Note: the content below is copied from https://hada-tech.com/index.php/2020/06/07/live-stream-usb-camera-with-raspberry-pi/

Introduction

This tutorial shows how to setup an USB webcam with Raspberry Pi, which can be used as a surveillance or monitoring live streaming camera. For this tutorial, any USB camera including webcams can be used.

In our example I have used an old webcam from Philips.

Prerequisites

- Raspberry pi 3 inclusive microSDHC 8GB (at least) and Micro USB Power Adapter 2A – 5V .
- ssh access to the raspberry pi is available, or connect the raspberry pi to a Screen or TV using HDMI cable in order to see the commands run for the installation.
- USB mouse and keyboard.
- Raspbian operating system installed on the microSDHC. Usually, Raspbian should be already installed on the microSDHC card, if purchased together with Raspberry Pi. If it is not the case, you can install it like described in this link.
- USB webcam or any other camera which is supporting Linux operating system.

Prepare raspberry pi for camera live stream

First, we have to update and upgrade the packages in the raspberry pi. For that, swichto the root user and update the system using the following commands:

sudo su

```
pi@raspberrypi:~ $ sudo su
```

apt-get update && apt-get upgrade

```
root@raspberrypi:/home/pi# apt-get update && apt-get upgrade
```

Install the tool "Motion" by using the following command. This tool makes the livestream possible in raspberry pi.

apt-get install motion -y

```
root@raspberrypi:/home/pi# apt-get install motion -y
```

The installation takes several minutes.

If not yet done, connect the camera to the raspberry pi.

If an USB camera is used, the following command can be used to check if the camera is recognized by the raspbian operating system: lsusb

```
root@raspberrypi:/home/pi# lsusb
```

If the USB camera is shown in the output of “lsusb” command, the camera is recognized correctly. This is the case for the used USB webcam from Philips:

```
Bus 001 Device 004: ID 1a86:e2e3 QinHeng Electronics
Bus 001 Device 008: ID 0471:0325 Philips (or NXP) SPC 200NC PC Camera
Bus 001 Device 003: ID 0424:ec00 Standard Microsystems Corp. SMSC9512/9514 Fast Ethernet Adapter
Bus 001 Device 002: ID 0424:9514 Standard Microsystems Corp. SMC9514 Hub
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
```

Run the following command to load the driver for automatically detected hardware. In many cases, this command is not necessary if the driver is already loaded by the system automatically.

modprobe bcm2835-v4l2

```
root@raspberrypi:/home/pi# modprobe bcm2835-v4l2
```

Live Stream Configuration of raspberry pi

Bofore starting with the configuration of the live stream, we have to get some data of our camera using the following command

v4l2-ctl -V

```
root@raspberrypi:/home/pi# v4l2-ctl -V
```

For the used Philips webcam, the following data is displayed:

```
root@raspberrypi:/home/pi# v4l2-ctl -V
Format Video Capture:
        Width/Height      : 352/288
        Pixel Format      : 'JPEG'
        Field             : None
        Bytes per Line    : 352
        Size Image        : 38606
        Colorspace        : JPEG
        Transfer Function : Default
        YCbCr/HSV Encoding: Default
        Quantization      : Default
        Flags             :
root@raspberrypi:/home/pi#
```

Now, we can edit the configuration file “/etc/motion/motion.conf” using nano command or any other editor:

nano /etc/motion/motion.conf

```
root@raspberrypi:/home/pi# nano /etc/motion/motion.conf
```

and make the following changes in the configuration file:

```
# Start in daemon (background) mode and release terminal (default: off)
daemon on
```

```
# Restrict stream connections to localhost only (default: on)
stream_localhost off
```

```
# Target base directory for pictures and films
# Recommended to use absolute path. (Default: current working directory)
target_dir /home/pi/motion
```

Depending on the data of the used camera which have been got above, the following parameters have to be changed in the opened motion configuration file.

```
# to capture from those supported by your videodevice. (default: 17)
# E.g. if your videodevice supports both V4L2_PIX_FMT_SBGGR8 and
# V4L2_PIX_FMT_MJPEG then motion will by default use V4L2_PIX_FMT_MJPEG.
# Setting v4l2_palette to 2 forces motion to use V4L2_PIX_FMT_SBGGR8
# instead.
#
# Values :
# V4L2_PIX_FMT_SN9C10X : 0  'S910'
# V4L2_PIX_FMT_SBGGR16 : 1  'BYR2'
# V4L2_PIX_FMT_SBGGR8  : 2  'BA81'
# V4L2_PIX_FMT_SPCA561 : 3  'S561'
# V4L2_PIX_FMT_SGBRG8  : 4  'GBRG'
# V4L2_PIX_FMT_SGRBG8  : 5  'GRBG'
# V4L2_PIX_FMT_PAC207  : 6  'P207'
# V4L2_PIX_FMT_PJPG    : 7  'PJPG'
# V4L2_PIX_FMT_MJPEG   : 8  'MJPEG'
# V4L2_PIX_FMT_JPEG    : 9  'JPEG'
# V4L2_PIX_FMT_RGB24   : 10 'RGB3'
# V4L2_PIX_FMT_SPCA501 : 11 'S501'
# V4L2_PIX_FMT_SPCA505 : 12 'S505'
# V4L2_PIX_FMT_SPCA508 : 13 'S508'
# V4L2_PIX_FMT_UYVY    : 14 'UYVY'
# V4L2_PIX_FMT_YUYV    : 15 'YUYV'
# V4L2_PIX_FMT_YUV422P : 16 '422P'
# V4L2_PIX_FMT_YUV420  : 17 'YU12'
#
v4l2_palette 9
```

```
# Image width (pixels). Valid range: Camera dependent, default: 352
width 352
```

```
# Image height (pixels). Valid range: Camera dependent, default: 288
height 288
```

```
# Maximum number of frames to be captured per second.
# Valid range: 2-100. Default: 100 (almost no limit).
framerate 5
```

If using nano editor, “Ctrl”, “o” then “ENTER” to save the changes, and “Ctrl”, “x” to exit the editor.

Now, we have to start the motion daemon, by opening the file “/etc/default/motion” and set “start_motion_daemon” to “yes” as in the following screenshot:

nano /etc/default/motion

```
root@raspberrypi:/home/pi# nano /etc/default/motion
```

```
# set to 'yes' to enable the motion daemon
start_motion_daemon=yes
```

Save and exit the editor.

Now, we have to create the target directory configured above and give it the necessary permissions to work correctly with the “Motion” tool.

mkdir /home/pi/motion

```
root@raspberrypi:/home/pi# mkdir /home/pi/motion/
```

chgrp motion /home/pi/motion

```
root@raspberrypi:/home/pi# chgrp motion /home/pi/motion
```

chmod g+rwx /home/pi/motion

```
root@raspberrypi:/home/pi# chmod g+rwx /home/pi/motion
```

Now, we can start the service using the following command

service motion start

```
root@raspberrypi:/home/pi# service motion start
```

Testing of the camera live streaming.

Open a web browser and open the following address if you did’nt changed the hostname and the port number in the configuration file:

http://raspberrypi:8081/

The following screenshot is showing the image displayed on the live stream video done by the used webcam from Philips. This camera is a very old model. If you use a newer model, you can get a better live straming quality.

To access the camera live streaming from outside of the LAN (Local Area Network), you need a DNS service provider like noip or dyndns … if the router does not have a static IP address