Reference: https://github.com/raspberrypi/userland/blob/master/host_applications/linux/apps/raspicam/RaspiCamDocs.odt

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RaspiCam Documentation

There are three applications provided, raspistill, raspivid and raspistillyuv.

raspistill and raspistillyuv are very similar and are intended for capturing images, raspivid is for capturing video.

The applications use up to four OpenMAX(mmal) components - camera, preview, encoder

and null_sink. All applications use the camera component, raspistill uses the Image Encode component, raspivid uses the Video Encode component and raspistillyuv does not use an encoder, and sends its YUV or RGB output direct from camera component to file.

The preview display is optional, but can be used full screen or directed to a specific rectangular area on the display.

If preview is disabled, the null_sink component is used to 'absorb' the preview frames. It is necessary for the camera to produce preview frames even if not required for display, as they are used for calculating exposure and white balance settings.

In addition it is possible to omit the filename option, in which case the preview is displayed but no file is written, or to redirect all output to

stdout.

Command line help is available by typing just the application name in on the command line.

Common Command line Options

Preview Window

--preview, -p Preview window settings <'x,y,w,h'>

Allows the user to define the

size and location on the screen that the preview window will be placed. Note this will be superimposed over the top of any other windows/graphics.

--fullscreen, -f Fullscreen preview mode

Forces the preview window to use the whole screen. Note that the aspect ratio of the incoming image will be retained, so there may be bars on some edges.

--nopreview, -n,Do not

display a preview window

Application specific settings

raspistill

--width, -w Set image width <size>
--height, -h Set image height <size>
--quality, -q Set jpeg quality <0 to 100>

Quality 100 is almost

completely uncompressed. 75 is a good all round value

--raw, -r Add raw bayer data to jpeg metadata

This option inserts the raw Bayer data from the camera in to the JPEG metadata

--output-o Output filename <filename>.

Specify the output filename. If not specified, no file is saved. If the filename is '-', then all output

is sent to stdout.

--latest -l Link latest frame to filename <filename>

Make a file system link under this name to the latest frame.

--verbose, -v Output verbose information during run

Outputs debugging/information messages during the program run.

--timeout, -t Time before

takes picture and shuts down.

The program will run for this length of time, then take the capture (if output is specified). If not specified, this is set to 5 seconds.

--timelapse, -tl Timelapse mode.

The specific value is the time between shots in milliseconds. Note you should specify %04d at the point in the filename where you want a frame count

number to appear. e.g.

-t 30000 -tl 2000 -o image %04d.jpg

will produce a capture every 2 seconds, over a total period of 30s, named image1.jpg, image0002.jpg..image0015.jpg. Note that the %04d indicates a 4 digit number with leading zero's added to pad to the required number of digits. So, for example, %08d would result in an 8 digit number.

If a timelapse value of 0 is entered, the application will take pictures as fast as possible. Note there is an minimum enforced pause of 30ms between captures to ensure that exposure calculations can be made.

--thumb, -th Set thumbnail parameters (x:y:quality)

Allows specification of the thumbnail image inserted in to the JPEG file. If not specified, defaults are a size of 64x48 at

quality 35.

if '--thumb none' is specified, no thumbnail information will be placed in the file. This reduces the file size slightly.

--demo, -d Run a demo mode <milliseconds>

This options cycles through range of camera options, no capture is done, the demo will end at the end of the timeout period, irrespective of whether all the options have been cycled.

The time between cycles should be specified as a millisecond value.

--encoding, -e Encoding to use for output file

Valid options are jpg, bmp, gif and png. Note that unaccelerated image types (gif, png, bmp) will take much longer to save than JPG which is hardware accelerated. Also note that the filename suffix is completely ignored when deciding the encoding of a file.

--exif, -x EXIF tag to apply to captures (format as 'key=value')

Allows the insertion of specific exif tags in to the JPEG image. You can have up to 32 exif tge entries. This is useful for things like adding GPS metadata. For example, to set the Longitude

--exif GPS.GPSLongitude=5/1,10/1,15/100

would set the Longitude to 5degs, 10 minutes, 15 seconds. See exif documentation for more details on the range of tags available; the supported tags are as follows.

IFD0.< or
IFD1.<
ImageWidth, ImageLength, BitsPerSample, Compression, PhotometricInterpretation, ImageDescription, Make, Model, StripOffsets, Orientation, SamplesPerPixel, RowsPerString,

StripByteCounts, Xresolution,
Yresolution,
PlanarConfiguration,
ResolutionUnit,
TransferFunction, Software,
DateTime, Artist, WhitePoint,
PrimaryChromaticities,
JPEGInterchangeFormat,
JPEGInterchangeFormatLength,
YcbCrCoefficients,
YcbCrSubSampling,
YcbCrPositioning,
ReferenceBlackWhite,
Copyright>

EXIF.<

ExposureTime, FNumber,
ExposureProgram,
SpectralSensitivity, a
ISOSpeedRatings, OECF,
ExifVersion, DateTimeOriginal,
DateTimeDigitized,
ComponentsConfiguration,
CompressedBitsPerPixel,
ShutterSpeedValue,
ApertureValue,
BrightnessValue,
ExposureBiasValue,
MaxApertureValue,
SubjectDistance,
MeteringMode, LightSource,
Flash, FocalLength,

SubjectArea, MakerNote,
UserComment, SubSecTime,
SubSecTimeOriginal,
SubSecTimeDigitized,
FlashpixVersion, ColorSpace,
PixelXDimension,
PixelYDimension,
RelatedSoundFile, FlashEnergy,
SpacialFrequencyResponse,
FocalPlaneXResolution,
FocalPlaneYResolution,
FocalPlaneResolutionUnit,
SubjectLocation,
ExposureIndex, SensingMethod,
FileSource, SceneType,
CFAPattern, CustomRendered,

ExposureMode,
WhiteBalance,
DigitalZoomRatio,
FocalLengthIn35mmFilm,
SceneCaptureType,
GainControl, Contrast,
Saturation, Sharpness,
DeviceSettingDescription,
SubjectDistanceRange,
ImageUniqueID>

GPS.<
GPSVersionID,
GPSLatitudeRef, GPSLatitude,
GPSLongitudeRef,
GPSLongitude,

GPSAltitudeRef, GPSAltitude,
GPSTimeStamp, GPSSatellites,
GPSStatus, GPSMeasureMode,
GPSDOP, GPSSpeedRef,
GPSSpeed, GPSTrackRef,
GPSTrack,
GPSImgDirectionRef,
GPSImgDirection,
GPSMapDatum,
GPSDestLatitudeRef,
GPSDestLatitude,
GPSDestLongitudeRef,
GPSDestLongitude,
GPSDestBearingRef,
GPSDestBearing,
GPSDestDistanceRef,

GPSDestDistance,
GPSProcessingMethod,
GPSAreaInformation,
GPSDateStamp,
GPSDifferential>

EINT.<
InteroperabilityIndex,
InteroperabilityVersion,
RelatedImageFileFormat,
RelatedImageWidth,
RelatedImageLength>

Note that a small subset of these tags will be set automatically by the camera system, but will be

overridden by any exif options on the command line.

Setting '--exif none' will prevent any EXIF information being stored in the file. This reduces the file size slightly.

--fullpreview, -fp Full Preview mode

This runs the preview windows using the full resolution capture mode. Maximum frames per second in this mode is 15fps and

the preview will have the same field of view as the capture. Captures should happen more quickly as no mode change should be required. This feature is currently under development.

--keypress -k Keypress mode

The camera is run for the requested time (-t), and a captures can be initiated throughout that by pressing the Enter key. Press X then Enter will exit the application before

the timeout is reached. If the timeout is set to 0, the camera will run indefinitely until X then Enter is typed. Using the verbose option (-v) will display a prompt asking for user input, otherwise no prompt is displayed.

--signal -s Signal mode

The camera is run for the requested time (-t), and a captures can be initiated throughout that time by sending a USR1 signal to the camera

process. This can be done using the kill command. You can find the camera process ID using the 'pgrep raspistill' command.

kill -USR1 <process id of raspistill>

raspistillyuv

Many of the options for raspistillyuv are the same as those for raspistill. This section shows the differences.

Unsupported Options:

--exif, --encoding, --thumb, --raw, --quality

Extra Options :

--rgb, -rgb Save uncompressed data as RGB888

This option forces the image to be saved as RGB data with 8 bits per channel, rather than YUV420.

Note that the image buffers saved in raspistillyuv are

padded to a horizontal size divisible by 16 (so there may be unused bytes at the end of each line to make the width divisible by 16). Buffers are also padded vertically to be divisible by 16, and in the YUV mode, each plane of Y,U,V is padded in this way.

Examples

Still captures

By default, captures are done at the highest resolution supported by the sensor. This can be changed using the -w and -h command line options.

Taking a default capture after 2s (note times are specified in milliseconds) on viewfinder, saving in image.jpg

```
raspistill -t 2000 -o image.jpg
```

Take a capture at a different resolution.

```
    raspistill -t 2000 -o image.jpg
-w 640 -h 480
```

Now reduce the quality considerably to reduce file size

```
    raspistill -t 2000 -o image.jpg
-q 5
```

Force the preview to appear at coordinate 100,100, with width 300 and height 200 pixels.

```
    raspistill -t 2000 -o image.jpg
-p 100,100,300,200
```

Disable preview entirely

raspistill -t 2000 -o image.jpg -n

Save the image as a png file (lossless compression, but slower than JPEG). Note that the filename suffix is ignored when choosing the image encoding.

raspistill -t 2000 -o image.png –e png

Add some EXIF information to

the JPEG. This sets the Artist tag name to Boris, and the GPS altitude to 123.5m. Note that if setting GPS tags you should set as a minimum GPSLatitude, GPSLatitudeRef, GPSLongitude, GPSLongitudeRef, GPSAltitude and GPSAltitudeRef.

```
raspistill -t 2000 -o image.jpg -x IFDO.Artist=Boris -x GPS.GPSAltitude=1235/10
```

Set an emboss style image effect

raspistill -t 2000 -o image.jpg -ifx emboss

Set the U and V channels of the YUV image to specific values (128:128 produces a greyscale image)

raspistill -t 2000 -o image.jpg -cfx 128:128

Run preview ONLY for 2s, no saved image.

raspistill -t 2000

Take timelapse picture, one every 10 seconds for 10 minutes (10 minutes = 600000ms), named image_num_001_today.jpg, image_num_002_today.jpg onwards, with the latest picture also available under the name latest.jpg.

```
raspistill -t 600000 -tl 10000 -o image_num_%03d_today.jpg -l latest.jpg
```

Take a picture and send image data to stdout

raspistill -t 2000 -o -

Take a picture and send image data to file

raspistill -t 2000 -o - > my_file.jpg

Run camera forever, taking a picture when Enter is pressed

raspistill -t 0 -k -o my_pics %02d.jpg

Video Captures

Image size and preview settings are the same as for stills capture. Default size for video recording is 1080p (1920x1080)

Record a 5s clip with default settings (1080p30)

```
raspivid -t 5000 -o video.h264
```

Record a 5s clip at a specified bitrate (3.5MBits/s)

```
raspivid -t 5000 -o video.h264 -b 3500000
```

Record a 5s clip at a specified framerate (5fps)

```
raspivid -t 5000 -o video.h264 -f 5
```

Encode a 5s camera stream and send image data to stdout

```
raspivid -t 5000 -o -
```

Encode a 5s camera stream and send image data to file

```
raspivid -t 5000 -o - >
```

my_file.h264