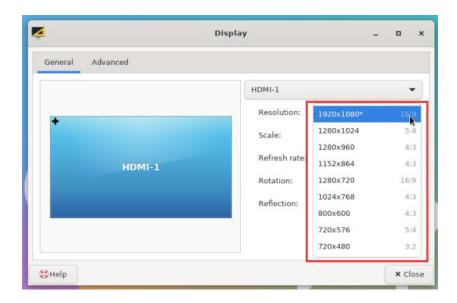
1) First open **Display** in **Settings** 



2) Then you can see the current resolution of the system

	HDMI-1		,
	Resolution:	1920x1080*	16:9 🗖
•	Scale:	lx	
HDMI-1	Refresh rate:	60.0 Hz	
пригт	Rotation:	None	
	Reflection:	None	
			✓ Appl

3) Click the drop-down box of Resolution to see all resolutions currently supported by the display



4) Then select the resolution you want to set and click Apply

	Display		_ = ×
General Advanced			
	HDMI-1		•
	Resolution:	1280x1024	5:4 🕶
	Scale:	lx	•
HDMI-1	Refresh rate:	60.0 Hz	•
	Rotation:	None	•
	Reflection:	None	•
			✓ Apply
🔁 Help			× Close

5) After the new resolution is set, select Keep the configuration

of Applications 🖉 Display	Confirmation		E Fri	2 Dec, 01:13	<b>∆</b> r ∰)orangepi
17 MB					
403 M					
		Display			_ = ×
		General Advanced			
			HDMI-1		
			Resolution:	1280×1024	5:4 💌
			Scale:	lx	*
	•	Confirmation + - 3	Refresh rate:	60.0 Hz	*
	Would you like to keep this configuration?		lotation:	None	*
	The previous configurat	ion will be restored in 1 seconds if you do not reply to this question.	teflection:	None	*
	Kee	p this configuration Restore the previous configuration			✓ Apply
		teip k			× Close

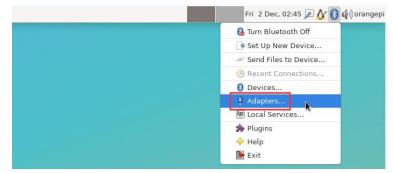
# 3.10. How to use Bluetooth

#### 3. 10. 1. Test method for desktop image

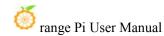
1) Click the Bluetooth icon in the upper right corner of the desktop



2) Then select the adapter



3) If prompted with the following interface, please select Yes.

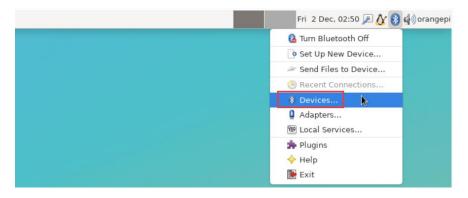




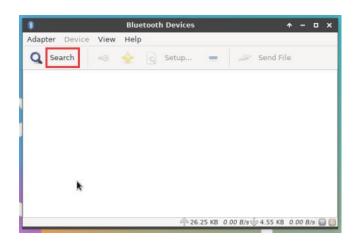
4) Then set the **Visibility Setting** to **Always visible** in the Bluetooth adapter setting interface, and then close it



5) Then open the configuration interface of the Bluetooth device



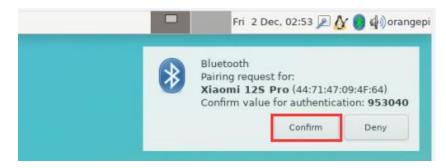
6) Click Search to start scanning for surrounding Bluetooth devices



7) Then select the Bluetooth device you want to connect to, and then click the right mouse button to pop up the operation interface for this Bluetooth device, select **Pair** to start pairing, and the demonstration here is to pair with an Android phone

8	Bluetooth Devices	+ - □ ×
Adapter Device View H	lelp	
🔍 Search 🖃 🚽	≽ 🔯 Setup 😑 🥔	🖻 Send File
OPPO K9 5G Smart phone B0:46:92:C1:8D:D8		
📄 Xiaomi 12S Pr	0	
Smart phone 44:71:47:09:4F:64	Connect Connect To:	
	<pre></pre>	
	🖳 Send a File	
	🗝 Pair 🗼	
	Create pairing with the device	B/s 5.68 KB 0.00 B/s
	Rename device	
and the second second	🛛 🛞 Remove	

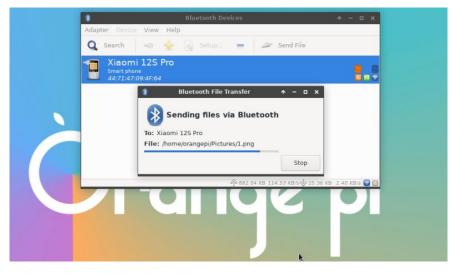
8) When pairing, a pairing confirmation box will pop up in the upper right corner of the desktop. Just select **Confirm** to confirm. At this time, you also need to confirm on the mobile phone.



9) After pairing with the mobile phone, you can select the paired Bluetooth device, then right click and select **Send a File** to start sending a picture to the mobile phone

Adapter Device Vie		
🔍 Search 🥪	🔶 🧕 Setup 💻 🥟 Send I	File
Tiaomi 12	S Pro	
Smart phone 44:71:47:09:4F.	64 Ocnnect	
	Connect To:	
	Retwork Access Point	
	💡 Info	
	💡 Send note	
	📳 Send a File 🖕	
	Pair	
	🔶 Trust	
	Setup	92 KB 0.00 B/s 💭 💽
	Rename device	32 KB 0.00 0/3 0 0
	8 Remove	

10) The interface for sending pictures is as follows



# 3.11. USB interface test

The USB interface can be connected to a USB hub to expand the number of USB interfaces.

#### 3. 11. 1. Connect USB mouse or keyboard to test

1) Insert the USB interface keyboard into the USB interface of the Orange Pi development board

2) Connect the Orange Pi development board to the HDMI display

3) If the mouse or keyboard can operate normally, it means that the USB interface is working normally (the mouse can only be used in the desktop version of the system)

#### 3. 11. 2. Connect USB storage device to test

1) First insert the U disk or USB mobile hard disk into the USB interface of the Orange Pi development board

2) Execute the following command, if you can see the output of sdX, it means that the U disk is recognized successfully

orangepi@ora	orangepi@orangepi:~\$ cat /proc/partitions   grep "sd*"				
major minor	#blo	ocks name			
8	0	30044160 sda			
8	1	30043119 sda1			

3) Use the mount command to mount the U disk to **/mnt**, and then you can view the files in the U disk

orangepi@orangepi:~\$ sudo mount /dev/sda1 /mnt/ orangepi@orangepi:~\$ ls /mnt/ test.txt

4) After mounting, you can check the capacity usage and mount point of the U disk through the **df -h** command.

orangepi@orange	pi:~\$ <b>d</b>	f -h   gre	ep "sd"	
/dev/sda1	29G	208K	29G	1% /mnt

#### 3. 11. 3. USB wireless network card test

The usable USB wireless network cards that have been **tested** so far are as follows. Please test other types of USB wireless network cards by yourself. If they cannot be used, you need to transplant the corresponding USB wireless network card driver.

serial number	model	
1	RTL8723BU	
	support 2.4G WIFI+BT4.0	WITH London 1.3

2	RTL8811	GRIS
	support 2.4G +5G WIFI	a the cost

# 3. 11. 3. 1. **RTL8723BU test**

1) First insert the RTL8723BU wireless network card module into the USB interface of the development board

2) Then the Linux system will automatically load the RTL8723BU bluetooth and WIFI-related kernel modules, through the lsmod command, you can see that the following kernel modules have been automatically loaded

orangepi@orangepi:~\$ lsmod		
Module	Size Used by	
rfcomm	57344 16	
rtl8xxxu	106496 0	
rtk_btusb	61440 0	

3) Through the dmesg command, you can see the loading information of the RTL8723BU module

orangepi@orangepi:~\$ dmesg

•••••

83.438901] usb 2-1: new high-speed USB device number 2 using ehci-platform

[ 83.588375] usb 2-1: New USB device found, idVendor=0bda, idProduct=b720, bcdDevice= 2.00

83.588403] usb 2-1: New USB device strings: Mfr=1, Product=2, SerialNumber=3

83.588422] usb 2-1: Product: 802.11n WLAN Adapter

83.588443] usb 2-1: Manufacturer: Realtek

83.588460] usb 2-1: SerialNumber: 00e04c000001

[ 83.601974] Bluetooth: hci0: RTL: examining hci\_ver=06 hci\_rev=000b lmp\_ver=06 lmp\_subver=8723

83.603894] Bluetooth: hci0: RTL: rom\_version status=0 version=1

83.603920] Bluetooth: hci0: RTL: loading rtl\_bt/rtl8723b\_fw.bin

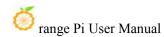
83.610108] Bluetooth: hci0: RTL: loading rtl\_bt/rtl8723b\_config.bin

[	83.611274] Bluetooth: hci0: RTL: cfg_sz 68, total sz 22564
[	83.658494] rtk_btusb: Realtek Bluetooth USB driver ver
3.1.	.6d45ddf.20220519-142432
[	83.658651] usbcore: registered new interface driver rtk_btusb
[	83.667124] usb 2-1: This Realtek USB WiFi dongle (0x0bda:0xb720) is untested!
[	83.667137] usb 2-1: Please report results to Jes.Sorensen@gmail.com
[	83.890140] usb 2-1: Vendor: Realtek
[	83.890153] usb 2-1: Product: 802.11n WLAN Adapter
[	83.890159] usb 2-1: rtl8723bu_parse_efuse: dumping efuse (0x200 bytes):
[	83.890412] usb 2-1: RTL8723BU rev E (SMIC) 1T1R, TX queues 3, WiFi=1, BT=1,
GP	S=0, HI PA=0
[	83.890417] usb 2-1: RTL8723BU MAC: 00:13:ef:f4:58:ae
[	83.890421] usb 2-1: rtl8xxxu: Loading firmware rtlwifi/rtl8723bu_nic.bin
[	83.895289] usb 2-1: Firmware revision 35.0 (signature 0x5301)
[	84.050893] Bluetooth: hci0: RTL: fw version 0x0e2f9f73
[	84.266905] Bluetooth: RFCOMM TTY layer initialized
[	84.266949] Bluetooth: RFCOMM socket layer initialized
[	84.266999] Bluetooth: RFCOMM ver 1.11
[	84.884270] usbcore: registered new interface driver rtl8xxxu
[	84.912046] rtl8xxxu 2-1:1.2 wlx0013eff458ae: renamed from wlan0

4) Then you can see the device node of RTL8723BU WIFI through the **sudo ifconfig** command. For the connection and test method of WIFI, please refer to the section of **WIFI connection test**, which will not be repeated here

orangepi@orangepi:~\$ sudo ifconfig wlx0013eff458ae
wlx0013eff458ae: flags=4099 <up,broadcast,multicast> mtu 1500</up,broadcast,multicast>
ether 00:13:ef:f4:58:ae txqueuelen 1000 (Ethernet)
RX packets 0 bytes 0 (0.0 B)
RX errors 0 dropped 0 overruns 0 frame 0
TX packets 0 bytes 0 (0.0 B)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
5) Then you can see the USB Bluetooth device through the <b>hciconfig</b> command
orangepi@orangepi:~\$ sudo apt update && sudo apt install bluez

orangepi@orangepi:~\$ hciconfig

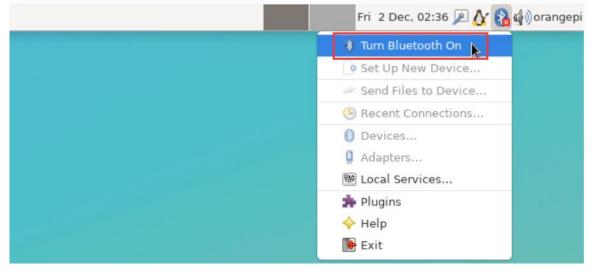


hci0: Type: Primary Bus: USB BD Address: 00:13:EF:F4:58:AE ACL MTU: 820:8 SCO MTU: 255:16 DOWN RX bytes:1252 acl:0 sco:0 events:125 errors:0 TX bytes:23307 acl:0 sco:0 commands:125 errors:0

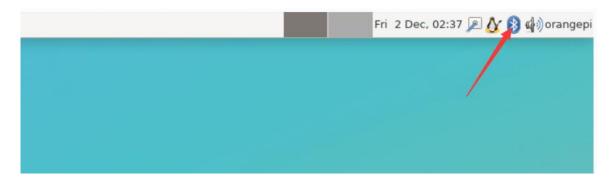
6) You can also see the Bluetooth icon on the desktop. Bluetooth is not turned on at this time, so a red x will be displayed



7) Click **Turn Bluetooth On** to turn on Bluetooth



8) The display after turning on Bluetooth is as follows



9) For the Bluetooth test method, please refer to the section on **Bluetooth usage** and will not be repeated here.

# 3. 11. 3. 2. RTL8811 test

1) First insert the RTL8811 wireless network card module into the USB interface of the development board

2) Then the Linux system will automatically load the kernel module related to RTL8811 WIFI. Through the lsmod command, you can see that the following kernel module has been automatically loaded.

orangepi@orangepi:~\$ lsmod			
Module	Size	Used by	
8821cu	1839104	0	

3) You can see the loading information of the RTL8811 module through the dmesg command

orangepi@orangepi:~\$ dmesg

118.618194] usb 2-1: new high-speed USB device number 2 using ehci-platform

[ 118.767152] usb 2-1: New USB device found, idVendor=0bda, idProduct=c811, bcdDevice= 2.00

118.767181] usb 2-1: New USB device strings: Mfr=1, Product=2, SerialNumber=3

118.767199] usb 2-1: Product: 802.11ac NIC

118.767219] usb 2-1: Manufacturer: Realtek

118.767235] usb 2-1: SerialNumber: 123456

119.500530] usbcore: registered new interface driver rtl8821cu

119.525498] rtl8821cu 2-1:1.0 wlx1cbfced9d260: renamed from wlan0

4) Then, you can see the WIFI device node through the **sudo ifconfig** command. For the WIFI connection and test method, please refer to the **WIFI connection test** section, which will not be repeated here

orangepi@orangepi:~\$ sudo ifconfig wlx1cbfced9d260
wlx1cbfced9d260: flags=4099 <up,broadcast,multicast> mtu 1500</up,broadcast,multicast>
ether 1c:bf:ce:d9:d2:60 txqueuelen 1000 (Ethernet)
RX packets 0 bytes 0 (0.0 B)
RX errors 0 dropped 0 overruns 0 frame 0
TX packets 0 bytes 0 (0.0 B)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

#### 3. 11. 4. USB camera test

1) First, you need to prepare a USB camera as shown in the picture below or similar that supports UVC protocol, and then insert the USB camera into the USB interface of the Orange Pi development board



2) Through the v4l2-ctl command, you can see that the device node information of the USB camera is /dev/video0

orangepi@orangepi:~\$ v4l2-ctl --list-devices

Q8 HD Webcam: Q8 HD Webcam (usb-fc880000.usb-1):

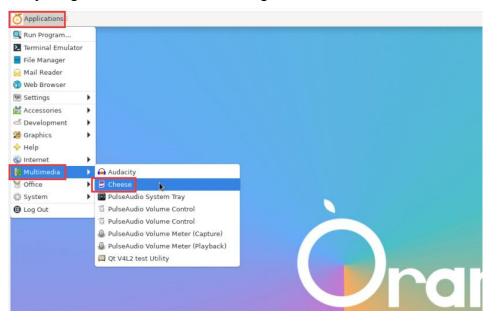
/dev/video0

/dev/video1

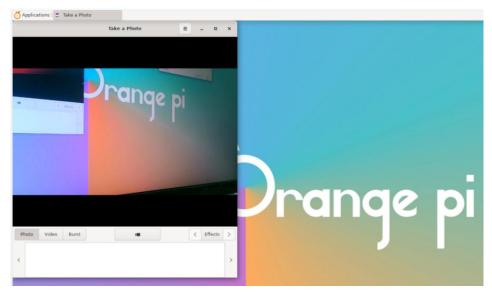
/dev/media0

#### Note that I in v4l2 is a lowercase letter I, not the number 1

In addition, the serial number of the video is not necessarily video0, please refer to what you actually see. 3) In the desktop system, you can use Cheese to directly open the USB camera. The method of opening Cheese is as shown in the figure below:



The interface after Cheese turns on the USB camera is as shown below:



- 4) How to use fswebcam to test USB camera
  - a. Install fswebcam

# orangepi@orangepi:~\$ sudo apt update orangepi@orangepi:~\$ sudo apt-get install -y fswebcam

b. After installing fswebcam, you can use the following command to take pictures

- a) -d option is used to specify the device node of the USB camera
- b) --no-banner Used to remove watermarks from photos
- c) -r option to specify the resolution of the photo
- d) -S Option to set the number of previous frames to skip
- e) ./image.jpg Used to set the name and path of the generated photo

orangepi@orangepi:~\$ sudo fswebcam -d /dev/video0 \

#### --no-banner -r 1280x720 -S 5 ./image.jpg

c. In the server version of the Linux system, you can use the scp command to transfer the taken pictures to the Ubuntu PC for mirror viewing after taking pictures

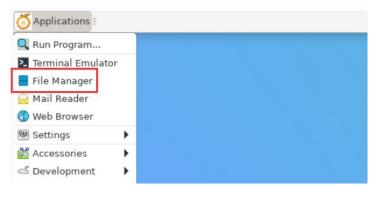
orangepi@orangepi:~\$ scp image.jpg test@192.168.1.55:/home/test (Modify the IP address and path according to the actual situation)

d. In the desktop version of the Linux system, you can directly view the captured pictures through the HDMI display

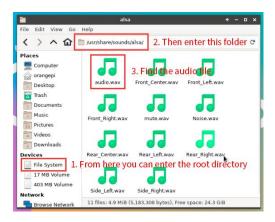
## 3.12. Audio test

#### 3. 12. 1. Testing audio methods on desktop systems

1) First open the file manager



2) Then find the following file (if there is no such audio file in the system, you can upload an audio file to the system yourself)

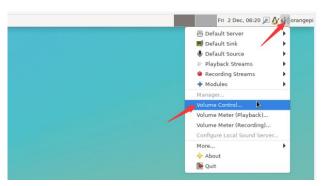


3) Then select the audio.wav file, right-click and select open with vlc to start playing.

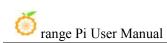
1	alsa	+ - □ ×
File Edit View Go	Help	
< > ^ 企	🛅 /usr/share/sounds/alsa/	G
Places Computer orangepi Desktop	audio, 🚖 Open With "VLC media	a player" t.wav
Trash Documents Music Pictures	Front_Rigt	wav
Videos Downloads Devices	Rear_Cent  Paste Paste Move to Trash Rear_Cent	] ht.wav
File System 17 MB Volume 403 MB Volume Network	Side_Left.wav	
Browse Network	Use "VLC media player" to open the	selected file

4) How to switch between different audio devices such as HDMI playback and headphone playback

a. First open the volume control interface



 When playing audio, the audio device options that can be used by the playback software will be displayed in **Playback**, as shown in the figure below. Here you can set which audio device needs to be played



pplications 🛛 🗂 Volume Contro	əl 🧧 alsa	audio.wav - VLC media			20	Wed 29 Mar. 13:52 🛓 🕯 📫 💉 🔤 orar
•		udlo.wav - VLC media player	* - 8 X			
	Media Mayback Audio	Video Subtiție Tools View Help		Volume Control	* - <b>a</b> x	
<b>60</b>			<u> </u>	Playback Recording Output Devices	Input Devices	
			5	ystem Sounds		
		_		ence 100% (0 dB)	100% (0.00	
				VLC media player (LibVLC 3.0.16) on He	adphone	
		0			MI Audio 0% (0.00	
			sik	ence 100% (0 dB)		
	00:03	_	00:11			
_	П на вна со т	Net Therefore a second second		Show: Applications		
File Edit View Go H	alse	+ - = ×	<b>n</b> a lint			
< > へ 企 🖷	/usr/share/sounds/alsa/	C				
Places © Computer	1 1	1				
C orangepi	audio.wav Front_Cente					
Trash	The second second	1				
Documents	wav	WOW				
Pictures	Front_Right.wav mute.wa					
Videos	<b>1</b>	<b>J</b>				
	Rear_Center.wav Rear_Left.v					
	D D					

3. 12. 2. How to use commands to play audio

# 3. 12. 2. 1. Headphone interface audio playback test

1) First insert the headphones into the headphone jack of the development board



2) Then you can use the **aplay -1** command to check the sound card devices supported by the Linux system. From the output below, we can see that **card 0** is the sound card device of rk809, which is the sound card device of the headset.

orangepi@orangepi:~\$ aplay -l \*\*\*\* List of PLAYBACK Hardware Devices \*\*\*\* card 0: rockchiprk809 [rockchip-rk809], device 0: dailink-multicodecs rk817-hifi-0 [dailink-multicodecs rk817-hifi-0] Subdevices: 0/1 Subdevice #0: subdevice #0 card 1: rockchiphdmi [rockchip,hdmi], device 0: fe400000.i2s-i2s-hifi i2s-hifi-0 [fe400000.i2s-i2s-hifi i2s-hifi-0] Subdevices: 0/1 Subdevice #0: subdevice #0

Subdevice #0: subdevice #0

3) Then use the **aplay** command to play the audio file that comes with the system. If the headset can hear the sound, it means that the hardware can be used normally.

orangepi@orangepi:~\$ aplay -D hw:0,0 /usr/share/sounds/alsa/audio.wav Playing WAVE 'audio.wav' : Signed 16 bit Little Endian, Rate 44100 Hz, Stereo

# 3. 12. 2. 2. HDMI audio playback test

1) First use a Micro HDMI to HDMI cable to connect the Orange Pi development board to the TV (other HDMI displays need to ensure that they can play audio)

2) Then check the serial number of the HDMI sound card. From the output below, you can know that the HDMI sound card is **card 1** 

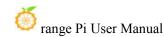
```
orangepi@orangepi:~$ aplay -l
**** List of PLAYBACK Hardware Devices ****
card 0: rockchiprk809 [rockchip-rk809], device 0: dailink-multicodecs rk817-hifi-0
[dailink-multicodecs rk817-hifi-0]
Subdevices: 0/1
Subdevice #0: subdevice #0
card 1: rockchiphdmi [rockchip,hdmi], device 0: fe400000.i2s-i2s-hifi i2s-hifi-0
[fe400000.i2s-i2s-hifi i2s-hifi-0]
Subdevices: 0/1
Subdevice #0: subdevice #0
Subdevice #0: subdevice #0
```

3) Then use the **aplay** command to play the audio file that comes with the system. If the sound can be heard on the HDMI display or TV, it means that the hardware can be used normally.

orangepi@orangepi:~\$ aplay -D hw:1,0 /usr/share/sounds/alsa/audio.wav

#### 3. 12. 3. How to test recording using commands

1) The Orange Pi CM4 development board does not have an onboard MIC, and audio can only be recorded through headphones with a MIC function. After inserting the headset with MIC function into the development board, run the following command to



record an audio period through the headset.

orangepi@orangepi:~\$ amixer -c 0 cset name='Capture MIC Path' 'Main Mic' orangepi@orangepi:~\$ arecord -D hw:0,0 -d 5 -f cd -t wav /tmp/test.wav

# 3.13. Temperature sensor

1) The command to view the system temperature sensor is:

orangepi@orangepi:~\$ sensors soc\_thermal-virtual-0 Adapter: Virtual device temp1: +41.9°C (crit = +115.0°C) gpu\_thermal-virtual-0 Adapter: Virtual device temp1: +43.8°C

2) The command to view the current temperature of the nvme ssd solid state drive is:

orangepi@orangepi:~\$ sudo smartctl -a /dev/nvme0 | grep "Temperature:" Temperature: 40 Celsius

# 3. 14. 40 Pin interface pin description

1) Please refer to the picture below for the order of the 40-pin interface pins of the Orange Pi CM4 development board



2) The functions of the 40-pin interface pins of the Orange Pi CM4 development board are as shown in the table below

a. The following is the complete pin diagram of 40pin

复用功能	复用功能	GPIO	<b>GPIO序号</b>	引脚序号	引脚序号	GPIO序号	GPIO	复用功能	复用功能
		3.3V		1	2		5V		
	I2C2_SDA_M1	GPIO4_B4	140	3	4		5V		
	12C2_SCL_M1	GP104_B5	141	5	6		GND		
	PWM15_IR_M1(fe700030)	GPI04_C3	147	7	8	25	GPIO0_D1	UART2_TX_MO	
		GND		9	10	24	GPIO0_D0	UART2_RX_MO	
		GP103_C6	118	11	12	119	GP103_C7		
		GPIO4_A0	128	13	14		GND		
	UART7_TX_M2	GPI04_A2	130	15	16	131	GPI04_A3	UART7_RX_M2	
		3.37		17	18	129	GPI04_A1		
I2C4_SDA_MO	SPI3_MOSI_MO	GPI04_B2	138	19	20		GND		
	SPI3_MISO_MO	GP104_B0	136	21	22	132	GPIO4_A4	UART9_TX_M2	
I2C4_SCL_MO	SPI3_CLK_MO	GP104_B3	139	23	24	134	GPIO4_A6	SPI3_CS0_M0	
		GND		25	26	135	GPI04_A7	SPI3_CS1_M0	
UART3_RX_MO	I2C3_SDA_MO	GPI01_A0	32	27	28	33	GPI01_A1	12C3_SCL_M0	UART3_TX_MO
1999 - 1999 1997 - 1999	UART9_RX_M2	GPIO4_A5	133	29	30		GND		
		GP103_D4	124	31	32	144	GPI04_C0	PWM11_IR_M1(fe6f0030)	
		GP103_D7	127	33	34		GND		
		GP103_D0	120	35	36	125	GPI03_D5		
		GP103_D3	123	37	38	122	GPIO3_D2		
		GND		39	40	121	GPI03_D1		

b. The table below is the picture of the left half of the complete table above, so you can see it clearly

复用功能	复用功能	GPIO	GPIO序号	引脚序号
		3. 3V		1
	I2C2_SDA_M1	GPIO4_B4	140	3
	I2C2_SCL_M1	GPIO4_B5	141	5
	PWM15_IR_M1(fe700030)	GPI04_C3	147	7
		GND		9
		GPIO3_C6	118	11
		GPIO4_A0	128	13
	UART7_TX_M2	GPI04_A2	130	15
		3. 3V		17
I2C4_SDA_MO	SPI3_MOSI_MO	GPIO4_B2	138	19
	SPI3_MISO_MO	GPIO4_B0	136	21
I2C4_SCL_MO	SPI3_CLK_MO	GPIO4_B3	139	23
		GND		25
UART3_RX_MO	I2C3_SDA_MO	GPIO1_AO	32	27
2010 - 1010-	UART9_RX_M2	GPIO4_A5	133	29
		GPIO3_D4	124	31
		GPIO3_D7	127	33
		GPIO3_DO	120	35
		GPIO3_D3	123	37
		GND		39

c. The table below is the picture of the right half of the complete table above, so you can see it clearly

引脚序号	GPIO序号	GPIO	复用功能	复用功能
2		57		
4		57		
6		GND		
8	25	GPIO0_D1	UART2_TX_MO	
10	24	GPIO0_D0	UART2_RX_MO	
12	119	GP103_C7		
14		GND		
16	131	GPIO4_A3	UART7_RX_M2	
18	129	GPIO4_A1		
20		GND		
22	132	GPIO4_A4	UART9_TX_M2	
24	134	GPIO4_A6	SPI3_CSO_MO	
26	135	GPIO4_A7	SPI3_CS1_MO	
28	33	GPI01_A1	I2C3_SCL_MO	UART3_TX_MO
30		GND		
32	144	GPIO4_CO	PWM11_IR_M1(fe6f0030)	
34		GND		
36	125	GPIO3_D5		
38	122	GPIO3_D2		
40	121	GPIO3_D1		

3) There are a total of **28** GPIO ports in the 40pin interface, and the voltage of all GPIO ports is **3.3v** 

# 3.15. How to install wiringOP

Note that wiringOP is already pre-installed in the Linux image released by Orange Pi. Unless the wiringOP code is updated, there is no need to re-download, compile and install it, just use it directly.

The storage path of the compiled wiringOP deb package in orangepi-build is: orangepi-build/external/cache/debs/arm64/wiringpi x.xx.deb

After entering the system, you can run the gpio readall command. If you can see the following output, it means that wiringOP has been pre-installed and can be used normally.

		+		+	- PI	CM4 ·	+		+	++	
GPI0	wPi	Name	Mode	V	Phys	ical	V	Mode	Name	wPi	GPIO
		3.3V			1	2			5V		
140	0	SDA.2	IN	1	3	4			5V	1 1	
141	1	SCL.2	IN	1	5	6			GND		
147	2	PWM15	IN	0	7	8	1	ALT1	RXD.2	3	25
		GND			9	10	1	ALT1	TXD.2	4	24
118	5	GPI03_C6	IN	0	11	12	0	IN	GPI03_C7	6	119
128	7	GPIO4_A0	IN	0	13	14			GND		
130	8	TXD.7	IN	0	15	16	0	IN	RXD.7	9	131
Î		3.3V			17	18	0	IN	GPI04_A1	10	129
138	11	SPI3_TXD	IN	0	19	20	1		GND	1 1	
136	12	SPI3_RXD	IN	0	21	22	0	IN	TXD.9	13	132
139	14	SPI3_CLK	IN	0	23	24	0	IN	SPI3_CS1	15	134
		GND			25	26	0	IN	GPI04_A7	16	135
32	17	SDA.3	ALT1	1	27	28	1	ALT1	SCL.3	18	33
133	19	RXD.9	IN	0	29	30			GND		
124	20	GPI03_D4	IN	0	31	32	0	IN	PWM11	21	144
127	22	GPI03_D7	IN	0	33	34			GND		
120	23	GPI03_D0	IN	0	35	36	0	IN	GPIO3_D5	24	125
123	25	GPIO3_D3	IN	0	37	38	0	IN	GPI03_D2	26	122
		GND			39	40	0	IN	GPI03_D1	27	121
GPIO	wPi	Name I	Mode	v	Phys	+ ical		Mode	+   Name	++   wPi	GPIO

WiringOP currently mainly adapts to the functions of setting GPIO port input and output, setting GPIO port output high and low levels, and setting pull-up and pull-down resistors. Functions such as hardware PWM cannot be used.

1) Download the code of wiringOP

orangepi@orangepi:~\$ sudo apt update

orangepi@orangepi:~\$ sudo apt install -y git

orangepi@orangepi:~\$ git clone https://github.com/orangepi-xunlong/wiringOP.git -b next

Note that Orange Pi CM4 needs to download the code of wiringOP next branch. Please don't miss the -b next parameter.

If you have problems downloading the code from GitHub, you can directly use the wiringOP source code that comes with the Linux image, and the storage location is: /usr/src/wiringOP.

2) Compile and install wiringOP
 orangepi@orangepi:~\$ cd wiringOP
 orangepi@orangepi:~/wiringOP\$ sudo ./build clean

orangepi@orangepi:~/wiringOP\$ sudo ./build

GPIO	wPi	Name	Mode	V	Phys	ical	V	Mode	Name	wPi	GPIO
		3.3V				2	1		5V		
140	0	SDA.2	IN	1	3	4	1		5V	1	1
141	1	SCL.2	IN	1	5	6			GND		Î
147	2	PWM15	IN	0	7	8	1	ALT1	RXD.2	3	25
	i i	GND		İ	9	10	1	ALT1	TXD.2	4	24
118	5	GPI03_C6	IN	0	11	12	0	IN	GPI03_C7	6	119
128	7	GPI04_A0	IN	0	13	14			GND		İ _
130	8	TXD.7	IN	0	15	16	0	IN	RXD.7	9	131
		3.3V			17	18	0	IN	GPI04_A1	10	129
138	11	SPI3_TXD	IN	0	19	20	1		GND		1
136	12	SPI3_RXD	IN	0	21	22	0	IN	TXD.9	13	132
139	14	SPI3_CLK	IN	0	23	24	0	IN	SPI3_CS1	15	134
		GND			25	26	0	IN	GPI04_A7	16	135
32	17	SDA.3	ALT1	1	27	28	1	ALT1	SCL.3	18	33
133	19	RXD.9	IN	0	29	30			GND		ĺ.
124	20	GPIO3_D4	IN	0	31	32	0	IN	PWM11	21	144
127	22	GPIO3_D7	IN	0	33	34			GND		1
120	23	GPIO3_D0	IN	0	35	36	0	IN	GPI03_D5	24	125
123	25	GPI03_D3	IN	0	37	38	0	IN	GPI03_D2	26	122
		GND			39	40	0	IN	GPI03_D1	27	121
GPIO	++   wPi	Name	Mode	+   v	++ I Phvs	+	+ I V	+   Mode	+	+ I wPi	+   GP]

3)	Test the	output of the	gpio readall	command	as follows
----	----------	---------------	--------------	---------	------------

# 3. 16. 40pin interface GPIO, I2C, UART, SPI and PWM test

Note, if you need to set overlays to open multiple configurations at the same time, please use spaces to separate them and write them on one line as follows. orangepi@orangepi:~\$ sudo vim /boot/orangepiEnv.txt

overlays=spi3-m0-cs0-spidev i2c2-m1 i2c3-m0 uart7-m2 uart9-m2 pwm11-m1

#### 3. 16. 1. 40pin GPIO port test

The Linux system released by Orange Pi has a pre-installed blink\_all\_gpio program, which will set all 28 GPIO ports in the 40pin to switch between high and low levels continuously.

After running the blink\_all\_gpio program, when using a multimeter to measure the level of the GPIO port, you will find that the GPIO pin will switch between 0 and 3.3v continuously. Using this program we can test whether the GPIO port is working properly. The way to run the blink\_all\_gpio program is as follows:orangepi@orangepicm4:~\$ sudo blink\_all\_gpio# Remember to add sudo permission[sudo] password for orangepi:# A password is required here

1) There are a total of 28 GPIO ports in the 40pins of the development board that can be used. The following uses pin 7—the corresponding GPIO is GPIO4\_C3—the corresponding wPi serial number is 2—as an example to demonstrate how to set the high and low levels of the GPIO port

GPIO	wPi		Name	Mode		V	Phy	si	cal	I V	1	Mode	Name		wPi	GPIO
7.7.7.7.7	+ 	1	3.3V		1		1	TT.	2	1	-+-		5V	-+-		+
140	0	i i	SDA.2	IN	İ	1	3	11	4	1	Ì		5V	Í		ĺ
141	1	j.	SCL.2	IN		1	5	11	б	1	Ì		GND	Ĩ.		Î
147	2		PWM15	IN	1	0	7		8	1	Ì	ALT1	RXD.2		3	25
	1	1	GND		1		9	11	10	1		ALT1	TXD.2	1	4	24

2) First set the GPIO port to output mode, where the third parameter needs to input the serial number of wPi corresponding to the pin

root@orangepi:~/wiringOP# **gpio mode 2 out** 

3) Then set the GPIO port to output low level. After setting, you can use a multimeter to measure the voltage value of the pin. If it is 0v, it means that the low level is set successfully.

root@orangepi:~/wiringOP# **gpio write 2** 0

Use gpio readall to see that the value (V) of pin 7 has changed to 0

			:~# gpio r +			PI CM4	11				
GPIC	wPi	Ì	Name	Mode	i v i	Physical			Name	wPi	
1		1	3.3V			1    2	1		5V		1
140	0		SDA.2	IN	11	3   4	li i		5V	1	j
141	1	Ĭ.	SCL.2	IN		5    6	1 1		GND		Î I
147	2	1	PWM15	OUT	0	7    8	1	ALT1	RXD.2	3	25
1	1	Î	GND			9    10	1	ALT1	TXD.2	4	24

4) Then set the GPIO port to output a high level. After setting, you can use a multimeter to measure the voltage value of the pin. If it is 3.3v, it means that the high level is set successfully

root@orangepi:~/wiringOP# gpio write 2 1

has changed to 1

Use gpio readall to see that the value (V) of pin 7

	A CONTRACTOR OF A	and the second second		:~# gpio r		+	- P1	CM4	+	+	.+	-+	+
1	GPIO	wPi	I	Name	Mode	V	Phy	sical	I V	Mode	Name	wPi	GPIO
Ť		1	Ĩ	3.3V				2	1	1	-+   5V	1	1
1	140	0	1	SDA.2	IN	1	3	4	1	1	5V	1	1
1	141	1	T	SCL.2	IN	1	5	6	1	1	GND	Ĩ	1
1	147	2		PWM15	OUT	1	7	8	1	ALT1	RXD.2	3	25
		1		GND			9	10	1	ALT1	TXD.2	4	24

5) The setting method of other pins is similar, just modify the serial number of wPi to the corresponding serial number of the pin

# 3. 16. 2. How to set the pull-up and pull-down resistance of 40pin GPIO port

Note that the 4 GPIO pins below the Orange Pi CM4 have an external 3.3V pull-up, so setting the pull-down is invalid, and the other pins can normally set the pull-up and pull-down resistor function

GPI0	wPi	Name	Mode	V	Phys	ical	V	Mode	Name	wPi	GPIC
		3.3V			1	2			5V		
140	0	SDA.2	IN	1	3	4	i i		5V		
141	1	SCL.2	IN	1	5	6	i i		GND		
147	2	PWM15	IN	0	7	8	1	ALT1	RXD.2	3	25
		GND		1	9	10	1	ALT1	TXD.2	4	24
118	5	GPI03_C6	IN	0	11	12	0	IN	GPI03_C7	6	119
128	7	GPIO4_A0	IN	0	13	14			GND		
130	8	TXD.7	IN	0	15	16	0	IN	RXD.7	9	131
		3.3V			17	18	0	IN	GPI04_A1	10	129
138	11	SPI3_TXD	IN	0	19	20	1		GND		
136	12	SPI3_RXD	IN	0	21	22	0	IN	TXD.9	13	132
139	14	SPI3_CLK	IN	0	23	24	0	IN	SPI3_CS1	15	134
		GND			25	26	0	IN	GPIO4 A7	16	135
32	17	SDA.3	ALT1	1	27	28	1	ALT1	SCL.3	18	33
133	19	RXD.9	IN	0	29	30			GND		
124	20	GPIO3_D4	IN	0	31	32	0	IN	PWM11	21	144
127	22	GPIO3_D7	IN	0	33	34			GND		
120	23	GPIO3_D0	IN	0	35	36	0	IN	GPI03_D5	24	125
123	25	GPIO3_D3	IN	0	37	38	0	IN	GPI03_D2	26	122
1		GND			39	40	0	IN	GPI03_D1	27	121

1) The following takes pin 11—the corresponding GPIO is GPIO3\_C6—the corresponding wPi serial number is 5—as an example to demonstrate how to set the

GPIO	wPi	Name	Mode	V	Phys ++	ical	V	Mode	Name	wPi	GPI
		3.3V		I		2			5V		
140	0	SDA.2	IN	1	3	4			5V		
141	1	SCL.2	IN	1	5	6	1		GND		
147	2	PWM15	IN	0	7	8	1	ALT1	RXD.2	3	25
	1	GND	1	1	9	10	1	ALT1	TXD.2	4	24
118	5	GPI03 C6	IN	0	11	12	0	IN	GPI03_C7	6	119
128	7	GPI04_A0	IN	0	13	14			GND		
130	8	TXD.7	IN	0	15	16	0	IN	RXD.7	9	131

pull-up and pull-down resistance of the GPIO port

2) First, you need to set the GPIO port to the input mode, and the third parameter needs to be the serial number of the wPi corresponding to the input pin

root@orangepi:~/wiringOP# **gpio mode 5 in** 

3) After setting to input mode, execute the following command to set the GPIO port to pull-up mode

root@orangepi:~/wiringOP# **gpio mode 5 up** 

4) Then enter the following command to read the level of the GPIO port, if the level is 1, it means that the pull-up mode is set successfully

root@orangepi:~/wiringOP# gpio read 5

1

5) Then execute the following command to set the GPIO port to pull-down mode root@orangepi:~/wiringOP# gpio mode 5 down

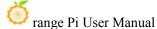
6) Then enter the following command to read the level of the GPIO port, if the level is 0, the pull-down mode is set successfully

```
root@orangepi:~/wiringOP# gpio read 5
```

0

#### 3. 16. 3. 40pin SPI test

1) According to the schematic diagram of the 40pin interface, the spi available for Orange Pi CM4 is spi3



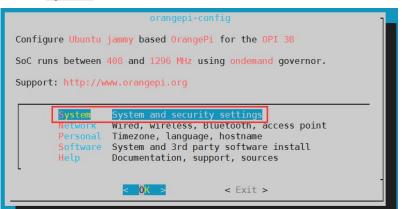
1       GPI04_A2       R501_200R_2 R0201       PIN46       15       16       PIN47       R631_200R_2 R0201       GPI04_A3       1         1       GPI04_B2 (SPI3_MOSL_M0)       R511_47R_2 R0201       PIN44       17       18       19       200R_2 R0201       GPI04_A1       1         1       GPI04_B0 (SPI3_MIS0_M0)       R511_47R_2 R0201       PIN44       19       20       21       22       PIN41       R651_200R_2 R0201       GPI04_B1       1         1       GPI04_B3 (SPI3_MIS0_M0)       R531_47R_2 R0201       PIN38       R651_200R_2 R0201       GPI04_B1       1         1       GPI04_B3 (SPI3_CLK_M0)       R551_200R_2 R0201       PIN38       R651_200R_2 R0201       GPI04_A6 (SPI3_CS0_M0)         1,2       GPI01_A0 (I2C3_SDA_M0)       R551_200R_2 R0201       PIN36       27       28         1       GPI03_D7       R551_200R_2 R0201       PIN30       R691_200R_2 R0201       GPI03_D7         1       GPI03_D7       R551_200R_2 R0201       PIN30       33       34       PIN29       R701_200R_2 R0201       GPI03_D5_1         1       GPI03_D1       GPI03_D2       R591_200R_2 R0201       PIN24       37       36       PIN27       R711_47R_2 R0201       GPI03_D5_1         1 </th <th>I         GPI04_B2 (SPI3_MOSI_M0)         R511_47R         2 R0201           1         GPI04_B0 (SPI3_MISO_M0)         R521_47R         2 R0201           1         GPI04_B3 (SPI3_CLK_M0)         R531_47R         2 R0201           1,2         GPI01_A0 (I2C3_SDA_M0)         R551_200R         2 R0201           1         GPI03_D4         GPI03_D4         R551_200R         2 R0201           1         GPI03_D4         R651_200R         2 R0201         R651_200R         2 R0201           1         GPI03_D4         R651_200R         2 R0201         1         R681_47R         2 R0201           1         GPI03_D0 (I2S1_LRCK_M1)         R681_47R         2 R0201         1         R681_47R         2 R0201</th> <th>PIN34         7         8           PIN50         9         10           PIN48         13         14           PIN46         13         14           PIN46         15         16           PIN44         17         14           PIN46         21         22           PIN36         25         26           PIN36         27         23           PIN36         27         23           PIN36         23         33           PIN28         31         35           PIN24         35         36           PIN24         37         36</th> <th>PIN47         R63 1         2008         2 R0201         GPI03_C7 (I2S1_SCLK_M1           4         PIN47         R63 1         2008         2 R0201         GPI04_A3         1           7         PIN45         R64 1         2008         2 R0201         GPI04_A1         1           8         PIN45         R66 1         2008         2 R0201         GPI04_A1         1           9         PIN39         R66 1         2008         2 R0201         GPI04_A6 (SPI3_CS0_M0)           9         PIN37         R67 1         2008         2 R0201         GPI04_A7 (SPI3_CS0_M0)           9         PIN35         R68 1         2008         2 R0201         GPI04_A7 (SPI3_CS1_M0)           9         PIN31         R69 1         2008         2 R0201         GPI04_A7 (SPI3_CS1_M0)           9         PIN31         R69 1         2008         2 R0201         GPI04_C0(PWM11_IR_M1)           4         PIN27         R70 1         2008         2 R0201         GPI03_D5         1           9         PIN27         R71 1         478         2 R0201         GPI03_D2 (S1_SDL_M1)         PIN25         SDL M1)</th>	I         GPI04_B2 (SPI3_MOSI_M0)         R511_47R         2 R0201           1         GPI04_B0 (SPI3_MISO_M0)         R521_47R         2 R0201           1         GPI04_B3 (SPI3_CLK_M0)         R531_47R         2 R0201           1,2         GPI01_A0 (I2C3_SDA_M0)         R551_200R         2 R0201           1         GPI03_D4         GPI03_D4         R551_200R         2 R0201           1         GPI03_D4         R651_200R         2 R0201         R651_200R         2 R0201           1         GPI03_D4         R651_200R         2 R0201         1         R681_47R         2 R0201           1         GPI03_D0 (I2S1_LRCK_M1)         R681_47R         2 R0201         1         R681_47R         2 R0201	PIN34         7         8           PIN50         9         10           PIN48         13         14           PIN46         13         14           PIN46         15         16           PIN44         17         14           PIN46         21         22           PIN36         25         26           PIN36         27         23           PIN36         27         23           PIN36         23         33           PIN28         31         35           PIN24         35         36           PIN24         37         36	PIN47         R63 1         2008         2 R0201         GPI03_C7 (I2S1_SCLK_M1           4         PIN47         R63 1         2008         2 R0201         GPI04_A3         1           7         PIN45         R64 1         2008         2 R0201         GPI04_A1         1           8         PIN45         R66 1         2008         2 R0201         GPI04_A1         1           9         PIN39         R66 1         2008         2 R0201         GPI04_A6 (SPI3_CS0_M0)           9         PIN37         R67 1         2008         2 R0201         GPI04_A7 (SPI3_CS0_M0)           9         PIN35         R68 1         2008         2 R0201         GPI04_A7 (SPI3_CS1_M0)           9         PIN31         R69 1         2008         2 R0201         GPI04_A7 (SPI3_CS1_M0)           9         PIN31         R69 1         2008         2 R0201         GPI04_C0(PWM11_IR_M1)           4         PIN27         R70 1         2008         2 R0201         GPI03_D5         1           9         PIN27         R71 1         478         2 R0201         GPI03_D2 (S1_SDL_M1)         PIN25         SDL M1)
---	---	--	---

2) In the linux system, the SPI in the 40 pin is closed by default, and it needs to be opened manually to use it. The detailed steps are as follows:

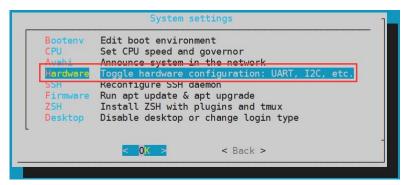
a. First run orangepi-config, common users remember to add sudo permission

#### orangepi@orangepi:~\$ sudo orangepi-config

b. Then select **System** 



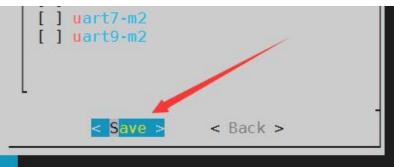
c. Then select Hardware



d. Then use the arrow keys on the keyboard to navigate to the position shown in the figure below, and then use the space to select the SPI configuration you want to open



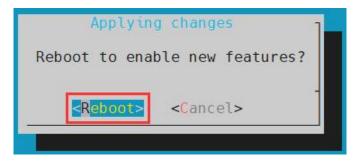
e. Then select **<Save>**Save



f. Then select<Back>

[] uart7-m2 [] uart9-m2		
< Save >	< Back >	

g. Then select **< Reboot>** Restart the system for the configuration to take effect



3) After restarting, enter the system to check whether there is a **spidev3.0** device node in the Linux system. If it exists, it means that SPI3 has been set up and can be used directly

orangepi@orangepi:~\$ ls /dev/spidev3.0 /dev/spidev3.0

4) Do not short-circuit the mosi and miso pins of SPI3 first, and the output result of running spidev\_test is as follows, you can see that the data of TX and RX are inconsistent

5) Then short-circuit the two pins of mosi (pin 19 in the 40pin interface) and miso (pin 21 in the 40pin interface) of SPI3 and run the output of spidev\_test as follows, you can see the sending and receiving same data



## 3. 16. 4. 40pin I2C test

1) As can be seen from the table below, the available i2c for Orange Pi CM4 is i2c2, i2c3 and i2c4, a total of three sets of i2c buses

of range Pi User Manual

复用功能	复用功能	GPIO	<b>GPIO序号</b>	引脚序号	引脚序号	GPIO序号	GPIO	复用功能	复用功能
		3.3V		1	2		5¥		
	I2C2_SDA_M1	GPIO4_B4	140	3	4		57		
	I2C2 SCL M1	GPI04_B5	141	5	6		GND		
	PWM15_IR_M1(fe700030)	GPI04_C3	147	7	8	25	GPI00_D1	UART2_TX_MO	
		GND		9	10	24	GPIO0_D0	UART2_RX_MO	
		GPI03_C6	118	11	12	119	GP103_C7		
		GPIO4_A0	128	13	14		GND		
	UART7_TX_M2	GPI04_A2	130	15	16	131	GPI04_A3	UART7_RX_M2	
		3.37		17	18	129	GPI04_A1		
I2C4_SDA_MO	SPI3_MOSI_MO	GPI04_B2	138	19	20		GND		
	SPI3_MISO_MO	GP104_B0	136	21	22	132	GPIO4_A4	UART9_TX_M2	
I2C4_SCL_MO	SPI3_CLK_MO	GPI04_B3	139	23	24	134	GPI04_A6	SPI3_CS0_MO	
		GND		25	26	135	GPIO4_A7	SPI3 CS1 MO	
UART3_RX_MO	I2C3_SDA_MO	GPI01_A0	32	27	28	33	GPI01_A1	I2C3_SCL_MO	UART3_TX_MO
	UART9_RX_M2	GPIO4_A5	133	29	30		GND		
		GPIO3_D4	124	31	32	144	GPI04_C0	PWM11_IR_M1(fe6f0030)	
		GP103_D7	127	33	34		GND		
		GP103_D0	120	35	36	125	GP103_D5		
		GP103_D3	123	37	38	122	GPI03_D2		
		GND		39	40	121	GPIO3 D1		

As can be seen from the above table, i2c4\_m0 and spi3\_m0 are multiplexed pins, and both cannot be opened at the same time. i2c3\_m0 and uart3\_m0 are also multiplexed pins, and both cannot be opened at the same time

2) In the linux system, the I2C bus in the 40 pin is closed by default, and it needs to be opened manually to use it. The detailed steps are as follows:

a. First run **orangepi-config**, common users remember to add **sudo** permission

- orangepi@orangepi:~\$ sudo orangepi-config
  - b. Then select System



c. Then select **Hardware** 

Bootenv	Edit boot environment
CPU	Set CPU speed and governor
Avahi	Announce system in the network
Hardware	Toggle hardware configuration: UART, I2C, etc.
SSH	Reconfigure SSH daemon
Firmware	Run apt update & apt upgrade
ZSH	Install ZSH with plugins and tmux
Desktop	Disable desktop or change login type
	< OK > < Back >

d. Then use the arrow keys on the keyboard to navigate to the position shown in the figure below, and then use the space to select the I2C configuration you want to open



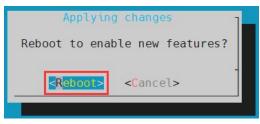
e. Then select **<Save>** Save



f. Then select <Back>

[ ] uart7-m2 [ ] uart9-m2		
< Save >	< Back >	-

g. Then select**<Reboot>** Restart the system for the configuration to take effect



3) After starting the Linux system, first confirm that there is an i2c device node under /dev



4) Then connect an i2c device to the i2c pin of the 40pin connector

	i2c2-m1	i2c3-m0	i2c4-m0
Sda Pin	Corresponding	Corresponding	Corresponding
	to No. 3 pin	to No. 27 pin	to No. 19 pin
Sck Pin	Corresponding	Corresponding	Corresponding
	to No. 5 pin	to No. 28 pin	to No. 23 pin
Vcc Pin	Corresponding	Corresponding	Corresponding
	to No. 1 pin	to No. 1 pin	to No. 1 pin
Gnd Pin	Corresponding	Corresponding	Corresponding
	to No. 6 pin	to No. 6 pin	to No. 6 pin

5) Then use the **i2cdetect -y** command, if the address of the connected i2c device can be detected, it means that i2c can be used normally

orangepi@orang	epi:	~\$ s	sudc	o i2c	dete	ect -	-y 2		#i2	2c2	con	nma	nd				
orangepi@orang	epi:	~\$ s	sudc	o i2c	dete	ect -	-y 3		#i2	2c3	con	nma	nd				
orangepi@orang	epi:	~\$ s	sudc	o i2c	dete	ect -	-y 4		#i2	2c4	con	ıma	nd				
roo	t@o	rang	gep:	icm4	4:~;	# i2	2cd	ete	ct	- y 4	1						
	0	1	2	3	4	5	6	7	8	9	а	b	С	d	е	f	
00:																	
10:																	
20:								( <b>1</b> 11)									
30:									38								
40:																	
50:																	
60:								<u></u>								04742	
70:						12											1

# 3. 16. 5. 40pin UART test

1) As can be seen from the table below, the available uarts for Orange Pi CM4 are uart2, uart3, uart7 and uart9, a total of four groups of uart buses, of which uart2 is the system' s debugging serial port by default.

复用功能	复用功能	GPIO	<b>GPI0序号</b>	引脚序号	引脚序号	GPIO序号	GPIO	复用功能	复用功能
		3.3₹		1	2		5¥		
	I2C2_SDA_M1	GPIO4_B4	140	3	4		57		
	12C2_SCL_M1	GPIO4_B5	141	5	6		GND		
	PWM15_IR_M1(fe700030)	GPIO4_C3	147	7	8	25	GPI00_D1	UART2_TX_MO	
		GND		9	10	24	GPIO0_D0	UART2_RX_MO	
		GP103_C6	118	11	12	119	GP103_C7		
		GPIO4_A0	128	13	14		GND		
	UART7_TX_M2	GPIO4_A2	130	15	16	131	GPI04_A3	UART7_RX_M2	
		3. 3V		17	18	129	GPI04_A1		
I2C4_SDA_MO	SPI3_MOSI_MO	GPIO4_B2	138	19	20		GND		
	SPI3_MISO_MO	GPIO4_B0	136	21	22	132	GPI04_A4	UART9 TX M2	
12C4_SCL_M0	SPI3_CLK_MO	GPIO4_B3	139	23	24	134	GPIO4_A6	SPI3_CS0_MO	
		GND		25	26	135	GPI04_A7	SPI3_CS1_M0	
UART3_RX_MO	I2C3_SDA_MO	GPI01_A0	32	27	28	33	GPI01_A1	I2C3_SCL_MO	UART3_TX_NO
	UART9_RX_M2	GPIO4_A5	133	29	30		GND		
		GPIO3_D4	124	31	32	144	GPI04_C0	PWM11_IR_W1(fe6f0030)	
		GPIO3_D7	127	33	34		GND		
		GPIO3_DO	120	35	36	125	GP103_D5		
		GP103_D3	123	37	38	122	GP103_D2		
		GND		39	40	121	GPI03_D1		

As can be seen from the above table, i2c3\_m0 and uart3\_m0 are pin-multiplexed, and both cannot be turned on at the same time.

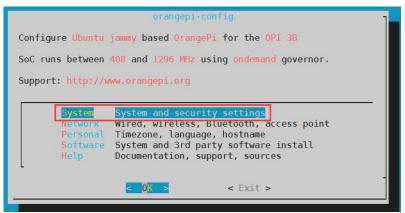
Please note that uart2\_m0 is used as the debugging serial port of the system by default. If the configuration of uart2 is turned on, the debugging serial port function will not be available.

2) In the linux system, the UART in the 40 pins is closed by default, and it needs to be opened manually to use. The detailed steps are as follows:

a. First run orangepi-config, common users remember to add sudo permission

#### orangepi@orangepi:~\$ sudo orangepi-config

b. Then select **System** 



c. Then select Hardware

Bootenv	Edit boot environment
CPU	Set CPU speed and governor
Avahi	Announce system in the network
Hardware	Toggle hardware configuration: UART, I2C, etc.
SSH	Reconfigure SSH daemon
Firmware	Run apt update & apt upgrade
ZSH	Install ZSH with plugins and tmux
Desktop	Disable desktop or change login type
	< OK > < Back >

d. Then use the arrow keys on the keyboard to navigate to the position shown in the figure below, and then use the space to select the UART configuration you want to open



of range Pi User Manual

f.

e. Then select **<Save>** Save



uart7-m2 uart9-m2	/
< Save >	< Back >
	uart9-m2

g. Then select **<Reboot>** Restart the system for the configuration to take effect

Applying changes
Reboot to enable new features?
<pre></pre>

3) After entering the Linux system, first confirm whether there is a device node corresponding to uart under /dev

orangepi@orangepi:~# ls /dev/ttyS\* /dev/ttyS1 /dev/ttyS3 /dev/ttyS7 /dev/ttyS9

4) Then start to test the uart interface, first use the DuPont line to short the rx and tx of the uart interface to be tested

	uart3	uart7	uart9
tx pin	Corresponding to	Corresponding to	Corresponding to
	pin 28	pin 16	pin 29
rx pin	Corresponding to	Corresponding to	Corresponding to
	pin 27	pin 15	pin 22



5) Use the **gpio serial** command to test the loopback function of the serial port as shown below, if you can see the following print, it means the serial port communication is normal

a. Test UART3

orange	pi@	orang	epi:~\$ sudo gpio serial /dev/ttyS3			
[sudo] password for orangepi: # enter password here						
[Sudo]	puss	woru				
Out:	0:	->	0			
Out:	1:	->	1			
Out:	2:	->	2			
Out:	3:	->	3			
Out:	4:	->	4			
Out:	5:	->	5^C			
b.	Te	st UA	IRT7			
orange	pi@	orang	epi:~\$ sudo gpio serial /dev/ttyS7			
[sudo]	pass	word	for orangepi: #enter password here			
Out:	0:	->	0			
Out:	1:	->	1			
Out:	2:	->	2			
Out:	3:	->	3			
Out:	4:	->	4			
Out:	5:	->	5^C			
С.	c. Test UART9					
orangepi@orangepi:~\$ sudo gpio serial /dev/ttyS9						
[sudo] password for orangepi: # enter password here						

Out: 0: -> 0

Out:	1:	->	1
Out:	2:	->	2
Out:	3:	->	3
Out:	4:	->	4
Out:	5:	->	5^C

#### 3. 16. 6. **PWM test method**

1) As can be seen from the table below, Orange Pi CM4 has two channels of pwm available pwm11 and pwm15

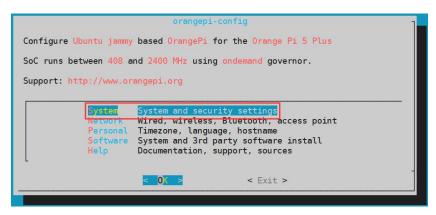
复用功能	复用功能	GPIO	GPIO序号	引脚序号	引脚序号	GPIO序号	GPIO	复用功能	复用功能
		3. 3V		1	2		5V		
	I2C2_SDA_M1	GPIO4_B4	140	3	4		5V		
	12C2 SCL M1	GPIO4_B5	141	5	6		GND		
	PWM15_IR_M1(fe700030)	GPIO4_C3	147	7	8	25	GPIO0_D1	UART2_TX_MO	
		GND		9	10	24	GPIO0_D0	UART2_RX_MO	
		GPIO3_C6	118	11	12	119	GP103_C7		
		GPIO4_A0	128	13	14		GND		
	UART7_TX_M2	GPI04_A2	130	15	16	131	GPI04_A3	UART7_RX_M2	
		3.3V		17	18	129	GPIO4_A1		
I2C4_SDA_H0	SPI3_MOSI_MO	GPIO4_B2	138	19	20		GND		
2010 0.007	SPI3_MISO_MO	GPIO4_B0	136	21	22	132	GPI04_A4	UART9_TX_M2	
12C4_SCL_10	SPI3_CLK_MO	GPIO4_B3	139	23	24	134	GPIO4_A6	SPI3_CS0_M0	
		GND		25	26	135	GPI04_A7	SPI3_CS1_M0	
UART3_RX_HO	I2C3_SDA_MO	GPI01_A0	32	27	28	33	GPI01_A1	12C3_SCL_M0	UART3_TX_MO
0.00	UART9_RX_M2	GPIO4_A5	133	29	30		GND		
		GPIO3_D4	124	31	32	144	GPIO4_CO	PWM11_IR_M1(fe6f0030)	
		GPIO3_D7	127	33	34		GND		
		GPIO3_D0	120	35	36	125	GPIO3_D5		
		GPIO3_D3	123	37	38	122	GPI03_D2		
		GND		39	40	121	GPI03_D1		

2) In the linux system, the PWM in the 40 pin is turned off by default, and it needs to be turned on manually before it can be used. The detailed steps are as follows:

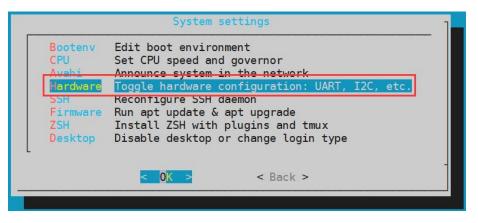
a. First run orangepi-config, common users remember to add sudo permission

#### orangepi@orangepi:~\$ sudo orangepi-config

b. Then selectSystem



c. Then select Hardware



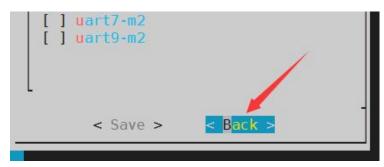
d. Then use the arrow keys on the keyboard to navigate to the position shown in the figure below, and then use the space to select the PWM configuration you want to open



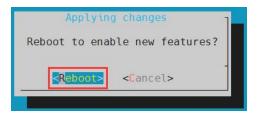
e. Then select **<Save>** Save



f. Then select **<Back>** 



g. Then select **<Reboot>** Restart the system for the configuration to take effect



3) After opening a pwm, there will be an extra pwmchipX in /sys/class/pwm/ (X is a specific number), for example, after opening pwm11, check the pwmchipX under /sys/class/pwm/ one becomes two

orangepi@o	rangepi:~\$ ls /sys/class/pwm/
pwmchip0	pwmchip1

4) Which of the above pwmchips corresponds to pwm11? Let's first check the output of the ls /sys/class/pwm/-l command, as shown below:

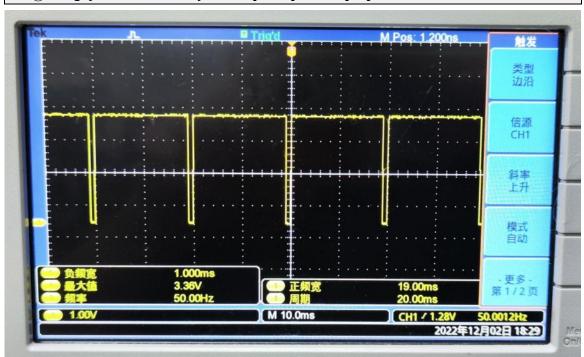
orangepi@orangepicm4:~\$ ls /s total 0	/s/class/pwm/ -l	
lrwxrwxrwx 1 root root 0 Jan	1 1970 pwmchip0 ->//devices/platform/fe6e0030.pwm/pwm/pwmchi	p0
lrwxrwxrwx 1 root root 0 Jan	1 1970 pwmchip1 ->//devices/platform/fe6f0030.pwm/pwm/pwmchip	p1

5) Then it can be known from the table below that the base address of the pwm11 register is fe6f0030, and then look at the output of the **ls /sys/class/pwm/ -l** command, you can see that pwmchip1 is linked to fe6f0030.pwm, so pwm11 corresponds to pwmchip as pwmchip1

引脚序号	GPIO序号	GPIO	复用功能	复用功能
2		57		
4		57		
6		GND		
8	25	GPIO0_D1	UART2_TX_MO	
10	24	GPIO0_D0	UART2_RX_MO	
12	119	GP103_C7		
14		GND		
16	131	GPIO4_A3	UART7_RX_M2	
18	129	GPIO4_A1		
20		GND		
22	132	GPIO4_A4	UART9_TX_M2	
24	134	GPIO4_A6	SPI3_CSO_MO	
26	135	GPIO4_A7	SPI3_CS1_MO	
28	33	GPIO1_A1	I2C3_SCL_MO	UART3_TX_MO
30		GND		
32	144	GPIO4_CO	PWM11_IR_M1(fe6f0030)	
34		GND		
36	125	GPIO3_D5		
38	122	GPIO3_D2		
40	121	GPIO3_D1		

6) Then use the following command to make pwm11 output a 50Hz square wave (please switch to the root user first, and then execute the following command)

root@orangepi:~# echo 0 > /sys/class/pwm/pwmchip1/export root@orangepi:~# echo 20000000 > /sys/class/pwm/pwmchip1/pwm0/period root@orangepi:~# echo 1000000 > /sys/class/pwm/pwmchip1/pwm0/duty\_cycle



root@orangepi:~# echo 1 > /sys/class/pwm/pwmchip1/pwm0/enable

7) The test method of pwm11 demonstrated above is similar to other pwm test methods.

## 3.17. How to install and use wiringOP-Python

wiringOP-Python is the Python language version of wiringOP, which is used to operate the hardware resources of the development board, such as GPIO, I2C, SPI and UART, in the Python program.

In addition, please note that all the following commands are operated under the root user.

3. 17. 1. **3.17.1.** How to install wiring**OP**-Python

1) First install the dependent packages

root@orangepi:~# **sudo apt-get update** 

root@orangepi:~# sudo apt-get -y install git swig python3-dev python3-setuptools

2) Then use the following command to download the source code of wiringOP-Python

Note that the following git clone--recursive command will automatically download the source code of wiringOP, because wiringOP-Python depends on

wiringOP. Please make sure that the download process does not report errors due to network problems.

If you have problems downloading the code from GitHub, you can directly use the wiringOP-Python source code that comes with the Linux image, and the storage location is: /usr/src/wiringOP-Python。

root@orangepi:~# git clone --recursive https://github.com/orangepi-xunlong/wiringOP-Python -b next

root@orangepi:~# cd wiringOP-Python

root@orangepi:~/wiringOP-Python# git submodule update --init --remote

3) Then use the following command to compile wiringOP-Python and install it into the Linux system of the development board

root@orangepi:~# cd wiringOP-Python

root@orangepi:~/wiringOP-Python# **python3 generate-bindings.py > bindings.i** root@orangepi:~/wiringOP-Python# **sudo python3 setup.py install** 

4) Then enter the following command, if there is help information output, it means that wiringOP-Python is installed successfully, press the q key to exit the help information interface

root@orangepi:~/wiringOP-Python# **python3 -c "import wiringpi; help(wiringpi)"** Help on module wiringpi:

NAME

wiringpi

DESCRIPTION

# This file was automatically generated by SWIG (http://www.swig.org).

# Version 4.0.2

#

# Do not make changes to this file unless you know what you are doing--modify # the SWIG interface file instead.

5) The steps to test whether wiringOP-Python is successfully installed under the python command line are as follows:

a. First use the python3 command to enter the command line mode of python3

### root@orangepi:~# python3

b. Then import the python module of wiringpi

## >>> import wiringpi;

c. Finally, enter the following command to view the help information of wiringOP-Python, press the q key to exit the help information interface

## >>> help(wiringpi)

Help on module wiringpi:

NAME

wiringpi

## DESCRIPTION

# This file was automatically generated by SWIG (http://www.swig.org).

# Version 4.0.2

#

# Do not make changes to this file unless you know what you are doing--modify # the SWIG interface file instead.

## CLASSES

builtins.object

GPIO

I2C Serial

nes

class GPIO(builtins.object)

```
GPIO(pinmode=0)
```

>>>

## 3. 17. 2. 40pin GPIO port test

wiringOP-Python is the same as wiringOP, you can also determine which GPIO pin to operate by specifying the wPi number, because there is no command to check the wPi number in wiringOP-Python, so you can only check the board wPi number and physical Correspondence between pins.

GPIO	wPi	Name	Mode	V	Phys	ical	V	Mode	Name	wPi	GPIO
	+ 	++   3.3V		+ 	++	1 2	+	+ 	+	+ 	+ 
140	0	SDA.2	IN	1	3	4	i		5V	1	1
141	1	SCL.2	IN	1	5	6	i i		GND	i	1
147	2	PWM15	IN	0	7	8	1	ALT1	RXD.2	3	25
	1	GND			9	10	1	ALT1	TXD.2	4	24
118	5	GPI03_C6	IN	0	11	12	0	IN	GPI03_C7	6	119
128	7	GPI04_A0	IN	0	13	14	i i		GND	į į	1
130	8	TXD.7	IN	0	15	16	0	IN	RXD.7	9	131
	1	3.3V			17	18	0	IN	GPI04_A1	10	129
138	11	SPI3_TXD	IN	0	19	20	1		GND	1	1
136	12	SPI3_RXD	IN	0	21	22	0	IN	TXD.9	13	132
139	14	SPI3_CLK	IN	0	23	24	0	IN	SPI3_CS1	15	134
	1	GND			25	26	0	IN	GPI04_A7	16	135
32	17	SDA.3	ALT1	1	27	28	1	ALT1	SCL.3	18	33
133	19	RXD.9	IN	0	29	30	1		GND	]	
124	20	GPI03_D4	IN	0	31	32	0	IN	PWM11	21	144
127	22	GPIO3_D7	IN	0	33	34			GND		
120	23	GPIO3_D0	IN	0	35	36	0	IN	GPI03_D5	24	125
123	25	GPIO3_D3	IN	0	37	38	0	IN	GPI03_D2	26	122
		GND		I	39	40	0	IN	GPIO3_D1	27	121

1) The following takes pin No. 7—the corresponding GPIO is GPIO4\_C3—the corresponding wPi number is 2—as an example to demonstrate how to set the high and low levels of the GPIO port

GPIO	wPi	Name	Mode	v	/	Phy	sic	al	V I	I	Mode	Name	wPi	GPIO
	++-			+	-+				+	-+-			-+	+
		3.3V		Ι.,	. [	1		2				5V		
140	0	SDA.2	IN	1		3	11 4	4				5V	1	
141	1 1	SCL.2	IN	1		5	11 (	б	Ì .	Ĩ		GND		Î.
147	2	PWM15	IN	0	)	7	1 8	8	1		ALT1	RXD.2	3	25
	i i	GND	-	1	1	9	11	10	1	i.	ALT1	TXD.2	4	24

2) The steps to test directly with the command are as follows

a. First set the GPIO port to output mode, where the first parameter of the **pinMode** function is the serial number of the wPi corresponding to the pin, and the second parameter is the GPIO mode

root@orangepi:~/wiringOP-Python# **python3 -c "import wiringpi**; \ from wiringpi import GPIO; wiringpi.wiringPiSetup(); \ wiringpi.pinMode(2, GPIO.OUTPUT); "

b. Then set the GPIO port to output low level. After setting, you can use a multimeter to measure the voltage value of the pin. If it is 0v, it means that the low level is set successfully.

root@orangepi:~/wiringOP-Python# python3 -c "import wiringpi; \ from wiringpi import GPIO; wiringpi.wiringPiSetup() ;\ wiringpi.digitalWrite(2, GPIO.LOW)"

c. Then set the GPIO port to output a high level. After setting, you can use a multimeter to measure the voltage value of the pin. If it is 3.3v, it means that the high level is set successfully.

root@orangepi:~/wiringOP-Python# python3 -c "import wiringpi; \ from wiringpi import GPIO; wiringpi.wiringPiSetup() ;\ wiringpi.digitalWrite(2, GPIO.HIGH)"

3) The steps to test in the python3 command line are as follows:

a. First use the python3 command to enter the command line mode of python3

root@orangepi:~# **python3** 

b. Then import the python module of wiringpi

>>> import wiringpi

>>> from wiringpi import GPIO

c. Then set the GPIO port to output mode, where the first parameter of the **pinMode** function is the serial number of the wPi corresponding to the pin, and the second parameter is the GPIO mode

>>> wiringpi.wiringPiSetup()

)

>>> wiringpi.pinMode(2, GPIO.OUTPUT)

d. Then set the GPIO port to output a low level. After setting, you can use a multimeter to measure the voltage value of the pin. If it is 0v, it means that the low level is set successfully.

>>> wiringpi.digitalWrite(2, GPIO.LOW)

e. Then set the GPIO port to output a high level. After setting, you can use a multimeter to measure the voltage value of the pin. If it is 3.3v, it means that the high level is set successfully.

>>> wiringpi.digitalWrite(2, GPIO.HIGH)

4) The method of setting GPIO high and low levels in the python code by wiringOP-Python can refer to the **blink.py** test program in the examples below. The **blink.py** test program will set the voltage of all GPIO ports in the 40 pins of the development board to change continuously.

root@orangepi:~/wiringOP-Python# cd examples

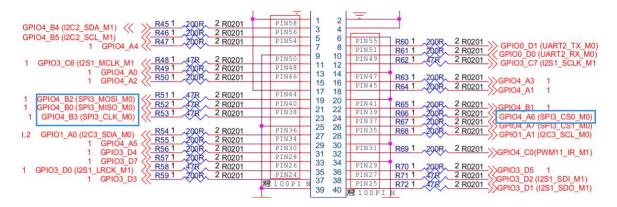
root@orangepi:~/wiringOP-Python/examples# ls blink.py

### blink.py

root@orangepi:~/wiringOP-Python/examples# python3 blink.py

## 3. 17. 3. 40pin SPI test

1) According to the schematic diagram of the 40pin interface, the spi available for Orange Pi CM4 is spi3



2) In the linux system, the SPI in the 40 pin is closed by default, and it needs to be opened manually to use it. The detailed steps are as follows:

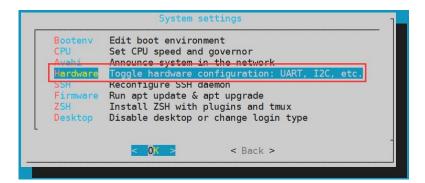
a. First run orangepi-config, common users remember to add sudo permission

orangepi@orangepi:~\$ sudo orangepi-config

b. Then select **System** 



c. Then select Hardware



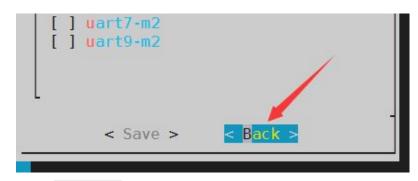
d. Then use the arrow keys on the keyboard to navigate to the position shown in the figure below, and then use the space to select the SPI configuration you want to open



e. Then select **<Save>**Save

uart7-m2 uart9-m2		
 < Save >	< Back >	

f. Then select **<Back>** 



g. Then select **< Reboot>** Restart the system for the configuration to take effect

new features?
-
Cancel>

3) First check whether there is a **spidev3.0** device node in the Linux system. If it exists, it means that SPI3 has been set up and can be used directly

```
orangepi@orangepi:~$ ls /dev/spidev3.0
/dev/spidev3.0
```

4) Then you can use the **spidev\_test.py** program in the examples to test the loopback function of the SPI. The **spidev\_test.py** program needs to specify the following two parameters:

a. -- channel: Specify the channel number of SPI

b. -- port: Specify the port number of SPI

5) Do not short-circuit the mosi and miso pins of SPI3, the output of running spidev\_test.py is as follows, you can see that the data of TX and RX are inconsistent

6) Then use the Dupont wire to short-circuit the two pins of txd (pin 19 in the 40pin interface) and rxd (pin 21 in the 40pin interface) of SPI3 and then run the output of spidev\_test.py as follows, you can see The data sent and received are the same, indicating that the SPI3 loopback test is normal

root@orangepi:~/wiringOP-Python# cd examples

root@orangepi:~/wiringOP-Python/examples# python3 spidev\_test.py \

--channel 3 --port 0

spi mode: 0x0

max speed: 500000 Hz (500 KHz)

Opening device /dev/spidev3.0

## 3. 17. 4. 40pin I2C test

1) As can be seen from the table below, the available i2c for Orange Pi CM4 is i2c2, i2c3 and i2c4, a total of three sets of i2c buses

复用功能	复用功能	GPIO	<b>GPIO序号</b>	引脚序号	引脚序号	GPIO序号	GPIO	复用功能	复用功能
		3.3V		1	2		57		
	I2C2_SDA_M1	GPIO4_B4	140	3	4		57		
	12C2 SCL M1	GPIO4_B5	141	5	6		GND		
	PWM15_IR_M1(fe700030)	GPI04_C3	147	7	8	25	GP100_D1	UART2_TX_MO	
		GND		9	10	24	GPIO0_D0	UART2_RX_MO	
		GP103_C6	118	11	12	119	GP103_C7		
		GPIO4_A0	128	13	14		GND		
	UART7_TX_M2	GPIO4_A2	130	15	16	131	GPI04_A3	UART7_RX_M2	
		3.3V		17	18	129	GPI04_A1		
I2C4_SDA_MO	SPI3_MOSI_M0	GPI04_B2	138	19	20		GND		
	SPI3_NISO_NO	GPIO4_B0	136	21	22	132	GPIO4_A4	UART9_TX_M2	
I2C4_SCL_M0	SPI3_CLK_MO	GPI04_B3	139	23	24	134	GPI04_A6	SPI3_CS0_MO	
		GND		25	26	135	GPI04_A7	SPI3 CS1 MO	
UART3_RX_MO	I2C3_SDA_MO	GPI01_A0	32	27	28	33	GPI01_A1	I2C3_SCL_M0	UART3_TX_MO
	UART9_RX_M2	GPIO4_A5	133	29	30		GND		
		GPIO3_D4	124	31	32	144	GPI04_C0	PWM11_IR_W1(fe6f0030)	
		GP103_D7	127	33	34		GND		
		GPIO3_D0	120	35	36	125	GP103_D5		
		GP103_D3	123	37	38	122	GP103_D2		
		GND		39	40	121	GPI03_D1		

As can be seen from the above table, i2c4\_m0 and spi3\_m0 are multiplexed pins, and both cannot be opened at the same time. i2c3\_m0 and uart3\_m0 are also multiplexed pins, and both cannot be opened at the same time

2) In the linux system, the I2C bus in the 40 pin is closed by default, and it needs to be

opened manually to use it. The detailed steps are as follows:

a. First run orangepi-config, common users remember to add sudo permission

#### orangepi@orangepi:~\$ sudo orangepi-config

b. Then select **System** 



c. Then select Hardware

	System settings
Bootenv CPU Avahi	Edit boot environment Set CPU speed and governor Announce system in the network
Hardware	Toggle hardware configuration: UART, I2C, etc.
SSH Firmware ZSH Desktop	Reconfigure SSH daemon Run apt update & apt upgrade Install ZSH with plugins and tmux Disable desktop or change login type
	< O <mark>K &gt;</mark> < Back >

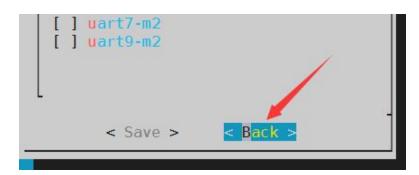
d. Then use the arrow keys on the keyboard to navigate to the position shown in the figure below, and then use the space to select the I2C configuration you want to open

[]	i2c2-m1		
[]	i2c3-m0		
[]	i2c4-m0		

e. Then select **<Save>** Save



f. Then select <Back>



g. Then select **<Reboot>** Restart the system for the configuration to take effect

Applying changes	1
Reboot to enable new features?	
<pre><reboot> <cancel></cancel></reboot></pre>	-
<pre><reboot> <cancel></cancel></reboot></pre>	

3) After starting the Linux system, first confirm that there is an i2c device node under /dev

orangepi@orangepi:~# ls /dev/i2c-\* /dev/i2c-0 /dev/i2c-2 /dev/i2c-3 /dev/i2c-4 /dev/i2c-6

4) Then connect an i2c device to the i2c pin of the 40pin connector, here we take the ds1307 RTC module as an example

	i2c2-m1	i2c3-m0	i2c4-m0
Sda pin	Corresponding	Corresponding	Corresponding
	to pin 3	to pin 27	to pin 19
Sck pin	Corresponding	Corresponding	Corresponding
	to pin 5	to pin 28	to pin 28
Vcc pin	Corresponding	Corresponding	Corresponding
	to pin 1	to pin 1	to pin 1
Gnd pin	Corresponding	Corresponding	Corresponding
	to pin 6	to pin 6	to pin 6



5) Then use the **i2cdetect -y** command, if the address of the connected i2c device can be detected, it means that i2c can be used normally

orangepi@orang	gepi:	~\$ \$	sudo	o i20	cdet	ect -	y 2		#i2	2c2	con	nma	nd			
orangepi@orang	gepi:	~\$ s	sudo	o i20	cdet	ect -	-y 3		#i2	2c3	con	nma	nd			
orangepi@orang	gepi:	~\$ 5	sudo	o i20	cdet	ect -	-y 4		#i	2c4	con	nma	nd			
roo	t@o	rang	gep	icm	4:~;	# i	2cd	ete	ct	- y	4					
	0	1	2	3	4	5	6	7	8	9	а	b	С	d	e	f
00:																
10:																
20:								( <b>1</b> 12)								0414
30:									38							Sec. 73
40:																
50:																
60:												20 <b>-</b> 20-20				0.010
70:																

6) Then you can run the ds1307.py test program in the examples to read the RTC time

root@orangepi:~/wiringOP-Python# cd examples

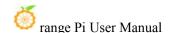
```
root@orangepi:~/wiringOP-Python/examples# python3 ds1307.py --device \
```

"/dev/i2c-4"

Thu 2023-01-05 14:57:55 Thu 2023-01-05 14:57:56 Thu 2023-01-05 14:57:57 ^C exit

# 3. 17. 5. 40pin UART test

1) As can be seen from the table below, the available uarts for Orange Pi CM4 are uart2, uart3, uart7 and uart9, a total of four groups of uart buses, of which uart2 is the system' s debugging serial port by default.



复用功能	复用功能	GPIO	<b>GPIO序号</b>	引脚序号	引脚序号	<b>GPIO序号</b>	GPIO	复用功能	复用功能
		3.3₹		1	2		5V		
	I2C2_SDA_M1	GPIO4_B4	140	3	4		5V		
	I2C2_SCL_M1	GPIO4_B5	141	5	6		GND		
	PWM15_IR_M1(fe700030)	GPIO4_C3	147	7	8	25	GP100_D1	UART2_TX_MO	
		GND		9	10	24	GPIO0_D0	UART2_RX_MO	
		GP103_C6	118	11	12	119	GP103_C7		
		GPIO4_A0	128	13	14		GND		
	UART7_TX_M2	GPIO4_A2	130	15	16	131	GPI04_A3	UART7_RX_M2	
		3.3V		17	18	129	GPI04_A1		
I2C4_SDA_MO	SPI3_MOSI_MO	GPIO4_B2	138	19	20		GND		
	SPI3_MISO_MO	GP104_B0	136	21	22	132	GPIO4_A4	UART9 TX M2	
12C4_SCL_10	SPI3_CLK_MO	GPIO4_B3	139	23	24	134	GPIO4_A6	SPI3_CS0_MO	
-		GND		25	26	135	GPIO4_A7	SPI3_CS1_MO	-
UART3_RX_MO	I2C3_SDA_MO	GPIO1_A0	32	27	28	33	GPI01_A1	12C3_SCL_M0	UART3_TX_MO
	UART9_RX_M2	GPIO4_A5	133	29	30		GND		
		GPIO3_D4	124	31	32	144	GPI04_C0	PWM11_IR_M1(fe6f0030)	
		GP103_D7	127	33	34		GND		
		GPIO3_D0	120	35	36	125	GPI03_D5		
		GPIO3_D3	123	37	38	122	GP103_D2		
		GND		39	40	121	GPI03_D1		

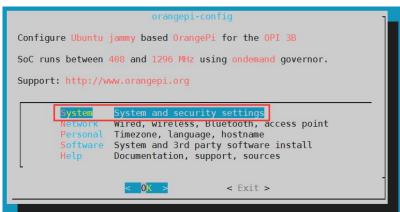
As can be seen from the above table, i2c3\_m0 and uart3\_m0 are pin-multiplexed, and both cannot be turned on at the same time.

Please note that uart2\_m0 is used as the debugging serial port of the system by default. If the configuration of uart2 is turned on, the debugging serial port function will not be available.

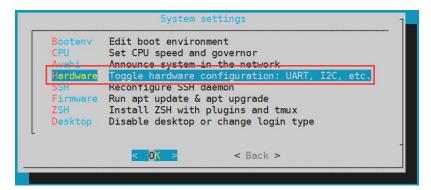
2) In the linux system, the UART in the 40 pins is closed by default, and it needs to be opened manually to use. The detailed steps are as follows:

a. First run **orangepi-config**, common users remember to add **sudo** permission orangepi@orangepi:~\$ **sudo orangepi-config** 

b. Then select System



c. Then select Hardware



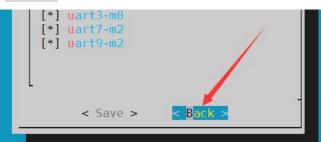
d. Then use the arrow keys on the keyboard to navigate to the position shown in the figure below, and then use the space to select the UART configuration you want to open



e. Then select<Save> Save

[*] uart3-m0 [*] uart7-m2 [*] uart9-m2	
l	
< Save >	< Back >

f. Then select **<Back>** 



g. Then select<Reboot>Restart the system for the configuration to take effect

Applying changes	1
Reboot to enable new features	s?
	-
<reboot> <cancel></cancel></reboot>	

3) After entering the Linux system, first confirm whether there is a device node

corresponding to uart under /dev

orangepi@orangepi:~# ls /dev/ttyS\*

/dev/ttyS1 /dev/ttyS3 /dev/ttyS7 /dev/ttyS9

4) Then start to test the uart interface, first use the DuPont line to short the rx and tx of the uart interface to be tested

	uart3	uart7	uart9
tx pin	Corresponding to	Corresponding to	Corresponding to
	pin 28	pin 16	pin 29
rx pin	Corresponding to	Corresponding to	Corresponding to
	pin 27	pin 15	pin 22



5) Use the **serialTest.py** program in the examples to test the loopback function of the serial port as shown below. If you can see the following print, it means that the serial port communication is normal

a. Test UART3

```
root@orangepi:~/wiringOP-Python/examples# python3 serialTest.py --device \
"/dev/ttyS3"
Out:
       0: ->
               0
Out:
       1: ->
               1
Out:
       2: ->
               2
       3: ->
               3
Out:
       4:^C
Out:
exit
```

b. Test UART7

root@orangepi:~/wiringOP-Python/examples# **python3 serialTest.py --device** \ "/**dev/ttyS7**"

Out: 0: -> 0

🍏 <sub>ra</sub>	ange Pi U	Jser Manual	Copyright reserved by Shenzhen Xunlong Software Co., Ltd
Out:	1: ->	1	
	2: ->		
	3: ->		
	4:^C		
exit			
c.	Test U	JART9	
root@c	orangepi	:~/wiringOP-Pytho	n/examples# python3 serialTest.pydevice \
"/dev/1	ttyS9"		
Out:	0: ->	0	
Out:	1: ->	1	
Out:	2: ->	2	
Out:	3: ->	3	
Out:	4:^C		
exit			

# 3. 18. Hardware watchdog test

The watchdog\_test program is pre-installed in the Linux system released by Orange Pi, which can be tested directly.

The method to run the watchdog\_test program is as follows:

a. The second parameter 10 indicates the counting time of the watchdog. If the dog is not fed within this time, the system will restart

b. We can feed the dog by pressing any key on the keyboard (except ESC). After feeding the dog, the program will print a line of keep alive to indicate that the dog is fed successfully

```
orangepi@orangepi:~$ sudo watchdog_test 10
open success
options is 33152,identity is sunxi-wdt
put_usr return,if 0,success:0
The old reset time is: 16
return ENOTTY,if -1,success:0
return ENOTTY,if -1,success:0
```

put\_user return,if 0,success:0 put\_usr return,if 0,success:0 keep alive keep alive keep alive

# 3. 19. Check the serial number of RK3566 chip

The command to view the serial number of the RK3566 chip is as follows. The serial number of each chip is different, so the serial number can be used to distinguish multiple development boards.

```
orangepi@orangepi:~$ cat_serial.sh
Serial : 8fa18eaf489041f0
```

# 3. 20. How to install Docker

1) The linux image provided by Orange Pi has pre-installed Docker, but the Docker service is not enabled by default

2) Use the **enable\_docker.sh**script to enable the docker service, and then you can start using the docker command, and the docker service will be automatically started when the system is started next time

orangepi@orangepi:~\$ enable\_docker.sh

3) Then you can use the following command to test docker, if you can run hello-world, it means that docker can be used normally

orangepi@orangepi:~\$ docker run hello-world

Unable to find image 'hello-world:latest' locally

latest: Pulling from library/hello-world

256ab8fe8778: Pull complete

Digest:

sha256:7f0a9f93b4aa3022c3a4c147a449ef11e0941a1fd0bf4a8e6c9408b2600777c5

Status: Downloaded newer image for hello-world:latest

Hello from Docker! This message shows that your installation appears to be working correctly.

# 3.21. How to download and install arm64 version balenaEtcher

- 1) The download address of balenaEtcher arm64 version is:
  - a. The download address of the deb installation package is as follows, which needs to be installed before it can be used

https://github.com/Itai-Nelken/BalenaEtcher-arm/releases/download/v1.7.9/balena-e tcher-electron 1.7.9+5945ab1f arm64.deb

The download address of the AppImage version that does not need to be installed b. is as follows:

https://github.com/Itai-Nelken/BalenaEtcher-arm/releases/download/v1.7.9/balenaE tcher-1.7.9+5945ab1f-arm64.AppImage

May 1 ● ryanfortner ◇ v1.7.9 • 9529280 ⊘	<b>balenaEtcher v1.7.9</b> Latest Update and rename compile-etcher_v1.7.3.sh to compile-etcher_v1.7.	9.sh	
Compare 🔻	<ul> <li>▼ Assets 10</li> <li> <sup>10</sup> </li> <li> <sup>10</sup> </li> </ul>	64.3 MB	May 1
	Dalena-etcher-electron-1.7.9+5945ab1f.armv7l.rpm	58.4 MB	May 1
	Salena-etcher-electron_1.7.9+5945ab1f_arm64.deb	87.9 MB	May 1
	<pre> @balena-etcher-electron_1.7.9+5945ab1f_armv7l.deb </pre>	76.5 MB	May 1
	SalenaEtcher-1.7.9+5945ab1f-arm64.AppImage	97.3 MB	May 1
	Delta Balena Etcher-1.7.9+5945ab1f-armv7l.AppImage	80.9 MB	May 1

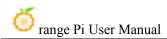
2) How to install and use the deb version of balenaEtcher:

The deb version of balenaEtcher installation command is as follows: a.

orangepi@orangepi:~\$ sudo apt install -y \

### -fix-broken ./balena-etcher-electron 1.7.9+5945ab1f arm64.deb

After the deb version of balenaEtcher is installed, it can be opened in the b. Application





c. The interface after balenaEtcher is opened is as follows:

8		balenaEtcher		+ - ×
		🌍 balena Etcher		¢Ø
	<b>÷</b> —	_	- 4	
	Flash from file			
	🔊 Flash from URL			
	🕼 Clone drive			

- 3) How to use AppImage version of balenaEtcher:
  - a. First add permissions to balenaEtcher

orangepi@orangepi:~/Desktop\$ chmod +x balenaEtcher-1.7.9+5945ab1f-arm64.AppImage

b. Then select the AppImage version balenaEtcher, then click the right mouse button, and then click Execute to open balenaEtcher

	裔 Execute	
her-1	Open With Other Application.	
blf	🖌 Cut	
arm64 pplma	탄 Copy	
	Move to Trash	
	🗵 Delete	
	<u>R</u> ename	
	Properties	
	Applications	•

# 3. 22. How to install BaoTa Linux panel

BaoTa Linux panel is a server management software that improves the efficiency of operation and maintenance. It supports one-click configuration of more than 100 server management functions such as LAMP/LNMP/cluster/monitoring/website/FTP/database/JAVA (excerpted from BaoTa Linux official website)

1) First, you need to expand the size of the/tmp space. After setting, you need to restart the linux system of the development board. The command is as follows:

orangepi@orangepi:~\$ sudo sed -i 's/nosuid/&,size=2G/' /etc/fstab orangepi@orangepi:~\$ sudo reboot

2) After restarting, you can see that the size of /tmp space has changed to 2G
orangepi@orangepi:~\$ df -h | grep "/tmp"
tmpfs
2.0G
12K
2.0G
1% /tmp

3) Then enter the following command in the Linux system to start the installation of the BaoTa

orangepi@orangepi:~\$ sudo install\_bt\_panel.sh

4) Then the installer will remind whether to install **Bt-Panel** to the /www folder, and then enter y

+-----

Bt-WebPanel FOR CentOS/Ubuntu/Debian

+-----

Copyright © 2015-2099 BT-SOFT(http://www.bt.cn) All rights reserved.

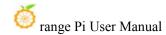
+-----

The WebPanel URL will be http://SERVER\_IP:8888 when installed.

+-----

Do you want to install Bt-Panel to the /www directory now?(y/n): y

5) The next thing to do is to wait patiently. When you see the following print information



output from the terminal, it means that the BaoTa has been installed. The entire installation process takes about 34 minutes, and there may be some differences depending on the network speed

username: 4qhagfrc password: 27b2d026 If you cannot access the panel, release the following panel port [29920] in the security group
If you cannot access the panel,
release the following panel port [29920] in the security group
若无法访问面板,请检查防火墙/安全组是否有放行面板[29920]端口 因已开启面板自签证书,访问面板会提示不匹配证书,请参考以下链接配置证 https://www.bt.cn/bbs/thread-105443-1-1.html

6) At this time, enter the panel address shown above in the browser to open the login interface of the BaoTa Linux panel, and then enter the **username** and **password** shown in the above figure at the corresponding position to log in.

章 宝塔Linux面板 × +		~ .	- 0
← → C △ ▲ 不安全   https://192.168.1.166:29920/52024d59		6 \$	
_			
	宝塔Linux面板		
	账号		
	売码		
	登录		
	<u>忘记密码&gt;&gt;</u>		

7) After successfully logging into the pagoda, the following welcome interface will pop up. First, please read the user notice in the middle and drag it to the bottom, then you can select "I have agreed and read the "User Agreement"", and then click "Enter the panel" You can enter the BaoTa



0

8) If you do not have an account, you can go to the official website of the BaoTa (http://www.aapanel.com/)to register

← → C ☆ ▲	不安全   https://192.168.1.166:29920/bind	Ŕ	\$ •
192.168.1.166 0			
い 首页	▲ 宣编團級作多功定額來級于實質,將是仅原于力卻還供更好的團級服务体验,不涉及卻服务醫公問或影倫書。 請做心使用。		
③ 网站	▲ 王州市代け今小田市が低す「¥R」が至此がオメロシドルビザジスを知られた」、小ジルとおび第三けのに作用。 おびしたけ。		
≜ FTP	绑定宝塔帐号		
◎ 数据库	学机器		
圆 監控	2000 2000		
☑ 安全	常用		
🛡 WAF	留录		
□ 文件	水角解闷,免费注册		
息 日志	<ul> <li>为了您能愿好给件批票积功能。请先哪些压得积极;</li> </ul>		
四 终端	<ul> <li>単个重容殊号支持多台旗号器構成:</li> <li>・ 規定教告決合論電影発展的功能反応、満該心使用:</li> </ul>		
□ 计划任务	<ul> <li>社會認定过程中國則同國論就將案權公理;</li> </ul>		
	<ul> <li>春期雨油:0769-2030556</li> <li>糸割肉油: 豊新二油()</li> </ul>		
88 软件商店			
面板设置			
⊖ 退出			
	宮垣Linux編板 © 2014-2023 广东運程安全技术有限公司 (bt.cn) 论坛求助   使用手册   微価公众号   正成音画   傷局QQ際: 907340327		

9) The final displayed interface is as shown in the figure below. You can intuitively see some status information of the Linux system on the development board, such as load status, CPU usage, memory usage, and storage space usage, etc.

會 宝塔Linux面板	× +						~ - 0
- > C & .	不安全   https://192.168.1.166:29920						@ ☆ □ ≗
j 192.168.1.166 🧕	A 157****4643 🧧 邀请認助 💧	系统: Orange Pi 1.0.0 Bullseye aarch64(Py3.	7.16) 已不间断运行: 0天			⊕ 企业版 免费版	7.9.10 更新 修复 重启
命 首页							
◎ 网站	状态						
≜ FTP	负载状态 📀	CPU使用率	内存便用率	/	/va	r/log	
3 数据库					(		
监控	16%	2%	33%	35%	5	B%	
) 安全	运行流畅	4 核心	490 / 1483(MB)	4.91G / 14.38G	0.03G	/ 0.05G	
WAF							
	概览						
7 文件	概览						
7 文件 8 日志	概览	FTP	数据库	安	全风险		
7 文件 8 日志		FTP O	数据库 0		全风脸 <b>12</b>		
7 文件 3 日志 3 终端	网站						
<ul> <li>文件</li> <li>日志</li> <li>1 终端</li> <li>1 计划任务</li> </ul>	网站				12		全部
<ul> <li>WAF</li> <li>文件</li> <li>日志</li> <li>休録</li> <li>计切任务</li> <li>软件商店</li> <li>面板设置</li> </ul>	网站 0				12		全部

10) For more functions of the pagoda, you can refer to the following information to explore by yourself

Manual: http://docs.bt.cn Forum address: https://www.bt.cn/bbs GitHub Link: https://github.com/aaPanel/BaoTa

# 3. 23. Setting Chinese environment and installing Chinese input method

Note, before installing the Chinese input method, please make sure that the Linux system used by the development board is a desktop system.

## 3. 23. 1. How to install Debian system

- 1) First set the default **locale** to Chinese
  - a. Enter the following command to start the configuration locale

### orangepi@orangepi:~\$ sudo dpkg-reconfigure locales

b. Then select zh\_CN.UTF-8 UTF-8 in the pop-up interface (move up and down through the up and down direction keys on the keyboard, select through the space bar, and finally move the cursor to <OK>through the Tab key, and then return to car)

	Configuring locales		
Locales are a framework to switch betw etc.		$^{\prime}$ use their language, country, characters, collation order	r,
	e. UTF-8 locales should be chosen by def tibility with older systems and software	ault, particularly for new installations. Other character .	
Locales to be generated:			
<pre>[ ] xh_ZA ISO-8859-1 [ ] xh_ZA,UTF-8 UTF-8 [ ] yi_US.UTF-8 UTF-8 [ ] yi_US.UTF-8 UTF-8 [ ] yu_HK UTF-8 [ ] yu_FG UTF-8 [ ] zh_CN.6682312 [ ] zh_CN.66818030 6B18030 [ ] zh_CN.664 664 [ ] zh_CN.0FF-8 UTF-8 [ ] zh_SG.684K 664 [ ] zh_SG.604K 748 [ ] zh_SG.604K 748 [ ] zh_SG.604K 748 [ ] zh_TN BIGS [ ] zu_ZA ISO-8859-1 [ ] zu_ZA.UTF-8 UTF-8</pre>			
	<0k>	<cancel></cancel>	

## c. Then set the default locale as zh\_CN.UTF-8

Many packages in Debian use locales to display text in the from the generated locales.	Configuring locales correct language for the user. You can choose a default locale for the system			
This will select the default language for the entire system. If this system is a multi-user system where not all users are able to speak the default language, they will experience difficulties.				
Default locale for the system environment:				
	None C.UTF-8 Zh_CNLUTF-8			
<0k>	<cancel></cancel>			

d. After exiting the interface, the **locale** setting will start, and the output displayed on the command line is as follows

orangepi@orangepi:~\$ sudo dpkg-reconfigure locales

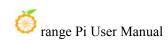
Generating locales (this might take a while)...

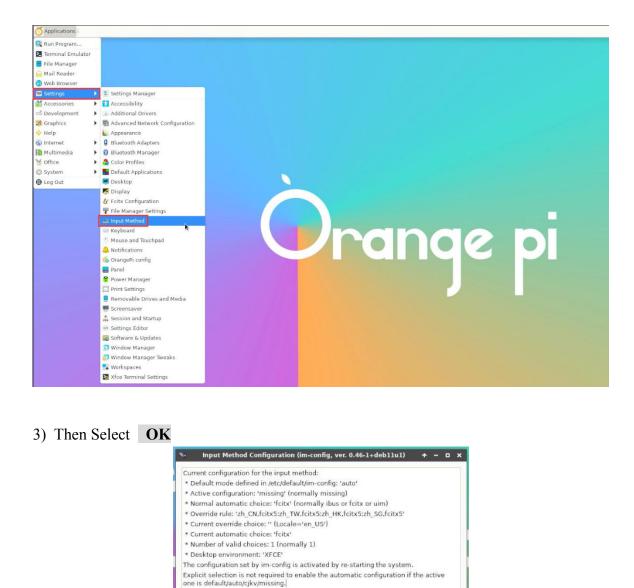
en\_US.UTF-8... done

zh CN.UTF-8... done

Generation complete.

2) Then open Input Method

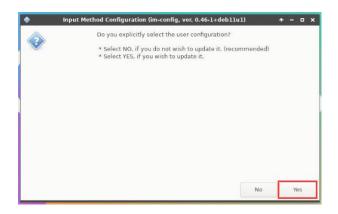




4) Then Select Yes

Cancel

OK



## 5) Then Select fcitx

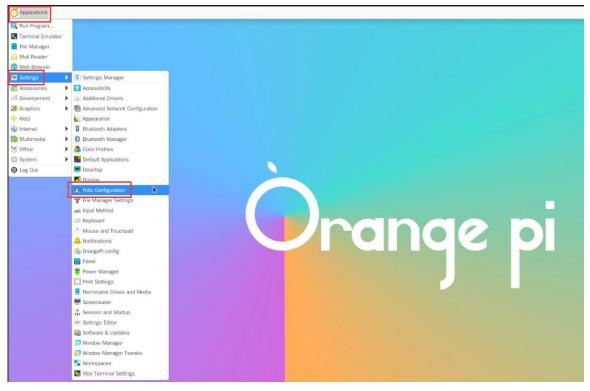
select	name	description
0000	default auto cjkv REMOVE fcitx none xim	use auto mode set by /etc/default/im-config activate IM with @-mark in its description use auto mode based on locale and desktop remove IM user configuration /home/orangepi/.xinputrc activate Flexible Input Method Framework (fcitx) @ do not set any IM from im-config and use desktop default activate the bare XIM with the X Keyboard Extension
		Cancel OK

6) Then Select OK

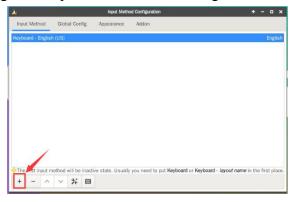
0	Input Method Configuration (im-config, ver. 0.46-1+deb1lu1) 🛧 – 🗆 🗙
Set	ing the user configuration /home/orangepi/.xinputrc to fcitx.
Mai	nual configuration selects: fcitx
Fle	vible Input Method Framework (fcitx)
* R	equired for all: fcitx
* L	anguage specific input conversion support:
*	Simplified Chinese: fcitx-libpinyin or fcitx-sunpinyin or fcitx-googlepinyin
*	Traditional Chinese / generic Chinese: fcitx-rime
*	Generic keyboard translation table: fcitx-table* packages
* A	pplication platform support:
In	stalling fcitx-frontend-all will cover all GUI platforms.
*	GNOME/GTK: fcitx-frontend-gtk2 and fcitx-frontend-gtk3 (both)
*	KDE/Qt5: fcitx-frontend-qt5
The	user configuration is modified by im-config.
Res	tart the session to activate the new user configuration.
	Cancel OK

7) Then restart the Linux system to make the configuration take effect

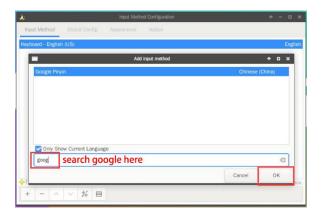
## 8) Then open Fcitx configuration



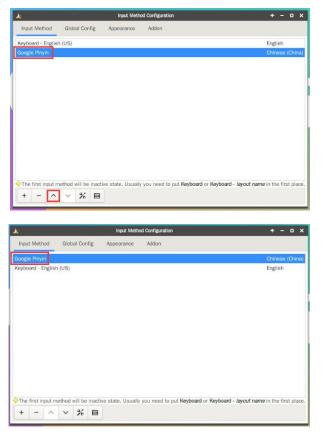
9) Then click the + sign in the position shown in the figure below



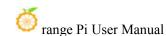
10) Then search Google Pinyin and click OK



11) Then bring**Google Pinyin** to the front

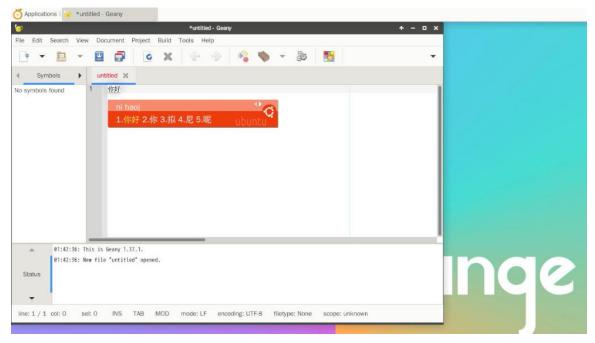


12) Then open the Geany editor to test the Chinese input method



🔍 Run Program							
Terminal Emulat	or.						
File Manager							
🗟 Mail Reader							
Web Browser							
9 Settings	•						
🔀 Accessories	· •	_	1	1	1	1	• • • • • • • • • • • • • • • • • • •
🚅 Development	🕨 🥶 (	Geany		· · ·	· · · · ·	•	•
Sraphics	· -				•		
🔶 Help		<b>k</b>					
Internet	•	27					
Multimedia	- F						
office	•						
System	•						
C Log Out							

13) The Chinese input method test is as follows

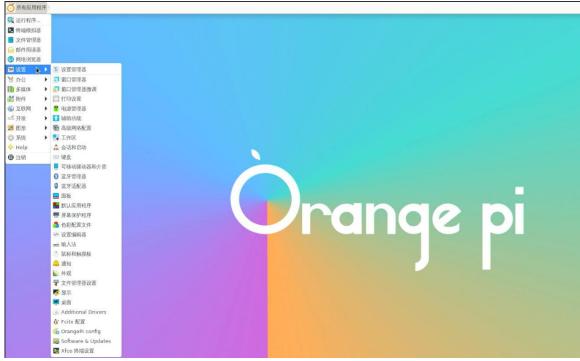


14) The Chinese and English input methods can be switched through the **Ctrl+Space** shortcut key

15) If the entire system needs to be displayed in Chinese, you can set the variables in /etc/default/locale to zh\_CN.UTF-8

orangepi@orangepi:~\$ sudo vim /etc/default/locale # File generated by update-locale LC\_MESSAGES=zh\_CN.UTF-8 LANG=zh\_CN.UTF-8

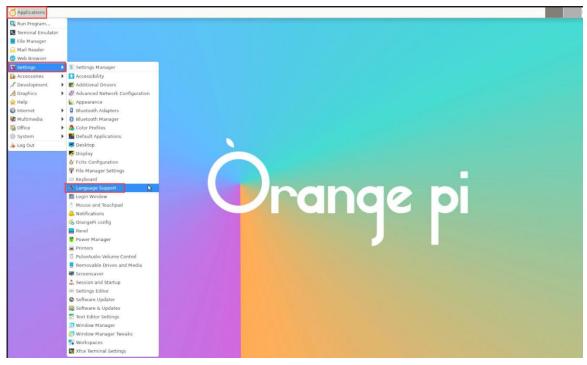
## LANGUAGE=zh\_CN.UTF-8

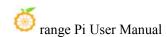


#### 16) Then restart the system and you can see that the system is displayed in Chinese

# 3. 23. 2. How to install Ubuntu 20.04 system

## 1) Open first Language Support





2) Then find the **Chinese (China)** option

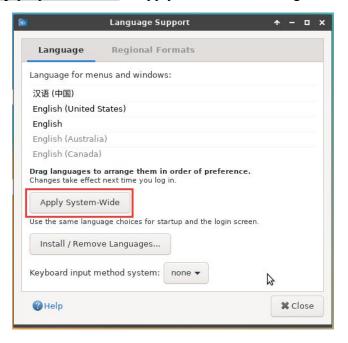
	Language Support		<b>*</b> -	• ×
Language	<b>Regional Formats</b>			
Language for me	nus and windows: /			
English (United	Kingdom)			
汉语 (中国)				
中文 (香港)				
中文 (臺灣)				
Drag languages t	o arrange them in order o	f preference.		1
Drag languages t	t next time you log in.	f preference.		
Drag languages t Changes take effec Apply System	t next time you log in.			
Drag languages t Changes take effec Apply System Use the same lang	t next time you log in. Wide			
Drag languages t Changes take effec Apply System Use the same lang	t next time you log in. Wide lage choices for startup and re Languages	the login screen.		

3) Then please use the left mouse button to select **Chinese (China)** and hold it down, then drag it up to the initial position, and the display after dragging is as shown in the figure below:

	Language Su	pport		*	-	•	>
Language	Regional Fo	ormats					
Language for me	nus and window	s:					
汉语 (中国)							
English (United	States)						
English							
English (Austral	ia)						
English (Canada	1						
		order of r	reference				
Drag languages t Changes take effect Apply System	o arrange them ir t next time you log		oreference.				
Drag languages t Changes take effec	o arrange them in t next time you log -Wide	in.					
Drag languages t Changes take effect Apply System Use the same lang	o arrange them in t next time you log -Wide	in.					
Drag languages t Changes take effect Apply System Use the same lang	o arrange them in t next time you log -Wide uage choices for st ve Languages	in.					

Note that this step is not easy to drag, please be patient and try a few more times.

4) Then select **Apply System-Wide** to apply the Chinese settings to the entire system

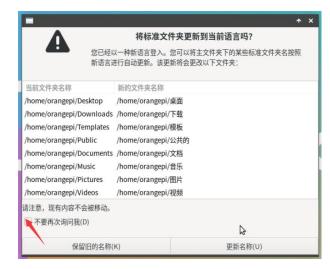


5) Then set Keyboard input method system as fcitx

<b>1</b> 0		Language Su	ipport		*	-		×
	Language	Regional Fo	ormats					
Li	anguage for me	nus and window	s:					
3	又语 (中国)							
E	English (United S	states)						
E	English							
E	English (Australi	a)						
E	English (Canada)							
	rag languages to hanges take effect Apply System-	next time you log		preference.				
U	se the same langu	age choices for st	artup and t	he login screen.				
	Install / Remov	e Languages	fcitx	\$				
ĸ	eyboard input m	ethod system:	none					
(	7 Help				1	K cl	ose	

- 6) Then restart the Linux system to make the configuration take effect
- 7) After re-entering the system, please choose not to ask me again in the following

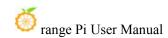
interface, and then please decide whether the standard folder should also be updated to Chinese according to your preferences

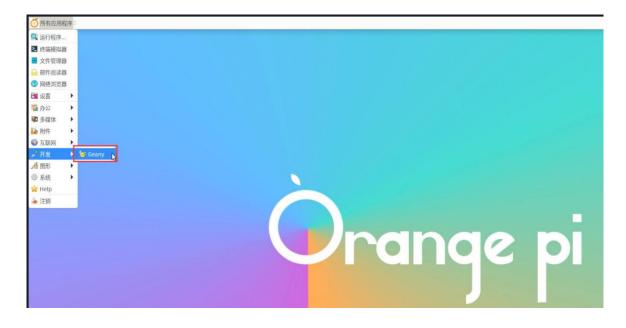


8) Then you can see that the desktop is displayed in Chinese

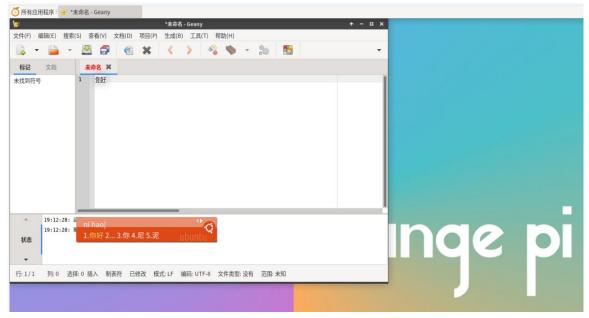


9) Then we can open **Geany** to test the Chinese input method, the opening method is as shown in the figure below

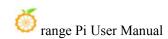


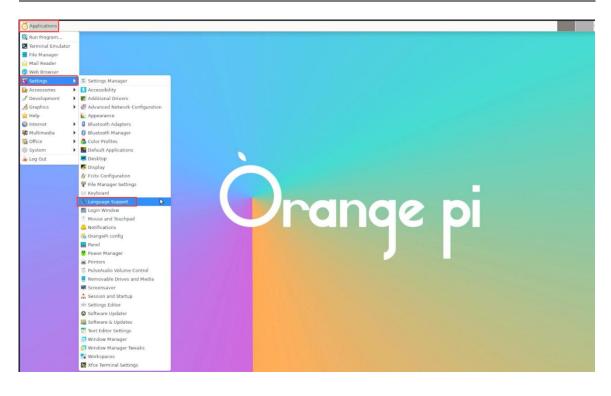


10) After opening **Geany**, the default is English input method, we can switch to Chinese input method through **Ctrl+Space**shortcut key, and then we can input Chinese



- 3. 23. 3. How to install Ubuntu 22.04 system
- 1) Open first Language Support





2) Then find the **Chinese (China)** option

	Language Suppo	rt	<b>↑</b> - □
Language	Regional Formats		
Language for m	enus and windows:		
Português (Bra	isil)		
Português (Por	tugal)		
русский (Росс	ийская Федерация)		
slovenščina			
汉语(中国)			
Apply System	n-Wide		
Use the same lan	guage choices for startup	and the login sc	reen.
Install / Rem	ove Languages		
Keyboard input	method system: Fci	tx 4 🕶	

3) Then please use the left mouse button to select **Chinese (China)** and hold it down, then drag it up to the initial position, and the display after dragging is as shown in the figure below:

Language       Regional Formats         Language for menus and windows:       汉语 (中国)         汉语 (中国)       English (United States)         English       Deutsch (Schweiz)         Deutsch (Deutschland)       Drag languages to arrange them in order of preference.	
汉语 (中国) English (United States) English Deutsch (Schweiz) Deutsch (Deutschland) Drag languages to arrange them in order of preference.	
English (United States) English Deutsch (Schweiz) Deutsch (Deutschland) Drag languages to arrange them in order of preference.	
English Deutsch (Schweiz) Deutsch (Deutschland) Drag languages to arrange them in order of preference.	
Deutsch (Schweiz) Deutsch (Deutschland) Drag languages to arrange them in order of preference.	
Deutsch (Deutschland) Drag languages to arrange them in order of preference.	
Drag languages to arrange them in order of preference.	
Changes take effect next time you log in.	
Apply System-Wide	
Use the same language choices for startup and the login screen.	
Install / Remove Languages	
Keyboard input method system: Fcitx 5 🗸	
<b>⊘</b> Help	X Close

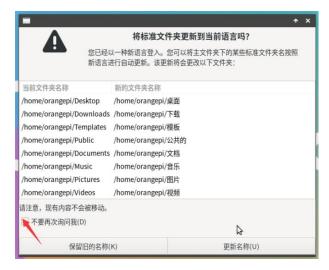
Note that this step is not easy to drag, please be patient and try a few more times.

4) Then select **Apply System-Wide** to apply the Chinese settings to the entire system

	Language Supp			•	- 27-0	
Language	Regional Formats					
Language for n	nenus and windows:					
汉语 (中国)						
English (Unite	d States)					
English						
Deutsch (Schw	veiz)					
Deutsch (Deut	(schland)					
Changes take eff	ect next time you log in.					
Apply Syste	ect next time you log in. m-Wide					
Apply Syste		p and the lo	gin screen.			
Apply Syste	m-Wide	p and the lo	gin screen.			
Apply Syste Use the same lar Install / Rem	m-Wide Iguage choices for startu	p and the log	gin screen.			

5) Then restart the Linux system to make the configuration take effect

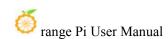
6) After re-entering the system, please choose **not to ask me again** in the following interface, and then please decide whether the standard folder should also be updated to Chinese according to your preferences

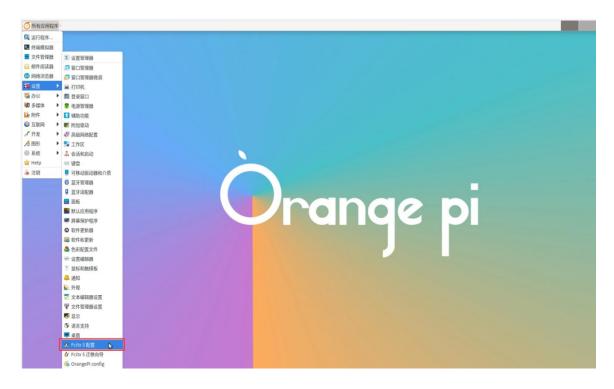


7) Then you can see that the desktop is displayed in Chinese



8) Then open the Fcitx5 configuration program





9) Then choose to use Pinyin input method

2	Fcitx 配置 🔷 🔷 🗖
输入法 全局选项 附加组件	
当前输入法:	可用输入法:
分组: Default	<ul> <li></li></ul>
99金-英语 (英国)	健全·法语 (加拿大) - 英语 (加拿大)         ●           健全·法尼以语 - 英语 (马里, 美國, 和acintosh)         ●           健全·法尼以语 - 英语 (马里, 美國, 和ille)         ●           健全·爱尔达语 (UnicodeExpert)         健全·灵华·语           夕田・和田yu Pinyin (with AltGr dead keys)         ●           ● 建金·汉语 - Hanyu Pinyin (with AltGr dead keys)         ●           ● 建金·汉语 - Hanyu Pinyin (with AltGr dead keys)         ●           ● 國金·汉语         ●           ● 國金·梁         ●
选择系统键盘布局	✔ 仅显示当前语言(S)
第一个输入法将为非激活状态。通常您需	将键盘或键盘 - 布局各种放在第一位。
✓重置(R) 恢复默认(D)	12 √ 应用(A) × 关闭(C) ● 输定(0)

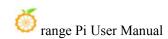
10) The interface after selection is as shown below, and then click OK

输入法 全局选	项 附加组件			
当前输入法: 分组: Default 键盘 - 英语(美国	)	• + -	可用输入法: 搜索输入法 键盘-印度语言-英语(印度,带卢比符号)	
拼音			<ul> <li>(加拿大) - 英语 (加拿大)</li> <li>(加拿大) - 英语 (加拿大)</li> <li>(建金: 把ECI2G - 英语 (二章, 美国), Agin(二)</li> <li>(建金: 芝加兰语 - 芝加兰语 (UnicodeExpert)</li> <li>(健金: 麦加兰语)</li> <li>(双语</li> <li>(双语 - 沢语 - Hanyu Pinyin (with AltGr dead)</li> <li>(健金 - 沢语 - Hanyu Pinyin (with AltGr dead)</li> </ul>	Ð
			健盘 - 汉语           简体中文(中国)           自然码           五笔字型           五笔拼音           咳风           二笔           电报码           合調           冰總全息	
	选择系统键盘布局		✓ 仅显示当前语言(S)	1
第一个输入法	将为非激活状态。通常您需要	守键盘或键盘 - 布局;	脓在第一位。	

11) Then we can open **Geany**to test the Chinese input method, the opening method is as shown in the figure below



12) After opening **Geany**, the default is English input method, we can switch to Chinese input method through **Ctrl+Space** shortcut key, and then we can input Chinese



40;	*未命名 - Geany	+ - ¤ ×
件(F) 编辑(E) 搜索(S	S) 查看(V) 文档(D) 项目(P) 生成(B) 工具(T) 帮助(H)	
🍹 🖷 🔹	🚨 🗟 🗙 < > 🦂 🗞 - 😥 🛅	<b>•</b>
标记 文档	未命名 🗶	
找到符号	1 ni hao 1. 你好 2. 你 3. 尼 4. 泥 5. 妮 6. 逆 7. 腻 ())	
	I	
	是 Geany 1.38。 这件"未命名"已打开。	

## 3. 24. How to remotely log in to the desktop of the Linux system

#### 3. 24. 1. 3.24.1. Remote login using NoMachine

Please make sure that the Ubuntu or Debian system installed on the development board is a desktop version. In addition, NoMachine also provides detailed usage documents. It is strongly recommended to read this document to familiarize yourself with the use of NoMachine. The document link is as follows: Please make sure that the Ubuntu or Debian system installed on the development board is a desktop version. In addition, NoMachine also provides detailed usage documents. It is strongly recommended to read this document to familiarize yourself with the use of NoMachine. The document to familiarize yourself with the use of NoMachine. The document to familiarize yourself with the use of NoMachine. The document to familiarize yourself with the use of NoMachine. The document link is as follows:

https://knowledgebase.nomachine.com/DT10R00166

NoMachine supports Windows, Mac, Linux, iOS and Android platforms, so we can remotely log in and control the Orange Pi development board through NoMachine on a variety of devices. The following demonstrates how to remotely log in to the Linux system desktop of the Orange Pi development board through NoMachine in Windows. For installation methods on other platforms, please refer to the official documentation of NoMachine.

Before operation, please make sure that the Windows computer and the development board are in the same LAN, and you can log in to the Ubuntu or Debian system of the development board through ssh.

1) First download the installation package of the NoMachine software Linux arm64 deb version, and then install it in the Linux system of the development board

a. Since RK3566 is an SOC with ARMv8 architecture, the system we use is Ubuntu or Debian, so here we need to download the NoMachine for ARM ARMv8 DEB installation package. The download link is as follows:

Note that this download link may change, please look for the deb package of the Armv8/Arm64 version.

https://downloads.nomachine.com/download/?id=116&distro=ARM

Home / Download / NoMachine for ARM - arm64

## NoMachine for ARM - arm64



b. In addition, you can also download the **NoMachine** installation package in the official tool

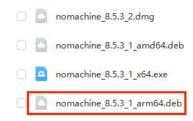
Download



First enter the remote login software-NoMachine folder

Remote Login Software-NoMachine

Then download the arm64 version of the deb installation package



- c. Then upload the downloaded **nomachine\_x.x.x\_arm64.deb** to the Linux system of the development board
- d. Then use the following command to install NoMachine in the Linux system of the development board **NoMachine**

orangepi@orangepi:~\$ sudo dpkg -i nomachine\_x.x.x\_x\_arm64\_arm64.deb

2) Then download the installation package of the Windows version of the NoMachine software, the download address is as follows

Note that this download link may change. https://downloads.nomachine.com/download/?id=8 NoMachine for Windows - 64bit



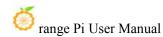
3) Then install NoMachine in Windows, please restart the computer after installation

Download

4) Then open NoMachine in Window NoMachine



5) After NoMachine starts, it will automatically scan other devices installed with



NoMachine in the LAN. After entering the main interface of NoMachine, you can see that the development board is already in the list of connectable devices, and then click the position shown in the red box in the figure below You can start to log in to the Linux system desktop of the development board

lachines				ACHINE
Add Edit Connect Q So orangepi, Uburtu 22.04.2 ITS	arch	View View	🕼 Order	Settings

6) Then Click OK

Host identification	changed	NEMACHINI
?	Remote host identification has changed. This can indicate that so connection, or the SSL certificate has been replaced due to a rei you want to proceed anyway and replace the old SSL certificate i	nstallation of the NoMachine server. Do
		Cancel

7) Then enter the user name and password of the Linux system of the development board in the corresponding position in the figure below, and then click **OK** to start logging in



8) Then click OK in the next interface



9) Finally, you can see the desktop of the development board Linux system

## 3. 24. 2. Use VNC to log in remotely

Before operation, please make sure that the Windows computer and the development board are in the same LAN, and you can log in to the Ubuntu or Debian system of the development board through ssh.

Ubuntu20.04 has many problems testing VNC, please do not use this method.

1) First run the set\_vnc.sh script to set up vnc, remember to add sudo permission

#### orangepi@orangepi:~\$ sudo set\_vnc.sh

You will require a password to access your desktops.

Password: **# Set the vnc password here, 8 characters** 

Verify: **# Set the vnc password here, 8 characters** 

Would you like to enter a view-only password (y/n)? n

xauth: file /root/.Xauthority does not exist

New 'X' desktop is orangepicm4:1

Creating default startup script /root/.vnc/xstartup Starting applications specified in /root/.vnc/xstartup Log file is /root/.vnc/orangepicm4:1.log

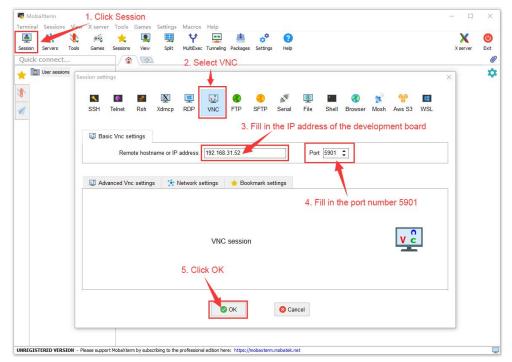
Killing Xtightvnc process ID 3047

New 'X' desktop is orangepicm4:1

Starting applications specified in /root/.vnc/xstartup Log file is /root/.vnc/orangepicm4:1.log

2) The steps to use MobaXterm software to connect to the Linux system desktop of the development board are as follows:

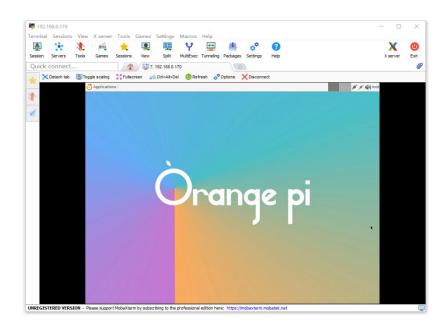
a. First click on Session, then select VNC, then fill in the IP address and port of the development board, and finally click OK to confirm



b. Then enter the VNC password set earlier

1 <mark>o</mark> baXterm		
	Please enter your passw	ord for 192.168.31.46
-	*******	
9	Show password	î (
	📀 ОК	🙁 Cancel

c. After successful login, the interface is displayed as shown in the figure below, and then you can remotely operate the desktop of the Linux system on the development board



# 3. 25. Some programming language tests supported by Linux system

## 3. 25. 1. Debian Bullseye System

1) Debian Bullseye has a gcc compilation tool chain installed by default, which can directly compile C language programs in the Linux system of the development board

a. The version of gcc is as follows

orangepi@orangepi:~\$ gcc --version

gcc (Debian 10.2.1-6) 10.2.1 20210110

Copyright (C) 2020 Free Software Foundation, Inc.

This is free software; see the source for copying conditions. There is NO

warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.

b. Write the **hello\_world.c** program in C language

```
orangepi@orangepi:~$ vim hello_world.c
#include <stdio.h>
```

```
int main(void)
```

{

printf("Hello World!\n");

return 0;

c. Then compile and run hello\_world.c

orangepi@orangepi:~\$ gcc -o hello\_world hello\_world.c

orangepi@orangepi:~\$ ./hello\_world

Hello World!

2) Debian Bullseye has Python3 installed by default

a. The specific version of Python is as follows

orangepi@orangepi:~\$ python3

**Python 3.9.2** (default, Feb 28 2021, 17:03:44)

[GCC 10.2.1 20210110] on linux

Type "help", "copyright", "credits" or "license" for more information.

>>>

b. Write **hello\_world.py** program in Python language

orangepi@orangepi:~\$ vim hello\_world.py

print('Hello World!')

c. The result of running **hello\_world.py** is as follows

orangepi@orangepi:~**\$ python3 hello\_world.py** Hello World!

3) Debian Bullseye does not install Java compilation tools and runtime environment by default

a. You can use the following command to install openjdk, the latest version in Debian Bullseye is openjdk-17

orangepi@orangepi:~**\$ sudo apt install -y openjdk-17-jdk** 

b. After installation, you can check the version of Java

orangepi@orangepi:~\$ java --version

c. Write the Java version hello\_world.java

orangepi@orangepi:~\$ vim hello world.java

public class hello\_world

public static void main(String[] args)

{

System.out.println("Hello World!");

}

#### d. Then compile and run hello\_world.java

orangepi@orangepi:~\$ javac hello\_world.java

orangepi@orangepi:~\$ java hello\_world

Hello World!

## 3. 25. 2. Debian Bookworm System

1) Debian Bookworm is installed with the gcc compilation tool chain by default, which can directly compile C language programs in the Linux system of the development board

a. The version of gcc is as follows

orangepi@orangepi:~\$ gcc --version

gcc (Debian 12.2.0-14) 12.2.0

Copyright (C) 2022 Free Software Foundation, Inc.

This is free software; see the source for copying conditions. There is NO

warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.

b. Write the **hello\_world.c** program in C language

orangepi@orangepi:~\$ vim hello\_world.c

#include <stdio.h>

int main(void)

{

printf("Hello World!\n");

return 0;

c. Then compile and run hello world.c

orangepi@orangepi:~\$ gcc -o hello\_world hello\_world.c orangepi@orangepi:~\$ ./hello\_world Hello World!

2) Debian Bookworm has Python3 installed by default

a. The specific version of Python is as follows

orangepi@orangepi:~\$ python3

Python 3.11.2 (main, Mar 13 2023, 12:18:29) [GCC 12.2.0] on linux

Type "help", "copyright", "credits" or "license" for more information.

#### Use the Ctrl+D shortcut to exit python's interactive mode.

b. Write **hello\_world.py** program in Python language

orangepi@orangepi:~\$ vim hello\_world.py print('Hello World!')

c. The result of running **hello\_world.py** is as follows

orangepi@orangepi:~\$ python3 hello\_world.py Hello World!

3) Debian Bookworm does not install Java compilation tools and runtime environment by default

a. You can use the following command to install openjdk, the latest version in Debian Bookworm is openjdk-17

orangepi@orangepi:~\$ sudo apt install -y openjdk-17-jdk

b. After installation, you can check the version of Java

orangepi@orangepi:~\$ java --version

c. Write the Java version hello\_world.java

```
orangepi@orangepi:~$ vim hello_world.java
```

public class hello\_world

```
public static void main(String[] args)
{
    System.out.println("Hello World!");
}
```

d. Then compile and run hello\_world.java

orangepi@orangepi:~\$ javac hello\_world.java

orangepi@orangepi:~\$ java hello world

Hello World!

## 3. 25. 3. Ubuntu Focal system

1) Ubuntu Focal has a gcc compilation tool chain installed by default, which can directly compile C language programs in the Linux system of the development board

a. The version of gcc is as follows

orangepi@orangepi:~\$ gcc --version

gcc (Ubuntu 9.4.0-1ubuntu1~20.04.1) 9.4.0

Copyright (C) 2019 Free Software Foundation, Inc.

This is free software; see the source for copying conditions. There is NO

warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.

b. Write the **hello\_world.c** program in C language

orangepi@orangepi:~\$ vim hello\_world.c

#include <stdio.h>

```
int main(void)
```

{

printf("Hello World!\n");

return 0;

c. Then compile and run hello\_world.c

orangepi@orangepi:~\$ gcc -o hello\_world hello\_world.c orangepi@orangepi:~\$ ./hello\_world Hello World!

2) Ubuntu Focal has Python3 installed by default

a. The specific version of Python3 is as follows

orangepi@orangepi:~\$ python3

Python 3.8.10 (default, Nov 14 2022, 12:59:47)

[GCC 9.4.0] on linux

Type "help", "copyright", "credits" or "license" for more information.

>>>

b. Write **hello\_world.py** program in Python language

orangepi@orangepi:~\$ **vim hello\_world.py** print('Hello World!')

c. The result of running **hello\_world.py** is as follows

orangepi@orangepi:~\$ python3 hello\_world.py Hello World!

3) Ubuntu Focal does not install Java compilation tools and operating environment by

default

a.	You can use the following command to install openjdk-17
orangepi	@orangepi:~\$ sudo apt install -y openjdk-17-jdk
b.	After installation, you can check the version of Java
orangepi	@orangepi:~\$ javaversion
openjdk	17.0.2 2022-01-18
OpenJD	K Runtime Environment (build 17.0.2+8-Ubuntu-120.04)
OpenJD	K 64-Bit Server VM (build 17.0.2+8-Ubuntu-120.04, mixed mode, sharing)
c.	Write the Java version hello_world.java
orangepi	@orangepi:~\$ vim hello_world.java
public cl	ass hello_world
{	
	public static void main(String[] args)
	{
	System.out.println("Hello World!");
	}
}	

d. Then compile and run hello\_world.java

orangepi@orangepi:~\$ javac hello\_world.java

orangepi@orangepi:~\$ java hello\_world

Hello World!

## 3. 25. 4. Ubuntu Jammy system

1) Ubuntu Jammy has a gcc compilation tool chain installed by default, which can directly compile C language programs in the Linux system of the development board

a. The version of gcc is as follows

orangepi@orangepi:~\$ gcc --version

gcc (Ubuntu 11.2.0-19ubuntu1) 11.2.0

Copyright (C) 2021 Free Software Foundation, Inc.

This is free software; see the source for copying conditions. There is NO

warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.

b. Write the **hello\_world.c** program in C language

orangepi@orangepi:~\$ vim hello\_world.c

#include <stdio.h>

```
int main(void)
{
printf("Hello World!\n");
return 0;
```

c. Then compile and run hello\_world.c

orangepi@orangepi:~\$ gcc -o hello\_world hello\_world.c orangepi@orangepi:~\$ ./hello\_world Hello World!

2) Ubuntu Jammy has Python3 installed by default

a. The specific version of Python3 is as follows

orangepi@orangepi:~\$ python3

Python **3.10.4** (main, Apr 2 2022, 09:04:19) [GCC 11.2.0] on linux

Type "help", "copyright", "credits" or "license" for more information.

>>>

b. Write **hello\_world.py** program in Python language

orangepi@orangepi:~\$ vim hello\_world.py

print('Hello World!')

c. The result of running **hello\_world.py** is as follows

orangepi@orangepi:~\$ python3 hello\_world.py

Hello World!

3) Ubuntu Jammy does not install Java compilation tools and runtime environment by default

a. You can use the following command to install openjdk-18

orangepi@orangepi:~\$ sudo apt install -y openjdk-18-jdk

b. After installation, you can check the version of Java

orangepi@orangepi:~\$ java --version

openjdk 18-ea 2022-03-22

OpenJDK Runtime Environment (build 18-ea+36-Ubuntu-1)

OpenJDK 64-Bit Server VM (build 18-ea+36-Ubuntu-1, mixed mode, sharing)

c. Write the Java version hello\_world.java

orangepi@orangepi:~\$ vim hello\_world.java

public class hello\_world

```
public static void main(String[] args)
{
    System.out.println("Hello World!");
}
```

d. Then compile and run hello\_world.java

```
orangepi@orangepi:~$ javac hello_world.java
orangepi@orangepi:~$ java hello_world
Hello World!
```

# 3. 26. How to install QT

1) Use the script below to install QT5 and QT Creator

orangepi@orangepi:~\$ install\_qt.sh

2) After installation, the version number of QT will be automatically printed

a. The qt version that comes with Ubuntu 20.04 is **5.12.8** 

orangepi@orangepi:~\$ install\_qt.sh

.....

QMake version 3.1

Using Qt version **5.12.8** in /usr/lib/aarch64-linux-gnu

b. The QT version that comes with Ubuntu 22.04 is **5.15.3** 

orangepi@orangepi:~\$ install\_qt.sh

.....

QMake version 3.1

Using Qt version **5.15.3** in /usr/lib/aarch64-linux-gnu

c. The QT version that comes with Debian11 is **5.15.2** 

orangepi@orangepi:~\$ install\_qt.sh

.....

QMake version 3.1

Using Qt version **5.15.2** in /usr/lib/aarch64-linux-gnu

d. The QT version that comes with Debian12 is 5.15.8

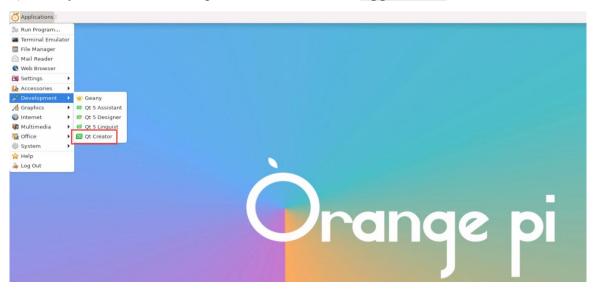
orangepi@orangepi:~\$ install\_qt.sh

.....

QMake version 3.1

Using Qt version **5.15.8** in /usr/lib/aarch64-linux-gnu

#### 3) Then you can see the startup icon of QT Creator in Applications



You can also use the following command to open QT Creator

orangepi@orangepi:~\$ qtcreator

During the startup process of QT and QT application, if the following error is prompted, please ignore it directly, this error will not affect the operation of the application.

libGL error: failed to create dri screen libGL error: failed to load driver: rockchip libGL error: failed to create dri screen libGL error: failed to load driver: rockchip

4) The interface after QT Creator is opened is as follows



- 5) The version of QT Creator is as follows
  - a. The default version of QT Creator in Ubuntu20.04 is as follows



b. The default version of QT Creator in Ubuntu22.04 is as follows

8							
10	Projects	Qt 5.15.3 in PATH (qt5) *	Search in Examples				
	Examples	File Tools	Analog Clock 📼 🖻 💈		no an. man.	vember 2	016 tor.
	Tutorials	ABC DEF GHI JKI	and the second second	<u>File E</u> dit <u>H</u> elp	0 31 6 7	1 2 8 9	3
m 		Ot U	About Qt Creator	+ × 🖻 🙆 🛛 💥 🦷	3 14 0 21	15 16 22 23	17 24
ug	Marketplace	Pete	reator 6.0.2	tandard features of	27 28	29 30 6 7	1
		Address Copy	d on Qt 5.15.3 (GCC 11.2.0, 64 bit) right 2008-2021 The Qt Company Ltd.	Example	Calendar W		
	New to Qt?	Tags: add	ved.	ion witgets	Tags: calendar	ios widget wid	gets
elp	Learn how to develop your own applications and explore Ot Creator.	The p ANY	orogram is provided AS IS with NO WA KIND, INCLUDING THE WARRANTY OF CHANTABILITY AND FITNESS FOR A PAR	RRANTY OF DESIGN.			
		PURP	OSE.			ame: fortun	
	Get Started Now	Lastin Control		Code Sample		nples require	_
		the solution resolution (speciality)     the solution of the solution of the solution (speciality)     the solution of the solution of the solution (speciality)     the solution of the solution of the solution (speciality)     the solution of the so	Default file: Index.html	Sample			
	⊥ Get Ot	Pader (1)	☑ Leunch file				
1	L Ot Account	Editable Tree Model Example	HTTP Example	JSON Save Game Example	Local Fortur		
	Online Community	Tags: android editable ios model tree widgets	Tags: http://etwork	Tags: core game joon save	Tags: client con	e fortune local	
	2	Fortune Server				Chip	Demo
	Blogs						

c. The default version of QT Creator in **Debian11** is as follows



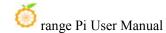
d. The default version of QT Creator in Debian12 is as follows

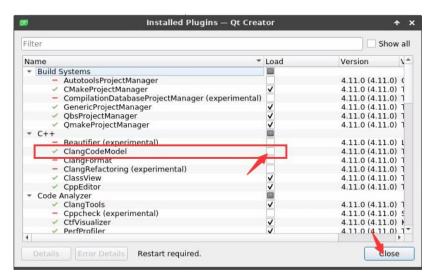
	Wolco	me to Qt Creato	ar.			
	Create Project	Qt 5.15.8 in PATH (qt5)	Search in Ex	amples		
	Open Project		About Qt Creat	tor ^	X and a	
	New to Qt?		Qt Creator 9.0.2 Based on Qt 6.4.2 (GCC 12	2.2.0, arm64) Qt Company Ltd. All rights reserved.	naam antadawa are prosteduri by Ot wa, sani kara, are dalam windowa. Panar pina an omga kataka ngalam tagi antakatar kapi in name lawa.	
	Get Started	Qu	The program is provided A	AS IS with NO WARRANTY OF ANY KIND Y OF DESIGN, MERCHANTABILITY AND		
L	Projects	Addres	Ot®, Ot Ouick Compiler®,	9, Qt Quick®, Built with Qt®, Boot to , Qt Enterprise®, Qt Mobile® and Ot	mple	
			Embedded® are registere	d trademarks of The Qt Company Ltd.		
	Examples		He man	providence and all to being the second	•	
	Tutorials		· presente · pres	Procession of the Independence of the Ind	- Balling Localized	
	Marketplace		The second secon	Adaptage facts and an Adaptage facts and a set of the set and a set of the set of the set was a set of the set of re bole		
			*******			
		Get Qt	Qt Account	Online Community	Blogs	User Guide

- 6) Then set the QT
  - a. open first Help->About Plugins...



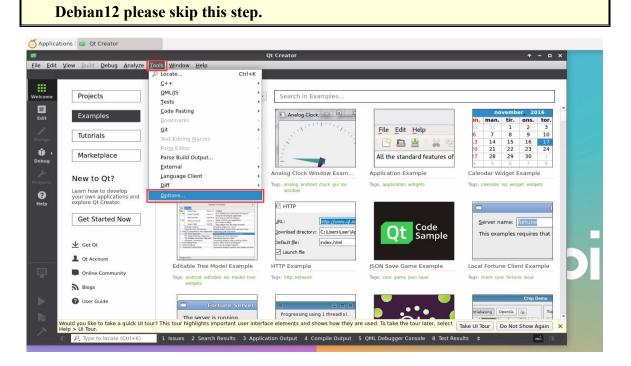
b. Then remove the tick of ClangCodeModel

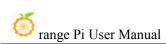




#### c. After setting, you need to restart QT Creator

d. Then make sure the GCC compiler used by QT Creator, if the default is Clang, please modify it to GCC



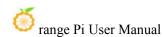


Projects	00	Or	otions — Ot Creator		<b>^</b>	×			
Trojecto	Filter	Kits							
Examples			mpilers Debuggers CMake			no nan.	tir. o	2016 1s. tor.	
	🔛 Kits		mpilers Debuggers CMake				1	2 3	
Tutorials	Environment	Name Auto-detected		_	Add	7		9 10 6 17	
Markotplaco	Text Editor	<ul> <li>Manual</li> </ul>			Clone	21	22 2	3 24	
Marketplace	FakeVim	🖵 Desktop (defa		F	Remove	28	29 3	0 1 7 8	
				Mal	ke Default	ar W	idget Exa		1
New to Qt?	Help			Setti	ings Filter		los widget		
Learn how to develop your own applications	{} C++			Default 9	Settings Filter				
your own applications explore Qt Creator.	🕇 Qt Quick					-			1
	▶ Build & Run		Desktop		₽.				
Get Started Now	Gbs	File system name:				ver n	ame: for	une	
		Device type:	Desktop	*		exa	mples req	ires that	
🔟 Get Qt	Debugger	Device:	Local PC (default for Desktop)	•	Manage				
L Qt Account	✓ Designer	Build device:	Local PC (default for Desktop)	*	Manage				
	New Python	Sysroot:			Browse	ortu	ne Client I	xample	
Online Community	Analyzer	System.	C: GCC (C, arm 64bit at /usr/bin/a	and CA lin -	browsen	nt co	re fortune la	cal	
Blogs		Compiler:			Manage				
0	Version Control		C++: GCC (C++, arm 64bit at /usr/bi	n/aarch6+ *			C	hip Demo	
😮 User Guide			√ Appl	ly Ocar	ncel JOK			mp Demo	

## 7) Then you can open a sample code

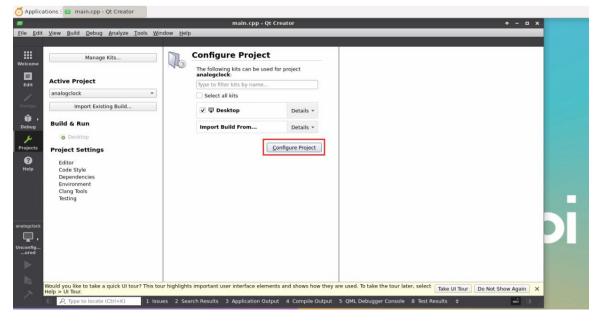
		.cpp - Qt Creator		↑ - □	×
<u>View Build D</u> ebug <u>A</u> nalyze <u>T</u> o	ools <u>W</u> indow <u>H</u> elp				
Projects	Qt 5.15.2 in PATH (qt5) *	Search in Examples			
Examples	<u>File</u> Tools	Analog Clock 😐 🛛 🛛		november 2016 on. man. tir. ons. tor.	1
Tutorials	ABC DEF GHI JKI	S S S S S S S S S S S S S S S S S S S	File Edit Help	30         31         1         2         3           6         7         8         9         10           .3         14         15         16         17	
Marketplace	Qt User         The Keys, E           Peter Rabbit         The Lake Di:		All the standard features of	20         21         22         23         24           27         28         29         30         1           4         5         6         7         8	
New to Qt?	Address Book Example Tags: address android book ios	Analog Clock Window Exam lags: analog android spock gui ios	Application Example Tags: application widgets	Calendar Widget Example Tags: calendar los widget widgets	
Learn how to develop your own applications and explore Qt Creator. Get Started Now	widgets	window HTTP JRL: Interformunction Qownload directory: C:\User\User\User\Approx	Code	Server name: fortune	
⊈ Get Qt	And And And And And And And And And	Default file: index.htm Launch file	Sample	This examples requires that y	
Qt Account	Editable Tree Model Example	HTTP Example	JSON Save Game Example	Local Fortune Client Example	
Blogs	widgets				
🕜 User Guide	Fortune Server			Chip Demo ntialiasina OpenGL (A) Top	
Would you like to take a quick UI tour Help > UI Tour.	? This tour highlights important user interf	ace elements and shows how they are	used. To take the tour later, select	ake UI Tour Do Not Show Again	×

8) After clicking the sample code, the corresponding instruction document will be opened automatically, you can read the instruction carefully

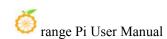


		in.cpp - Qt Creato	H.	+ - D X 🐷 Help - Analog Clock Window Example   QE GU Open in Help Mode 🕥 G 🗇 📕 🕲 😁 Analog Cloc	
Edit View Build Debug Analyze Tools	Mindow Helb			Open in Help Mode 😭 😳 🔂 🕷 🐨 Analog Cloc	k Win <sub>ter</sub> C
Manage Kits	Configure F	Project		Analog Clock Window Example	
	The following kits analogclock:	can be used for proj	ject	Qt 5.15 Qt GUI > Analog Clock Window Example	Qt 5.15.2 Reference Documentatio
Active Project	Type to filter kits	by name			Contents
analogclock	* Select all kits			The Analog Clock Window example shows how to draw the contents of a custom window.	AnalogClockWindow Cl
Import Existing Build	V 🖵 Desktop		Details +		Definition
Build & Run	Import Build Fr		Details +	Analog Clock 📼 🐵 😣 🗋	<ul> <li>AnalogClock Class Implementation</li> </ul>
O Desktop	import build th	-	Details -	Next Contraction of the	
Project Settings		Configu	are Project		
Editor Code Style Dependencies Environment Clang Teols Testing				The second second second second second second second second second second second second second second second se	
				Clock Window example	
рек •				This example demonstrates how the transformation and so to make drawing easier.	aling features of QPainter can be us
kun .				AnalogClockWindow Class Definition	
Would you like to take a quick UI tour? The Help > UI Tour.	his tour highlights important user inte	rface elements and	shows how they a	The AnalogClockWindow class provides a clock with ho updated every few seconds. We make use of the Rasterv Take UI four Do Not Show Again X and reimplement the revise function to draw the clock fa	findow from the Raster Window Exar
	Issues 2 Search Results 3 App	ALC: NO DECISION OF THE OWNER OF THE OWNER OF THE OWNER OF THE OWNER OF THE OWNER OF THE OWNER OF THE OWNER OF			

## 9) Then click next Configure Project

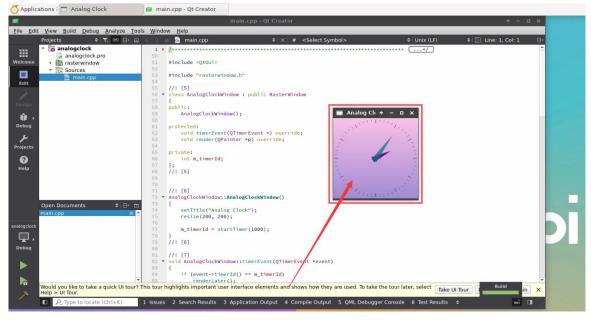


10) Then click the green triangle in the lower left corner to compile and run the sample code



O Applic	ations 🗄 🔃 main.cpp - Qt Creator								
<b>R</b> E				main.cpp - Qt Crea	ator			↑ - □	×
<u>File</u> <u>E</u> di	<u>⊻</u> iew <u>B</u> uild <u>D</u> ebug <u>A</u> nalyze <u>T</u> ool	s <u>W</u> indo	w <u>H</u> elp						
	Projects 💠 🔽 😁 🗄 🖃		🚽 🗟 main.cp	p \$	× # <select symbol=""></select>		🗢 Unix (LF)	🗘 🔄 Line: 1, Col: 1	8+
	* 🛅 analogclock		<b>X</b> *********	*****	*****	*****	····*/		*
Welcome	<ul> <li>analogclock.pro</li> <li>analogclock.pro</li> </ul>	50 51	#include <q1< th=""><th>Gui&gt;</th><th></th><th></th><th></th><th></th><th></th></q1<>	Gui>					
E	* 🐻 Sources	52 53	adapted a star	sterwindow.h"					
Edit	👼 main.cpp	53	#include "ra	sterwindow.n"					
		55 56 -	//! [5]	ClockWindow : public Rast	a shtë a dani				
Design		57	{	crockwindow : public Rase	erwindow				
		58 59	public:	ockWindow();					
		60		Jern moon(),					
Debug		61 62	protected:	erEvent(QTimerEvent *) ov	erride:				
ىر		63		der(QPainter *p) override					
Projects		64 65	private:						
•		66	int m_t	merId;					
Help		67 68	}; //! [5]						
		69 70	/						
		76	//1 [6]						
		73	AnalogClock	indow::AnalogClockWindow(	)				
	Open Documents	74		("Analog Clock");					
	mannepp	75 76	resize(2	00, 200);					
analogclock		77	m_timer]	d = startTimer(1000);					
- 🖵 ,		78 79	}						
Debug		80							
		81 82 -	//! [7] void Analog(	lockWindow::timerEvent(QT	imerEvent *event)				
		83 84	{						
<b>A</b>		85	rend	<pre>t-&gt;timerId() == m_timerId erLater();</pre>					¥
	Would you like to take a quick UI tour? T Help > UI Tour.	This tour h	highlights impo	tant user interface elements a	and shows how they are use	ed. To take the tour lat	ter, select Take UI Tou	Do Not Show Again	×
1		1 Issues	2 Search Re	sults 3 Application Output	4 Compile Output 5 QM	1L Debugger Console	8 Test Results 💠		
									and the second se

11) After waiting for a period of time, the interface shown in the figure below will pop up, which means that QT can compile and run normally



12) References

https://wiki.qt.io/Install\_Qt\_5\_on\_Ubuntu https://download.qt.io/archive/qtcreator https://download.qt.io/archive/qt

Recommended

# 3.27. How to install ROS

## 3. 27. 1. How to install ROS 1 Noetic on Ubuntu 20.04

1) The current active version of ROS 1 is as follows, and the recommended version is **Noetic Ninjemys** 

#### Active ROS 1 distributions



DistroRelease datePosterTuturtle, turtle in tutorioEOL dateROS Noetic Ninjemys<br/>(Recommended)May 23rd, 2020Image: Comparison of the compa

# http://docs.ros.org https://wiki.ros.org/Distributions

2) The official installation document link of ROS 1 Noetic Ninjemys is as follows:
 http://wiki.ros.org/noetic/Installation/Ubuntu

3) In the official installation document of ROS **Noetic Ninjemys**, Ubuntu recommends using Ubuntu20.04, so please make sure that the system used by the development board is **Ubuntu20.04 desktop system** 

#### http://wiki.ros.org/noetic/Installation



#### 4) Then use the following script to install ros1

orangepi@orangepicm4:~\$ install ros.sh ros1

5) Before using the ROS tool, you first need to initialize rosdep, and then you can quickly install some system dependencies and some core components in ROS when compiling the source code

Note that running the following command needs to ensure that the development board can access github normally, otherwise an error will be reported due to network problems.

The install\_ros.sh script will try to modify /etc/hosts and automatically run the following commands. However, this method cannot guarantee normal access to github every time. If the following error is prompted after installing ros1 in install\_ros.sh, please find other ways to allow the Linux system of the development board to access github normally, and then manually run the following Order.

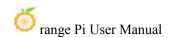
https://raw.githubusercontent.com/ros/rosdistro/master/rosdep/osx-homebrew.yaml Hit https://raw.githubusercontent.com/ros/rosdistro/master/rosdep/base.yaml ERROR: error loading sources list: The read operation timed out

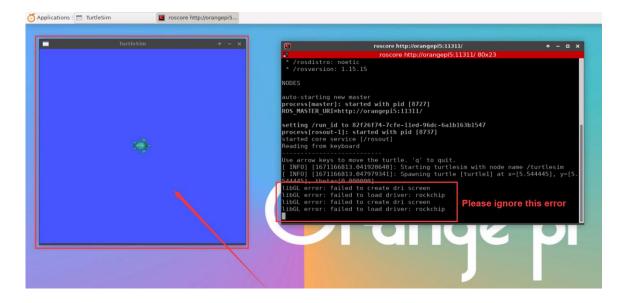
orangepi@orangepi:~\$ source /opt/ros/noetic/setup.bash orangepi@orangepi:~\$ sudo rosdep init Wrote /etc/ros/rosdep/sources.list.d/20-default.list Recommended: please run

rosdep update orangepi@orangepi:~\$ rosdep update reading in sources list data from /etc/ros/rosdep/sources.list.d Hit https://raw.githubusercontent.com/ros/rosdistro/master/rosdep/osx-homebrew.yaml Hit https://raw.githubusercontent.com/ros/rosdistro/master/rosdep/base.yaml Hit https://raw.githubusercontent.com/ros/rosdistro/master/rosdep/python.yaml Hit https://raw.githubusercontent.com/ros/rosdistro/master/rosdep/ruby.yaml Hit https://raw.githubusercontent.com/ros/rosdistro/master/releases/fuerte.yaml Query rosdistro index https://raw.githubusercontent.com/ros/rosdistro/master/index-v4.yaml Skip end-of-life distro "ardent" Skip end-of-life distro "bouncy" Skip end-of-life distro "crystal" Skip end-of-life distro "dashing" Skip end-of-life distro "eloquent" Add distro "foxy" Add distro "galactic" Skip end-of-life distro "groovy" Add distro "humble" Skip end-of-life distro "hydro" Skip end-of-life distro "indigo" Skip end-of-life distro "jade" Skip end-of-life distro "kinetic" Skip end-of-life distro "lunar" Add distro "melodic" Add distro "noetic" Add distro "rolling" updated cache in /home/orangepi/.ros/rosdep/sources.cache

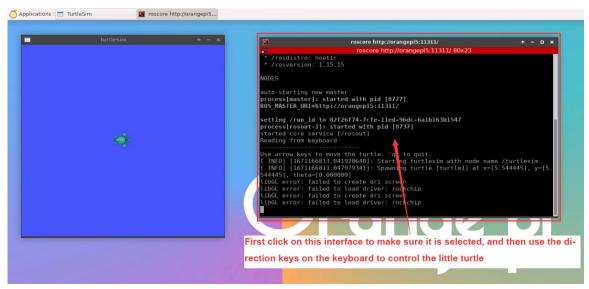
6) Then open a command line terminal window on the desktop, and then use the **test\_ros.sh** script to start a small turtle routine to test whether ROS can be used normally orangepi@orangepi:~\$ **test\_ros.sh** 

7) After running the **test\_ros.sh** script, a little turtle as shown in the figure below will pop up

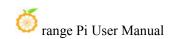


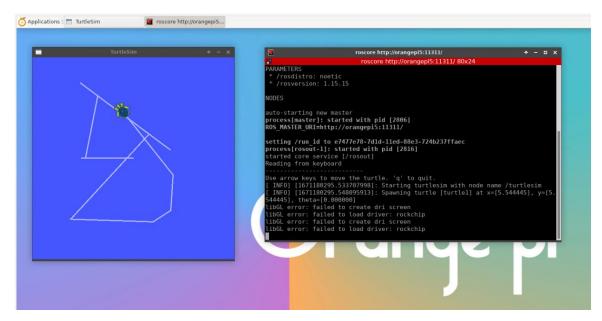


8) Then please keep the terminal window just opened at the top



9) At this time, press the direction keys on the keyboard to control the little turtle to move up, down, left, and right





# 3. 27. 2. How to install ROS 2 Galactic on Ubuntu 20.04

1) The current active version of ROS 2 is as follows, and the recommended version is **Galactic Geochelone** 

#### **Active ROS 2 distributions**

Recommended

Development



Distro	Release date	Logo	EOL date
Humble Hawksbill	May 23rd, 2022		May 2027
	May 23rd, 2021	GALACTIC GEOCHELONE	November 2022
Foxy Fitzroy	June 5th, 2020		May 2023

#### http://docs.ros.org

http://docs.ros.org/en/galactic/Releases.html

2) The link to the official ROS 2 **Galactic Geochelone** installation documentation is as follows:

docs.ros.org/en/galactic/Installation.html http://docs.ros.org/en/galactic/Installation/Ubuntu-Install-Debians.html

3) In the official ROS 2 Galactic Geochelone installation document, Ubuntu Linux recommends using Ubuntu 20.04, so please make sure that the system used by the development board is the Ubuntu 20.04 desktop system. There are several ways to install ROS 2. The following demonstrates how to install it through Debian packages ROS 2 Galactic Geochelone

4) Use the **install\_ros.sh** script to install ros2

orangepi@orangepi:~\$ install\_ros.sh ros2

5) The **install\_ros.sh** script will automatically run the **ros2** -hcommand after installing ros2. If you can see the following print, it means that the ros2 installation is complete usage: ros2 [-h] Call `ros2 <command> -h` for more detailed usage. ...

ros2 is an extensible command-line tool for ROS 2.

optional arguments:

-h, --help

show this help message and exit

Commands:

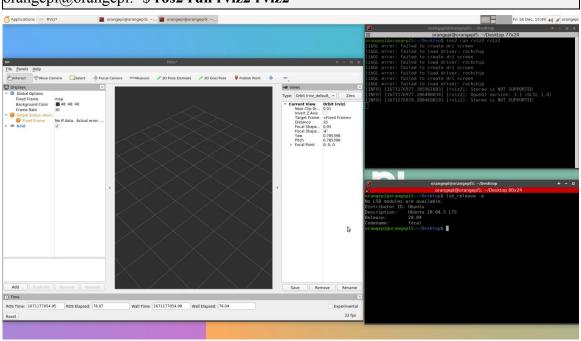
action	Various action related sub-commands
bag	Various rosbag related sub-commands
componer	t Various component related sub-commands
daemon	Various daemon related sub-commands
doctor	Check ROS setup and other potential issues
interface	Show information about ROS interfaces
launch	Run a launch file
lifecycle	Various lifecycle related sub-commands
multicast	Various multicast related sub-commands
node	Various node related sub-commands
param	Various param related sub-commands
pkg	Various package related sub-commands
run	Run a package specific executable
security	Various security related sub-commands
service	Various service related sub-commands
topic	Various topic related sub-commands
wtf	Use `wtf` as alias to `doctor`
Call `ros2	<command/> -h` for more detailed usage.

6) Then you can use the **test\_ros.sh** script to test whether ROS 2 is installed successfully. If you can see the following print, it means that ROS 2 can run normally

5 81 5
orangepi@orangepicm4:~\$ test_ros.sh
[INFO] [1671174101.200091527] [talker]: Publishing: 'Hello World: 1'
[INFO] [1671174101.235661048] [listener]: I heard: [Hello World: 1]
[INFO] [1671174102.199572327] [talker]: Publishing: 'Hello World: 2'
[INFO] [1671174102.204196299] [listener]: I heard: [Hello World: 2]
[INFO] [1671174103.199580322] [talker]: Publishing: 'Hello World: 3'
[INFO] [1671174103.204019965] [listener]: I heard: [Hello World: 3]

7) Run the following command to open rviz2

## orangepi@orangepi:~\$ source /opt/ros/galactic/setup.bash orangepi@orangepi:~\$ ros2 run rviz2 rviz2



8) For how to use ROS, please refer to the documentation of ROS 2

http://docs.ros.org/en/galactic/Tutorials.html

#### 3. 27. 3. How to install ROS 2 Humble on Ubuntu 22.04

1) Use the **install\_ros.sh** script to install ros2

orangepi@orangepi:~\$ install\_ros.sh ros2

The install\_ros.sh script will automatically run the ros2 -h command after installing ros2. If you can see the following print, it means that the ros2 installation is complete

usage: ros2 [-h] Call `ros2 <command> -h` for more detailed usage. ...

ros2 is an extensible command-line tool for ROS 2.

optional arguments:

-h, --help show this help message and exit

Commands:

action	Various action related sub-commands
bag	Various rosbag related sub-commands

componen	t Various component related sub-commands
daemon	Various daemon related sub-commands
doctor	Check ROS setup and other potential issues
interface	Show information about ROS interfaces
launch	Run a launch file
lifecycle	Various lifecycle related sub-commands
multicast	Various multicast related sub-commands
node	Various node related sub-commands
param	Various param related sub-commands
pkg	Various package related sub-commands
run	Run a package specific executable
security	Various security related sub-commands
service	Various service related sub-commands
topic	Various topic related sub-commands
wtf	Use `wtf` as alias to `doctor`
Call `ros?	<command/> h` for more detailed usage

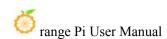
Call `ros2 <command> -h` for more detailed usage.

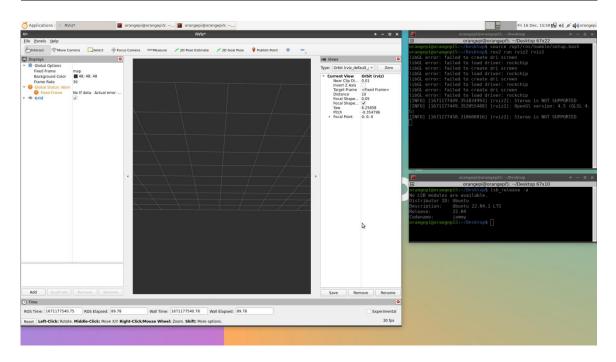
3) Then you can use the **test\_ros.sh** script to test whether ROS 2 is installed successfully. If you can see the following print, it means that ROS 2 can run normally

orangepi@orangepicm4:~\$ test_ros.sh
[INFO] [1671174101.200091527] [talker]: Publishing: 'Hello World: 1'
[INFO] [1671174101.235661048] [listener]: I heard: [Hello World: 1]
[INFO] [1671174102.199572327] [talker]: Publishing: 'Hello World: 2'
[INFO] [1671174102.204196299] [listener]: I heard: [Hello World: 2]
[INFO] [1671174103.199580322] [talker]: Publishing: 'Hello World: 3'
[INFO] [1671174103.204019965] [listener]: I heard: [Hello World: 3]

4) Run the following command to open rviz2

orangepi@orangepi:~\$ source /opt/ros/humble/setup.bash orangepi@orangepi:~\$ ros2 run rviz2 rviz2





#### 5) Reference documents

http://docs.ros.org/en/humble/index.html http://docs.ros.org/en/humble/Installation/Ubuntu-Install-Debians.html

# 3. 28. How to install kernel header files

1) The Linux image released by OPi comes with the deb package of the kernel header file by default, and the storage location is **/opt/** 

orangepi@orangepi:~\$ ls /opt/linux-headers\*

/opt/linux-headers-legacy-rockchip-rk356x\_x.x.x\_arm64.deb

2) Use the following command to install the deb package of the kernel header file

The name of the kernel header file deb package needs to be replaced with the actual name, please do not copy it.

orangepi@orangepi:~\$ sudo dpkg -i /opt/linux-headers-legacy-rockchip-rk356x\_1.x.x\_arm64.deb

3) After installation, you can see the folder where the kernel header files are located under /usr/src

orangepi@orangepi:~**\$ ls /usr/src** linux-headers-5.10.160-rockchip-rk356x 4) Then you can write a hello kernel module to test the kernel header file

a. First write the code of the hello kernel module, as follows:

```
orangepi@orangepi:~$ vim hello.c
#include <linux/init.h>
#include <linux/module.h>
static int hello init(void)
         printk("Hello Orange Pi -- init\n");
         return 0;
static void hello exit(void)
         printk("Hello Orange Pi -- exit\n");
         return;
module init(hello init);
module exit(hello exit);
MODULE LICENSE("GPL");
       Then write the Makefile for compiling the hello kernel module, as follows:
    b.
orangepi@orangepi:~$ vim Makefile
ifneq ($(KERNELRELEASE),)
obj-m:=hello.o
else
KDIR :=/lib/modules/$(shell uname -r)/build
PWD :=$(shell pwd)
all:
    make -C $(KDIR) M=$(PWD) modules
clean:
    rm -f*.ko *.o *.mod.o *.mod *.symvers *.cmd *.mod.c *.order
```

endif

c. Then use the make command to compile the hello kernel module. The output of the compilation process is as follows:

If there is a problem with compiling the code you copied here, please go to the official tool to download the source code and upload it to the Linux system of the development board for testing.

hello kernel module source code and Makefile

orangepi@orangepi:~\$ make

make -C /lib/modules/5.10.160-rockchip-35xx/build M=/home/orangepi modules

make[1]: Entering directory '/usr/src/linux-headers-5.10.160-rockchip-rk35xx'

CC [M] /home/orangepi/hello.o

MODPOST /home/orangepi/Module.symvers

CC [M] /home/orangepi/hello.mod.o

LD [M] /home/orangepi/hello.ko

make[1]: Leaving directory '/usr/src/linux-headers-5.10.160-rockchip-rk35xx'

d. After compiling, the hello.ko kernel module will be generated

orangepi@orangepi:~\$ ls \*.ko

hello.ko

e. Use the **insmod**command to insert the **hello.ko** kernel module into the kernel

orangepi@orangepi:~\$ sudo insmod hello.ko

f. Then use the **demsg** command to view the output of the **hello.ko** kernel module. If you can see the output below, it means that the**hello.ko** kernel module is loaded correctly.

orangepi@orangepi:~\$ dmesg | grep "Hello"

[ 2871.893988] Hello Orange Pi -- init

g. Use the **rmmod** command to uninstall the **hello.ko** kernel module

orangepi@orangepi:~\$ sudo rmmod hello

orangepi@orangepi:~\$ dmesg | grep "Hello"

2871.893988] Hello Orange Pi -- init

[3173.800892] Hello Orange Pi -- exit

# 3. 29. Use of Raspberry Pi 5 Inch screen

## 3. 29. 1. How to assemble the Raspberry Pi 5 Inch screen

- 1) First prepare the required accessories
  - a. Raspberry Pi 5-inch MIPI LCD display + Touch screen

**Raspberry Pi 5-inch MIPI LCD display + Touch screenis shown in the figure** below 5inch DSI Display LCD DIY 4 TT T (5) 1 6 ANN 20224 800 800 VH 1 ANN 20224 800 800 VH 1 ANN 20224 800 800 VH 1 (2) 7 (3) 包装清单: ① 5寸触摸显示屏 x1 ④螺丝 (M2.5x4) x4 ② FFC-1.0-15P-10cm (反向) ×1 ⑤铜柱 (M2.5x4+4) x4 ③ FFC-1.0-15P-5cm (反向) ×1 ⑥螺丝 (M2.5x12) x2 ⑦ 支架 x2



b. 15pin MIPI cable



2) Then connect the 15pin MIPI cable to the Raspberry Pi 5-inch screen as shown in the figure below (note the orientation of the insulating surface)



3) Finally connect to the LCD interface of the Orange Pi CM4 development board



## 3. 29. 2. How to open Raspberry Pi 5-inch screen configuration

1) By default, the Linux image does not enable the configuration of the Raspberry Pi 5-inch screen. If you need to use the Raspberry Pi 5-inch screen, you need to manually open it.

2) The steps to open the mipi lcd configuration are as follows:

```
a. First run orangepi-config, common users remember to add sudo permission
```

orangepi@orangepi:~\$ sudo orangepi-config

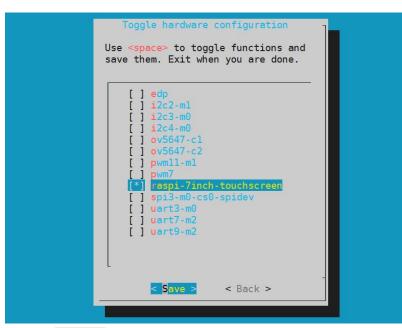
b. Then select System

	orangepi-config						
Configure <mark>Ubuntu</mark>	jammy based OrangePi for the OPI 3B						
SoC runs between	SoC runs between 408 and 1296 MHz using ondemand governor.						
Support: http://w	ww.orangepi.org						
System Network Personal Software Help							
	< 0 <mark>K &gt;</mark> < Exit >						

c. Then select Hardware

	System settings	
Install Bootenv CPU Avahi Hardware SSH Firmware ZSH Desktop	Install to/update boot loader Edit boot environment Set CPU speed and governor Announce system in the network Toggle hardware configuration: UART, I2C, etc. Reconfigure SSH daemon Run apt update & apt upgrade Install ZSH with plugins and tmux Disable desktop or change login type	
	< <mark>OK &gt;</mark> < Back >	

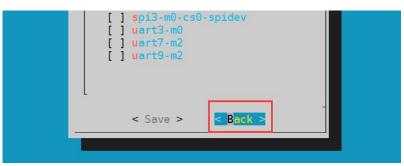
d. Then use the arrow keys on the keyboard to navigate to raspi-7inch-touchscreen, and then use the space to select



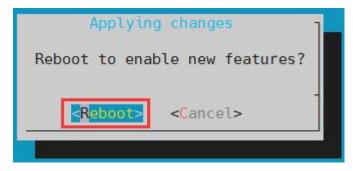
e. Then select <Save>Save

	[] uart3-m0 [] uart7-m2 [] uart9-m2		
-	< Save >	< Back >	

f. Then select <Back>



g. Then select **<Reboot>** Restart the system for the configuration to take effect



The above settings will eventually add the configuration of overlays=raspi-7inch-touchscreen to /boot/orangepiEnv.txt. After setting, you can check it first. If this configuration does not exist, then there is a problem with the settings.

If you find it troublesome to use orangepi-config, you can also use the vim editor to open /boot/orangepiEnv.txt, and then add the configuration of overlays=raspi-7inch-touchscreen is also possible.

orangepi@orangepi:~\$ cat /boot/orangepiEnv.txt | grep "raspi" overlays=raspi-7inch-touchscreen # sample configuration

3) After startup, you can see the display of the LCD screen as follows:



3. 29. 3. The method of server version image rotation display direction

1) Add **extraargs=fbcon=rotate: the direction to rotate** in **/boot/orangepiEnv.txt** This line configuration can set the direction displayed by the server version of the Linux system, where the number after **fbcon=rotate:** can be set as:

- a. 0: normal screen (default is landscape)
- b. 1: Turn clockwise 90 degrees
- c. 2: Flip 180 degrees
- d. 3: Turn clockwise 270 degrees

orangepi@orangepi:~\$ sudo vim /boot/orangepiEnv.txt overlays=lcd1

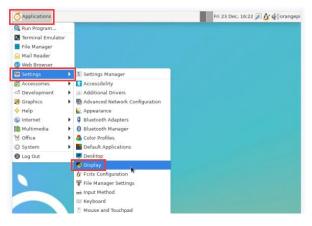
extraargs=cma=64M fbcon=rotate:3

Note that if there is the line extraargs=cma=64M in /boot/orangepiEnv.txt by default, the configuration fbcon=rotate:3 can be added after extraargs=cma=64M (separated by spaces).

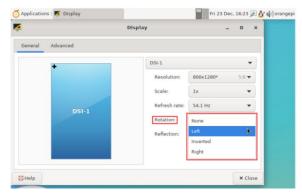
2) Then **restart** the Linux system and you can see that the direction displayed on the LCD screen has been rotated

# 3. 29. 4. Method of rotating display and touch direction of desktop version image

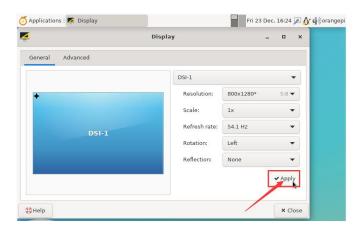
1) First open **Display** Settings in Linux



- 2) Then select the direction you want to rotate in Rotation
  - a. **None**: no rotation
  - b. Left: rotate left 90 degrees
  - c. Inverted: Flip up and down, which is equivalent to rotating 180 degrees
  - d. **Right**: rotate right 90 degrees



3) Then click Apply



### 4) Then select Keep this configuration

Applications 🛛 🗾 Display	© Confirmation			
	Display		o x	
General Advanced				
	DSI-1		•	
+	Resolution:	800x1280*	5:8 🕶	
DSI-1	Scale:	lx	•	
	Refresh rat	9: 54.1 Hz	-	
	Rotation:	Left	-	
•	Confirmation	Nono	+ - x	
	e to keep this configuration will be restored in a secon		this question.	er
DHe I	Keep this configuration	Restore the previous	configuration	

5) At this point, the screen display has been rotated, and then close the **Display** program

6) The above steps will only select the display direction, and will not rotate the direction of the touch. Use the **set\_lcd\_rotate.sh** script to rotate the direction of the touch. After the script is set, it will automatically restart, and then you can test whether the touch has been used normally.

a. None: no rotation

orangepi@orangepi:~\$ set lcd rotate.sh none

b. Left: rotate left 90 degrees

orangepi@orangepi:~\$ set\_lcd\_rotate.sh left

c. **Inverted**: Flip up and down, which is equivalent to rotating 180 degrees

orangepi@orangepi:~\$ set\_lcd\_rotate.sh inverted

d. **Right**: rotate right 90 degrees

orangepi@orangepi:~\$ set\_lcd\_rotate.sh right

### The set\_lcd\_rotate.sh script mainly does four things:

1. Rotate the direction displayed by the framebuffer

- 2. Rotate the direction of the touch
- 3. Turn off the boot logo
- 4. Restart the system

7) Touch rotation reference

https://wiki.ubuntu.com/X/InputCoordinateTransformation

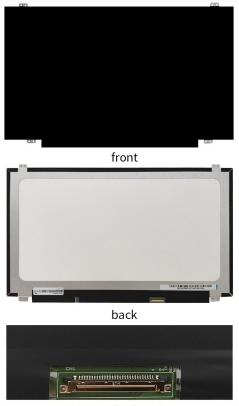
## 3. 30. How to use the eDP screen

### 3. 30. 1. Assembly method of eDP screen

- 1) Currently only one eDP screen is compatible, including the following accessories:
  - a. 0.5 pitch 30pin single-head cable in the same direction



b. eDP display



30pins EDP interface

2) Connect the 30pin eDP interface of the screen and the eDP interface of the development board with a 30pin single-head cable in the same direction



## 3. 30. 2. How to open the eDP screen configuration

Note that the method described below is only applicable to the adapted eDP screen. If the customer uses an unadapted screen, it cannot be turned on according to the following method.

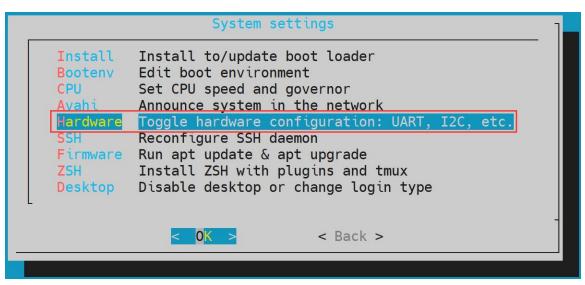
1) By default, the Linux image does not have the configuration to open the eDP screen. If you need to use the eDP screen, you need to open it manually.

2) The steps to open the eDP screen configuration are as follows:

- a. First run **orangepi-config**, ordinary users remember to add **sudo** permission orangepi@orangepi:~\$ **sudo orangepi-config** 
  - b. Then select System



c. Then select Hardware



d. Then use the arrow keys on the keyboard to navigate to edp, and then use the **space** to select

	and the second se		
] 12c2-m1 ] 12c3-m0 ] 12c4-m0			
] ov5647-c2			
] pwm7	touchscreen-	dsi0	
] spi3-m0-cs0-		110000	
] uart7-m2			
	<pre>1 12c4-m0 0v5647-c1 0v5647-c2 pwm11-m1 pwm7 raspi-7inch- raspi-7inch- spi3-m0-cs0- uart3-m0</pre>	12c4-m0 ov5647-c1 ov5647-c2 pvmll-m1 pvm7 raspi-7inch-touchscreen raspi-7inch-touchscreen spi3-m0-cs0-spidev uart3-m0 uart7-m2	12c4-m0 ov5647-c1 ov5647-c2 pwml1-m1 pwm7 raspi-7inch-touchscreen-dsi0 raspi-7inch-touchscreen spi3-m0-cs0-spidev uart3-m0 uart7-m2

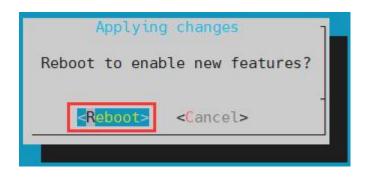
e. Then select **<Save>** to save

[] uart3-m0 [] uart7-m2 [] uart9-m2
<pre>&lt; Back &gt;</pre>

f. Then select **<Back>** 

<pre>[] spi3-m0-cs0-spidev [] uart3-m0 [] uart7-m2 [] uart9-m2</pre>
< Save > Back >

g. Then select **<Reboot>** to restart the system to make the configuration take effect



The above settings will eventually add the configuration of overlays=edp to /boot/orangepiEnv.txt. After setting, you can check it first. If this configuration does not exist, then there is a problem with the settings.

If you find it troublesome to use orangepi-config, you can also use the vim editor to open /boot/orangepiEnv.txt, and then add the configuration of overlays=edp.

orangepi@orangepi:~\$ cat /boot/orangepiEnv.txt | grep "edp" overlays=edp #sample configuration



3) After startup, you can see the display of the eDP screen as follows:

# 3. 31. Instructions for using the switch logo

1) By default, the switch logo will only be displayed in the desktop version of the system

2) Set the **bootlogo** variable to **false** in /boot/orangepiEnv.txt to turn off the switch logo orangepi@orangepi:~\$ vim /boot/orangepiEnv.txt verbosity=1
bootlogo=false

3) Set the bootlogo variable to true in /boot/orangepiEnv.txt to enable the switch logo orangepi@orangepi:~\$ vim /boot/orangepiEnv.txt verbosity=1 bootlogo=true

4) The location of the boot logo image in the Linux system is

### /usr/share/plymouth/themes/orangepi/watermark.png

5) After replacing the boot logo picture, you need to run the following command to take effect

orangepi@orangepi:~\$ sudo update-initramfs -u

# 3. 32. How to use the ZFS file system

### 3. 32. 1. How to install ZFS

Before installing zfs, please make sure that the Linux image used is the latest version. In addition, if zfs is already installed in the system, it needs to be installed again.

Before installing zfs, you need to install the kernel header file first. For the method of installing the kernel header file, please refer to the instructions in the section on the method of installing the kernel header file.

In Ubuntu20.04, Ubuntu22.04 and Debian11 systems, zfs cannot be installed directly through apt, because the default apt source zfs version is lower than 2.1.6, and there is a problem of incompatibility with rk Linux5.10 kernel. This problem is fixed in zfs version

2.1.6 and later.

To solve this problem, we provide a zfs deb package that can be installed normally, which can be downloaded from the **official tool** of the development board. Open the **official tool**, and enter the **zfs-related deb package folders used by Ubuntu and Debian systems**. You can see three types of deb packages: Ubuntu20.04, Ubuntu22.04 and Debian11. Please download the required version.

••• >	Official Tool $\rightarrow$ zfs-related deb packag	•
Туре	People      Modified	
Name	$\mathbf{\Psi}$	
	ubuntu22.04_zfs_2.1.6	
	ubuntu20.04_zfs_2.1.6	
	debian11_zfs_2.1.11	

After downloading the zfs deb packages of the corresponding version, please upload them to the Linux system of the development board. For the upload method, please refer to the description in the section of the method of uploading files to the Linux system of the development board.

After the upload is complete, use the **cd** command in the command line of the development board Linux system to enter the directory of the deb package, and then use the following command to install the deb package of zfs.

orangepi@orangepi:~\$ sudo apt install ./\*.deb

After the installation is complete, use the following command to see the zfs-related kernel modules:

```
orangepi@orangepi:~$ ls /lib/modules/5.10.160-rockchip-rk356x/updates/dkms/
icp.ko spl.ko zavl.ko zcommon.ko zfs.ko zlua.ko znvpair.ko zunicode.ko
zzstd.ko
```

Then restart the Linux system to see that the zfs kernel module will be automatically loaded:

orangepi@orangepi:~\$ lsmod   grep "zfs"				
zfs	2801664 0	0		
zunicode	327680 1	1 zfs		
zzstd	471040 1	1 zfs		
zlua	139264 1	1 zfs		
zcommon	69632	2 1 zfs		

🥺 range Pi User Manual		Copyright reserved by Shenzhen Xunlong Software Co., Ltd
znvpair	61440	2 zfs,zcommon
zavl	16384	
	221184	
icp spl	77824	6 zfs,icp,zzstd,znvpair,zcommon,zavl

×

In Debian12, the default version of zfs is 2.1.11, so we can install zfs directly through the following command. Again, please make sure that the system has installed the deb package of the kernel header file before installation.

orangepi@orangepi:~\$ sudo apt install -y zfsutils-linux zfs-dkms					
3. 32. 2. Methods of creating ZFS pools					
ZFS is based on storage pools, we can add multiple physical storage devices to					
the pool, and then allocate storage space from this pool.					
The following content is demonstrated based on the development board					
connected to an NVMe SSD and a USB flash drive.					

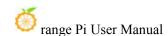
1) First, we can use the **lsblk** command to view all storage devices on the development board. The current development board is connected to an NVMe SSD and a U disk. The output is as follows:

a san san i Ga sa		+ 1.				
orangepi@ora	angep ::~:	φ L:	SDLK			
NAME	MAJ:MIN	RM	SIZE	RO	TYPE	MOUNTPOINTS
sda	8:0	1	28.8G	0	disk	
—sda1	8:1	1	28.8G	Θ	part	
└─sda9	8:9	1	8M	0	part	
mtdblock0	31:0	0	16M	0	disk	
mmcblk0	179:0	0	29.7G	0	disk	
-mmcblk0p1	179:1	0	1G	0	part	/boot
└─mmcblk0p2	179:2	0	28.4G	0	part	/var/log.hdd
						/
zram0	254:0	0	7.7G	0	disk	[SWAP]
zram1	254:1	0	200M	0	disk	/var/log
n∨me0n1	259:0	0	476.9G	0	disk	
—n∨me0n1p1	259:3	0	476.9G	0	part	
└─n∨me0n1p9	259:4	0	8M	0	part	
orangepi@ora	angepi:~	\$				

2) Then enter the following command to create a ZFS pool, including two storage devices, NVMe SSD and U disk

orangepi@orangepi:~\$ sudo zpool create -f pool1 /dev/nvme0n1 /dev/sda

3) Then use the **zpool list** command to see that the system has created a ZFS pool named **pool1**, and the size of the ZFS pool pool1 is the size of the NVME SSD plus the size of



the U disk

orangep	i@oran	gepi:~\$	zpool	list						CHARLES AND A STREET
NAME	SIZE	ALLOC	FREE	CKPOINT	EXPANDSZ	FRAG	CAP	DEDUP	HEALTH	ALTROOT
pool1	504G	114K	504G			0%	0%	1.00x	ONLINE	

### 4) Then execute **df -h** to see that **pool1** is mounted to the **/pool1** directory

orangepi@orange	orangepi@orangepi:~\$ df -h						
Filesystem	Size U	Used Ava	ail Use%	Mounted on			
tmpfs	1.6G	18M	1.6G	2% /run			
/dev/mmcblk0p2	29G	6.0G	22G	22% /			
tmpfs	7.7G	46M	7.7G	1% /dev/shm			
tmpfs	5.0M	4.0K	5.0M	1% /run/lock			
tmpfs	7.7G	944K	7.7G	1% /tmp			
/dev/mmcblk0p1	1022M	115M	908M	12% /boot			
/dev/zram1	188M	4.5M	169M	3% /var/log			
tmpfs	1.6G	80K	1.6G	1% /run/user/1000			
pool1	489G	9.3M	<b>489G</b>	1% <mark>/pool1</mark>			

5) Use the following command to see that the file system type of pool1 is zfs

orangepi@orangepi:~\$ mount | grep pool1

pool1 on /pool1 type zfs (rw,xattr,noacl)

6) Then we can test copying a file to the ZFS pool

orangepi@orangepi:~\$ sudo cp -v /usr/local/test.mp4 /pool1/

'/usr/local/test.mp4' -> '/pool1/test.mp4'

## 3. 32. 3. Test the data deduplication function of ZFS

1) The data deduplication function of ZFS is disabled by default, we need to execute the following command to enable it

orangepi@orangepi:~\$ sudo zfs set dedup=on pool1

2) Then do a simple test, first enter pool1, and then execute the following command to generate a random file with a size of 1G

orangepi@orangepi:~\$ cd /pool1/

root@orangepi:/pool1\$ sudo dd if=/dev/urandom of=test.1g bs=1M count=1024

1024+0 records in

1024+0 records out

1073741824 bytes (1.1 GB, 1.0 GiB) copied, 5.04367 s, 213 MB/s

# 3) Then use the following command to copy 1000 random files of size 1G root@orangepi:/pool1\$ for ((i=0; i<1000; i++)); do sudo cp test.1g \$i.test.1g; done

4) Then use **du** -lh to see that there are currently 1002G of data in the pool, but in fact the size of the ZFS pool is only **504GB** (the total capacity of SSD+U disk), which cannot hold such a large amount of data

root@orangepi:/pool1\$ **du -lh** 1002G

5) Then use the **zpool list** command to see that only 1.01G is actually occupied, because these 1001 files are all duplicates, indicating that the data deduplication function is effective.

orange	orangepi@orangepi:/pool1\$ zpool list										
NAME	SIZE	ALLOC	FREE	CKPOINT	EXPANDSZ	FRAG	CAP	DEDUP	HEALTH	ALTROOT	
pool1	504G	1.01G	503G			0%	0%	6.00x	ONLINE		

### 3. 32. 4. Test the data compression function of ZFS

1) Because the stored data is different, the disk space saved by compression will also be different, so we choose to compress relatively large plain text files for compression testing, and execute the following commands to pack the **/var/log/** and **/etc/** directories into a tarball

orangepi@orangepi:~\$ cd /pool1/

root@orangepi:/pool1\$ sudo tar -cf text.tar /var/log/ /etc/

2) Then the file size that can be seen through the **ls** -**lh** command and the space occupied in the ZFS pool are both **27M** 

		gepi:/po	ool1\$ l	s -lh						
total 27M -rw-rr 1 root root 27M Jun 1 14:46 text.tar										
	orangepi@orangepi:/pool1\$ zpool list									
NAME		ALLOC		CKPOINT	EXPANDSZ	FRAG	CAP	DEDUP	HEALTH	ALTROOT
pool1	504G	26.7M	504G			0%	0%	1.00x	ONLINE	-
orangep	orangepi@orangepi:/pool1\$									

3) Then we enable compression in the ZFS pool pool1

root@orangepi:/pool1\$ sudo zfs set compression=lz4 pool1

4) Then execute the following command again to package the /var/log/ and /etc/

directories into a tar package

root@orangepi:/pool1\$ sudo tar -cf text.tar /var/log/ /etc/

5) At this time, you can see that the size of the **text.tar** file is still 27M, but it only occupies 9.47M in the ZFS pool, indicating that the file is compressed

total s -rw-r	9.2M r 1		ot 27M	Jun 1 14	:54 text.ta	ar				
orange	orangepi@orangepi:/pool1\$ zpool list									
NAME	SIZE	ALLOC	FREE	CKPOINT	EXPANDSZ	FRAG	CAP	DEDUP	HEALTH	ALTROOT
pool1	504G	9.47M	504G_			0%	0%	1.00x	ONLINE	

# 3. 33. How to shut down and restart the development board

1) During the running of the Linux system, if the Type-C power supply is directly unplugged, some data may be lost or damaged in the file system, so please use the **poweroff** command to shut down the Linux system of the development board before powering off. Then unplug the power again.

orangepi@orangepi:~\$ sudo poweroff

2) The command to restart the Linux system is

orangepi@orangepi:~\$ sudo reboot

# 4. Linux SDK——orangepi-build instructions

## 4.1. Compilation system requirements

We can cross-compile the Linux image of the development board on the x64 computer, or compile the Linux image of the development board on the Ubuntu22.04 system of the development board, please choose one according to your preference.

If you use orangepi-build to compile the Linux image in the Ubuntu22.04 system of the development board, please do a good job of cooling (especially when the SSD starts). If the heat dissipation is not done well, it is prone to the error of file system runaway.

# 4. 1. 1. Compile with the Ubuntu22.04 system of the development board

1) The Linux SDK, namely **orangepi-build**, supports running on the **Ubuntu 22.04** of the development board (other systems have not been tested), so before downloading orangepi-build, please first ensure that the Ubuntu version installed on the development board is Ubuntu 22.04. The command to check the Ubuntu version installed on the development board is as follows. If the Release field does not display **22.04**, it means that the current Ubuntu version does not meet the requirements. Please replace the system before performing the following operations.

test@test:~\$ lsb\_release -a

👂 range Pi User Manual

No LSB modules are available. Distributor ID: Ubuntu Description: Ubuntu 22.04 LTS Release: 22.04 Codename: jammy

2) If the computer is installed with Windows system and there is no computer with Ubuntu 22.04 installed, you can consider using **VirtualBox** or **VMwar** to install an Ubuntu 22.04 virtual machine in the Windows system. But please be careful not to compile orangepi-build on the WSL virtual machine, because orangepi-build has not been tested in the WSL virtual machine, so it cannot be guaranteed that orangepi-build can be used normally in WSL.

3) The download address of the installation image of Ubuntu 22.04 amd64 version is: https://mirrors.tuna.tsinghua.edu.cn/ubuntu-releases/22.04/ubuntu-22.04-desktop-amd64.iso or

https://repo.huaweicloud.com/ubuntu-releases/22.04/ubuntu-22.04.1-desktop-amd64.iso

# 4. 2. Get the source code of Linux sdk

# 4. 2. 1. Download orangepi-build from github

1) The Linux sdk actually refers to the code of orangepi-build. orangepi-build is modified based on the armbian build system. Using orangepi-build, multiple versions of Linux images can be compiled. First download the code of orangepi-build, the command is as follows:

test@test:~\$ sudo apt-get update

test@test:~\$ sudo apt-get install -y git

test@test:~\$ git clone https://github.com/orangepi-xunlong/orangepi-build.git -<mark>b next</mark>

Note that the Orange Pi 3B development board needs to download the source code of the next branch of orangepi-build. The above git clone command needs to specify the branch of the orangepi-build source code as next.

Code 🛈 Issue	s 6 🕄 Pull requests 1 🗔	Discussions 🕑 Actions 🗄 Projects	🛱 Wiki 🛈 Security 🗠 Insights 🕸
អ្វី ne	xt 🚽 🐉 2 branches 🛛 🛇 0 tags		Go to file Add file - <> Code -
<u> </u>	branches/teas >	x behind main.	ئ¢ Contribute ◄
Branc			69dd359 4 days ago 🕥 222 commit
✓ ne		Update for Orange Pi 5 v1.0.2 Update for Orange Pi 5 v1.0.2	4 days ago 4 days ago
	gitignore	Update for Orange Pi 5 v1.0.2	4 days ago
	ICENSE	First Commit	2 years ago
P F	EADME.md	Support orangepi3 next branch	8 months ago
P t	uild.sh	Bump to next branch	9 months ago

Downloading the orangepi-build code through the git clone command does not require entering the user name and password of the github account (the same is true for downloading other codes in this manual), if the Ubuntu PC prompts the user to enter the github account after entering the git clone command The name and password are usually entered incorrectly in the address of the orangepi-build warehouse behind the git clone. Please check the spelling of the command carefully, instead of thinking that we forgot to provide the username and password of the github account.

2) The u-boot and Linux kernel versions currently used by the development board are as follows

branch	u-boot version	Linux Kernel version
legacy	u-boot 2017.09	Linux5.10

The branch mentioned here is not the same thing as the branch of the orangepi-build source code, please do not confuse it. This branch is mainly used to distinguish different kernel source code versions.

Currently, the Linux5.10 bsp kernel provided by RK is defined as the legacy branch. If the mainline kernel is supported in the future, a current branch will be added.

3) orangepi-build will contain the following files and folders after downloading

- a. **build.sh**: Compile the startup script
- b. **external**: Contains the configuration files needed to compile the image, specific scripts, and the source code of some programs, etc.
- c. LICENSE: GPL 2 license file
- d. README. md: orangepi-build documentation
- e. scripts: General script for compiling Linux images

test@test:~/orangepi-build\$ ls

build.sh external LICENSE README.md scripts

If you downloaded the code of orangepi-build from github, after downloading, you may find that orangepi-build does not contain the source code of u-boot and Linux kernel, nor does u-boot and Linux kernel need to use cross-compilation tools Chain, this is normal, because these things are stored in other separate github warehouses or some servers (the addresses will be detailed below). orangepi-build will specify the address of u-boot, Linux kernel and cross-compilation toolchain in the script and configuration file. When running orangepi-build, when it finds that there are no such things locally, it will automatically go to the corresponding place to download them.

### 4. 2. 2. Download the cross-compilation toolchain

The cross-compilation toolchain will only be downloaded when the orangepi-build compilation image is used on an x64 computer. Compiling the Linux image of the development board in the Ubuntu22.04 of the development board will not download the cross-compilation toolchain. At this time, orangepi-build/toolchains will be an empty folder.

1) When orangepi-build runs for the first time, it will automatically download the cross-compilation toolchain and put it in the **toolchains** folder. Every time after running the build.sh script of orangepi-build, it will check whether the cross-compilation toolchain in **toolchains** exists, if it does not exist, the download will be restarted, if it exists, it will be used directly, and the download will not be repeated.

[ o.k. ]	Checking for external GCC compilers	
	downloading using http(s) network [ gcc-linaro-aarch64-none-elf-4.8-2013.11_linux.tar.xz ]	
	) 16MiB/24MiB(65%) CN:1 DL:7.9MiB ETA:1s]	
	Verified [ PGP ]	
	decompressing	-
	gcc-linaro-aarch64-none-elf-4.8-2013.11_linux.tar.xz: 24.9MiB [14.4MiB/s] [====================================	J 100%
	downloading using http(s) network [gcc <sup>-</sup> linaro-arm-none-eabi-4.8-2014.04_linux.tar.xz ]	
	17MiB/33MiB(50%) (OH: DL:10MIB ETA:15) Verified [ PGP ]	
	verified [POP] decompression	
	uecompressing gcc-linaro-arm none-eabi-4.8-2014.04 linux.tar.xz: 33.9MiB [9.66MiB/s] [====================================	1 100%
	gtc-tinaro-anim-indic-adi-4.o-2014.04_Linux.idi.x2: 33.9910 [9.00016/5] Londons/Januaro-adi-10001200000000000000000000000000000000	-1 100-8
	Authorization Strip https://www.commercenter-and-conder-gineeditin-4-0-2014.04_tink.cd.x2_j	
	Verifiel [P6P]	
	decompressing	
	acc-linaro-arm-linux-anueabihf-4.8-2014.04 linux.tar.xz: 48.8MiB [13.0MiB/s] [====================================	1 100%
	downloading using http(s) network [ gcc-linaro-4.9.4-2017.01-x86 64 arm-linux-gnueabi.tar.xz ]	
	27/18/76/18(93%) CN:1 DL:3.7/18 ETA:151	
[ o.k. ]	Verified [ MD5 ]	
[ ]	decompressing	
	gcc-linaro-4.9.4-2017.01-x86 64 arm-linux-gnueabi.tar.xz: 77.0MiB [14.2MiB/s] [====================================	] 100%
[ ]	downloading using http(s) network [ gcc-linaro-7.4.1-2019.02-x86 64 arm-linux-gnueabi.tar.xz ]	
	3 104MiB/104MiB(99%) CN:1 DL:2.8MiB]	
	Verified [ MD5 ]	
	decompressing	
	gcc-linaro-7.4.1-2019.02-x86_64_arm-linux-gnueabi.tar.xz: 104MiB [13.9MiB/s] [====================================	·] 100%
	downloading using http(s) network [ gcc-linaro-7.4.1-2019.02-x86_64_aarch64-linux-gnu.tar.xz ]	
	: 108MiB/111MiB(97%) CN:1 DL:3.9MiB]	
	Verified [ MD5 ]	
	decompressing	
	gcc-linaro-7.4.1-2019.02-x86 64 aarch64-linux-gnu.tar.xz: 111MiB [13.4MiB/s] [====================================	·] 100%
	downloading using http(s) network [ gcc-arm-9.2-2019.12-x86_64-arm-none-linux-gnueabihf.tar.xz ] 2509HB/251HB(999) (ct: D Lu:2,0HB)	
	/ Zomlo/ZJHIO(39%) VN:1 UL:2.0MID) Verified (MDS )	
	decompression	
	acc-arm-9.22019.12-x86 64-arm-none-linux-gnueabihf.tar.xz; 251MiB [13.7MiB/s] [====================================	1 100%
	downloading using http(s) network [ gc-arm-9.2-2.2019.12-x86 64-aarch64-none-linux-gnu.tar.xz ]	1 100 0
	Cosmic/CosmiB (9%) (N:1 D1:0.9MiB)	
	Verified [ MD5 ]	
	decompressing	

2) The image URL of the cross-compilation toolchain in China is the open source software image site of Tsinghua University

https://mirrors.tuna.tsinghua.edu.cn/armbian-releases/\_toolchain/

3) After **toolchains** is downloaded, it will contain multiple versions of cross-compilation toolchains, and the development board will only use two of them

test@test:~/orangepi-build\$ ls toolchains/
gcc-arm-11.2-2022.02-x86_64-aarch64-none-linux-gnu
gcc-arm-11.2-2022.02-x86_64-arm-none-linux-gnueabihf
gcc-arm-9.2-2019.12-x86_64-aarch64-none-linux-gnu
gcc-arm-9.2-2019.12-x86_64-arm-none-linux-gnueabihf
gcc-linaro-4.9.4-2017.01-x86_64_arm-linux-gnueabi
gcc-linaro-5.5.0-2017.10-x86_64_arm-linux-gnueabihf
gcc-linaro-7.4.1-2019.02-x86_64_aarch64-linux-gnu
gcc-linaro-7.4.1-2019.02-x86_64_arm-linux-gnueabi
gcc-linaro-aarch64-none-elf-4.8-2013.11_linux
gcc-linaro-arm-linux-gnueabihf-4.8-2014.04_linux
gcc-linaro-arm-none-eabi-4.8-2014.04_linux

4) The cross-compilation toolchain used to compile the Linux kernel source code is a. Linux5.10

### gcc-arm-11.2-2022.02-x86\_64-aarch64-none-linux-gnu

5) The cross-compilation tool chain used to compile the u-boot source code is

a. v2017.09

### gcc-linaro-7.4.1-2019.02-x86\_64\_aarch64-linux-gnu

### 4. 2. 3. orangepi-build complete directory structure description

1) The orangepi-build repository does not contain the source code of the Linux kernel, u-boot, and cross-compilation toolchain after downloading. The source code of the Linux kernel and u-boot is stored in an independent git repository

a. The git repository where the Linux kernel source code is stored is as follows:

https://github.com/orangepi-xunlong/linux-orangepi/tree/orange-pi-5.10-rk35xx

b. The git warehouse where the b.u-boot source code is stored is as follows:

https://github.com/orangepi-xunlong/u-boot-orangepi/tree/v2017.09-rk3588

2) When orangepi-build runs for the first time, it will download the cross-compilation toolchain, u-boot and Linux kernel source code. After successfully compiling a Linux image, the files and folders that can be seen in orangepi-build are:

a. build.sh: compile startup script

b. **external**: Contains the configuration files needed to compile the image, scripts with specific functions, and the source code of some programs. The rootfs compressed package cached during the image compilation process is also stored in external

c. **kernel**: stores the source code of the Linux kernel, and the folder named orange-pi-5.10-rk35xx stores the kernel source code of the legacy branch of the RK3588/RK3588S/RK3566 series development boards. Please do not manually name the folder name of the kernel source code Modify, if modified, the kernel source code will be re-downloaded when the compilation system is running

d. LICENSE: GPL 2 license file

e. README.md: orangepi-build documentation

f. **output**: Store compiled deb packages such as u-boot and Linux, compilation logs, and compiled images and other files

g. scripts: general scripts for compiling Linux images

h. toolchains: store cross-compilation toolchain

i. **u-boot**: stores the source code of u-boot, the folder named **v2017.09-rk3588** stores the u-boot source code of the legacy branch of the RK3588/RK3588S/RK3566 series development boards, the name of the folder of the u-boot source code Please do not

modify it manually, if it is modified, the u-boot source code will be re-downloaded when the compiling system is running

j. userpatches: Store configuration files needed to compile scripts

test@test:~/orangepi-build\$ ls

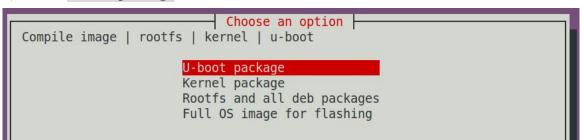
build.sh external kernel LICENSE output README.md scripts toolchains u-boot userpatches

## 4.3. **Compile u-boot**

1) Run the build.sh script, remember to add sudo permission

```
test@test:~/orangepi-build$ sudo ./build.sh
```

2) Select U-boot package, then enter



3) Then select the model of the development board

4) Then it will start to compile u-boot, and some information prompted during compilation is explained as follows

a. u-boot source code version

[ o.k. ] Compiling u-boot [ **v2017.09** ]

b. The version of the cross-compilation toolchain

o.k. ] Compiler version [ aarch64-linux-gnu-gcc 7.4.1 ]

c. Path to the generated u-boot deb package

o.k. ] Target directory [ orangepi-build/output/debs/u-boot ]

d. The package name of the generated u-boot deb package

o.k. ] File name [ linux-u-boot-legacy-orangepi3b\_1.0.0\_arm64.deb ]

e. Compilation time

[ o.k. ] Runtime [ **1 min** ]

f. Repeat the command to compile u-boot, use the following command to start compiling u-boot directly without selecting through the graphical interface

[ o.k. ] Repeat Build Options [ sudo ./build.sh BOARD=orangepi3b BRANCH=legacy BUILD OPT=u-boot KERNEL CONFIGURE=no ]

5) View the u-boot deb package generated by compilation

test@test:~/orangepi-build\$ ls output/debs/u-boot/

linux-u-boot-legacy-orangepi3b\_1.0.0\_arm64.deb

6) The files contained in the generated u-boot deb package are as follows

a. Use the following command to decompress the deb package

test@test:~/orangepi-build\$ cd output/debs/u-boot

test@test:~/orangepi\_build/output/debs/u-boot\$ \$ dpkg -x \

linux-u-boot-legacy-orangepi3b\_1.0.0\_arm64.deb . (Note that there is a "." at the end of the command)

test@test:~/orangepi\_build/output/debs/u-boot\$ ls

linux-u-boot-legacy-orangepi3b\_1.0.0\_arm64.deb usr

b. The decompressed file is as follows

test@test:~/orangepi-build/output/debs/u-boot\$ tree usr

```
usr
```

└── lib

linux-u-boot-legacy-orangepi3b\_1.0.0\_arm64

idbloader.img

rkspi\_loader.img

└── u-boot.itb

— u-boot

LICENSE orangepi-3b-rk3566\_defconfig platform\_install.sh

3 directories, 6 files

7) When the orangepi-bulid compilation system compiles the u-boot source code, it will first synchronize the u-boot source code with the u-boot source code of the github server, so if you want to modify the u-boot source code, you first need to turn off the download and update function of the source code (This function needs to be fully compiled once u-boot, otherwise it will prompt that the source code of u-boot cannot be found. If the source code package downloaded from Baidu cloud disk, there is no such problem, because the source code of u-boot is all cached), otherwise the changes made will be reverted, the method is as follows:

Set the IGNORE\_UPDATES variable in userpatches/config-default.conf to "yes" test@test:~/orangepi-build\$ vim userpatches/config-default.conf IGNORE\_UPDATES="yes"

8) When debugging u-boot code, you can use the following method to update u-boot in the Linux image for testing

a. Upload the compiled u-boot deb package to the Linux system of the development board

test@test:~/orangepi-build\$ cd output/debs/u-boot

test@test:~/orangepi\_build/output/debs/u-boot\$ scp \

linux-u-boot-legacy-orangepi3b\_1.0.0\_arm64.deb root@192.168.1.xxx:/root

b. Then log in to the development board and uninstall the deb package of u-boot installed

root@orangepi:~# apt purge -y linux-u-boot-orangepi3b-legacy

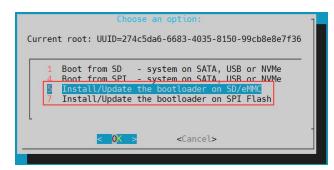
c. Install the new u-boot deb package just uploaded

root@orangepi:~# dpkg -i linux-u-boot-legacy-orangepi3b\_1.0.0\_arm64.deb

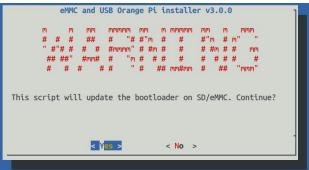
d. Then run the nand-sata-install script

root@orangepi:~# nand-sata-install

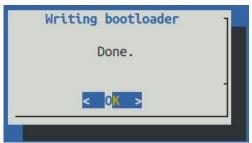
e. Then select **5 Install/Update the bootloader on SD/eMMC** to update the u-boot in the TF card or **7 Install/Update the bootloader on SPI Flash** to update the u-boot in the SPI Flash



f. After pressing the Enter key, a Warning will pop up first



g. Press the Enter key again to start updating u-boot, and the following information will be displayed after the update is completed



- h. Then you can restart the development board to test whether the modification of u-boot takes effect
- 9) Other useful information
  - a. In the u-boot 2017.09 source code, the defconfig configuration file used by the development board is

orangepi-build/u-boot/v2017.09-rk3588/configs/orangepi-3b-rk3566\_defconfig

b. In the u-boot 2017.09 source code, the dts file used by the development board is orangepi-build/u-boot/v2017.09-rk3588/arch/arm/dts/rk3566-orangepi-3b.dts

# 4.4. Compile the Linux kernel

#### 1) Run the build.sh script, remember to add sudo permission

test@test:~/orangepi-build\$ sudo ./build.sh

### 2) Select Kernel package, then enter

Compile image   rootf	Choose an option Choose an option	
	U-boot package <mark>Kernel package</mark> Rootfs and all deb packages Full OS image for flashing	

### 3) Then select the model of the development board

ſ	Please choose a Board.	٦
	orangepi3-lts Allwinner H6 quad core 2GB RAM GBE WiFi/BT-AW859A eMMC USB3 ↑ orangepizero2 Allwinner H616 quad core 512MB/1GB RAM WiFi/BT GBE SPI orangepizero3 Allwinner H618 quad core 1GB/1.5GB/2GB/4GB RAM WiFi/BT GBE SPI orangepizero2w Allwinner H618 quad core 1GB/1.5GB/2GB/4GB RAM WiFi/BT SPI orangepi4 Rockchip RK3399 hexa core 4GB RAM GBE eMMC USB3 USB-C WiFi/BT orangepi4-lts Rockchip RK3399 hexa core 4GB RAM GBE eMMC USB3 USB-C WiFi/BT orangepi5 Rockchip RK3399 hexa core 4GB RAM GBE eMMC USB3 USB-C WiFi/BT VGA orangepi5 Rockchip RK3588S octa core 4-16GB RAM GBE USB3 USB-C NVMe orangepi5b Rockchip RK3588 octa core 4-16GB RAM GBE USB3 USB-C WiFi/BT eMMC orangepi5b Rockchip RK3588 octa core 4-32GB RAM 2.5GBE USB3 USB-C WiFi/BT NVMe eMMC Orangepi3b Rockchip RK3566 quad core 2-8GB RAM GBE eMMC USB3 NVMe WiFi/BT ↓	
	<select> <exit></exit></select>	

4) Then it will prompt whether to display the kernel configuration interface. If you do not need to modify the kernel configuration, select the first one. If you need to modify the kernel configuration, select the second one.

Choose an option	
Select the kernel configuration.	
Do not change the kernel configuration	
Show a kernel configuration menu before compilation	

5) If you choose to display the kernel configuration menu (the second option) in step 4, the kernel configuration interface opened by **make menuconfig** will pop up. At this time,

you can directly modify the kernel configuration, save and exit after modification. Yes, after exiting, the kernel source code will be compiled

Linux/arm64 5.10.110 Kernel Configuration
Arrow keys navigate the menu. <enter> selects submenus&gt; (or empty submenus). Highlighted letters are hotkeys. Pressing <y> includes, <n> excludes, <m> modularizes features. Press <esc><esc> to exit, <? > for Help,  for Search. Legend: [*] built-in [ ] excluded <m> module &lt; &gt; module capable</m></esc></esc></m></n></y></enter>
General setup>
[*] Support DMA zone
[*] Support DMA32 zone
Platform selection>
Kernel Features>
Boot options>
Power management options>
CPU Power Management>
Firmware Drivers>
[ ] ACPI (Advanced Configuration and Power Interface) Support
<pre>[*] Virtualization&gt;</pre>
-*- ARM64 Accelerated Cryptographic Algorithms>
General architecture-dependent options>
[*] Enable loadable module support>
- v(+)
<pre><select> &lt; Exit &gt; &lt; Help &gt; &lt; Save &gt; &lt; Load &gt;</select></pre>

a. If you do not need to modify the configuration options of the kernel, when running the build.sh script, pass in **KERNEL\_CONFIGURE=no** to temporarily block the pop-up kernel configuration interface

test@test:~/orangepi-build\$ sudo ./build.sh KERNEL\_CONFIGURE=no

b. You can also set **KERNEL CONFIGURE=no** in the

**orangepi-build/userpatches/config-default.conf** configuration file, which can permanently disable this function

c. If the following error is displayed when compiling the kernel, it is because the terminal interface of the Ubuntu PC is too small to display the **make menuconfig** interface. Please maximize the terminal of the Ubuntu PC and run the build.sh script again

range Pi User Manual

HOSTCC	scripts/kconfig/mconf.o
	scripts/kconfig/lxdialog/checklist.o
	scripts/kconfig/lxdialog/util.o
	scripts/kconfig/lxdialog/inputbox.o
	scripts/kconfig/lxdialog/textbox.o
	scripts/kconfig/lxdialog/yesno.o
	scripts/kconfig/lxdialog/menubox.o
	scripts/kconfig/mconf
	config/mconf_Kconfig
Your disp	lay is too small to run Menuconfig!
It must be	e at least 19 lines by 80 columns.
scripts/ko	config/Makefile:28: recipe for target 'menuconfig' failed
make[1]: *	*** [menuconfig] Error 1
Makefile:	560: recipe for target 'menuconfig' failed
make: ***	[menuconfig] Error 2
[ error ]	ERROR in function compile kernel [ compilation.sh:376 ]
[ error ]	Error kernel menuconfig failed
[ o.k. ] F	Process terminated

- 6) Part of the information prompted when compiling the kernel source code is as follows
  - a. The version of the Linux kernel source code

[o.k.] Compiling current kernel [ 5.10.160]

b. The version of the cross-compilation toolchain used

o.k. ] Compiler version [ aarch64-none-linux-gnu-gcc 11.2.1 ]

c. The configuration file used by the kernel by default and the path where it is stored

[ o.k. ] Using kernel config file [ config/kernel/linux-rockchip-rk356x-legacy.config ]

d. The path of the deb package related to the kernel generated by compiling

[ o.k. ] Target directory [ orangepi-build/output/debs/ ]

e. The package name of the compiled kernel image deb package

[ o.k. ] File name [ linux-image-legacy-rockchip-rk356x\_1.0.0\_arm64.deb ]

f. The time used for compilation

[ o.k. ] Runtime [ **5 min** ]

g. Finally, the compilation command to repeatedly compile the kernel selected last time will be displayed. Use the following command to start compiling the kernel source code directly without selecting through the graphical interface

[ o.k. ] Repeat Build Options [ sudo ./build.sh BOARD=orangepi3b BRANCH=legacy BUILD\_OPT=kernel KERNEL\_CONFIGURE=no ]

- 7) View the deb package related to the kernel generated by compilation
  - a. linux-dtb-legacy-rockchip-rk356x\_1.0.0\_arm64.deb Contains dtb files used by the kernel
  - b. linux-headers-legacy-rockchip-rk356x\_1.0.0\_arm64.deb Include kernel header files
  - c. linux-image-legacy-rockchip-rk356x\_1.0.0\_arm64.deb Contains kernel images and kernel

modules

test@test:~/orangepi-build\$ **ls output/debs/linux-\*** output/debs/linux-dtb-legacy-rockchip-rk356x\_1.0.0\_arm64.deb output/debs/linux-image-legacy-rockchip-rk356x\_1.0.0\_arm64.deb output/debs/linux-headers-legacy-rockchip-rk356x\_1.0.0\_arm64.deb

8) The files contained in the generated Linux-image deb package are as follows

- a. Use the following command to decompress the deb package
- test@test:~/orangepi-build\$ cd output/debs

test@test:~/orangepi\_build/output/debs\$ mkdir test

test@test:~/orangepi\_build/output/debs\$ cp \

linux-image-legacy-rockchip-rk356x\_1.0.0\_arm64.deb test/

test@test:~/orangepi\_build/output/debs\$ cd test

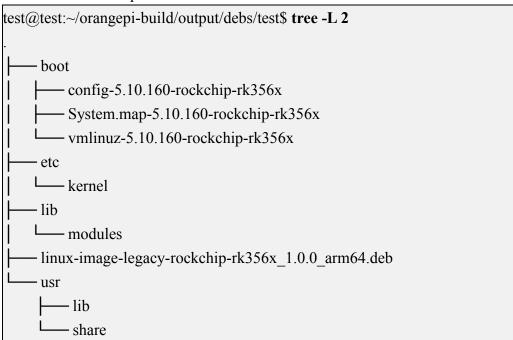
test@test:~/orangepi\_build/output/debs/test\$ **dpkg -x** \

linux-image-legacy-rockchip-rk356x\_1.0.0\_arm64.deb .

test@test:~/orangepi\_build/output/debs/test\$ ls

boot etc lib linux-image-legacy-rockchip-rk356x\_1.0.0\_arm64.deb usr

b. The decompressed file is as follows



9) The orangepi-bulid compilation system will first synchronize the Linux kernel source code with the Linux kernel source code of the github server when compiling the Linux

kernel source code, so if you want to modify the Linux kernel source code, you first need to turn off the update function of the source code (You need to fully compile the Linux kernel source code before turning off this function. Otherwise, you will be prompted that the source code of the Linux kernel cannot be found. If you download the source code package from Baidu cloud disk, there is no such problem, because the source code of Linux has been cached.), otherwise the The changes made will be reverted as follows:

Set the IGNORE\_UPDATES variable in **userpatches/config-default.conf** to "yes" test@test:~/orangepi-build\$ **vim userpatches/config-default.conf** IGNORE\_UPDATES="**yes**"

10) If the kernel has been modified, the following method can be used to update the kernel and kernel modules of the development board Linux system

a. Upload the deb package of the compiled Linux kernel to the Linux system of the development board

test@test:~/orangepi-build\$ cd output/debs

test@test:~/orangepi-build/output/debs\$ scp \

linux-image-legacy-rockchip-rk356x\_1.0.0\_arm64.deb root@192.168.1.xxx:/root

b. Then log in to the development board and uninstall the deb package of the installed Linux kernel

root@orangepi:~# apt purge -y linux-image-legacy-rockchip-rk356x

c. Install the deb package of the new Linux kernel just uploaded

root@orangepi:~# dpkg -i linux-image-legacy-rockchip-rk356x\_1.0.0\_arm64.deb

d. Then restart the development board, and then check whether the kernel-related modifications have taken effect

root@orangepi:~# reboot

- 11) Other useful information
  - a. The storage location of the kernel configuration file is as follows, please do not go to the kernel source code to find the kernel configuration file used by the development board

orangepi-build/external/config/kernel/linux-rockchip-rk356x-legacy.config

b. The location of the dts file used by the development board is

orangepi-build/kernel/orange-pi-5.10-rk35xx/arch/arm64/boot/dts/rockchip/rk3566orangepi-cm4.dts

# 4.5. **Compile rootfs**

1) Run the build.sh script, remember to add sudo permission

test@test:~/orangepi-build\$ sudo ./build.sh

2) Select Rootfs and all deb packages, then enter

Choose an option Compile image   rootfs   kernel   u-boot	
U-boot package Kernel package <mark>Rootfs and all deb packages</mark> Full OS image for flashing	

3) Then select the model of the development board

Please choose a Boa	rd.	
orangepizero2 orangepizero3 orangepizero2w orangepi4	Allwinner H6 quad core 2GB RAM GBE WiFi/BT-AW859A eMMC USB3 Allwinner H616 quad core 512MB/1GB RAM WiFi/BT GBE SPI Allwinner H618 quad core 1GB/1.5GB/2GB/4GB RAM WiFi/BT GBE SPI Allwinner H618 quad core 1GB/1.5GB/2GB/4GB RAM WiFi/BT SPI Rockchip RK3399 hexa core 4GB RAM GBE eMMC USB3 USB-C WiFi/BT Rockchip RK3399 hexa core 4GB RAM GBE eMMC USB3 USB-C WiFi/BT Rockchip RK3399 hexa core 4GB RAM GBE eMMC USB3 USB-C WiFi/BT Rockchip RK3588 octa core 4-16GB RAM GBE USB3 USB-C WiFi/BT VGA Rockchip RK3588 octa core 4-32GB RAM GBE USB3 USB-C WiFi/BT NVMe eMMC Rockchip RK3588 octa core 4-32GB RAM GBE USB3 USB-C WiFi/BT NVMe eMMC Rockchip RK3586 quad core 2-8GB RAM GBE eMMC USB3 NVMe WiFi/BT Rockchip RK3566 quad core 2-8GB RAM GBE eMMC USB3 NVMe WiFi/BT Rockchip RK3566 quad core 2-8GB RAM GBE eMMC USB3 NVMe WiFi/BT	

4) Then select the type of rootfs

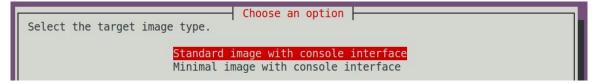
Select the target OS release package base	se a relea	se package base	
bull: jammu	200 C	11 Bullseye jammy 22.04 LTS	l i

5) Then select the type of image

- a. **Image with console interface (server)** Indicates the image of the server version, which is relatively small
- b. **Image with desktop environment** Indicates a image with a desktop, which is relatively large

	Choose an option	
Select the target image type.		
Image	with console interface (server)	
Image	with desktop environment	

6) If you are compiling the image of the server version, you can also choose to compile the Standard version or the Minimal version. The pre-installed software of the Minimal version will be much less than that of the Standard version (please do not choose the Minimal version if there is no special requirement, because many things are not pre-installed by default. Some functions may not be available)



7) If you are compiling the image of the desktop version, you also need to select the type of desktop environment. Currently, Ubuntu Jammy mainly maintains XFCE and Gnome desktops, Ubuntu Focal only maintains XFCE desktops, and Debian Bullseye mainly maintains XFCE and KDE desktops



You can then select additional packages that need to be installed. Please press the Enter key to skip directly here.

Select which kind of s [] 3dsupport [] browsers [] chat [] desktop_tools [] editors [] internet [] multimedia [] office [] programming [] remote_desktop	oftwares you'd l 3dsupport Browsers Chat Desktop_tools Editors Internet Multimedia Office Programming	se desktop softwares to add like to add to your build
	<0k>	<cancel></cancel>

8) Then it will start to compile rootfs, and some of the information prompted during compilation are as follows

a. The type of rootfs

[ o.k. ] local not found [ Creating new rootfs cache for <b>jammy</b> ]
---

- b. The storage path of the compiled rootfs compressed package
- [ o.k. ] Target directory [ external/cache/rootfs ]

c. The name of the rootfs compressed package generated by compilation

[ o.k. ] File name [ **jammy-xfce-arm64.f930ff6ebbac1a72108a2e100762b18f.tar.lz4** ]

d. The time used for compilation

[ o.k. ] Runtime [ **13 min** ]

- 9) View the rootfs compressed package generated by compilation
  - a. jammy-xfce-arm64.f930ff6ebbac1a72108a2e100762b18f.tar.lz4 is the rootfs compressed package, the meaning of each field of the name is
    - a) **jammy** indicates the type of Linux distribution of rootfs
    - b) **xfce** means rootfs is the type of desktop version, if it is **cli**, it means the type of server version
    - c) **arm64** represents the architecture type of rootfs
    - d) **f930ff6ebbac1a72108a2e100762b18f** is the MD5 hash value generated by the package names of all software packages installed by rootfs. As long as the list of software packages installed by rootfs is not modified, this value will not change. The compilation script will use this MD5 hash value to

generate Determine whether rootfs needs to be recompiled

b. **jammy-xfce-arm64.f930ff6ebbac1a72108a2e100762b18f.tar.lz4.list** lists the package names of all packages installed by rootfs

test@test:~/orangepi-build\$ **ls external/cache/rootfs/** jammy-xfce-arm64.f930ff6ebbac1a72108a2e100762b18f.tar.lz4 jammy-xfce-arm64.f930ff6ebbac1a72108a2e100762b18f.tar.lz4.current jammy-xfce-arm64.f930ff6ebbac1a72108a2e100762b18f.tar.lz4.list

10) If the required rootfs already exists under **external/cache/rootfs**, then compiling rootfs again will directly skip the compilation process and will not restart the compilation. When compiling the image, it will also go to **external/cache/rootfs** to find out whether it has If there is rootfs available in the cache, use it directly, which can save a lot of download and compilation time.

# 4. 6. **Compile Linux image**

1) Run the build.sh script, remember to add sudo permission

test@test:~/orangepi-build\$ sudo ./build.sh

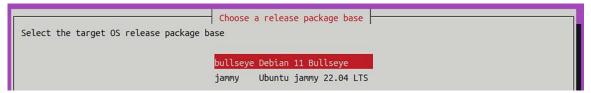
2) Select Full OS image for flashing, then enter

Compile image   rootfs   kernel   u-boot	٦
U-boot package Kernel package Rootfs and all deb packages <mark>Full OS image for flashing</mark>	

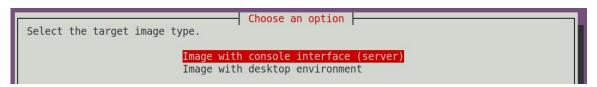
3) Then select the model of the development board

Please choose a Board	Choose an option	
orangepizero2 A orangepizero3 A orangepizero2w A orangepi4 R orangepi4-lts R orangepi5 R orangepi5 R orangepi5 R orangepi5 R	Allwinner H6 quad core 2GB RAM GBE WiFi/BT-AW859A eMMC USB3 Allwinner H616 quad core 512MB/1GB RAM WiFi/BT GBE SPI Allwinner H618 quad core 1GB/1.5GB/2GB/4GB RAM WiFi/BT GBE SPI Allwinner H618 quad core 1GB/1.5GB/2GB/4GB RAM WiFi/BT SPI Rockchip RK3399 hexa core 4GB RAM GBE eMMC USB3 USB-C WiFi/BT Rockchip RK3399 hexa core 4GB RAM GBE eMMC USB3 USB-C WiFi/BT Rockchip RK3399 hexa core 4GB RAM GBE eMMC USB3 USB-C WiFi/BT Rockchip RK3399 hexa core 4GB RAM GBE eMMC USB3 USB-C WiFi/BT Rockchip RK3399 hexa core 4-16GB RAM GBE USB3 USB-C NVMe Rockchip RK3588S octa core 4-16GB RAM GBE USB3 USB-C WiFi/BT eMMC Rockchip RK3588 octa core 4-32GB RAM 2.5GBE USB3 USB-C WiFi/BT NVMe eMMC	
	Rockchip RK3566 quad core 2-8GB RAM GBE eMMC USB3 NvMe WiFi/BT Rockchip RK3566 quad core 2-8GB RAM GBE eMMC USB3 NvMe WiFi/BT ↓	
	<select> <exit></exit></select>	

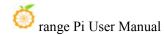
4) Then select the type of rootfs



- 5) Then select the type of image
  - a. **Image with console interface (server)** Indicates the image of the server version, which is relatively small
  - b. **Image with desktop environment** Indicates a image with a desktop, which is relatively large



6) If you are compiling the image of the server version, you can also choose to compile the Standard version or the Minimal version. The pre-installed software of the Minimal version will be much less than that of the Standard version (please do not choose the Minimal version if there is no special requirement, because many things are not pre-installed by default. Some functions may not be available)



Choose an option
Select the target image type.
Standard image with console interface
Minimal image with console interface

7) If you are compiling the image of the desktop version, you also need to select the type of desktop environment. Currently, Ubuntu Jammy mainly maintains XFCE and Gnome desktops, Ubuntu Focal only maintains XFCE desktops, and Debian Bullseye mainly maintains XFCE and KDE desktops

Select the default desktop	Choose a desktop environment environment to bundle with this	s image
	Gnome desktop environment Xfce desktop environment	
Cho	ose the desktop environment con	
Select the configuration for		
	base configuration	

You can then select additional packages that need to be installed. Please press the Enter key to skip directly here.

<pre>[] 3dsupport [] browsers [] chat [] desktop_tools [] editors [] internet</pre>	oftwares you'd 3dsupport Browsers Chat Desktop_tools Editors Internet Multimedia Office Programming	e desktop softwares to add ike to add to your build
	<0k>	<cancel></cancel>

8) Then it will start to compile the Linux image. The general process of compilation is as follows

a. Initialize the compilation environment of Ubuntu PC and install the software packages required for the compilation process

b. Download the source code of u-boot and Linux kernel (if cached, only update the code)

c. Compile u-boot source code and generate u-boot deb package

d. Compile the Linux source code and generate Linux-related deb packages

e. Make the deb package of Linux firmware

f. Make the deb package of the orangepi-config tool

g. Create a deb package supported by the board

h. If you are compiling the desktop image, you will also create desktop-related deb packages

i. Check whether the rootfs has been cached, if not, recreate the rootfs, if it has been cached, directly decompress and use

j. Install the previously generated deb package into rootfs

k. Make some specific settings for different development boards and different types of images, such as pre-installing additional software packages, modifying system configuration, etc.

1. Then make an image file and format the partition, the default type is ext4

m. Then copy the configured rootfs to the mirrored partition

n. Then update initramfs

o. Finally, write the bin file of u-boot into the image through the dd command

9) After compiling the image, the following information will be prompted

a. The storage path of the compiled image

o.k. ] Done building

[ output/images/Orangepi3b\_1.0.0\_debian\_bullseye\_desktop\_xfce\_linux5.10.160/Or angepi3b\_1.0.0\_debian\_bullseye\_desktop\_xfce\_linux5.10.160.img ]

b. Compilation time

[ o.k. ] Runtime [ 19 min ]

c. Repeat the command to compile the image, and use the following command to start compiling the image directly without selecting through the graphical interface

[ o.k. ] Repeat Build Options [ sudo ./build.sh BOARD=orangepi3b BRANCH=legacy BUILD\_OPT=image RELEASE=bullseye BUILD\_MINIMAL=no BUILD\_DESKTOP=no KERNEL\_CONFIGURE=yes ]

# 5. Instructions for using the Orange Pi OS Arch system

# 5.1. Orange Pi OS Arch system function adaptation

Function	OPi OS Arch
USB2. 0x3	ОК
USB3. 0x1	ОК
SPIF1ash+M.2 NVMe SSD Boot	OK, It needs to be pasted with SPI
	Flash to work normally
WIFI	ОК
Bluetooth	ОК
GPIO (40pin)	OK
UART (40pin)	ОК
SPI (40pin)	ОК
I2C (40pin)	ОК
PWM (40pin)	ОК
3pin debugging serial port	ОК
eMMC start	ОК
TF card start	ОК
HDMI video	ОК
HDMI audio	ОК
Raspberry Pi 5 inch screen display	ОК
Raspberry Pi 5-inch screen touch	ОК
function	
eDP display	ОК
OV5647 camera	The kernel driver is OK, 3A is not

	adjusted
Gigabit Ethernet port	OK
Network port status light	OK
headphone playback	OK
headphone recording	ОК
LED lights	ОК
GPU	NO
NPU	NO
VPU	NO

#### 5.2. Orange Pi OS Arch System User Guide Instructions

First of all, please note that the OPi OS Arch system does not have a default orangepi user and password, so after burning and starting the system, it is impossible to log in remotely through the serial port and ssh directly (not even the root user). This is different from Ubuntu and Debian systems.

When the OPi OS Arch system starts for the first time, it needs to be connected to an HDMI display, and then initialize the system settings through the user wizard (including creating a new user name and setting a password). The setup steps of the User Wizard are as follows:

a) After burning the system, you will see the user wizard program shown in the figure below after starting the system for the first time and entering the desktop



b) First you need to choose the desired language

ŵ				
Trase				
Ø				
lasyatam				
	6	Orangepi OS Linux Setup Program	A _ D X	
	Ó	Welcome to Orangepi OS Linux (rolling) se	etup	
	Welcome	This program will ask you some questions and set up Orangepi OS Linux on your compu	iter.	
	Location Keyboard			
	Users			
	Summary	<i>∞</i> (``)		
	Set up Finish			
	8	A American English		
		cpncsu srpski svenska	Serbian Serbian Swedish	
	About	างรุงหมั โกย	Tajik sncel	
		Türkiye (Türkiye) yepilmicana Türkiyi yüt	Turkish (Turkey) Ukrainian Vietnamese	
		Teniy Very 爾作 <b>中交</b> 緊節中文	Chinese	
🚰 💿 💍 Orangepi OS Linux Setup				• • • • •

c) After selecting the language, the user guide will immediately switch to the corresponding language interface, such as the Chinese display as shown below



d) Then select the area

Till Tean PilleSpaan			
Jan J	2 次辺 位置 確盘 用户 接受 建立 结束 地区: Aut 系4438時		
🗿 📴 🛃 🕐 💿 Galagopi OS Linux 9281877	**	£32(0) T-\$00 TE3(C)	€ <b>1 2 20110905</b> 0€#

e) Then select the keyboard model

Ticali Icali Niki System				
ία. Jana	摘要 建立 结束	Crich Mongdan (Bild David) Mongdan (Bal David) Mongdan (Bal Divel) Mongdan (Bal Divel) Mongdan (Bal Divel) Mongdan (Bal Divel) Mongdan (Bal Bangdan (Marsha) Mongdan (Bal) Mongdan (Bal) Mongdan (Bal)	ik) hthu Galik) hthu Jo Galik) lo (a)	
	XŦ	在此处的期间测试输出	后进(8) 下一步(N) 10消(C)	
🗿 📴 🗺 💿 🖸 Orangepi OS Linux SR RIF.				● ● ● ● ● ● * <sup>201005</sup> ort

f) Then create a new user name and set a password

Tizan Tizan Disiyatan					
Auro		<ul> <li>(3) 技名?</li> <li>(2) 安全(第一日) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2</li></ul>	arepi OS Linux 犯視提序	∧ _ Β X	
🗿 📴 🗺 💿 🖸 Orangepi OS Linux SERTER	¥7			(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	

g) Then make sure that there is no problem with the selection, and then click the **install** button

0 0			
#lls-System			
Lens		^ _ D X	
	建立 结束 <sub>大于</sub>	5.800 92803 17.000	
🕢 🕞 🖬 🕐 💽 Changepi OS Linux STREFF			● 1000 ⊕ 1 □ \$ 20009 orm

h) Then wait for the installation to complete

nləsyntam					
<b>L</b> ionia	·	Orangepi OS Linux 安装程序	^ - ¤ X		
	欢迎位置	\$***			
	键盘 用户 摘要	N # CO			
	· 病安 建立 · 结束	Orange Pi OS has multimedia support and supports multi-core CPI command line installation and graphical installation. It is highly co	Us. it supports		
		open-source graphics drivers.			
	关于	33% 法地论 <b>化器</b> 。 后日	5(0) T-⊎(N) TC3R(C)		
🍝 🧧 🗺 😨 🔿 Orangepi OS Linux 安装程序				•	3 □ \$ 2223-09-05 or 073% or 0

i) After the installation is complete, you need to click the **Finish** button to restart the system



j) After restarting, the Orange Pi Hello program will be started automatically. At this time, you need to remove the check status in the lower right corner **when starting up**. Otherwise, you need to manually close the Orange Pi Hello program every time you start it.



At this point, you can use the newly created user name and password to log in to the OPi OS system through the serial port or ssh.

# 5. 3. How to set DT overlays

LCD MIPI screen, eDP screen, and multiplexing functions such as I2C/SPI/UART/PWM in 40pin are disabled by default in the dts of the kernel, and the corresponding DT overlays need to be manually enabled to use.

The method of opening DT overlays in OPi OS Arch system is as follows:

First open the /boot/extlinux/extlinux.conf configuration file
 [orangepi@orangepi-pc ~]\$ sudo vim /boot/extlinux/extlinux.conf

2) Then open the corresponding configuration by adding **FDTOVERLAYS** /dtbs/rockchip/overlay/xxx.dtbo in /boot/extlinux/extlinux.conf

Note that xxx.dtbo in FDTOVERLAYS /dtbs/rockchip/overlay/xxx.dtbo needs to be replaced with the specific dtbo configuration, please do not copy it.

[orangepi@orangepi-pc ~]\$ sudo vim /boot/extlinux/extlinux.conf LABEL OPIOS ARM LINUX /Image FDT /dtbs/rockchip/rk3566-orangepi-3b.dtb FDTOVERLAYS /dtbs/rockchip/overlay/xxx.dtbo #Configuration that needs to be added

3) The storage path of xxx.dtbo in the OPi OS Arch image is as follows, please note that not all dtbos under this path can be used.

/boot/dtbs/rockchip/overlay/

4) The DT overlays configuration that can be used by the development board is as follows

Features on the development	Corresponding DT overlays configuration
board	
EDP screen	rk356x-edp.dtbo
Raspberry Pi 5 inch screen	rk356x-raspi-7inch-touchscreen.dtbo
40pin expansion interface -	rk356x-i2c2-m1.dtbo
I2C2	

40pin expansion interface -	rk356x-i2c3-m0.dtbo
I2C3	
40pin expansion interface -	rk356x-i2c4-m0.dtbo
I2C4	
40pin extension interface -	rk356x-pwm11-m1.dtbo
PWM11	
40pin extension interface -	rk356x-pwm15-m1.dtbo
PWM15	
40pin expansion interface -	rk356x-uart3-m0.dtbo
UART3	
40pin expansion interface -	rk356x-uart7-m2.dtbo
UART7	
40pin expansion interface -	rk356x-uart9-m2.dtbo
UART9	
40pin expansion interface -	rk356x-spi3-m0-cs0-spidev.dtbo
SPI3	

5) If you need to open multiple configurations at the same time, just add the paths of multiple configurations directly behind **FDTOVERLAYS**. For example, the configurations to open i2c2 and pwm11 at the same time are as follows

[orangepi@orangepi-pc ~]\$ sudo vim /boot/extlinux/extlinux.conf LABEL OPIOS ARM LINUX /Image FDT /dtbs/rockchip/rk3566-orangepi-3b.dtb FDTOVERLAYS /dtbs/rockchip/overlay/rk356x-i2c2-m1.dtbo /dtbs/rockchip/overlay/rk356x-pwm11-m1.dtbo

6) After setting, you need to restart the system to make the configuration take effect [orangepi@orangepi-pc~]\$ sudo reboot

### 5. 4. Use of Raspberry Pi 5-inch screen

#### 5. 4. 1. How to assemble the Raspberry Pi 5-inch screen

Please refer to the assembly method of the Raspberry Pi 5-inch screen (click the text in the blue part to jump to the corresponding position).

#### 5. 4. 2. How to open Raspberry Pi 5-inch screen configuration

By default, OPi OS Arch mirroring does not enable the configuration of the Raspberry Pi 5-inch screen. If you need to use the Raspberry Pi 5-inch screen, you need to manually open it. The method to open the configuration is as follows:

a. First add the following configuration in /boot/extlinux/extlinux.conf

[orangepi@orangepi-pc ~]\$ sudo vim /boot/extlinux/extlinux.conf	
LABEL OPIOS ARM	
LINUX /Image	
FDT /dtbs/rockchip/rk3566-orangepi-3b.dtb	
FDTOVERLAYS /dtbs/rockchip/overlay/rk356x-raspi-7inch-touchscreen.dtbo	#Configuration that needs
to be added	
b. Then restart the system	
[orangepi@orangepi-pc ~]\$ sudo reboot	

After restarting, you can see the display on the LCD screen as follows:



## 5.5. How to use the eDP screen

#### 5. 5. 1. Assembly method of eDP screen

Please refer to how to use the eDP screen (click the text in the blue part to jump

#### to the corresponding position).

#### 5. 5. 2. How to open eDP screen configuration

The OPi OS Arch image does not enable the eDP screen configuration by default. If you want to use the eDP screen, you need to manually open it. The method to open the configuration is as follows:

a. First add the following configuration in /boot/extlinux/extlin	ux.conf
[orangepi@orangepi-pc ~]\$ sudo vim /boot/extlinux/extlinux.conf	
LABEL OPIOS ARM	
LINUX /Image	
FDT /dtbs/rockchip/rk3566-orangepi-3b.dtb	
FDTOVERLAYS /dtbs/rockchip/overlay/rk356x-edp.dtbo	#Configuration that
needs to be added	
b. Then restart the system	

[orangepi@orangepi-pc ~]\$ sudo reboot

After restarting, you can see that the display of the eDP screen is as follows:



#### 5.6. How to install the software

Use the pacman package management tool to install software that is not in OPi OS. For example, the command to install the vim editor is as follows. If you want to install other software, you only need to replace vim with the package name of the software you want to install. [orangepi@orangepi-pc ~]\$ sudo pacman -Syy vim

# 6. Android 11 operating system instructions

# 6.1. Supported Android versions

Android version	Kernel version
Android 11	Linux4.19

# 6.2. Android Function Adaptation

Functions	Android 11
USB2.0x3	ОК
USB3.0x1	ОК
M.2 NVMe SSD boot	ОК
WIFI	ОК
Bluetooth	ОК
GPIO (40pin)	ОК
UART (40pin)	ОК
SPI (40pin)	ОК
I2C (40pin)	ОК
PWM (40pin)	ОК
PWM fan interface	ОК
<b>3pin Debugging serial port</b>	ОК
ЕММС	ОК
TF card boot	ОК
HDMI video	ОК
HDMI Audio	ОК
LCD	ОК
eDP display	ОК
OV5647 Camera	The kernel driver is OK, 3A is not

•

	adjusted
Gigabit network port	ОК
Network port status indicator	ОК
Headphone playback	ОК
Headphone recording	ОК
LED Light	ОК
GPU	ОК
NPU	ОК
VPU	ОК
RTC	ОК

# 6.3. WIFI connection test method

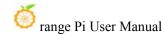
#### 1) First click enter Setting

7:58 AM 🛈	ф <b>О</b>				
			Q Search apps		
			۵	•	<b>E</b>
	Calculator	Calendar	Camera	Clock	Contacts
	6			<b></b>	۲
	Explorer	Files	Gallery	Lightning	Music
	Q	\$	٩		
	Search	Settings	Sound Recorder	Video	WebView Browser Tester
	آن				
	wiringOP				

#### 2) Then select Network & internet



#### 3) Then select Wi-Fi



8:01 AM 🛈 🖞 🛈		0
← Networ	k & internet	۹
Wi-Fi       Off		
Airplane mode		

# 4) Then turn on the **Wi-Fi** switch

8:02 AM	O + O	8
÷	Wi-Fi	٩
	Use Wi-Fi	
(j)	To see available networks, turn Wi-Fi on. To improve location accuracy, turn on Wi-Fi scanning in <u>scanning settings</u> .	
	Wi-Fi preferences Wi-Fi doesn't turn back on automatically	
	Wi-Fi data usage 0 8 used Jun 20 – Jul 18	

#### 5) After turning on Wi-Fi, if everything is normal, you can scan for nearby Wi-Fi

hotspots

8:03 AM 🕒 🖞 🛈		$\bigcirc$ (i)
← Wi-Fi		۹
Use Wi-Fi		
•		ð
•		Đ
•	*	Ô
$\widehat{\mathbf{P}}$		Đ

6) Then select the Wi-Fi you want to connect to, and the password input interface shown in the figure below will pop up

sseword										
	1									
Show passv	word									
inner nation										
q	w	e	r <sup>4</sup>	t	y "	u 7	1	0	p	G
7					,	-				
а	S	d	f	g	h	j	k	1		0
+	z	х	с	v	b	n	m	!	?	
										-

7) Then use the keyboard to enter the password corresponding to Wi-Fi, and then use the mouse to click the Enter button in the virtual keyboard to start connecting to Wi-Fi

*******			1													
] Show pass																
4:00-001 contro 1	2	3	4		5		6		7		8		9		0	a
			\$	%	U	&	Ū	-		+	-	(	-	)		0
~   <	١	=	*		.0		32		:		;		!		?	~[+
ABC		-											1			٢

8) After the Wi-Fi connection is successful, the display is as shown in the figure below:

8:05 AM 🜵		କ ଯ
÷	Wi-Fi	۹
	Use Wi-Fi	•
×	unlong_orangepi_5G	(i) (i)

# 6.4. How to use Wi-Fi hotspot

1) First, please make sure that the Ethernet port is connected to the network cable and can access the Internet normally

#### 2) Then select Settings

58 AM 🕒 🖞 🕒				
		Q Search apps		
	132		0	23
Calculator	Calendar	Camera	Clock	Contacts
6			$\bigcirc$	۲
Explorer	Files	Gallery	Lightning	Music
	\$	٩		ø
Search	Settings	Sound Recorder	Video	WebView Browser Tester
Ŏ,				
wiringOP				

#### 3) Then select Network & internet

8:00 AM	1 O + O	8
٩	. Search settings	
হ	Network & internet Wi-Fi, data usage, and hotspot	
60	Connected devices Bluetooth	

#### 4) Then select Hotspot & tethering



5) Then select Wi-Fi hotspot

🥮 range Pi User Manual	Copyright reserved by Shenzhen Xunlong Software Co., Ltd
8:08 AM ¥	8
← Hotspot & tethering	٩
Wi-Fi hotspot Not sharing internet or content with other devices	
USB tethering Share tablet's internet connection via USB	

10

6) Then turn on the **Wi-Fi hotspot**, you can also see the name and password of the generated hotspot in the figure below, remember them, and use them when connecting to the hotspot (If you need to modify the name and password of the hotspot, you need to turn off the **Wi-Fi hotspot** first, and then you can modify it)

8:11 AM	ψ	R
÷	Wi-Fi hotspot	۹
	Off	
	Hotspot name AndroidAP_6953	
	Security WPA2-Personal	
	Hotspot password	

7) At this time, you can take out your mobile phone. If everything is normal, you can find the WIFI hotspot with the same name (here AndroidAP\_6953) displayed under the **Hotspot name** in the above picture in the WI-FI list searched by the mobile phone. Then you can click AndroidAP\_6953 to connect to the hotspot, and the password can be seen under the **Hotspot password** in the above picture



8) After the connection is successful, it will be displayed as shown in the figure below (the interface of different mobile phones will be different, the specific interface is subject

0

to the display of your mobile phone). At this point, you can open a webpage on your mobile phone to see if you can access the Internet. If you can open the webpage normally, it means that the **WI-FI Hotspot** of the development board can be used normally.



# 6.5. Bluetooth test method

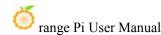
#### 1) First click enter Setting

7:58 AM 🛈 🖞 🛈				
		Q Search apps		
	136	D	•	<b>2</b>
Calculator	Calendar	Camera	Clock	Contacts
a			$\bigcirc$	۲
Explorer	Files	Gallery	Lightning	Music
Q	\$	٩		
Search	Settings	Sound Recorder	Video	WebView Browser Tester
Ő,				
wiringOP				

2) Then select Connected devices

8:12 AM	*	0
Q	Search settings	
Ŷ	Network & internet Wi-Fi, data usage, and hotspot	
60	Connected devices Bluetooth	

3) Then click **Pair new device** to turn on Bluetooth and start scanning the surrounding Bluetooth devices

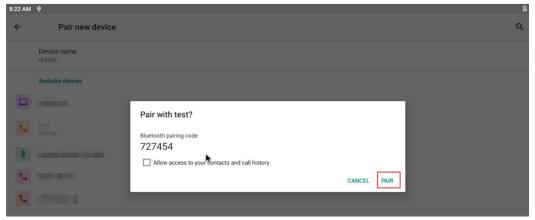


8:13 AM	Ψ	0
÷	Connected devices	۹
	OTHER DEVICES	
ψ	USB Charging this device	
+	Pair new device Bluetooth will turn on to pair	

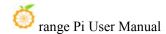
4) The searched Bluetooth devices will be displayed under Available devices

8:18 AM	φ.	9
÷	Pair new device	۹
	Device name rk3566	
	Available devices	^
5		
5		
*		
*		
2	Second Contraction of	
5	test	
	Entran Par	

5) Then click the Bluetooth device you want to connect to start pairing. When the following interface pops up, please use the mouse to select the **Pair** option



6) The test here is the configuration process of the development board and the Bluetooth of the Android mobile phone. At this time, the following confirmation interface will pop up on the mobile phone. After clicking the pairing button on the mobile phone, the



pairing process will start



7) After the pairing is completed, you can see the paired Bluetooth device as shown in the figure below



8) At this time, you can use the Bluetooth of your mobile phone to send a picture to the development board. After sending, you can see the following confirmation interface in the Android system of the development board, and then click **Accept** to start receiving the picture sent by the mobile phone.

🥯 range Pi User Manual		Copyright	reserved by	Shenz	hen Xu	nlong So	ftware Co	o., Ltd	
8:26 AM	<b>\$</b> ; ф	_	_	_		_	_	_	0
÷	Connected devices								۹
	OTHER DEVICES								
ψ	USB Charging this device								
L.	test	Accept incoming f	ile?						
+	Pair new device	From test							
	PREVIOUSLY CONNECTED DEVICES	Filename 1689731722436.jpg							
>	See all	Size 226 kB							
	Connection preferences Bluetooth		*		DECLINE	ACCEPT			
0	Visible as "rk3566" to other devices								

9) You can open the **Download** directory in the file manager to view the pictures received by the Android system Bluetooth of the development board



# 6. 6. How to use Raspberry Pi 5-inch screen

Please make sure that the image used is the following two versions of the image: OrangePi3B\_RK3566\_Android11\_lcd\_v1.x.x.img OrangePi3B\_RK3566\_Android11\_spi-nvme\_lcd\_v1.x.x.img

1) The screen needs to be assembled first, please refer to the assembly method of the Raspberry Pi 5-inch screen

2) Connect the Type-C power supply to the board and power it on. After the system starts, you can see the screen display as shown in the figure below

Both the display and touch of the Raspberry Pi 5-inch screen can be used. If you have problems with the screen test, please make sure that the screen you purchased is exactly the same as the screen that the Orange Pi is compatible with.

The Orange Pi compatible screen is described in the assembly method of the Raspberry Pi 5-inch screen.



# 6.7. How to use the eDP screen

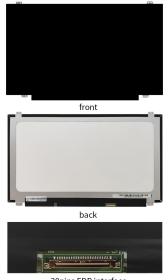
Please make sure that the image used is the following two versions of the image: OrangePi3B\_RK3566\_Android11\_lcd\_v1.x.x.img OrangePi3B\_RK3566\_Android11\_spi-nvme\_lcd\_v1.x.x.img

The eDP screen has no touch function.

- 1) Currently only one eDP screen is compatible, including the following accessories:
  - a. 0.5 pitch 30pin single-head cable in the same direction



15.6-inch eDP display with a resolution of 1920x1080 b.



30pins EDP interface

2) Connect the FPC end of the 30pin single-head codirectional cable to the eDP interface of the development board, and connect the other end to the eDP interface of the screen



3) Then connect the Type-C power supply to the board and power it on. After the system starts, you can see the screen display as shown in the figure below



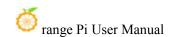
# 6.8. 40pin interface GPIO, UART, SPI and PWM test

#### 6. 8. 1. **40pin GPIO port test**

1) First click on the wiringOP icon to open the wiringOP APP

		Q Search apps		
			ø	
Calculator	Calendar	Camera	Clock	Contacts
6			$\bigcirc$	۲
Explorer	Files	Gallery	Lightning	Music
Q	<b>\$</b>	٩		<b>@</b>
Search	Settings	Sound Recorder	Video	WebView Browser Test
wiringOP				

2) The main interface of wiringOP APP is displayed as shown in the figure below, and then click the **GPIO\_TEST** button to open the GPIO test interface

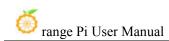


8:02 AM 🕐 🜵	6
wiringOP	
	GPI0_TEST
	UART_TEST
	12C_TEST
	SPI_TEST
	PWM_TEST

3) The GPIO test interface is shown in the figure below. The two rows of **CheckBox** buttons on the left are in one-to-one correspondence with the 40pin pins. When the **CheckBox** button is checked, the corresponding GPIO pin will be set to **OUT** mode, and the pin level will be set to high level; when the checkbox is unchecked, the GPIO pin level will be set to low level; When the **GPIO READALL** button is pressed, information such as wPi number, GPIO mode, and pin level can be obtained; when the **BLINK ALL GPIO** button is clicked, the program will control the 28 GPIO ports to continuously switch between high and low levels

8:03 AM 🕐 🜵		
wiringOP		
3.3V 🔲 🗍 5V		
SDA.2	GPIO READALL	BLINK ALL GPIO
SCL.2 GND		
GPI04_A4 🗌 🗌 RXD.2		
GND 🗌 🔲 TXD.2		
GPI03_C6 🗌 🔲 GPI03_C7		
GPIO4_A0 🔲 🔲 GND		
GPI04_A2 🔲 🔲 GPI04_A3		
3.3V 🔲 🔲 GPI04_A1		
SPI3_RXD 🔲 🔲 GPI04_B1		
SPI3_CLK 🔲 🔲 SPI3_CS1		
GND GPI04_A7		
SDA.3 SCL.3		
GPI04_A5 🔲 🔄 GND		
GPI03_D4 🗌 🔲 GPI04_C0		
GPIO3_D7 🔲 🔲 GND		
GPI03_D0 🗌 🔲 GPI03_D5		

4) Then click the **GPIO READALL** button, the output information is as shown in the figure below:



3.3V       5V         A.2       5V         2L.2       GND	+   GPI0 +   140   141   132   132   118   128   130	WPi 0 1 2 5 7	GPIO REAL Name 3.3V SDA.2 SCL.2 GPIO4_A4 GND GPIO3_C6	ALL Mode ALT1 ALT1 ALT4 IN	++   V     1     1     1		2      4      6      8	BLIN	K ALL GPIO 	+   wPi +             3	+   GPIO +             25
A4       RXD.2         SND       TXD.2         LC6       GPI03_C7         _A0       GND         _A2       GPI04_A3         _SV       GPI04_A1	140 141 132 118 128	0 1 2 5	3.3V SDA.2 SCL.2 GPI04_A4 GND	ALT1 ALT1 ALT4	++   1   1   1	Phys 1 3 5 7	sical      2      4      6      8		5V   5V   5V   GND	+   	÷     
SND     TXD.2	140 141 132 118 128	0 1 2 5	3.3V SDA.2 SCL.2 GPI04_A4 GND	ALT1 ALT1 ALT4	++   1   1   1	Phys 1 3 5 7	sical      2      4      6      8		5V   5V   5V   GND	+   	÷     
	141   132   118   128	1 2 5	SDA.2 SCL.2 GPI04_A4 GND	ALT1 ALT4		5 7	4	+     1   ALT1	5V   GND	+     	+         25
RXD     GPI04_B1       CLK     SPI3_CS1       SND     GPI04_A7       AA.3     SCL.3	138 136 139 32 133 124 127 120 120 123	8 11 12 14 17 19 20 22 23 25	GPI04_A0 GPI04_A2 3.3V SPI3_TXD SPI3_RXD SPI3_CLK GPI05 GPI03_D4 GPI03_D7 GPI03_D0 GPI03_D0 GPI03_D0 GPI03_D0 GPI03_D0 GND	IN ALT4 ALT4 ALT4 ALT4 ALT1 ALT4 IN IN IN IN		11 13 15 17 21 23 25 27 29 31 33 35 37 39	12 14 16 18 20 22 24 26 26 28 30 30 32 34 34 36 38 38 40 38	1 ALT1 ALT4 ALT4 I ALT4 I ALT4 I ALT4 ALT4 ALT4 ALT1 I ALT4 I ALT4 I ALT4 I N IN IN IN IN IN IN I	TXD.2           GP103_C7           GND           GP104_A3           GP104_A1           GND           GP104_A1           GND           SP13_C51           GP104_C0           GND           GND           GP104_C0           GND           GP103_D2           GP103_D2           GP103_D2           GP103_D1	4   6   9   10   13   15   16   18   21   21   24   26   27	24 119 131 129 137 134 135 33 144 125 125 122 121
_D4 GPI04_C0 _D7 GND _D0 GPI03_D5	GPIO	WP1	Name	Mode		Phys	sical	V   Mode	Name	wPi	GPIO

5) There are a total of 28 GPIO ports in the 40pins of the development board that can be used. The following uses pin 7 — the corresponding GPIO is GPIO4\_A4 — the corresponding wPi serial number is 2—as an example to demonstrate how to set the high and low levels of the GPIO port. First click the **CheckBox** button corresponding to pin 7. When the button is selected, pin 7 will be set to high level. After setting, you can use a multimeter to measure the voltage value of the pin. If it is 3.3v, it means setting high level success



6) Then click the **GPIO READALL** button, you can see that the current pin 7 mode is **OUT**, and the pin level is high

:08 AM 🕑 🜵												
wiringOP												
3.3V 🔲 🔲 5V							_					
SDA.2 🔲 🔲 5V			GPIO REA	ութո					BLIN	ALL GPIO		
SCL.2 GND												
PIO4_A4 🔽 🗍 RXD.2			+   3.3V		+' 	++   1		** 		+   5V	+ 	+ 
	140		SDA.2 SCL.2	ALT1 ALT1	1	3	4			5V   GND	1	
	132		GPI04_A4	OUT	1	7	8	0	ALT1	RXD.2	3	25
103_C6 🔲 🔲 GPI03_C7	118	5	GND GPI03_C6	IN	0	9	10	1	ALT1	TXD.2   GPI03_C7	4	24
04_A0 🔲 🔄 GND	128		GPI04_A0	IN	0	13	14			GND		
104_A2 GPI04_A3	130	8	GPI04_A2	ALT4	1	15     17	16	1   0	ALT4	GPI04_A3	9   10	131   129
	138	11	SPI3 TXD	ALT4	1	19	20		TIN	GND	1	125
3.3V GPI04_A1	136	12	SPI3_RXD	ALT4	j 1	21		j o	IN	GPI04_B1	13	137
	139	14	SPI3_CLK	ALT4	0	23	24	1	ALT4	SPI3_CS1	15	134
3_TXD 🔲 🔲 GND	32	17	GND   SDA.3	ALT1	1	25     27	26		ALT4	GPI04_A7   SCL.3	18	135   33
3_RXD GPI04_B1	133	19	GPI04 A5	ALT4	1	29	30	'		I GND	1 10	
	124	20	GPI03_D4	IN	0	31	32	0	IN	GPI04_C0	21	144
B_CLK SPI3_CS1	127	22	GPI03_D7	IN	0	33	34			GND		
	120   123	23 25	GPI03_D0   GPI03 D3	IN IN	0	35	36	0	IN IN	GPI03_D5   GPI03 D2	24	125
GND GPI04_A7	123	25	GP103_D3	IN		37     39	40	0   0	IN	GPI03_D2	26	1 121
SDA.3 🔲 🗌 SCL.3			+		+	++		+			+	+
104_A5 GND	GPI0	wPi	Name +	Mode	V +		ical 3B ·	V +	Mode	Name +	wPi +	GPI0 +
03_D4 🔲 🔲 GPI04_C0												
03_D7 🔲 🔲 GND												
103_D0 🔲 🔲 GPI03_D5												

7) Click the **CheckBox** button in the figure below again to cancel the check status. Pin 7 will be set to low level. After setting, you can use a multimeter to measure the voltage value of the pin. If it is **0v**, it means that the low level is set successfully.

3.3V 🗌	5V
SDA.2	□ 5V
SCL.2	GND
GPIO4_A4	RXD.2
GND	TXD.2
GPI03_C6	GPI03_C7
GPIO4_A0	GND
GPI04_A2	GPI04_A3
3.3V 🗌	GPI04_A1

8) Then click the GPIO READALL button, you can see that the current pin 7 mode is

#### OUT, and the pin level is low

wiringOP	N											
3.3V 🔲 🔲 5V												
SDA.2 🔲 🔲 5V			GPIO READ	ALL					BLIN	ALL GPIO		
SCL.2												
PI04_A4 🗌 🗌 RXD.2	++   GPIO	wPi	+   Name	Mode	   V		3B · ical		Mode	+·   Name	+   wPi	+   GPI0
GND TXD.2	++		+ 3.3V		·	++	+	++ 		+·   5V	+ 	
FPI03_C6 🔲 🔲 GPI03_C7	140	0 1	SDA.2 SCL.2	ALT1	1	3	4			5V GND		
	132		GPI04_A4	OUT	0	7	8	1	ALT1	RXD.2	3	25
	118		GND     GPI03_C6	IN	0	9	10   12	1   0	ALT1 IN	GPI03_C7	4   6	24   119
PIO4_A2 🗌 🔲 GPIO4_A3	128     130	7 8	GPI04_A0   GPI04 A2	IN ALT4	0	13	14		ALT4	GND   GPI04 A3	   9	131
3.3V 🔲 🔲 GPI04_A1			3.3V			17	18	o i	IN	GPI04_A1	10	129
	138     136	11 12	SPI3_TXD   SPI3_RXD	ALT4 ALT4	1	19     21	20	   0	IN	GND GPI04_B1	   13	137
	139	14	SPI3_CLK	ALT4	o	23	24	1	ALT4	SPI3_CS1	15	134
PI3_RXD 🔲 🔲 GPIO4_B1	32	17	GND SDA.3	ALT1		25	26		ALT4 ALT1	GPI04_A7	16   18	135   33
PI3_CLK 🔲 🔲 SPI3_CS1	133	19	GPI04_A5	ALT4	1	29	30	'	ALTI	GND	10	
	124     127	20 22	GPI03_D4   GPI03_D7	IN IN	0	31     33	32	0	IN	GPI04_C0	21	144
	120	23	GPI03_D7	IN	0	35	36	0	IN	GPI03_D5	24	125
SDA.3 🔲 🔲 SCL.3	123	25	GPI03_D3	IN	0	37	38	0	IN	GPI03_D2	26	122
04_A5 🔲 🔲 GND	++		GND		 	39   ++	40 +	0	IN	GPI03_D1 +	27 +	121 +
103_D4 🗍 🗍 GPIO4_C0	GPIO	WPi	Name I	Mode	V	Phys	ical	V	Mode	Name	wPi	GPIO
PI03_D7												

#### 6. 8. 2. **40pin UART test**

1) UART7 and UART9 are enabled by default in Android. The position of the 40pin is shown in the figure below, and the corresponding device nodes are /dev/ttyS7 and /dev/ttyS9 respectively



2) First click on the wiringOP icon to open the wiringOP APP

		Q Search apps		
	122	۵	ø	
Calculator	Calendar	Camera	Clock	Contacts
6			$\bigcirc$	۲
Explorer	Files	Gallery	Lightning	Music
Q	<b>\$</b>	٩		<b>•</b>
Search	Settings	Sound Recorder	Video	WebView Browser Test
رقب wiring0P				

3) The main interface of wiringOP APP is displayed as shown in the figure below, and then click the **UART\_TEST** button to open the UART test interface

8:02 AM 🚯 🖞 🕼	8
wiringOP	
	GPIO_TEST
	UART_TEST
	I2C_TEST
	SPL_TEST
	PWM_TEST

4) The serial port test interface of the APP is shown in the figure below

8:03 AM 🕐 🌵	D						0
wiringOP							
/dev/ttyS1	÷ <u>115200</u>	OPEN	CLOSE				
hello world!					SEND		
			•	•	•	<b>■</b> )	

5) Take the test of **UART7** as an example below, select the /dev/ttyS7 node in the selection box, enter the baud rate you want to set in the edit box, and then click the **OPEN** button to open the /dev/ttyS7 node. After the opening is successful, the **OPEN** button becomes unselectable, and the **CLOSE** button and **SEND** button become selectable



8:06 AM 🕑 🜵 🕻	•								0
wiringOP									
/dev/ttyS7	-	115200	OPEN	CLOSE					
hello world!									
						SEND			

6) Then use Dupont wire to short the RXD and TXD pins of uart7



7) Then you can enter a character in the send edit box below, and click the **SEND** button to start sending

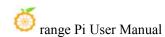
8:11 AM 🛈 🖞 🕻	•							
wiringOP								
/dev/ttyS7	÷	115200	OPEN	CLOSE				
hello world!								
					SEND			

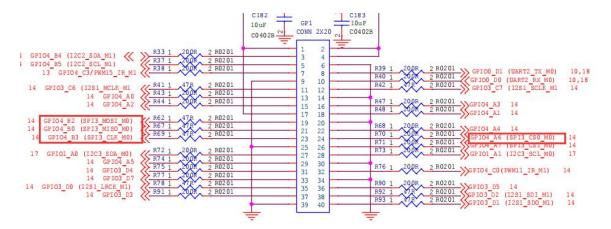
8) If everything is normal, the received string will be displayed in the receiving box

B:TO AM 🕐 🕆 🛈	Ø
wiringOP	
/dev/ttyS7 <b>*</b> 115200 OPEN CLOSE	
hello world!	
hello world!	
SEND	

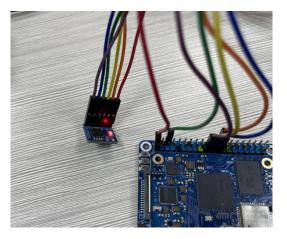
#### 6.8.3. **40pin SPI test**

1) According to the schematic diagram of the 40pin interface, the spi available for Orange Pi 3B is spi3





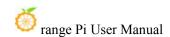
2) Here, the SPI interface is tested through the w25q64 module. First, the w25q64 device is connected to the SPI3 interface



3) Then click the wiringOP icon to open the wiringOP APP

		Q Search apps		
			0	
Calculator	Calendar	Camera	Clock	Contacts
6			$\bigcirc$	۲
Explorer	Files	Gallery	Lightning	Music
	<b>\$</b>	٩		
Search	Settings	Sound Recorder	Video	WebView Browser Te
(intersection) wiringOP				

4) The main interface of wiringOP APP is displayed as shown in the figure below, click the SPI\_TEST button to open the SPI test interface

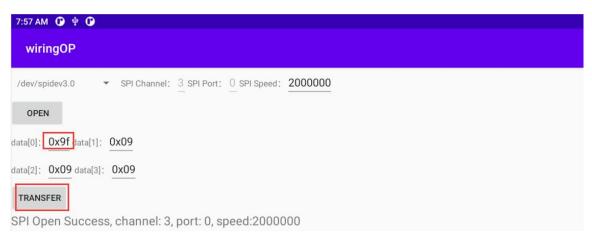


7:56 AM 🕒 🖞 🛈		0
wiringOP		
	GPI0_TEST	
	UART_TEST	
	I2C_TEST	
	SPL_TEST	
	PWM_TEST	

#### 5) Then click the **OPEN** button to initialize the SPI

7:57 AM 🛈 🖞 🛈
wiringOP
/dev/spidev3.0  SPI Channel: <u>3</u> SPI Port: <u>0</u> SPI Speed: <u>2000000</u>
OPEN
data[0]: 0x9f data[1]: 0x09
data[2]: 0x09 data[3]: 0x09
TRANSFER
SPI Open Success, channel: 3, port: 0, speed:2000000

6) Then fill in the bytes that need to be sent, such as reading the ID information of w25q64, fill in the address 0x9f in data[0], and then click the **TRANSFER** button



#### 7) Finally, the APP will display the read ID information

7:59 AM 🕐 🜵 🕼
wiringOP
/dev/spidev3.0  SPI Channel: <u>3</u> SPI Port: <u>0</u> SPI Speed: <u>2000000</u>
OPEN
ata[0]: 0x9f data[1]: 0x09
ata[2]: 0x09 data[3]: 0x09
TRANSFER
PI Transfer success
et:4 ata[0]:9f
ata[1]:ef
ata[2]:40
ata[3]:17

8) The MANUFACTURER ID of the w25q64 module is EFh, and the Device ID is 4017h, corresponding to the value read above (h stands for hexadecimal)

MANUFACTURER ID	(MF7 - MF0)		
Winbond Serial Flash	EFh	-	
Device ID	(ID7 - ID0)	(ID15 - ID0)	
Instruction	ABh, 90h, 92h, 94h	9Fh	
W25Q64FV (SPI)	16h	4017h	
W25Q64FV (QPI)	16h	6017h	

#### 6. 8. 4. **40pin PWM test**

1) Android enables **PWM11** by default, and the corresponding pin is located at 40pin as shown in the figure below



2) First click on the wiringOP icon to open the wiringOP APP

🍏 range Pi User I	Manual	Copyright reserved by	y Shenzhen Xunlo	ong Software Co., Ltd
		Q Search apps		
•			۲	8
Calculator	Calendar	Camera	Clock	Contacts
6			$\bigcirc$	۲
Explorer	Files	Gallery	Lightning	Music
Q	<b>\$</b>	٩		1
Search	Settings	Sound Recorder	Video	WebView Browser Tester
wiringOP				

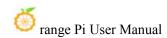
3) Then click the **PWM\_TEST** button on the main interface of wiringOP to enter the PWM test interface

7:56 AM O ♥ O wiringOP	ତ
GPI0_TEST	
UART_TEST	
12C_TEST	
SPI_TEST	
PWM_TEST	

4) The base address corresponding to PWM11 is **fe6f0030**, here pwmchip0 shows **fdd70020.pwm** on the right, then you need to click the drop-down option to select other pwmchips until **fe6f0030.pwm** is displayed on the right

8:03 AM 🛈 🕂 🛈
wiringOP
Controller: pwmchip0 - fdd70020.pwm
Channel: 0
Period: 50000 ns
EXPORT
Enable pwmchip0 Duty

5) When the drop-down option selects **pwmchip3**, the corresponding base address of PWM11 is **fe6f0030** on the right



8:07 AM 🛈 🖞 🛈	
wiringOP	
Controller: pwmchip3 - fe6f0030.pv	/m
Channel: 0	
Period: 50000 ns	
EXPORT	
Enable pwmchip3 Duty	

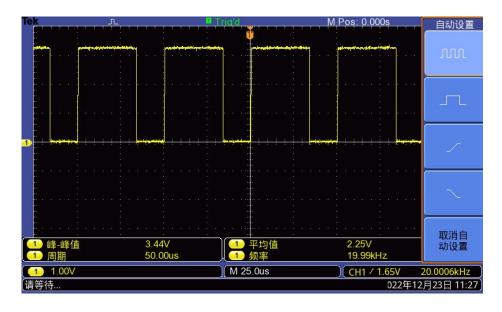
6) Then confirm the PWM channel, the default is channel 0, and confirm the PWM cycle, the default configuration is **50000ns**, converted to PWM frequency is **20KHz**, you can modify it yourself, click the **EXPORT** button to export **PWM11** 

8:07 AM 🕑 🖞 ઉ	Ø
wiringOP	
Controller: pwmchip3 - fe6f0030.pwm	
Channel: 0	
Period: 50000 ns	
EXPORT	
Enable pwmchip3 Duty	

7) Then drag the drag bar below to change the PWM duty cycle, and then check Enable to output the PWM waveform

8:10 AM 🚱 🖞 🚱	6
wiringOP	
Controller: pwmchip3 - fe6f0030.pwm	
Channel: 0	
Period: 50000 ns	
UNEXPORT	
Enable pwmchip3 Duty	

8) Then use an oscilloscope to measure the No. 32 pin in the 40pin of the development board, and you can see the following waveform



## 6.9. How to use ADB

## 6.9.1. The method of USB OTG mode switching

The development board has 4 USB interfaces, among which the USB interface marked in red box in the figure below can support both Host mode and Device mode, and the other 3 USB interfaces only support Host mode.



The USB OTG interface defaults to Host mode, which can be used to connect USB devices such as mouse and keyboard. If you want to use ADB, you need to manually switch to Device mode.

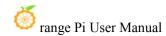
1) First open Settings

orange Pi User	Manual	Copyright reserved b	y Shenzhen Xunl	ong Software Co., Ltd
7:58 AM 🛈 🖞 🛈				8
		Q Search apps		
-			•	<b>E</b>
Calculator	Calendar	Camera	Clock	Contacts
a.			$\bigcirc$	۲
Explorer	Files	Gallery	Lightning	Music
	\$	٩		- (Ör
Search	Settings	Sound Recorder	Video	WebView Browser Tester
Ŏ,				
wiringOP				

## 2) Then select About tablet

9:48 AM	00					0
	Storage 5% used - 243 GB free					
<b>(</b>	Privacy Permissions, account activity, personal data					
0	Location On - 1 app has access to location					
۵	Security Screen lock					
9	Accounts No accounts added					
Ť	Accessibility Screen readers, display, interaction controls					
٥	Screenshot Screenshot					
6	System Languages, gestures, time, backup					
	About tablet orangepi3b					
		щ.	•	•	-	

3) Then click the **Build number** menu bar several times with the mouse until the promptYou are now a developer! appears



10:07 AM	0	↔ 🚯
÷	About tablet	۹
	Model orangepi3b	
	Android version	
	IP address fe80:a18e:3b41:a563:4574 192.168.1.222	
	Wi-Fi MAC address To view, choose saved network	
	Device Wi-Fi MAC address Unavailable	
	Bluetooth address Unavailable	
	Up time 01:24	
	Build number     You are now a developer!       rk3566_r-userdebug 11 RD2A.211001.002 eng.orange.20230824.173248     elicease keys	
	♦ ◄ ● ■ ♦)	

## 4) Then click to return to the previous menu

÷	About tablet	۹
	Model orangepi3b	
	Android version	
	IP address fe80::a18e:3b41:a563:4574 192.168.1.222	
	Wi-Fi MAC address To view, choose saved network	
	Device Wi-Fi MAC address Unavailable	
	Bluetooth address Unavailable	
	Up time 15:39	
	Build number rk3566_r-userdebug 11 RD2A.211001.002 eng.orange.20230824.173248 release-keys	

5) Then select System

Č	range Pi User Manual	Copyright reserved by Shenzhen Xunlong Software Co., Ltd
10:22 AM	0	⇔ 8
	Storage 5% used - 243 GB free	
	Privacy Permissions, account activity, personal data	
0	Location On - 1 app has access to location	
₿	Security Screen lock	
2	Accounts No accounts added	
Ť	Accessibility Screen readers, display, interaction controls	
۵	Screenshot Screenshot	
6	System Languages, gestures, time, backup	
	About tablet orangepi3b	

# 6) Then select Advanced

10:24 AM	0	$\leftrightarrow  \widehat{0}$
÷	System	۹
۲	Languages & input Android Keyboard (AOSP)	
Ŀ	Gestures	
0	Date & time GMT+00:00	
۲	Backup Off	
~	Advanced Reset options, Multiple users, Developer options	

7) Then select **Developer options** in the expanded column

Č	5 range Pi User Manual	Copyright reserved by Shenzhen Xunlong Software Co., Ltd
10:25 AM	M (D)	⇔ @
÷	System	۹
•	Languages & input Android Keyboard (AOSP)	
	Gestures	
0	Date & time GMT+00:00	
۲	Backup Off	
Ð	Reset options Network, apps, or device can be reset	
Do	Multiple users Signed in as Owner	
{ }	Developer options	

8) Finally find the **USB OTG Mode Switch** switch, **turn on the switch to switch to Device mode**, **turn off the switch to switch to Host mode** 

10:28 AM 🕐 🛈	$\leftrightarrow \mathfrak{g}$
← Developer options	۹
On	•
Quick settings developer tiles	
DEBUGGING	
USB debugging Debug mode when USB is connected	•
USB OTG Mode Switch Open: Device mode; Close: Host mode	
Wireless debugging Debug mode when Wi-Fi is connected	()».

### 6. 9. 2. Use the data cable to connect to adb debugging

1) First prepare a good quality USB2.0 male-to-male data cable



2) Then refer to the method of USB OTG mode switching to switch USB OTG to Device mode

3) Then connect the development board to the Ubuntu PC through the USB2.0 male-to-male data cable. The position of the USB OTG interface on the development board is shown in the figure below:



4) Then install the adb tool on the Ubuntu PC

test@test:~\$ sudo apt update test@test:~\$ sudo apt -y install adb

5) You can view the identified ADB devices through the following command

test@test:~**\$ adb devices** List of devices attached S63QCF54CJ device test@test:~**\$ lsusb** Bus 003 Device 006: ID 2207:0006

6) Then you can log in to the android system through the adb shell on the Ubuntu PC test@test:~\$ adb shell console:/\$

7) Execute the following command to remount the Android system

test@test:~\$ adb root

test@test:~\$ adb remount

8) Then you can transfer files to the Android system

test@test:~\$ adb push example.txt /system/

#### 6.9.3. Use network connection adb debugging

Using the network adb does not require a data cable to connect the computer and the development board, but to communicate through the network, so first make sure that the wired or wireless network of the development board is connected, and

#### then obtain the IP address of the development board, which will be used later.

1) Make sure that the **service.adb.tcp.port** of the Android system is set to port number 5555

console:/ # getprop | grep "adb.tcp" [service.adb.tcp.port]: [5555]

2) If **service.adb.tcp.port** is not set, you can use the following command to set the port number of network adb

console:/ # setprop service.adb.tcp.port 5555

console:/ # stop adbd

console:/ # start adbd

3) Install adb tool on Ubuntu PC

test@test:~\$ sudo apt update

test@test:~\$ sudo apt install -y adb

4) Then connect to the network adb on the Ubuntu PC

test@test:~\$ adb connect 192.168.1.xxx (IP 地址需要修改为开发板的 IP 地址) \* daemon not running; starting now at tcp:5037 \* daemon started successfully connected to 192.168.1.xxx:5555 test@test:~\$ adb devices List of devices attached 192.168.1.xxx:5555 device

5) Then you can log in to the android system through the adb shell on the Ubuntu PC test@test:~\$ adb shell console:/ #

# 7. How to compile Android11 source code

## 7.1. Download the source code of Android 11

1) First download the Android 11 source code sub-volume compressed package from the Google network disk

#### a. Google Drive

名称	¥	所有者	上次修改日期 🔻	文件大小	
	RK356X_Android11.tar.gz06	GrangePi	19:55 OrangePi	962.1 MB 😤 🛃	ℓ_ ☆ :
	RK356X_Android11.tar.gz05	GrangePi	19:31 OrangePi	4 GB	:
	RK356X_Android11.tar.gz04	GrangePi	19:31 OrangePi	4 GB	÷
	RK356X_Android11.tar.gz03	GrangePi	19:32 OrangePi	4 GB	÷
	RK356X_Android11.tar.gz02	GrangePi	16:37 OrangePi	4 GB	÷
	RK356X_Android11.tar.gz01	GrangePi	16:37 OrangePi	4 GB	i
₽	RK356X_Android11.tar.gz00	GrangePi	16:37 OrangePi	4 GB	i
	RK356X_Android11.tar.gz.md5sum	GrangePi	16:37 OrangePi	420 个字节	:

2) After downloading the sub-volume compression package of the Android 11 source code, please check whether the MD5 checksum is correct, if not, please download the source code again

test@test:~\$ md5sum -c RK356X_Android11.tar.gz.md5sum		
RK356X_Android11.tar.gz00: OK		
RK356X_Android11.tar.gz01: OK		
RK356X_Android11.tar.gz02: OK		
RK356X_Android11.tar.gz03: OK		
RK356X_Android11.tar.gz04: OK		
RK356X_Android11.tar.gz05: OK		
RK356X_Android11.tar.gz06: OK		

3) Then you need to merge multiple compressed files for decompression

test@test:~\$ cat RK356X\_Android11.tar.gz0\* | tar -xvzf -

## 7.2. Compile the source code of Android 11

1) First install the software packages required to compile the Android11 source code

test@test:~\$ sudo apt-get update test@test:~\$ sudo apt-get install -y git gnupg flex bison gperf build-essential \ zip curl zlib1g-dev gcc-multilib g++-multilib libc6-dev-i386 libncurses5 \ lib32ncurses5-dev x11proto-core-dev libx11-dev lib32z1-dev ccache \ libg11-mesa-dev libxml2-utils xsltproc unzip liblz4-tool

2) There is a build.sh compilation script in the source code, and the compilation parameters are as follows

- a. -U: Compile uboot
- b. -K: Compile kernel
- c. -A: compile android
- d. -u: Package and generate update.img and update\_spi\_nvme.img
- e. -o: Compile OTA package
- f. -d: Specify kernel dts
- 3) Compile uboot, kernel, android and package them into update.img
  - a. The command to compile and support HDMI 4K display mirroring (LCD is turned off by default) is as follows:

test@test:~\$ cd RK356X\_Android11

test@test:~/ RK356X\_Android11\$ export BOARD=orangepi3b

test@test:~/ RK356X\_Android11\$ source build/envsetup.sh

test@test:~/ RK356X\_Android11\$ lunch rk3566\_r-userdebug

test@test:~/ RK356X\_Android11\$ ./build.sh -AUKu

b. The command to compile and support LCD display mirroring (HDMI is disabled by default) is as follows:

test@test:~\$ cd RK356X\_Android11 test@test:~/ RK356X\_Android11\$ export BOARD=orangepi3b test@test:~/ RK356X\_Android11\$ export DUAL\_LCD=true test@test:~/ RK356X\_Android11\$ source build/envsetup.sh test@test:~/ RK356X\_Android11\$ lunch rk3566\_r-userdebug test@test:~/ RK356X\_Android11\$ ./build.sh -AUKu 4) After the compilation is complete, the following information will be printed

\*\*\*\*\*\*\*\*rkImageMaker ver 2.1\*\*\*\*\*\*\* Generating new image, please wait... storage is spinor Writing head info... Writing boot file... Writing firmware... Generating MD5 data... MD5 data generated successfully! New image generated successfully! \*\*\*\*\*\*\*rkImageMaker ver 2.1\*\*\*\*\*\*\* Merging storage firmware, please wait... storage count = 2adding spinor update.img...ok adding pcie update.img...ok Merging firmware success. Making update spi nvme.img OK. Make update image ok! /wspace3/RK3566/RK356X Android11

5) The final image file will be placed in the **rockdev/Image-rk3566\_r**/ directory. Among them, **update.img** is the boot image that supports TF card and eMMC, and **update spi nvme.img** is the boot image of NVME SSD

test@test:~/RK356X\_Android11\$ cd rockdev/Image-rk3566\_r test@test:~/RK356X\_Android11/rockdev/Image-rk3566\_r \$ ls update\* update.img update\_spi\_nvme.img

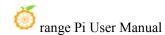
# 8. Appendix

# 8.1. User Manual Update History

Version	Date	Update Notes
v1.0	2023-08-29	initial version
v1.1	2023-09-05	Instructions for using the Orange Pi OS Arch system
v1.2	2023-09-21	Linux: How to create a WIFI hotspot through create_ap

# 8.2. Image Update History

Date	Update Notes
2023-08-29	Orangepicm4_1.0.0_ubuntu_focal_server_linux5.10.160.7z
	Orangepicm4_1.0.0_ubuntu_jammy_server_linux5.10.160.7z
	Orangepicm4_1.0.0_debian_bullseye_server_linux5.10.160.7z
	Orangepicm4_1.0.0_debian_bookworm_server_linux5.10.160.7z
	Orangepicm4_1.0.0_ubuntu_focal_desktop_xfce_linux5.10.160.7z
	Orangepicm4_1.0.0_ubuntu_jammy_desktop_xfce_linux5.10.160.7z
	Orangepicm4_1.0.0_debian_bullseye_desktop_xfce_linux5.10.160.7z
	Orangepicm4_1.0.0_debian_bookworm_desktop_xfce_linux5.10.160.7z
	OrangePiCM4_RK3566_Android11_v1.0.0.tar.gz
	OrangePiCM4_RK3566_Android11_lcd_v1.0.0.tar.gz
	OrangePiCM4_RK3566_Android11_spi-nvme_v1.0.0.tar.gz
	OrangePiCM4_RK3566_Android11_lcd_spi-nvme_v1.0.0.tar.gz
	* initial version
2023-09-05	Opios-arch-aarch64-xfce-opicm4-23.09-linux5.10.160.img.xz
	* initial version
2023-09-21	Orangepicm4_1.0.2_ubuntu_focal_server_linux5.10.160.7z
	Orangepicm4_1.0.2_ubuntu_jammy_server_linux5.10.160.7z
	Orangepicm4_1.0.2_debian_bullseye_server_linux5.10.160.7z



Orangepicm4\_1.0.2\_debian\_bookworm\_server\_linux5.10.160.7zOrangepicm4\_1.0.2\_ubuntu\_focal\_desktop\_xfce\_linux5.10.160.7zOrangepicm4\_1.0.2\_ubuntu\_jammy\_desktop\_xfce\_linux5.10.160.7zOrangepicm4\_1.0.2\_debian\_bullseye\_desktop\_xfce\_linux5.10.160.7zOrangepicm4\_1.0.2\_debian\_bookworm\_desktop\_xfce\_linux5.10.160.7z\* Solve the problem of CPU frequency being limited to 1.2GHz\* Add rk356x-uart2-m0.dtbo