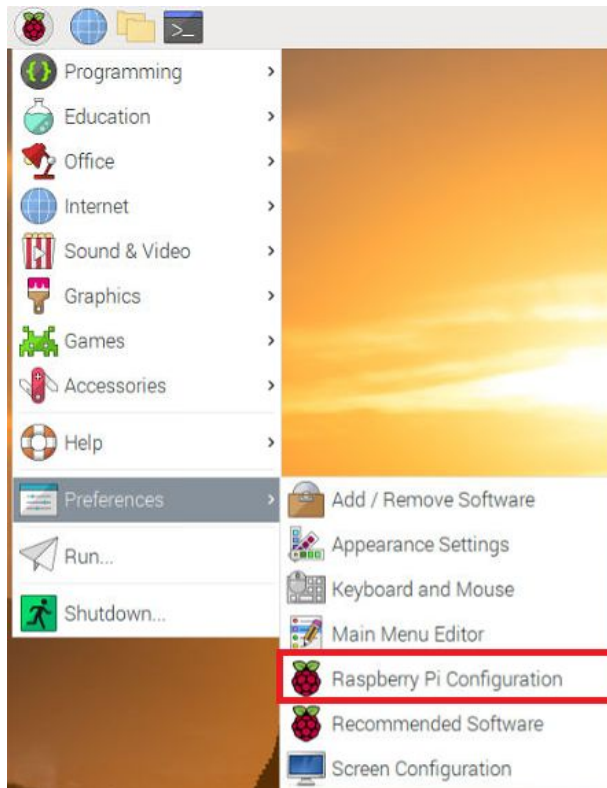
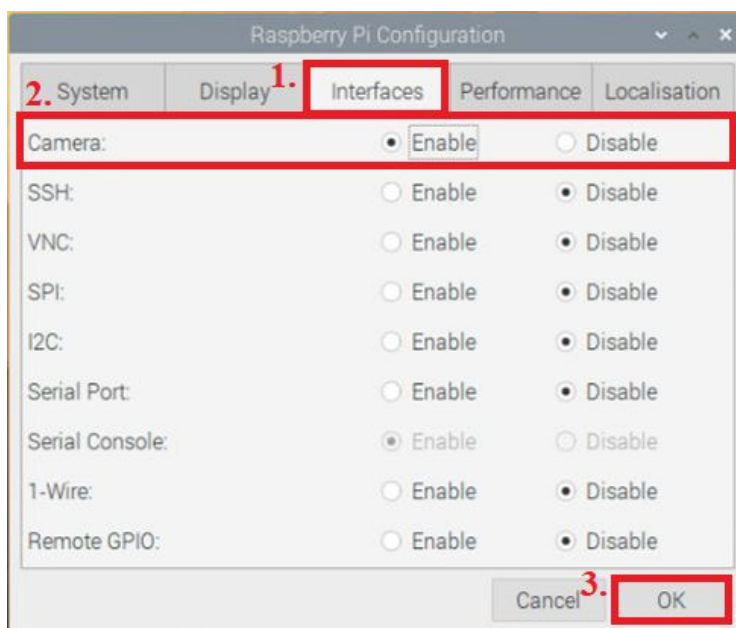


How to use the camera module?

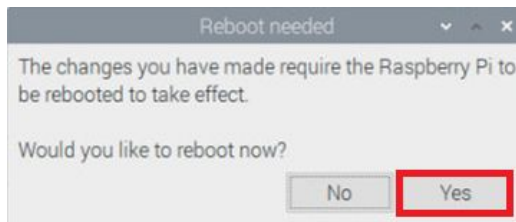
1. Open “**Application Menu**”, Select “**Preferences**” → “**Raspberry Pi Configuration**”.



2. In the “**Raspberry Pi Configuration**” window, click the “**Interfaces**” tab, select “**Enable**” in the “**Camera**” option. Then, click “**OK**”.



3. Select “**Yes**” to reboot the Raspberry Pi. Try to reconnect the TeamViewer **after 5 minutes**.

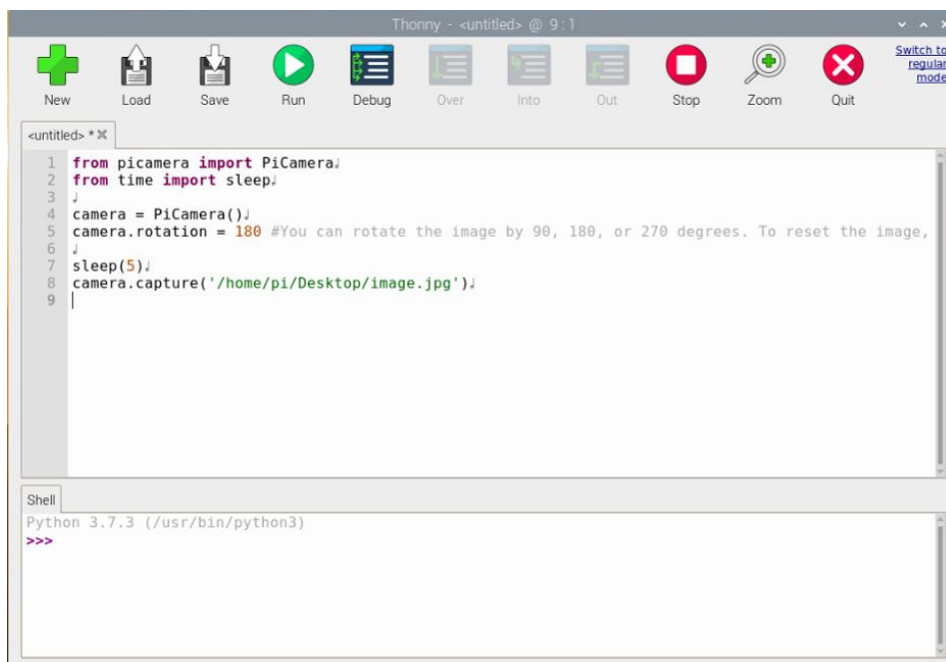


4. Try to take a still picture and save it to the Desktop. Open Thonny Python IDE and copy the following program.

```
from picamera import PiCamera
from time import sleep

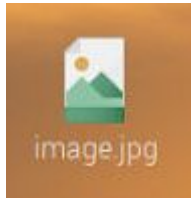
camera = PiCamera()
camera.rotation = 180 #You can rotate the image by 90,
180, or 270 degrees. To reset the image, set rotation to
0 degrees.

sleep(5)
camera.capture('/home/pi/Desktop/image.jpg')
```

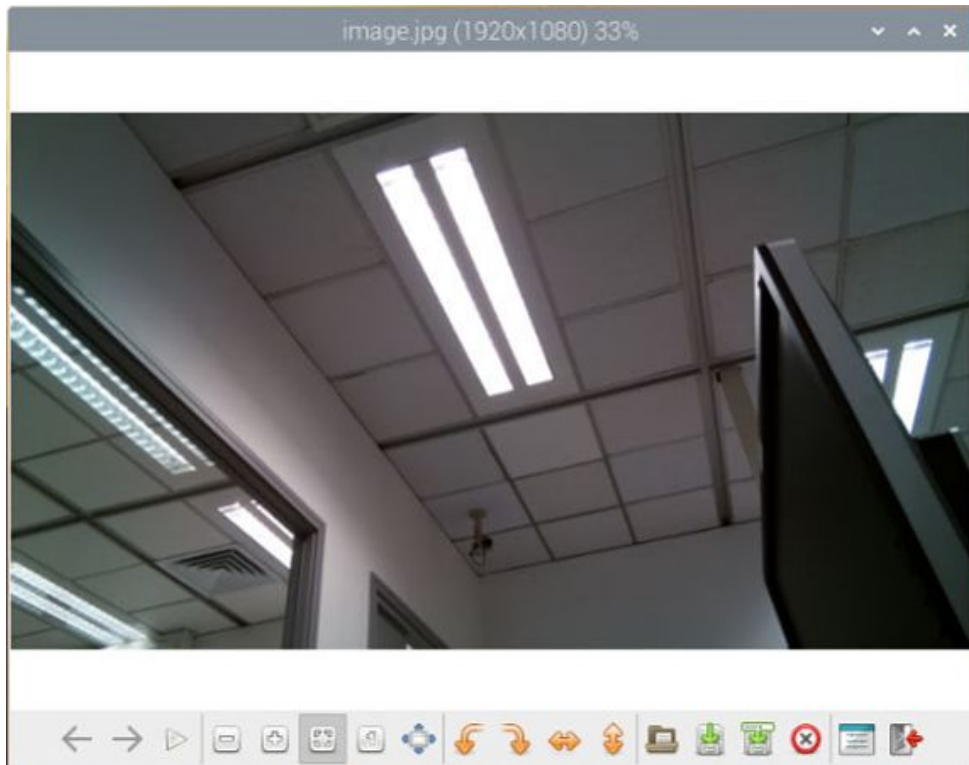


5. Save the program and name it `camera.py`.

6. Click “**Run**”. After **five second**, you will see a file named `image.jpg` appear on your Desktop.



7. Double click the icon to open the file. You will see a photo of the lab.



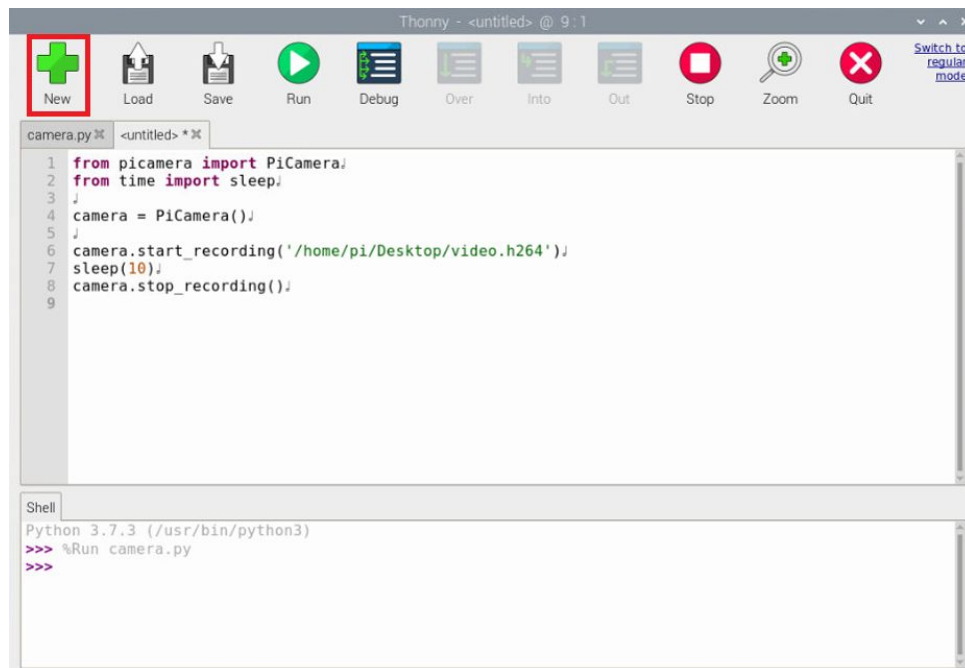
It's important to sleep for **at least two seconds** before capturing an image, because this gives the camera's sensor time to sense the light levels.

8. Try to record a 10 seconds video and save it to the Desktop. Click “**New**” on the top navigation bar of the Thonny Python IDE and copy the following program.

```
from picamera import PiCamera
from time import sleep

camera = PiCamera()

camera.start_recording('/home/pi/Desktop/video.h264')
sleep(10)
camera.stop_recording()
```



9. Save the program and name it `video.py`.
10. Click “**Run**”. Then, you will see a file named `video.h264` appear on your Desktop. After **ten seconds**, the program finish compiling. Open the file and you will see ten seconds footage of the lab.

Noted that the footage maybe **unstable** or **lagging** since you are watching it via the TeamViewer.

11. Try to change the resolution of the image. Click “**New**” on the top navigation bar of the Thonny Python IDE and copy the following program.

```
from picamera import PiCamera
from time import sleep

camera = PiCamera()

camera.resolution = (2592, 1944)
camera.framerate = 20

sleep(5)
camera.capture('/home/pi/Desktop/max.jpg')
```

12. Save the program and name it `max_image.py`.
13. Click “**Run**”. After **five second**, you will see a file named `max.jpg` appear on your Desktop.
14. Compare `max.jpg` with `image.jpg`, click the “**Original Size**” button at the bottom in both images, you can observe the difference between them.



Noted that the maximum resolution is **2592×1944** for still photos, and **1920×1080** for video recording. The minimum resolution is **64×64**. You also need to set the frame rate to 20 to enable this maximum resolution.