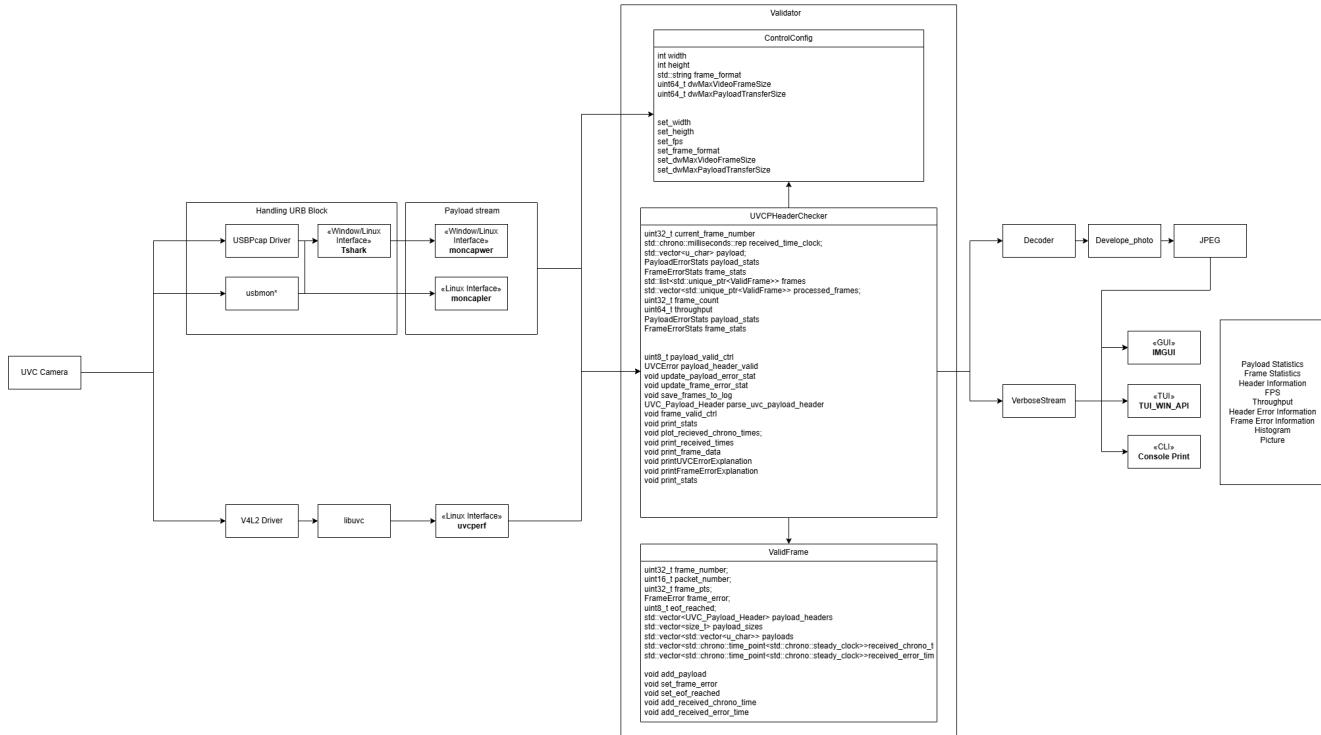


Project Design

UML



- fps 누락, frame 없어짐
- hle 크기 오류 범위랑 다름
- (pts scr 포함 크기 오류)
- err bit set
- res bit set
- eoh bit not set
- eof 포함 누락
- fid 다름, (이전 eof가 없을때)
- fid 같음 pts 다름 -주로 bulk
- frame 크기 초과 yuyv
- frame 크기 미만 missing
- frame max size
- urb max size

https://docs.google.com/document/d/1EaJGdyNN5I1Ey1idCmWbopi2fnEFvoZ-e-4M5_wXN9k/edit?usp=sharing

ERR Type	Expression	Algorithm	Explanation
No Error, Valid	ERR_NO_ERROR = 0,		아무런 에러가 없는 경우

No Payload	ERR_EMPTY_PAYLOAD = 1,	<pre> if (uvc_payload.empty()) { v_cerr_5 << "UVC payload is empty." << std::endl; update_payload_error_stat(ERR_EMPTY_PAYLOAD); return ERR_EMPTY_PAYLOAD; } </pre>	payload header 조차 없는 경우
payload overflow	ERR_MAX_PAYLAOD_OVERFLOW=2,	<pre> if (uvc_payload.size() > ControlConfig::dwMaxPayloadTransferSize) { v_cerr_5 << "UVC payload size exceeds maximum transfer size." << std::endl; update_payload_error_stat(ERR_MAX_PAYLOAD_OVERFLOW); return ERR_MAX_PAYLAOD_OVERFLOW; } </pre>	interface descriptor에서 설정한 maxpayload 값보다 큰 값이 들어왔을 때, payload overflow 에러 설정
BFH Error bit set	ERR_ERR_BIT_SET = 3,	<pre> // Checks if the Error bit is set if (payload_header.bmBFH.BFH_ERR) { v_cerr_2 << "Invalid UVC payload header: Error bit is set." << std::endl; return ERR_ERR_BIT_SET; } </pre>	Error bit set
Payload Header Length	ERR_LENGTH_OUT_OF_RANGE = 4	<pre> if (payload_header.HLE < 0x02 payload_header.HLE > 0x0C) { v_cerr_2 << "Invalid UVC payload header: Unexpected start byte 0x" << std::hex << std::setw(2) << std::setfill('0') << static_cast<int>(payload_header.HLE) << "." << std::endl; return ERR_LENGTH_OUT_OF_RANGE; } </pre>	HLE가 2 미만 12 초과인 경우
Payload Header Length incorrect with BFH	ERR_LENGTH_INVALID = 5	<pre> // Checks if the Source Clock Reference bit is set if (payload_header.bmBFH.BFH PTS && payload_header.bmBFH.BFH SCR && payload_header.HLE != 0x0C) { v_cerr_2 << "Invalid UVC payload header: Both Presentation Time Stamp and " "Source Clock Reference bits are set." << std::endl; return ERR_LENGTH_INVALID; } else if (payload_header.bmBFH.BFH PTS && !payload_header.bmBFH.BFH SCR && payload_header.HLE != 0x06) { v_cerr_2 << "Invalid UVC payload header: Presentation Time Stamp bit is " "set but header length is less than 6." << std::endl; return ERR_LENGTH_INVALID; } else if (!payload_header.bmBFH.BFH PTS && payload_header.bmBFH.BFH SCR && payload_header.HLE != 0x08) { v_cerr_2 << "Invalid UVC payload header: Source Clock Reference bit is " "set but header length is less than 12." << std::endl; return ERR_LENGTH_INVALID; } else if (!payload_header.bmBFH.BFH PTS && !payload_header.bmBFH.BFH SCR && payload_header.HLE != 0x02) { v_cerr_2 << "Invalid UVC payload header: Neither Presentation Time Stamp nor " "Source Clock Reference bits are set but header length is not 2." << std::endl; return ERR_LENGTH_INVALID; } </pre>	PTS, SCR이 설정되거나 설정되어 있지 않아서 HLE의 크기가 정해졌을 때 HLE와 다른 경우 즉, pts = 0 , scr = 0, hle = 2 pts = 1, scr = 0, hle = 6 pts = 0, scr = 1, hle = 8, pts = 1, scr = 1, hle = 12, 위 경우에 해당하지 않는 경우
BFH Reserved Bit set	ERR_RESERVED_BIT_SET = 6,	<pre> if (payload_header.bmBFH.BFH_EOF) { } else { if (payload_header.bmBFH.BFH_RES) { v_cerr_2 << "Invalid UVC payload header: Reserved bit is set." << std::endl; return ERR_RESERVED_BIT_SET; } } </pre>	Specification 기준 RES는 항상 0이어야 하지만 많은 카메라에서 EOF = 1 인 경우 RES 또한 1로 설정되어있는 경우가 많기 때문에 EOF = 0 일 때만 검사 진행. 검사 시 RES=1 일시 오류
EOH Set or NOT Set	ERR_EOH_BIT = 7,	-x	EOH는 추가적으로 검토하지 않음 ISO일 때 eoh가 0으로 설정되며 Bulk 일시 eoh가 1로 설정되기에 초기값이 연속으로 잘못되어서 나오는 경우가 test 전체의 안정성을 확보하지 못할 수 있음

Overlapped toggle bit	ERR_TOGGLE_BIT_OVERLAPPED = 8,	-x	<p>기존 toggle bit overlap은 다른 오류로 판별 가능. 추가적으로 pts, scr_stc 값이 decrease 되는 경우로 판단 시 (overflow되는 경우 제외) 오히려 정상적인 프레임이 오류 처리되면서 깨지는 현상이 나타남.</p> <p>추가적인 처리를 안하는 편이 판별에 용이함. pts 및 scr은 단독으로 여러 판별에 사용하기에는 예외 사항이 많기에 사용하지 않음.</p>
BFH Toggle Bit Error	ERR_FID_MISMATCH = 9,	<pre>if (payload_header.bmBFH.BFH_FID == previous_payload_header.bmBFH.BFH_FID && previous_payload_header.bmBFH.BFH_EOF && previous_payload_header.HLE != 0) { v_cerr_2 << "Invalid UVC payload header: Frame Identifier bit is same " "as the previous frame and EOF is set." << std::endl; return ERR_FID_MISMATCH;</pre>	<p>이전 Transfer의 Toggle bit가 같은 경우 EOF가 나타나지 않아야 함 만약 나타날 경우 한 개 이상의 frame이 사라졌거나 해당 payload의 toggle bit가 잘못된 것 HLE는 start of stream packet에서 previous frame이 없기 때문에 0으로 설정시 오류 해제</p>
BFH Toggle Bit Error with PTS difference	ERR_SWAP = 10,	<pre>} else if (payload_header.bmBFH.BFH_FID == previous_payload_header.bmBFH.BFH_FID && previous_payload_header.bmBFH.BFH_EOF && (payload_header.PTS == previous_payload_header.PTS) && payload_header.PTS != 0) { v_cerr_2 << "Invalid UVC payload header: Frame Identifier bit is same " "as the previous frame and PTS matches." << std::endl; return ERR_SWAP;</pre>	<p>위 경우에서 PTS를 비교했을 때 (만약 pts가 있다면) 이전 payload의 pts와 같은 경우 toggle bit가 잘못된 것</p>
Missing EOF	ERR_MISSING_EOF = 11,	<pre>} else if (payload_header.bmBFH.BFH_FID != previous_payload_header.bmBFH.BFH_FID && !previous_payload_header.bmBFH.BFH_EOF && previous_payload_header.HLE != 0) { v_cerr_2 << "Missing EOF" << std::endl; return ERR_MISSING_EOF; }</pre>	<p>이전 Transfer의 Toggle bit가 다른 경우 previous_payload_header과 비교했을 때 EOF가 있어야 함 없으면 최소한 한 개 이상의 EOF를 가진 payload + a 가 사라짐 또는 해당 payload의 toggle bit가 잘못된 것 HLE는 start of stream packet에서 previous frame이 없기 때문에 0으로 설정시 오류 해제</p>
	ERR_FRAME_NO_ERROR = 0,		프레임 오류 검출 없음
Frame Drop	ERR_FRAME_DROP = 1,	<pre>void UVCPHeaderChecker::timer_thread() { while (!stop_timer_thread) { std::this_thread::sleep_for(std::chrono::seconds(1)); std::cout << "FPS: " << frame_count.load() << " frames per second" << std::endl; frame_count = 0; } }</pre>	만약 FPS 측정한 뒤 선택한 fps만큼 나오지 않는다면 그 차이만큼 frame drop 나타남
Frame Error	ERR_FRAME_ERROR = 2,	<pre>//Process the last frame when EOF is missing if (payload_header_valid_return == ERR_MISSING_EOF) { v_cerr_2 << "Missing EOF" << std::endl; if (!frames.empty()) { auto& last_frame = frames.back(); last_frame->frame_error = ERR_FRAME_ERROR; last_frame->eof_reached = false; //finish the last frame update_frame_error_stat(last_frame->frame_error); save_frames_to_log(last_frame); processed_frames.push_back(std::move(frames.back())); frames.pop_back(); frame_count++; } }</pre>	프레임 에러, payload validation error로 인한 오류, 주로 eof missing
Max Frame Size overflow	ERR_FRAME_MAX_FRAME_OVERFLOW = 3,	<pre>size_t total_payload_size = std::accumulate(new_frame->payload_sizes.begin(), new_frame->payload_sizes.end(), size_t(0)); if (total_payload_size > ControlConfig::dwMaxVideoFrameSize) { new_frame->frame_error = ERR_FRAME_MAX_FRAME_OVERFLOW; }</pre>	frame size가 interface descriptor에서 설정한 값보다 큰 값이 될 때 중간에 더미 데이터가 같이 프레임에 추가되었거나 오류 페이로드가 같이 들어있다는 것이기에 overflow 오류 설정

YUYV frame length	<pre>ERR_FRAME_INVALID_YUYV_RAW_SIZE = 4,</pre> <pre> if (ControlConfig::frame_format == "yuyv") { // Calculate the expected size for the YUYV frame size_t expected_frame_size = ControlConfig::get_width() * ControlConfig::get_height() * 2; // Calculate the actual size by summing up all payload sizes and // subtracting the total header lengths size_t actual_frame_size = 0; for (const auto& frame : frames) { for (size_t i = 0; i < frame->payload_sizes.size(); ++i) { actual_frame_size += frame->payload_sizes[i] - frame->payload_headers[i].HLE; } } if (actual_frame_size != expected_frame_size) { v_cerr_2 << "Frame size mismatch for YUYV: expected " << expected_frame_size << " but got " << actual_frame_size << std::endl; } } </pre>	<p>max frame size overflow에서 추가로 yuyv 일 때 판단해서 크기 다르면 오류</p> <p>yuyv는 width*height*2로 정확히 크기가 나오기 때문에 이에 맞는 크기가 나오지 않을 시 yuyv 오류</p>
Same frame different PTS	<pre>ERR_FRAME_SAME_DIFFERENT_PTS = 5,</pre>	<p>다른 valid error에 걸리지 않고 오로지 pts만 다른 경우</p> <p>Toggle Valid Error 검출이 되지 않았지만 오로지 PTS가 다르게 나오는 경우 (pts값이 0이 아닌 경우 예만)</p>
-----	-----	-----
Skipping urb block		<p>URB Block에서 ERR=45 가 검출되면 해당 urb block 건너뜀</p> <p>urb block을 구성하는 컴퓨터 문제로 판단 valid test에 넣지 않음</p>
URB Bulk	<pre> if (bulk_usbmon_bulk_maxlengthsize > urb_data->data_length + sizeof(URB_Data)) { // finish the transfer v_cout_3 << "Finish the transfer" << std::endl; temp_buffer.insert(temp_buffer.end(), packet + sizeof(URB_Data), packet + pkthdr->caplen); } else if (bulk_usbmon_bulk_maxlengthsize == urb_data->data_length + sizeof(URB_Data)) { // continue the transfer // v_cout_3 << "Continue the transfer" << std::endl; temp_buffer.insert(temp_buffer.end(), packet + sizeof(URB_Data), packet + pkthdr->caplen); } else { v_cerr_3 << "Invalid data length for bulk transfer" << std::endl; return; } } </pre>	<p>Bulk 인 경우 URB가 short 인 경우는 data_length 비교해서 다음 것 temp buffer에 같이 넣어서 queue로 push</p> <p>만약 max length 넘어갈 시, 오류로 판단</p>
URB Iso	<pre> } else { v_cerr_3 << "No iso descriptor detected, skipping this packet" << std::endl; return; } </pre>	<p>Iso 인 경우 length에 적힌 대로만 valid test, 나머지를 dummy data로 취급</p> <p>iso descriptor가 없는 경우 skip</p>

BULK_insta

```
C:\Users\gyuho\svc_frame_detector\build>"C:\Program Files\Wireshark\tshark" -i \\.\USBPcap1 -T fields -e usb.transfer_type -e frame.time_epoch -e frame.len -e usb.capdata -E separator=; -l -Y "usb.device_address == 7" | .\debug\oldmanandsea.exe -fw 1280 -fh 720 -fps 30 -ff mjpeg -mf 16777216
Frame Width: 1280
Frame Height: 720
Frame FPS: 30
Frame Format: mjpeg
Waiting for input...
Capturing on 'USBPcap1'
175 FPS: 29 frames per second
235 FPS: 30 frames per second
295 FPS: 30 frames per second
355 FPS: 30 frames per second
415 FPS: 30 frames per second
475 FPS: 30 frames per second
535 FPS: 30 frames per second
595 FPS: 30 frames per second
655 FPS: 30 frames per second
715 FPS: 30 frames per second
775 Process packet() end
...
UVCPHeaderChecker Destructor
Payload Error Statistics:
No Error: 2200 (99.9546%)
Empty Payload: 0 (0%)
Max Payload Overflow: 0 (0%)
Error Bit Set: 0 (0%)
Length Out of Range: 0 (0%)
Length Invalid: 0 (0%)
Reserved Bit Set: 0 (0%)
End of Header Bit: 0 (0%)
Toggle Bit Overlapped: 0 (0%)
Frame Identifier Mismatch: 1 (0.0454339%)
Swap: 0 (0%)
Missing EOF: 0 (0%)
Unknown Error: 0 (0%)

Frame Error Statistics:
No Error: 2200 (99.9546%)
Frame Drop: 1 (0.0454339%)
Frame Error: 0 (0%)
Max Frame Overflow: 0 (0%)
Invalid YUYV Raw Size: 0 (0%)
Same Different PTS: 0 (0%)
```

wireshark log로 기록한 것 기반으로 테스트한 결과

ISO_BRIO

```
UVCPHeaderChecker Destructor
Payload Error Statistics:
No Error: 49078 (99.8494%)
Empty Payload: 0 (0%)
Max Payload Overflow: 0 (0%)
Error Bit Set: 64 (0.130208%)
Length Out of Range: 0 (0%)
Length Invalid: 0 (0%)
Reserved Bit Set: 0 (0%)
End of Header Bit: 0 (0%)
Toggle Bit Overlapped: 0 (0%)
Frame Identifier Mismatch: 0 (0%)
Swap: 0 (0%)
Missing EOF: 10 (0.0203451%)
Unknown Error: 0 (0%)

Frame Error Statistics:
No Error: 178 (97.8022%)
Frame Drop: 0 (0%)
Frame Error: 4 (2.1978%)
Max Frame Overflow: 0 (0%)
Invalid YUYV Raw Size: 0 (0%)
Same Different PTS: 0 (0%)
```

wireshark log로 기록한 것 기반으로 테스트한 결과

ISO_logi

```
mint@mint-VirtualBox:~/t/uvc_frame_detector/build$ ./log_test
UVCPHeaderChecker Destructor
Payload Error Statistics:
No Error: 52373 (100%)
Empty Payload: 0 (0%)
Max Payload Overflow: 0 (0%)
Error Bit Set: 0 (0%)
Length Out of Range: 0 (0%)
Length Invalid: 0 (0%)
Reserved Bit Set: 0 (0%)
End of Header Bit: 0 (0%)
Toggle Bit Overlapped: 0 (0%)
Frame Identifier Mismatch: 0 (0%)
Swap: 0 (0%)
Missing EOF: 0 (0%)
Unknown Error: 0 (0%)

Frame Error Statistics:
No Error: 422 (100%)
Frame Drop: 0 (0%)
Frame Error: 0 (0%)
Max Frame Overflow: 0 (0%)
Invalid YUYV Raw Size: 0 (0%)
Same Different PTS: 0 (0%)
```

ISO_unknown

```
C:\Users\gyuho\svc_frame_detector\build>"C:\Program Files\Wireshark\tshark" -i \\.\USBPcap1 -T fields -e usb.transfer_type -e frame.time_epoch -e frame.len -e usb.iso.data -E separator=; -l | C:\Users\gyuho\svc_frame_detector\build\Debug\oldmanandsea.exe -fw 1280 -fh 720 -fps 30 -ff mjpeg
```

Payload Error Statistics:

```
No Error: 13344 (22.2965%)  
Empty Payload: 0 (0%)  
Max Payload Overflow: 0 (0%)  
Error Bit Set: 0 (0%)  
Length Out of Range: 0 (0%)  
Length Invalid: 0 (0%)  
Reserved Bit Set: 0 (0%)  
End of Header Bit: 0 (0%)  
Toggle Bit Overlapped: 0 (0%)  
Frame Identifier Mismatch: 0 (0%)  
Swap: 46504 (77.7035%)  
Missing EOF: 0 (0%)  
Unknown Error: 0 (0%)
```

Frame Error Statistics:

```
No Error: 56 (23.0453%)  
Frame Drop: 187 (76.9547%)  
Frame Error: 0 (0%)  
Max Frame Overflow: 0 (0%)  
Invalid YUV Raw Size: 0 (0%)  
Same Different PTS: 0 (0%)  
End of main
```

FRAME LOG

```
---  
Frame Number: 55  
Packet Number: 236  
Frame PTS: 689867489  
Frame Error: 0  
EOF Reached: 0  
Payloads:  
  Payload 1:  
    Payload Size: 612 bytes  
    Received Time: 1728627008330 ms since epoch  
  Payload 2:  
    Payload Size: 12 bytes  
    Received Time: 1728627008330 ms since epoch  
  Payload 3:  
    Payload Size: 12 bytes  
    Received Time: 1728627008330 ms since epoch
```

uvperf live stream

```
UVCPHeaderChecker Destructor
Payload Error Statistics:
No Error: 193 (99.4845%)
Empty Payload: 1 (0.515464%)
Max Payload Overflow: 0 (0%)
Error Bit Set: 0 (0%)
Length Out of Range: 0 (0%)
Length Invalid: 0 (0%)
Reserved Bit Set: 0 (0%)
End of Header Bit: 0 (0%)
Toggle Bit Overlapped: 0 (0%)
Frame Identifier Mismatch: 0 (0%)
Swap: 0 (0%)
Missing EOF: 0 (0%)
Unknown Error: 0 (0%)

Frame Error Statistics:
No Error: 193 (80.7531%)
Frame Drop: 46 (19.2469%)
Frame Error: 0 (0%)
Max Frame Overflow: 0 (0%)
Invalid YUYV Raw Size: 0 (0%)
Same Different PTS: 0 (0%)
```

bravia_log_test

```
mint@mint-VirtualBox:~/uvc_frame_detector/uvc_frame_detector/build$ ./log_test
FPS: 30 frames per second
UVCPHeaderChecker Destructor
Payload Error Statistics:
No Error: 1326 (100%)
Empty Payload: 0 (0%)
Max Payload Overflow: 0 (0%)
Error Bit Set: 0 (0%)
Length Out of Range: 0 (0%)
Length Invalid: 0 (0%)
Reserved Bit Set: 0 (0%)
End of Header Bit: 0 (0%)
Toggle Bit Overlapped: 0 (0%)
Frame Identifier Mismatch: 0 (0%)
Swap: 0 (0%)
Missing EOF: 0 (0%)
Unknown Error: 0 (0%)

Frame Error Statistics:
No Error: 221 (100%)
Frame Drop: 0 (0%)
Frame Error: 0 (0%)
Max Frame Overflow: 0 (0%)
Invalid YUYV Raw Size: 0 (0%)
Same Different PTS: 0 (0%)
```

bulk는 모든 문제 없음

Project TEST Code 결과

Moncapler, 유닛 테스트 결과

```
mint@mint-VirtualBox:~/uvc_frame_detector/build$ ./test_packet_handler
[=====] Running 4 tests from 1 test suite.
[-----] Global test environment set-up.
[-----] 4 tests from PacketHandlerTest
[ RUN    ] PacketHandlerTest.ValidPacket_i0
[ OK     ] PacketHandlerTest.ValidPacket_i0 (2 ms)
[ RUN    ] PacketHandlerTest.ValidPacket_i1
[ OK     ] PacketHandlerTest.ValidPacket_i1 (3 ms)
[ RUN    ] PacketHandlerTest.ValidPacket_iio
[ OK     ] PacketHandlerTest.ValidPacket_iio (15 ms)
[ RUN    ] PacketHandlerTest.ValidPacket_b
[ OK     ] PacketHandlerTest.ValidPacket_b (1 ms)
[-----] 4 tests from PacketHandlerTest (23 ms total)

[-----] Global test environment tear-down
[=====] 4 tests from 1 test suite ran. (23 ms total)
[ PASSED ] 4 tests.
```

Uvcheader_checker Valid checker 함수 유닛 테스트 결과

```
mint@mint-VirtualBox:~/uvc_frame_detector/build$ ./valid_test
[=====] Running 10 tests from 1 test suite.
[-----] Global test environment set-up.
[-----] 10 tests from uvc_header_checker_test
[ RUN   ] uvc_header_checker_test.valid_payload_test_0
FPS: 0 frames per second
[ OK    ] uvc_header_checker_test.valid_payload_test_0 (1027 ms)
[ RUN   ] uvc_header_checker_test.valid_payload_test_1
FPS: 1 frames per second
[ OK    ] uvc_header_checker_test.valid_payload_test_1 (1004 ms)
[ RUN   ] uvc_header_checker_test.valid_payload_test_2
FPS: 1 frames per second
[ OK    ] uvc_header_checker_test.valid_payload_test_2 (1011 ms)
[ RUN   ] uvc_header_checker_test.err_bit_set_test
FPS: 0 frames per second
[ OK    ] uvc_header_checker_test.err_bit_set_test (1001 ms)
[ RUN   ] uvc_header_checker_test.length_out_of_range_invalid_test_small
FPS: 0 frames per second
[ OK    ] uvc_header_checker_test.length_out_of_range_invalid_test_small (1017 ms)
[ RUN   ] uvc_header_checker_test.length_out_of_range_invalid_test_big
[ OK    ] uvc_header_checker_test.length_out_of_range_invalid_test_big (0 ms)
[ RUN   ] uvc_header_checker_test.reserved_bit_set_test
FPS: 0 frames per second
[ OK    ] uvc_header_checker_test.reserved_bit_set_test (1002 ms)
[ RUN   ] uvc_header_checker_test.valid_reserved_bit_set_test
[ OK    ] uvc_header_checker_test.valid_reserved_bit_set_test (5 ms)
[ RUN   ] uvc_header_checker_test.header_length_diff_test
[ OK    ] uvc_header_checker_test.header_length_diff_test (24 ms)
[ RUN   ] uvc_header_checker_test.fid_mismatch_test
FPS: 1 frames per second
[ OK    ] uvc_header_checker_test.fid_mismatch_test (1005 ms)
[-----] 10 tests from uvc_header_checker_test (7100 ms total)

[-----] Global test environment tear-down
[=====] 10 tests from 1 test suite ran. (7100 ms total)
[ PASSED ] 10 tests.
```

Uvcheader_checker Frame class bulk/iso 유닛 테스트 결과

```
mint@mint-VirtualBox:~/uvc_frame_detector/build$ ./frame_test_bulk
[=====] Running 2 tests from 1 test suite.
[-----] Global test environment set-up.
[-----] 2 tests from frame_test
[ RUN      ] frame_test.two_different_frames_test_insta
FPS: 0 frames per second
FPS: 2 frames per second
[      OK  ] frame_test.two_different_frames_test_insta (1013 ms)
[ RUN      ] frame_test.whole_frame_test_bravia
FPS: 1 frames per second
FPS: 0 frames per second
FPS: 0 frames per second
[      OK  ] frame_test.whole_frame_test_bravia (2015 ms)
[-----] 2 tests from frame_test (3028 ms total)

[-----] Global test environment tear-down
[=====] 2 tests from 1 test suite ran. (3028 ms total)
[  PASSED  ] 2 tests.
```

```
mint@mint-VirtualBox:~/uvc_frame_detector/build$ ./frame_test_iso
[=====] Running 1 test from 1 test suite.
[-----] Global test environment set-up.
[-----] 1 test from frame_test
[ RUN      ] frame_test.whole_frame_test_brio
FPS: 1 frames per second
[      OK  ] frame_test.whole_frame_test_brio (1011 ms)
[-----] 1 test from frame_test (1011 ms total)

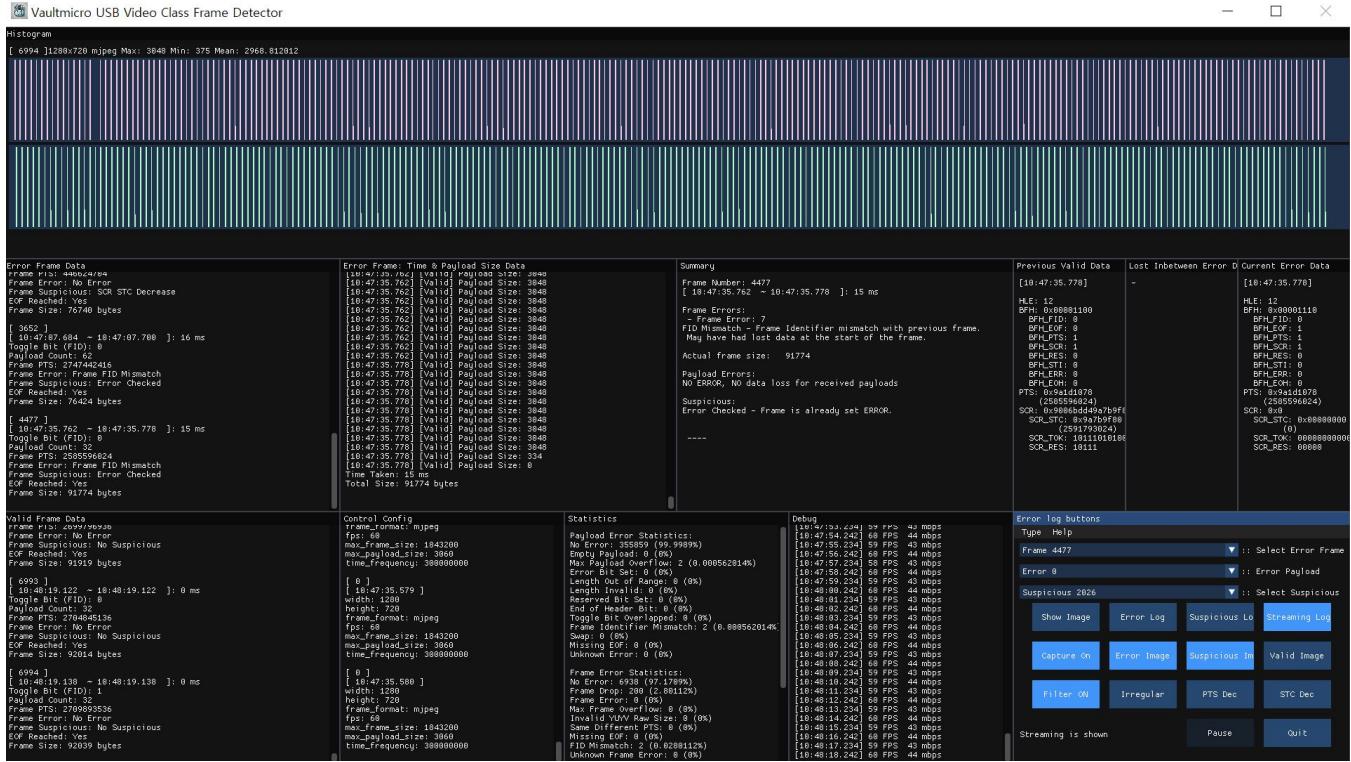
[-----] Global test environment tear-down
[=====] 1 test from 1 test suite ran. (1011 ms total)
[  PASSED  ] 1 test.
```

```
max_frame_size: 2097152
max_payload_size: 1310720
format_index_int: 2
frame_index_int: 3
width: 1280
height: 720
fps: 30

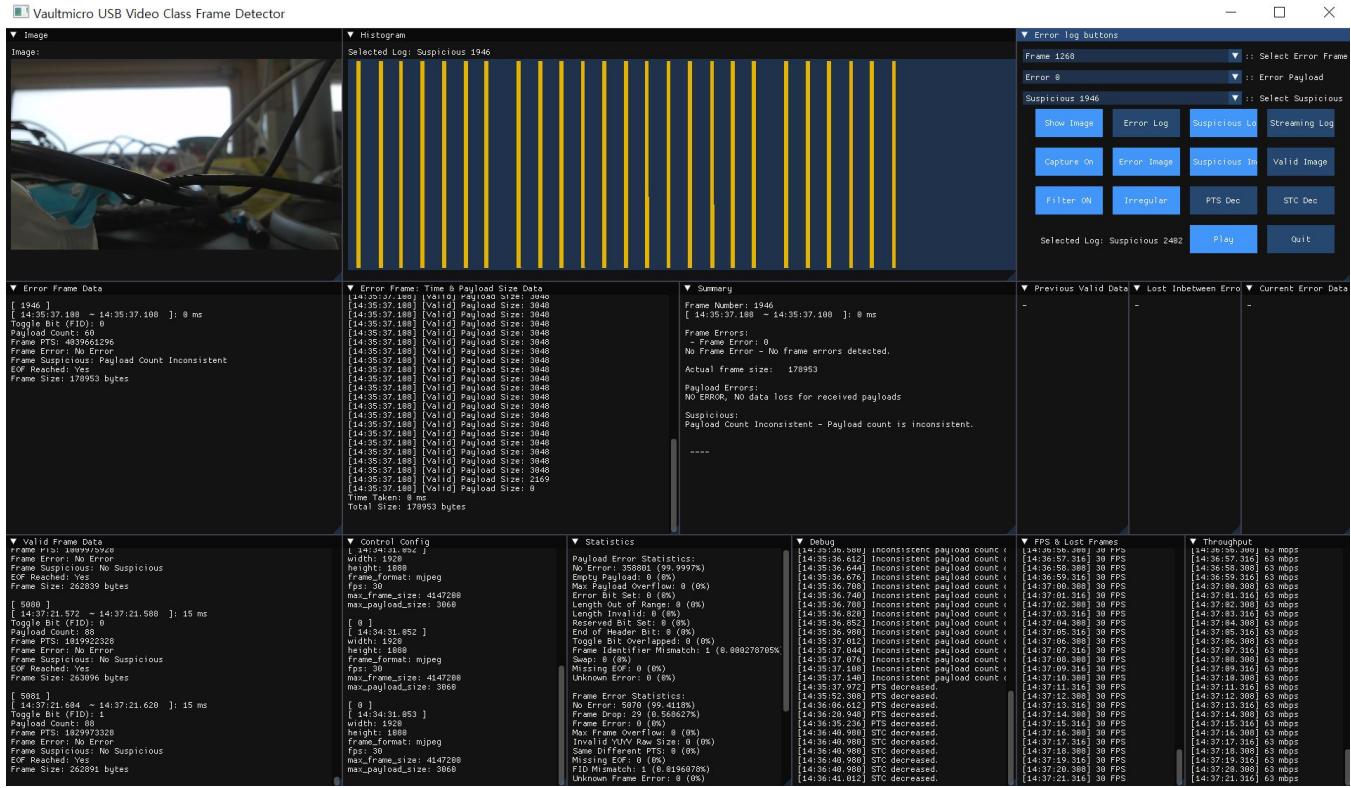
max_frame_size: 2097152
max_payload_size: 1310720
format_index_int: 2
frame_index_int: 10
width: 3840
height: 2160
fps: 30
```

자동으로 getcur 확인해서 frame size 업데이트, window 기본 카메라 애플리케이션 종료하고 재시작 시 변경된 control configuration 정보

v.0.3.5

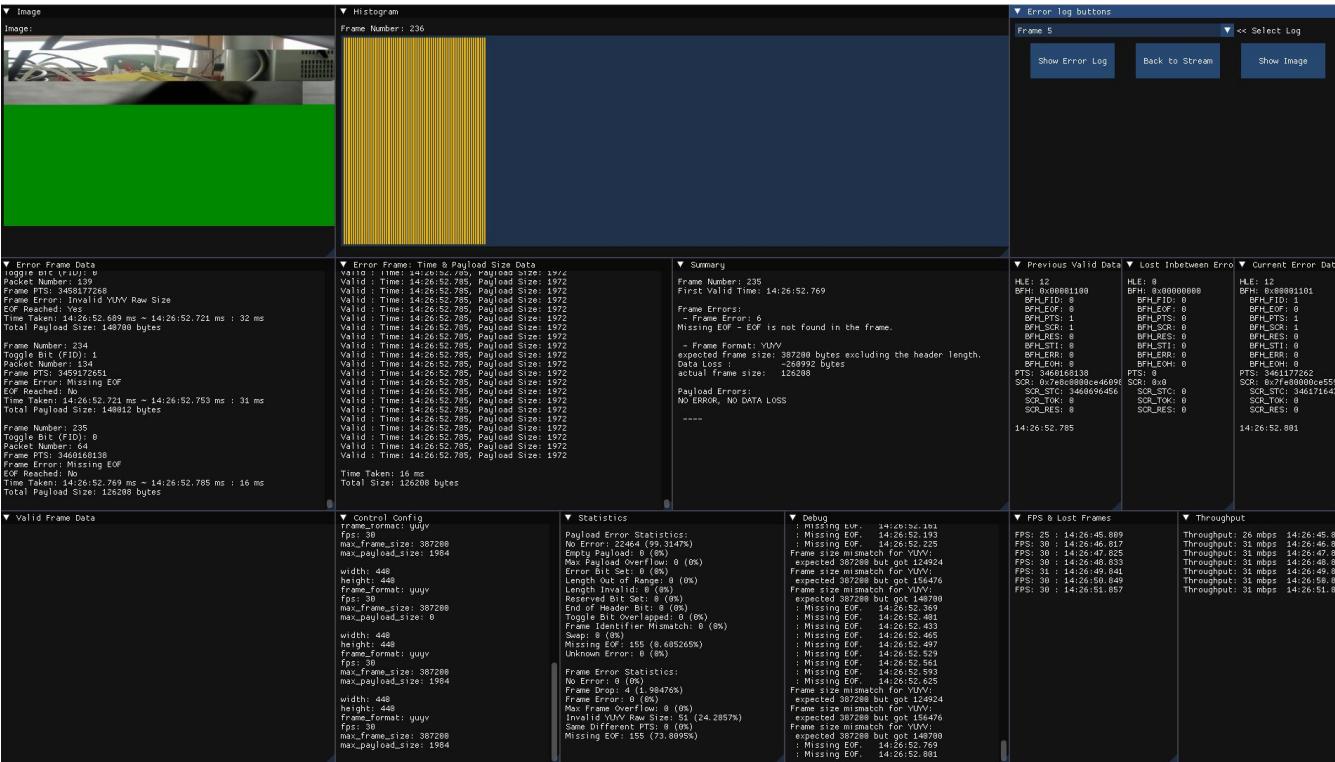


v.0.3.4



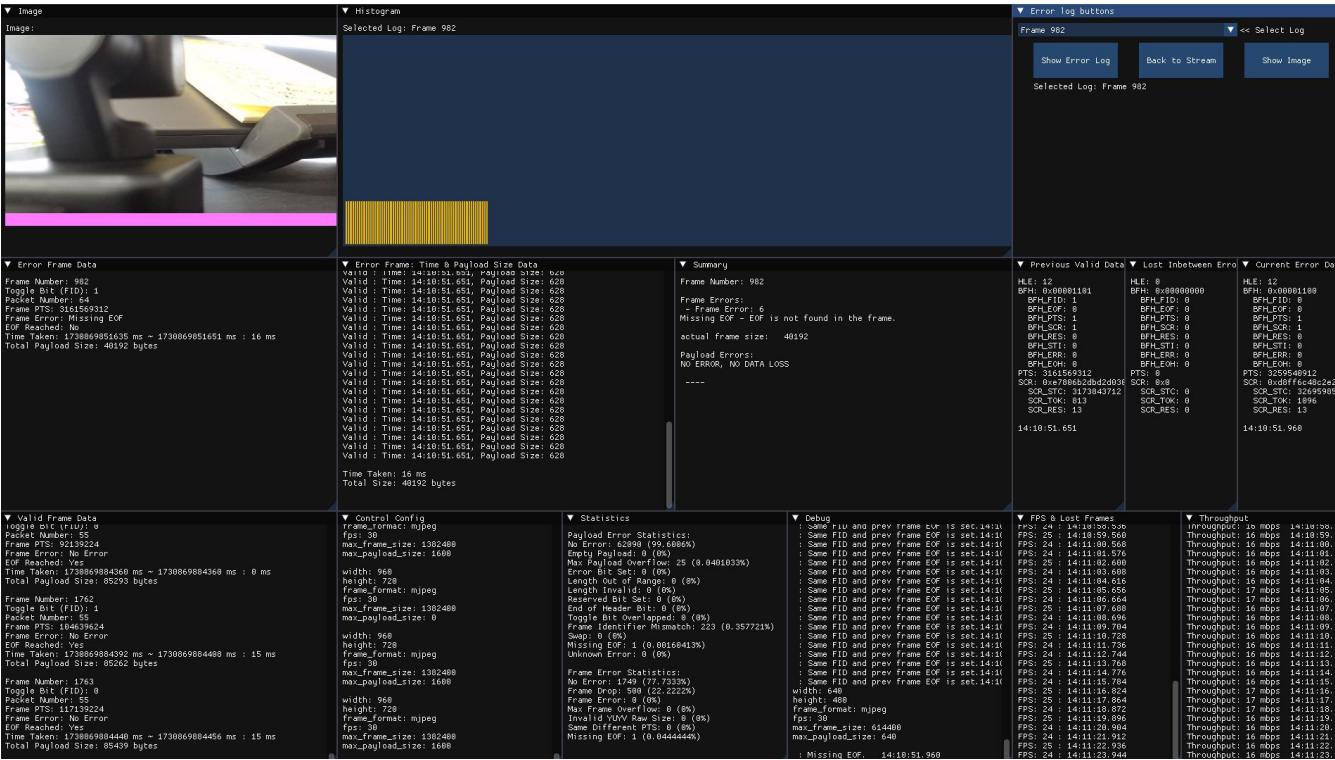
v.0.3.3

Vaultmicro USB Video Class Frame Detector

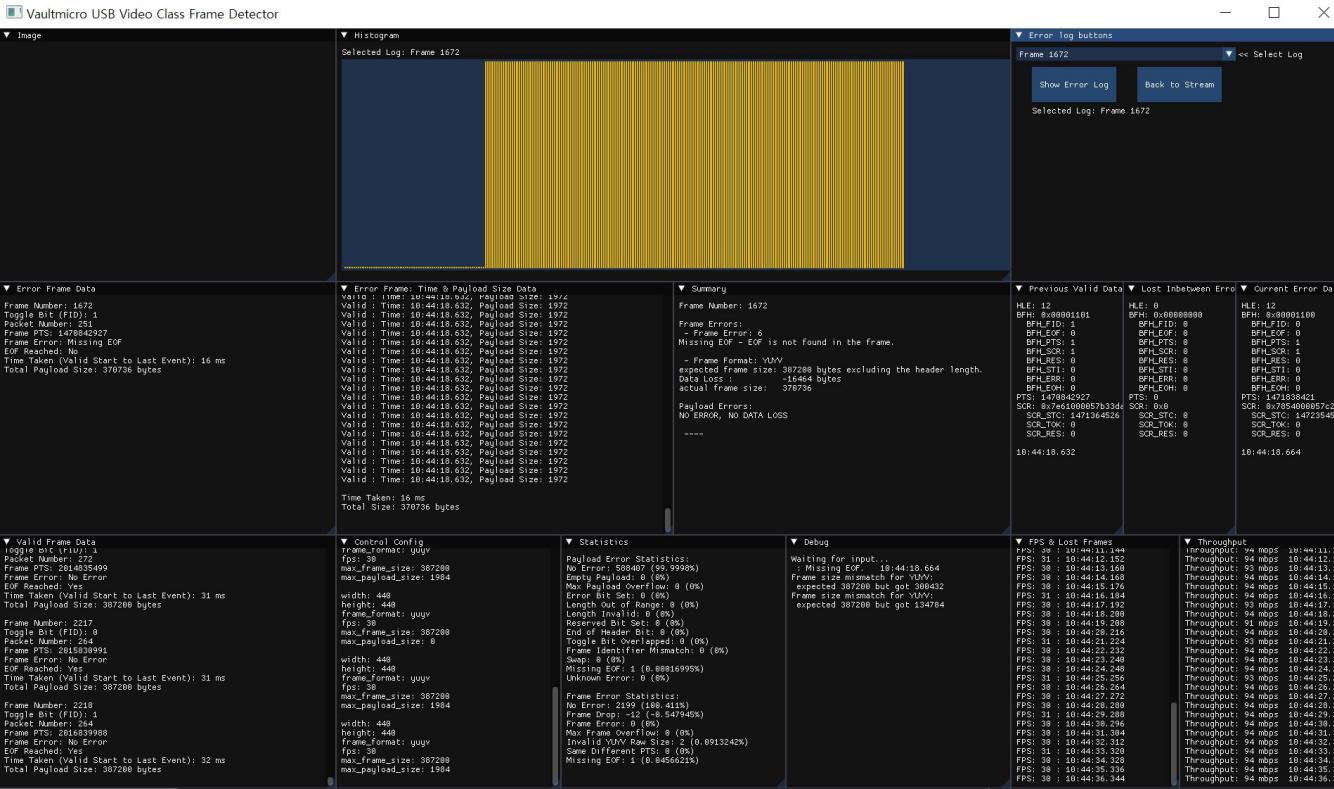


v.0.3.2

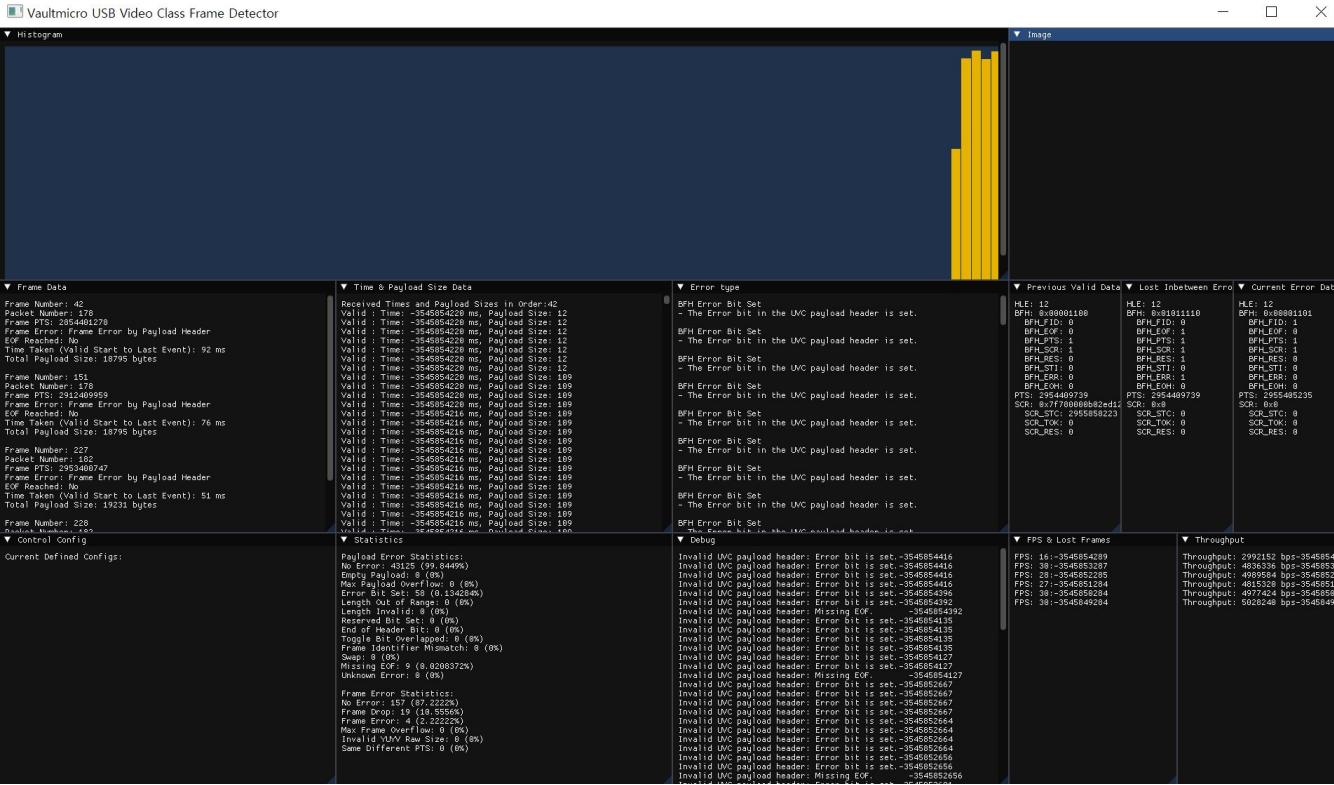
Vaultmicro USB Video Class Frame Detector



v.0.3.1



v.0.3.0



v.0.2.0

Frame Width: 1280		Frame Height: 720		FPS: 30		Frame Format: mjpeg		Max Frame Size: 16777216		Max Transfer Size: 1310720	
2E:Invalid UVC payload header: Error bit is set.-3545848983											Payload Error Statistics:
2E:Invalid UVC payload header: Error bit is set.-3545848983											No Error: 49078 (99.8494%)
2E:Invalid UVC payload header: Error bit is set.-3545848983											Empty Payload: 0 (0%)
2E:Invalid UVC payload header: Error bit is set.-3545848983											Max Payload Overflow: 0 (0%)
2E:Invalid UVC payload header: Error bit is set.-3545848983											Error Bit Set: 64 (0.130208%)
2E:Invalid UVC payload header: Error bit is set.-3545848983											Length Out of Range: 0 (0%)
2E:Invalid UVC payload header: Error bit is set.-3545848983											Length Invalid: 0 (0%)
10:UVCPHeaderChecker Destructor											Reserved Bit Set: 0 (0%)
											End of Header Bit: 0 (0%)
HLE: 12		HLE: 12									Toggle Bit Overlapped: 0 (0%)
BFH: 0x00001100		BFH: 0x00001100									Frame Identifier Mismatch: 0 (0%)
BFH_FID: 0		BFH_FID: 0									Swap: 0 (0%)
BFH_EOF: 0		BFH_EOF: 0									Missing EOF: 10 (0.0203451%)
BFH PTS: 1		BFH PTS: 1									Unknown Error: 0 (0%)
BFH_SCR: 1		BFH_SCR: 1									Frame Error Statistics:
BFH_RES: 0		BFH_RES: 0									No Error: 178 (88.5572%)
BFH_STI: 0		BFH_STI: 0									Frame Drop: 19 (9.45274%)
BFH_ERR: 0		BFH_ERR: 0									Frame Error: 4 (1.99005%)
BFH_EOH: 0		BFH_EOH: 0									Max Frame Overflow: 0 (0%)
PTS: 2954409739		PTS: 2954409739									Invalid YUVV Raw Size: 0 (0%)
SCR: 0x7f780000b02ed12f		SCR: 0x7f780000b02ed12f									Same Different PTS: 0 (0%)
SCR_STC: 2955858223		SCR_STC: 2955858223									
SCR_TOK: 0		SCR_TOK: 0									
C:\#Users\gyuho\#uvc_frame_detector\#build>RES: 0		SCR_RES: 0									
20:o x ox											-3545850821
20:o x ox											-3545850821
20:o x ox											-3545850821
20:o x											-3545848983
20:o x											-3545848983
20:o x											-3545848983
20:o x											-3545848983
20:o x 0 0 0 0 0 x											-3545848963
20:o x 0 0 0 0 0 x											-3545848963

Frame 0 saved to frame_0.jpg

Vaultmicro Usb Video Class Camera Frame Detector.. Press ctrl+c key to exit...

- Stream 받기 UVC-PERF
- PCAP으로 capture, wireshark log parsing
- pcap 이용한 moncapler 실시간으로 분류해서 stream과 같은 출력처럼 만들기
- Bulk, Iso 구분해서 payload만 분리
- Payload header 분리
- streaming frame 구분, 저장
- 오류 판별 - length
- 오류 판별 - bfh [eof err sti res scr pts eof fid] 각각 관련 내용 구별, ex) fid 연속, eof 연속 ...
- 오류 판별 - pts
- 오류 판별 - scr
- 판별 - zlp
- 오류 발생 시 데이터 저장
- 이미지 저장
- Control 정보 저장