# Capture Software for SVM-03U

# [NVCap]

# Software Manual

V1.30

Netvision Co., Ltd

# Revision History

| Edition | Date | Detail | Charge |
|---|---|---|---|
| 1.00 | 2015/08/12 | New file | H. Yamada |
| 1.10 | 2016/01/04 | Changed chapter format, added some charts | H. Yamada |
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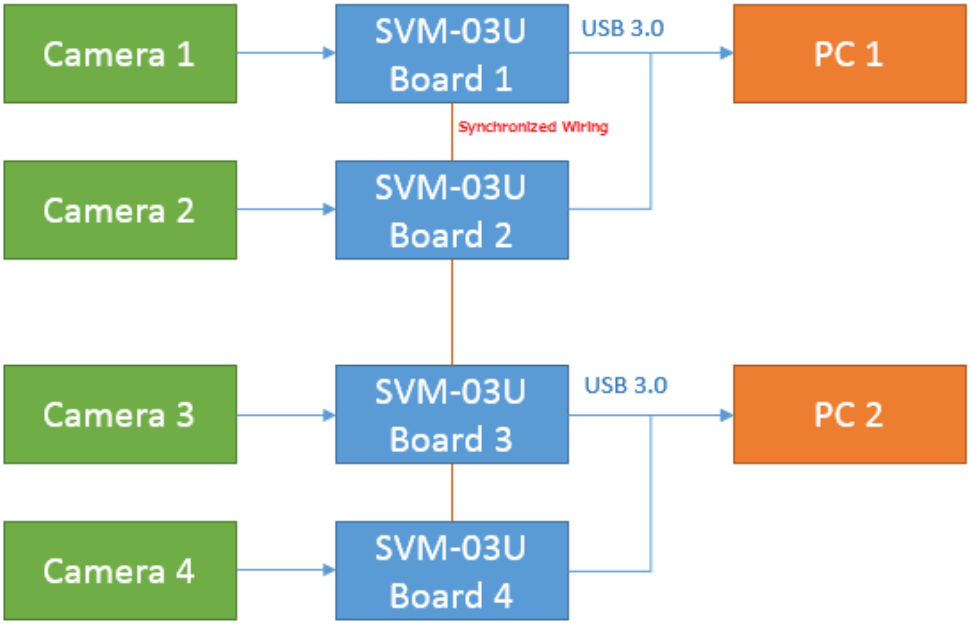
# 1. Outline

NVCap Previewing Window

UVC capture Software "NVCap" is a program on Windows that operates in an environment using our USB 3.0 Video capture Board SVM series (SVM board). NVCap is a simple UI with a focus on video display during preview, allowing you to preview video, record to AVI format, and control the target sensor or SVM board.

The "NVCap" software is corresponding to not only single channel capturing using one SVM board but also multi channel capturing using multiple SVM boards up to 4ch. As an example, the figure below shows the configuration diagram of the SVM Board capture environment for multi-channel use. In this figure, two SVM-03 boards are connected to one PC are connected through USB3.0 cable in this configuration to optimize the load. Optionally, it is able to synchronize start/end timing for recording between multiple SVM-03 boards by using wiring. Recording multi-channel HD image is possible by using high performance PC and SSD (Solid State Disk). Many kinds of digital image sensor can be captured by SVM boards and NVCap application.

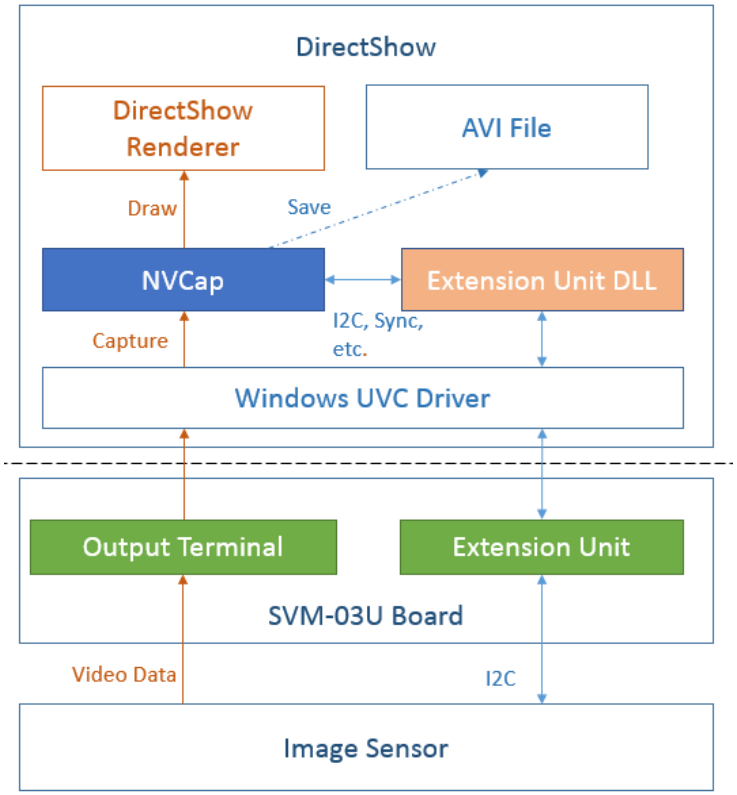
SVM-03U 4ch Capture Environment Configuration Example




This software is able not only to capture/record video image but to transmit camera setting through I2C and start capturing using external trigger signal (synchronized capturing). These functions are extension; installing "Extension Unit DLL" is required to use these extension function. How to install DLL is referred to the 3rd chapter. To use this software installing hardware driver is not required.

- When you use USB3.0 hub (or PC card-based USB3.0 controller), operating instability is caused depending on a USB controller mounted on the hub. We recommend to use USB controller of TI Company.

Software Block Diagram




The NVCap software configuration diagram is shown in the figure above.

As shown on the figure, NVCap has capturing video data function, saving function and I2C transceiver function. Capturing and saving are available by OS standard driver. I2C transceiver to sensor etc is done through extension unit. It is done in the framework of DirectShow by way of Windows standard driver through our original "Extension Unit DLL" installed in the PC.

For detailed information etc of SVM-03U board, refer to attached summary specifications.

# 2. Install and Uninstall

## 2. 1. How to Install

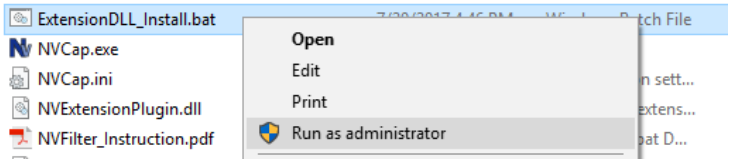
### 2.1.1. Install “NVCap” Software

File list

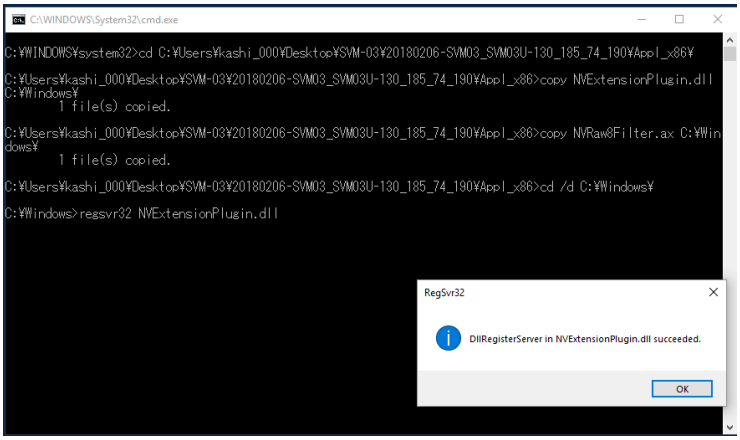
(Date of modification, size is different for version)

| Name | Date modified | Type | Size |
|---|---|---|---|
| Filter | 3/1/2018 4:41 PM | File folder | |
| PluginDLL | 3/1/2018 4:41 PM | File folder | |
| ExtensionDLL_Install.bat | 7/20/2017 4:46 PM | Windows Batch File | 1 KB |
| NVCap.exe | 2/6/2018 5:15 PM | Application | 118 KB |
| NVCap.ini | 7/14/2017 5:13 PM | Configuration sett... | 1 KB |
| NVExtensionPlugin.dll | 5/19/2015 2:24 PM | Application extens... | 39 KB |
| NVFilter_Instruction.pdf | 10/28/2016 7:04 PM | Adobe Acrobat D... | 306 KB |
| NVFlipDLL.ax | 6/9/2017 6:32 PM | AX File | 51 KB |
| NVRaw8Filter.ax | 6/14/2017 10:28 AM | AX File | 52 KB |
| NVRaw8NFFilter.ax | 7/3/2017 7:09 PM | AX File | 52 KB |
| NVRaw8YUVFilter.ax | 7/3/2017 7:09 PM | AX File | 52 KB |

1. Copy everything in the Nvcap folder of the product CD to any folder on your PC.
2. Right-click ″Extensiondll_install.bat″ and select ″Run as Administrator″.




3. If the installation succeeds, the following dialog will be displayed.




“Microsoft Visual C++ Redistributable Package(x86)” and “Microsoft Visual C++ SP1 Redistributable Package(x86)” that Microsoft provide to us is required to operate program. If these programs are not installed in your PC, you need to install separately. For details, refer to web page of Microsoft.

## 2. 2. How to Uninstall

### 2.2.1. Uninstall of “NVCap” Software

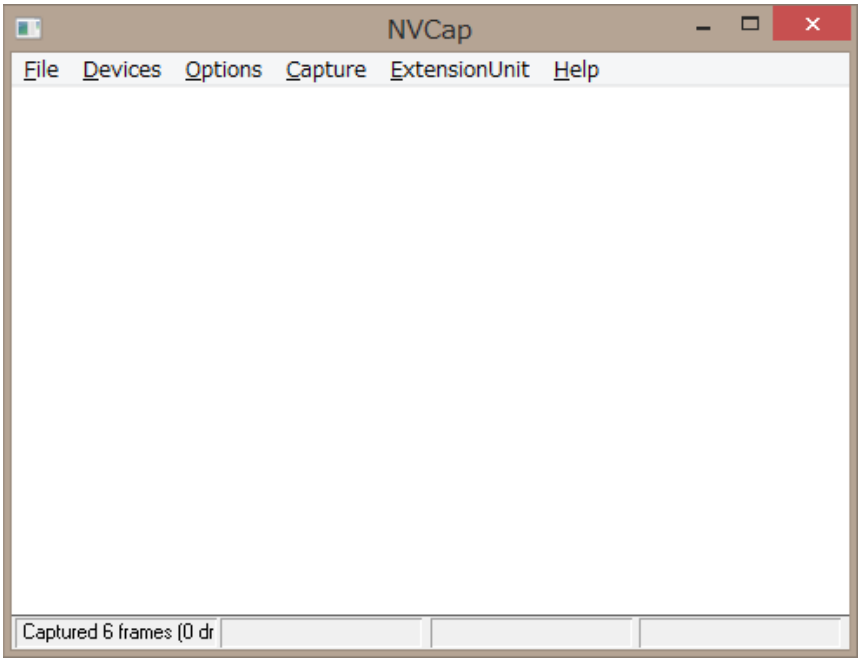
The uninstallation is completed by deleting the copied files in 2.1.

# 3. Capture Software for SVM-03U (NVCap) Detailed Description

Capture Software for SVM-03U (NVCap) is GUI software for Windows 7/8 that has function of previewing and saving image that captured by SVM board up to 4ch.

## 3. 1. NVCap Window Explanation

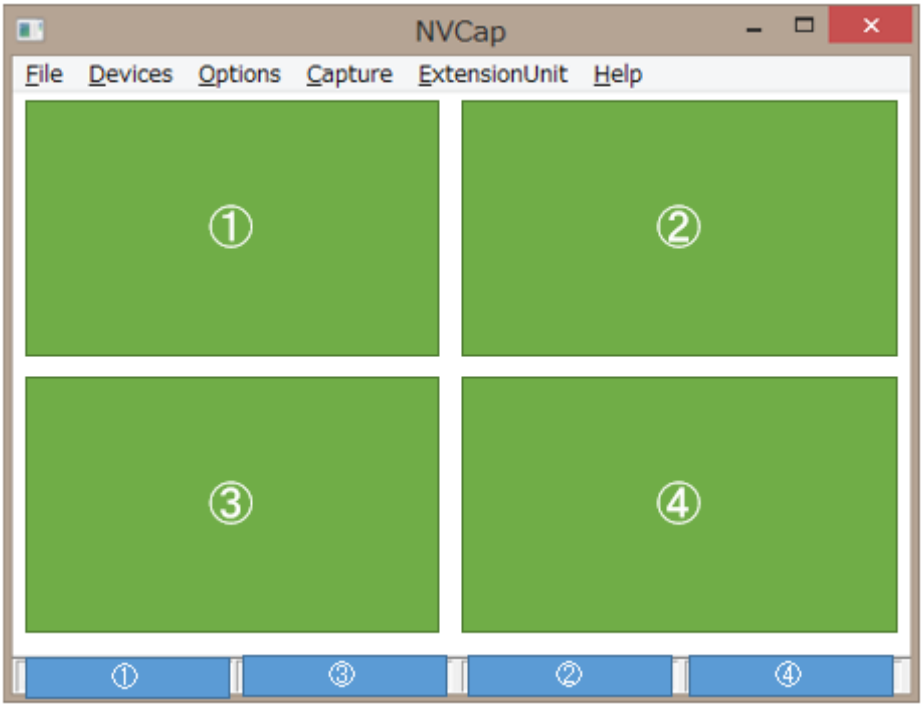
NVCap Main Window




Main window is simple that is constructed with menu bar, picture view area, and status bar. In picture view area, image from device is displayed at one area in case of connecting one device, divided for four sub areas in case of connecting multiple device.

If you want to capture multiple devices, select the Device Configuration screen (File-> settings...) corresponding to the camera number that is set in (cameras 0-3), each image is projected on the main screen NVCap. The correspondence of the camera number, the video display area, and the status bar are as shown below.

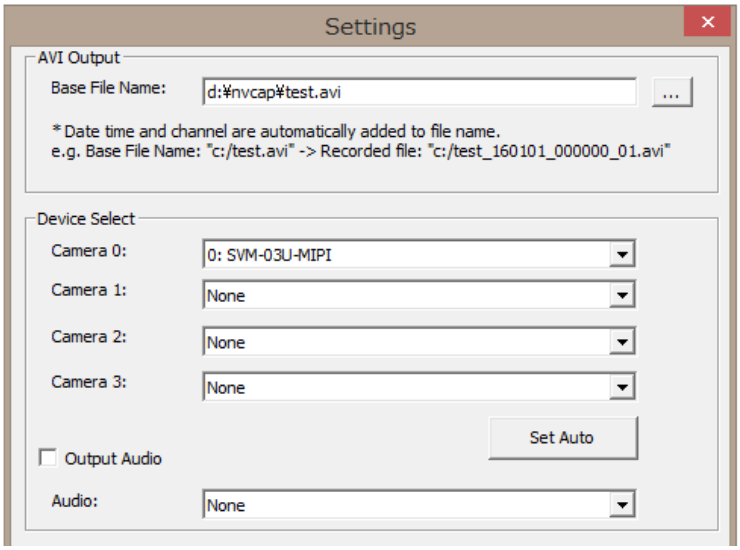
Corresponding of Multi Channel Chaptering




The ①-④ number corresponds to the Camera 0-3.

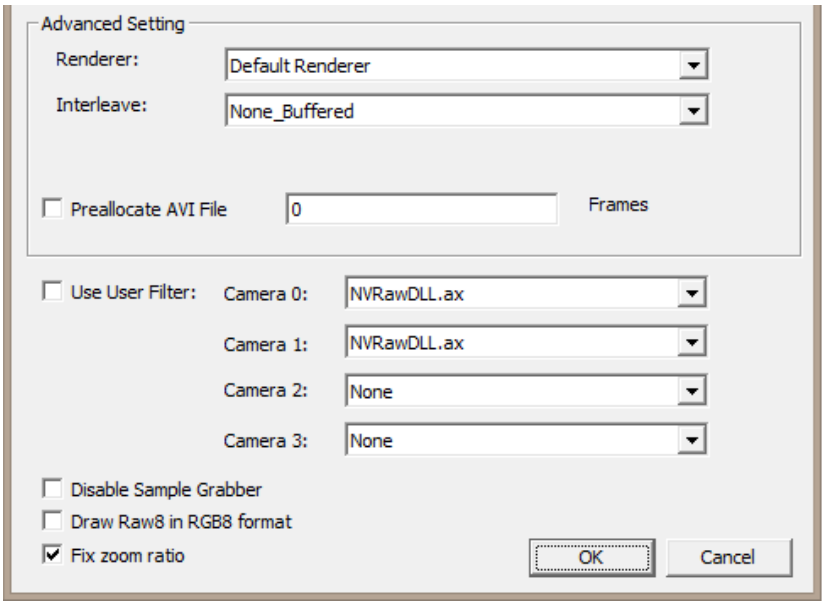
## 3.2. Device Setting Window Explanation

NVCap device setting window (Top half)




| | |
|---|---|
| Base File Name | Sets the base file name of the output file used for capture (.avi) and screenshot (.bmp). For example, when the base file name is C:¥NVCap¥test.avi , the file name that is generated by the capture<br>C:¥NVCap¥test_[Date]_[Time]_[ch].avi<br>The file name generated by the screenshot is<br>C:¥NVCap¥test_[ Date]_[ Time]_[ch].bmp<br>It comes to. The date and time are represented as six digits. |
| Camera 0-3 | Select the name of the SVM board that you want to capture as the Camera 0-3. It is an error to specify the same SVM board for multiple cameras. |
| Set Auto | Click to select the Camera 0-3 SVM board automatically. |
| Output Audio<br>Audio | Not currently valid. |

NVCap device setting window (Bottom half)

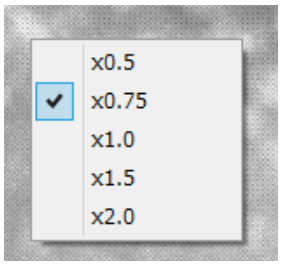



| | |
|---|---|
| Renderer | Select the renderer to use for the video display. The default is "default Renderer", but it may be better to "VMR9" or "VMR7" depending on the environment and capture format. |
| Interleave | Usually set to "None_buffred". |
| Preallocate AVI File | Set the amount of space in frames that you want to reserve on storage at the beginning of the AVI save. If the file processing does not meet the save time, it may be improved by enabling this feature and specifying the appropriate number of frames. |
| Use User Filter | The user filter function is enabled when the check is put. |
| Use User Filter / Camera 0-3 | Specifies the user filter to insert for each Camera 0-3. Set none if not inserted. |
| Disable Sample Grabber | If checked, disables insertion into the Sample Grabber Filter filter Graph. The screen shot (BMP Save) feature is no longer available in the checked state, but the capture process is slightly faster because it omits the amount of processing. |
| Draw Raw8 in RGB8 format | If checked, the Raw input will be processed in RGB8 format. If unchecked, the YUV format for processing. The RGB8 data size is half the YUV, and it is faster to do RGB8 because the RAW-YUV conversion process is unnecessary, but it may not work well depending on the environment. |

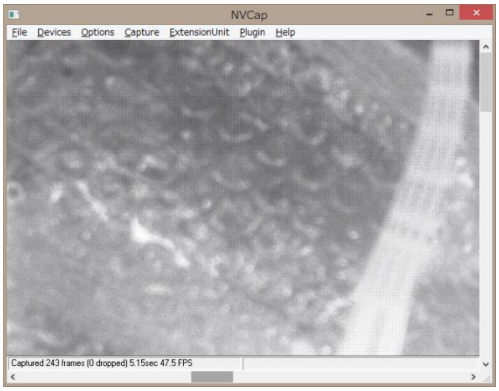
| | |
|---|---|
| Fix zoom ratio | If checked, the magnification is fixed and the video is displayed. If the display size is greater than the window size, the scroll bar is displayed automatically. If unchecked, the magnification will be adjusted by the window size. |

## 3. 3. Display magnification adjustment

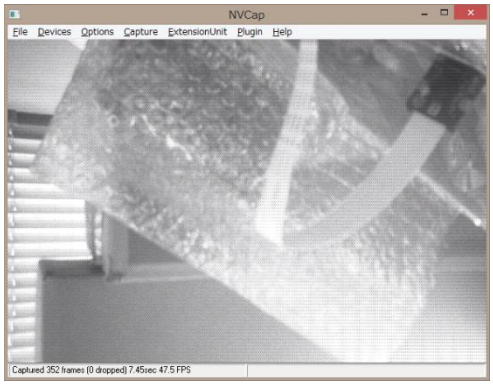
Right-click the Nvcap window to display the magnification adjustment menu.




If "Fix zoom ratio" is checked in the Device Settings screen, the magnification of the video will be fixed to the value set in the magnification adjustment menu. When the Nvcap window size is smaller than the display size, a scroll bar is displayed.




If "Fix zoom ratio" is unchecked in the Device Settings screen, the video size will be adjusted automatically when you change the window size.



## 3.4. Menu List

- File
  - Settings... Show Option Setting dialog.
  - Quit Quit NVCap application.
- Devices Recognized devices list are displayed below “Devices” menu.
  - (Device name) If you click to check, capturing device is set to “(device name)”.
- Options
  - Preview Start / end previewing video.
  - Audio Format... (Not used)
  - Video Capture Filter... Show capture filter dialog.
  - Video Capture Pin... Show capture pin dialog.
- Capture
  - Start Capture Start AVI capturing.
  - Stop Capture Stop AVI capturing.
  - Capture Audio (Not used)
  - Screen Shot... Save screenshot (.bmp format).
- ExtensionUnit
  - I2C Transceiver... Display “I2C Transceiver” dialog.
  - I2C Stream Sender... Display “I2C Stream Sender” dialog.
  - Test (Not used)
  - HW Reset (Not used)
  - Reset Enable (Not used)
- Plugin Call registered plugin DLLs.
- Help
  - About... Show version information dialog.

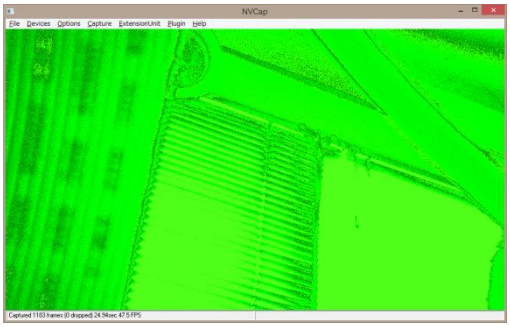
## 3.5. Plugin Features

In addition to the standard functions as capture software such as preview and recording, the "plugin function" enables image processing such as de-mosaic of raw images, and display of the Register Setting dialog of I2C and FPGA on Nvcap. The plugin function is enabled by copying our DLL files to a specific folder in Nvcap.

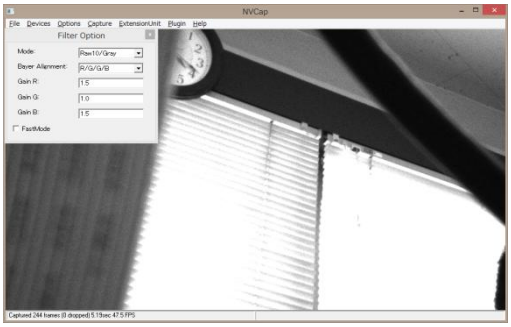
You can also develop DLLs in customer's environment by purchasing the UVC SDK separately.

### 3.5.1. User Filters

Before inserting the user filter
(Capture Raw 10bit as UYVY)



After inserting the user filter
(Raw -> Gray Conversion)



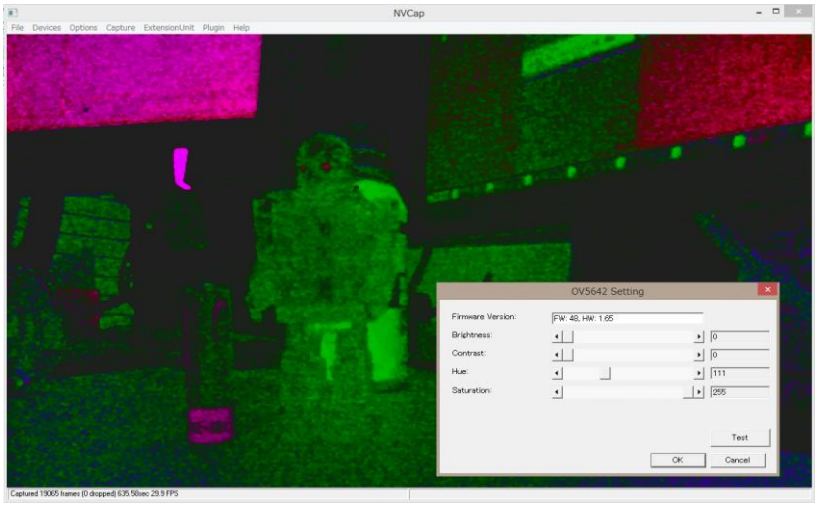
"User filter" is a function for simple image processing for images captured by the SVM board.

Customers Raw10bit/raw12bit uptake are provided with a standard filter (NVRawDLL) for color conversion including RAW-> Gray conversion and de-mosaic processing.

Recording in AVI format does not affect the video processing of this user filter, because the data captured by the SVM board is stored intact. The BMP screenshot function saves the image after inserting the user filter.

### 3.5.2. Plugin DLL Function

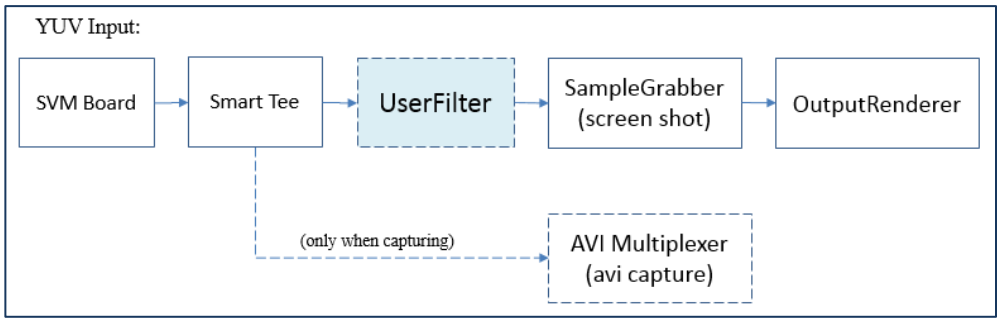
【Figure 3.4】 Example of image quality adjustment by plugin DLL



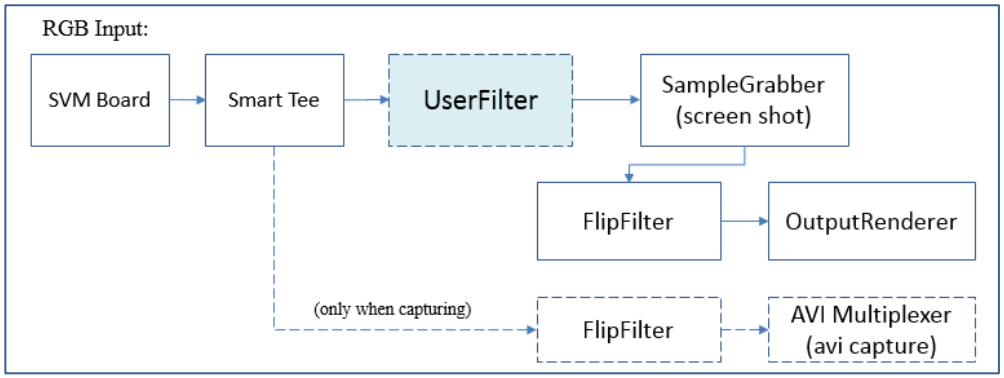
"Plugin DLL" is a function to perform the register setting of I2C and the FPGA on Nvcap. The plugin DLL function allows you to set the register of the image sensor while confirming the video. When you copy a plugin DLL to the Nvcap "PluginDLL" folder, a menu is added to invoke the dialog within the menu plugin.

In the figure above, the adjustment of the brightness, the hue, etc. through the I2C signal is done by the dialog called by the plugin DLL.

### 3.5.3. User filter Insertion Order




To illustrate the order in which user filters are inserted, the DirectShow capture graph is shown in the figure above for YUV input. As shown, the user filter is sandwiched between the preview output and the screenshot output. In addition, the user filter does not intervene in the data path when AVI is recorded.



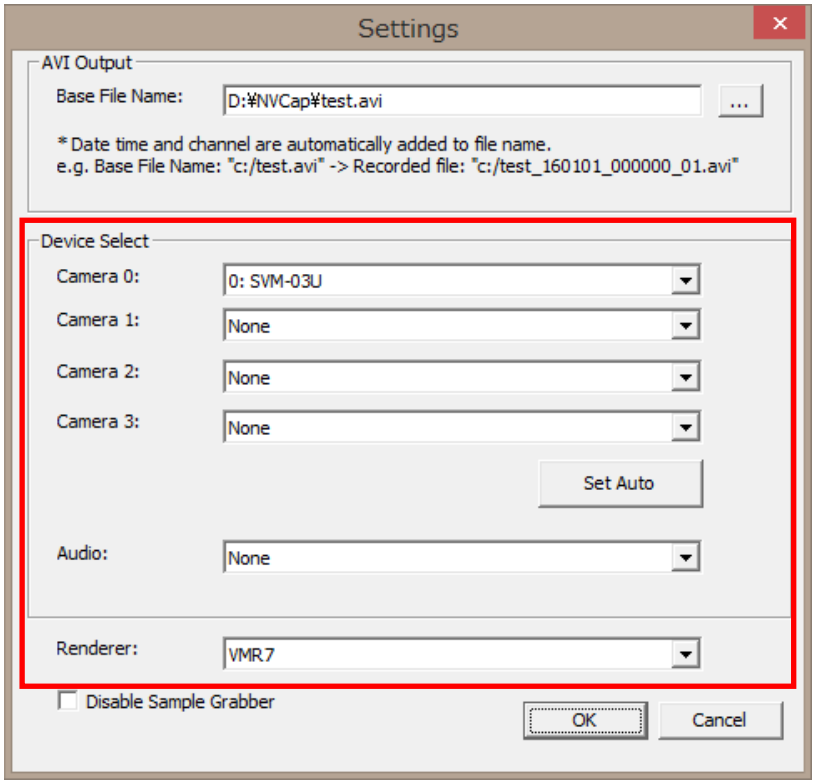

In the case of RGB input, the image in the RGB format is treated in the order of Bottom-> Top in the Windows environment, so that the data order of the general image sensor output is upside down. Because the SVM board outputs the data column entered from the image sensor to the PC as it is, it is displayed as the reverse image when it is displayed as it is. In order to compensate for this, NVCap is a mechanism to sandwich the FlipFilter to reverse the top and bottom of the video when RGB input.

## 3. 6. NVCap Operation Method

This section describes the basic operating procedures for NVCap.

### 3.6.1. Preview Video

1. First, from the menu, click "File-> Settings..." To configure the device.




Setting device that capture from "Camera 1" to "Camera 4".You can set up to four SVM-03U boards. Automatically set from recognized devices on PC by pressing "Set Auto". NVCap opens device by pressing "OK" button.

If you want to capture audio at the same time, you need to set device to "Audio". But recording multi channel, audio is output only for device appointed to camera 0.

Select the renderer used for window display in "Renderer". It is able to recover from symptom by changing this setting in case of occurring error and failing previewing at the time of using high-resolution image sensor.

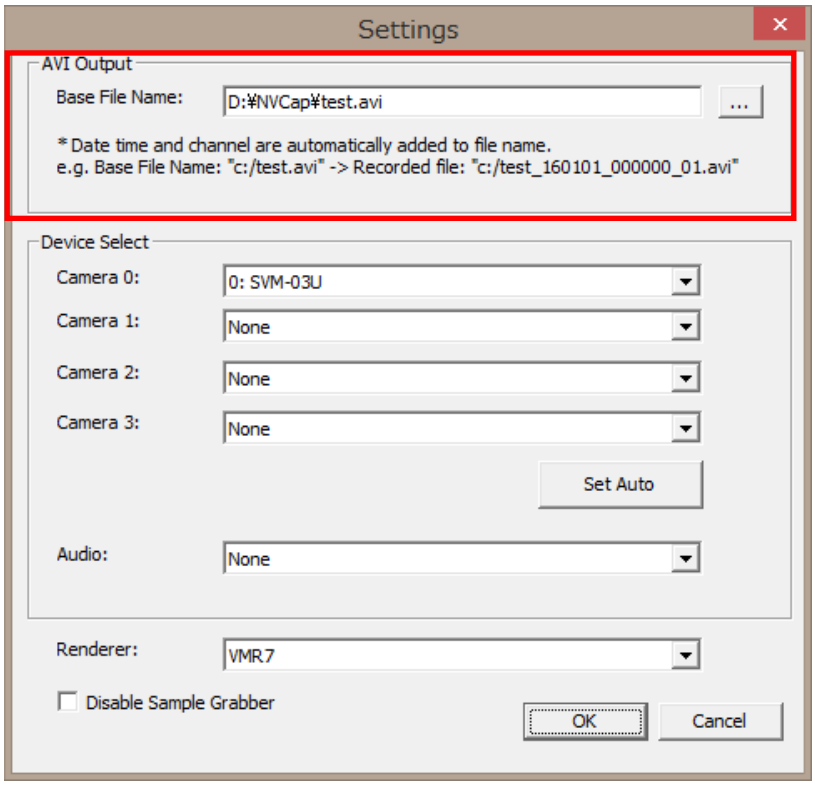
You don't need to configure settings at the time from the second starting on, because set contents are saved. At the time from the second starting, devices are opened caused by previous setting.

But, if it is failed to open devices by the reason such as connected devices are changed, this setting is reset and you need to set anew.

2. Transmit to initial setting to camera through I2C as necessary.
(ExtensionUnit -> I2C Transceiver / ExtensionUnit -> I2C Stream Sender)
Alternatively, you can use the utility software SVMCtl. The details such as I2C transfer methods are mentioned later.
3. Click "Options-> preview" From the menu to start the preview.

### 3.6.2. Capture Video (.avi format)

1. Set the output file and select the device. (File -> Settings)




Set the base file name of output file to "Base File name" used for capture(.avi) and screenshot(.bmp) and so on. For example, base file name is test.avi, file name made by capture is

test_[date]_[time]_[ch].avi

file name made by screenshot is

test_[date]_[time]_[ch].bmp

Date and time are expressed as a numeral of six digits.

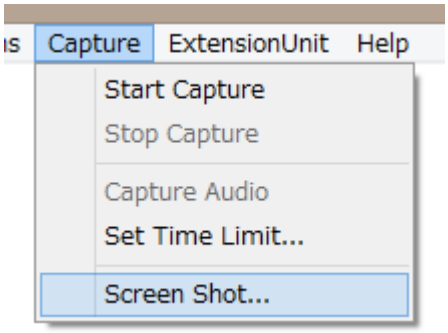
2. If you want to display image during capturing, preview image. (refer to 3.5.1)
3. Click "Capture-> Start" from the menu to start the video capture. If you do not need a video preview, try to capture the video without previewing it to reduce the processing.
In the case of multi-channel capture, the start frame may not be exactly the same at the same time, as all devices have an in-order start. By wiring the trigger signal between the boards, you

can also start the capture in sync with the hardware trigger signal.

4. Click "Capture-> Stop" From the menu to end the video capture.

### 3.6.3. Save Screenshot (.bmp)

1. Preview image. (refer to 3.5.2)
2. Save screenshot in an arbitrary timing. (Capture -> Screen Shot)

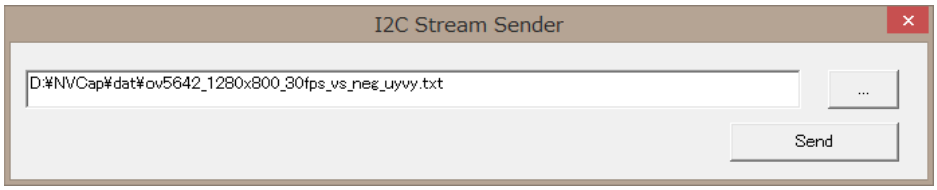



Saved file path and file name are mentioned at the chapter of image capturing. At the case of using plural numbers of SVM-03U devices, screenshots are generated to different files for each device. Start capturing screenshot for all device in turn, we don't guarantee about the time identity of the frame.

### 3.6.4. Text-based I2C Transmitter

NVCap can transmit contents of configuration file used for our SV series and SVMCtl (SVM-03U utility software) (.txt / .dat form) to opened device through I2C bass on SVM-03U board. If plural numbers of devices are opened, file is transmitted to all devices in turn. About format of setting file, please refer to another document.

1. Display I2C Stream Sender dialog. (ExtensionUnit -> I2C Stream Sender)

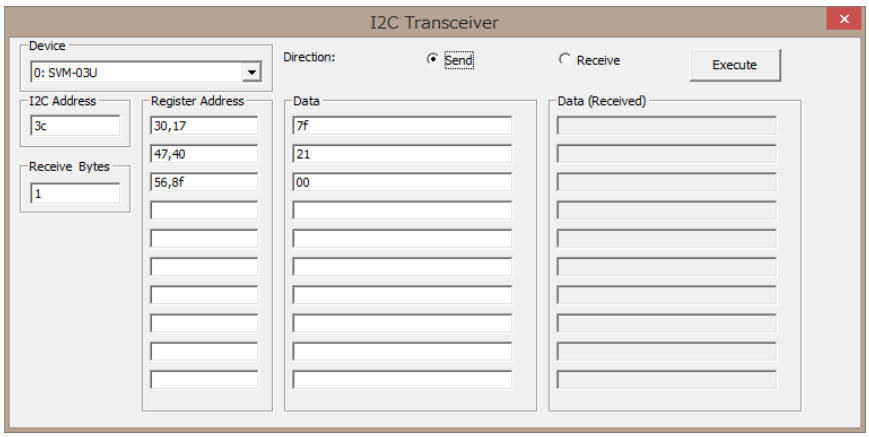



2. Press "Send" button after selecting setting file.
3. If the message of sending is automatically closed, I2C transmitting is finished.

Yet, if errors are occurred at the process of transmitting or Extension Unit DLL is not installed, error message is displayed.

### 3.6.5. Dialog-based I2C Transceiver

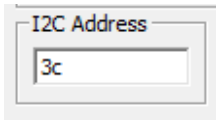
1. Display I2C Transceiver dialog. (ExtensionUnit -> I2C Transceiver)



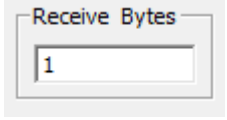

2. Select the device to communicate.

3. Select “Send” or “Receive”.

4. Set slave address (I2C Address).

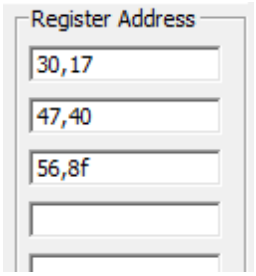



5. Set maximum receive bytes. (in case of receiving)



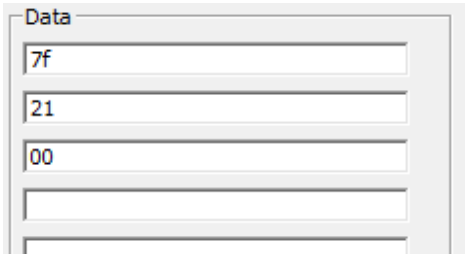

6. Set sub address (Register Address) for number of items.

   (1 – 8 bytes, comma separated value)



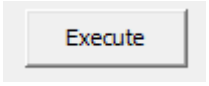

7. Set sending data (Data) for number of items. (in case of sending)

   (1 – (30-(Register Address)) bytes,comma separated value)




8. When you click “Execute” button, transmission or reception is carried out.

   Received data is input in “Data(Received)” box.




*The number of packets that transmit or receive is up to ten.

If Resister Address is blank, it is skipped.

*If the number of bytes that was really received is fewer than set(including reception error), indefinite value is displayed on dialog.

*Format of I2C packet that received and transmitted is shown below.

I2C Packet Format

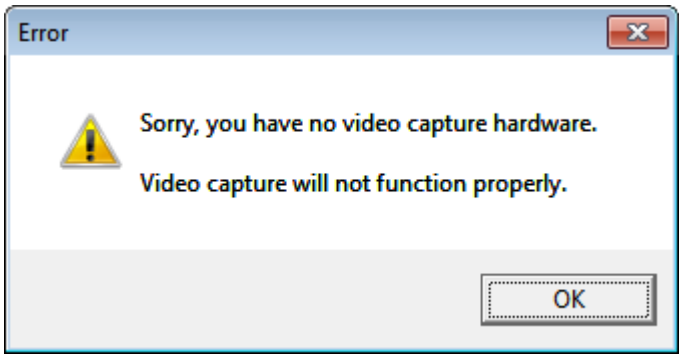
Send Request

Receive Request

S: Start Bit / P: Stop Bit / W: Write Bit (0) / R: Read Bit (1) / A: Ack / N: Nack

# 4. FAQ

- When starting an error dialog as below is shown.



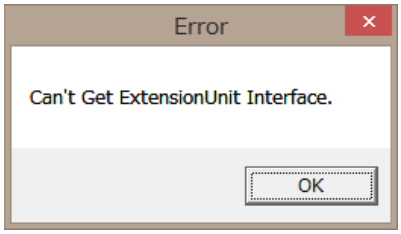

⇒SVM-03U board is not recognized by PC. Because it takes several seconds for starting SVM-03U board, you need to wait a while before starting NVCap after USB connected.

- SVM-03U is recognized, but image is kept black screen and not displayed after starting preview.

⇒ The follwing problems may be caused.

- Connected by USB2.0 cable.
  (USB3.0 cable is required according to resolution and data rate.)
- Image from camera is not received.
  (Please confirm blinking of "VSYNC" LED on board.)
- Resolution set to SVM-03U board is different from the resolution of camera signal.
- The board started in SVM-03 mode.

- The dialog below is displayed by controlling ExtensionUnit menu.




⇒ Installation of Extension Unit DLL is not succeeded.
Please install it according to this document.

- "The side-by-side configuration of this application is incorrect..." error occurs and cannot be started.

⇒ Install "the Microsoft Visual C++ 2008 Redistributable Package (x86)" and "Microsoft Visual C++ 2008 SP1 Redistributable Package (x86)".

# 5. Recommended System Requirements

OS: Windows 7, 8.1 / 64bit, 32bit

CPU: Intel Core i5-4590 3.30 GHz or higher

RAM: 8.0 GB or higher

Connecting through USB 3.0 port

- High-speed storage device such as SSD (Solid State Disk) should be used for multi channel capturing.