

Basler Camera Software Suite

ONE FOR ALL

Now Supporting Mac OS X,
New Embedded Camera Interface BCON

pylon 5



USB
VISION

GiGE
VISION

BCON
FOR LVDS

CAMERA
Link
MULTIMEDIA PRODUCT

FireWire

- Easy-to-use tools for camera configuration, and for capturing and recording images
- Access to all camera features thanks to GenICam technology
- User-optimized SDK for desktop and embedded applications
- Windows, Mac OS X, Linux x86 and Linux ARM support

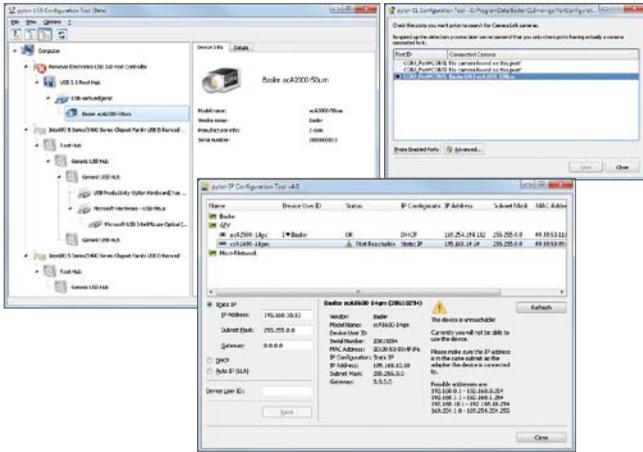
BASLER
the power of sight

OVERVIEW

Basler pylon 5 Camera Software Suite

The pylon Camera Software Suite is a collection of drivers and tools for operating any Basler camera with a Windows, Mac OS X or Linux PC or embedded processing board. As it is based on GenICam technology, it offers barrier-free access to the newest camera models and the latest features. Making changes to an existing camera device in your application essentially becomes a plug-and-play process.

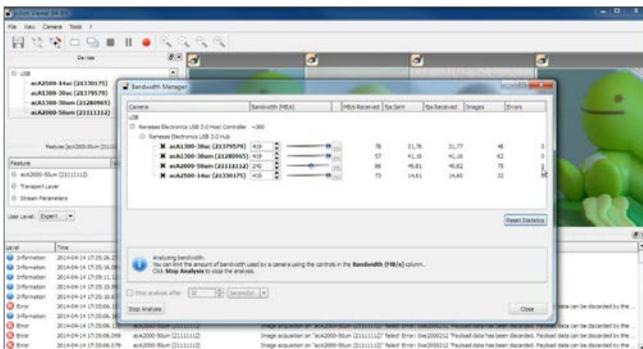
An easy-to-use set of **configuration tools** allows you to configure the camera's interface:



For example, you can easily configure the IP settings of a GigE Vision camera, fix driver or bandwidth problems for USB cameras, or configure baud rates for Camera Link cameras.

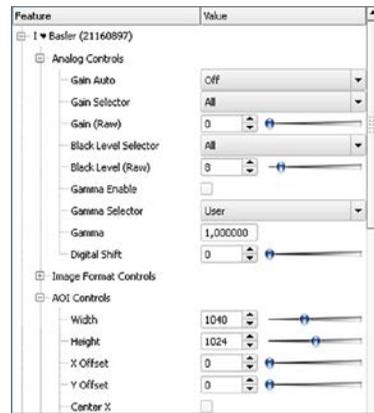
The **pylon Viewer** is a versatile application for testing and evaluating Basler cameras.

Camera images can be recorded to video files or into a sequence of single images (pylon Windows only).



With the viewer's new Bandwidth Manager you can quickly check whether your USB 3.0 camera can reliably deliver all images to your application (e.g. the pylon Viewer) with the given bandwidth settings. You can adjust the camera's bandwidth load until all cameras connected to your PC will transmit their images without any losses.

The tree structure of the viewer's graphical user interface lets you easily find the best camera parameter setup, adjust image quality, and control advanced camera features.



The pylon **USB3 Vision Driver** fully supports the USB3 Vision standard. It allows Basler USB 3.0 cameras to use the full speed and bandwidth of USB 3.0 for image transmission, while reducing resource load and using off-the-shelf hardware components.

The pylon **GigE Vision Performance Driver** quickly separates incoming packets carrying image data from other traffic on the network, and makes the data available for use by your vision application while requiring low CPU resources. This driver can only be used with network cards that include specific Intel chipsets. The pylon **GigE Vision Filter Driver** supports all kinds of hardware, common GigE network cards, and GigE ports on your motherboard as well.

The pylon Camera Software Suite is also available for the Basler dart with **BCON**, Basler's LVDS interface for sophisticated embedded technology requirements.

The pylon **IEEE 1394 Driver** gives you access to a well-established interface technology, and the pylon **Camera Link Configuration Driver** offers easy access to all camera parameters of Basler's latest Camera Link families: ace, aviator, and racer.

**New GenICam Version 3:
FASTER and SMALLER!**

Software Development Kit

The pylon Camera Software Suite also contains a **powerful SDK** and helps to develop any kind of camera application for Windows, Linux or Mac OS X on desktop as well as on embedded systems.

With the well-designed and user-friendly API you will need just a few lines of code to configure the camera and to grab and display images. The Instant Camera Class takes care of device lifetime and buffer management, as well as setting up a grab loop and handling camera events.

Documentation and Samples

Comprehensive documentation, plus a collection of programming samples for C++, C, .NET languages (C#, VB.NET, etc.), illustrate various use cases for different grab strategies, multi-camera applications, recording video files, and many more.

The GenICam concept

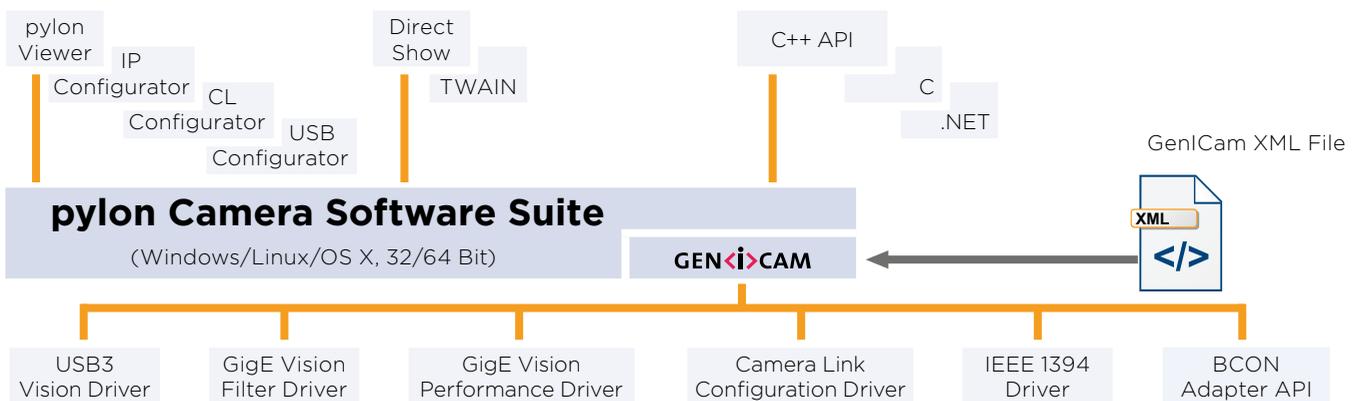
The pylon SDK is based on the concept of GenICam. This means that the camera itself describes its features and parameters (name, data type, value range etc.) through an XML file which is part of the camera firmware.

When pylon opens the camera, it loads and processes the camera XML file and creates a generic API which provides access to all camera parameters and functions. The new GenICam Version 3 performs these actions significantly faster than previous versions, while consuming a lot less user memory.

This approach allows the creation of generic camera applications compatible with all kinds of Basler cameras, no matter what interface they use.

You can easily provide generic GUI feature controls which are generated dynamically when processing the camera XML, and which provide access to all camera features without having any prior knowledge about the existence of these features - the pylon viewer's feature tree is a good example of these kinds of controls.

The pylon Camera Software Suite operates with all Basler line scan and area scan cameras - no matter what interface they use. It offers stable, reliable and flexible data exchange between Basler cameras and PCs, for Windows, Mac OS X and Linux on x86 and ARM based systems - at a very low CPU load.



pylon 5 – Faster, smaller, simpler!

With the pylon 5 Camera Software Suite Basler was the first camera manufacturer to provide software that uses the new GenICam 3 technology.

Faster: Thanks to GenICam 3, cameras now open about 4 times faster than in the previous GenICam versions.

Smaller: GenICam 3 requires only about half as much memory in comparison with previous GenICam versions.

Both features are especially advantageous in systems with less performance e.g. ARM based, embedded

platforms such as Raspberry Pi. The new standard is also extensively backward compatible; no or only slight code modification of the existing software is necessary and even older Basler cameras can take advantage of these innovations in pylon. Required changes are described in detail in the pylon Migration Guide.

Simpler: Thanks to the new availability of simple copy deployment programs generated with the pylon SDK can be delivered to the end user with unprecedented ease. In this way, pylon can be installed without conflicting with machine vision software packages from other manufacturers based on GenICam technology.

	GigE Vision				USB3 Vision			
	x86		x64		x86		x64	
	pylon4	pylon5	pylon4	pylon5	pylon4	pylon5	pylon4	pylon5
Time to open camera [ms]	813	197	944	185	430	111	420	102
Memory consumption after device creation [MB]	45	27	54	36	29	17	39	21
Peak memory consumption during device creation [MB]	65	28	80	36	42	18	56	23
Time to open camera from cache [ms]	285	128	340	118	186	75	198	67
Memory consumption after device creation from cache [MB]	26	16	32	21	19	13	24	15
Peak memory consumption during device creation from cache [MB]	48	17	63	21	34	13	44	15

Measured on Intel Core I7 - 3.4GHz

pylon Camera Software Suite for Windows

The pylon Camera Software Suite for Windows contains the following main modules. Each one can be individually selected/unselected during the installation process, preventing the installation of unneeded modules on your system:

Supports
Windows 10

- USB3 Vision Driver
- GigE Vision Filter and Performance Driver
- IEEE 1394 Driver
- Camera Link Serial Communication Driver
- pylon Viewer
- Configuration tools for GigE Vision, USB3 Vision and Camera Link

Standard Interface Adapter for 3rd Party Software

Pylon for Windows provides a number of adapters to interface with other 3rd party software:

- pylon DirectShow adapter – interfaces with any Direct Show-compliant software (e.g. other Machine Vision software, video editing software).
- pylon TWAIN adapter – interfaces with any TWAIN-compliant software (most commonly scanner or microscopy software).
- pylon AIK Driver – interfaces Basler USB3 cameras with Cognex Vision Pro.
- pylon Neurocheck Driver – interfaces Basler cameras with Neurocheck 6.1 or higher.

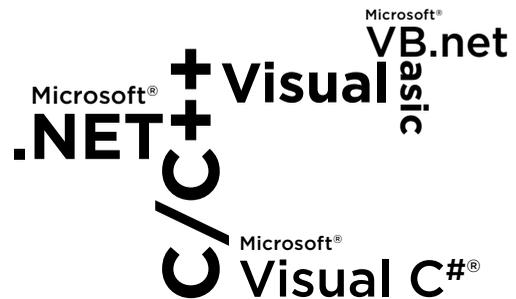
Easy Software deployment

pylon offers two methods to redistribute pylon based applications to the end user:

- A dedicated “pylon redistributable” includes the pylon runtime environment and drivers for USB3.0, GigE, IEEE 1394 – It simply needs to be installed along with the actual end user application
- With the Copy Deployment option (introduced in pylon 5) it is possible to simply copy the needed pylon files to the target system – this helps to keep the end user application as lean as possible.

Support for various programming languages

The pylon SDK for Windows supports all Basler cameras with the major programming languages: C, C++, and the .NET languages (C#, VB.NET, etc.).



pylon for Windows System Requirements

- Windows XP SP3 (up to pylon 4.0), Windows 7, Windows 8, Windows 8.1, Windows 10, 32 or 64 bit
- 150 MB of free disk space and 50 MB RAM per camera required

The pylon Camera Software Suite for Windows can be downloaded for free at:

www.baslerweb.com/pylon5Windows.

For more information on the installation process, refer to the pylon Installation Guide. The helpful pylon Release Notes contain all improvements and bug fixes since the first pylon version.

PYLON FOR LINUX (X86/ARM)

Tailor-made for Desktop and Embedded Applications

pylon Camera Software Suite for Linux

The pylon 5 Camera Software Suite is also available for Linux on x86 and ARM architectures. pylon for Linux offers:

- Design for standard PC Applications as well as for embedded systems
- User friendly, well-designed C and C++ API
- pylon Viewer and an IP Configuration tool for GigE vision
- BCON I²C Driver Adapter
- Full support of Basler GigE and USB 3.0 cameras
- Support for 32 and 64-bit x86 architectures
- Support for **ARM 32-bit in soft and hard-float** options: pylon 5 for Linux was successfully tested on several systems including the following ARM systems: **Raspberry Pi, NVIDIA Jetson, MiraBox, Wandboard and Inforce systems.** An application note about “pylon on ARM systems” is available on our **website**.

Easier Software Development for Embedded Systems

Because of their significant cost advantages (compared to standard Desktop PCs) embedded systems – quite often based on low cost ARM processors – are getting more and more attractive for computer vision applications. However in contrast to classic PCs software development for embedded systems is typically much more complex and hence costly.

pylon eases software development for embedded platforms and can help to reduce the development costs:

- Because pylon offers the same API for different operating systems, application development can be started on a standard PC (Windows, Mac, Linux) and later easily migrated to an embedded target e.g. Linux (ARM). Already existing pylon-based

code can simply be ported from a desktop to an embedded target.

- Since pylon can easily be ported from one camera interface technology to another (e.g. from USB3 Vision to BCON) without any significant code changes, an application can be prototyped with an easy-to-integrate, plug-and-play camera interface (like USB3 Vision) before switching to a more complex camera interface technology.
- pylon’s modular concept and the Copy Deployment option allow users to redistribute pylon-based applications with the necessary pylon runtime files only. This keeps the application lean and reduces memory consumption.

pylon for Linux System Requirements

pylon for Linux 4.1 and higher supports all relevant Linux distributions not older than 2 years. Older versions may work as well but is not tested nor guaranteed. 150 MB of free disk space and 50 MB RAM per camera are also required for the full SDK. Copy deployed on a target system the pylon runtime can be much smaller.

The pylon Camera Software Suite can be downloaded for free at www.baslerweb.com/pylon5Linux-x86 or www.baslerweb.com/pylon5Linux-ARM.

For more information on the installation process, refer to the pylon README and INSTALL file.



pylon has been successfully tested on several embedded boards

PYLON FOR BCON

pylon for BCON

The proven and user-friendly pylon Camera Software Suite is also available for the dart with BCON interface and supports Linux on x86 or ARM-based systems. **NEW!** The programming interface for creating user-specific applications is identical to other interfaces, such as USB3 Vision. This fact makes migrations (e.g. dart USB to dart BCON) much easier.

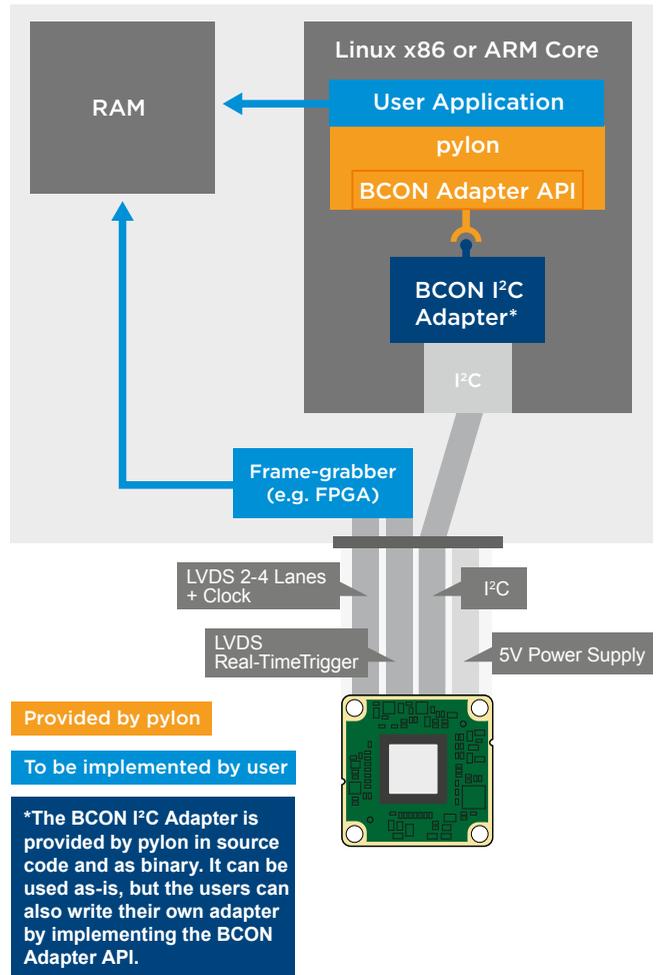
Based on GenICam technology, the camera configuration is performed via the I²C bus of the Linux system. This requires a BCON I²C driver adapter which is provided by pylon and which can be used directly on standard Linux systems with I²C. With a new BCON Adapter API, the user can also implement an own-driver adapter to control the camera via I²C. In this case, the standard pylon BCON I²C driver adapter can serve as a blue print for independent development as it is made available in source code too.

Because pylon isn't supposed to know anything about the LVDS image acquisition hardware actually used the user is required to create their own logic for image data transfer.

The BCON Adapter API can also be used to implement the image acquisition for the actual image-grabbing hardware. After doing so, pylon can be used without limitation – even for image data transfer.



Tailor-made for embedded vision applications: pylon for BCON



PYLON FOR OS X

pylon Camera Software Suite for OS X



The pylon 5 Camera Software Suite is also available for Mac OS X. It offers:

- User friendly, well-designed C++ API
- GenICam 3-based Technology
- pylon Viewer and an IP Configuration tool for GigE vision
- Full support of Basler GigE and USB 3.0 cameras
- Support for 64-bit x86 architectures

About Basler

Founded in 1988, Basler is a leading global manufacturer of high quality digital cameras and lenses for factory automation, medical & life sciences, retail and traffic applications. The company employs 500 people at its headquarters in Ahrensburg, Germany and subsidiaries in the United States and Asia.

Basler's portfolio of products offers customers the vision industry's widest selection of industrial and network cameras as well as lenses. Today it includes some 300 camera models – and it's still growing. We're committed to developing technology that drives business results for our customers: cameras and lenses that are easy to use, easy to integrate, and deliver an exceptional price/performance ratio.

Easy Software Deployment

With the Copy Deployment option it is possible to simply copy the needed pylon files to the target system – this helps to keep the end user application as lean as possible.

pylon for OS X System Requirements

- pylon 5 for OS X requires OS X Version 10.10 (Yosemite) or 10.11 (El Capitan)
- 150 MB of free disk space and 50 MB RAM per camera required

The pylon Camera Software Suite can be downloaded for free at www.baslerweb.com/pylon5OSX.

For more information on the installation process, refer to the pylon README and INSTALL file. The helpful pylon Release Notes contain all improvements and bug fixes since the first pylon version.



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