SUMIX corporation

Megapixel USB2.0 CMOS

CAMERA

User Guide

SMX-M8xx Series USB2.0 Cameras

SMX-M8XX SERIES USB2.0 CAMERA

USER GUIDE

SMX-M8xx Series USB2.0 Camera User Guide

Revision 2.0

3403 Southwood Dr.

Oceanside, CA 92054

Tel.: (877)233-3385; Fax: (508) 300 5526

Email: camera@sumix.com

www.sumix.com

CONTENTS

Chapter 1

INTRODUCTION

SMX-M8xx Series Cameras - are megapixel CMOS cameras with USB2.0 interface suitable for scientific and industrial applications.

The cameras are designed for capturing, streaming and storing high quality digital images.

The **SMX-M8xx Series Cameras** are available in three modifications:

- **SMX-M81M** (1.3 Megapixel, monochrome)
- **SMX-M82C** (2 Megapixel, color)
- **SMX-M83C** (3 Megapixel, color)

All the **SMX-M8xx Cameras** feature:

- Communication interface - USB2.0
- Form factor - a duralumin housing with C/CS - mount interface

All the **SMX-M8xx Cameras** benefit:

- High speed
- Low power consumption
- No external power supply required
- Ease of use
- Compact size

The programmable functions include viewport window settings, adjustable exposure time and gain, selectable sensor clock frequency and image decimation, flipping image horizontally and vertically. The **SMX-M8xx Series Camera** can be used in microscopy, video conferencing, webcasting, surveillance and security systems, etc.

Camera Specifications

Table 1-1 *Output Video and Camera Control Characteristics*

	SMX-M81M Camera	SMX-M82C Camera	SMX-M83C Camera
Maximum resolutions of output window	1280x1024, full resolution mode	1600 x 1200, full resolution mode	2048 x 1536, full resolution mode
Max Frame rate at resolution (24MHz)*	15 fps at 1280 x 1024 24 fps at 1024 x 768 37 fps at 800 x 600 40 fps at 768 x 576 54.7 fps at 640 x 480 89.5 fps at 400 x 400 166 fps at 320x240	10 fps at 1600x1200 14 fps at 1280 x 1024 22.7 fps at 1024 x 768 34.6 fps at 800 x 600 37 fps at 768 x 576 50 fps at 640 x 480 79.6 fps at 400 x 400 145 fps at 320x240	6 fps at 2048x1536 10 fps at 1600x1200 13.9 fps at 1280 x 1024 21.9 fps at 1024 x 768 33 fps at 800 x 600 35.7 fps at 768 x 576 48 fps at 640 x 480 75 fps at 400 x 400 138.5 fps at 320x240
Output bit per pixel	Selectable, 8 bits or 10 bits	Selectable, 8 bits or 10 bits	Selectable, 8 bits or 10 bits
Lookup table	Software, converts 10 bits of imaging chip's ADC to 8 bits of output for user selected 8 bits mode	Software, converts 10 bits of imaging chip's ADC to 8 bits of output for user selected 8 bits mode	Software, converts 10 bits of imaging chip's ADC to 8 bits of output for user selected 8 bits mode
Pixel rates	12 MHz, 24 MHz	12 MHz, 24 MHz	12 MHz, 24 MHz
Exposure range	0.06 - 65.7 ms (24 MHz, 1280 x 1024, 1:1); More than 2 sec with fps decrease	0.07 - 96.91 ms (24 MHz, 1600 x 1024, 1:1); More than 2.5 sec with fps decrease	0.09 - 156.92 ms (24 MHz, 2048 x 1536, 1:1); More than 200 sec with fps decrease
Pixel Gain Control	Programmable (Hardware): 48 gain levels from 1 to 15	Programmable (Hardware): 48 gain levels from 1 to 15 Gain controls for R, G, B: 48 gain levels from 1 to 15	Programmable (Hardware):161 gain levels from 1 to 128 Gain controls for R, G, B: 161 gain levels from 1 to 128

Table 1-1 *Output Video and Camera Control Characteristics*

	SMX-M81M Camera	SMX-M82C Camera	SMX-M83C Camera
Output window modes	View port (from 1280 x 1024 to 8 x 8 with 2 pixels/2 lines step positioning) Frame Decimation (1:1, 1:2, 1:4, 1:8) Horizontal mirroring, hardware Vertical flipping, hardware	View port (from 1600 x 1200 to 8 x 8 with 2 pixels/2 lines step positioning) Frame Decimation (1:1, 1:2, 1:4, 1:8) Horizontal mirroring, hardware Vertical flipping, hardware	View port (from 2048 x 1536 to 8 x 8 with 2 pixels/2 lines step positioning) Frame Decimation 1:1, 1:2, 1:3, 1:4, 1:5, 1:6, 1:7, 1:8 Frame Binning: 1:1, 1:2, 1:3, 1:4 Horizontal mirroring, hardware Vertical flipping, hardware
Gamma, brightness and contrast control	Programmable with lookup table, software gamma correction	Programmable with lookup table, software gamma correction	Programmable with lookup table, software gamma correction

* Listed frame rate values at the defined resolutions are not the maximal possible. Increasing of frame rate can be done by reducing the current Exposure value (the lower Exposure the higher frame rate), hiding the active video window from the display, running the camera with a fast speed computer, etc

Table 1-2 *Imaging Chip Characteristics*

	SMX-M81M Camera	SMX-M82C Camera	SMX-M83C Camera
Type	Mono inch 1.3 megapixel CMOS sensor manufactured by Micron Technology, Inc	Color inch 2 megapixel CMOS sensor manufactured by Micron Technology, Inc	Color inch 3 megapixel CMOS sensor manufactured by Micron Technology, Inc
Pixel Size	5.2 um x 5.2 um	4.2 um x 4.2 um	3.2 um x 3.2 um
Image Array Size	8.4 mm diagonal	8.4 mm diagonal	8.4 mm diagonal
Shutter	Rolling	Rolling	Rolling (Optional Global Reset)
Scanning mode	Progressive	Progressive	Progressive
ADC Resolution	10 bit	10 bit	10 bit
Sensitivity	2.1 V/lux-sec	1.2 V/lux-sec (550nm)	>1.0 V/lux-sec (550nm)
Dynamic Range	68.2dB	>61dB	61dB

Table 1-3 *Camera Electrical Characteristics*

	SMX-M81M Camera	SMX-M82C Camera	SMX-M83C Camera
Supply Voltage	5 V supplied by USB2.0 interface	5 V supplied by USB2.0 interface	5 V supplied by USB2.0 interface

Table 1-4 *Camera Physical Characteristics*

	SMX-M81M Camera	SMX-M82C Camera	SMX-M83C Camera
Operating Temperature	0 to +70 C	0 to +60 C	0 to +60 C
Dimensions, L x D	46 x 31.5 mm	46 x 31.5 mm	46 x 31.5 mm
Lens Mount Type	C/CS - mount	C/CS - mount	C/CS - mount
Camera Housing material	Duralumin	Duralumin	Duralumin

Table 1-5 *Camera Interface Characteristics*

	SMX-M81M Camera	SMX-M82C Camera	SMX-M83C Camera
Interface Type	USB2.0, 480Mbps	USB2.0, 480Mbps	USB2.0, 480Mbps
Connector Type	USB mini-B, 5 pin	USB mini-B, 5 pin	USB mini-B, 5 pin

Table 1-6 *System Requirements*

	SMX-M81M Camera	SMX-M82C Camera	SMX-M83C Camera
Operating System	Windows XP Professional SP1or SP2 Windows Server 2003 SP1	Windows XP Professional SP1or SP2 Windows Server 2003 SP1	Windows XP Professional SP1or SP2 Windows Server 2003 SP1
Processor	Pentium 4, 3 GHz or higher, HT or dual-core recommended	Pentium 4, 3 GHz or higher, HT or dual-core recommended	Pentium 4, 3 GHz or higher, HT or dual-core recommended
RAM	256MB, recommended 384Mb	256MB, recommended 384Mb	256MB, recommended 384Mb
Hard Disk Space	5 MB for installation plus additional space for captured images	5 MB for installation plus additional space for captured images	5 MB for installation plus additional space for captured images
Video	24 bit True Color, 8 MB video memory	24 bit True Color, 8 MB video memory	24 bit True Color, 8 MB video memory

Table 1-6 *System Requirements*

	SMX-M81M Camera	SMX-M82C Camera	SMX-M83C Camera
USB	USB2.0 Host Controller, recommended Intel integrated host controller	USB2.0 Host Controller, recommended Intel integrated host controller	USB2.0 Host Controller, recommended Intel integrated host controller

SMX-M8xx Camera Kit

The **SMX-M8xx Camera Kit** includes the following items:

- The SMX-M8xx Series Camera
- The SMX-M8xx Series USB2.0 Cameras Software Package which is available for downloading via the provided URL
- USB A to USB mini-B cable (optional)
- Tripod adapter (optional)
- C-mount adapter with IR-cut filter (optional)
- C-mount adapter (optional)

Chapter 2
INSTALLATION

Install (if needed) USB2.0 adapter card into your PC. Install all required drivers. Refer to your USB2.0 adapter card manufacturer's User Guide for detailed instructions for hardware and software installation.

Automatic Camera Installation

Browse to the downloaded via URL **SMXM8X_CD** folder. Open **setup.exe** to start the **SMX-M8xx Series USB2.0 Software Package** installation.

Welcome to the SMX-M8x USB2.0 Camera Software Setup Wizard will appear (see Figure 2-1 Welcome to the SMX-M8xx USB2.0 Camera Software Setup Wizard window).

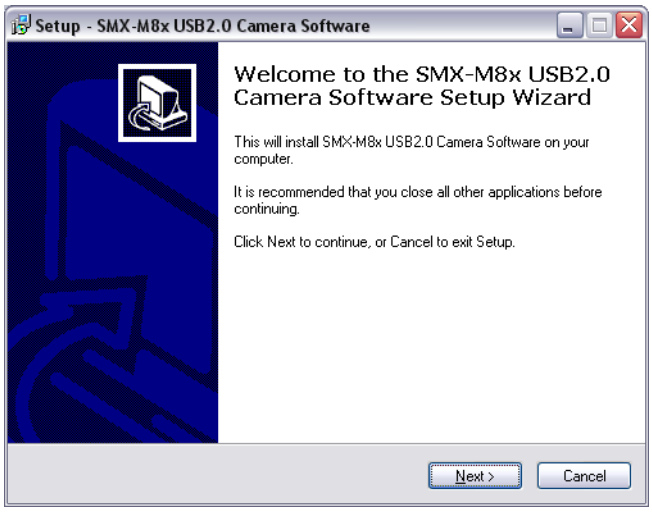


Figure 2-1 *Welcome to the SMX-M8xx USB2.0 Camera Software Setup Wizard window*

In order to proceed with the **SMX-M8xx USB2.0 Camera Software Package** installation click the **Next** button.

On the third step the **SMX-M8xx USB2.0 Camera Software Setup Wizard** will determine whether your system configuration meets system requirements of the **SMX-M8xx USB2.0 Camera** (see Table 1-6 System Requirements).

The following system information will be displayed:

- OS version
- USB2.0 Host Controller availability
- Memory Size

- CPU Speed

Each point of the system information will be marked by its status according to the compatibility with the **SMX-M8xx USB2.0 Camera.**

The current system information will be marked as one of the following:

- Ok (Found - for USB2.0 Host Controller)
- Warning
- Fail

System information that completely satisfy the **SMX-M8xx USB2.0 Camera** requirements will be marked by **Ok** (for USB2.0 Host Controller - **Found**). In this case the **SMX-M8xx USB2.0 Camera** will work properly (see Figure 2-2 Setup Wizard, System information window: the case of satisfactory system configuration).

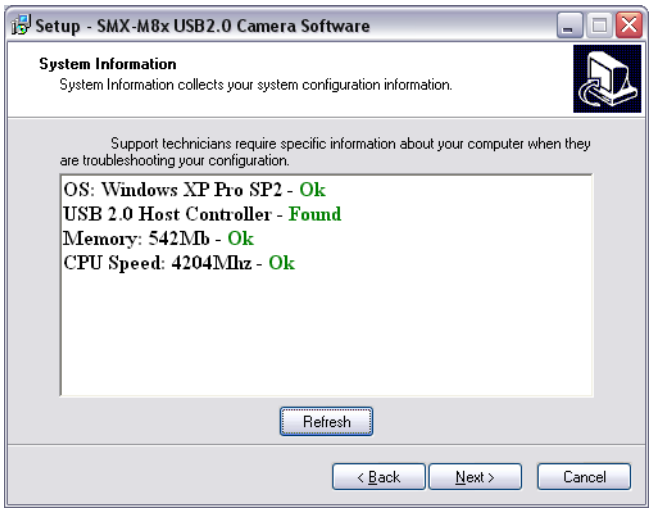


Figure 2-2 *Setup Wizard, System information window: the case of satisfactory system configuration*

The **Warning** status will be displayed in cases when the **SMX-M8xx USB2.0 Camera** can be installed but might not work properly (see Figure 2-3 Setup Wizard, System information window: the case of warning system configuration).

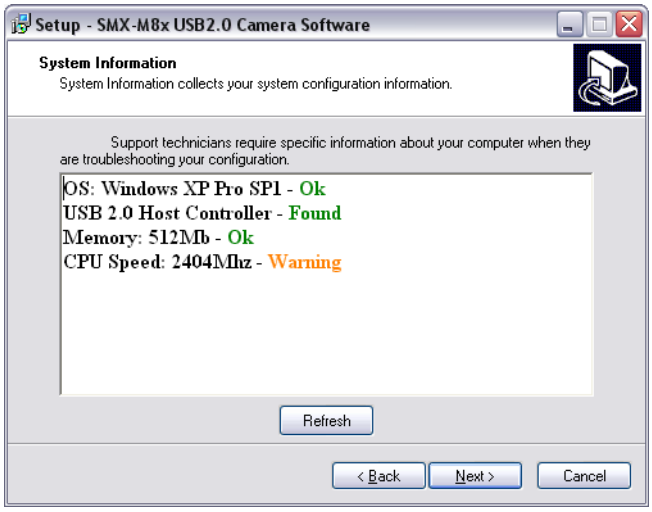


Figure 2-3 *Setup Wizard, System information window: the case of warning system configuration*

The **Fail** status will be displayed in cases when the **SMX-M8xx USB2.0 Camera** will not work at all with current system configuration (see Figure 2-4 The SMX-M8xx Setup Wizard: failed to detect USB2.0 Host Controller).

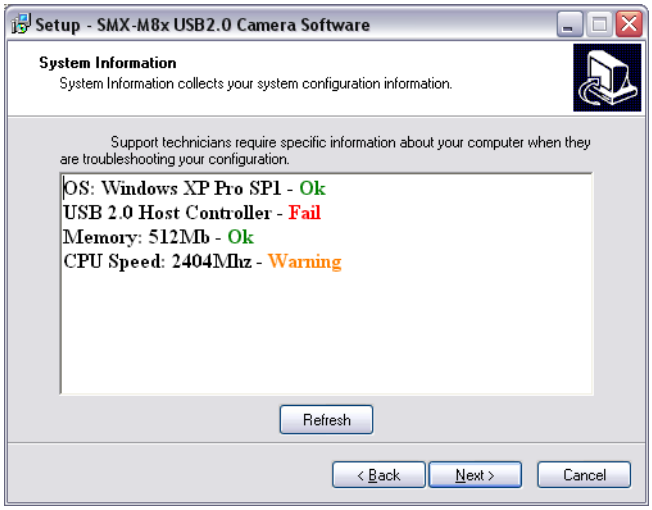


Figure 2-4 *The SMX-M8xx Setup Wizard: failed to detect USB2.0 Host Controller*

In any of these cases click the **Next** button.

If the system information was marked as **Warning** or **Fail**, the Error message will appear and you will be asked to update your system configuration (see Figure 2-5 Error message box when the SMX-M8xx Setup Wizard failed to detect USB2.0 Host Controller).

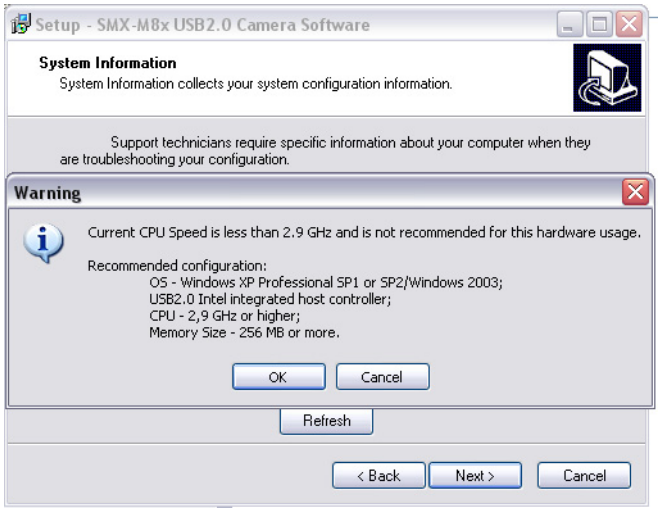


Figure 2-5 *Error message box when the SMX-M8xx Setup Wizard failed to detect USB2.0 Host Controller*

Note: *It is recommended to update your system configuration in the case of **Warning** status, otherwise the device might not work properly*

*It is strongly recommended to update the system configuration in the case of **Fail** status, otherwise the device will not work at all*

If all the system information was marked as **Ok**, the next window of the **SMX-M8xx USB2.0 Camera Setup Wizard** will appear. Follow easy-on-screen recommendations and when ready press the **Install** button (see Figure 2-6 The SMX-M8xx Setup Wizard: ready to install).

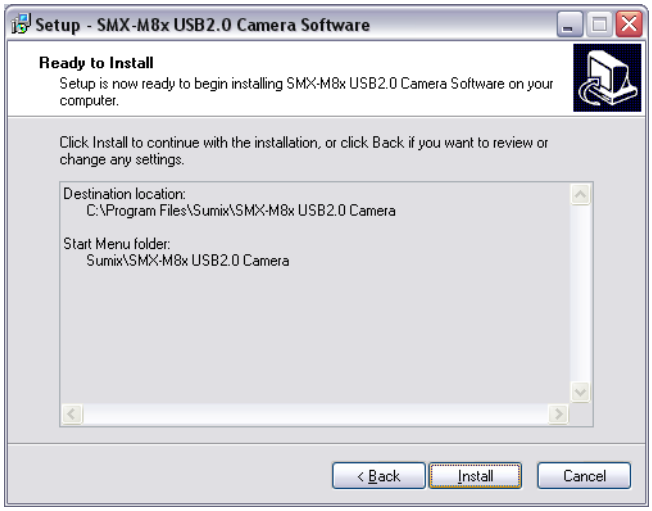


Figure 2-6 *The SMX-M8xx Setup Wizard: ready to install*

The **SMX-M8xx USB2.0 Camera Setup Wizard** will install the **SMX-M8xx USB2.0 Camera Software Package** and **USB2.0 camera driver**.

When done, in the **Completing the SMX-M8xx USB2.0 Camera Software Setup Wizard** window additionally choose:

- Install a TWAIN driver (see chapter "Guidelines for Using TWAIN Driver")
- Create Desk Top icon
- Create Quick Launch icon
- Launch the SMX-M8xx USB2.0 Camera Application Program after finishing

Click the **Finish** button and wait while TWAIN and/or Direct Show drivers are installed, if it was selected (see Figure 2-7 Completing the SMX M8x USB2.0 Camera Software Setup Wizard).

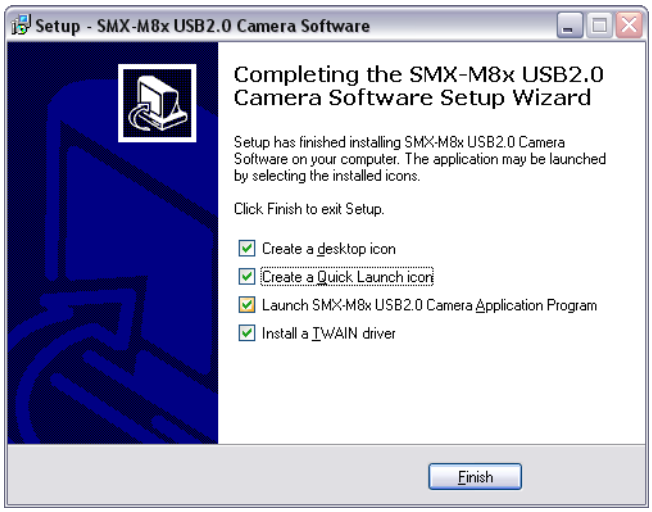


Figure 2-7 *Completing the SMX M8x USB2.0 Camera Software Setup Wizard*

Note: *TWAIN driver can be also installed separately, using the \Sumix\SMXM8xx USB2.0 Camera\Drivers\TWAIN folder. Browse the Sumix folder that appears after the **SMX-M8xx USB2.0 Camera Software Setup Wizard** installation and run the TWAIN driver setup (see chapter "Installation")*

Manual Hardware Installation

The camera installation using the **Found New Hardware Wizard** on Windows XP operating system is described below. On Windows 2000 the installation wizard slightly differs, although, it is built on the same principles.

Note: *The details in the look of the screenshots may vary depending on your operating system version and configuration*

Connect the camera to your computer with the USB cable. The **Found New Hardware** message will appear in the right corner of the Taskbar (see Figure 2-8 Found New Hardware message in the Task bar).

Figure 2-8 *Found New Hardware message in the Task bar*

Then the **Found New Hardware Wizard** will start up (see Figure 2-9 Found New Hardware Wizard: welcome window).

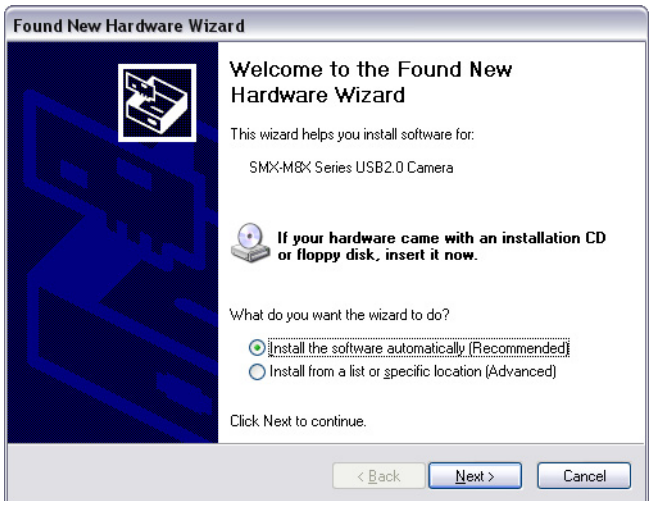


Figure 2-9 *Found New Hardware Wizard: welcome window*

Leave as it is suggested by default '**Install the software automatically (Recommended)**' and click the **Next** button to go to the next step of the device installation.

The **Found New Hardware Wizard** automatically will search for the software for your video device (see Figure 2-10 Found New hardware Wizard: searching for needed files).

Figure 2-10 *Found New hardware Wizard: searching for needed files*

You may be prompted for manufacturer's disk to be inserted (see Figure 2-11 Found New Hardware Wizard: Insert Disk message box).

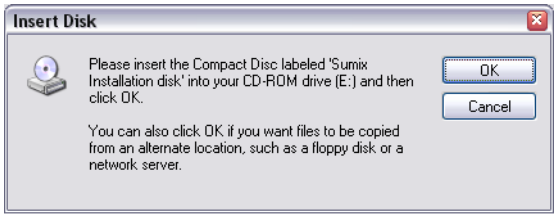


Figure 2-11 *Found New Hardware Wizard: Insert Disk message box*

Browse to the **SMXM8X.inf** file which is normally located in the **Drivers** folder of the **SMXM8X_CD** (see Figure 2-12 Found New Hardware Wizard: Files Needed message box).

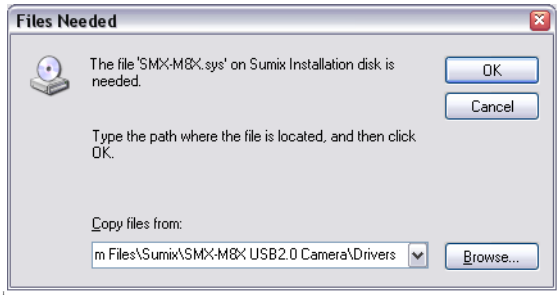


Figure 2-12 *Found New Hardware Wizard: Files Needed message box*

When done, the **Driver Files Search Results** window will be displayed (see Figure 2-13 Completing the Found New Hardware Wizard).

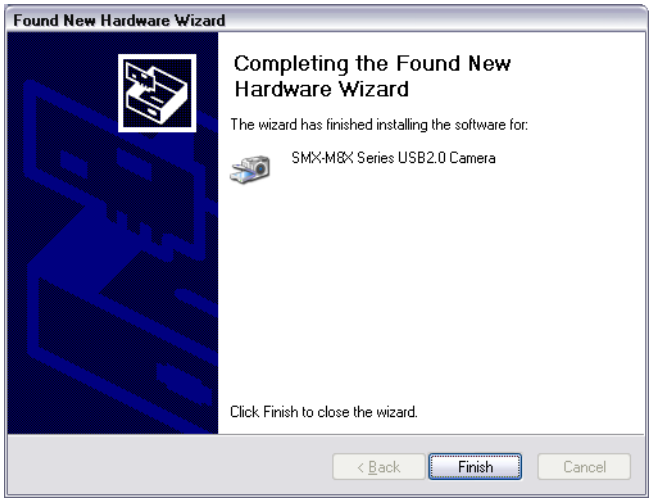


Figure 2-13 *Completing the Found New Hardware Wizard*

Press the **Finish** button. Windows will warn you that the **SMX-M8xx Camera driver** does not contain Microsoft digital signature. In order to proceed with the camera installation click **Continue anyway** (**Yes** in Windows 2000) in the Digital Signature window (see Figure 2-14 Software has not passed Windows Logo Testing message box).

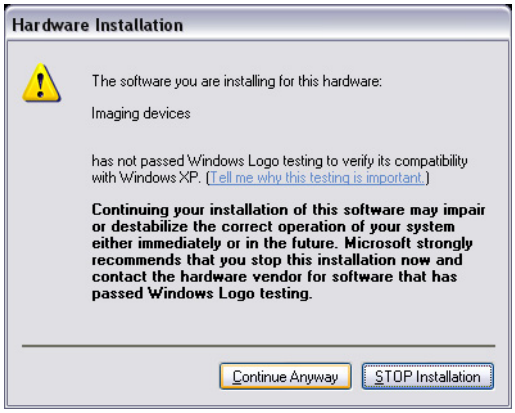


Figure 2-14 *Software has not passed Windows Logo Testing message box*

Removing the SMX-M8xx Camera

Removing the Software

To remove the **SMX-M8xx USB2.0 Camera Software Package** click **Start > Control Panel > Add/Remove Programs** (**Start >Settings> Control panel > Add or Remove Programs** under **Windows 2000**). Find the **SMX-M8x USB2.0 Camera Software** in the registered applications list (see Figure 2-15 Removing the SMXM8xx USB2.0 Camera Software) and click the **Change/Remove** button. A message to confirm the removal will appear (see Figure 2-16 Removal Application Prompt).

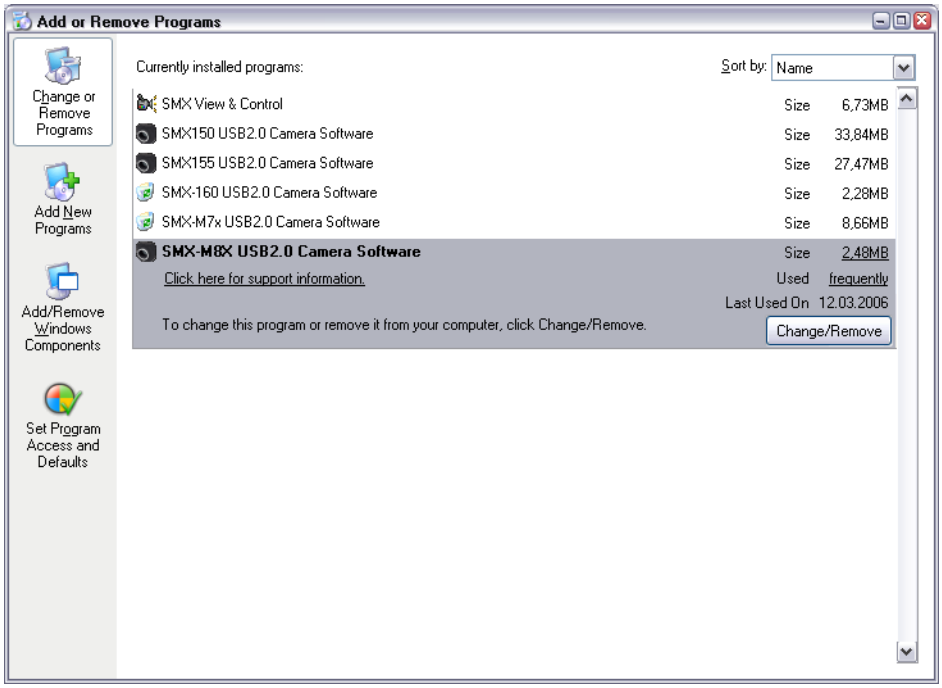


Figure 2-15 *Removing the SMXM8xx USB2.0 Camera Software*

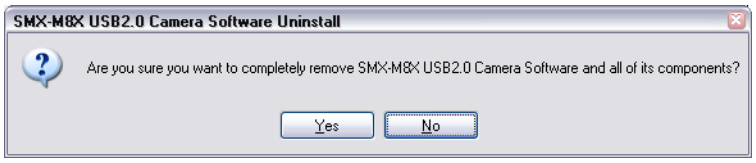


Figure 2-16 *Removal Application Prompt*

To remove the **SMXM8xx Camera Application**, click **Yes**. The **SMX-M8xx Camera Software** will be removed from your computer.

Removing the Hardware

To remove the **SMX-M8xx USB2.0 Camera** from your computer, connect the camera and click **Start > Control panel > System** (under **Windows 2000** click **Start > Settings > Control Panel > System**).

In the **System Properties** window, select the **Hardware** tab and click the **Device Manager** button (see Figure 2-17 System Properties window).

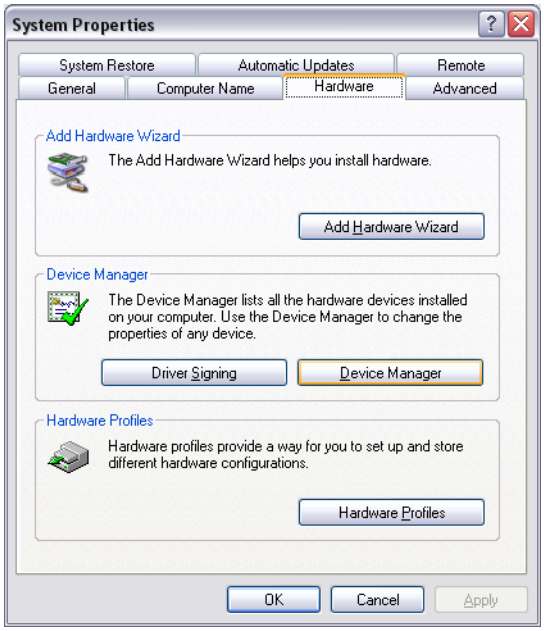


Figure 2-17 *System Properties window*

The **Device Manager** window will open. Choose **Imaging devices** and do the following:

1. Highlight the SMX-M8xx Series USB2.0 Camera
2. Right-click and select Uninstall (see Figure 2-18 Device Manager window: removing the SMX-M8xx Series USB2.0 Camera)
3. Click OK in the Confirm Device Removal prompt (see Figure 2-19 Confirm Device Removal prompt)

The **SMX-M8xx USB2.0 Camera** will be removed from your computer.

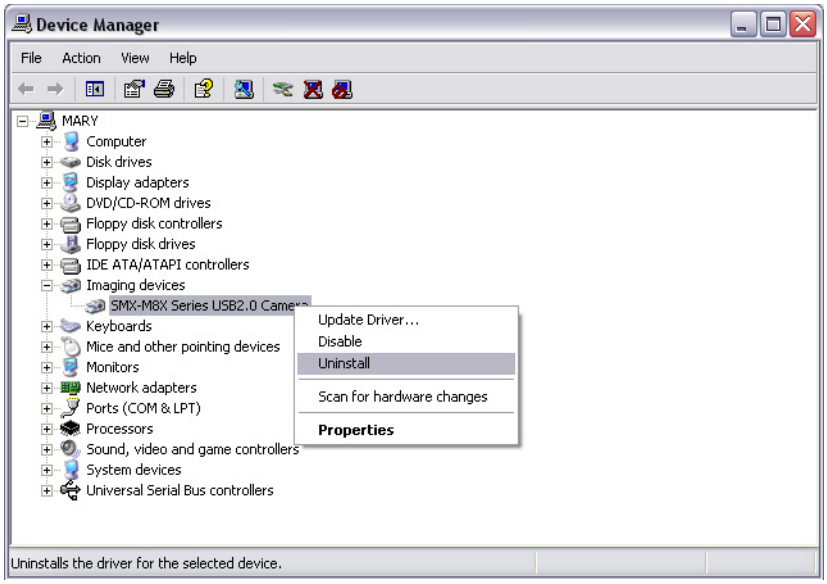


Figure 2-18 *Device Manager window: removing the SMX-M8xx Series USB2.0 Camera*

Figure 2-19 *Confirm Device Removal prompt*

Updating the Hardware

To update the **SMX-M8xx USB2.0 Camera** with a newer driver, do the following:

1. Connect the camera to your computer
2. Open the Device Manager window (Start> Settings> Control Panel> System> Hardware tab)
3. Click Imaging devices, then SMX-M8xx Series USB2.0 Camera
4. Right-click and select Update Driver... (see Figure 2-20 Device Manager window: updating of the SMX-M8xx USB2.0 Camera driver)
5. Run the Hardware Update Wizard that will appear - follow easy-on-screen instructions that the Wizard will suggest (see Figure 2-21 Hardware Update Wizard: welcome window)

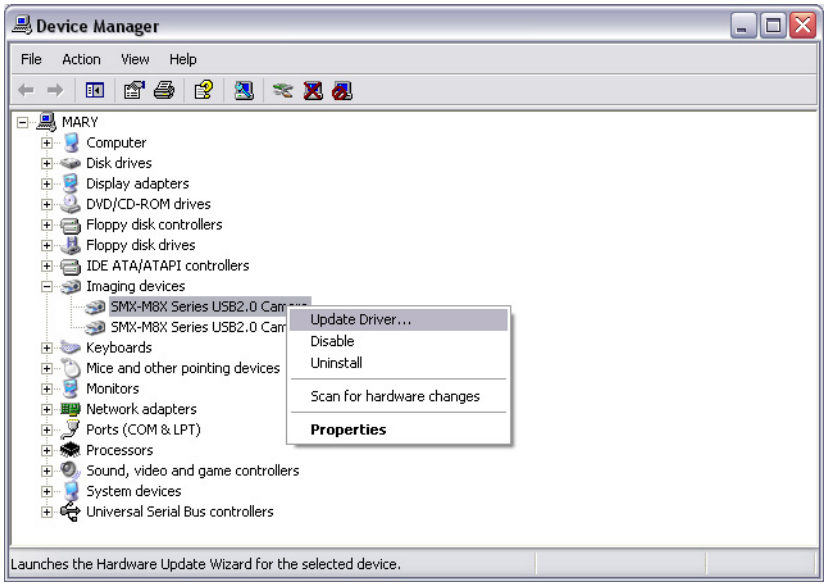


Figure 2-20 *Device Manager window: updating of the SMX-M8xx USB2.0 Camera driver*

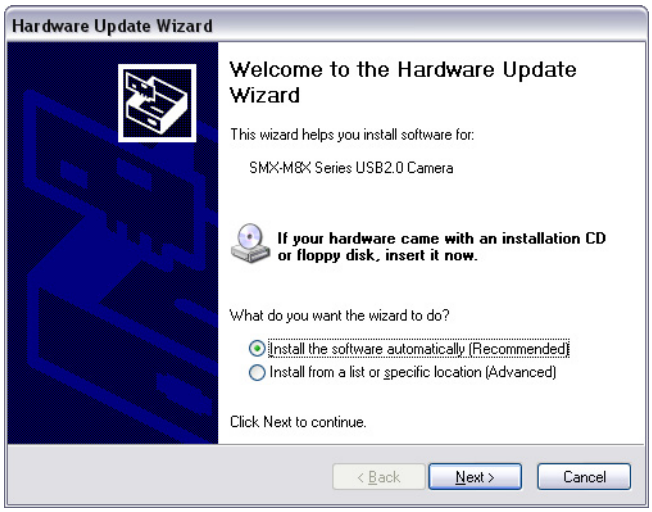


Figure 2-21 *Hardware Update Wizard: welcome window*

Note *Refer to the Camera Installation Troubleshooter if you face problems during the camera installation (***)*

Chapter 3

GETTING STARTED

To start the **SMX-M8xx** camera, connect it with the **USB cable** to your computer. Since the camera is already installed (see chapter "Automatic Camera Installation", see chapter "Manual Hardware Installation"), the corresponding icon should appear in the right corner of the Taskbar:

Note *If no icon appears, refer to the Troubleshooter chapter of this Document and learn how to fix this problem*

To start the **SMX-M8X Camera Application** open **Start> Programs> Sumix > SMX-M8X USB2.0 Camera > SMX-M8X> USB2.0 Camera Application Program** (see Figure 3-1 Opening the SMX-M8xx Camera Software).

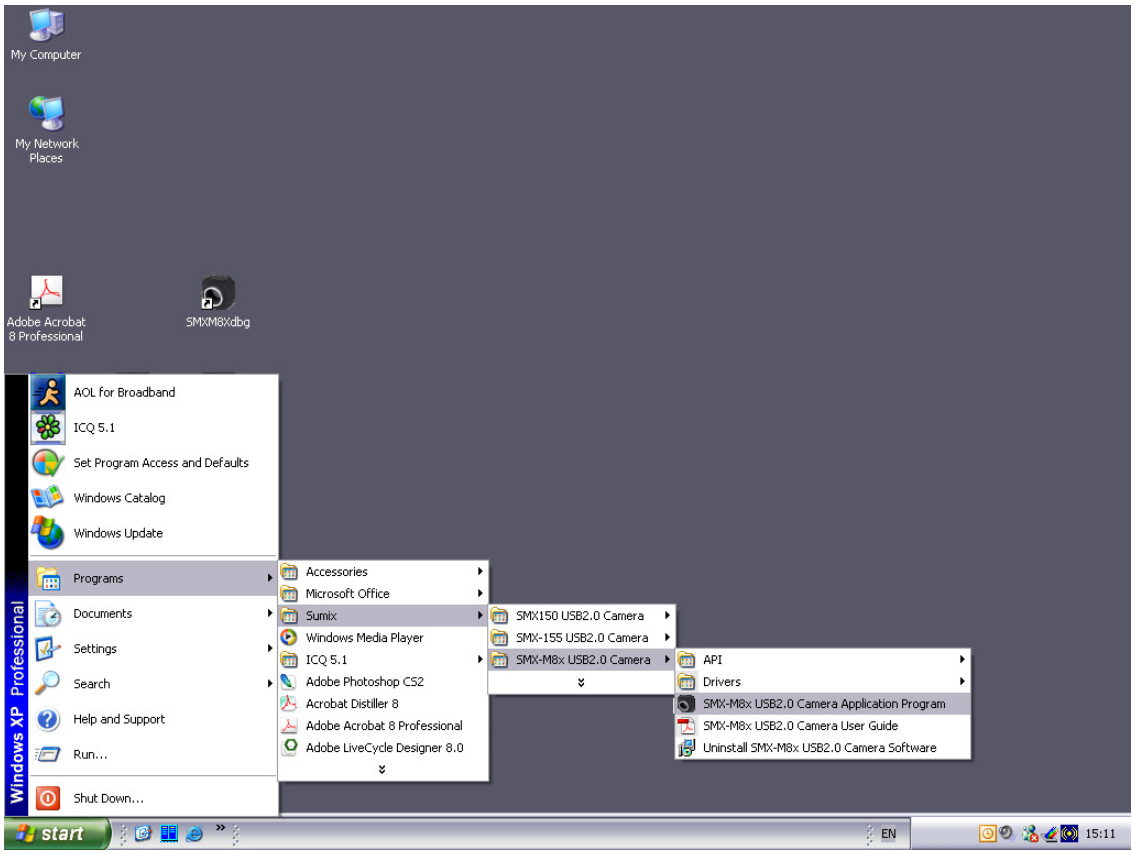


Figure 3-1 *Opening the SMX-M8xx Camera Software*

The **SMX-M8X Camera Application** will start and you will see its main window (see Figure 3-2 The SMX-M8X Camera Application main window outlook).

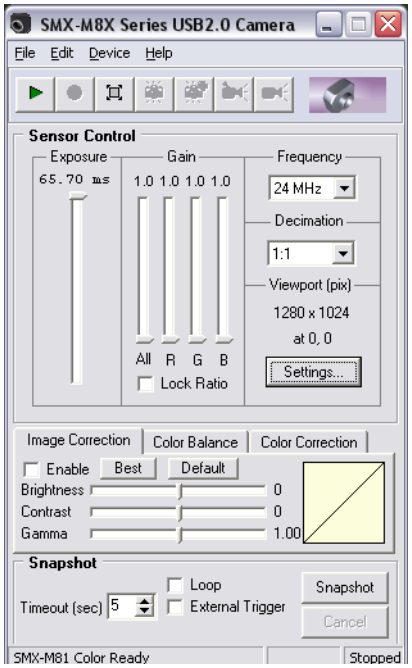


Figure 3-2 *The SMX-M8X Camera Application main window outlook*

To see the video captured by the camera, press **F5** or click the **Start Video** button:

The View window will appear (see Figure 3-3 The SMX-M8X View).

Figure 3-3 *The SMX-M8X View*

The **SMX-M8xx Camera Application** consists of 3 main parts:

- Application main window
- Histogram
- Device Settings window

Application main window contain:

- Sensor Controls, Image Correction
- Color Balance and Color Correction Controls (for color models only)
- Snapshot options

Histogram is reflecting all color settings that were done with the camera.

Device Settings window consists of:

- Standard camera information
- Color mode changing
- Image flipping
- Averaging frames
- Exposure limiting
- Frame rate controlling
- Standard program options
- 8/10 bit modes

- Limit Gain 10
- Filtering

Chapter 4

Sensor Control

Exposure

The camera **Exposure** parameter is similar to exposure notion in photography. It defines time for which the sensor elements are gathering the energy of light.

Use the **Exposure** slider to adjust the camera exposure time. The current exposure time in **milliseconds (ms)** is displayed above the control. This value depends on viewport height, decimation and sensor frequency.

To perform **Autoexposure**, in the **Device** menu select the **Auto Exposure** command or simply press **E** keyboard.

Gain

Use the **Gain** controls to change the signal gain of the sensor. Increasing **Gain** is reasonable when light condition is poor and increasing time of exposure does not help. For color models Gain can be controlled independently for **Red**, **Green** and **Blue** channels (**R, G, B**).

Checking the **Lock Ratio** checkbox allows controlling gain on three channels simultaneously keeping the fixed **R, G, B** gain ratio.

All the **Gain** sliders control the camera's hardware gain amplifier. The **R, G** and **B** gain sliders control the software gain for each color channel.

Use the '**White balance (Hard)**' menu item (**Device> White Balance (Hard)** or the '**Alt+W**' keyboard shortcut to balance **Gain** of all three channels so they are equally intense.

Note: *The **R, G, B** channels are disabled when running the **SMX-M81M Camera**, as well as **White Balance (Soft)** and **White Balance (Hard)***

Note: ***Auto Exposure** is done automatically every time **White Balance (Hard)** is performed*

Frequency

This control defines the pixel clock frequency of the sensor. The lower **Frequency**, the higher maximum possible **Exposure** time and the lower **Frame Rate** (see chapter "Frame Rate Control"). Use the dropdown menu (near the **Gain** and **Exposure** controls) to define **Frequency**.

Decimation

Use the **Decimation** control to decimate (sub-sample) the picture by 2, 4, etc. The decimation means excluding pixels and rows from the scan process (e.g. every second pixel and second row for the 1:2 decimation). This mode thus allows viewing the full picture at the higher **Frame Rate** (see chapter "Frame Rate Control"). The decimation can be used for preview, when the full 1600x1200 image displayed as 800x600 with the frame rate twice higher. Use its dropdown menu to change **Decimation**.

Viewport Settings

Viewport is a rectangular area of the sensor on which the image is scanned. It can have variable size, from the smallest area of 8x8 pixels to the full field of view of the sensor. The smaller the size of the **Viewport**, the faster the scan process, and the higher **Frame Rate** (see chapter "Frame Rate Control"). To open the **Viewport Settings** dialog (see Figure 4-1 Viewport Setting dialog: the case of the SMX-M82C Camera), press **Alt+V** or click the corresponding button on the toolbar:

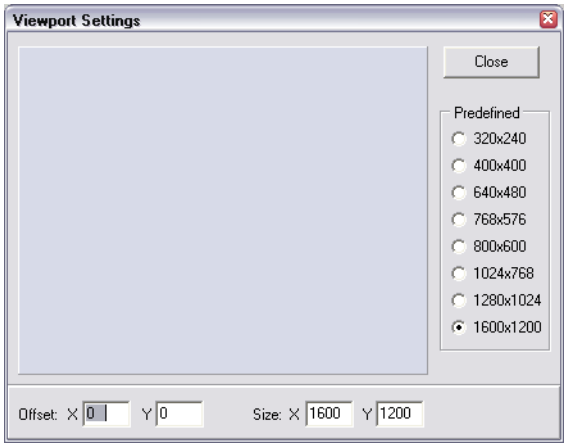


Figure 4-1 *Viewport Setting dialog: the case of the SMX-M82C Camera*

The blue rectangle represents the current viewport window related to the full possible field of view. Drag the rectangle across the full resolution area for the viewport panning. The changes are displayed in the View window immediately.

Use the boxes in the bottom part to set the viewport offset and size manually and click the **Apply** button to apply the settings. The values should be divisible by 8 and will be rounded and applied automatically within 2 seconds after last keystroke.

Use one of the radio buttons on the **Predefined** control to set one of the predefined viewport sizes. The Viewport rectangle position may also be changed by dragging the video image in the View window.

Image Correction

The **Image Correction** controls are designed for setting up the camera's **Brightness**, **Contrast** and **Gamma** (see Figure 3-2 The SMX-M8X Camera Application main window outlook).

This correction is done programmatically by the camera firmware using the conversion (look-up) table of the values. The correction does not affect any electrical settings of the camera. To use the **Image Correction** controls, check the **Enable** command - **Brightness**, **Contrast** and **Gamma** become editable.

The default values of **Brightness**, **Contrast** and **Gamma** are set to **0; 0; 1, 00**, respectively.

You can restore the default values of the I**mage Correction** controls on any step of changes: simply click the **Default** button on the **Image Correction** tab.

The **Best** button, if applied, activates application to transform the look-up table of 8 and10 bit to increase the dynamic range.

Note: *The **SMX-M8xx Camera Software** does not display changes of the **Image Correction** look -up table when the **Best** button is applied*

With every change of any image correction controls, you can view a graphical interpretation of the dependence of the image's changes on the changes of the **Image Correction** controls (see Figure 3-2 The SMX-M8X Camera Application main window outlook).

Note: *The default values of **Image Corrections** are the most suitable and recommended for performing **White Balance (Hard)***

Color Balance

The **Color Balance** controls are designed to adjust the ratio of the main induced color components (**Red**, **Green** and **Blue**) on the image that is displayed by the camera software.

This correction is done on the software level and does not affect any electrical settings of the camera (see Figure 4-2 The SMX-M8X Camera Application Color Balance Controls).

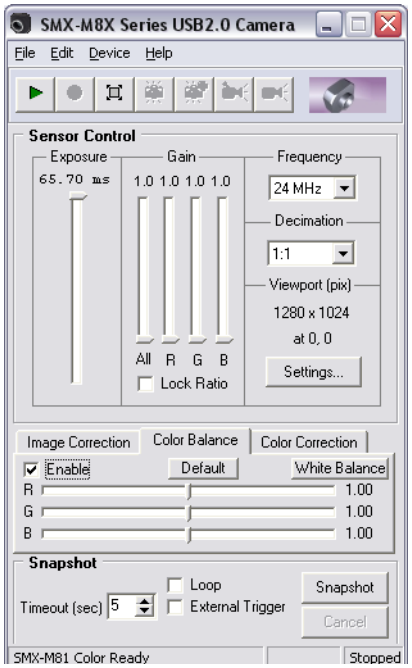


Figure 4-2 *The SMX-M8X Camera Application Color Balance Controls*

To use the **Color Balance** controls, check the **Enable** command - the **R**, **G** and **B** sliders becomes editable.

Use the **White Balance (Soft)** button for balancing white color (same can be done on **Device> White Balance (Soft)** or with the '**W**' keyboard accelerator) in the **Color Balance** tab.

The **Default** button restores the default values of the **Color Balance** controls: **1, 00; 1, 00; 1, 00**, respectively.

A single step of each **Color Balance** control is 10 times smaller than **R**, **G**,

B (Gain) of **Sensor Controls**, so all changes of **Color Balance** are performed with more exactness than using **R, G, B (Gain)** of **Sensor Controls**.

Note: *The difference between **White balance (Soft)** and **White Balance (Hard)** is as follows. The **White Balance (Soft)** operation is done only on the software level, so it changes the **Color Balance Controls**. The **White Balance (Hard)** operation is done programmatically by the camera firmware, so it changes **R, G** and **B (Gain)** of **Sensor Controls***

Note: *It is not recommended to perform **White Balance (Hard)** when **White Balance (Soft)** is already performed. It may cause the image colors distortion*

Note: *The **Color Balance** tab is disabled when running the **SMX-M81M Camera** (see Figure 4-4 Application's main window outlook when using the SMX-M81M Camera)*

Color Correction

The **Color Correction** controls are designed to adjust the intensity of the color properties (**Brightness**, **Contrast** and **Saturation**) of the image that is displayed by the camera.

This correction is also done on the software level and does not affect any electrical settings of the camera.

Check the **Enable** command to make the **Color Correction** controls available.

Use the **Default** button to restore the default values of **Brightness**, **Contrast** and **Saturation** - **0,0; 1,00; 1,00**, respectively (see Figure 4-3 The SMX-M8X Camera Application Color Correction Controls).

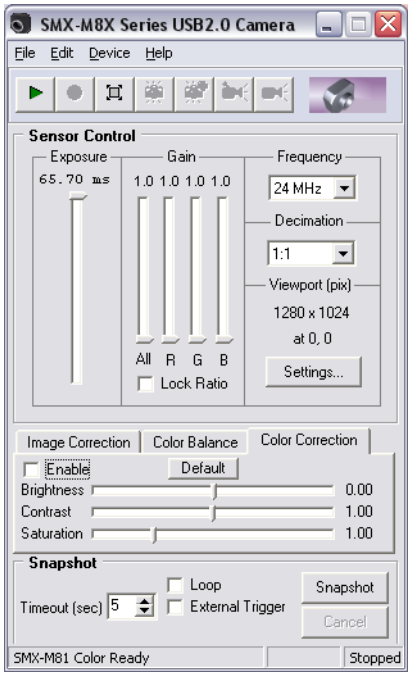


Figure 4-3 *The SMX-M8X Camera Application Color Correction Controls*

Note: *Use of the Controls done on the software level (**Color Balance, Color Correction, White Balance (Soft)**, etc) may cause an overloading of the computer's processor, especially when more than one camera is running*

Note: *The **Color Correction** tab is disabled when running the **SMX-M81M Camera** (see Figure 4-4 Application's main window outlook when using the SMX-M81M Camera)*

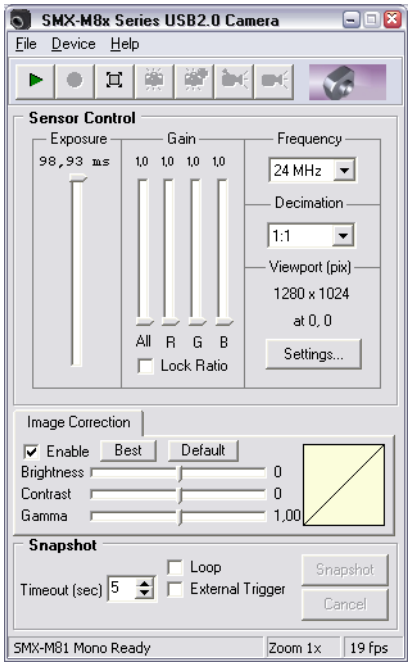


Figure 4-4 *Application's main window outlook when using the SMX-M81M Camera*

Chapter 5

SNAPSHOTS

Snapshots Basics

The **SMX-M8xx Series Camera** has two modes of operation: **Video** and **Snapshot**. When the camera is not in the **Video** mode, it is possible to take a **Snapshot** - to capture a still image. For the SMX-M8xx series cameras a **Snapshot** can be triggered by software only.

Video is the normal mode when the camera is giving out the image data. The mode is **On** when **View** window is open. The **Snapshot** mode forces the camera to capture the still image (a single frame).

To take a **Snapshot** from the camera, use the **Snapshot** section of the **SMX-M8X Series USB2.0 Camera** window. Remember that you need to **Stop Video** (**Shift+F5**) in order to turn on the **Snapshot** mode.

The **Snapshot** button starts the snapshot process.

To take a **Snapshot** using software trigger, do the following:

1. Turn the video mode off(**Shift+F5**)
2. Set **Exposure**, **Gain**, **Viewport**, etc
3. Click the **Snapshot** button or press **F9**

The **Snapshot View** window will open (see Figure 5-1 The Snapshot View window).

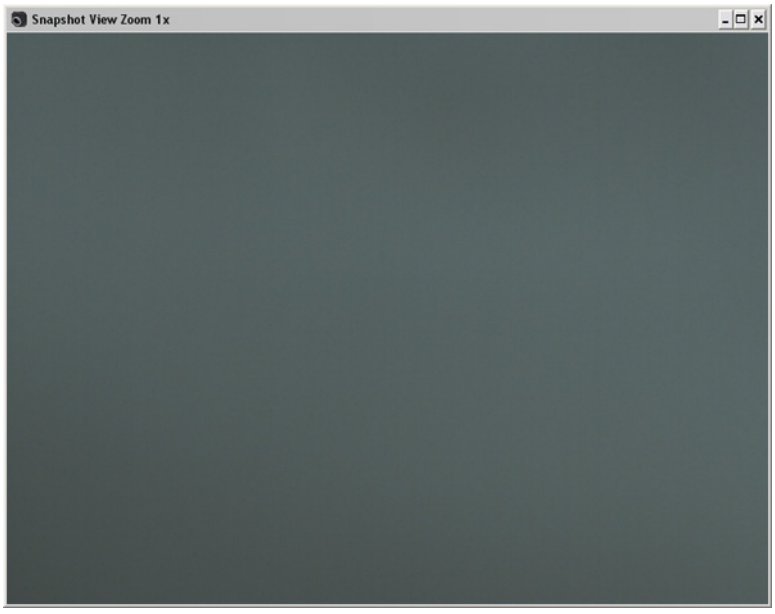


Figure 5-1 *The Snapshot View window*

Note: *In the **Video** mode, the **Exposure** slider controls the exposure time for the video. When the video is stopped, the **Exposure** slider controls exposure time of the snapshot*

For a continuous sequence of **Snapshots**, use the **Loop** option (see Figure 5-2 Running the Snapshot Loop mode):

1. Check the **Loop** checkbox
2. Click the **Snapshot** button

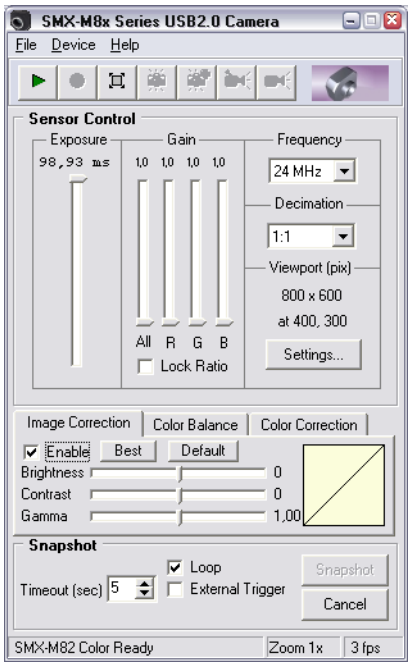


Figure 5-2 *Running the Snapshot Loop mode*

The stream of continuous snapshots will be displayed in the **Snapshot View** window (see Figure 5-1 The Snapshot View window). This mode can be useful to adjust the picture parameters for the **Snapshot** mode.

Click **Cancel** or uncheck **Loop** to stop capturing.

Timeout - defines time during which the **SMX-M8X Software** is waiting for a **Snapshot**.

Use the spin buttons to increase or decrease time of waiting for a **Snapshot**.

Chapter 6

Switching Between Cameras

If you have more than one **SMX-M8xx Series Camera** connected to your PC, the **SMX-M8X Camera Application** allows you to switch between them.

To switch between the multiple cameras, do the following:

1. In the **Device** menu, select the **Switch Multiple** command. The '**Choose a Camera…**' window will appear (see Figure 6-1 Choosing active camera).

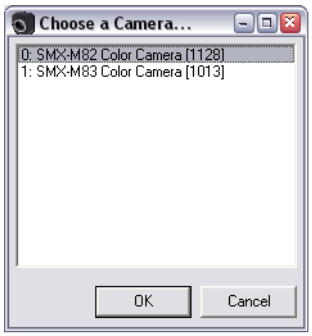


Figure 6-1 *Choosing active camera*

2. From the list of available cameras select the one you want and click **OK**.

Note: *When more than one camera is running on the same computer, the speed of each camera decreases as well as **Frame Rate** (see chapter "Frame Rate Control")*

Note: *Every opening of the application automatically detects the first connected camera. So, when connecting more than one camera to the computer you should perform the **Switch Multiple…** action to choose the right camera before running*

Note: *It is not recommended to run twice the same camera (to start video of one camera with 2 applications). This may cause stopping of the camera's work*

Chapter 7

Camera Device Settings

The **Device Settings** dialog is activated with **Alt+S** or by selecting **Settings…**in the **Device** menu.

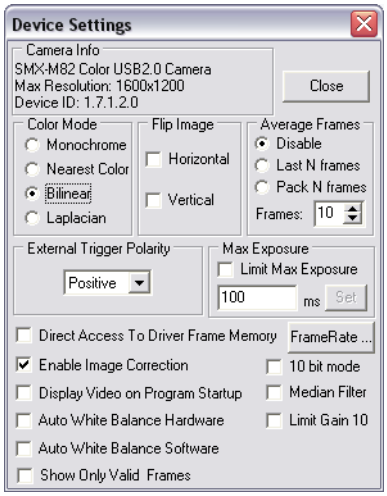


Figure 7-1 *Device Settings window for the SMX-M8xC Cameras*

Camera Info

The **Camera Info** section contains information about the currently installed camera. It consists of:

- The Camera type - the type of the camera that is connected
- Maximal resolution (depends on the camera type)
- ID of the camera

Color Mode

The **Color Mode** section defines rules for decoding source pixels stream from the sensor and transforming it into the output image. This control is available for the color models only:

- The **Monochrome** mode forces transformation of sensor pixels data into mono-chrome stream

- The **Nearest Color** mode: the Bayer matrix from sensor is transformed into destination stream using the Nearest Color algorithm (the fastest algorithm that gives the worst image quality (compared to other algorithms)
- The **Bilinear** mode: the Bayer matrix from sensor is transformed into destination stream using Bilinear algorithm (slower algorithm that gives better quality)
- The **Laplacian** mode: the Bayer matrix from sensor is transformed into destination stream using Linear Interpolation with Laplacian second-order correction terms (the slowest algorithm that gives the best quality)

Note: *The **Color Mode** section is disabled when running the **SMX-M81M Camera** (see Figure 7-2 Device Settings window for the SMX-M81M Cameras)*

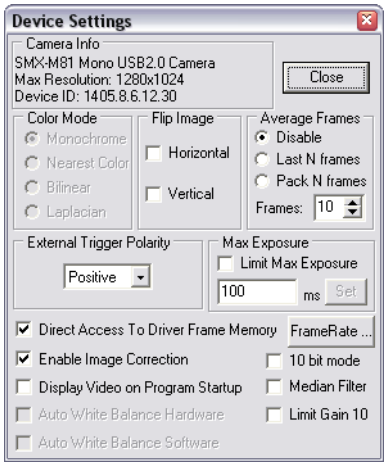


Figure 7-2 *Device Settings window for the SMX-M81M Cameras*

Flip Image

Use **Flip Image** controls to flip the image **horizontally** and/or **vertically**

- **Horizontal** flipping is done by the camera software (as a result, frame rate may decrease, see chapter "Frame Rate Control")
- **Vertical** flipping is done by the camera hardware

Average Frames

The **Average Frames** controls are used to increase the image quality by compensating the random noise of the sensor

There are two averaging modes:

- **Last N frames**: the currently displayed frame is the average of the last N frames. The picture is updated every frame

- **Pack N Frames**: the currently displayed frame is the average of the last N frames. The picture is updated every Nth frame

Note: Use averaging only for static pictures. Displaying moving objects in the average mode will lead to the image blurring

Max Exposure

The **Max Exposure** scales the exposure slider bar. This option is useful to setup the short exposure time.

To limit the maximal value of **Exposure**, do the following:

1. Enable the **Limit Max Exposure** command
2. Enter in the field the new maximal value of **Exposure**
3. Click the **Set** button

The maximal value of **Exposure** should be change to the one you entered.

*Note: The default maximal value of **Exposure** is different for each frequency. So, the maximal value that can be used for limiting **Exposure** is 16 times greater than its default maximal value, for each frequency.*

Direct Access To Driver Frame Memory

The **Direct Access To Driver Frame Memory** option can be used to reduce CPU load by providing direct pointer to the driver frame memory instead of copying the frame to the user buffer. See the API documentation for the details.

Enable Image Correction

Enable Image Correction enables **Brightness**, **Contrast** and **Gamma** of the **Image Correction** controls.

Display Video on Program Startup

Checked **Display Video on Program Startup** starts the video display immediately after the program starts - there is no need to click the **Start Video** button.

Auto White Balance Hardware

Checked **Auto White Balance Hardware** performs **White Balance (Hard)** automatically every time when you move the **Brightness**, **Contrast** and **Gamma** sliders of the **Image Corrections** tab.

*Note: **Auto White Balance Hardware** is disabled when running the **SMX-M81M Camera***

Auto White Balance Software

Checked **Auto White Balance Software** performs **White Balance (Soft)** automatically every time when you move the **Brightness**, **Contrast** and **Gamma** sliders of the **Image Corrections** tab.

Note: ***Auto White Balance Software*** *is disabled when running the* ***SMX-M81M Camera***

Frame Rate Control

The speed of the camera is measured in **fps** (frames per second). The value means the number of frames (images) given by the camera per second. In the **SMX-M8X Camera Software** the option of controlling the current number of frames per second is called **Frame Rate Control**.

You can see the frame rate value in the right corner of the status bar in the main window of the **SMX-M8X Camera Application**.

To open the **Frame Rate Control** window, click the **Frame Rate…** button in the **Device Settings** window. The **Frame Rate Control** window will open (see Figure 7-3 Frame Rate Control window).

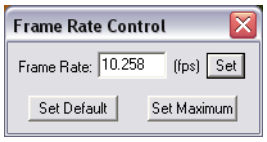


Figure 7-3 *Frame Rate Control window*

The **Set Default** button sets the default value of frame rate for the camera with current settings. The default value is flashed in every camera and is applying automatically when the camera's settings are changed.

Note: *It is recommended to use the default value of frame rate as the most suitable for the Snapshot Loop mode*

The **Set Maximum** button sets the maximal possible value of frame rate for the camera with current settings.

To change the **Frame Rate** value manually, do the following:

1. Open the **Frame Rate Control** window
2. In the **Frame Rate** field enter the value you need
3. Click **Set**

The current frame rate value should change according to the one you entered in the **Frame Rate Control** window. Check it when running video: the frame rate value will be displayed in the right corner of the status bar of the main application window.

Note: *The real frame rate value may vary in the range of 2-3 steps and even lower if you use a low-speed computer*

To restore the maximal or default value of frame rate, do the following:

1. Click the **Frame Rate…** button to open the **Frame Rate Control** window
2. Click the **Set Maximum** button to get the maximal value or click the **Set Default** button to get the default value
3. Close the window

Note: *When changing frame rate value manually, a warning message may appear. Usually it appears when the entered value is lower than it is allowed. In this case, follow the instructions in the warning message (see Figure 7-4 Warning message of the Frame Rate Control window)*

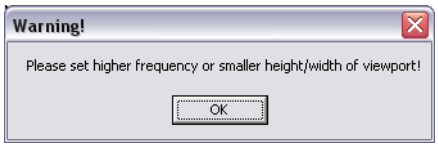


Figure 7-4 *Warning message of the Frame Rate Control window*

Output Bits per Pixel Control

10 bit - enables the software to transmit **10 bit** images from the camera as opposed to regular **8 bit**.

Median Filter

Median filter - turns on pixel averaging. The brightness of every single pixel becomes affected by the brightness of its neighbor pixels and the whole image becomes smoother.

Limit Gain

Limit Gain 10 - limits maximal value of Gain to 10.

Chapter 8

PROFILES

The **SMX-M8X Camera Application** automatically stores all the camera and interface settings on exit and restores them on startup.

Also you can store current settings in the **Profile files** (***.pro**) and load them whenever you need. Profiles are program settings saved as files. The number of stored profiles is not limited.

To save current settings to a profile, press **Ctrl+S** or in the **File** menu select the **Save Profile** command. To load a profile, press **Ctrl+O** or in the **File** menu select the **Open Profile** command.

Chapter 9

CAPTURING

The **SMX-M8X Camera Application** allows user to capture images from the camera and to store them as **BMP** or **TIFF** files.

To open the **Capture Options** dialog, do one of the following:

- Press **Alt+C**
- Open **File>Capture Options…**

The **SMX-M8X Capture Options** window will open (see Figure 9-1 SMX-M8X Capture Options window).

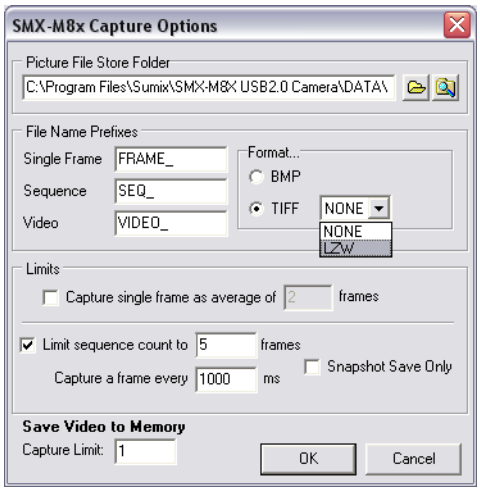


Figure 9-1 *SMX-M8X Capture Options window*

The captured files are stored in the folder that can be selected in the **Picture File Store Folder** field.

The files are named automatically by combining the corresponding **File Name Prefix** and numerical value that is calculated by the number of last captured file + 1; for example, if the last captured file found is "FRAME_15.BMP" then the next file will be named as "FRAME_16.BMP". The file name prefixes for single frames and frame sequences can be set independently.

The **Limits** section allows controlling the sequence capture parameters.

For example, there will be a sequence of 5 frames (the '**Limit sequence count to**' field) captured one by one every second (1000ms, the '**Capture a frame every**' field, see Figure 9-1 SMX-M8X Capture Options window).

Note: The sequence capture interval cannot be less than current frame exposure time. If it is, the error message will be displayed when a user tries to perform the sequence capture

To perform the single frame capture procedure, press **F2**.

To perform the frame sequence capture procedure, press **F3**. To stop the sequence capture, stop the video stream by clicking the **Stop Video** button:

Sequence recording is automatically stopped when the number of saved frames reaches the sequence count limit.

The **Snapshot Save Only** option allows saving snapshots without showing it on the screen.

When this option is selected and the command to save snapshot is given, snapshot will be not shown on the screen but saved in the specified folder (the '**Picture File Store Folder**' field).

You can save the video stream from the **SMX-M8xx** camera to **.avi** file. Start saving video by pressing **F4** or the **Save Video** toolbar button:

Using the **Stop Video** button will stop the saving video process.

Note: When you open video .avi file right after it was saved, stop the video stream. Otherwise the file will not be available

You can also take advantage of the faster video saving method invoked by the **Save Video To Memory** (**Shift+F4**) button:

When you click the **Stop Video** button, capture will stop and the **SMX-M8X Application** will flush the **.smx** file to the specified folder (the '**Picture File Store Folder**' field). This file can be replayed and converted to .avi with the **SMXView** utility that comes with the standard SMX-M8X software package. Saving video directly to memory can slow down the camera's output visualization but this method insures that no frames are missed from the saved file.

Use the **Save Video to Memory** option to limit the number of grabbed frames when save video to the memory (the '**Capture Limit**' field).

Captured file can be saved as **BMP** or **TIFF** image file.

Capturing with **BMP** format saves any **8 bit** or **10 bit** image as **8 bit BMP** image.

Capturing with **TIFF** format saves **8 bit** image as **8 bit TIFF** image and **10 bit** image as **10 bit TIFF** image.

Note: *Note please, that some image editors can not open the captured **10bit TIFF** image since they can not read **10bit** images (for example, **Microsoft Paint** will not open a **10bit TIFF** image)*

Use the dropdown menu near the **TIFF** radio button to specify saving **TIFF** image with or without compression.

- **NONE** - to save image with **TIFF** format without compression
- **LZW** - to save image with **TIFF** format with **LZW** (Lemple-Zif-Welch) - lossless type of compression, supported by **TIFF** format

Note: *Capture functions, buttons and menu items are enabled only if **Video** is started (**F5**)*

Chapter 10

Guidelines for Using TWAIN Driver

Overview

To get a picture from the **SMX-M8xx Camera** you can use the **Scanners and Cameras** operation - the standard Window's Administrative Tool (**Start> Control Panel>Scanners and Cameras**).

You can also use almost any of the image editing programs to get the image from the **SMX-M8xx Camera** using **Scanners and Cameras**. This action is available in almost all image editing programs.

The information in this section of the document is based on the image editor that is always available in Windows XP - **Microsoft Paint**.

To use the **SMX-M8xx Camera** for getting images, you should first install the required software - **TWAIN Driver**.

Installation and use of **TWAIN Driver** requires that the needed hardware for the camera use is already installed (see chapter "Installation").

Note: *Installation and further use of **TWAIN Driver** is supported only by **Windows XP** operating system*

Installation

If the **TWAIN Driver** was installed during the **SMX-M8x USB2.0 Camera Software Package** installation (see chapter "Automatic Camera Installation"), it is ready to be used.

If the **TWAIN Driver** was not installed during the **SMX-M8x USB2.0 Camera Software Package** installation (see chapter "Automatic Camera Installation"), browse to the **Sumix** folder where the **SMX-M8xx USB2.0 Camera** was installed and open the **\SMX-M8X USB2.0 Camera\Drivers\TWAIN** folder. In order to install the **TWAIN Driver** run the **SMXM8WIA** application file. Wait a few minutes for the driver installation to complete.

TWAIN Driver is installed and ready to be used.

How It Works

Location

Open the **Control Panel** window (**Start>Control Panel**) and open **Scanners and Cameras** (see Figure 10-1 Scanners and Cameras in the Control Panel window).

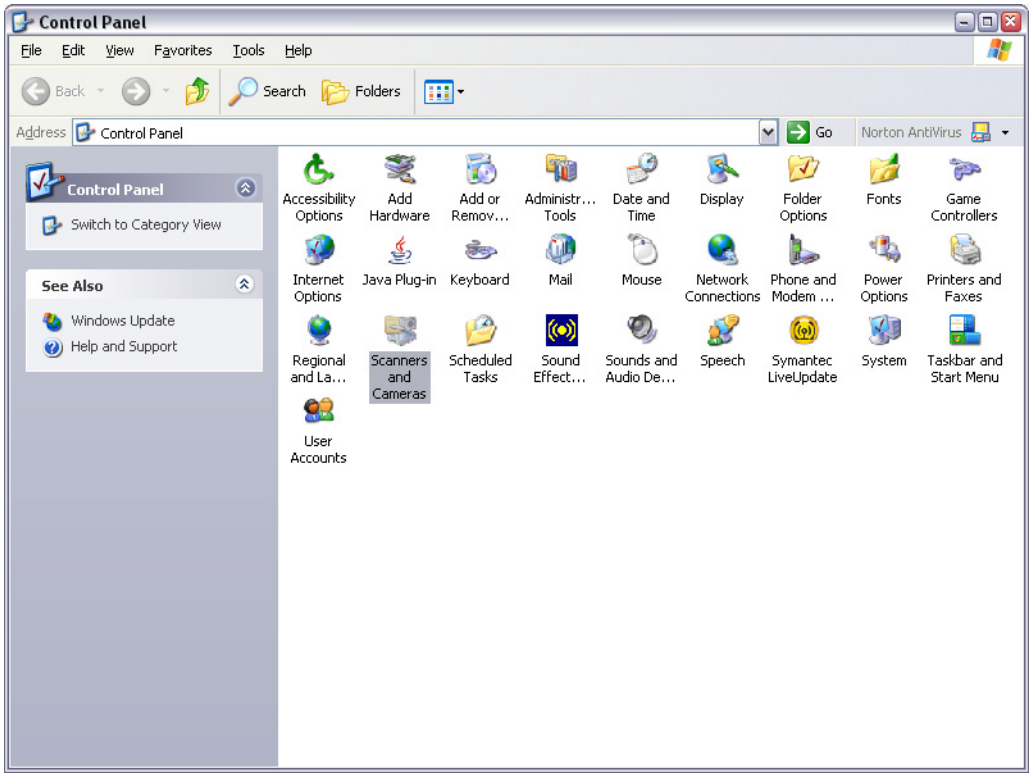


Figure 10-1 *Scanners and Cameras in the Control Panel window*

Since **TWAIN Driver** is already installed, the **SMX-M8X Series USB2.0 Camera WIA** should be available (see Figure 10-2 Scanners and Cameras).

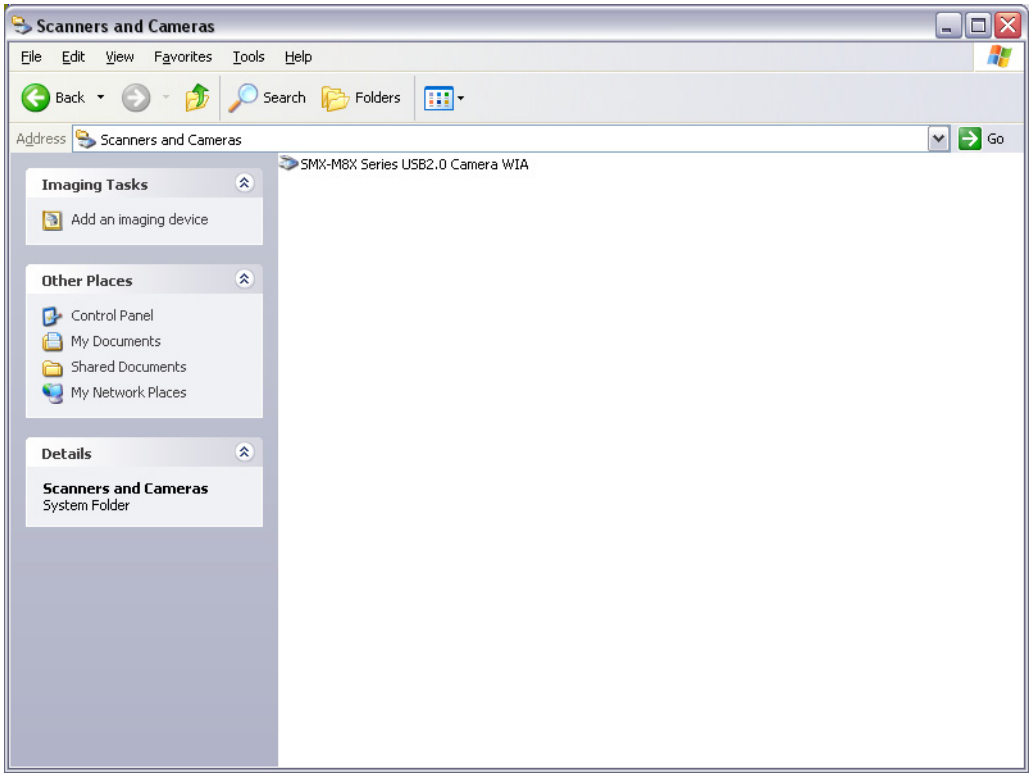


Figure 10-2 *Scanners and Cameras*

Now you can use the **SMX-M8X Series USB2.0 Camera WIA** to get the image from your camera.

Getting Image Using Scanner and Camera Wizard

To get the image using the **Scanner and Camera Wizard**, do the following:

1. Connect the **SMX-M81M**, **SMX-M82C** or **SMX-M83C USB2.0 Camera** to your computer
2. Open **Control Panel>Scanners and Cameras**
3. Select the **SMX-M8X USB2.0 Camera WIA** and do one of the following:

   - Right-click and select **Get picture using Scanner Wizard** (see Figure 10-3 Selecting Scanner Wizard for getting image from camera)
   - Double-click the selected

Welcome to the Scanner and Camera Wizard will appear (see Figure 10-4 The Scanner and Camera Wizard welcome window)

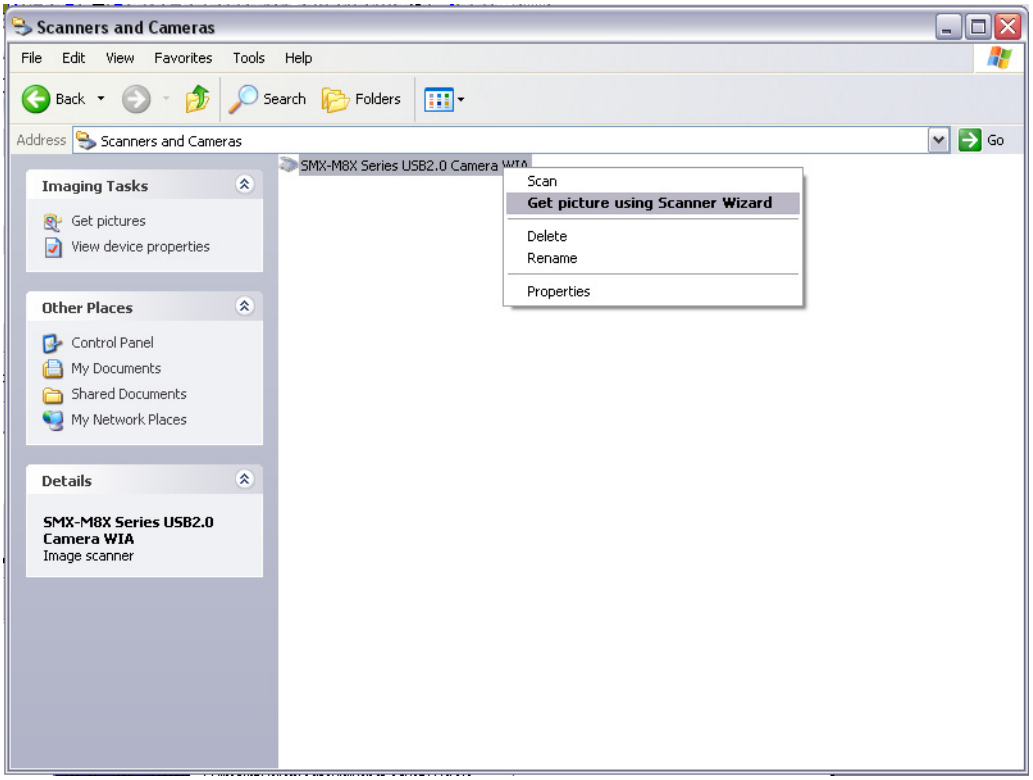


Figure 10-3 *Selecting Scanner Wizard for getting image from camera*

Figure 10-4 *The Scanner and Camera Wizard welcome window*

4. Click the **Next** button to go to the next step of the **Scanner and Camera Wizard** (see Figure 10-5 Scanner and Camera Wizard: selecting scanning preferences)

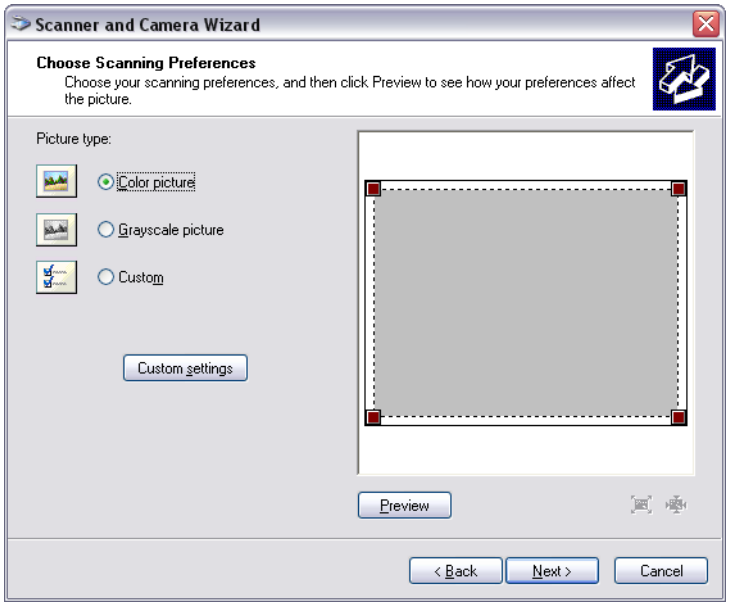


Figure 10-5 *Scanner and Camera Wizard: selecting scanning preferences*

5. Select **Picture Type** and adjust the image's settings (see Figure 10-5 Scanner and Camera Wizard: selecting scanning preferences):

   - **Color picture** - to get the color image
   - **Grayscale picture** - to get the black-and-white image
   - Click the **Custom Settings** button to adjust properties of the image (see Figure 10-6 Scanner and Camera Wizard: Advanced Properties window)

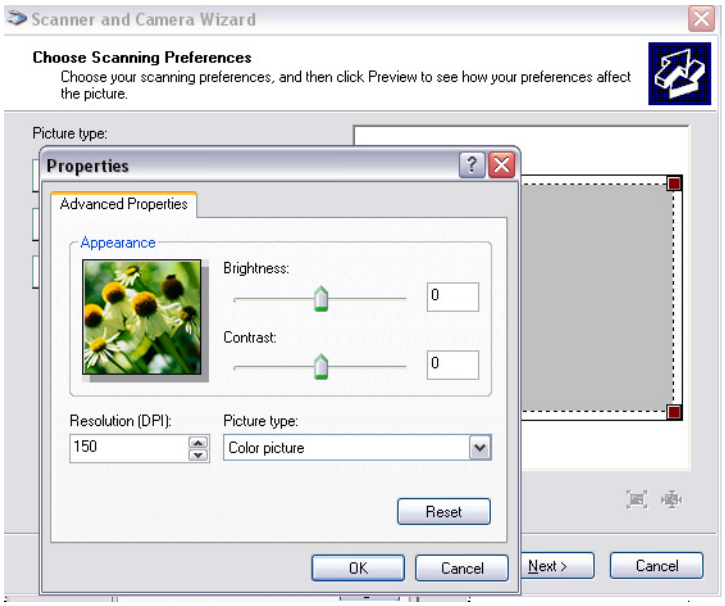


Figure 10-6 *Scanner and Camera Wizard: Advanced Properties window*

6. Click the **Preview** button to view the image from the camera to be scanned (see Figure 10-7 Scanner and Camera Wizard: previewing)

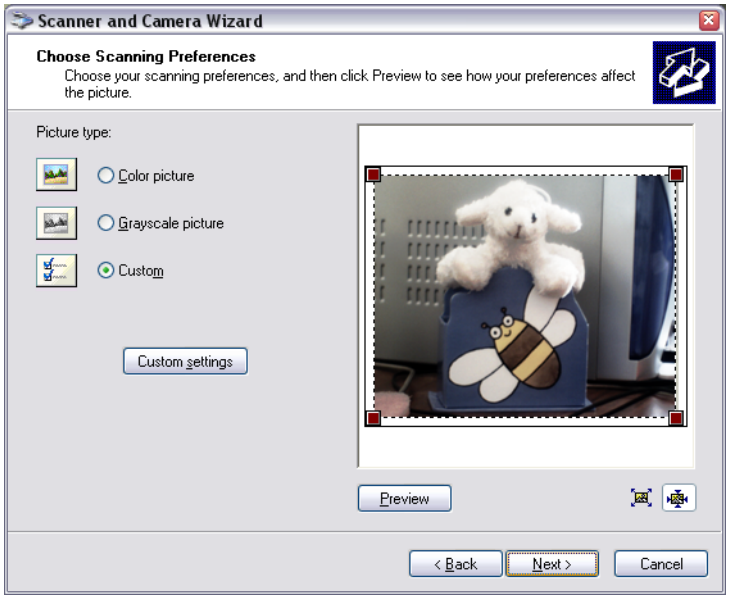


Figure 10-7 *Scanner and Camera Wizard: previewing*

7. Resize the image if needed
8. Click **Next** to go to the next step of the **Scanner and Camera Wizard** (see Figure 10-8 Scanner and Camera Wizard: picture name and destination window)

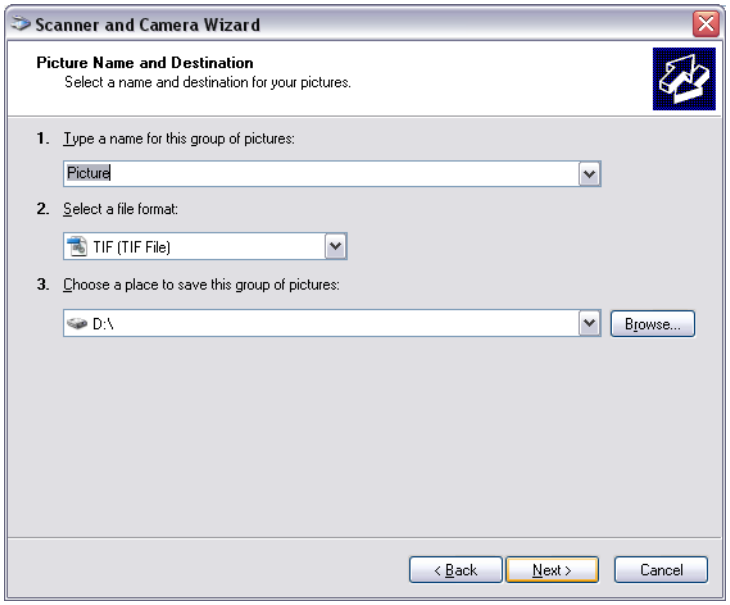


Figure 10-8 *Scanner and Camera Wizard: picture name and destination window*

9. Input the name, select file format and choose the location where you want to save your picture
10. Click the **Next** button - the **Scanner and Camera Wizard** starts scanning your picture (see Figure 10-9 Scanner and Camera Wizard: scanning picture)

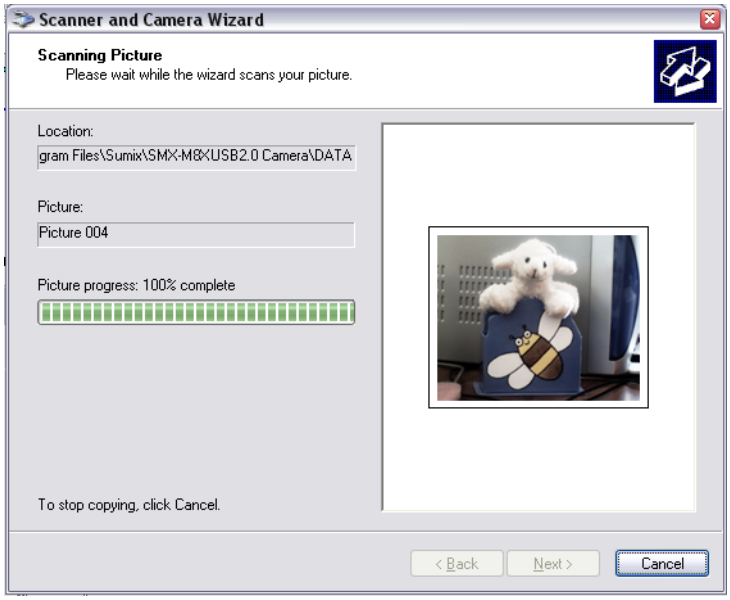


Figure 10-9 *Scanner and Camera Wizard: scanning picture*

11. After the **Wizard** finishes scanning a picture, you will be asked for other options of the picture. Select the last option (see Figure 10-10 Scanner and Camera Wizard: other options) and click **Next**

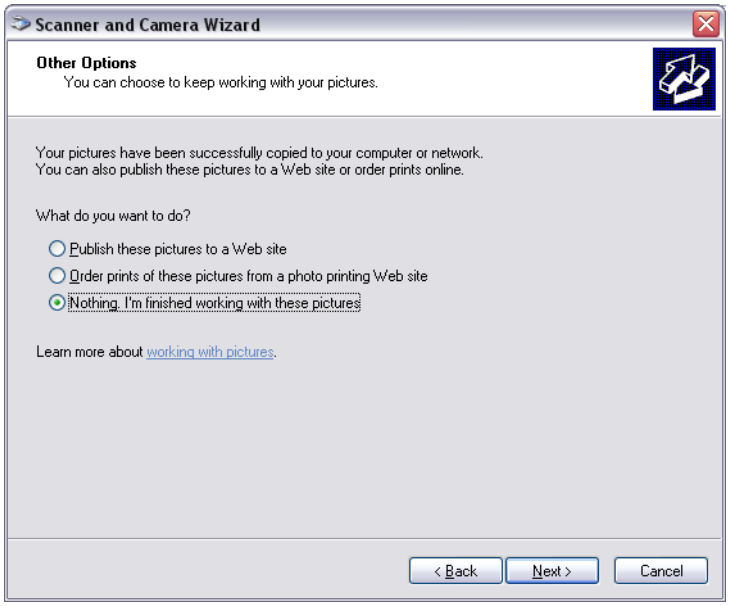


Figure 10-10 *Scanner and Camera Wizard: other options*

12. View the last window of the **Scanner and Camera Wizard** and click the **Finish** button (see Figure 10-11 Completing the Scanner and Camera Wizard window)

Figure 10-11 *Completing the Scanner and Camera Wizard window*

Microsoft Windows will open the folder, where you saved the scanned image.

Getting Image Using Scan

To get the image using **Scan**, do the following:

1. Connect the **SMX-M81M**, **SMX-M82C** or **SMX-M83C USB2.0 Camera** to your computer
2. Open **Control Panel>Scanners and Cameras**
3. Select the **SMX-M8X USB2.0 Camera WIA** and right-click. Select **Scan** (see Figure 10-12 Scanners and Cameras: selecting Scan), as a result, a window with a list of available programs will appear - the programs that are installed on your computer, to launch for Scanning the image (see Figure 10-13 “Select the program to launch for Scanning” window)

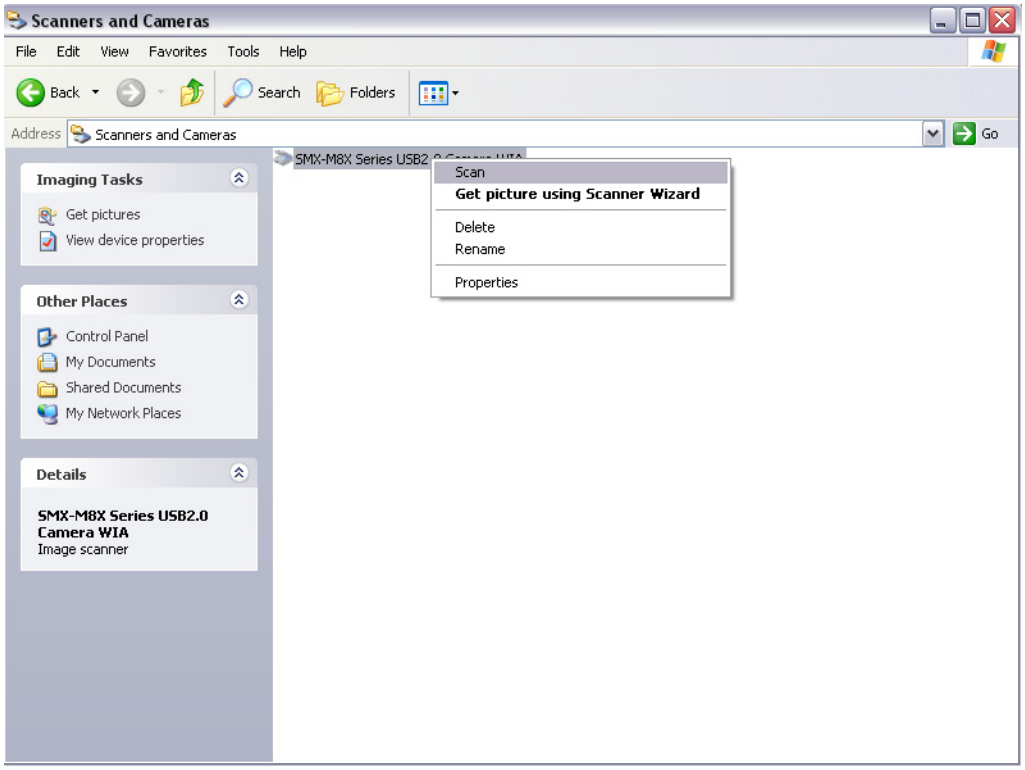


Figure 10-12 *Scanners and Cameras: selecting Scan*

Figure 10-13 *"Select the program to launch for Scanning" window*

Note: *Some image editing programs that can be also used for scanning images might not be present in the list that is shown (see Figure 10-13 "Select the program to launch for Scanning" window). It might be due to the current operating system's settings or the image editing program configuration. For more information, see **Help Topics** of Windows operating system about **Scanners and Cameras** or **Help Topics** of the corresponding program*

4. Select the program most suitable for you and click the **OK** button. The selected program will open and **Scan Using SMX-M8X Series USB2.0 Camera WIA** will open (see Figure 10-14 Scan using SMX-M8X Series USB2.0 Camera WIA window)

Note: *Not all image editing programs open the **Scan Using SMX-M8X Series USB2.0 Camera WIA** window (see Figure 10-14 Scan using SMX-M8X Series USB2.0 Camera WIA window) automatically - some of them just open the program's main window. It depends on the program configuration. In this case, for more information see Help Topic for this program*

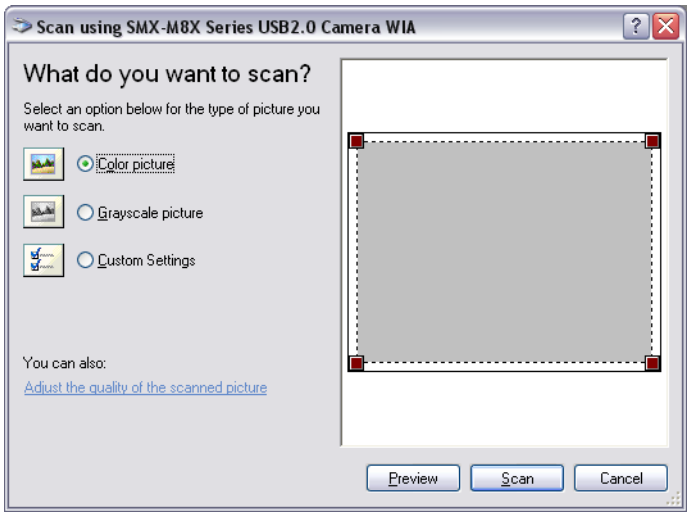


Figure 10-14 *Scan using SMX-M8X Series USB2.0 Camera WIA window*

5. Select **Color** or **Grayscale** picture or click the **Adjust the quality of the scanned picture** link to change the image's settings. Click the **Preview** button to preview the image to be scanned
6. When ready, click the **Scan** button - your image editor will start scanning and will show the scanned image in the current program's window

Getting Image from Camera Using Microsoft Paint

To get the image from the camera using **Microsoft Paint** program, do the following:

1. Open **Microsoft Paint** (**Start>All Programs>Accessories>Paint**)
2. Connect the **SMX-M81M**, **SMX-M82C** or **SMX-M83C USB2.0 Camera** to your computer
3. In **Microsoft Paint** open **File>From Scanner or Camera…** - **Scan Using SMX-M8X Series USB2.0 Camera WIA** will open (see Figure 10-15 Getting image from camera using Microsoft Paint program)

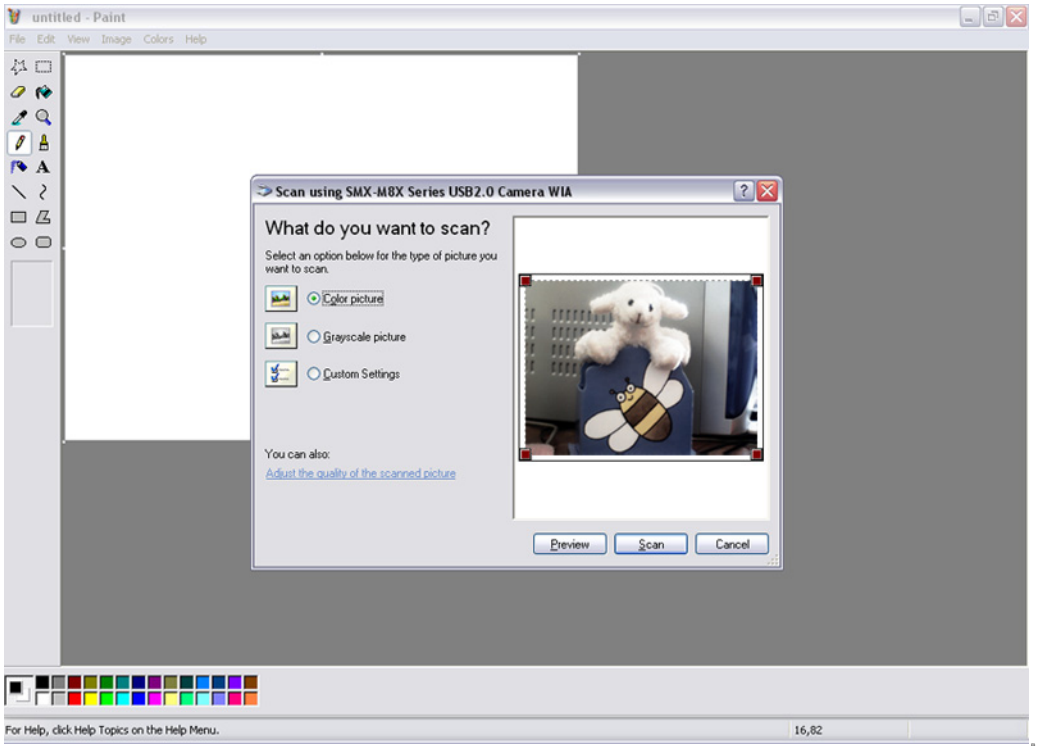


Figure 10-15 *Getting image from camera using Microsoft Paint program*

4. Adjust the image's settings, click **Preview** to view the image that is scanned (see Figure 10-15 Getting image from camera using Microsoft Paint program)
5. When ready, click the **Scan** button
6. When done, save the scanned image (see Figure 10-16 Microsoft Paint: Image, received after scanning)

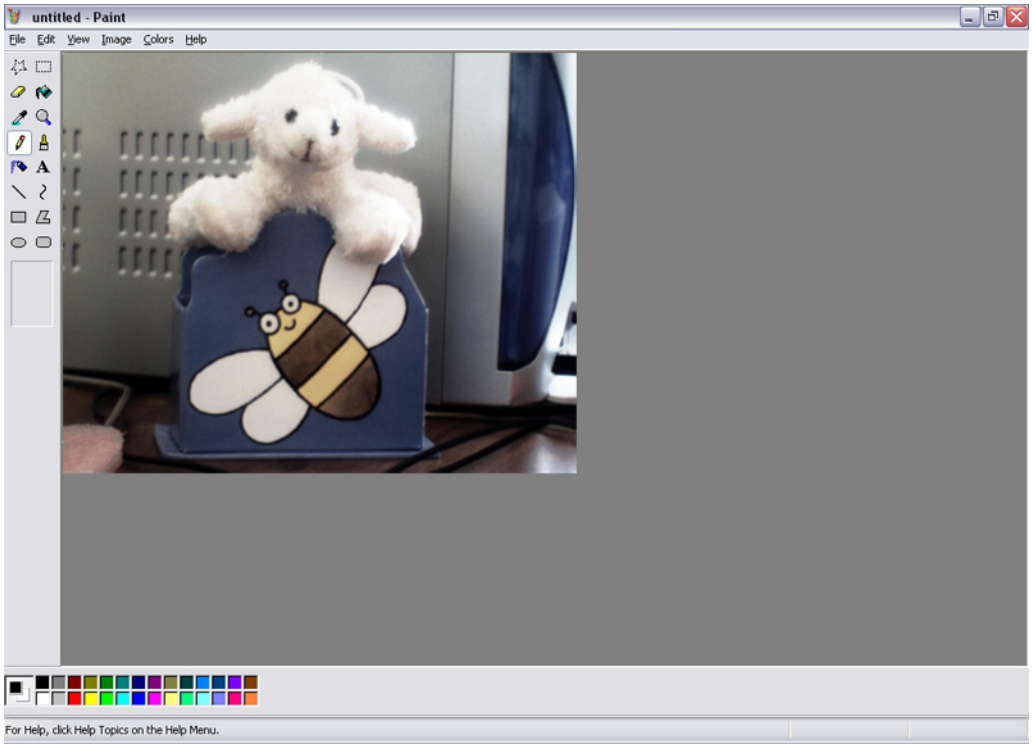


Figure 10-16 *Microsoft Paint: Image, received after scanning*

Note: *To get more information about **Scanners and Cameras** operation, see the standard **Window's XP Help Topics***

Appendix 1

MENU OVERVIEW

The **Main** menu includes three command groups described below.

File

Save Frame (F2) - saves a single frame as **.bmp** file to a location specified in **Capture Options**

Save Sequence (F3) - saves a sequence of frames to a location specified in **Capture Options**

Save Video (F4) - saves video as a video file to a specific location specified in **Capture Options**

Save Video To Memory (Shift + F4) - starts saving video to memory to a location specified in **Capture Options**

Capture Options… (Alt+C) - opens the **Capture Options** window

Load Profile (Ctrl+O) - opens the **Load Camera Profile** window

Save Profile (Ctrl+S) - saves all settings to **Profile**

Exit - closes the application

Edit

Copy (Ctrl+C) - copies an image from the camera to buffer

Device

Start Video (F5) - starts video stream

Stop Video (Shift+F5) - stops video stream

Viewport Settings…(Alt + V) - opens the **Viewport Settings** window

Auto Exposure (E) - performs auto exposure

White Balance (Soft) (W) - performs white balancing on software level

White Balance (Hard) (Alt+W) - performs white balancing on **Hardware** level

Histogram (H) - opens the Histogram view

Snapshot (F9) - saves single snapshot as .bmp file to a location specified in **Capture Options**

Zoom In (Num +) - zooms in view

Zoom (Out Num -) - zooms out view

Original Size Num * - returns view to the Zoom=1x

Switch Multiple… - opens the **Choose a Camera…** window

Settings… (Alt+S) - opens the **Device Settings** window

Help

Help (F1) - opens the application help window

Version Info - opens window with the version information

About - opens the '**About**' window

Appendix 2

KEYBOARD SHORTCUTS

Main Keyboard Shortcuts Operations

Table 2-1 *Main Keyboard shortcut operations*

Keyboard operations	Description
F1	Help
F2	Captures a frame to bitmap file
F3	Captures a sequence of frames to bitmap files
F4	Captures a sequence of frames to AVI file
Shift + F4	Capture a sequence of frames to the memory
F5	Starts live video display in the View window
Shift+F5	Stops live video display and closes the View window
F9	Takes a snapshot
F12	Brings up the Main window when displaying the live video
Esc	The same as Shift + F5, stops the video
Ctrl + O	Opens Camera Profile
Ctrl + S	Stores Camera Profile
Ctrl+C	Copies an image from the camera to buffer
Alt + C	Brings up the Capture Options window
Alt + S	Brings up the Device Settings window
Alt + V	Brings up the Viewport Settings window
H	Brings up the Histogram
W	Performs White Balance (Soft) using Color Balance
Alt + W	Performs White Balance (Hard) using Gain Controls
Numpad +/-	Zoom In/Zoom Out the picture in the View window
Numpad *	Restores the picture in the View window to its original (100%) size

Appendix 3

TOOLBAR OVERVIEW

Main Toolbar Operations

The most popular menu commands are duplicated on the application toolbar:

 Starts live video display in the View window

 Stops live video display and closes the View window

 Brings up the Viewport Setup Dialog

 Captures a frame to BMP/TIFF file

 Captures a sequence of frames to BMP/TIFF files

 Starts saving Video to a file

 Starts saving Video to memory

Appendix 4

Basic Guidelines on Using the SMX-M8xx Series USB2.0 Cameras

Introduction

The **SMX-M8xx Series Cameras** - are megapixel CMOS cameras with USB2.0 interface.

The **SMX-M8xx Series Cameras** are available in three modifications:

- SMX-M81M (1.3 Megapixel, monochrome)
- SMX-M82C (2 Megapixel, color)
- SMX-M83C (3 Megapixel, color)

All the **SMX-M8xx cameras** feature small size and **C/CS-mount** form factor.

The **SMX-M8xx cameras** are supplied with **C-mount adapter** and/or **C-mount adapter with IR-cut filter** for converting **CS-mount** to **C-mount**.

Camera Kit

The **SMX-M8xx Camera Kit** includes:

- SMX-M8xx Series Camera:

- The SMX-M8xx Series USB2.0 Cameras Software Package which is available for downloading via the provided URL
- USB A to USB mini-B cable (optional):

- Tripod adapter (optional):

- C-mount adapter with IR-cut filter (optional):

- C-mount adapter (optional):

Use of C-mount Adapter with and without IR-cut Filter

Overview

The **C-mount adapter** is an adapter that converts the **SMX-M8xx** camera from **SC-mount** (the initial form factor of the **SMX-M8xx** cameras) to **C-mount**.

The **C-mount adapter with IR-cut filter** is a **C-mount adapter** that additionally contains a built-in **IR-cut filter** (see chapter "IR-cut filter Characteristics").

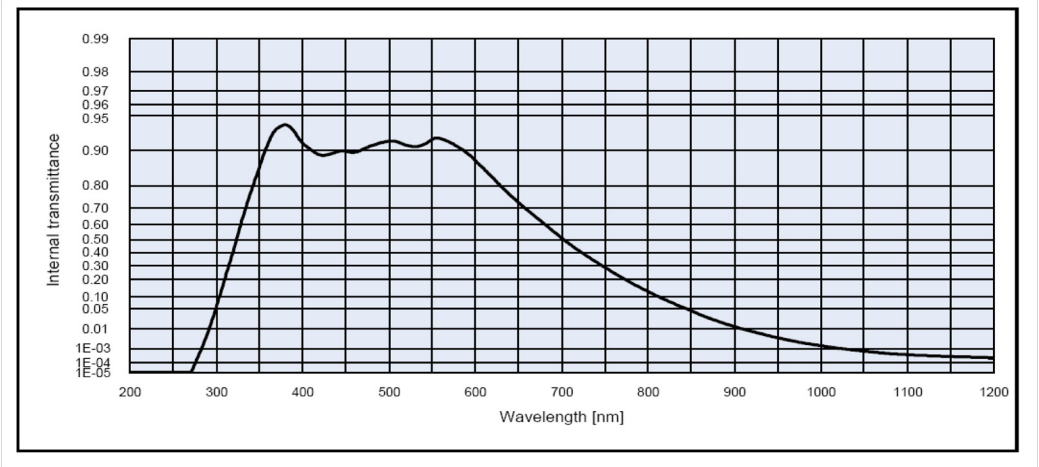
Both color and monochrome camera models can be used either with **C-mount adapter** or **C-mount adapter with IR-cut filter**.

IR-cut filter Characteristics

IR-cut filter is a color filter that blocks infrared light.

The **IR-cut filter** characteristics are as follows:

- Diameter = 20mm
- Thickness = 2 mm



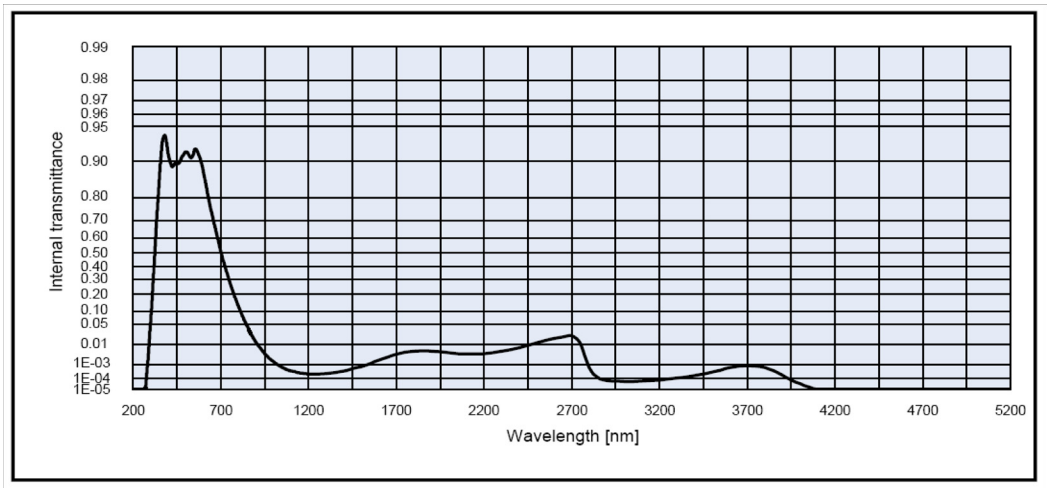


Chart of the IR-cut filter transmission characteristics

When to Use the C-mount Adapter with IR-cut Filter

C-mount adapter with IR-cut filter use with the color cameras. Since the **SMX-M8xx color cameras** are sensitive to IR-light, use the **C-mount adapter with IR-cut filter** for the color camera models to make colors of the image more realistic.

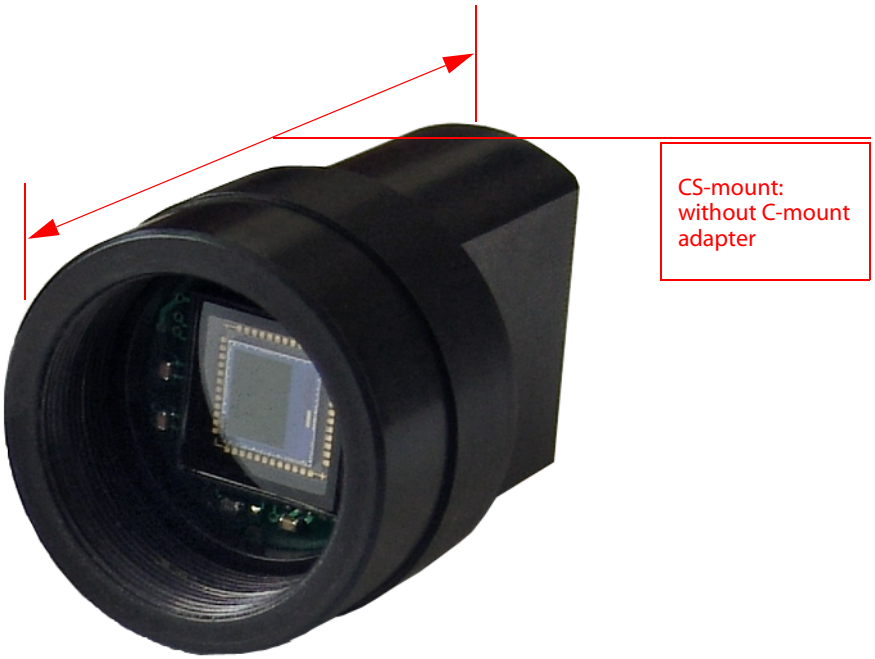
Many light sources, including the sun, emit infrared light, so the color camera in daylight will see a significant amount of infrared light without the **IR-cut filter**. As a result, strange and non-realistic colors appear.

Another reason for using the **IR-cut filter** is the limited color correction for many lenses. A lot of lenses have different depth of focus for the visible and infrared spectrum. The **IR-cut filter** cuts away a significant amount of the overall collected light and thereby affects the sensitivity in a negative way. In general, color cameras are one factor less sensitive compared to monochrome (depending on the sensor). This is primarily due to the **IR-cut filter**.

C-mount adapter with IR-cut filter use with monochrome cameras. The **SMX-M8xx monochrome cameras** (the SMX-M81M cameras) are more sensitive to infrared light than color models. Using the cameras in environment rich for infrared light may result in highlighted images. In order to avoid highlighted images, use the **C-mount adapter with IR-cut filter** for monochrome cameras.

Using the SMX-M8xx Camera as CS-mount

Using the **SMX-M8xx camera** as **CS-mount** means using it without both **C-mount adapter** and **C-mount adapter with IR-cut filter**:



Using the SMX-M8xx Camera as C-mount

Using the **SMX-M8xx camera** as **C-mount** means using it with the **C-mount adapter** or with the **C-mount adapter with IR-cut filter**:

Converting the SMX-M8xx Camera from CS-mount to C-mount, from C-mount to CS-mount

Usually the **SMX-M8xx camera** goes with the **C-mount adapter** or **C-mount adapter with IR-cut filter** already screwed in.

To use the **SMX-M8xx camera** as **CS-mount** screw the **C-mount adapter**/**C-mount adapter with IR-cut filter** out.

To use the **SMX-M8xx camera** as **C-mount** screw the **C-mount adapter**/**C-mount adapter with IR-cut filter** in.

Note *It is recommended to install (as well as to remove) the **C-mount adapter**/**C-mount adapter with IR-cut filter**, lens or the camera's cover when the camera is faced down or when the camera is in horizontal position - to prevent the sensor contamination:*

Use of Tripod Adapter with the SMX-M8xx Cameras

The **SMX-M8xx camera** may go with the **Tripod adapter** already on:

To remove the **Tripod adapter** from the camera:

1. Loosen the screw of the **Tripod adapter**
2. Remove the **Tripod adapter** from the camera:

To put the **Tripod adapter** on the camera, do the following:

1. Loosen the screw of the **Tripod adapter**
2. Put the **Tripod adapter** on the camera and locate it as shown in the image below:

Appendix 5

Camera Installation Troubleshooter

Before following instructions of this chapter make sure that you follow all instructions and recommendations that are described in the See "Installation" on page 11 chapter of this Document.

If you face problems with installation and detection of the camera, use this **Troubleshooter**.

If you face problems that are not described below, contact **Sumix Technical Department**.

Camera was not Detected or Recognized

If after connecting the camera the system does not detect it: there is no icon

 on your Taskbar; or the camera was not recognized by the system:

try to:

- Check if the device was installed successfully: open the following system folder: **WINDOWS> system32>drivers** and check if the **SMXM8X.sys** file is present (normally it is located on the **C** hard disk). If not, run the **Driver installation** again. Be sure that no camera is connected during installation.

If the same problem still occurs, save manually the **SMXM8X.sys** file to the **WINDOWS>system32>drivers** folder (the **SMXM8X.sys** file is located in the **\Sumix\SMX-M8x USB2.0 Camera\Drivers** folder)

If you failed on previous step, try one of the following:

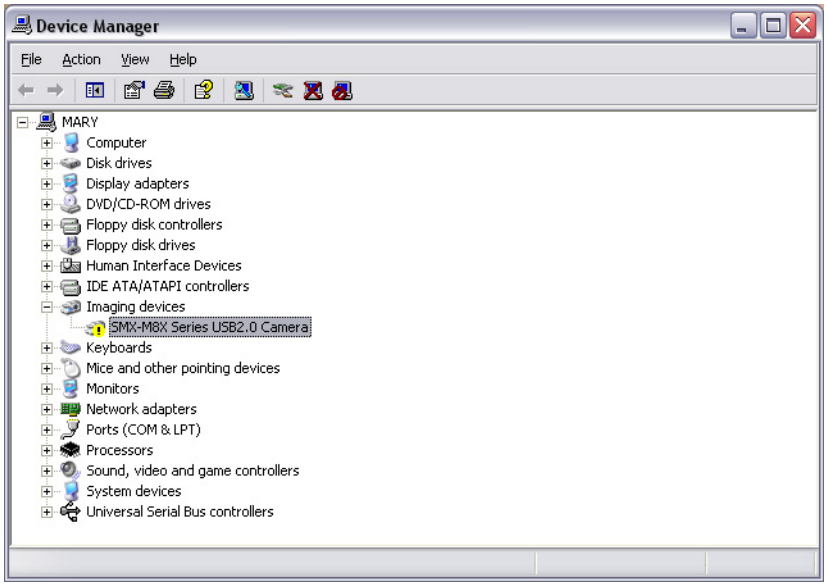
- Reconnect the camera

- Use other USB2.0 port(s) of your computer - the problem might be due to the faulty USB2.0 port
- Use another USB2.0 cable - the problem might be due to the faulty USB2.0 cable
- Connect other (if any) **SMX-M8xx** camera to the same USB2.0 port(s) (if you have more than one) - the problem might be due to the faulty camera
- Disconnect the camera and restart the computer

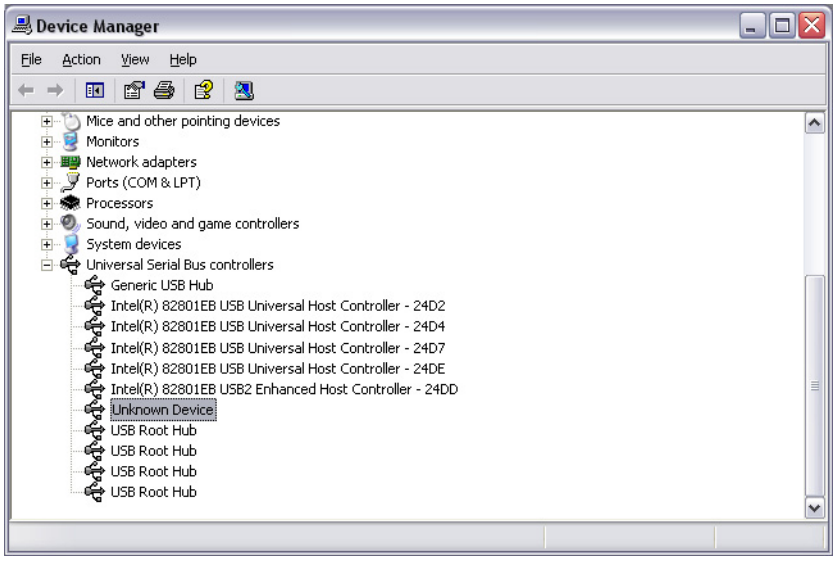
If none of the previous steps succeeded, and the device is not recognized yet, try to do the following:

1. Connect the problematical camera to your computer
2. Open the **Device Manager** window (right-click **My Computer** desktop icon, select **Properties**, then select the **Hardware** tab, and click **Device Manager**)
3. In **Device Manager** select one of the following:

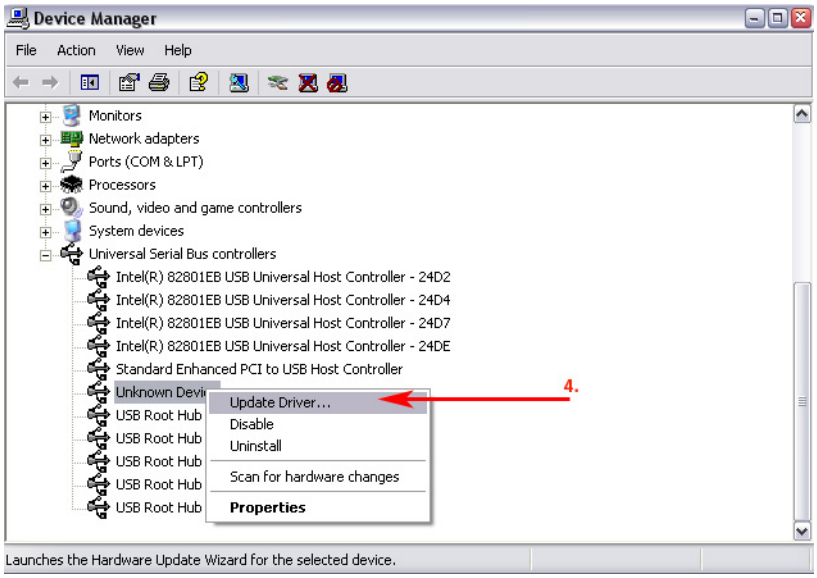
- **Imaging devices> SMX M8X Series USB2.0 Camera** with the Warning status, if it available:



- **Universal Serial Bus controllers> Unknown device** (in the case if no **SMX-M8X Series USB2.0 Camera** with the Warning status available in the **Imaging devices**):

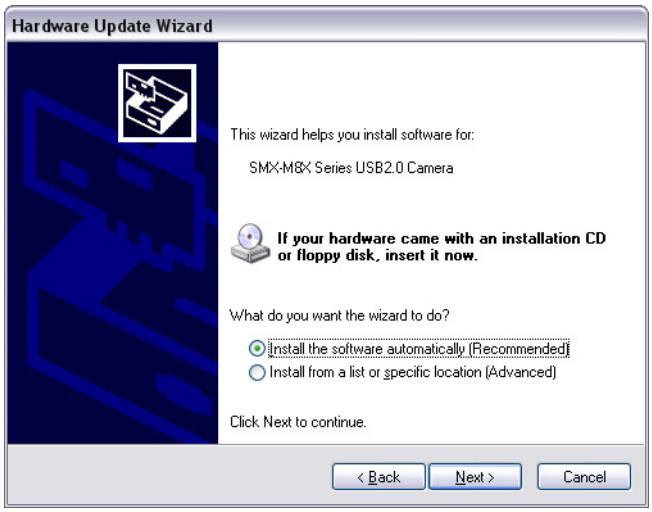


4. Right-click and select '**Update Driver…**':



5. Select 'No, not this time' in the **Welcome to the Hardware Update Wizard** window and click **Next**:

Run the **Hardware Update Wizard** the same way as the **Found New Hardware Wizard** choosing the '**Install the software automatically (Recommended)**':



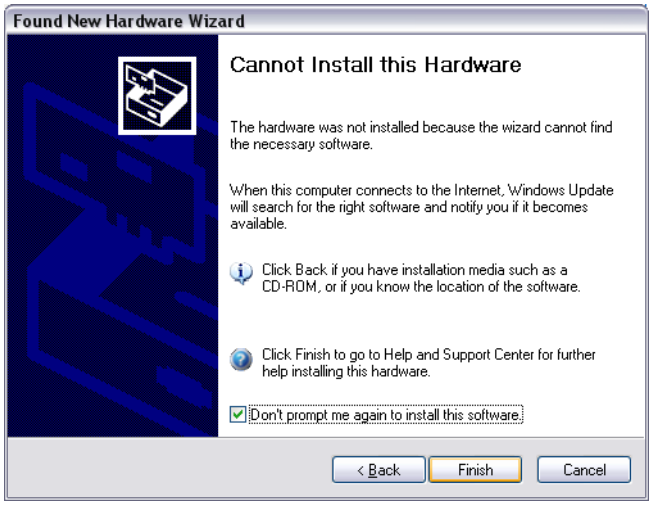
See the '**Manual Hardware Installation**' chapter of the **SMX-M8xx USB2.0 Camera User Guide** and follow its recommendations on this step (see chapter "Manual Hardware Installation").

If some problems occur during the manual hardware installation, read the next chapter of this **Troubleshooter** (see chapter "Cannot Install the Hardware").

If the system still fails to detect the camera after all these actions, described above, contact **Sumix Technical Department**.

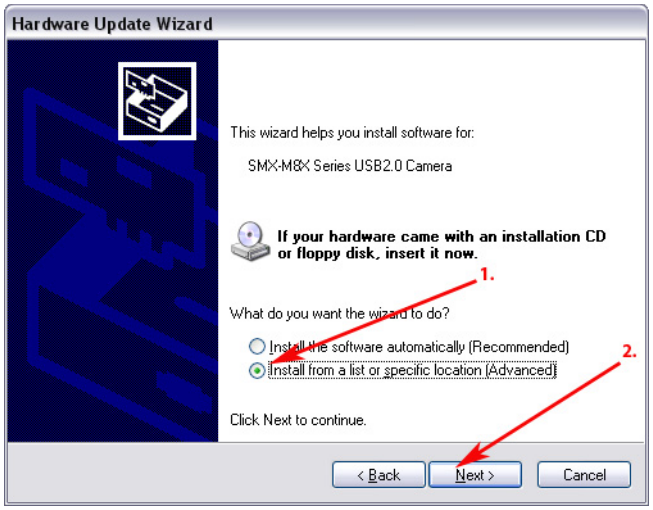
Cannot Install the Hardware

If the **Found New Hardware Wizard\Hardware Update Wizard** failed to install the hardware (the **Wizard** that starts after the first connection of the camera or the **Wizard** that starts for updating the hardware; failure appears after you browsed to the needed files for the installing):



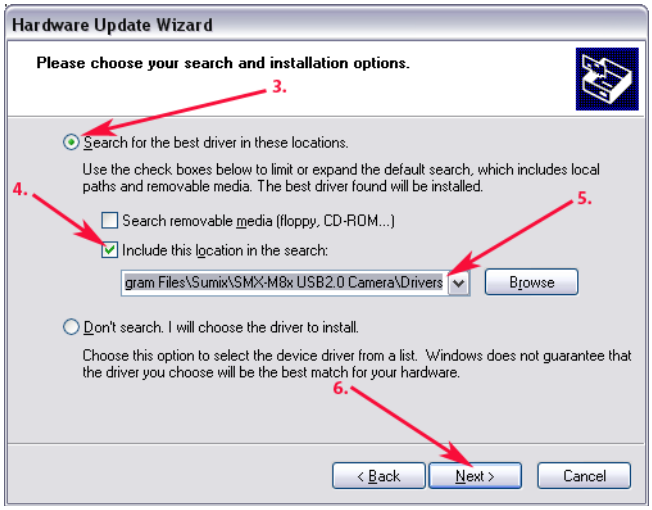
Try to do the following:

1. Click **Back** in the **Found New Hardware Wizard** and select '**Install from a list or specific location (Advanced)**'
2. Click the **Next** button:



3. Select '**Search for the best driver in these locations.**'
4. Check the '**Include this location in the search**' checkbox

5. Browse to the **Drivers** folder - from the **SMX-M8xx Camera CD** or from the **Sumix\SMX-M8x USB2.0 Camera** folder (located on the hard disk where you installed the **SMX-M8x Camera Software**, normally it is **C:\Program Files\Sumix\SMX-M8x USB2.0 Camera**)
6. Click the **Next** button:



7. Wait till the **Wizard** installs all needed files

Click **Finish** if installation passed successfully

Appendix 6

FIGURES

Appendix 7

TABLES