RaspiCam Documentation

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This document describes the use of the three Raspberry Pi camera applications as of May 2013.

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.

All the applications are command line driven, written to take advantage of the mmal API which runs over OpenMAX. The mmal API provides an easier to use system than that presented by OpenMAX. Note that mmal is a Broadcom specific API used only on Videocore 4 systems.

The applications use up to three OpenMAX(mmal) components - camera, preview and encoder. 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 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.

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

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Preview Window

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--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

Disables the preview window completely. Note that even though the preview is disabled, the camera will still be producing frames, so will be using power.

Camera Control Options

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--sharpness, -sh Set image sharpness (-100 to 100)

Set the sharpness of the image, 0 is the default.

--contrast, -co Set image contrast (-100 to 100)

Set the contrast of the image, 0 is the default

--brightness, -br Set image brightness (0 to 100)

Set the brightness of the image, 50 is the default. 0 is black, 100 is white.

--saturation, -sa Set image saturation (-100 to 100)

set the colour saturation of the image. 0 is the default.

--ISO, -ISO Set capture ISO

Not yet implemented

--vstab, -vs Turn on video stabilisation

In video mode only, turn on video stabilisation.

--ev, -ev Set EV compensation

Set the EV compensation of the image. Range is -10 to +10, default is 0.

--exposure, -ex Set exposure mode

Possible options are:

off

auto Use automatic exposure mode

night Select setting for night shooting

nightpreview

backlight Select setting for back lit subject

spotlight

sports Select setting for sports (fast shutter etc)

snow Select setting optimised for snowy scenery

beach Select setting optimised for beach

verylong Select setting for long exposures

fixedfps, Constrain fps to a fixed value

antishake Antishake mode

fireworks Select settings

Note that not all of these settings may be implemented, depending on camera tuning.

--awb, -awb Set Automatic White Balance (AWB) mode

off Turn off white balance calculation

auto Automatic mode (default)

sun Sunny mode

cloud Cloudy mode

shade Shaded mode

tungsten Tungsten lighting mode

fluorescent Fluorescent lighting mode

incandescent Incandescent lighting mode

flash Flash mode

horizon Horizon mode

--imxfx, -ifx Set image effect

Set an effect to be applied to the image

none NO effect (default)

negative Negate the image

solarise Solarise the image

posterize Posterise the image

whiteboard Whiteboard effect

blackboard Blackboard effect

sketch Sketch style effect

denoise Denoise the image

emboss Emboss the image

oilpaint Apply an oil paint style effect

hatch Hatch sketch style

gpen

pastel A pastel style effect

watercolour A watercolour style effect

film Film grain style effect

blur Blur the image

saturation Colour saturate the image

colourswap Not fully implemented

washedout Not fully implemented

posterise Not fully implemented

colourpoint Not fully implemented

colourbalance Not fully implemented

cartoon Not fully implemented

--colfx, -cfx Set colour effect <U:V>

The supplied U and V parameters (range 0 to 255) are applied to the U and Y channels of the image. For example, --colfx 128:128 should result in a monochrome image.

--metering, -mm Set metering mode

Specify the metering mode used for the preview and capture

average Average the whole frame for metering.

spot Spot metering

backlit Assume a backlit image

matrix Matrix metering

--rotation, -rot Set image rotation (0-359)

Sets the rotation of the image in viewfinder and resulting image. This can take any value from 0 upwards, but due to hardware constraints only 0, 90, 180 and 270 degree rotations are supported.

--hflip, -hf Set horizontal flip

Flips the preview and saved image horizontally.

--vflip, -vf Set vertical flip

Flips the preview and saved image vertically.

Application specific settings

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raspistill

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--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.

--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 %d at the point in the filename where you want a frame count number to appear. e.g.

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

will produce a capture every 2 seconds, over a total period of 30s, named image1.jpg, image2.jpg..image15.jpg.

--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.

--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 encoding 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.

raspivid

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--width, -w Set image width <size>

Width of resulting video. This should be between 64 and 1920.

--height, -h Set image height <size>

Height of resulting video. This should be between 64 and 1080.

--bitrate, -b Set bitrate.

Use bits per second, so 10MBits/s would be -b 10000000. For H264, 1080p a high quality bitrate would be 15Mbits/s or more.

--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.

--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 5seconds

--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.

--framerate, -fps Specify the frames per second to record

At present, the minimum frame rate allowed is 2fps, the maximum is 30fps. This is likely to change in the future.

--penc, -e Display preview image \*after\* encoding

Switch on an option to display the preview after compression. This will show any compression artefacts in the preview window. In normal operation, the preview will show the camera output prior to being compressed. This option is not guaranteed to work in future releases.

Examples

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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\_number\_1\_today.jpg, image\_number\_2\_today.jpg onwards.

raspistill -t 600000 -tl 10000 -o image\_num\_%d\_today.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

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