

FPGA Technology

Use of reprogrammable processor technology in A-series and V-series framegrabbers

FPGAs are classified as a reprogrammable processor technology. Its functional behavior is programmed in a hardware description language as a special function code (IP core) which is uploaded. The code can be changed at any time and reloaded. The FPGA can be completely or partially reprogrammed.

Advantage of FPGA technology is the ability to run programs with a very high parallelism. The processing performance guarantees a real-time behavior. The control and configuration of the application parameters are realized by accessing FPGA registers via software. These features make FPGA processors to a very powerful and flexible technology.

Silicon Software uses FPGAs as a core processor technology. By development of internal programming languages and tools, the implementation of image processing functions was optimized and accelerated.

The complete basic functionality of image acquisition, signal processing and data transfer is implemented in the FPGA. It runs without any load of the host CPU. The high parallelism of the operation guarantees a robust real-time processing in parallel to the provision of image data from the camera. In addition, further real-time functions have been implemented that perform image enhancement and image pre-processing. These include inter alia the sensor correction, image reconstruction, a high-quality color reconstruction (CFA Bayer filter), control of contrast, brightness or gamma values.

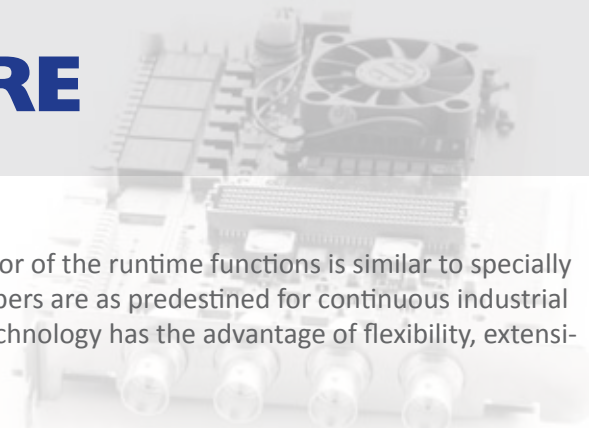
Many functions can be implemented by reprogramming the FPGA without need of changing the frame grabber hardware. One example is the additional support of PoCL lite standards. Silicon Software releases updates of the operating software regularly, which may include functional enhancements. The operating software covers functional programming for the FPGA processor, so-called hardware applets. These are selected and loaded during the initialization of the frame grabber. The hardware applets provide the frame grabber with operation related functions, e.g. a flat-field correction and special 1D trigger functions for line scan camera applications.

Frame grabber models, which are focused on the image acquisition, are summarized in the A-series. These are delivered with a predefined set of functions (hardware applet) and cannot be extended to additional individual functions.

The V-series covers more powerful boards that were designed to perform complex image processing. Besides the basic functionality and pre-processing of the A-series features, these models allow the user to program and load individual functions. These functions can be programmed by use of the graphical programming environment VisualApplets, by charging programming as a service or by loading application-specific hardware applets from the image processing libraries series SmartApplets. These additional functions that are loaded into the FPGA run in real time and don't use any load of the host CPU.






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FPGAs are an industrial, very robust processor technology. The behavior of the runtime functions is similar to specially manufactured hardware chips (ASIC). Hereby FPGA-based frame grabbers are as predestined for continuous industrial use by a high reliability and high performance. Moreover the FPGA technology has the advantage of flexibility, extensibility and upgrading over functional predefined processors (ASICs).

Available or planned models:

Standard / Frame Grabber	Description
A-Series for Camera Link	
microEnable IV AS1-PoCL	1-channel image acquisition card with power supply
microEnable IV AD1-CL	2-channels image acquisition card
microEnable IV AD1-PoCL	2-channels image acquisition card with power supply
microEnable IV AD1-mPoCL	2-channels image acquisition card with power supply
microEnable IV AD4-CL	2-channels high-performance image acquisition card
microEnable IV AD4-PoCL	2-channels high-performance image acquisition board with power supply
V-Series for Camera Link	
microEnable IV VD1-CL	2-channels image processing board
microEnable IV VD4-CL	2-channels high-performance image processing board
microEnable IV VD4-PoCL	2-channels high-performance image processing board with power supply
A-Series for GigE Vision	
microEnable IV AQ4-GE	4-channels image acquisition card
microEnable IV AQ4-GPoE	4-channels image acquisition card with voltage injector (optional)
V-Series for GigE Vision	
microEnable IV VQ4-GE	4-channels image processing board
microEnable IV VQ4-GPoE	4-channels image processing board with voltage injector (optional)
Camera Link HS and CoaXPress	
A-Series for Camera Link HS	up to 2-channel image acquisition boards with CX4 or SFP+ connectors
V-Series for Camera Link HS	up to 2-channel image processing boards with CX4 or SFP+ connectors
A-Series for CoaXPress	up to 4-channel image acquisition boards with BNC or 5W5 connectors
V-Series for CoaXPress	up to 4-channel image processing boards with BNC or 5W5 connectors

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