

Fingerprint entry

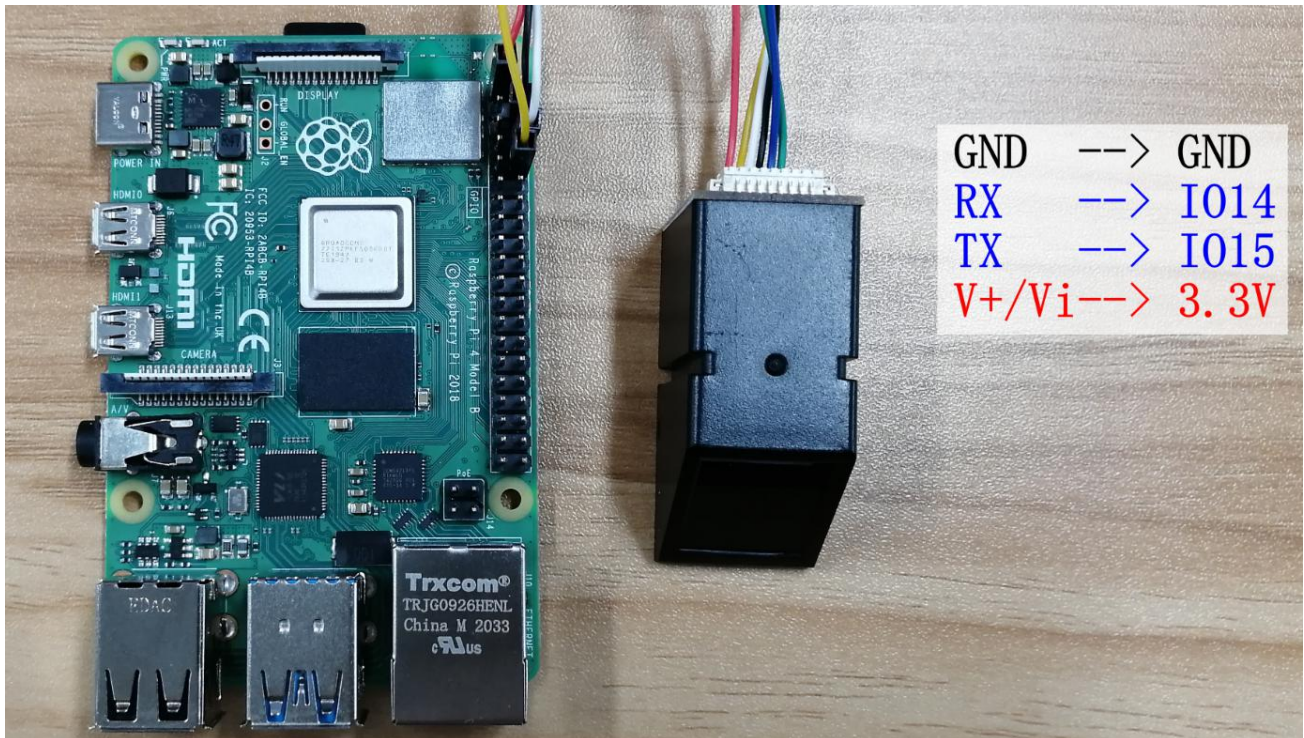
1. Learning target

In this course, we will learn how to use Raspberry Pi and fingerprint recognition module to achieve fingerprint entry function.

2. Preparation

The fingerprint recognition module uses UART communication, and the program uses a virtual serial port. Connect the TX and RX of the module to the IO15 and IO14 pins of the Raspberry Pi board. V+/Vi and GND are connected to 3.3V and GND of Raspberry Pi respectively.

Raspberry Pi GPIO Header + PoE Header				
Pin#	NAME		NAME	Pin#
01	3.3v DC Power		DC Power 5v	02
03	GPIO02 (SDA1 , I ² C)		DC Power 5v	04
05	GPIO03 (SCL1 , I ² C)		Ground	06
07	GPIO04 (GPIO_GCLK)		(TXD0) GPIO14	08
09	Ground		(RXD0) GPIO15	10
11	GPIO17 (GPIO_GEN0)		(GPIO_GEN1) GPIO18	12
13	GPIO27 (GPIO_GEN2)		Ground	14
15	GPIO22 (GPIO_GEN3)		(GPIO_GEN4) GPIO23	16
17	3.3v DC Power		(GPIO_GEN5) GPIO24	18
19	GPIO10 (SPI_MOSI)		Ground	20
21	GPIO09 (SPI_MISO)		(GPIO_GEN6) GPIO25	22
23	GPIO11 (SPI_CLK)		(SPI_CE0_N) GPIO08	24
25	Ground		(SPI_CE1_N) GPIO07	26
27	ID_SD (I ² C ID EEPROM)		(I ² C ID EEPROM) ID_SC	28
29	GPIO05		Ground	30
31	GPIO06		GPIO12	32
33	GPIO13		Ground	34
35	GPIO19		GPIO16	36
37	GPIO26		GPIO20	38
39	Ground		GPIO21	40
01	TR01		TR00	02
03	TR03		TR02	04



3. Configure the serial port of Raspberry Pi

3.1 Raspberry Pi needs to assign ttyAMA0 port to GPIO serial port TXD0, RXD0.

Input **sudo raspi-config** in the command terminal.

3.2 You enter the Raspberry Pi system configuration interface, and select the fifth [Interfacing Options].

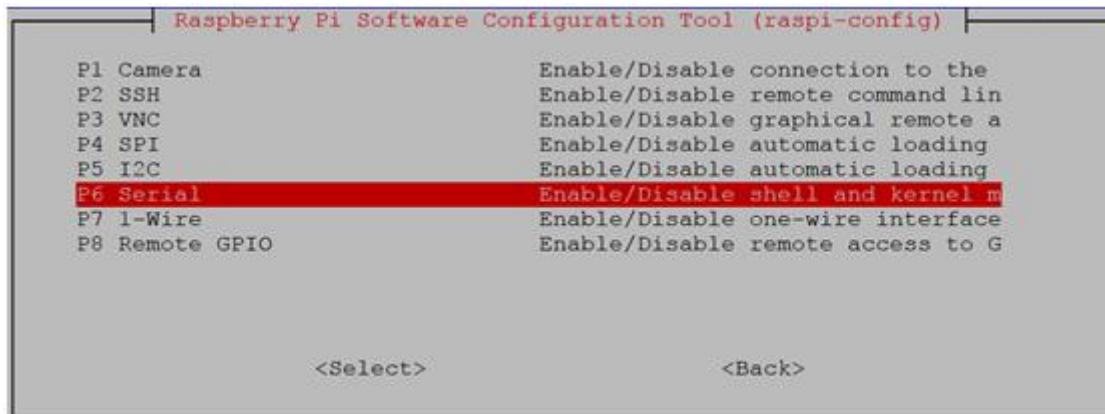
```

Raspberry Pi Software Configuration Tool (raspi-config)

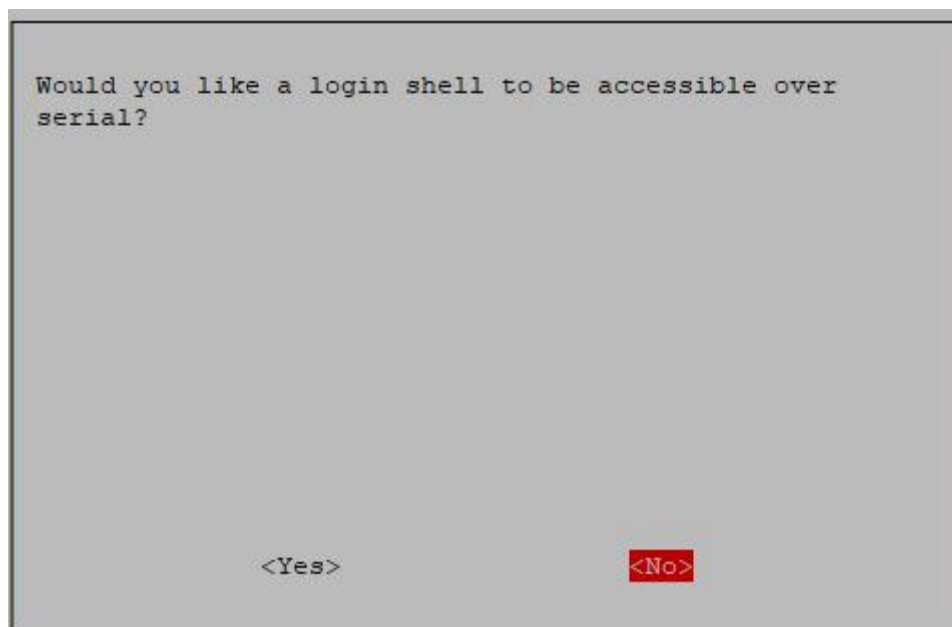
1 Change User Password Change password for the current user
2 Network Options       Configure network settings
3 Boot Options          Configure options for start-up
4 Localisation Options  Set up language and regional settings to match your
5 Interfacing Options   Configure connections to peripherals
6 Overclock             Configure overclocking for your Pi
7 Advanced Options      Configure advanced settings
8 Update               Update this tool to the latest version
9 About raspi-config    Information about this configuration tool

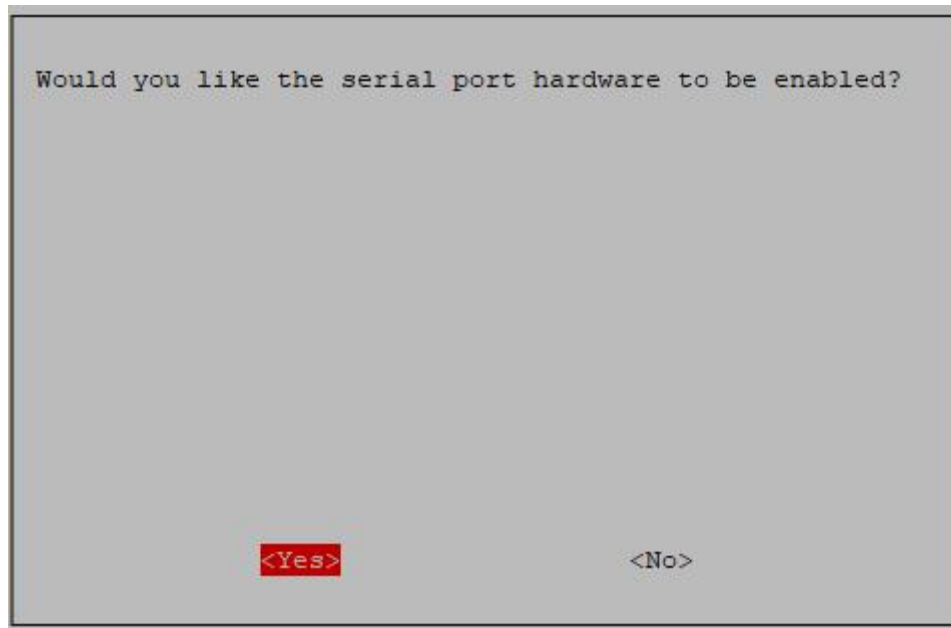
<Select>                <Finish>
  
```

3.3 Choose [P6 Serial]

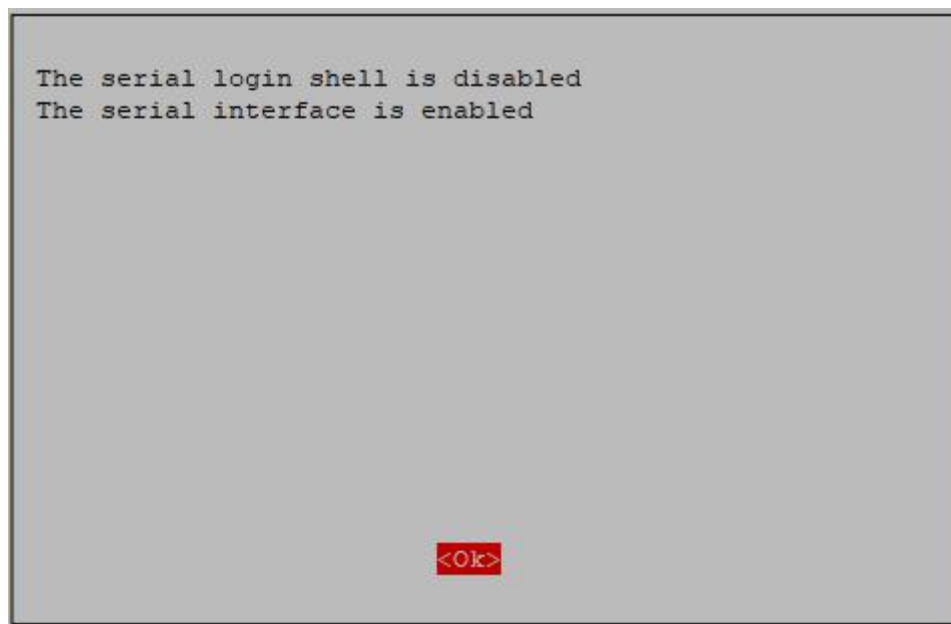


3.4 Choose to close the serial port login function and turn on the hardware serial port debugging function.





3.5 After finishing, the system will show the following prompt.



3.6 Exit raspi-config settings, and restart the Raspberry Pi according to the prompts.
Edit the config.txt file in the /boot directory.

`sudo nano /boot/config.txt`

Add the following two lines to the end:

`dtoverlay=pi3-miniuart-bt`

`force_turbo=1`

As shown below.


```

GNU nano 3.2 /boot/config.txt

#dtoverlay=lirc-rpi

# Additional overlays and parameters are documented /boot/overlays/README

# Enable audio (loads snd_bcm2835)
dtparam=audio=on
start_x=1
gpu_mem=128

dtoverlay=pi3-miniuart-bt
force_turbo=1

```

3.7 Press **Ctrl+O** to save, press **Ctrl+X** to exit.

3.8 Input following command to restart Raspberry Pi board.

sudo reboot

3.9 After restarting the Raspberry Pi. Input following command, you can see that the two serial ports have changed positions.

ls /dev -al again

```

drwxr-xr-x  2 root root          60 Jan  1  1970 raw
crw-rw-r--  1 root netdev    10,  57 Aug 26 11:55 rfkill
lrwxrwxrwx  1 root root          7 Aug 26 11:55 serial0 -> ttyAMA0
lrwxrwxrwx  1 root root          5 Aug 26 11:55 serial1 -> ttyS0
drwxrwxrwt  2 root root        40 Feb 14  2019 shm
drwxr-xr-x  3 root root       160 Aug 26 11:55 snd
crw-rw----  1 root spi       153,  0 Aug 26 11:55 spidev0.0
crw-rw----  1 root spi       153,  1 Aug 26 11:55 spidev0.1

```

4. About code

Please view **finger_save.py** file.

5. Running code

Input following command to this code.

python finger_save.py

6. Phenomenon

After the program is run successfully. System will start to initialize the fingerprint recognition module.

If the initialize is successfully, it will display "Initialized successfully". Otherwise, please check the baud rate or wiring of the module.

When the Shell window prints "Press your finger", please put your finger on the fingerprint recognition module. When the Shell window prints "Press your finger again", release your finger and put your finger on the fingerprint recognition module again.

The system will automatically compare the previous and next fingerprints. If they are the same, the Shell window will print "Saved successfully" and automatically set the fingerprint ID to 3.

After we run the fingerprint recognition program, when we put our finger on the fingerprint recognition module, the Shell window will print the ID of the fingerprint.