

Getting Started with the BitFlow SDK 3.00

INSTALLATION, CONFIGURATION AND TESTING

Before Installation

- 1 You must log onto the computer using an account that has administrative privileges.
- 2 You may install the software before or after you install the board in your computer.
- 3 On "Plug and Play" operating systems, the New Hardware Wizard will request the drivers for a "Multimedia Device" the first time the system is booted with the board is installed. These are located both on the CD-ROM ("\\Windows2000") and in the installation folder (typically "\\BitFlow SDK X.XX\\Windows2000"). The latter is only available after the software is installed.
- 4 Uninstall any previous BitFlow SDK releases.

Serial Numbers

If you purchased the SDK, your serial number will be on a label affixed to the CD-ROM case. If you are upgrading from a previous release and downloaded the SDK, you must obtain a serial number from BitFlow. In either case, use this serial number when prompted by the installer. If you are using a third party application or just want to run our simple example applications, you can install the binary components of the SDK by using the serial number 0.

Install the SDK

- 1 If you have a CD-ROM, insert it into your computer. The CD-ROM will auto-run an installation screen, from here you can start the software installer. If you downloaded the SDK, just run the installer directly.
- 2 Follow the instructions of the installer.
- 3 Reboot computer (the installer will prompt you).

Testing a Road Runner or an R3

- 1 Run SysReg (Start Menu > Programs > BitFlow > SDK X.XX > SysReg)
- 2 Make sure the Camera configuration file path is correct. If you installed the SDK in the default directory, the configuration directory should be "C:\\BitFlow.xxx\\Config".
- 3 All of the BitFlow boards in your system should appear in the BitFlow boards found list. Highlight a board in this list then click the Board operation: Configure button to open the Board Details dialog.
- 4 Click the Camera file operation: Add button to open the Choose Camera File dialog.
- 5 **(Camera Link Boards)** Navigate through the tree to the following entry:
 - + Make: BitFlow
 - + Model: Synthetic
 - + Mode: Free Run
 - + BFSynth256E1.rcl.

Click on "BFSynth256E1.rcl" and then click OK.

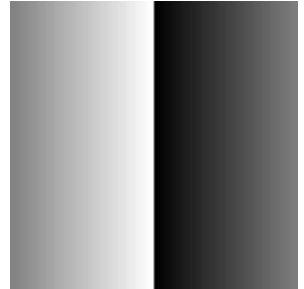
- 5 **(LVDS/RS422 Boards)** Navigate the file open dialog and select "BFSynth256E1.cam". Click OK.

- 6 Click OK to the Board Details dialog.
- 7 Click OK to the System Configuration dialog.
- 8 Now run R2View. Leave the defaults and click OK to the Preview Mode dialog and the



Thread Options dialog.

9 A display surface will open and you should see a wedge pattern similar to the image on the right. If you see this image, the system is working fine. If you do not see this pattern, go to the Troubleshooting section.



Road Runner and R3 synthetic camera output

Testing a Raven

- 1 Run SysReg (Start Menu > Programs > BitFlow > SDK X.XX > SysReg)
- 2 Make sure the Camera configuration file path is correct. If you installed the SDK in the default directory, the configuration directory should be "C:\BitFlow.xxx\Config".
- 3 All of the BitFlow boards in your system should appear in the BitFlow boards found list. Highlight a board in this list then click the Board operation: Configure button to open the Board Details dialog.
- 4 Click the Camera file operation: Add button to open the Choose Camera File dialog.
- 5 Navigate through the tree to the following entry:
 - + Make: Generic
 - + Model: Synthetic
 - + Mode: Crystal, 640 x 480, digital wedge dynamic
 - + GenSynthetic-640DigDyn.rvc.

Click on "GenSynthetic-640DigDyn.rvc" and then click OK.

- 6 Click OK to the Board Details dialog.
- 7 Click OK to the System Configuration dialog.
- 8 Now run RvView. Leave the defaults and click OK to the Preview Mode dialog and the Thread Options dialog.
- 9 A display surface will open and you should see a wedge pattern similar to the images on the right (the image will appear to continuously shift horizontally). If you see this image, the system is working fine. If you do not see this pattern, go to the Troubleshooting section.



Raven synthetic camera output

Configure a Road Runner or an R3 for your camera

- 1 Run SysReg.
- 2 Highlight the board in the BitFlow boards found list, then click the Board operation: Configure button to open the Board Details dialog.
- 3 Highlight the existing configuration file in the Attached camera list and click the Change button.
- 4 **(Camera Link Boards)** Navigate the configuration file tree to get the Make, Model, and Mode of your camera, click on the file name, then click the OK button.
- 4 **(LVDS/RS422 Boards)** Navigate the file open dialog to find the configuration file for your camera. Click OK. If you are not sure which file is for your camera, see the document: "BitFlow SDK X.XX\docs\R2CamList.txt".
- 5 The default firmware works for almost all cameras, check the camera configuration file for notes on firmware changes.
- 6 Click OK to the Board Details dialog.
- 7 Click OK to the System Configuration dialog.
- 8 Make sure your camera is powered up and connected to the board.
- 9 Run R2View again. You should see live video from your camera. If you do not see an image, go to the Troubleshooting section.

Configure a Raven for your camera

- 1 Run SysReg.
- 2 Highlight the board in the BitFlow boards found list, then click the Board operation:

Configure button to open the Board Details dialog.

3 Highlight the existing configuration file in the Attached camera list and click the Change button.

4 Navigate the configuration file tree to get the Make, Model, and Mode of your camera, click on the file name, then click the OK button.

5 Click the Special firmware: Configure button and set the firmware according to the type of camera.

6 If you made changes to the firmware settings, click the Download button. If the default firmware settings are correct for your camera, click the Cancel button.

7 Click OK to the Board Details dialog.

8 Click OK to the System Configuration dialog.

9 Make sure your camera is powered up and connected to the board.

10 Run RvView again. You should see live video from your camera. If you do not see an image, go to the Troubleshooting section.



INSTALLED COMPONENTS

The following components are copied to your computer when installing the full SDK.

Read Me The latest information about the release

SysReg System configuration utility: associates cameras with installed boards.

BiFlow Sequence capture application based on the Bufln API

Circ Circular buffer processing application based on the Bufln API.

Flow Sequence capture application based on the R2 and Rv APIs.

CamEd Camera configuration file editor.

RvProcess (Raven), PingPong (Road Runner & R3) Real-time processing example.

RvView (Raven), R2View (Road Runner & R3) Real-time display application.

BFCCom HyperTerminal like application for camera communication through the Camera Link board's serial port.

RvSimple (Raven), R2Simple (Road Runner & R3) Simple console based application.

RvBench (Raven), R2Bench (Road Runner) PCI bus benchmark utility.

PCIWalk PCI configuration utility.

CamVert Low Level camera configuration editor.

VerCheck Displays DLL and driver version information.

DLLs Dynamic Link Libraries: these contain all of the functionality of the SDK.

Camera Configuration Files Used to configure the board for your cameras).

Kernel Driver Provides access to the BitFlow hardware.

Documents Text files with the detailed information about the release.

Source Code Complete 'C' source for all examples and user level DLLs.

Header files definitions required for the API.

DEVELOPING YOUR APPLICATION

Once you are confident that your board is working correctly with your camera, the next step is to develop your application. The examples provided should allow you to quickly integrate the BitFlow SDK functionality into your program.

If you need something simple

RvSimple (Raven), R2Simple (Road Runner & R3) This program shows the minimum function calls required to get images into the host memory. It should be very easy to integrate these same function calls into your application. These applications do not display images, perform real time processing, nor do they provide a GUI. However, they are extremely easy to understand and build upon.

If you need to view and save live images



RvView (Raven), R2View (Road Runner & R3) These applications demonstrate real-time display and also allow you to snap single images into separate buffers, which can then be processed and/or saved to disk. It is quite simple to extend these programs by adding your own processing functions or file formats.



If you need real-time processing

RvProcess (Raven), Ping Pong (Road Runner & R3) These applications demonstrate dual-buffered acquisition from the board. One buffer is used to receive DMA data from the board, while the other is available for processing. This allows the CPU to access an entire image without data being overwritten by the board. These examples do a simple histogram calculation and display the results continuously on the screen, but you can plug in any processing function you need.

If you need to acquire sequences of images



BiFlow This application acquires sequences of images in real time to host memory using the Bufln API. The resulting sequence can be displayed one at a time on the VGA, played back as a sequence and/or saved to disk. This application captures images in the cameras native format (i.e. pixel bit depth) for internal storage and for saving to disk. Non-standard pixels depth images will be reformatted for display. This application works with all Raven, Road Runner and R3 models.

If you need to acquire and process images via a circular set of buffers



Circ This application demonstrates the circular buffer processing portion of the Bufln API. The concept is that the board is acquiring continuously into a set of buffers. Unsynchronized with acquisition, the host is processing the images in the buffers. The number of buffers required is dependent on the variability of acquisition and processing time. The Bufln API makes this type of an application very easy to write. Circ fully demonstrates the power of this API. This application works with all Raven, Road Runner and R3 models.

Whatever example you decide to start with, you must build and modify it with a C compiler. We provide source and project files to build all of our examples with Microsoft Visual C++ version 6.0 or above. However the BitFlow API is fully WIN32 compliant and can be called from any WIN32 programming environment, for example Microsoft Visual Basic. Please refer to the "readme.txt" file to see how to get started with this and other environments.

WORKING WITH THIRD PARTY SOFTWARE

The functionality of the BitFlow SDK is greatly extended by the addition of third party software. If you are going to use one of these products, then you will need to install a driver that provides an interface between the third party product and the BitFlow SDK. Usually you will have to install the BitFlow SDK before installing the individual 3rd party imaging

software product driver. However, some imaging software products install the driver and/or the SDK automatically. Please consult the documentation of the individual imaging software product for details.

Drivers for third party software packages are available from the download sections of our web site or from their respective vendors. There is a specific driver for each supported third party package. Some of our drivers work only with one family of camera interfaces (i.e. a Raven driver or a Road Runner and R3 driver), while other drivers are based on BitFlow's Common Interface library (Ci) and will work with whichever BitFlow board is installed in your system (i.e a single driver for Raven, Road Runner and R3).

TROUBLESHOOTING YOUR SYSTEM

Here are some simple things you can check if your system is not working correctly:

If computer does not boot, or the computer hangs during the boot process:

- 1 This problem is usually caused by another device conflicting with the board. Try removing or disabling all other non-critical PCI devices.¹
- 2 Try put the board in another PCI slot.
- 3 Try reserving the IRQ of the device conflicting with the board, this can be done in some BIOS's.

If no boards appears in SysReg:

- 1 Check the Event Viewer for an error message from the BitFlow driver. This may help diagnose the problem.
- 2 Check your computer's BIOS settings. If you have a Plug and Play OS setting, try changing to the opposite of current state.
- 3 Check for conflicting PCI devices. Try removing all PCI devices from your system except your display card and the BitFlow board.

If the synthetic image does not appear in RvView (Raven), R2View (Road Runner & R3):

- 1 Try the board in another PCI slot.
- 2 Remove all PCI cards except the BitFlow board and your Display card.
- 3 Try the BitFlow board in another PC.

If you get time out errors in RvView (Raven) or R2View (Road Runner & R3) with your camera:

- 1 Make sure your camera has power.
- 2 Check the cable between the camera and the board to ensure all the connectors are tight.
- 3 Make sure you have selected the correct configuration file for your camera.
- 4 Make sure your camera is set in the mode for which configuration file was designed.
- 5 If you are using an encoder or trigger, make sure that they are sending the correct signals to the board (see the hardware reference manual for interface specifications). Confirm that the camera works in free running mode first.
- 6 Check the overall PCI DMA throughput using either the application RvBench (Raven) or R2Bench (Road Runner and R3). Your system should be at least 20% faster than your camera's data rate. If you are unsure of your camera's data rate use the following formula:

$\text{Data Rate (MB/S)} = \text{Camera Taps} \times \text{Pixel Clock Frequency} \times \text{Bytes Per Pixel}$

For monochrome or 8-bit cameras: Bytes Per Pixel = 1

For cameras with 9 to 16-bit pixels: Bytes Per Pixel = 2

For packed (RGB) color cameras: Bytes Per Pixel = 3

For unpacked (ARGB) color cameras: Bytes Per Pixel = 4

The formulas define the maximum possible data rate produced by the camera, the average data rate may be somewhat slower.

If the video display is blank and you don't get time out errors in RvView (Raven) or R2View (Road Runner & R3):

- 1 Check the lens cap and F-Stop settings.
- 2 Try pointing the camera directly at a light or window. Some cameras need a very bright light to provide an image.
- 3 Check your camera's gain and other adjustments.

If you get video but it is skewed, scrolling or looks out of sync:

- 1 Double check that you are using the correct camera file for the camera you have attached to the board and for the mode that the camera is in. If you are not sure which camera file to use, edit the file in CamVert, and check to make sure the comments in the file agree with your camera/mode.
- 2 Make sure that you are using the correct firmware for your camera .
- 3 If your camera has a binning mode, make sure that you are using a binning camera file.

GETTING HELP

There are many resources, beyond this document, that are available to you if you have trouble getting started:

The manuals There is a wealth of information in both the SDK manual as well as the individual hardware manuals.

Our web site www.bitflow.com

Email support@bitflow.com

Telephone 781-932-2900 (9 AM-6 PM EST)

Facsimile 781-933-9965

Please have the following available when seeking support:

- 1 Model and serial number of Raven, Road Runner or r3.
- 2 Make and model of camera and mode being used.
- 3 Manufacturer and model of camera cable.
- 4 Software revision, run VerCheck to find the installed version information.
- 5 Computer CPU type, PCI chipset, and bus speed.
- 6 Operating system, service pack.
- 7 Example code (if applicable).
- 8 The event viewer log from the period of time when the problem occurred.