

Customer

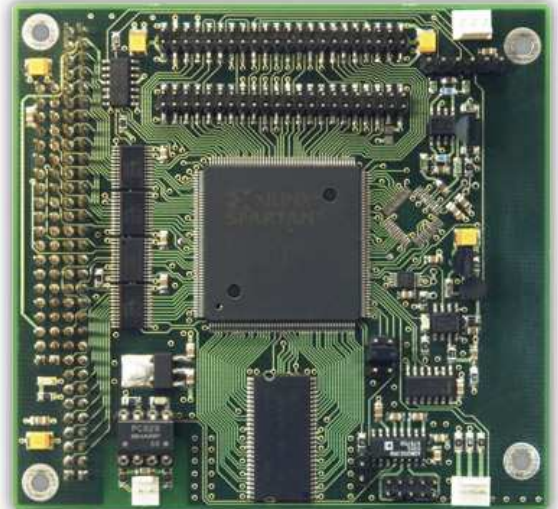
Joint German-Belarusian venture "Proscan Special Instruments" develops devices for industries, scientific researches, laboratory diagnostics and medicine.

One of the company's directions of activities is development of fluorescent, Raman spectrometers, spectrometers with inductively coupled plasma and other types of spectrometers. These devices are used when carrying out scientific researches, controlling semiconductors, registering low luminous fluxes and in many other science and technology fields.

Objective

The task is to develop digital control card for image registration system that works in complex of spectral optical devices. Complex works in the wave-length range from 400 to 1100 nms. It is necessary to choose FPGA crystal and develop configuration that functions as SDRAM controller, ISA decoder, Fillfactory LUPA-4000-M CMOS matrix controller and data bus internal arbiter.

- To organize data exchange between CMOS matrix and industrial PC via SDRAM by means of ISA bus;
- To manage operation modes in accordance with temporary diagrams of CMOS matrix work;
- To organize data buffering in SDRAM with successive reading at frequency up to 48 MHz;



Solution

On the development stage of project architecture our team chose Xilinx XC3S400-PQ208 chip as FPGA crystal. We built internal project architecture on the basis of PicoBlaze master controller; three DMA channels; CMOS, SDRAM and ISA controllers; and also UART transceiver for project testing and debugging.

We realized the following functions on Xilinx XC3S400-PQ208 crystal:

- Operating ISA bus;
- Operating external TI ADS5221 ADC;
- Operating camera's work and feed;
- Forming synchronization signals;



FPGA-based CMOS Matrix Controller for Digital Camera

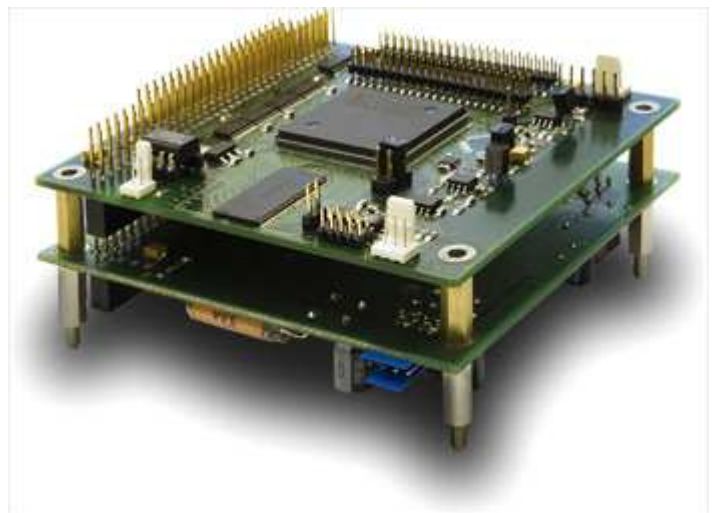
- Organizing camera's successive operation mode;
- Organizing camera's parallel operation mode;
- Organizing camera's non-destructive operation mode;



Benefits and features

The package of developed IP cores together with Xilinx PicoBlaze (or MicroBlaze) processor core is the basis for the following tasks:

- Data transmission via PCI bus;
- Data output to VGA display or TV set using standard analog video output;
- Overlaying camera's original signal with additional information (symbols, images, etc.) transmitted from PC or other operating device;
- Processing video signal received from CMOS matrix in real-time mode;



Project tools	Xilinx ISE 6.2, Synplify Pro 7.2, ModelSim
Tools and interfaces	ISA, SDRAM, DMA, CMOS
Programming languages	VHDL, ASM
Project management tools	dotProject, MSProject, CVS
Efforts	80 man-days
Duration	2,5 months