

Spc5xx Linux Webcams Driver

- Generic USB Isochronous driver
- Kernel Module
- Bridge between
 - « Proprietary Hard/Soft design »
 - « Linux User Space application »



Spc5xx Linux Webcams Driver

- Reverse Engineering USB protocole
- USB Class Vendor versus Class Video
- Reverse Engineering Tools:
 - « Windoze Usb stack Sniffer »
 - GPL <http://benoit.papillault.free.fr>
 - « Hardware Usb Tracker »
 - Ellisys USB 1.1 Tracker 110
 - Ellisys USB 2.0 Explorer



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```
10 [339 ms] UsbSnoop - DispatchAny(c18c3bd0) : IRP_MJ_INTERNAL_DEVICE_CONTROL
11 [339 ms] UsbSnoop - MyDispatchInternalIOCTL(c18c5430) : fdo=c15ea4a8, Irp=c15c9a50, IRQL=0
12 [340 ms] >>> URB 1 going down >>>
13 -- URB_FUNCTION_GET_DESCRIPTOR_FROM_DEVICE:
14   TransferBufferLength = 00000012
15   TransferBuffer       = c15bd330
16   TransferBufferMDL    = 00000000
17   Index                = 00000000
18   DescriptorType       = 00000001 (USB_DEVICE_DESCRIPTOR_TYPE)
19   LanguageId           = 00000000
20 [346 ms] UsbSnoop - MyInternalIOCTLCompletion(c18c5360) : fido=00000000, Irp=c15c9a50, Context=c15e6b00, IRQL=2
21 [346 ms] <<< URB 1 coming back <<<
22 -- URB_FUNCTION_CONTROL_TRANSFER:
23   PipeHandle           = c15c99fc
24   TransferFlags        = 0046004f (USBD_TRANSFER_DIRECTION_IN, USBD_SHORT_TRANSFER_OK)
25   TransferBufferLength = 00000012
26   TransferBuffer       = c15bd330
27   TransferBufferMDL    = c15e2670
28   00000000: 12 01 10 01 ff ff 00 08 6d 04 2a 09 00 00 01 02
29   00000010: 00 01
30   UrbLink              = 00000000
31   SetupPacket          =
32   00000000: 80 06 00 01 00 00 12 00
33 [347 ms] UsbSnoop - DispatchAny(c18c3bd0) : IRP_MJ_INTERNAL_DEVICE_CONTROL
34 [347 ms] UsbSnoop - MyDispatchInternalIOCTL(c18c5430) : fdo=c15ea4a8, Irp=c15c9a50, IRQL=0
35 [347 ms] >>> URB 2 going down >>>
36 -- URB_FUNCTION_GET_DESCRIPTOR_FROM_DEVICE:
37   TransferBufferLength = 00000040
38   TransferBuffer       = c15d77e0
39   TransferBufferMDL    = 00000000
40   Index                = 00000000
41   DescriptorType       = 00000002 (USB_CONFIGURATION_DESCRIPTOR_TYPE)
42   LanguageId           = 00000000
43 [357 ms] UsbSnoop - MyInternalIOCTLCompletion(c18c5360) : fido=00000000, Irp=c15c9a50, Context=c15e6b00, IRQL=2
44 [357 ms] <<< URB 2 coming back <<<
45 -- URB_FUNCTION_CONTROL_TRANSFER:
46   PipeHandle           = c15c99fc
47   TransferFlags        = 0046004f (USBD_TRANSFER_DIRECTION_IN, USBD_SHORT_TRANSFER_OK)
48   TransferBufferLength = 00000040
49   TransferBuffer       = c15d77e0
50   TransferBufferMDL    = c15bb3c0
51   00000000: 09 02 e9 00 01 01 00 80 32 09 04 00 00 01 ff 00
52   00000010: 00 00 07 05 81 01 00 00 01 09 04 00 01 01 ff 00
53   00000020: 00 00 07 05 81 01 80 00 01 09 04 00 02 01 ff 00
54   00000030: 00 00 07 05 81 01 70 03 01 09 04 00 03 01 ff 00
55   UrbLink              = 00000000
```

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- Hardware Design :
 - Sensor command
 - Internal I2c Bus / 3 wires Bus
 - Slave address / Eeprom data
 - Write protocol
 - Read protocol
 - Status report



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```
10 dir: c0 req: 00 val: 00 index: 8102 lenght: 0001
11 04 33
12 dir: 40 req: 00 val: 00 index: 8320 lenght: 0002
13 dir: 40 req: 00 val: 92 index: 8804 lenght: 0000
14 dir: 40 req: 00 val: 04 index: 8802 lenght: 0000
15 25 01
16 dir: 40 req: 00 val: 00 index: 8303 lenght: 0002
17 69 01
18 dir: 40 req: 00 val: 00 index: 8304 lenght: 0002
19 0b 00
20 dir: 40 req: 00 val: 00 index: 8328 lenght: 0002
21 07 00
22 dir: 40 req: 00 val: 00 index: 833c lenght: 0002
23 04 19
24 dir: 40 req: 00 val: 00 index: 832f lenght: 0002
25 aa 00
26 dir: 40 req: 00 val: 00 index: 8307 lenght: 0002
27 03 00
28 dir: 40 req: 00 val: 00 index: 8301 lenght: 0002
29 0e 00
30 dir: 40 req: 00 val: 00 index: 8302 lenght: 0002
31 2a
32 dir: c0 req: 00 val: 00 index: 8106 lenght: 0001
33 09
34 dir: c0 req: 00 val: 00 index: 8107 lenght: 0001
35 2a
36 dir: c0 req: 00 val: 00 index: 8106 lenght: 0001
37 09
38 dir: c0 req: 00 val: 00 index: 8107 lenght: 0001
39 Interface : Alternatesetting :
40 Interface : Alternatesetting :
41 dir: 40 req: 00 val: 21 index: 8118 lenght: 0000
42 dir: 40 req: 00 val: 10 index: 8500 lenght: 0000
43 dir: 40 req: 00 val: 07 index: 8601 lenght: 0000
44 dir: 40 req: 00 val: 07 index: 8602 lenght: 0000
45 dir: 40 req: 00 val: 04 index: 8501 lenght: 0000
46 dir: 40 req: 00 val: 21 index: 8118 lenght: 0000
47 dir: 40 req: 00 val: 02 index: 8201 lenght: 0000
48 dir: 40 req: 00 val: 08 index: 8200 lenght: 0000
49 dir: 40 req: 00 val: 01 index: 8200 lenght: 0000
50 00
51 dir: c0 req: 00 val: 00 index: 8205 lenght: 0001
52 00
53 dir: c0 req: 00 val: 00 index: 8206 lenght: 0001
54 00 00
55 dir: 40 req: 00 val: 00 index: 8339 lenght: 0002
56 dir: 40 req: 00 val: 00 index: 8114 lenght: 0000
57 dir: 40 req: 00 val: 00 index: 8114 lenght: 0000
58 dir: 40 req: 00 val: 90 index: 8604 lenght: 0000
59 dir: 40 req: 00 val: 00 index: 8605 lenght: 0000
60 dir: 40 req: 00 val: b0 index: 8603 lenght: 0000
61 dir: 40 req: 00 val: 00 index: 8610 lenght: 0000
```

Spc5xx Linux Webcams Driver

- Hardware Design :
 - USB bridge / Video encoder
 - Identify the loop and status report
 - Functional Analysis
 - Initialize
 - Camera start
 - Camera stop
 - Camera shutdown
 - Feature request brightness, contrast, exposure



Spc5xx Linux Webcams Driver

- Software Design :
 - Driver Core
 - Probe and Camera detect
 - Usb Vendor Product Id
 - Connect, Disconnect (HotPlug)
 - Open, Close
 - Read, Mmap
 - V4l Ioctl



Spc5xx Linux Webcams Driver

- Software Design :
 - Webcams specific Library
 - Configure getcapability()
 - Initialize
 - Camera start() stop() restart()
 - Camera change size ()
 - Camera get contrast brightness exposure
 - Camera set contrast brightness exposure
 - Camera shutdown GPIO line (led)



Spc5xx Linux Webcams Driver

- Software Design :
 - Spca5xx Video Decoders
 - Jpeg stream yuv 4.1.1 yuv 4.2.2 encoded
 - Bayer stream GBRG
 - Sonix specific Differential Pixels Huffman Encoder
 - Sunplus YUV variations :)
 - Tasklet per Webcams
 - Reenable interrupt() transfert
 - Low latencies Allow 4 webcams RT stream



Szca5xx Linux Webcams Driver

- Szca5xx Design Policy :
 - Development Outside Main Kernel Tree
 - Video Decompressor In the package
 - Multi/Media Kernel Free GPL code
 - Work on embedded devices
 - Normalize Output stream MJPEG, YUVplanar, RGB
 - No need of external library for UserSpace Apps

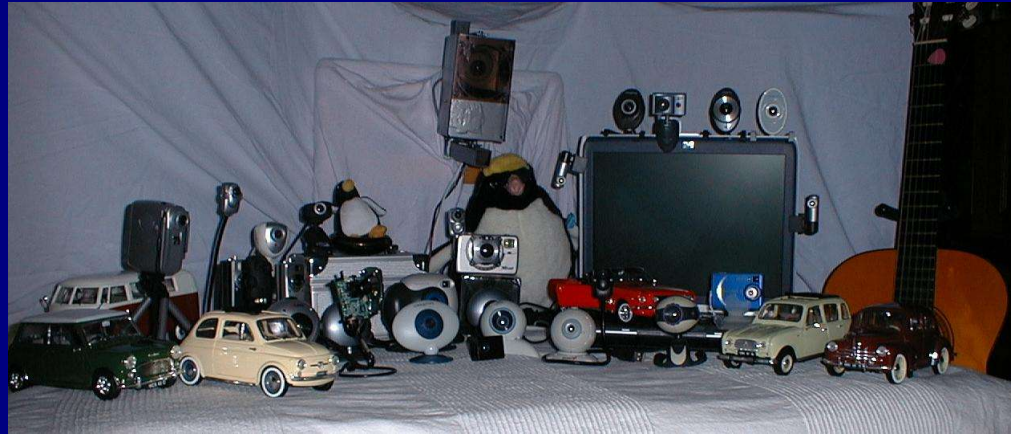


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- Specific Software:
 - Spcaview/Spcaserv
 - V4l grabber /Player /TcpIp Client
 - Include all decoding library for embedded device only SDL is need.
 - Record Pictures Avi Sound :)
 - TCP/IP MJPEG stream server
 - Spcagui
 - The same with SDL gui feature :)



Spca5xx Linux Webcams Driver

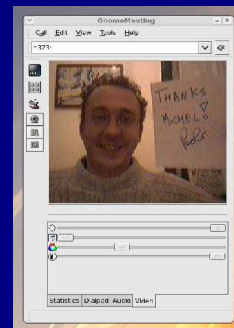


Spc5xx Linux Webcams Driver

- Embedded Spcaserv
 - uClibc
 - Busybox
 - TinyLogin
 - Kernel 2.4.27
 - Spc5xx
 - Http Boa server
 - Tcp/Ip Spcaserv

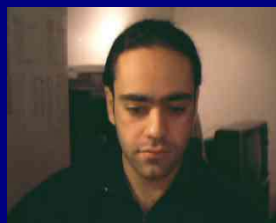


Spca5xx Linux Webcams Driver



- Thanks for every one help / test / patch.
- Special thanks for Generous Donators

- This project need Hardware Webcams !!
- <http://mxhaard.free.fr>



Spc5xx Linux Webcams Driver

Enjoy !!

Module Author : Michel Xhaard

license GPL

30 june 2005

147 Webcams supported
from

*Sunplus Sonix Conexant Z-star Mars-Semi
Tranvision Etoms

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respective Owners
