

Using USB camera

Using USB camera

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Take photos and videos on your Raspberry Pi using a standard USB camera.

Install FSWebcam

FSWebcam is a simple and clear webcam application. The software installation command is as follows:

```
sudo apt install fswebcam
```

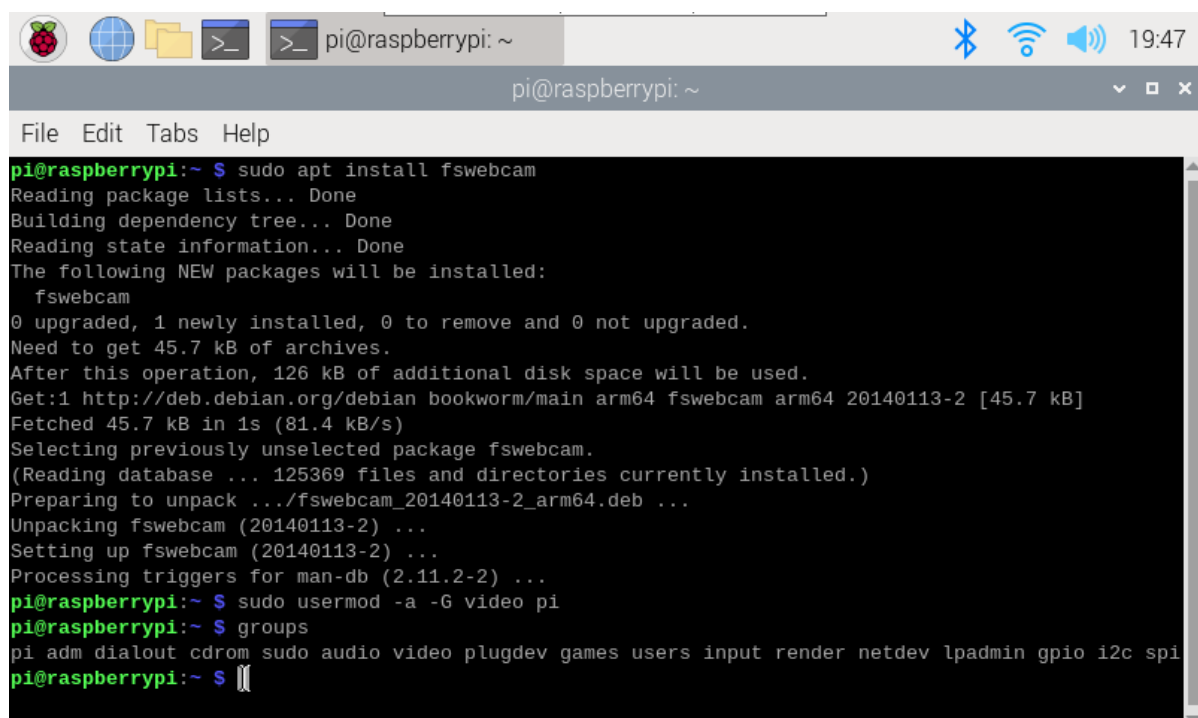
- Add user permissions: `sudo usermod -a -G video`

Example: Add pi user permissions to the group

```
sudo usermod -a -G video pi
```

- Check if the user has been added to the group correctly

Command: `groups`



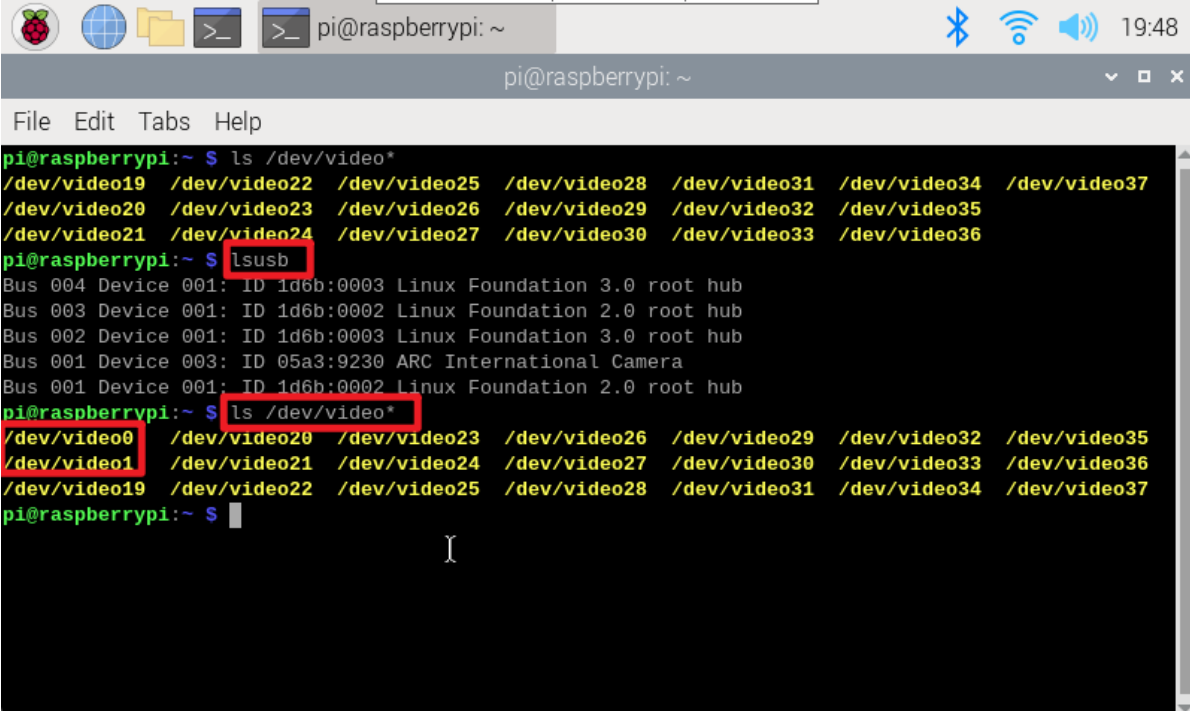
```
pi@raspberrypi: ~  
File Edit Tabs Help  
pi@raspberrypi:~ $ sudo apt install fswebcam  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
The following NEW packages will be installed:  
  fswebcam  
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.  
Need to get 45.7 kB of archives.  
After this operation, 126 kB of additional disk space will be used.  
Get:1 http://deb.debian.org/debian bookworm/main arm64 fswebcam arm64 20140113-2 [45.7 kB]  
Fetched 45.7 kB in 1s (81.4 kB/s)  
Selecting previously unselected package fswebcam.  
(Reading database ... 125369 files and directories currently installed.)  
Preparing to unpack .../fswebcam_20140113-2_arm64.deb ...  
Unpacking fswebcam (20140113-2) ...  
Setting up fswebcam (20140113-2) ...  
Processing triggers for man-db (2.11.2-2) ...  
pi@raspberrypi:~ $ sudo usermod -a -G video pi  
pi@raspberrypi:~ $ groups  
pi adm dialout cdrom sudo audio video plugdev games users input render netdev lpadmin gpio i2c spi  
pi@raspberrypi:~ $
```

View USB camera device

Use the `lsusb` command to view all USB devices recognized by the system;

Use the `ls /dev/video*` command to list all video devices recognized by the system.

The next two commands are to detect the information displayed by the camera. You can compare the differences by yourself:
One is image/video collection and the other is metadata collection.

A screenshot of a terminal window on a Raspberry Pi. The window title is 'pi@raspberrypi: ~'. The terminal shows the following commands and output:
1. Command: `ls /dev/video*`
Output: `/dev/video19 /dev/video22 /dev/video25 /dev/video28 /dev/video31 /dev/video34 /dev/video37`
`/dev/video20 /dev/video23 /dev/video26 /dev/video29 /dev/video32 /dev/video35`
`/dev/video21 /dev/video24 /dev/video27 /dev/video30 /dev/video33 /dev/video36`
2. Command: `lsusb`
Output: `Bus 004 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub`
`Bus 003 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub`
`Bus 002 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub`
`Bus 001 Device 003: ID 05a3:9230 ARC International Camera`
`Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub`
3. Command: `ls /dev/video*`
Output: `/dev/video0 /dev/video20 /dev/video23 /dev/video26 /dev/video29 /dev/video32 /dev/video35`
`/dev/video1 /dev/video21 /dev/video24 /dev/video27 /dev/video30 /dev/video33 /dev/video36`
`/dev/video19 /dev/video22 /dev/video25 /dev/video28 /dev/video31 /dev/video34 /dev/video37`
The terminal window has a menu bar with 'File', 'Edit', 'Tabs', and 'Help'. The status bar at the top shows system icons (Bluetooth, Wi-Fi, volume) and the time '19:48'.

Photograph

- `fswebcam <image_name>`

Example: Take a photo and save it as `image.jpg` (the file saving path defaults to the user directory)

```
fswebcam image.jpg
```

- `fswebcam -r resolution <image_name>`

Example: Take an image file with a resolution of 1280x720 and save it as `image2.jpg`

```
fswebcam -r 1280x720 image2.jpg
```

- `fswebcam -r resolution --no-banner <image_name>`

Example: Take an image file with a resolution of 1280x720, no information such as time is displayed on the picture, and save it as `image3.jpg`

```
fswebcam -r 1280x720 --no-banner image3.jpg
```

Time-lapse photography

Create a new Webcam folder and enter the file

```
mkdir webcam
```

```
cd webcam
```

Create a new webcam.sh script file and edit the content

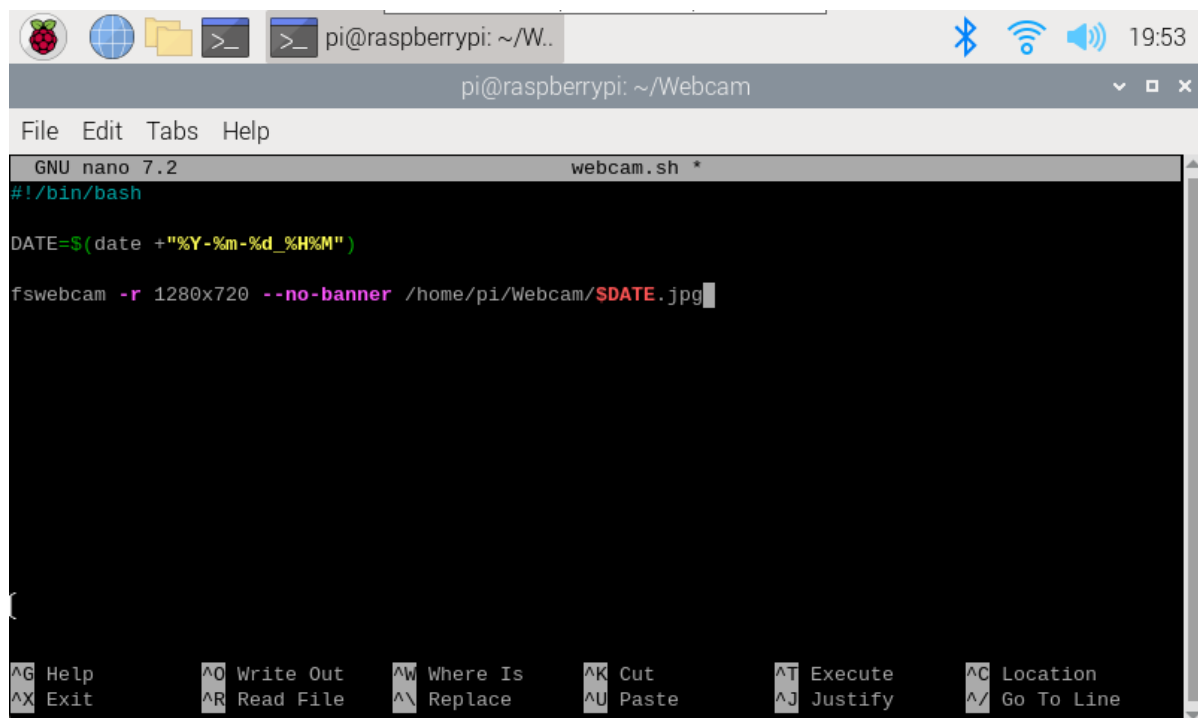
```
sudo nano webcam.sh
```

File content: The file saving path needs to be modified by yourself. My system username directory is yahboom.

```
#!/bin/bash

DATE=$(date +"%Y-%m-%d_%H%M")

fswebcam -r 1280x720 --no-banner /home/pi/webcam/$DATE.jpg
```



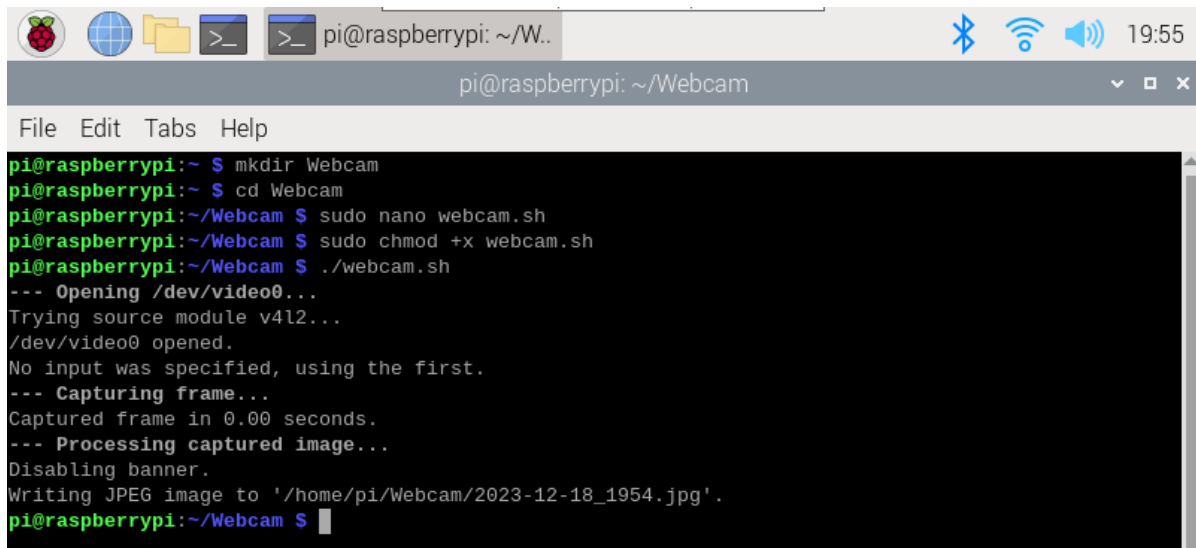
Hold down Ctrl+X, enter Y, and press Enter.

Add executable permissions

```
sudo chmod +x webcam.sh
```

run script

```
./webcam.sh
```

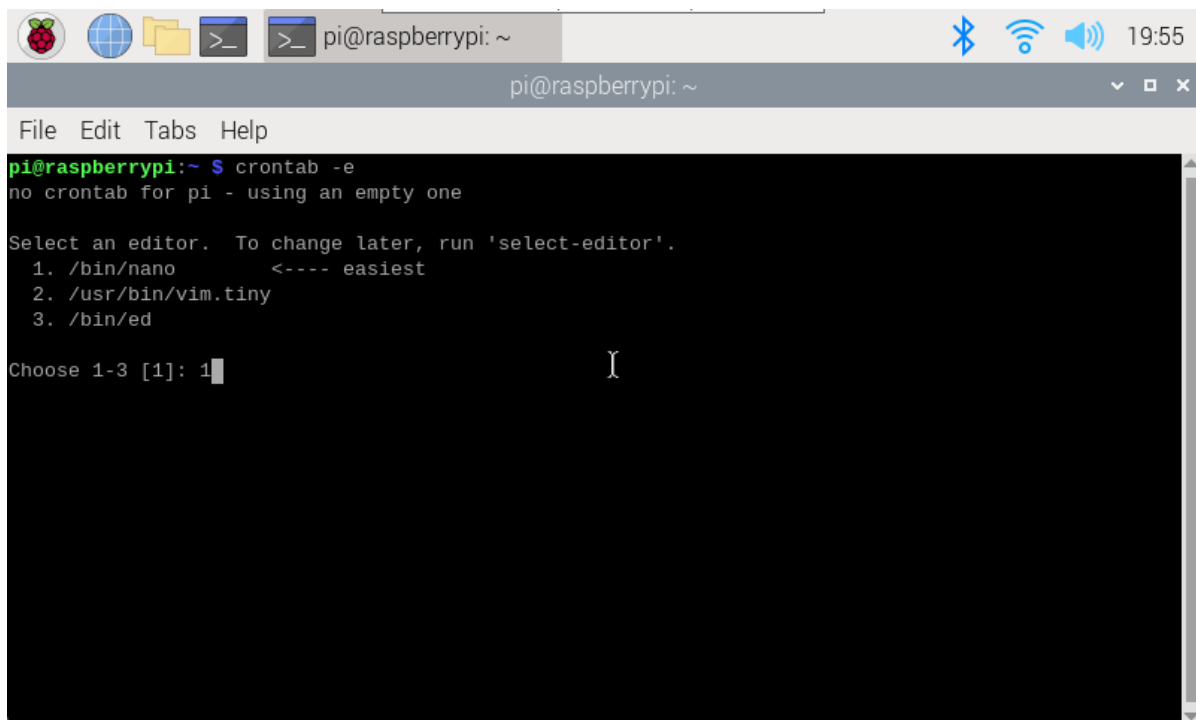


```
pi@raspberrypi: ~/W..
pi@raspberrypi: ~/Webcam
File Edit Tabs Help
pi@raspberrypi:~$ mkdir Webcam
pi@raspberrypi:~$ cd Webcam
pi@raspberrypi:~/Webcam$ sudo nano webcam.sh
pi@raspberrypi:~/Webcam$ sudo chmod +x webcam.sh
pi@raspberrypi:~/Webcam$ ./webcam.sh
--- Opening /dev/video0...
Trying source module v4l2...
/dev/video0 opened.
No input was specified, using the first.
--- Capturing frame...
Captured frame in 0.00 seconds.
--- Processing captured image...
Disabling banner.
Writing JPEG image to '/home/pi/Webcam/2023-12-18_1954.jpg'.
pi@raspberrypi:~/Webcam$
```

Using Cron (scheduled tasks)

Open the cron table for editing. You will be prompted to select an editor when using it for the first time. It is recommended to use the nano editor.

```
crontab -e
```



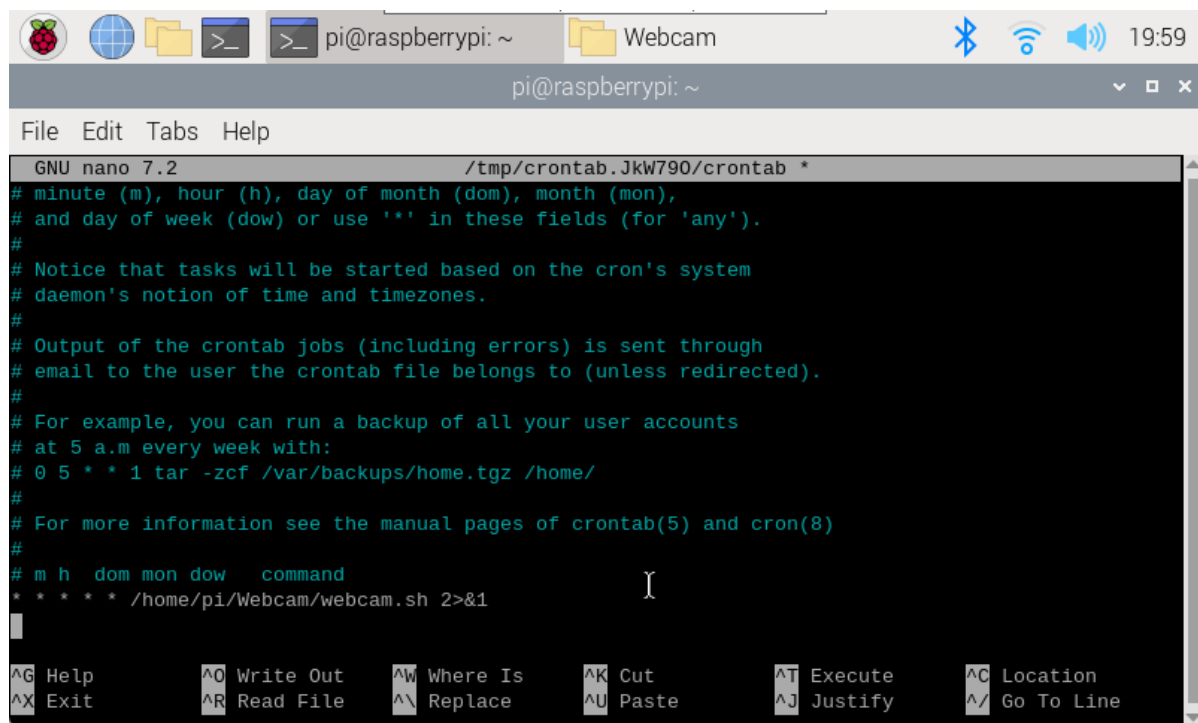
```
pi@raspberrypi: ~
pi@raspberrypi: ~
File Edit Tabs Help
pi@raspberrypi:~$ crontab -e
no crontab for pi - using an empty one

Select an editor. To change later, run 'select-editor'.
 1. /bin/nano      <---- easiest
 2. /usr/bin/vim.tiny
 3. /bin/ed

Choose 1-3 [1]: 1
```

Add the following code to the edited document: the first 5 * symbols represent a timer of 1 minute, and 2>&1 is to input the error output to the standard output.

```
* * * * * /home/pi/webcam/webcam.sh 2>&1
```



After saving the file and exiting, the terminal will output the following content:

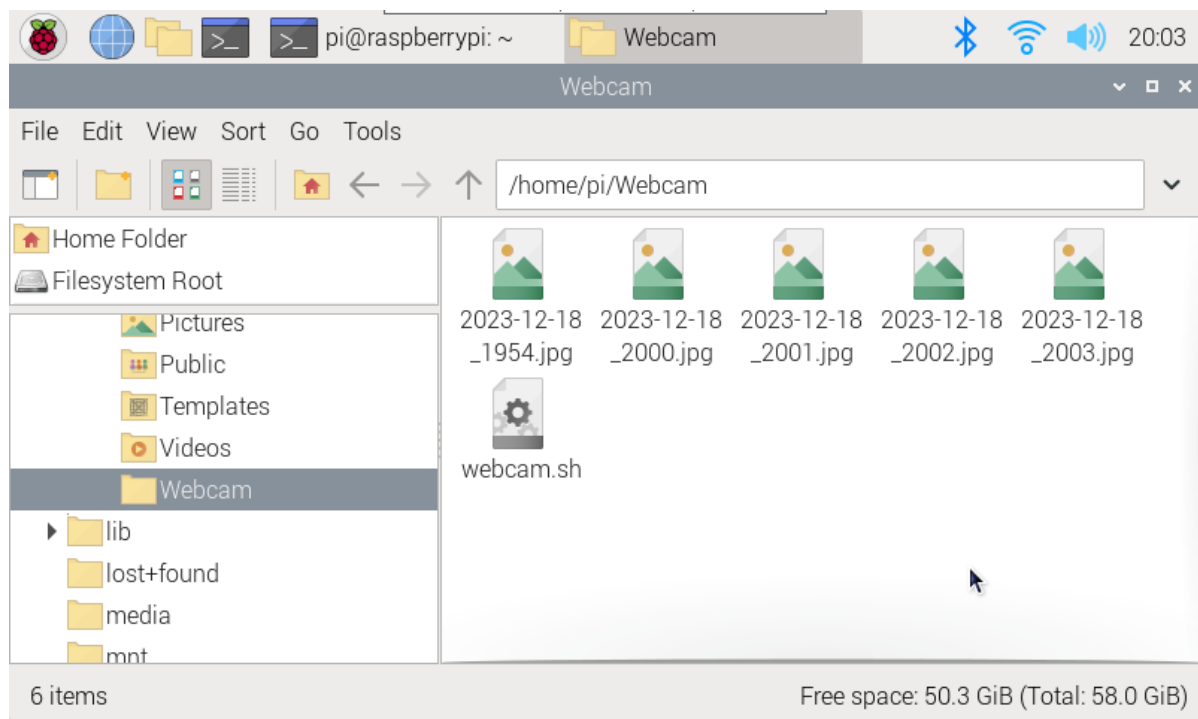
```
crontab: installing new crontab
```

For Cron jobs, you can learn about format and syntax by yourself!

If no pictures are generated after one minute, you can restart the service and check whether the path is correct!

Start cron service: `sudo service cron start`

Stop the cron service: `sudo service cron stop`



If you cannot turn off the camera to automatically shoot using the cron service stop command, it is recommended to use the `crontab -e` command directly to delete the previously edited content!

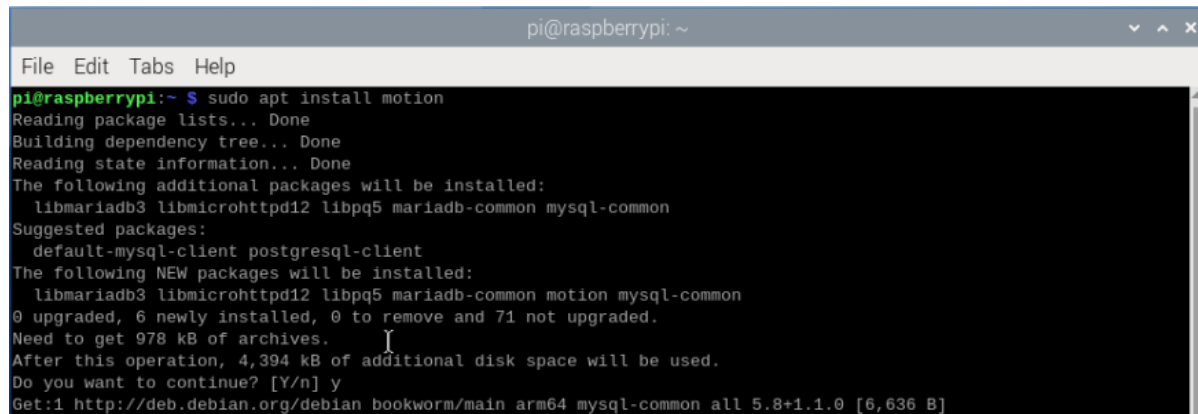
Web page preview camera

Use Motion to view the video captured by the USB camera in real time on the web page.

CSI cameras cannot use this method to preview the camera!

Install Motion

```
sudo apt install motion
```



```
pi@raspberrypi: ~  
File Edit Tabs Help  
pi@raspberrypi:~$ sudo apt install motion  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
The following additional packages will be installed:  
  libmariadb3 libmicrohttpd12 libpq5 mariadb-common mysql-common  
Suggested packages:  
  default-mysql-client postgresql-client  
The following NEW packages will be installed:  
  libmariadb3 libmicrohttpd12 libpq5 mariadb-common motion mysql-common  
0 upgraded, 6 newly installed, 0 to remove and 71 not upgraded.  
Need to get 978 kB of archives.  
After this operation, 4,394 kB of additional disk space will be used.  
Do you want to continue? [Y/n] y  
Get:1 http://deb.debian.org/debian bookworm/main arm64 mysql-common all 5.8+1.1.0 [6,636 B]
```

Modify configuration file

-motion.conf

```
sudo nano /etc/motion/motion.conf
```

Add or modify the following:

```
daemon on  
stream_localhost off  
picture_output off  
movie_output off  
stream_maxrate 100  
framerate 70  
width 640  
height 480
```

illustrate:

1. The above options that are not found in the configuration file can be added directly to the file. For example, the stream_maxrate option needs to be added by yourself, but other options are available.
2. Frame rate: You can modify it yourself (the above parameters are my best results)
3. The nano editor can use the Ctrl+W shortcut keys to search for keywords and quickly locate the content that needs to be modified.

```
stream_maxrate: real-time streaming frame rate
framerate: frame rate
width: image width
height: image height
The above parameters can be adjusted!
```

- motion

```
sudo nano /etc/default/motion
```

Add the following code: motion runs in the background

```
start_motion_daemon=yes
```

```
pi@raspberrypi:~ $ sudo nano /etc/motion/motion.conf
pi@raspberrypi:~ $ sudo nano /etc/default/motion
```

Start service

- Start service

```
sudo service motion start
```

- Out of service

```
sudo service motion stop
```

- Restart service

```
sudo service motion restart
```

- Turn on motion

```
sudo motion
```

Web page preview screen

Enter the start motion service and enable motion commands in the terminal:

```
sudo service motion start
sudo motion
```

```
pi@raspberrypi:~ $ sudo service motion start
pi@raspberrypi:~ $ sudo motion
[0:motion] [NTC] [ALL] conf_load: Processing thread 0 - config file /etc/motion/motion.conf
[0:motion] [NTC] [ALL] motion_startup: Logging to file (/var/log/motion/motion.log)
```

- Preview screen

After turning on motion, enter the car IP: 8081 on the browser on the same LAN to view the real-time image of the camera.

Example: 192.168.2.93:8081