

VisualApplets 3

FPGA Programming Made Easy



VISUAL APPLETS

VERSION 3

VisualApplets 3 –

Graphical FPGA Programming for Real Time Applications

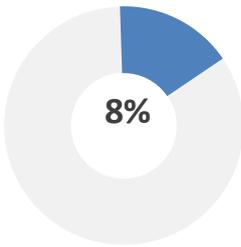
VisualApplets is a most intuitive, graphical tool for programming FPGAs used in machine vision. Even applications handling highly complex image processing tasks can be developed and created in a time and cost-effective manner. VHDL knowledge is not necessary, and the developer is supported by features like visual debugging, analyzing options, and pixel accurate simulation. An integrated SDK generator and the accompanying *microDisplay* program simplify implementation on the FPGA. These features offer a completely new flexibility to the machine vision industry: By employing VisualApplets, image processing tasks are implemented fast and comfortably, and existing solutions are maintained and refined in a most cost-efficient way.

Reducing CPU Load

The use of FPGAs in machine vision results in an enormous reduction of CPU load. With the rapid development of new sensors, images of higher and higher resolution can be acquired at continually increasing speed. CPUs and even GPUs are no longer able to handle the resulting enormous amounts of data. The solution lies in employing FPGAs. Preceding the CPU in the data processing chain, they fulfill a variety of image processing tasks such as image optimization, data interpretation, or creation of control signals. Thus, the load of CPU/GPU can be reduced significantly.

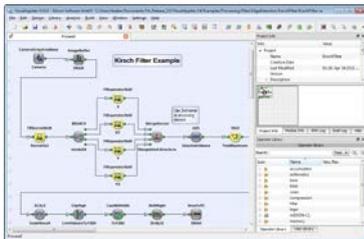
Image Processing on the Fly

By processing data in parallel and in deep pipe lines, FPGAs offer optimum qualities for interpreting image data in real time – which is the key feature of useful machine vision systems: Only when control signals created out of image data can be transferred in real time, can automated processes (like robotics in manufacturing) be controlled. Using VisualApplets, FPGAs can be programmed in a minimum of time and without any prior knowledge.



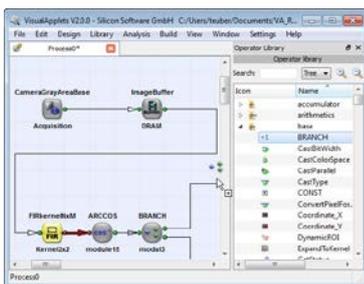
Cutting Edge Technology

VisualApplets offers a unique, highly advanced approach to programming FPGAs for machine vision. Projects that might need about three month of work when using conventional tools can be accomplished in about one week using VisualApplets – the resulting code showing the same efficiency and effectiveness.



FPGA Programming for Everybody

Since VisualApplets provides a GUI for programming, VHDL knowledge is not required to program FPGAs. Thus, this is no longer a task exclusively for hardware programmers, but can also be accomplished by software developers or machine vision experts.



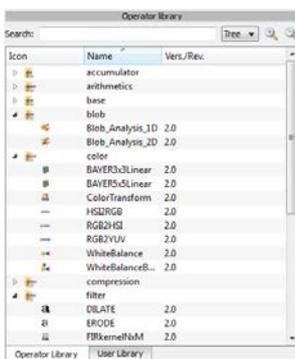
Graphical Application Development

Programming with VisualApplets is done by designing flow charts. The user models the data flow of the individual image processing solution by combining image processing modules (operators) and interconnecting transport links simply via Drag & Drop.



Team Functionality

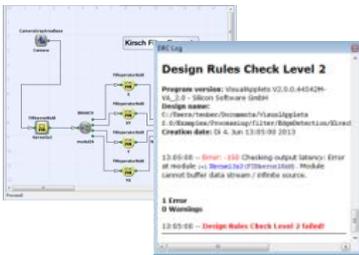
VisualApplets offers a broad range of team work functions. In addition, members of the project team can communicate their ideas to each other without having to tackle any programming language issues.



Icon	Name	Verz./Rev.
	accumulator	
	arithmetics	
	base	
	blob	
	Blob_Analysis_1D	2.0
	Blob_Analysis_2D	2.0
	color	
	BAVER3dLinear	2.0
	BAVER5dLinear	2.0
	ColorTransform	2.0
	HSDIRGB	2.0
	RGB2HSI	2.0
	RGB2YUV	2.0
	WhiteBalance	2.0
	WhiteBalanceB...	2.0
	compression	
	filter	
	DILATE	2.0
	ERODE	2.0
	FBKernelbM	2.0

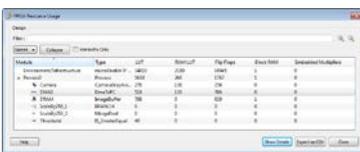
Operators and Libraries

For defining image processing solutions, more than 200 operators are available. Each operator offers a specific image processing function within the image processing chain. Operators can be freely combined and linked to meet a specific image processing task. They are grouped by theme into 13 libraries.



Design Rules Check and Visual Debugging

Using the two-level design check rules check, the user can verify if the new application conforms to the basic combination and parameterization rules of VisualApplets. Error analysis and debugging are closely intertwined, thus allowing comfortable visual debugging: Errors are listed as links, and clicking on an error message leads the user directly to the position where the design shows the reported defect.



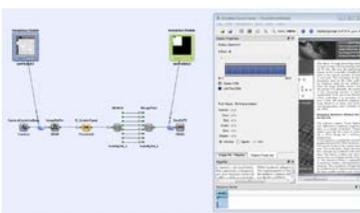
FPGA Resource Estimation

Detailed estimations and calculations indicate as to which amount existing FPGA resources are being used by individual design components and image processing operators. Thus, it is very easy to locate design elements with high resource consumption, so-called 'hot spots', instantly and to optimize the design at these places accordingly.



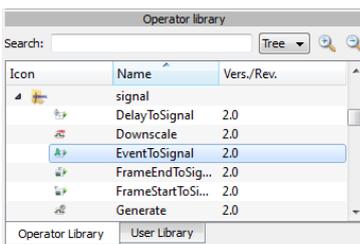
Bandwidth Analysis

The required bandwidth of each individual transport link is calculated by the program's data throughput analysis function. Links which need to have their bandwidth (re)adjusted are highlighted. For all links of the design, detailed information stating available and required bandwidth is displayed on mouse over.



Simulation

A pixel-accurate image processing simulation allows testing of the functionality of the designed application. Input modules (for feeding in test images or test image sequences) and output modules (for fetching the calculated visual results) can be placed on any spot of the design.



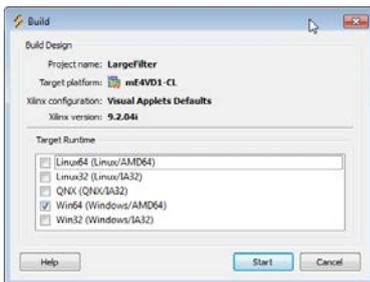
Event Control

With VisualApplets, it is possible to program event control mechanisms on FPGAs. The user can define that in specific situations that might arise on the FPGA during processing, events are to be generated by the application. These events are handed over to a connected software control by an implemented mechanism in real time. Thus, CPU-consuming polling processes are no longer necessary.



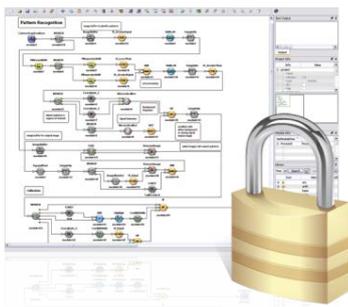
Parameterization at Runtime

In the process of developing the FPGA design, the user can define which parameters can be modified after the applet's implementation at runtime. These parameters can be (re)set, during runtime, by using the SDK or the microDisplay tool. This allows for a comfortable, software-based real-time control.



Build

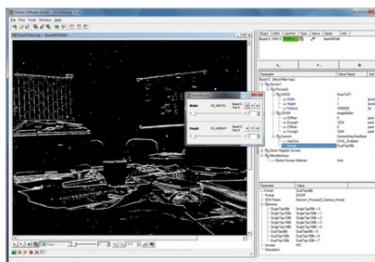
As soon as a design is ready, an executable FPGA applet can be created via mouse click. In this build process, VisualApplets automatically makes use of the previously installed Xilinx synthesis software.



Protection of Intellectual Property

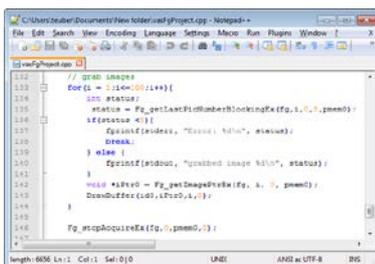
The design of individually developed image processing solutions is always protected by conversion into binary code.

Unauthorized use of applets can be prevented by restricting the executability of individual applets to certain, pre-defined FPGAs. In these cases, an applet developed by the customer or on behalf of the customer will only run on FPGAs approved by the customer.



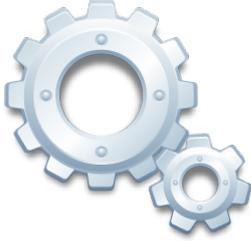
Implementation Using microDisplay

Using the configuration and preview program microDisplay, the user can monitor the runtime behavior of the FPGA applet in real-time, visually adapt and configure the image processing behavior of the applet, and save the complete system environment to a configuration file.



SDK Code Generator

Together with the build of the FPGA code, an individual software example is automatically generated to ease implementation into a software application. The parameterizable interfaces are listed and embedded into a programming environment for image acquisition, memory management and image transfer.



Interfaces to 3rd Party Image Processing Applications

Functional and easy interfaces to image processing applications like VisionPro® (Cognex), LabVIEW (National Instruments), HALCON (MVTec), CVB (STEMMER IMAGING) and MIL (Matrox) allow for implementation of FPGA applications created with VisualApplets® into almost all conceivable image processing systems.

Silicon Software VisualApplets Documentation



Documentation and Online Tutorial

Comprehensive documentation provides information for all audiences and is also available as context-sensitive online help which can be accessed directly from within the program. A live link leads to the online version of the documentation that is updated on a regular basis:

www.siliconsoftware.de/visualapplets3.html



Face-to-Face

Silicon Software offers a broad range of services such as workshops, tutorials, and coaching that deal with implementation and usage possibilities of VisualApplets. Development services that speed up the development of customer-specific applications complete the product portfolio. Get information on upcoming events from your local distributor or directly from Silicon Software.

About Silicon Software

Silicon Software, located in Mannheim/Germany and Nashua/USA, is a manufacturer of frame grabbers and intelligent pre-processing solutions based on reprogrammable FPGA technology for machine vision applications. Further focuses are graphical programming environments and image processing libraries for real-time applications. The hardware and software products are designed for flexibility, easy handling and performance featuring user programmable FPGA technology.

Contact

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