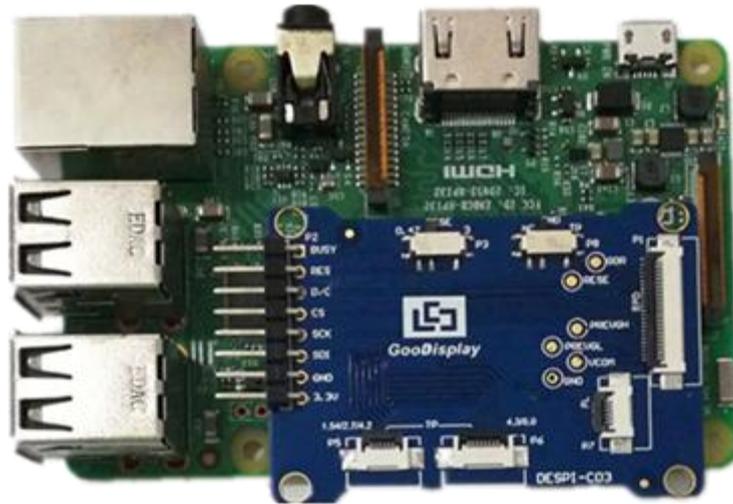




Raspberry Pi User Manual for E-paper Display

User Manual



Model Name	User Manual for Raspberry Pi
Date	2020/03/11
Revision	1.1

	Design Engineering		
	Approval	Check	Design
			

No.17 Gonghua Street, Shahekou District, Dalian 116021 China

Tel: +86-411-84619565

Fax: +86-411-84619585-810

Email: info@good-display.com

Website: www.e-paper-display.com

Contents

1. Overview.....	4
2. Initial configuration of Raspberry Pi.....	5
3. How to drive e-papers.....	13

1. Overview

Raspberry Pi is an ARM-based microcomputer motherboard with a Micro SD card as memory hard disk. It has GPIO custom interface, USB interface and Ethernet interface, can connect keyboard, mouse and network cable. It also has the video analog signal television output interface and the HDMI HD video output interface, has all the basic functions of PC.

Raspberry Pi motherboard can drive e-papers with connector board DESPI-C03 or DESPI-C1248. (DESPI-C1248 need to be connected by Raspberry Pi-C1248.) This manual will give a brief introduction of Raspberry Pi motherboard for the purpose of driving e-paper.

Tips: Raspberry Pi motherboard and related accessories and tools need to be purchased by users. We only provide e-paper driving required transfer accessories.

2.Initial configuration of Raspberry Pi

2.1 Gather all the things needed

Here is a list of all the things you need to get started with Raspberry Pi. (5~8 is only for initial configuration.)

- 1) Computer.
- 2) Raspberry Pi motherboard.
- 3) Micro SD card, at least 8 GB.
- 4) Good quality 5V 2A power supply.
- 5) Internet connectivity (Ethernet or WiFi).
- 6) HDMI compatible display and HDMI cable.
- 7) Keyboard and mouse.
- 8) Micro SD card reader.

2.2 Installation of Raspberry Pi operating system

2.2.1 Download the operating system "Raspbian OS ISO"

Download the operating system "Raspbian OS ISO" on the Raspberry Pi website. There are some different versions.

"RASPBIAN STRETCH WITH DESKTOP"(Figure 1) is recommended if users only want to drive e-papers.

Website: <http://www.raspberrypi.org/downloads>

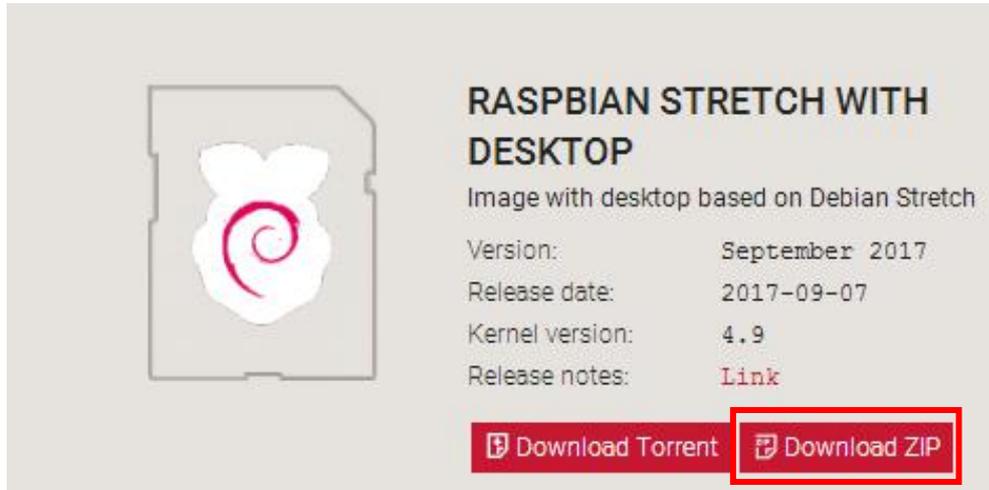


Figure 1 : Raspbian stretch with desktop

2.2.2 Prepare the Micro SD card

Insert the Micro SD card into your computer using a card reader. Open "SDFormatter" and click "格式化" in the red box in Figure 2.



Figure 2 : Prepare the Micro SD card

2.2.3 Install the operating system

Extract the ISO file and install it to the Micro SD card by “Win32 Disk Imager” as shown in Figure 3.

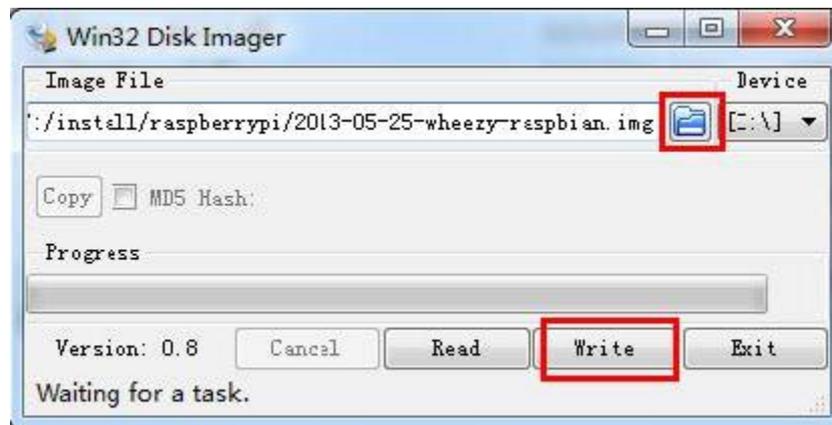


Figure 3 : Install the operating system

2.3 Initial setup of Raspberry Pi

Insert the Micro SD card into Raspberry Pi, connect the HDMI compatible display through the HDMI cable, connect the mouse and keyboard, connect the power supply to open the Raspberry Pi. First boot can take about a minute or two, once the Pi has booted up you are taken to the welcome screen (Figure 4) for initial setup.

- 1) Click next.
- 2) Set Country: Set your country, language and keyboard preferences.
- 3) Change Password: Set a new password, the default being “raspberrypi”.
- 4) Select WiFi Network: Connect to your WiFi network if you haven’t plugged in an Ethernet cable.

- 5) Set Up Screen: If the UI does not fill your display completely and has black border around it, tick the box. It will get corrected once the Pi restarts after the software update.
- 6) Update Software: Update the Raspbian OS, this step will take a while depending on network speeds. Once the Raspberry Pi has finished updating, the initial setup is done.

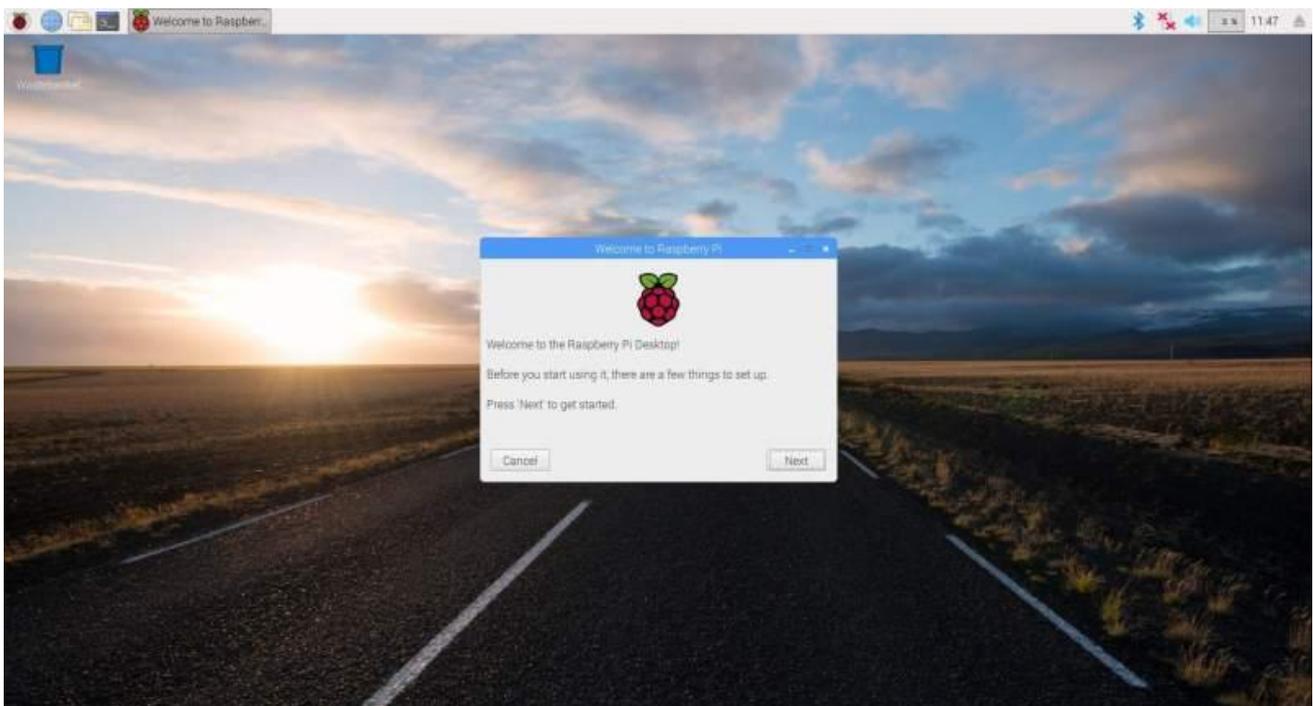


Figure 4 : welcome screen of Raspbian OS

2.4 VPN configuration for remote access

For easier operations in future, we recommend to operate Raspberry Pi with remote access. Remote access is divided into two ways: SSH and VNC. SSH need to connect Raspberry Pi to the computer by a USB to serial converter, but VNC only need to make Raspberry Pi and computer in the same LAN for remote desktop operation. VNC remote access is configured below:

2.4.1 Open the configuration interface

Open the configuration interface in the path of “Main Menu (the raspberry logo) > Preferences > Raspberry Pi Configuration” as shown in Figure 5.

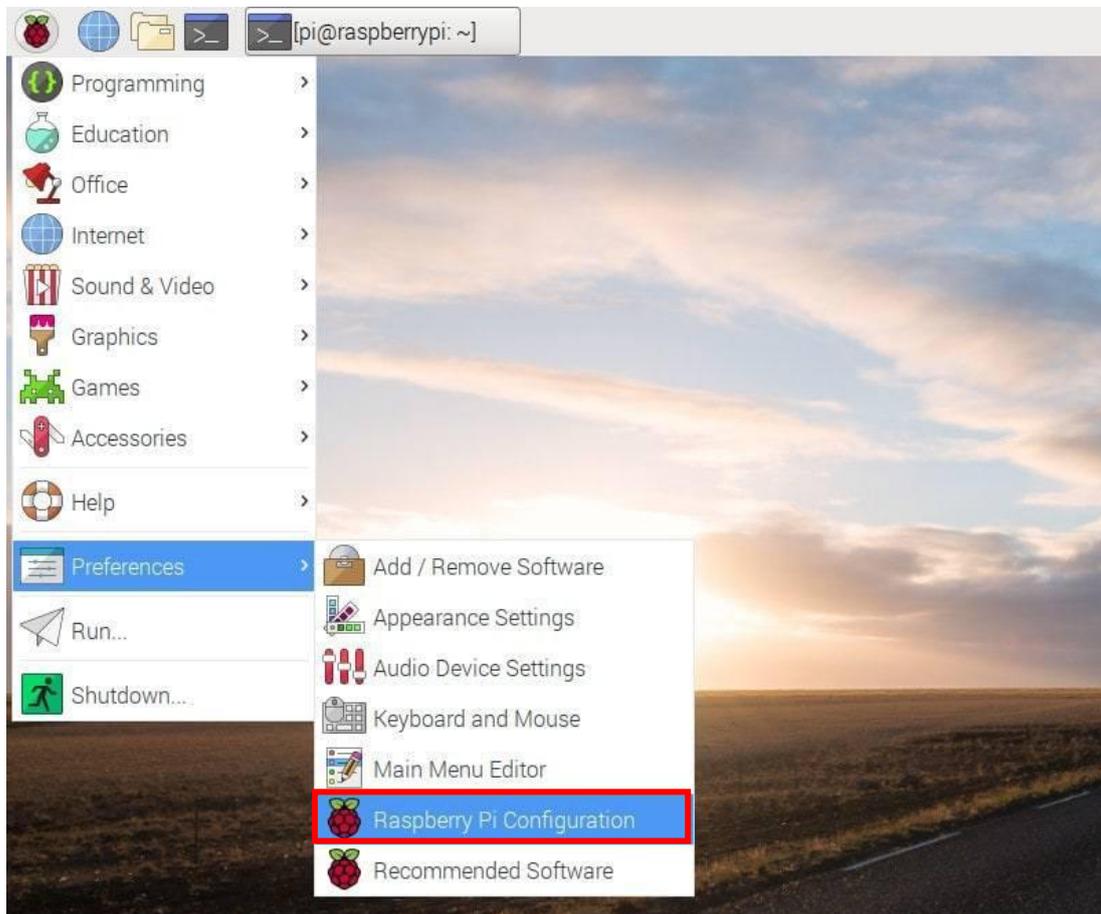


Figure 5 : Open the configuration interface

2.4.2 Set VNC available

Select the “Interfaces” column in Figure 6, set the "VNC" item required for remote access to “Enable”, click “OK” to confirm. Restart Raspberry Pi and configurations will effective.

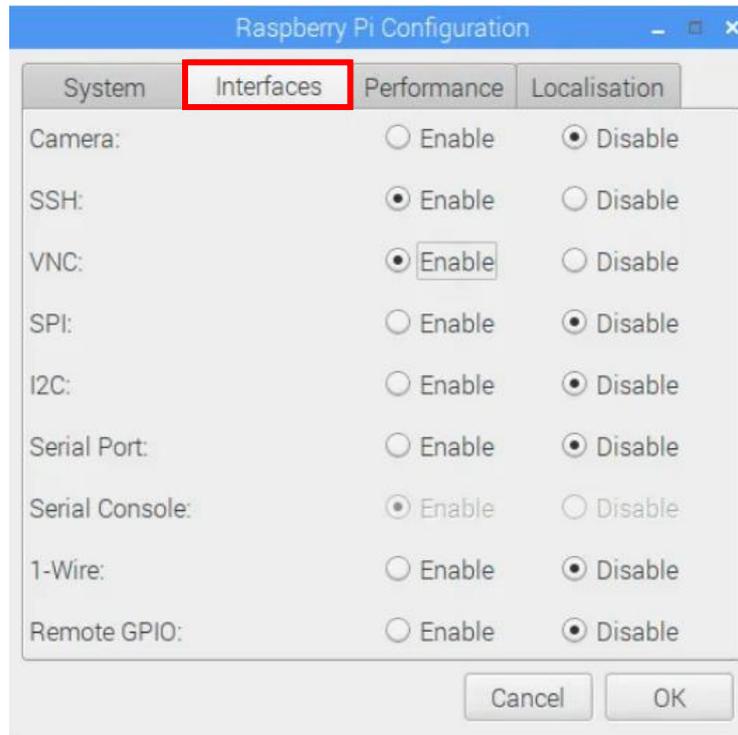


Figure 6 : Set VNC available

2.4.3 Install relevant software for VNC access

Open the program box, enter the following code:

sudo apt-get update(Update software list.)

sudo apt-get install xrdp(Installation of xrdp software.)

2.4.4 Scan the IP address of Raspberry Pi

Use a same network computer to scan the IP address where the Raspberry Pi is located with "Advanced IP Scanner", record the IP address as shown in Figure 7.

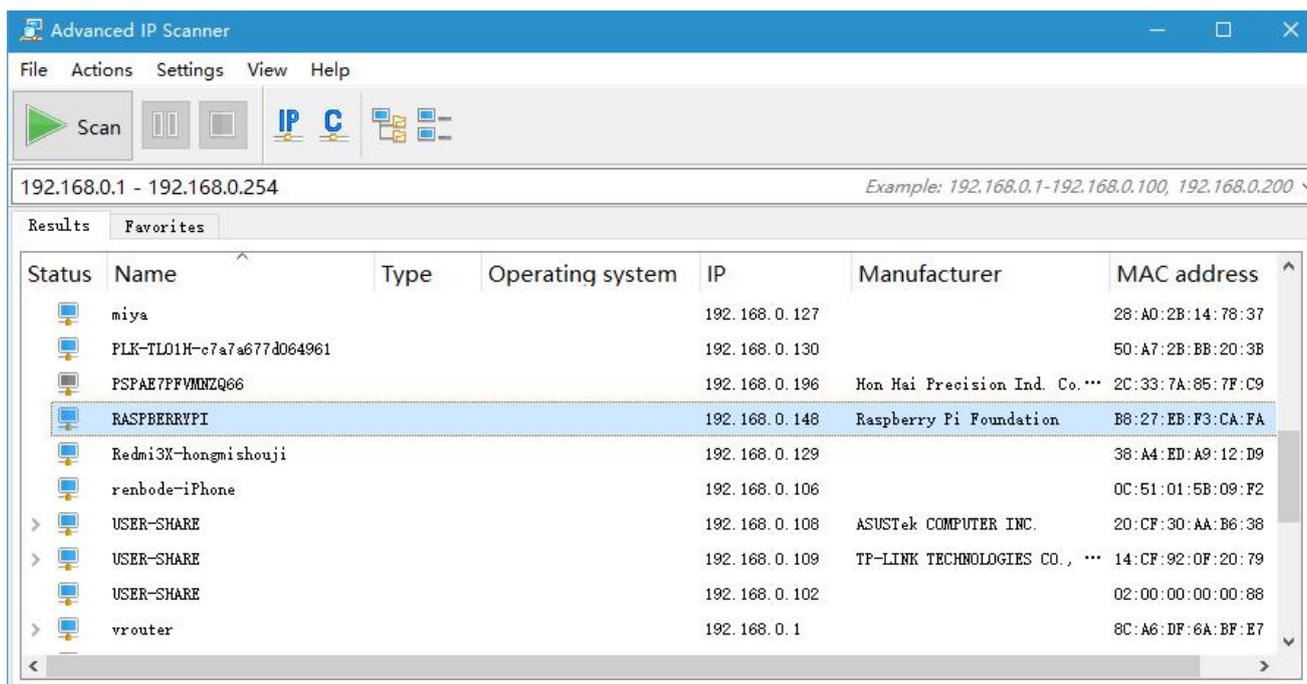


Figure 7 : Scan the IP address of Raspberry Pi

2.4.5 Login Raspberry Pi with remote desktop connection

Open “Remote Desktop Connection” in windows as shown in Figure 8, enter the IP address of Raspberry Pi, click “连接” and it will go to the Raspberry Pi remote login screen as shown in Figure 9, enter the Raspberry Pi user name and password to log in. (Default username: pi, default password: raspberry).



Figure 8 : remote desktop connection

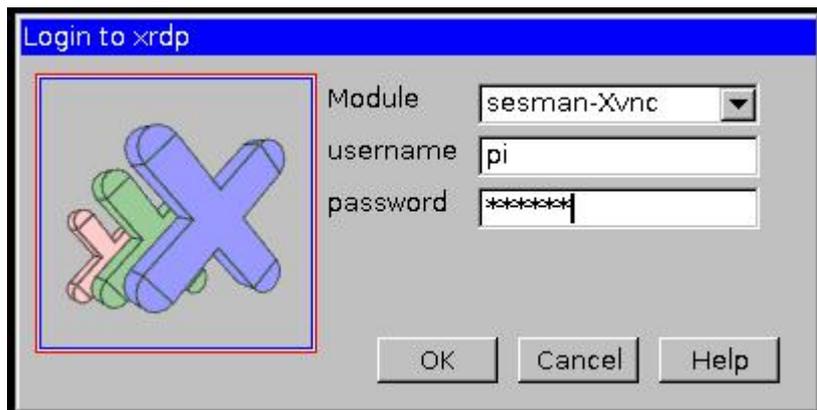


Figure 9 : Login Raspberry Pi

3.How to drive e-papers

3.1 Connection between Raspberry Pi and connector boards

3.1.1 DESPI-C1248 and Raspberry Pi-C1248

DESPI-C1248 supports Raspberry Pi driving. Raspberry Pi-C1248 (Figure 10) is the connector board between DESPI-C1248 and Raspberry Pi motherboard.

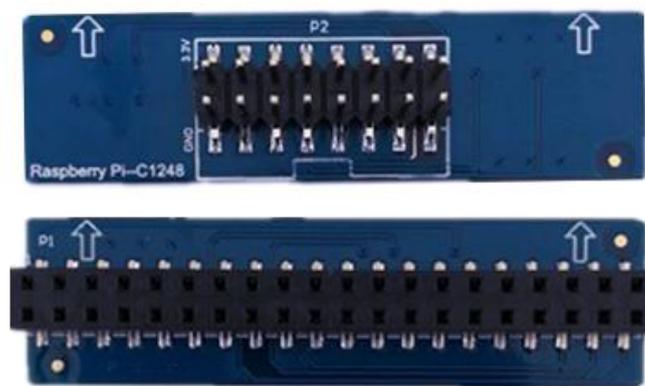


Figure 10 : Raspberry Pi-C1248

Connection between Raspberry Pi-C1248 and Raspberry Pi motherboard is as shown in Figure 11.

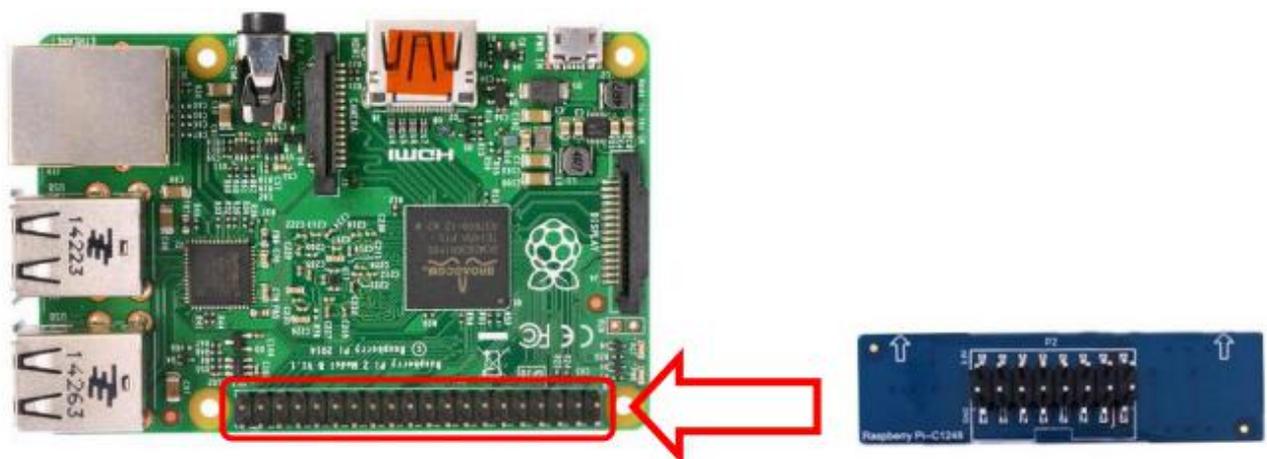


Figure 11 : Connection between Raspberry Pi-C1248 and Raspberry Pi

Raspberry Pi-C1248 connect with DESPI-C1248 by a 16PIN connector as shown in Figure 12. When connecting the 16PIN connector with Raspberry Pi-C1248, align the protruding portion of the 16PIN connector to the notch direction of P2 as shown in Figure 13.

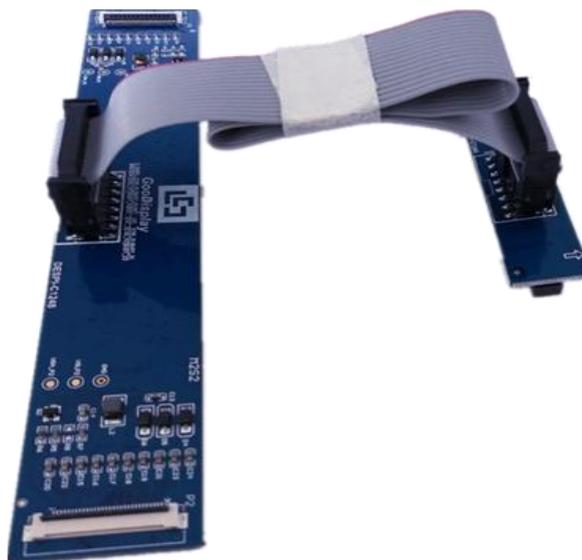


Figure 12 : Connection between Raspberry Pi-C1248 and DESPI-C1248

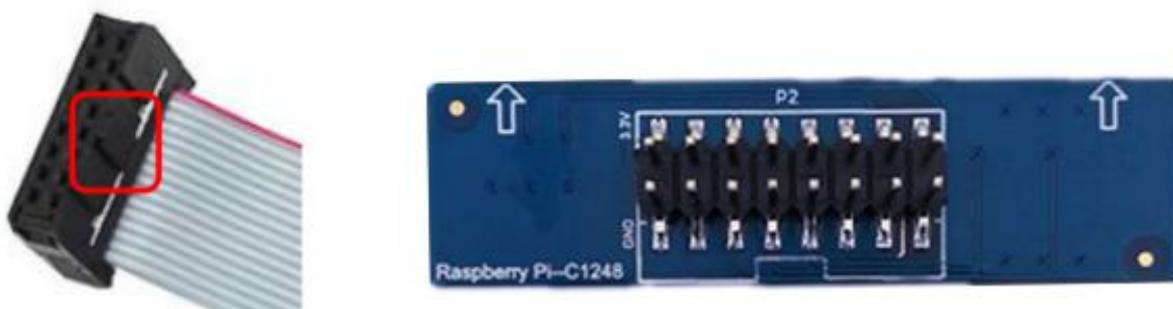


Figure 13 : Connection between Raspberry Pi-C1248 and connector

3.1.2 DESPI-C03

DESPI-C03 supports Raspberry Pi driving. Users need to connect DESPI-C03 to Raspberry Pi motherboard in the direction shown in Figure 14. The pins of DESPI-C03 should in the same direction with the USB interface of Raspberry Pi.

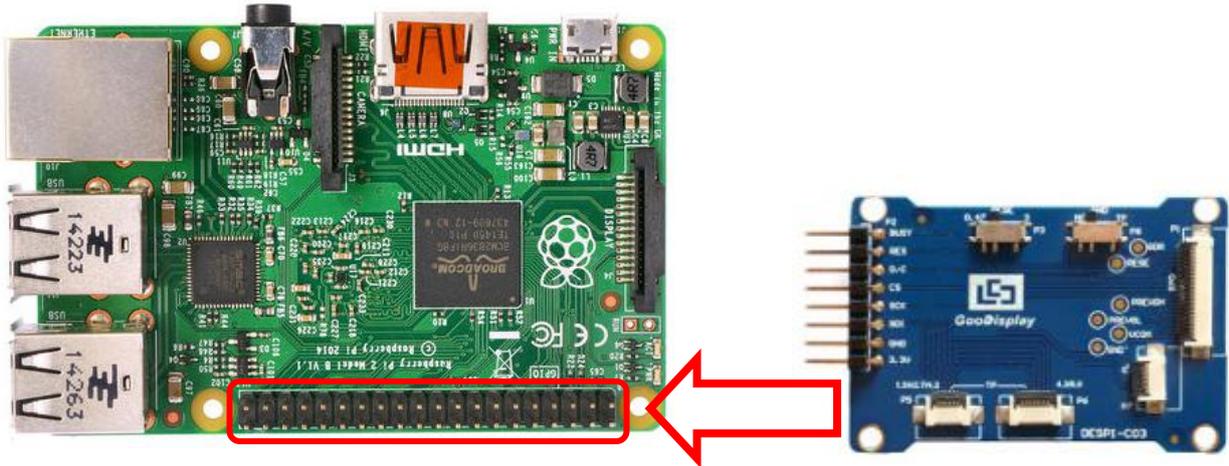


Figure 14 : Connection between DESPI-C03 and Raspberry Pi

3.2 Install function library bcm2835

3.2.1 Copy bcm2835 to Raspberry Pi

Copy bcm2835-1.52 and the e-paper driver program files to Raspberry Pi root directory shown in Figure 15 with a USB flash disk. Right-click the files separately, select "EXTRACT" to extract.

Download address of bcm2835:

<http://www.airspayce.com/mikem/bcm2835/>

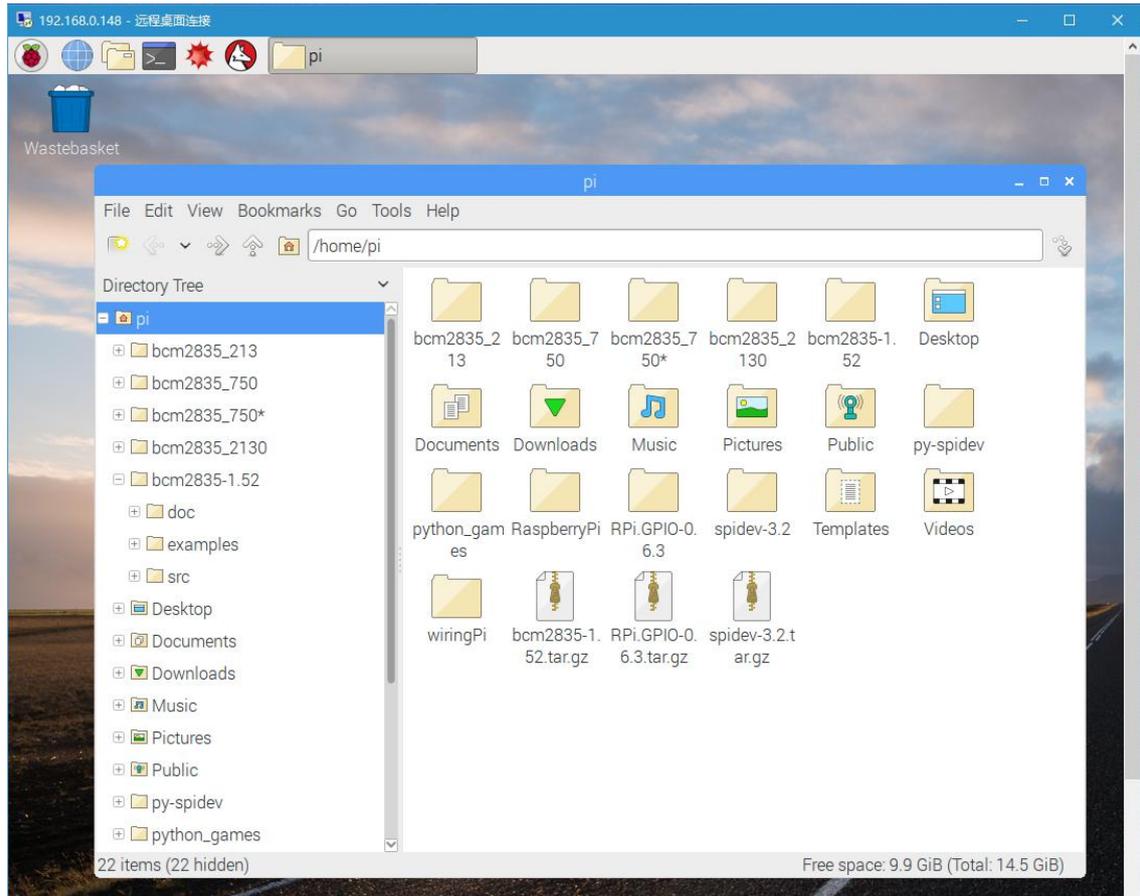


Figure 15 : Copy bcm2835 to Raspberry Pi

3.2.2 Install bcm2835

Open the program box, enter the following code:

```
cd bcm2835-1.52
```

```
./configure
```

```
make
```

```
sudo make check
```

```
sudo make install
```

3.3 Run the e-paper driver program

Take 7.5 inch e-paper as an example, the driver program operation is shown in Figure 16. Enter the following code:

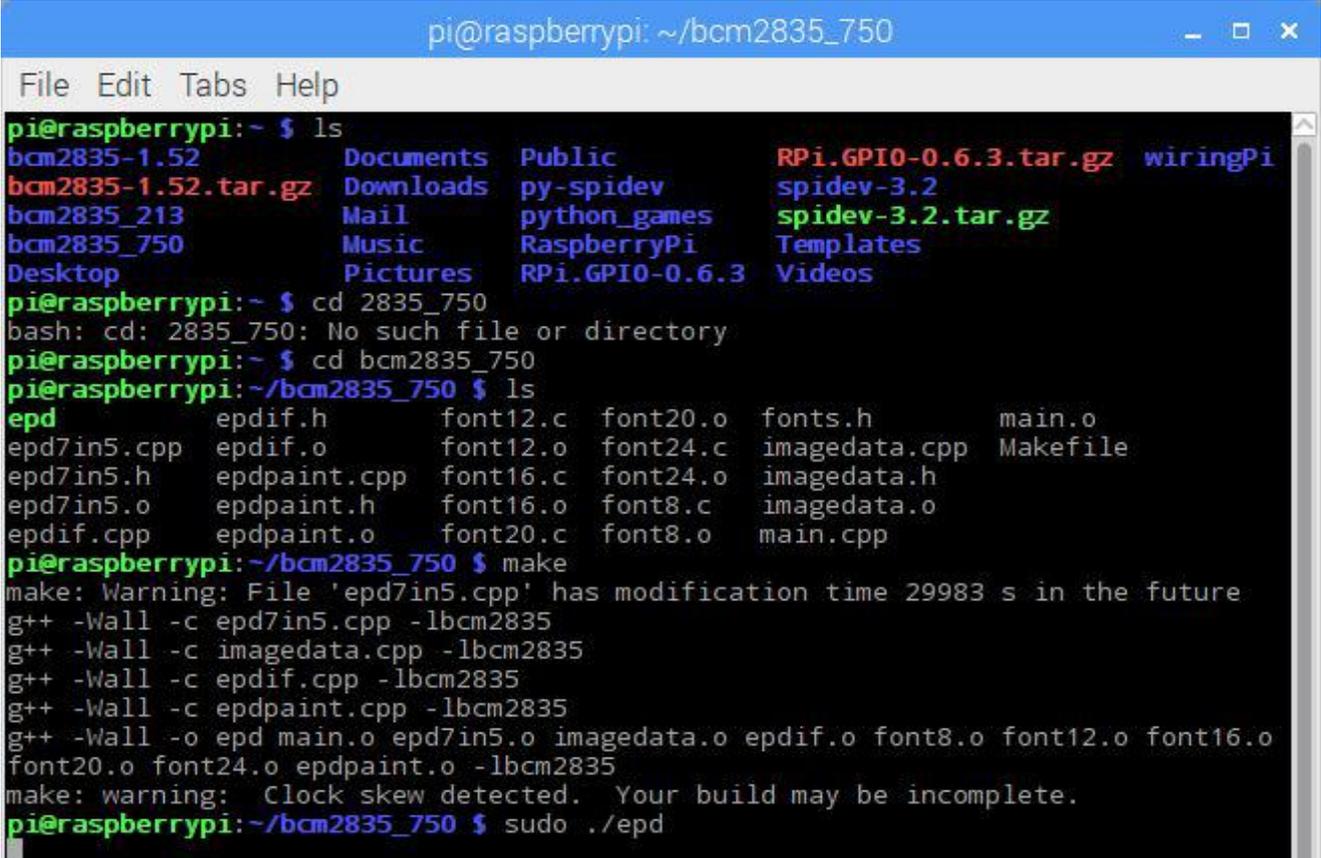
```
ls
```

```
cd bcm2835_750
```

```
ls
```

```
make
```

```
sudo ./epd
```



```
pi@raspberrypi: ~/bcm2835_750
File Edit Tabs Help
pi@raspberrypi:~ $ ls
bcm2835-1.52      Documents  Public      RPi.GPIO-0.6.3.tar.gz  wiringPi
bcm2835-1.52.tar.gz  Downloads  py-spidev   spidev-3.2
bcm2835_213      Mail       python_games  spidev-3.2.tar.gz
bcm2835_750      Music     RaspberryPi  Templates
Desktop          Pictures   RPi.GPIO-0.6.3  Videos
pi@raspberrypi:~ $ cd 2835_750
bash: cd: 2835_750: No such file or directory
pi@raspberrypi:~ $ cd bcm2835_750
pi@raspberrypi:~/bcm2835_750 $ ls
epd          epdif.h      font12.c   font20.o   fonts.h     main.o
epd7in5.cpp epdif.o      font12.o   font24.c   imagedata.cpp  Makefile
epd7in5.h   epdpaint.cpp font16.c   font24.o   imagedata.h
epd7in5.o   epdpaint.h   font16.o   font8.c    imagedata.o
epdif.cpp   epdpaint.o   font20.c   font8.o    main.cpp
pi@raspberrypi:~/bcm2835_750 $ make
make: Warning: File 'epd7in5.cpp' has modification time 29983 s in the future
g++ -Wall -c epd7in5.cpp -lbcm2835
g++ -Wall -c imagedata.cpp -lbcm2835
g++ -Wall -c epdif.cpp -lbcm2835
g++ -Wall -c epdpaint.cpp -lbcm2835
g++ -Wall -o epd main.o epd7in5.o imagedata.o epdif.o font8.o font12.o font16.o
font20.o font24.o epdpaint.o -lbcm2835
make: warning: Clock skew detected. Your build may be incomplete.
pi@raspberrypi:~/bcm2835_750 $ sudo ./epd
```

Figure 16 : Driver program operation of 7.5" e-paper

3.4 Other operations of Raspberry Pi

- sudo apt-get install xxx*(Install program)
- sudo apt-get remove xxx*(Remove program)
- sudo apt-get update*(Update program list)
- sudo apt-get upgrade*(Upgrade installed program)
- sudo raspi-config*(Open configuration list)
- tar -zxvf (file name)tar.gz*(Extract the folder)
- cd (file name)*(Open the folder)
- ls*(List the contents)
- cd*(Return the root directory)
- make*(Compile)
- sudo ./main*(Run the "main" function file)
- sudo ./epd*(Run the "epd" function file)
- CTRL + C*(Stop the running program)