

How to Stream Video and Take Pictures with Raspberry Pi

[Alex](#): June 24, 2019

Table of Contents

Preface	1
Required Materials	1
Optional Materials	1
Steps.....	1
Optional Steps.....	5
Device Functions	5

Preface

The goal of this project is to use a Raspberry Pi 3 Model B(+) as a web streaming device that can take pictures during the web stream (does not require an internet connection). A potential drawback is that the image is not taken simultaneously with the stream; therefore, the web stream is momentarily shut off (< 3 seconds) while the Raspberry Pi snaps a photo. After the picture is taken the stream is started again—the user simply refreshes the webpage to see the web stream again.

Here is a demo (and video tutorial) of this project: https://youtu.be/gqv1_-f2H98.

Required Materials

1. Raspberry Pi 3 Model B(+)
2. Raspberry Pi Camera (V1 or V2)
3. USB Thumb Drive
4. Wi-Fi Enabled Device (e.g. smartphone, laptop, tablet, etc.)
5. Ethernet Cable (connected to Wi-Fi router)
6. Mouse (preferably wireless)
7. Keyboard
8. Internet Connection

Optional Materials

1. Power Bank/External Power Supply
2. Micro USB Cable

Steps

1. Before we get started.
 - a. This tutorial begins with a fresh install of [*Raspbian with Recommended Software*](#).

- i. This OS image comes with pre-installed software and modules that are used in this tutorial.
 - ii. Issues may arise if you do not have the correct modules for the python scripts.
 1. Be sure to install libraries that you do not have (*See Step 7*)
2. Download the python scripts.
 - a. Download the python scripts and save them on a USB thumb drive.
 - i. Python scripts: `live.py`, `mouse.py`, `findDeviceName.py`
 - b. Transfer and save the files onto the Raspberry Pi. *You can save the files wherever you like (please read steps 2.b.i and 2.b.i.1).*
 - i. The python scripts have file paths that assume `live.py` and `mouse.py` are in the directory of `/home/pi/Documents`.
 1. If you do not save the files in this directory, then you will need to update the file paths in the python scripts (*See Step 8*)
3. Update the Pi.
 - a. It is always good to update the Raspberry Pi before any project.
 - b. Open the command line and run the following command:
 - i. `sudo apt-get update && apt-get upgrade -y`
4. Connect and enable the Raspberry Pi Camera.
 - a. Connect the Raspberry Pi Camera to the Raspberry Pi (*See Figure 1*).



Figure 1: Raspberry Pi Camera connected to Raspberry Pi 3 Model B(+).

- b. Go to the Raspberry Pi's configuration settings by running the following command:
 - i. `sudo raspi-config`
 - c. Go to *Interfacing Options* and *Enable* camera.
 - i. After the camera is enabled, exit the configuration options and reboot the Raspberry Pi.
5. Install evdev module.
 - a. Run the following command lines:
 - i. `sudo apt-get install python-dev`
 - ii. `sudo apt-get install python-pip`
 - iii. `sudo pip3 install evdev`
6. Find your device.

- a. In order to take a picture, we need a controller or a button to tell the Raspberry Pi to take a picture; therefore, in this tutorial, we are using a Logitech Bluetooth mouse (left-mouse-click) to take a picture.
 - i. You can use any device you want, but you will need to change some of the python scripts (See Steps 6.b and 8).
 - b. From the files you downloaded, run `findDeviceName.py`.
 - i. In the console, it should output a *1 by 3 array*. The second element (index 1) is the only information we are concerned about.
 - ii. Find your device name in the second element of the arrays.
 1. Note: If you have multiple devices plugged in, then you will see an array for each device, where the name of the corresponding device is in the second element of the array. Find the device name of the device you are using to take a picture (e.g. mouse, keyboard, gamepad, etc.).
 - iii. Write down or remember the device name. You will need this to update the python script for your device.
7. Check libraries.
 - a. As said earlier, you must have all the libraries and modules that are listed in the python scripts.
 - b. To check that you have all the correct libraries installed, create a new python script and copy and paste the modules into that script.
 - i. The script does not need a specific title; we are just checking if there are any errors with any of the modules.
 - c. Run the script.
 - i. If there are no errors, then proceed to *Step 8*.
 - ii. If there are errors, then you need to install that specific module. Google and YouTube are your best friends.
 - iii. If there are errors **and** you believe you have installed all the modules, then be sure to run the script with the python3 interpreter (since some modules require python 3).
 1. Go to the script file location (e.g. `cd /home/pi/Documents`).
 - a. `cd /home/pi/Documents`
 2. Run the script with python3 interpreter.
 - a. `python3 enter_script_name.py`
8. Update python scripts:
 - a. Open `live.py`.
 - i. Change the variable, `ipath`, to the file location of `live.py`.
 1. This may not be necessary if you saved `live.py` in **`/home/pi/Documents`**.
 2. `ipath` is located on line 28.
 - ii. Change the variable, `devData[1]`, to the name of the device you are using.
 1. For example: `` name "Logitech M325"'`
 2. `devData[1]` is located on **line 47**.
 - b. Open `mouse.py`.
 - i. Change the variable, `ipath`, to the file location of `live.py`.

1. `ipath` is located on **line 16**.
 - ii. Change the variable, `devData[1]`, to the name of the device you are using.
 1. For example: `` name "Logitech M325" ``
 2. `devData[1]` is located on **line 37**.
 - iii. Change the name of the USB thumb drive.
 1. For example: ``/media/pi/4GB DRIVE/*.jpg``
 - a. Change **4GB DRIVE** to the name of your USB thumb drive.
 2. This is located on **line 65** and **line 88**.
 - iv. **If you are using another device other than a keyboard or mouse, then you much change the event codes to match the inputs of your device. You will have to Google and find these event codes.**
9. Use the Raspberry Pi as a local hotspot.
 - a. I will be using the following video as a reference to create a Wi-Fi hotspot:
 - i. <https://www.youtube.com/watch?v=XgcDipALFOc>
 - b. Connect the Raspberry Pi to your router with an ethernet cable.
 - c. Run the following the commands:
 - i. `Sudo apt install network-manager network-manager-gnome openvpn \openvpn-systemd-resolved network-manager-openvpn \network-manager-openvpn-gnome`
 - ii. `sudo apt purge openresolv dhcpcd5`
 - iii. `sudo ln -sf /lib/systemd/resolv.conf /etc/resolv.conf`
 - d. Right click the task bar.
 - i. Go to panel settings.
 - ii. Go to panel applets.
 - iii. Select *Wired & Wired Network* and **remove**.
 - iv. Select *Spacer* and **remove**.
 - v. Close.
 - e. Reboot the Raspberry Pi.
 - f. Right click the *wired connection symbol*.
 - i. Click on *Edit Connections*.
 - ii. Click Add.
 - iii. Select *Wi-Fi*.
 - iv. Enter a *Connection Name*.
 - v. Enter a *SSID*.
 - vi. Change *Mode* to **Hotspot**.
 - vii. Go to *Wi-Fi Security*.
 - viii. Select *WPA & WPA2 Personal*.
 - ix. Enter a *password*.
 - x. Save, close, and reboot.
10. Connect to the web stream through the Raspberry Pi's IP address.
 - a. Find IP address.
 - i. Run the following command:
 1. `ifconfig`
 2. In the console, it should list an IP address that looks like 10.42.0.1. This will be used to connect to the Raspberry Pi.

- b. On another wifi enabled device, connect to the wifi hotspot.
 - i. Be sure to enter the password you used to setup the hotspot on the Raspberry Pi.
 - ii. You do not need to be connected to the internet for this to work.
 - c. On another Wi-Fi enabled device (e.g. smartphone, laptop, tablet, etc.), open a web browser and type in the following web address.
 - i. <https://10.42.0.1:8000>
 1. If your IP address is not 10.42.0.1, then use the one found when using *ifconfig* (Step 10.a.i).
 2. The webpage will display the web stream on the camera.
11. More optional steps.
- a. Your Raspberry Pi should be fully configured to web stream and take picture.
 - b. Please go to **Device Functions** to see how to operate the device.
 - c. Proceed to **Optional Steps** if you want to make the Raspberry Pi more mobile (e.g. put the Raspberry Pi onto a RC car).

Optional Steps

1. Auto run the scripts at boot up.
 - a. Run the following command:
 - i. `sudo crontab -e`
 1. If prompted, then run *nano* by pressing 2.
 - ii. Go to last line of the script and type the following command:
 1. `@reboot python3 /home/pi/Documents/live.py`
 - a. If the live.py script is not in the *documents* folder, then please update the command with the correct path of the file.
 - iii. Save the file and exit.
 - iv. Now, whenever you reboot the Raspberry Pi the web stream will immediately begin, and the Raspberry Pi will be hearing for mouse clicks.

Device Functions

- A. How do I start the live stream?
 - a. Run `live.py`.
 - b. If you configured the Raspberry Pi to run live.py during boot up, then turn on your Raspberry Pi.
- B. How do I connect to the Raspberry Pi?
 - a. Go onto your Wi-Fi enabled device (e.g. smartphone, laptop, tablet, etc.), and connect to the Wi-Fi hotspot.
 - b. Once connected, open a web browser and type in the IP address into the web address.
- C. How do I take a picture?
 - a. Make sure the correct USB thumb drive is connected to the Raspberry Pi (Step 8.b.iii).
 - b. Once `live.py` is running, press the mouse's left-mouse-button.
 - c. The stream will stop when a picture is taken. Refresh the page to continue the live stream.
- D. How do turn off the Raspberry Pi?

- a. Depending if you **did not** change the device from a mouse or edited the even codes in `mouse.py`, then the middle-mouse-button will properly shut down the device without corrupting files or the USB thumb drive.
 - b. The green LED on the motherboard of the Raspberry Pi will blink 10 times before being fully off. A red LED next to the green LED should remain on.
- E. How do I access the images?
 - a. Once the Raspberry Pi is properly off, remove the USB thumb drive and connect it to a computer.
 - b. Open the USB thumb drive on the computer and all the images taken will be labeled numerically starting from 1 or will continue from the last highest number.
- F. Can I have more than one device watching the live stream?
 - a. Yes, but I would not recommend more than two devices. More than two devices may affect the latency of the stream, but feel free to find your sweet-spot for the number of devices connected to the stream.