

How to set up a motion detection webcam in Ubuntu

Motion is a useful tool that can turn a regular webcam into a surveillance camera. It does this by monitoring the signal from the webcam and taking photos and videos when motion is detected.

The following article will show you how to install Motion and set up a motion detection webcam in Ubuntu Linux.

Install Motion Server

By default, Motion is included in the official Ubuntu repository. This means you can install this program through your apt package manager:

```
sudo apt install motion v4l-utils
```

Note : We mention Ubuntu in this article, but Motion will also work with most Linux distributions.

Confirm that Motion Server is working properly by opening the program's help prompt:

```
motion -h
```

Configure Motion for the system

Before starting to configure Motion, it is necessary to copy the configuration file to the Home folder to have a clean backup of the original. Open Terminal and copy the configuration file to the Home folder:

```
cp /etc/motion/motion.conf ~/motion.conf.backup
```

Open the root configuration with your favorite editor:

```
sudo nano /etc/motion/motion.conf
```

One of the easiest adjustments you can make to your Motion Server is to change the image and video output quality. By default, the server sets the resolution at 640×480, which may be too small for modern webcams.

To change this, run the following command in the new terminal to check the available resolutions for the camera:

```
sudo v4l2-ctl -d /dev/video0 --list-formats-ext
```

```
ramces@mte-ubuntu-desktop: ~  
ramces@mte-ubuntu-desktop:~$ sudo v4l2-ctl -d /dev/video0 --list-formats-ext  
ioctl: VIDIOC_ENUM_FMT  
Type: Video Capture  
  
[0]: 'MJPG' (Motion-JPEG, compressed)  
Size: Discrete 1920x1080  
Interval: Discrete 0.033s (30.000 fps)  
Size: Discrete 1280x720  
Interval: Discrete 0.033s (30.000 fps)  
Size: Discrete 1024x768  
Interval: Discrete 0.033s (30.000 fps)  
Size: Discrete 800x600  
Interval: Discrete 0.033s (30.000 fps)  
Size: Discrete 640x480  
Interval: Discrete 0.033s (30.000 fps)  
Size: Discrete 320x240  
Interval: Discrete 0.033s (30.000 fps)  
[1]: 'YUYV' (YUYV 4:2:2)  
Size: Discrete 1920x1080  
Interval: Discrete 0.200s (5.000 fps)  
Size: Discrete 1280x720  
Interval: Discrete 0.100s (10.000 fps)  
Size: Discrete 800x600  
Interval: Discrete 0.050s (20.000 fps)
```

Back in the Motion configuration, scroll down to the 'Image Processing' category, then find both the width and height variables.

```
ramces@mte-ubuntu-desktop: ~  
GNU nano 7.2 /etc/motion/motion.conf *  
#####  
# Image Processing configuration parameters  
#####  
# Image width in pixels.  
width 640  
# Image height in pixels.  
height 480
```

Provide appropriate values ??for the desired resolution. In the example case, I want to run Motion at 1280x720, so the author entered '1280' as the width and '720' as the height.

```
ramces@mte-ubuntu-desktop: ~  
GNU nano 7.2 /etc/motion/motion.conf *  
#####  
# Image Processing configuration parameters  
#####  
# Image width in pixels.  
width 1280  
# Image height in pixels.  
height 720
```

Set the framerate value to the frame rate at which you want to record video. By default, this value is set to '15' but you can lower this value to save disk space.

```
ramces@mte-ubuntu-desktop: ~
GNU nano 7.2 /etc/motion/motion.conf *
#####
# Image Processing configuration parameters
#####
# Image width in pixels.
width 1280
# Image height in pixels.
height 720
# Maximum number of frames to be captured per second.
framerate 15
```

Scroll down to the 'Picture output' category, then set the value of the **picture_output** variable to 'on'. This will allow Motion to capture both images and video from the webcam.

```
ramces@mte-ubuntu-desktop: ~
GNU nano 7.2 /etc/motion/motion.conf *
#####
# Picture output configuration parameters
#####
# Output pictures when motion is detected
picture_output on
# File name(without extension) for pictures relative to target directory
picture_filename %Y%m%d%H%M%S-%q
```

Change default save location

Another adjustment you can make to Motion Server is to change where data is saved. This can be useful if you want to export your captured videos and images to a mounted remote folder or a cloud storage service like Dropbox.

To get started, navigate to or create the folder you want to save your data in:

```
sudo mkdir /motion/data
```

Set folder ownership to 'motion:adm':

```
sudo chown -R motion:adm /motion/data
```

Make sure that the entire path to the folder is readable by all users:

```
sudo chmod -R 755 /motion/data
```

Back in the Motion configuration, find the `target_dir` variable, then set its value to the full path in the directory.

```
ramces@mte-ubuntu-desktop: ~
GNU nano 7.2 /etc/motion/motion.conf
# Start in Setup-Mode, daemon disabled.
setup_mode off

# File to store the process ID.
; pid_file value

# File to write logs messages into. If not defined stderr and syslog is used.
log_file /var/log/motion/motion.log

# Level of log messages [1..9] (EMG, ALR, CRT, ERR, WRN, NTC, INF, DBG, ALL).
log_level 6

# Target directory for pictures, snapshots and movies
target_dir /motion/data

# Video device (e.g. /dev/video0) to be used for capturing.
video_device /dev/video0
```

Fine-tune detection settings in Motion

Motion works by looking at the difference between the current video feed and the feed immediately before. If the program finds enough difference between the two, it classifies it as 'motion' and records a video of the event.

Currently, Motion assumes that a difference of 1500 pixels is enough to classify as 'motion'. While this makes it easy for most webcams to detect motion, it can be too sensitive for higher resolution cameras.

To alleviate this, go to the 'Motion Detection' category, then increase the value of the threshold variable. 5500 pixels is enough to prevent Motion from recording unnecessary small movements from the webcam feed.

```
ramces@mte-ubuntu-desktop: ~
GNU nano 7.2 /etc/motion/motion.conf *
#####
# Motion detection configuration parameters
#####

# Always save pictures and movies even if there was no motion.
emulate_motion off

# Threshold for number of changed pixels that triggers motion.
threshold 5500
```

You can also add a `threshold_maximum` variable to set a limit on the amount of difference that Motion considers 'motion'. This is useful if the webcam is covering a crowded area and you only want it to run when there is less activity.

If you're not sure about the `threshold` and `threshold_maximum` values ??for your webcam, you can let Motion adjust it for you. To do that, add the variable `threshold_tune` and set it to 'on'.

```
ramces@mte-ubuntu-desktop: ~
GNU nano 7.2 /etc/motion/motion.conf *
#####
# Motion detection configuration parameters
#####

# Always save pictures and movies even if there was no motion.
emulate_motion off

# Threshold for number of changed pixels that triggers motion.
threshold 5500
threshold_maximum 25000
threshold_tune on

# Noise threshold for the motion detection.
; noise_level 32
```

Finally, you can configure Motion to record the moments before and after motion is detected. To do that, go to the `pre_capture` and `post_capture` variables and set their values ??to the number of additional frames you want to save.

```
ramces@mte-ubuntu-desktop: ~
GNU nano 7.2 /etc/motion/motion.conf *
# Despeckle the image using (E/e)rode or (D/d)ilate or (l)abel.
despeckle_filter EedDl

# Number of images that must contain motion to trigger an event.
minimum_motion_frames 1

# Gap in seconds of no motion detected that triggers the end of an event.
event_gap 60

# The number of pre-captured (buffered) pictures from before motion.
pre_capture 10

# Number of frames to capture after motion is no longer detected.
post_capture 10
```

Enable the Motion web interface

Motion server comes with a web interface that allows remote webcam monitoring. To enable this feature, go to the **'Webcontrol'** section of the configuration, then set the value of the `webcontrol_localhost` variable to 'off'.

Scroll down to the 'Live stream' section, then set the value of `stream_localhost` to 'off'.

```
ramces@mte-ubuntu-desktop: ~
GNU nano 7.2 /etc/motion/motion.conf

# Port number used for the webcontrol.
webcontrol_port 8080

# Restrict webcontrol connections to the localhost.
webcontrol_localhost off

# Type of configuration options to allow via the webcontrol.
webcontrol_parms 0

#####
# Live stream configuration parameters
#####

# The port number for the live stream.
stream_port 8081

# Restrict stream connections to the localhost.
stream_localhost off

^G Help      ^O Write Out  ^W Where Is   ^K Cut        ^T Execute
^X Exit      ^R Read File  ^\ Replace    ^U Paste      ^J Justify
```

Note : Motion does not have any validation checks for its web interface. Therefore, anyone who knows your Motion Server address can view the webcam and control the service.

Manage saved photos remotely

As mentioned earlier, it is best to save the image to a Dropbox folder so it can be accessed anywhere you want. However, if you want to upload images to your own file server (via FTP), you can use the wput command to upload images:

```
sudo apt install wput
```

Open the Motion Server configuration, then insert the following lines of code at the end of the file:

```
on_picture_save wput ftp://YOUR-USERNAME:YOUR-PASSWORD@YOUR-SERVER-ADDRESS %f on_
```

```
ramces@mte-ubuntu-desktop: ~
GNU nano 7.2 /etc/motion/motion.conf

#####
# Script execution configuration parameters
#####

# Command to be executed when an event starts.
; on_event_start value

# Command to be executed when an event ends.
; on_event_end value

# Command to be executed when a movie file is closed.
on_picture_save wput ftp://ramces:my-password@100.88.11.26 %f
on_movie_end wput ftp://ramces:my-password@100.88.11.26 %f
```

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