

Video Capture Interface

System Message: ERROR/3 (D:\onboarding-resources\sample-onboarding-resources\linux-master\Documentation\userspace-api\media\v4l\linux-master) (Documentation) (userspace-api) (media) (v4l) dev-capture.rst, line 2)

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.. c:namespace:: V4L
```

Video capture devices sample an analog video signal and store the digitized images in memory. Today nearly all devices can capture at full 25 or 30 frames/second. With this interface applications can control the capture process and move images from the driver into user space.

Conventionally V4L2 video capture devices are accessed through character device special files named `/dev/video` and `/dev/video0` to `/dev/video63` with major number 81 and minor numbers 0 to 63. `/dev/video` is typically a symbolic link to the preferred video device.

Note

The same device file names are used for video output devices.

Querying Capabilities

Devices supporting the video capture interface set the `V4L2_CAP_VIDEO_CAPTURE` or `V4L2_CAP_VIDEO_CAPTURE_MPLANE` flag in the `capabilities` field of struct `c:type:'v4l2_capability'` returned by the `ref:'VIDIOC_QUERYCAP'` ioctl. As secondary device functions they may also support the `ref:'video overlay <overlay>'` (`V4L2_CAP_VIDEO_OVERLAY`) and the `ref:'raw VBI capture <raw-vbi>'` (`V4L2_CAP_VBI_CAPTURE`) interface. At least one of the read/write or streaming I/O methods must be supported. Tuners and audio inputs are optional.

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Supplemental Functions

Video capture devices shall support `ref:'audio input <audio>'`, `ref:'tuner'`, `ref:'controls <control>'`, `ref:'cropping and scaling <crop>'` and `ref:'streaming parameter <streaming-par>'` ioctls as needed. The `ref:'video input <video>'` ioctls must be supported by all video capture devices.

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Image Format Negotiation

The result of a capture operation is determined by cropping and image format parameters. The former select an area of the video picture to capture, the latter how images are stored in memory, i. e. in RGB or YUV format, the number of bits per pixel or width and height. Together they also define how images are scaled in the process.

As usual these parameters are *not* reset at `:c:func:`open()` time to permit Unix tool chains, programming a device and then reading from it as if it was a plain file. Well written V4L2 applications ensure they really get what they want, including cropping and scaling.

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Cropping initialization at minimum requires to reset the parameters to defaults. An example is given in `ref:`crop``.

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To query the current image format applications set the `type` field of a struct `:c:type:`v4l2_format`` to `V4L2_BUF_TYPE_VIDEO_CAPTURE` or `V4L2_BUF_TYPE_VIDEO_CAPTURE_MPLANE` and call the `ref:`VIDIOC_G_FMT`` `<VIDIOC_G_FMT>` ioctl with a pointer to this structure. Drivers fill the struct `:c:type:`v4l2_pix_format`` `pix` or the struct `:c:type:`v4l2_pix_format_mplane`` `pix_mp` member of the `fmt` union.

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To request different parameters applications set the `type` field of a struct `c:type:'v4l2_format'` as above and initialize all fields of the struct `c:type:'v4l2_pix_format'` vbi member of the `fmt` union, or better just modify the results of `ref:'VIDIOC_G_FMT <VIDIOC_G_FMT>'`, and call the `ref:'VIDIOC_S_FMT <VIDIOC_G_FMT>'` ioctl with a pointer to this structure. Drivers may adjust the parameters and finally return the actual parameters as `ref:'VIDIOC_G_FMT <VIDIOC_G_FMT>'` does.

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Like `ref:'VIDIOC_S_FMT <VIDIOC_G_FMT>'` the `ref:'VIDIOC_TRY_FMT <VIDIOC_G_FMT>'` ioctl can be used to learn about hardware limitations without disabling I/O or possibly time consuming hardware preparations.

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The contents of struct `:ctype:`v4l2_pix_format`` and struct `:ctype:`v4l2_pix_format_mplane`` are discussed in `ref`pixfmt``. See also the specification of the `ref`VIDIOC_G_FMT<VIDIOC_G_FMT>``, `ref`VIDIOC_S_FMT<VIDIOC_G_FMT>`` and `ref`VIDIOC_TRY_FMT<VIDIOC_G_FMT>`` ioctls for details. Video capture devices must implement both the `ref`VIDIOC_G_FMT<VIDIOC_G_FMT>`` and `ref`VIDIOC_S_FMT<VIDIOC_G_FMT>`` ioctl, even if `ref`VIDIOC_S_FMT<VIDIOC_G_FMT>`` ignores all requests and always returns default parameters as `ref`VIDIOC_G_FMT<VIDIOC_G_FMT>`` does. `ref`VIDIOC_TRY_FMT<VIDIOC_G_FMT>`` is optional.

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Reading Images

A video capture device may support the `ref.read()` function `<func-read>` and/or streaming (`ref` memory mapping `<func-mmap>` or `ref.user pointer <userp>`) I/O. See `ref.io` for details.

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