Xylon d.o.o.

Fallerovo setaliste 22
10000 Zagreb, Croatia
Phone: +385 1 368 00 26
Fax: +385 1 365 51 67
E-mail: support@logicbricks.com
URL: www.logicbricks.com

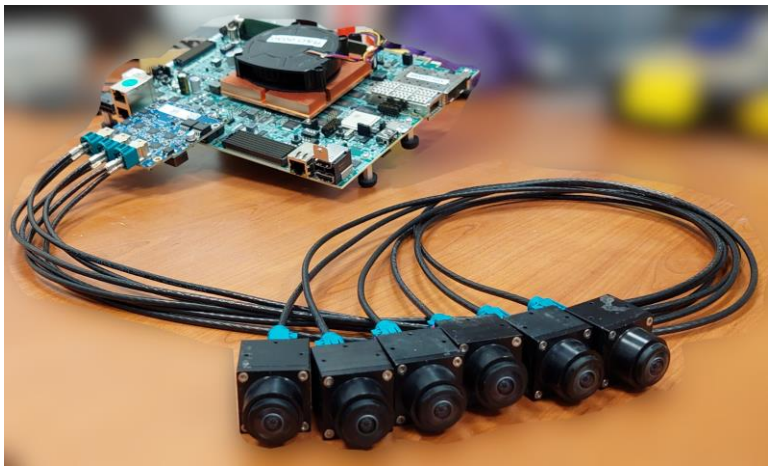

Figure 1: Xylon's logiVID-ACAP-6CAM Vision Development Kit and AMD-Xilinx VCK190 evaluation kit

Xilinx Versal AI Core Series VCK190 evaluation kit must be purchased from Xilinx and distributers. The kit is prepared for use with the optional Ouster™ OS-1-64 high resolution imaging Lidar, which has to be sourced independently.

Features

- Complete and flexible design platform for embedded multi-camera vision applications
- Prepared for use with the AMD-Xilinx Versal™ Adaptive Compute Acceleration Platform (ACAP)
- Supports the next generation Maxim Integrated GMSL2 automotive high-speed serial interface
- Licensed reference design (logiREF-ACAP-VDF) demonstrates video capture and display of six camera inputs, as well as visualization of LIDAR data as a 3D point cloud
- Reference design (logiREF-ACAP-VDF) includes licensed[1] Xylon logicBRICKS IP Cores
- Design fully prepared for AMD-Xilinx Vivado Design Suite 2021.2, Vitis Unified Software Platform and PetaLinux 2021.2
- Provided demo runs on Linux OS and includes logicBRICKS software drivers and applications
- Enables vision developers to quickly add their own algorithms to the provided infrastructure
- HDMI display output achieved through the on-board HDMI port via the Xilinx HDMI 1.4/2.0 Transmitter Subsystem[2]
- Input video resolution: 1928x1208@30fps
- Output video resolution: 1920x1080@60fps
- Compatible with Xilinx PetaLinux tool 2021.2
- logiVID-ACAP-6CAM ACAP vision development kit includes:
  - 6x Xylon 2.3MP automotive video cameras
  - 1x Xylon GMSL2 deserializer FMC module
  - 6x Rosenberger® FAKRA cables (5 m)
  - 3x Rosenberger HFM® to 4x FAKRA cable assemblies
- Documentation and Tech support (e-mail)

1. *Included are 3-month Xylon evaluation licenses for the Xylon logiCVC-ML, logiWIN and logi3D logicBRICKS IP cores.*
2. *Xilinx licensed IP. Digital code vouchers provided by Xylon to buyers of the logiVID-ACAP-6CAM Vision Development Kit for Versal ACAP.*

Applications

- AD/ADAS, guided robotics, drones, machine vision, AR/VR and other vision applications

General Description

The logiVID-ACAP-6CAM Vision Development Kit provides system designers with tools necessary for efficient development of multi-camera vision applications on AMD-Xilinx Versal AI Core ACAP devices. The hardware platform includes six of Xylon's 2.3MP GMSL2 automotive video cameras with cabling and Xylon's 12-Ch GMSL2 deserializer FMC add-on module. The display output of the Vision Development Kit is done directly through the on-board VCK190 HDMI port which is achieved with the implementation of a combination of programmable logic, most notably the HDMI 1.4/2.0 Transmitter Subsystem. It supports standard full high definition resolution monitors.

The kit comes with the complete and licensed logiREF-ACAP-VDF Framework with pre-verified reference design implemented by Xylon's logicBRICKS IP cores. All IP cores are supplied with Linux software drivers. The video capture and display demo applications run on Linux OS:

Figure 2: logiREF-ACAP-VDF IP Framework provides complete Multi-Camera to display ACAP designs

logiREF-ACAP-VDF Video Design Framework for Multi-camera Vision Applications

The logiREF-ACAP-VDF Video Design Framework for Multi-Camera Vision Applications enables users of the logiVID-ACAP-6CAM Development Kit to quickly utilize the provided reference design for further development of embedded multi-camera vision systems, intended to also use the many benefits of the AMD-Xilinx Versal family of platforms such as Scalar Engines, Adaptable Engines and Intelligent Engines to achieve dramatic performance improvements in comparison to traditional hardware platforms.

The complete camera-to-display ACAP design uses just a fraction of available programmable logic and significantly saves design time. Instead of starting from scratch and having to spend months designing and building a new design framework, users of the logiREF-ACAP-VDF Reference Design Framework can immediately focus on specific vision-based parts of their next ACAP design. The logiVID-ACAP-6CAM Development Kit can be installed on test vehicles (cars, robots etc.) and used in exhaustive tests, e.g. for testing and validation of new AD/ADAS developments in the test vehicle and in different road conditions.

The design implements six parallel video inputs from Xylon's GMSL2 video cameras and the HDMI FHD display output. The six parallel video camera feeds are displayed in a six area tiled manner on the output monitor. All video inputs are stored in the video memory and by mean of the on-board user push button, the user can select between displaying all video inputs from all six video cameras simultaneously in a tiled manner, or video input

from one of the video cameras (with selectable Sobel filtering on Camera #1). The HW accelerated Sobel filter edge detector is an example of the use of Xilinx's Vitis Vision library and is a demonstration of the possibilities for developers of implementing their own image processing on the hardware level.

The design is prepared for use with the OS-1-64 High Resolution Imaging Lidar from Ouster. The Lidar Visualization Demo Application is included and will render the acquired data in real-time in the form of a 3D point cloud, with the perspective being controllable via a mouse connected to the board. A connected LIDAR is not a requirement for running the camera portion of the framework, but an application running in parallel that can be turned on and off via on-board push buttons. Users also have the option of modifying the existing framework to support LIDAR devices of their choice.

To get more information about the logiREF-ACAP-VDF IP Framework, please read the following datasheet:
http://www.logicbricks.com/Documentation/Datasheets/IP/logiREF-ACAP-VDF_hds.pdf

Xylon's logicBRICKS IP core used in the logiREF-ACAP-VDF Reference Design is licensed through Xylon's Low-Volume or Evaluation IP program:
http://www.logicbricks.com/logicBRICKS/Low-Volume-IP-Program.aspx

Xylon's Automotive Video Camera

Packed in a compact, one cubic inch big waterproof aluminum housing, Xylon's new automotive video camera provides excellent performance. Based on the Semiconductor AR0231AT CMOS image sensor, the camera provides 30 Frames per Second (fps) of color 2.3 MP (1928x1280) video processed by an internal FPGA video processor. The FPGA integrates Xylon's complete logicBRICKS High Dynamic Range (HDR) Image Signal Processing (ISP) pipeline. Depending on the camera's version, the supported communication interface can be either the GMSL2 or the FPD-Link III high-speed serial interface. Cameras supplied with the logiVID-ACAP-6CAM Vision Development Kit are equipped with the FIFO Optics 05525FM lens and short coax-cable leads with the Rosenberger FAKRA Z type connector. Customers can also order the camera with the Sunex NoGhost DSL182B fisheye lens.

Figure 3: Xylon's logiCAM-GMSL2-AR0231 video camera with FIFO Optics 005525FM Lens

Xylon's Automotive GMSL2 deserializer FMC module

The logiVID-ACAP-6CAM Vision Development Kit includes the logiFMC-GMSL2 automotive deserializer FMC module. This add-on card is designed primarily to enable quick prototyping and evaluation of automotive multi-camera Advanced Driver Assistance (ADAS) and Autonomous Driving (AD) applications. It enables easy interfacing of up to twelve (12) automotive video cameras to hardware boards based on Xilinx' FPGA, SoC, MPSoC and ACAP video and vision processors.

Figure 4: Xylon's logiFMC-GMSL2 deserializer FMC module

https://www.logicbricks.com/Products/logiFMC-GMSL2.aspx

Related Design Services

Design services are available to customers interested in customization and enhancement developments based on the presented hardware and software products. For more information, please contact Xylon at info@logicbricks.com.

Related Xylon Products

The logiREF-ACAP-VDF ACAP IP Reference Framework for Multi-Camera Vision Applications provides system designers with everything they need to evaluate Xylon's logicBRICKS IP Suite and to efficiently develop multi-camera vision applications on AMD-Xilinx Versal devices. The complete reference design enabled users to quickly utilize the design to kickstart their development of embedded multi-camera vision systems.

Email: support@logicbricks.com
URL: https://www.logicbricks.com/Products/logiREF-ACAP-VDF.aspx

The logi3D Scalable 3D Graphics Accelerator IP core is specifically designed for Xilinx Versal ACAPs and Zynq-7000 SoCs. The logi3D enables designers to add attractive 2D and 3D graphics, including advanced Graphical User Interfaces (GUI), to their SoC design. The logi3D is a parametrizable and scalable Graphics Processing Unit (GPU) IP core that allows advanced and highly customized graphic controller designs. For more information, please visit our website:

Email: support@logicbricks.com
URL: http://www.logicbricks.com/Products/logi3D.aspx

The ACAP HDR Image Signal Processing Framework is intended to showcase a complete logicBRICKS IP suite implementation of High-Dynamic Range (HDR) Image Signal Processing (ISP) pipeline in an embedded design based on AMD-Xilinx ACAP programmable devices. The HDR ISP pipeline enables crisp camera video under altering and rough lighting conditions in next generation multi-channel embedded systems for use in automotive, surveillance, medical, aerospace and similar video and vision AI applications. This design is prepared for use with the AMD-Xilinx Versal AI Core Series VCK190 evaluation board. For more information, please visit our website:

Email: support@logicbricks.com
URL: http://www.logicbricks.com/Products/logiREF-ACAP-MULTICAM-ISP.aspx

Xylon's logiISP-UHD Image Signal Processing Pipeline IP core is a full high-definition ISP pipeline designed for digital processing and image quality enhancements of an input video stream in Smarter Vision embedded designs based on Xilinx's All Programmable devices. The logiISP-UHD ISP pipeline IP core can be supplemented with the logiHDR High Dynamic Range (HDR) Pipeline. To learn more, please visit our website:

URL: http://www.logicbricks.com/Products/logiISP.aspx
URL: http://www.logicbricks.com/Products/logiHDR.aspx

Ordering Information

Products are available directly from Xylon. Please visit our web shop or contact Xylon for pricing and additional information:

Email: sales@logicbricks.com
URL: http://www.logicbricks.com/Products/logiVID-ACAP-6CAM.aspx

This publication has been carefully checked for accuracy. However, Xylon does not assume any responsibility for the contents or use of any product described herein. Xylon reserves the right to make any changes to the product without further notice. Our customers should ensure that they take appropriate action so that their use of our products does not infringe upon any patents. Xylon products are not intended for use in life support applications. Use of the Xylon products in such appliances is prohibited without written Xylon approval.

Related Information

Xilinx Programmable Logic

For information on AMD-Xilinx programmable logic or development system software, contact your local AMD-Xilinx sales office, or:

Xilinx, Inc.

2100 Logic Drive
San Jose, CA 95124
Phone: +1 408-559-7778
Fax: +1 408-559-7114
URL: www.xilinx.com

Revision History

Version	Date	Note
1.00	19.10.2022	Initial public release.