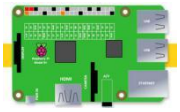
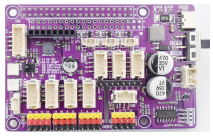
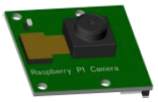
Lesson 12 How to Take a Photo with Raspberry Pi

In this tutorial we will learn the photography function of the Raspberry Pi.

For more details, refer to the Raspberry Pi official website:

https://www.raspberrypi.org/documentation/usage/camera/README.md

12.1 Components & Parts

Components	Quantity	Picture
Raspberry Pi	1	
Adeept Robot HAT V3.0	1	
Camera Module	1	
Camera Cable	1	

12.2 Introducing the Camera Module

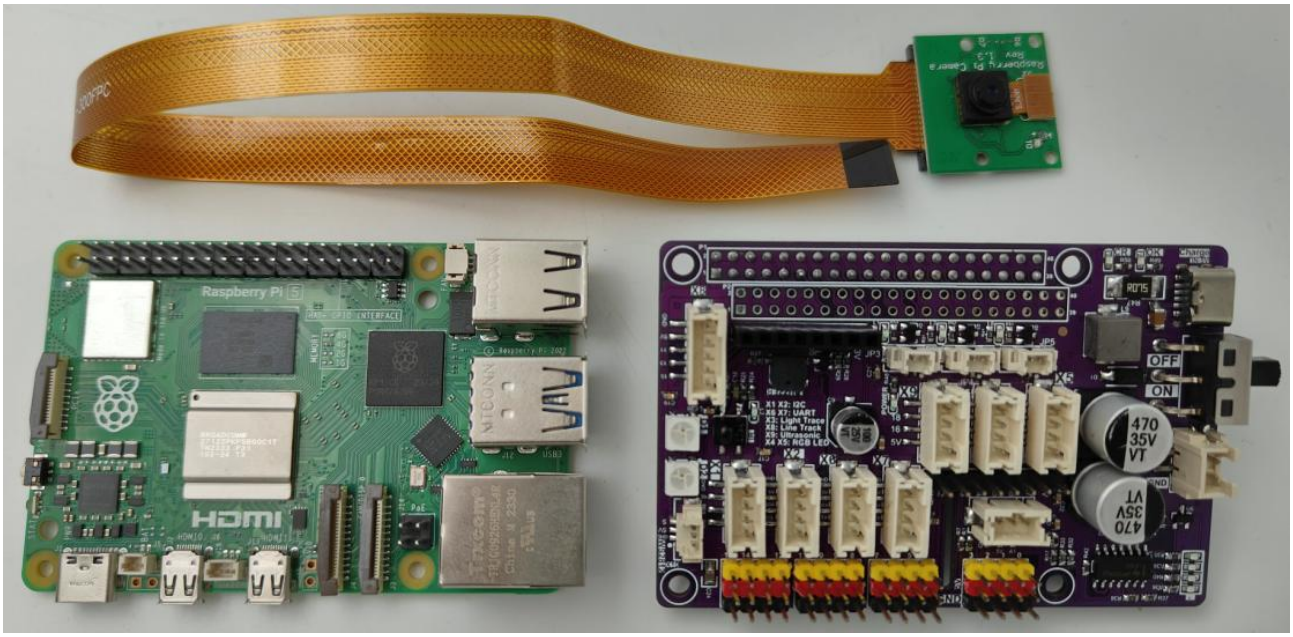
The Raspberry Pi camera module is capable of taking full HD 1080p photos and videos and can be controlled programmatically.

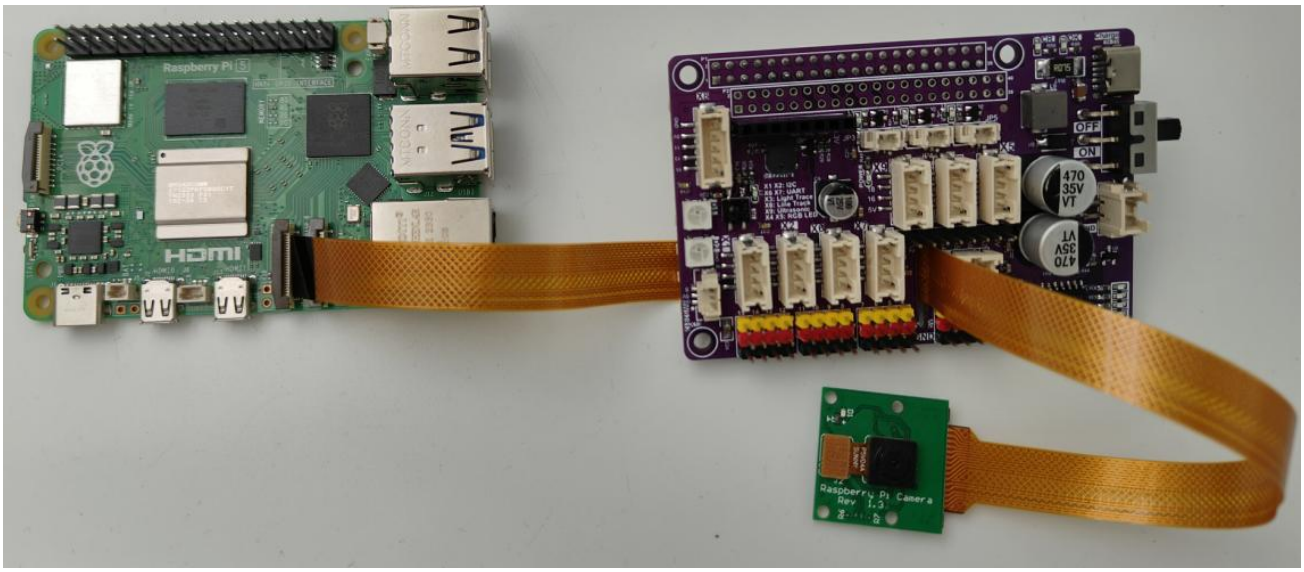
12.3 Schematic Diagram

The flex cable inserts into the connector situated between the Ethernet and HDMI ports, with the silver connectors facing the HDMI port. The flex cable connector should be opened by pulling the tabs on the top of the connector upwards then towards the Ethernet port. The flex cable should be inserted firmly into the connector, with care taken not to bend the flex at too acute an angle. The top part of the connector should then be pushed towards the HDMI connector and down, while the flex cable is held in place. (Pay attention that the metal of the connector should be in contact with that of the cable)

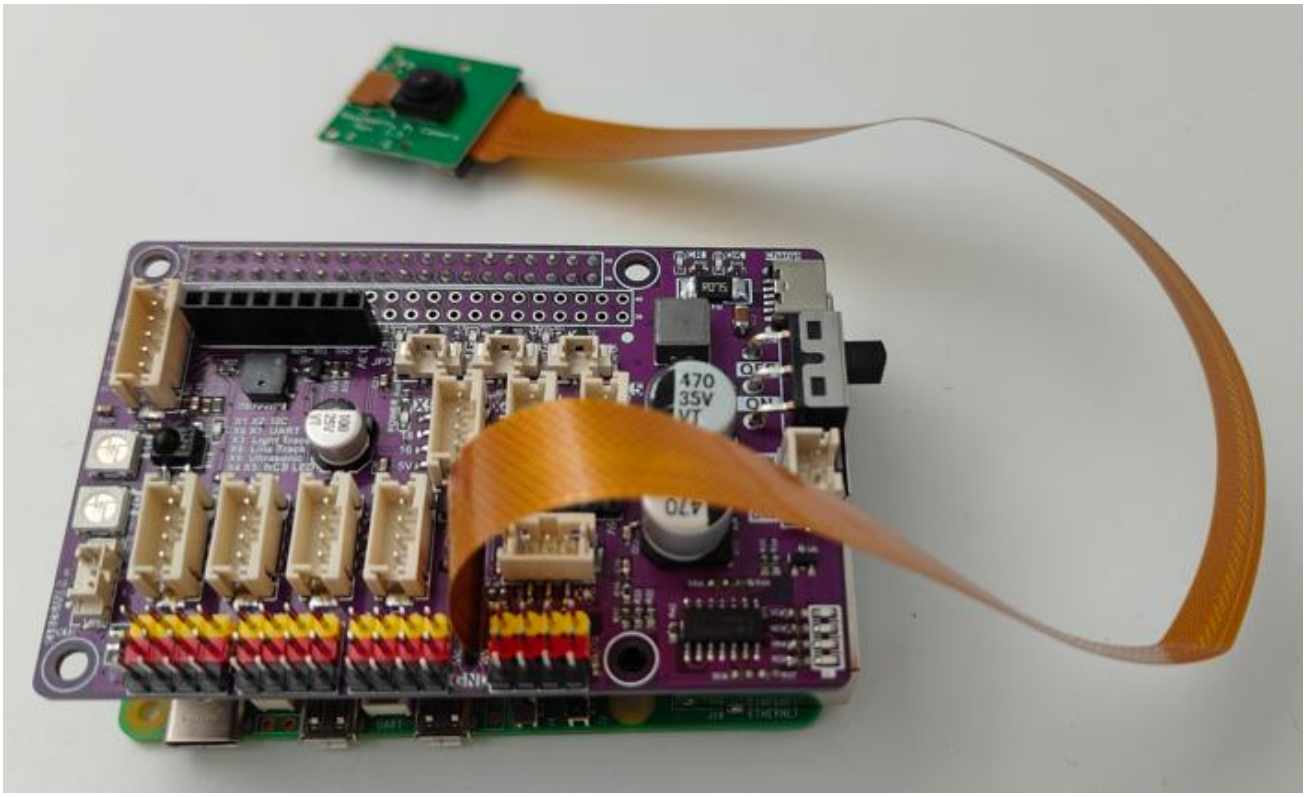
The picture below uses a Raspberry Pi 5, so you need to use the corresponding Raspberry Pi 5 camera cable.

If you are using a Raspberry Pi 3B, 3B+, 4. You will need to use the black camera cable. Black ribbon cable is included in the kit.





Install the Adeept Robot HAT V3.0. And connect the Raspberry Pi power supply.



12.4 Programming the Raspberry Pi to Take Photos

Run the code

1. Log into the Raspberry Pi remotely.

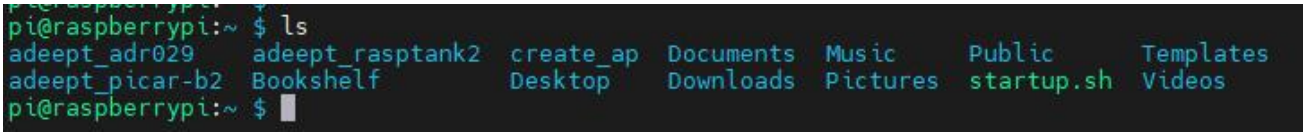
```
Linux raspberrypi 4.19.118-v7l+ #1311 SMP Mon Apr 27 14:26:42 BST 2020 armv7l

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Sat Aug 29 08:17:49 2020 from 192.168.3.208

SSH is enabled and the default password for the 'pi' user has not been changed.
This is a security risk - please login as the 'pi' user and type 'passwd' to set
 a new password.

pi@raspberrypi:~ $
```

2. When the Raspberry Pi is configured with the robot software, the Raspberry Pi will automatically run the webServer.py program. If you need to use the camera in other programs, you need to terminate this program. Termination command:

```
sudo killall python3
```

3. View the files of the current directory:

```
ls
```



- 4. Type in commands, press Enter to run the program. **If there are errors, please see the F&A in this tutorial.**

```
libcamera-jpeg -o image.jpg -n
```

Some warning messages may appear, please ignore it. If other messages appear, please check whether the camera is connected correctly.

Note: You need to disconnect the Raspberry Pi power supply before plugging or unplugging the camera cable.

```
pi@raspberrypi:~ $
pi@raspberrypi:~ $ libcamera-jpeg -o image.jpg -n
[0:58:51.893477179] [2073]  INFO Camera camera_manager.cpp:284 libcamera v0.2.0+46-075b
54d5
[0:58:51.932202058] [2076]  WARN RPiSdn sdn.cpp:39 Using legacy SDN tuning - please con
sider moving SDN inside rpi.denoise
[0:58:51.934431541] [2076]  INFO RPI vc4.cpp:447 Registered camera /base/soc/i2c0mux/i2
c@1/ov5647@36 to Unicam device /dev/media1 and ISP device /dev/media3
[0:58:51.934509743] [2076]  INFO RPI pipeline_base.cpp:1144 Using configuration file '/
usr/share/libcamera/pipeline/rpi/vc4/rpi_apps.yaml'
Mode selection for 1296:972:12:P
    SGBRG10_CSI2P,640x480/0 - Score: 3296
    SGBRG10_CSI2P,1296x972/0 - Score: 1000
    SGBRG10_CSI2P,1920x1080/0 - Score: 1349.67
    SGBRG10_CSI2P,2592x1944/0 - Score: 1567
Stream configuration adjusted
[0:58:51.935647855] [2073]  INFO Camera camera.cpp:1183 configuring streams: (0) 1296x9
72-YUV420 (1) 1296x972-SGBRG10_CSI2P
[0:58:51.936037478] [2076]  INFO RPI vc4.cpp:611 Sensor: /base/soc/i2c0mux/i2c@1/ov5647
@36 - Selected sensor format: 1296x972-SGBRG10_1X10 - Selected unicam format: 1296x972-
pGAA
Mode selection for 2592:1944:12:P
    SGBRG10_CSI2P,640x480/0 - Score: 7832
    SGBRG10_CSI2P,1296x972/0 - Score: 5536
    SGBRG10_CSI2P,1920x1080/0 - Score: 4238.67
    SGBRG10_CSI2P,2592x1944/0 - Score: 1000
Stream configuration adjusted
[0:58:57.085879951] [2073]  INFO Camera camera.cpp:1183 configuring streams: (0) 2592x1
944-YUV420 (1) 2592x1944-SGBRG10_CSI2P
[0:58:57.090063699] [2076]  INFO RPI vc4.cpp:611 Sensor: /base/soc/i2c0mux/i2c@1/ov5647
@36 - Selected sensor format: 2592x1944-SGBRG10_1X10 - Selected unicam format: 2592x194
4-pGAA
Still capture image received
pi@raspberrypi:~ $
```

5. after the successful run, the camera will take a photo *image.jpg*.

6. Type in "ls" to view the file.

ls

```
pi@raspberrypi:~ $ ls
adeept_adr029     Bookshelf  Documents  Music      startup.sh
adeept_picar-b2   create_ap  Downloads  Pictures   Templates
adeept_rasptank2  Desktop    image.jpg  Public     Videos
pi@raspberrypi:~ $
```

12.5 Q&A

- Metals of the flex cable and camera module should be in contact with each other.

- Metals of the camera module's flex cable and camera connector of the Raspberry Pi should be in contact with each other.
- Check whether the flex cable and camera are good or damaged.

- If you run "sudo killall python3" remotely, the remote login software is stuck. (cannot enter characters in the interface)

A small number of Raspberry Pi will have this situation. When you need to manually run our product program, please close the program that the Raspberry Pi automatically runs. For details, please refer to the penultimate lesson "Configuring Auto-run Program". When you want the Raspberry Pi to boot to be able to control, then start the Raspberry Pi auto-start program.