

Raspberry Pi two degrees of freedom camera use tutorial

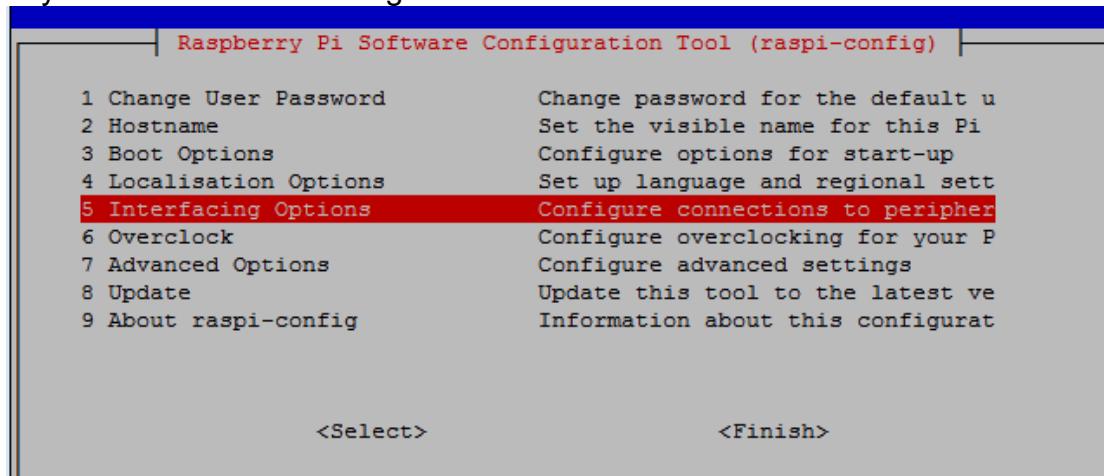
1. You need to connect camera to Raspberry Pi board.
2. You must to install a new operating system before use camera, which can identify if the camera module is connected. The simplest method is download Raspbian system from Raspberry Pi website, and install it to new SD card.

Regardless of the version of the Raspbian system you are using, I recommend that you update the system with the following command:

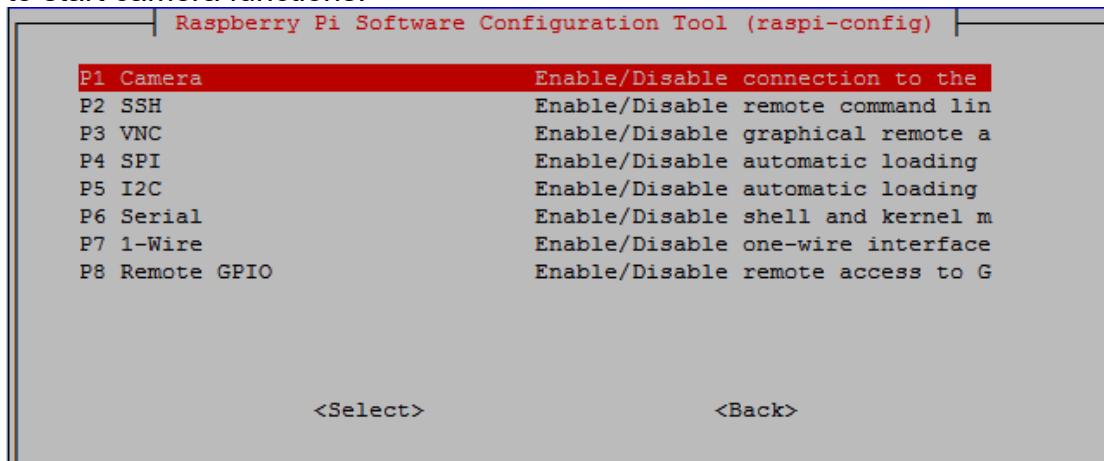
**sudo apt-get update
sudo apt-get upgrade**

3. Enable camera options

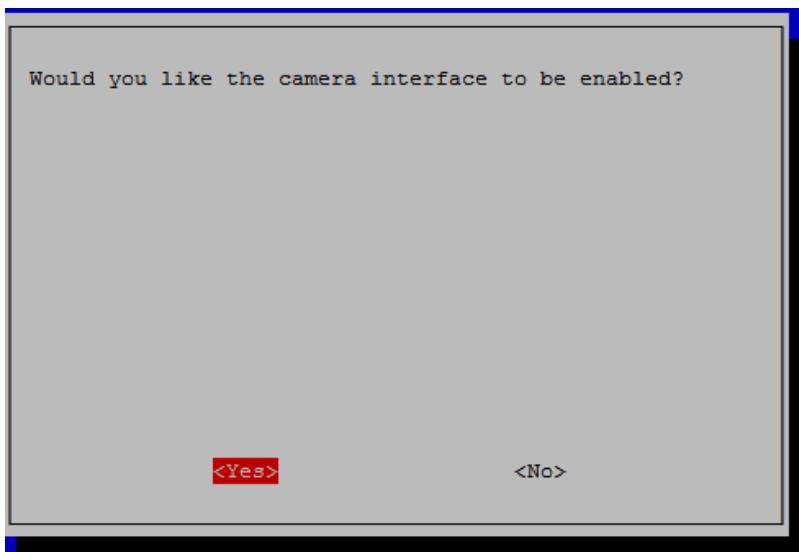
- 3.1) You need to input: **sudo raspi-config** to enter the following interface:
- 3.2) You need to choose “Interfacing Options”, press the “Enter” key of your keyboard to enter the configuration.



- 3.3) You need to choose “P1 Camera”, press the “Enter” key of your keyboard to start camera functions.



- 3.4) You need to choose “Yes”.



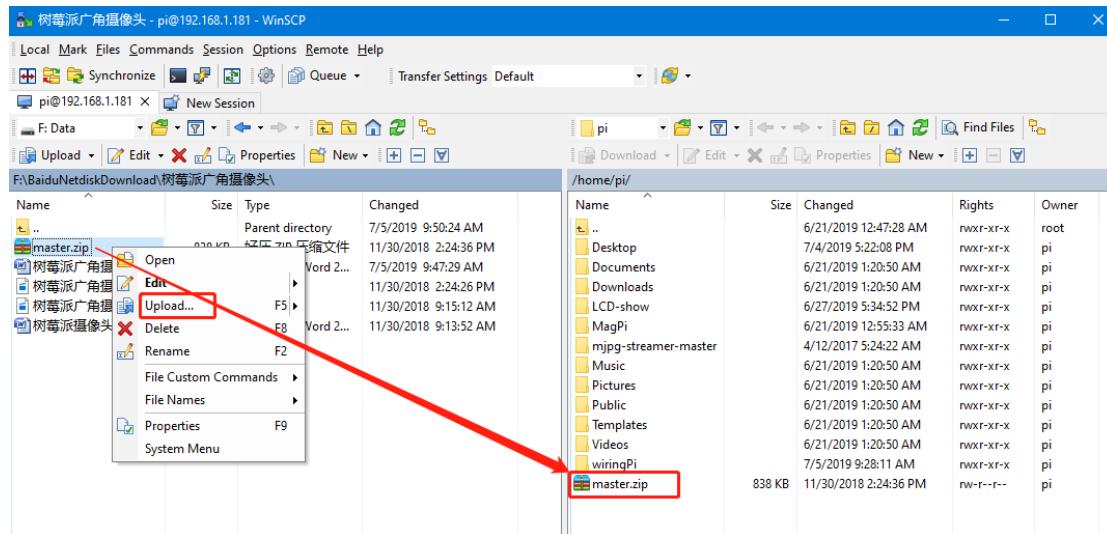
After the above steps, the camera function of Raspberry Pi has been turned on.

Finally ,we need to restart Raspberry Pi, input : **sudo reboot**.

4.Use camera

4.1 You can transfer the video which captured by the Raspberry Pi to the web page.

You need to log in to the WinSCP software and transfer the master.zip file to the pi directory of the Raspberry Pi.



4.2 You should input: **#unzip master.zip**

(This command to unzip mater.zip)

After complete unzip, input **ls**, you can see **mjpg-streamer-master** folder. As shown in the figure below.



4.3 Compiling this project requires cmake: perform the following command to install download.

(apt-get is a networked installation, so you need make Raspberry Pi successfully connect to the network.)

You should input:

#sudo apt-get install cmake

A prompt will appear when installing, you need to enter Y.

After completion, As shown in the figure below.

```
Suggested packages:
  codeblocks eclipse ninja-build
The following NEW packages will be installed:
  cmake cmake-data
0 upgraded, 2 newly installed, 0 to remove and 6 not upgraded.
Need to get 2,845 kB of archives.
After this operation, 14.6 MB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://mirrordirector.raspbian.org/raspbian/ jessie/main cmake-data all 3.0.2-1+deb8u1 [929 kB]
Get:2 http://mirrordirector.raspbian.org/raspbian/ jessie/main cmake armhf 3.0.2-1+deb8u1 [1,915 kB]
Fetched 2,845 kB in 3s (861 kB/s)
Selecting previously unselected package cmake-data.
(Reading database ... 124054 files and directories currently installed.)
Preparing to unpack .../cmake-data_3.0.2-1+deb8u1_all.deb ...
Unpacking cmake-data (3.0.2-1+deb8u1) ...
Selecting previously unselected package cmake.
Preparing to unpack .../cmake_3.0.2-1+deb8u1_armhf.deb ...
Unpacking cmake (3.0.2-1+deb8u1) ...
Processing triggers for man-db (2.7.0.2-5) ...
Setting up cmake-data (3.0.2-1+deb8u1) ...
Setting up cmake (3.0.2-1+deb8u1) ...
root@raspberrypi:/home# █
```

4.4 You need to install library

You should input:

#sudo apt-get install libjpeg8-dev

After completion, As shown in the figure below.

```
root@raspberrypi:/home# sudo apt-get install libjpeg8-dev
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  libjpeg8-dev
0 upgraded, 1 newly installed, 0 to remove and 6 not upgraded.
Need to get 205 kB of archives.
After this operation, 436 kB of additional disk space will be used.
Get:1 http://mirrordirector.raspbian.org/raspbian/ jessie/main libjpeg8-dev armhf 8d1-2 [205 kB]
Fetched 205 kB in 1s (150 kB/s)
Selecting previously unselected package libjpeg8-dev:armhf.
(Reading database ... 125733 files and directories currently installed.)
Preparing to unpack .../libjpeg8-dev_8d1-2_armhf.deb ...
Unpacking libjpeg8-dev:armhf (8d1-2) ...
Setting up libjpeg8-dev:armhf (8d1-2) ...
root@raspberrypi:/home#
```

4.5 Compiling

Note: we possess two formats of camera (JPEG/YUYV)
 2-degree-of-freedom camera: **YUYV/JPEG**

If we want to change to the YUYV format, we need to modify the relevant files and compile:

Specific steps as shown below:

You should enter the **input_uvc.c** file in the **/home/pi/mjpg-streamer-master/mjpg-streamer-experimental/plugins/input_uvc/** directory.

You should input:

cd /home/pi/mjpg-streamer-master/mjpg-streamer-experimental/plugins/input_uvc/

You should input:

ls

```
pi@raspberrypi:~ $ cd /home/pi/mjpg-streamer-master/mjpg-streamer-experimental/plugins/input_uvc/
pi@raspberrypi:~/mjpg-streamer-master/mjpg-streamer-experimental/plugins/input_uvc $ ls
CMakeLists.txt  dynctrl.h  input_uvc.c  jpeg_utils.h  uvc_compat.h  v4l2uvc.c
dynctrl.c      huffman.h  jpeg_utils.c  README.md    uvcvideo.h   v4l2uvc.h
pi@raspberrypi:~/mjpg-streamer-master/mjpg-streamer-experimental/plugins/input_uvc $
```

Just modify the format of 135 lines to **V4L2_PIX_FMT_YUYV** (The default is **format=V4L2_PIX_FMT_MJPEG**)

You should input:

nano -c input_uvc.c

```

int input_init(input_parameter *param, int id)
{
    char *dev = "/dev/video0", *s;
    int width = 640, height = 480, fps = -1, format = V4L2_PIX_FMT_YUYV, i;
    v4l2_std_id tvnorm = V4L2_STD_UNKNOWN;
    context *pctx;
    context_settings *settings;
}

[ line 135/814 (16%), col 1/76 (1%), char 4854/29175 (16%) ]

```

If you want to change the resolution and frame rate of the USB camera, you can change it here.

After the modification is completed, press **ctrl+X**, press **Y** to save, and then press the **Enter** key.

Then return to the **mjpg-streamer-experimental** folder to compile

Then return to **mjpg-streamer-experimental**:

cd /home/pi/mjpg-streamer-master/mjpg-streamer-experimental

And input :**make clean all** to complete the compilation.

```

pi@raspberrypi:~/mjpg-streamer-master/mjpg-streamer-experimental/plugins/input_u
vc $ cd /home/pi/mjpg-streamer-master/mjpg-streamer-experimental
pi@raspberrypi:~/mjpg-streamer-master/mjpg-streamer-experimental $ sudo make cle
an all
[ ! -f _build/Makefile ] || make -C _build clean
make[1]: Entering directory '/home/pi/mjpg-streamer-master/mjpg-streamer-experi
mental/_build'
make[2]: Entering directory '/home/pi/mjpg-streamer-master/mjpg-streamer-experi
mental/_build'
make[3]: Entering directory '/home/pi/mjpg-streamer-master/mjpg-streamer-experi
mental/_build'

```

You can wait for the compilation to complete, you can see the interface shown below.

```

[ 92%] Built target output_rtsp
make[3]: Entering directory '/home/pi/mjpg-streamer-master/mjpg-streamer-experi
mental/_build'
make[3]: Leaving directory '/home/pi/mjpg-streamer-master/mjpg-streamer-experi
mental/_build'
make[3]: Entering directory '/home/pi/mjpg-streamer-master/mjpg-streamer-experi
mental/_build'
make[3]: Entering directory '/home/pi/mjpg-streamer-master/mjpg-streamer-experi
mental/_build'
[ 96%] Building C object plugins/output_udp/CMakeFiles/output_udp.dir/output_udp
.c.o
[100%] Linking C shared library output_udp.so
make[3]: Leaving directory '/home/pi/mjpg-streamer-master/mjpg-streamer-experi
mental/_build'
[100%] Built target output_udp
make[2]: Leaving directory '/home/pi/mjpg-streamer-master/mjpg-streamer-experi
mental/_build'
make[1]: Leaving directory '/home/pi/mjpg-streamer-master/mjpg-streamer-experi
mental/_build'
pi@raspberrypi:~/mjpg-streamer-master/mjpg-streamer-experimental $

```

7. Restart system

You need to input: **sudo reboot** to reboot system
 Plug in the camera and restart the system.

8. After rebooting, enter the system.

You need to enter the **mjpg-streamer-experimental** directory by command. And use the following command to start the normal USB camera (for 2-DOF cameras):

```
#./mjpg_streamer -i "./input_uvc.so" -o "./output_http.so -w ./www"
```

Some cameras will report an error when executing this command. If they do not return to the command prompt and display "Starting Camera", it means success.

As shown in the figure below, the camera is successfully turned on:

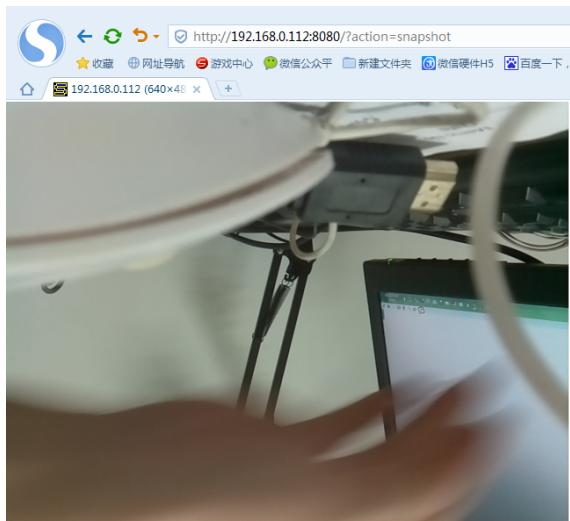
```
pi@raspberrypi:~/mjpg-streamer-master/mjpg-streamer-experimental $ ./mjpg_streamer -i "./input_uvc.so" -o "./output_http.so -w ./www"
MJPG Streamer Version.: 2.0
  i: Using V4L2 device.: /dev/video0
  i: Desired Resolution: 640 x 480
  i: Frames Per Second.: -1
  i: Format.....: YUYV
  i: JPEG Quality....: 80
  i: TV-Norm.....: DEFAULT
UVCIOC_CTRL_ADD - Error at Pan (relative): Inappropriate ioctl for device (25)
UVCIOC_CTRL_ADD - Error at Tilt (relative): Inappropriate ioctl for device (25)
UVCIOC_CTRL_ADD - Error at Pan Reset: Inappropriate ioctl for device (25)
UVCIOC_CTRL_ADD - Error at Tilt Reset: Inappropriate ioctl for device (25)
UVCIOC_CTRL_ADD - Error at Pan/tilt Reset: Inappropriate ioctl for device (25)
UVCIOC_CTRL_ADD - Error at Focus (absolute): Inappropriate ioctl for device (25)
UVCIOC_CTRL_MAP - Error at Pan (relative): Inappropriate ioctl for device (25)
UVCIOC_CTRL_MAP - Error at Tilt (relative): Inappropriate ioctl for device (25)
UVCIOC_CTRL_MAP - Error at Pan Reset: Inappropriate ioctl for device (25)
UVCIOC_CTRL_MAP - Error at Tilt Reset: Inappropriate ioctl for device (25)
UVCIOC_CTRL_MAP - Error at Pan/tilt Reset: Inappropriate ioctl for device (25)
UVCIOC_CTRL_MAP - Error at Focus (absolute): Inappropriate ioctl for device (25)
UVCIOC_CTRL_MAP - Error at LED1 Mode: Inappropriate ioctl for device (25)
UVCIOC_CTRL_MAP - Error at LED1 Frequency: Inappropriate ioctl for device (25)
UVCIOC_CTRL_MAP - Error at Disable video processing: Inappropriate ioctl for dev
ice (25)
UVCIOC_CTRL_MAP - Error at Raw bits per pixel: Inappropriate ioctl for device (2
5)
  o: www-folder-path.....: ./www/
  o: HTTP TCP port.....: 8080
  o: HTTP Listen Address...: (null)
  o: username:password....: disabled
  o: commands.....: enabled
```

9. Test results

View the image, open the browser on the PC side, you need to enter the following URL to see the static screenshot:

<http://<RaspberryPi IP>:8080/?action=snapshot>

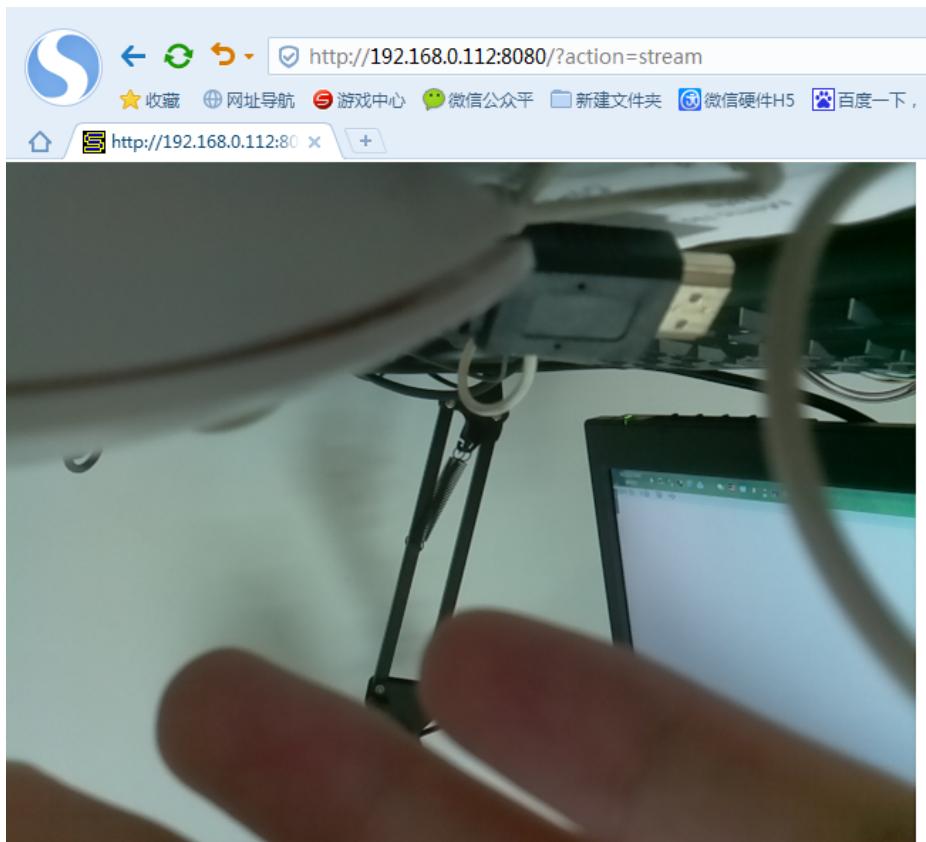
My URL is: <http://192.168.0.112:8080/?action=snapshot>



You should input the following URL to see the dynamic image:

http://<RaspberryPi IP>:8080/?action=stream

My URL is: <http://192.168.0.112:8080/?action=stream>



You can also use the following URL:

Http://<RaspberryPi IP>:8080/javascript_simple.html