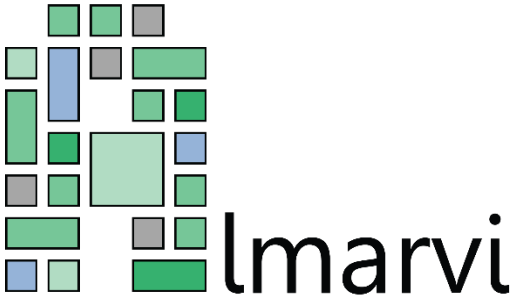
Artemis No. 621439

Algorithms, Design Methods, and Many-Core Execution Platform for Low-Power Massive Data-Rate Video and Image Processing



Video Chain Demonstrator on Xilinx Kintex7 FPGA with EdkDSP Floating Point Accelerators

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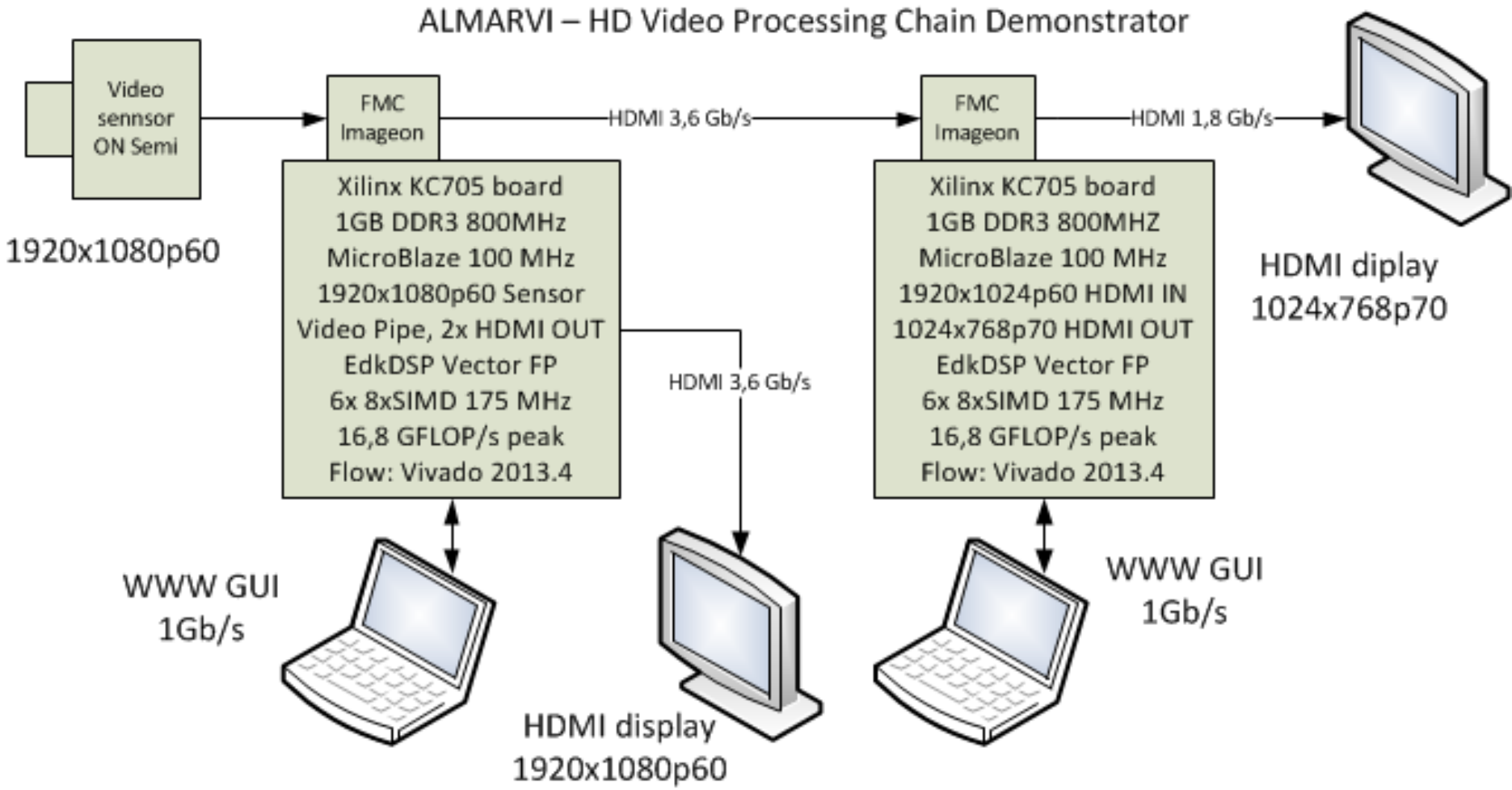
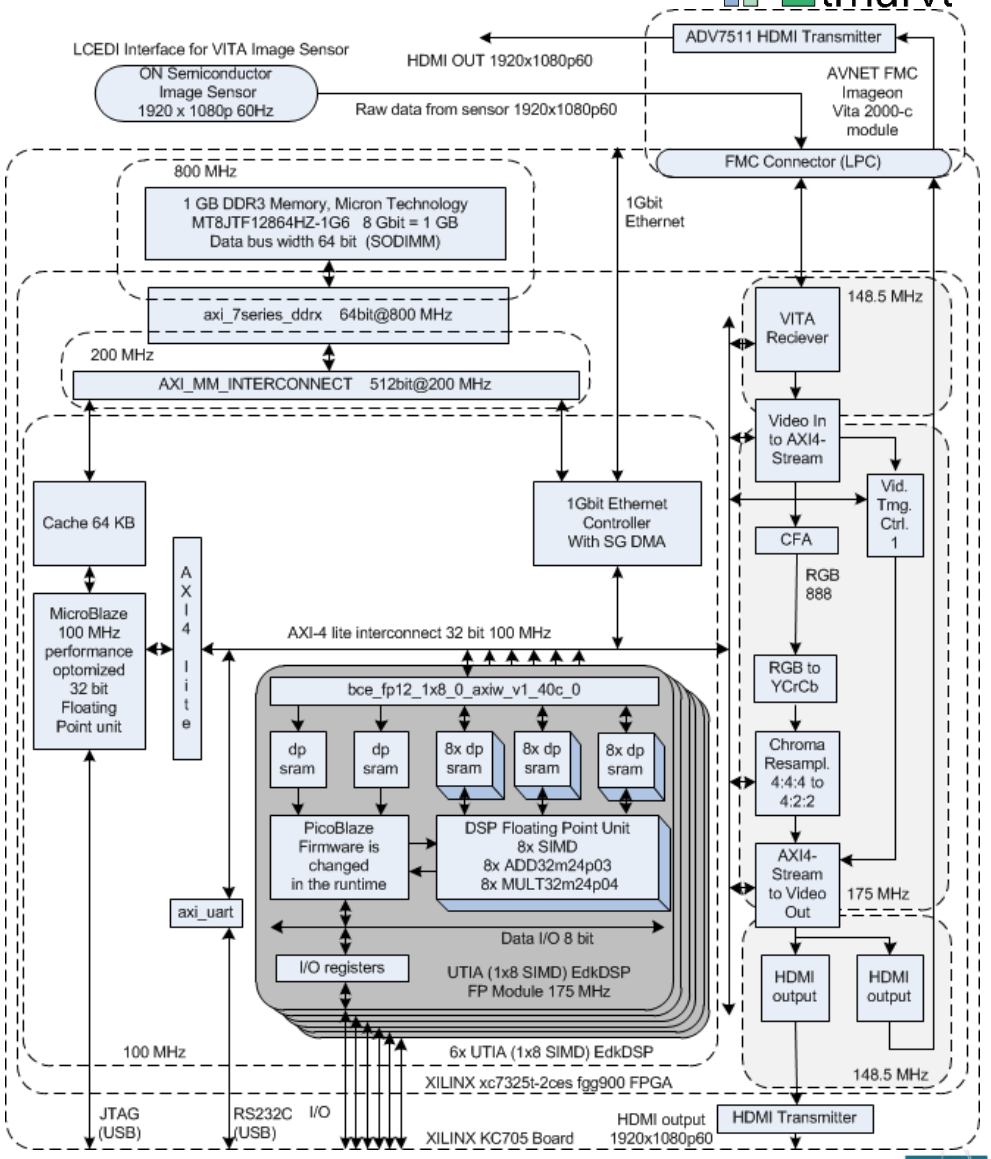
ARTEMIS

Introduction



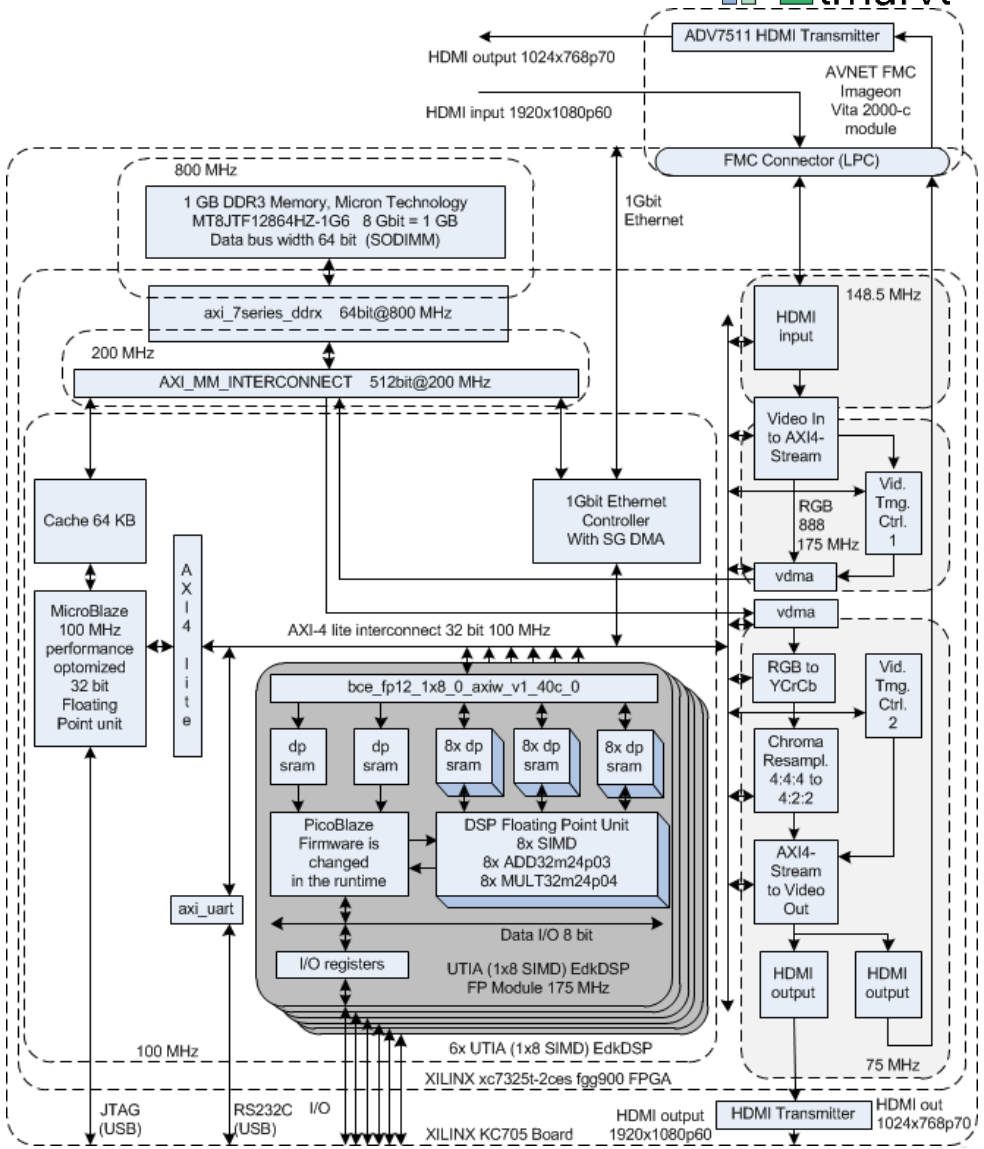
Video Sensor with EdkDSP accelerators

- Xilinx Kintex KC705 board
- ON Semi VITA 2000 color video sensor 1920x1080p60
- HDMI video pass-through
- 6x EdkDSP vector 8xSIMD FP32bit accelerators 175 MHz, peak perf. 16,8 GFLOP
- 6x 8bit PicoBlaze serving as reprogrammable schedulers
- MicroBlaze 32bit 100 MHz
- Xilkernel + LwIP based 1Gb Ethernet Web Server
- 1Gb Ethernet TFTP file transfers



HDMI passthrough + EdkDSP accelerators

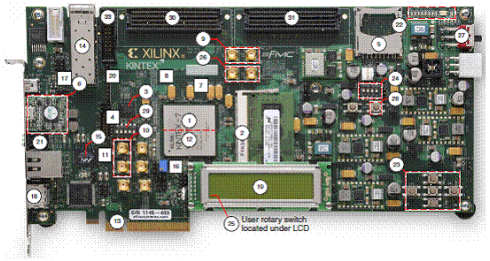
- Xilinx Kintex KC705 board
- HD Video pass-through with 30 HD videoframe buffers, 1920x1080p60 (0.5s of video)
- Output 1024x768p75
- 6x EdkDSP vector 8xSIMD FP32bit accelerators 175 MHz, peak perf. 16,8 GFLOP
- 6x 8bit PicoBlaze serving as reprogrammable schedulers
- MicroBlaze 32bit 100 MHz
- Xilkernel + LwIP based 1Gb Ethernet Web Server
- 1Gb Ethernet TFTP file transfers



HD Video Processing Chain Demo

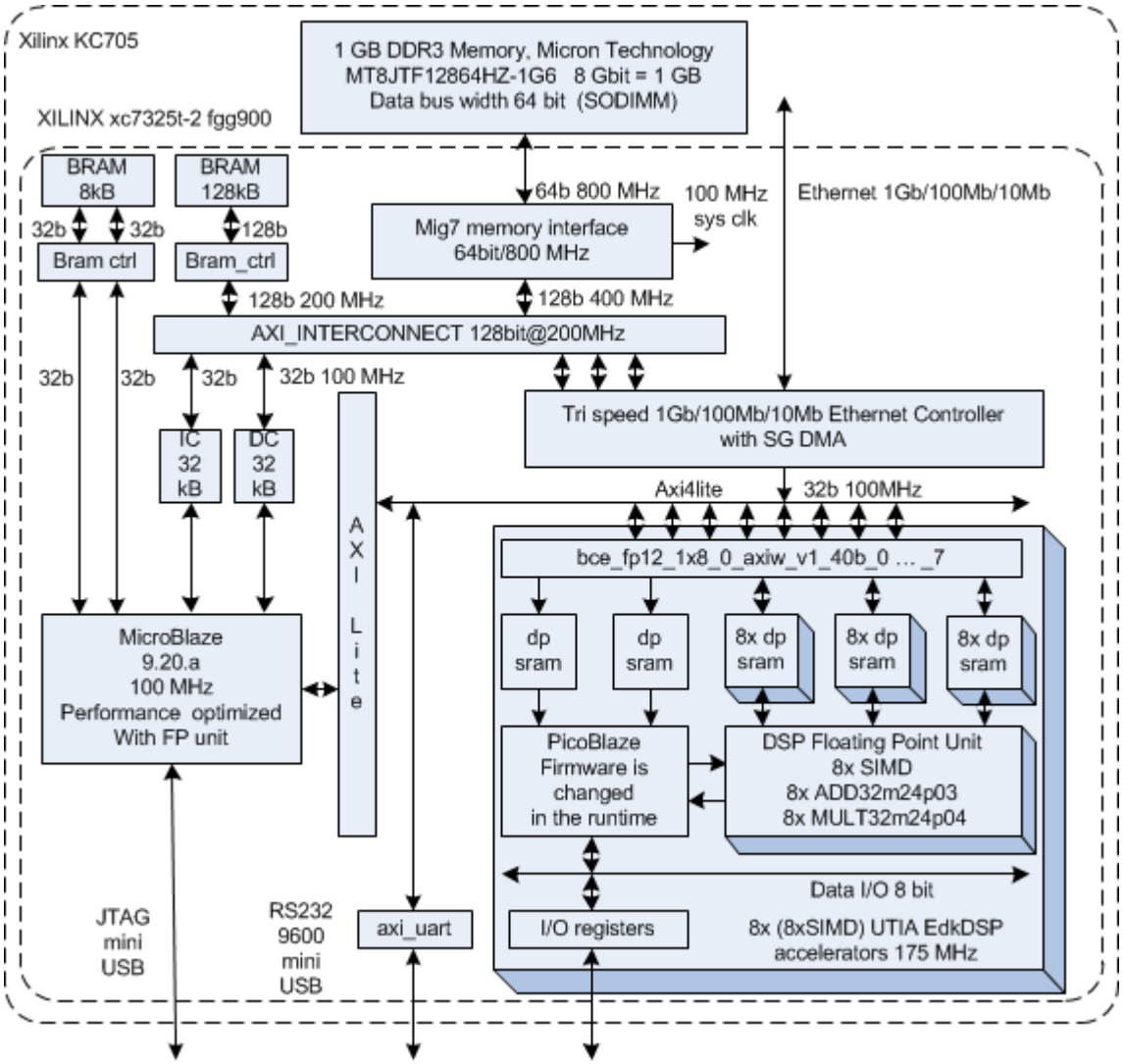
Evaluation package - EdkDSP Accelerators

- **Computation and Communication Blocks for Xilinx Kintex7 FPGA with UTIA EdkDSP Accelerators. Vivado 2013.4 Designs with SW Demos.**
  - KC705 with 175 MHz EdkDSP accelerators
  - EdkDSP accelerators for processing data
    100 MHz 32bit MicroBlaze CPU,
  - 1G Ethernet controller, DDR3 800 MHz
  - Xilkernel and LwIP based Web server for status & control
  - EdkDSP FP32 accelerators 8x (8xSIMD) 175 MHz
  - PicoBlaze6 based schedulers 175 MHz with UTIA C compiler



- **http://sp.utia.cz/index.php?ids=results&id=Utia_EdkDSP_Vivado_2013_4_KC705**
- **Detailed application note (61 pages):**
  http://sp.utia.cz/results/Utia_EdkDSP_Vivado_2013_4_KC705/Utia_EdkDSP_Vivado_2013_4_KC705.pdf

Evaluation package - EdkDSP Accelerators



- **Peak performance (8x 8xSIMD) 22,4 GFLOP/s**
- **Demonstration of performance of a single EdkDSP accelerator:**
- **FIR (1x 8xSIMD) 1,4 GFLOP/s**
- **LMS (1x 8xSIMD) 1,0 GFLOP/s**

Summary of Demonstrated Technology

- ON Semi CMOS Color Image Sensor
  2.3 Megapixel.
- HDMI In & Out for Video data
- Full HD support (1920x1080p60)
- 1Gbit Ethernet for configuration, control and GUI
- Future work on HW portability (FMC standard):
  - ZC702 – 1x HDMI out + 2x FMC Imageon card
  - KC705 – 1x HDMI out, 2x FMC Imageon card
  - Industrial FMC carriers with ZYNQ System-On-Module

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