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Figure 1: The logiRECORDER-BASE Multi-Channel Video Recording ADAS Kit

Features

- Based on the Xilinx® Zynq®-7000 All Programmable SoC ZC706[1] Evaluation Kit
- Enables recording of up to six (6) uncompressed video channels along with annotated metadata:
  - Resolution 1280x800@30fps, YCbCr 4:2:2
- Currently supports Xylon video cameras[2,3]: HDR, 1-Mpixel, LVDS interface, waterproof…
- Fully synchronous recordings - channels are frame-to-frame aligned with the skew < 4 lines
- The recorded metadata come from the vehicle's OBD-II bus, external GPS module and the RTC: UTC, frame timestamp, RPM, speed, location…
- Supports standard and event-triggered recording of video before and after the configured trigger

- Enables continuous video display of the annotated video channels, even while recording
- Videos can be played back directly from the kit's HDMI out, or copied to a PC for offline viewing
- The video (.AVI) and metadata (.SUB) can be played by popular media players, i.e. the VLC
- The kit is fully controllable through a simple to use web interface
- Four portable FAT32 formatted SSD Disks (combined 2 TB) enables one hour[4] of recording
- Xylon offers a PC geared up (optional product!) for comfortable use of recorded videos directly from the plugged-in logiRECORDER SSD disks
- Built for installations in test vehicles

- Integrated DC/DC regulation, power monitoring and graceful shutdown
- Main box L x W x H: 328 x 258 x 102 mm

- Power: 9-24 VDC, 50 W
- Tech support (e-mail)

1   *OEM kit version without the Xilinx Vivado® Design Suite.*

2   *Xylon plans to support different video streaming front ends and offer more kit versions in the near future.*

3   *For more info about Xylon video cameras, please read the related text section "Xylon Video Camera"*

4   *While recording all six video channels. The recording time is longer when recording less than six video channels.*

Applications

- Recording of the real-world road conditions for use in a lab environment
- Development of new advanced ADAS algorithms and systems and their verification and validation in test vehicles under real-world driving conditions

General Description

The logiRECORDER Multi-Channel Video Recording Advanced Driver Assistance (ADAS) Kit builds on the Xilinx Zynq-7000 All Programmable SoC based Xylon logiADAK Automotive Driver Assistance kit by including all necessary hardware and software for synchronous video recording and playback of up to six (6) uncompressed video streams from Xylon video cameras. The recorded video sessions also include important video metadata collected from the vehicle's On-Board Diagnostic OBD-II bus and an external GPS module: timestamps, vehicle GPS position, speed and others. The kit can be integrated in test vehicles for video recordings of real-world driving conditions and situations for use in lab environments.

The logiRECORDER web interface (Figure 2) allows users to fully control and interact with the kit from a PC running a web browser. It can be used for selecting video inputs for recording, switching between display views, swapping continuous and event-triggered recording modes, controlling video playback directly from the logiRECORDER system, power supply (graceful shutdown) setups, etc. The selected logiRECORDER views with annotated metadata are continuously displayed on the attached monitor (Figure 3 and 4).
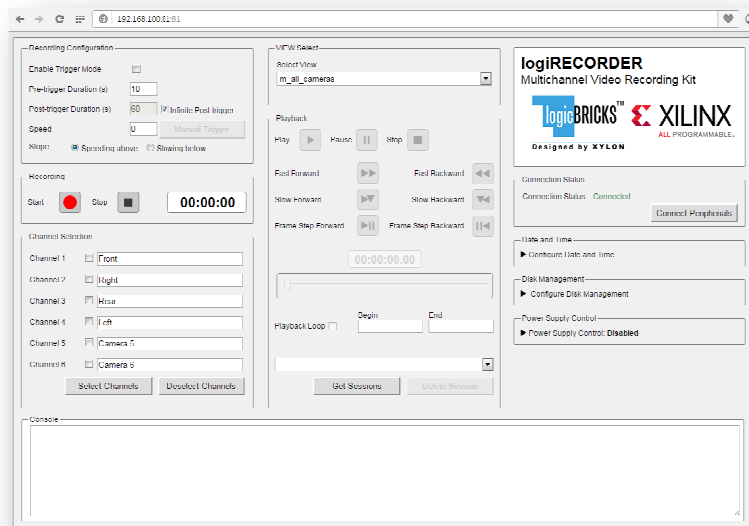

Figure 2: logiRECORDER-BASE Web Interface

The video playback directly from the logiRECORDER is straightforward. The web interface allows users to browse the recorded sessions, play, stop, forward/rewind, fast forward/rewind and step frame-by-frame through the recordings. The recorded video sessions can be also transferred to a PC for more comfortable viewing, archiving and use in the lab. Virtually any media player, such as the VLC media player, can play the recorded video sessions on the PC due to their standard formatting: .AVI for video files and .SUB for the metadata files.

The kit stores recorded video sessions on four (4) FAT32 formatted Samsung 840 Pro Solid State Disks (SSD), which can be removed and plugged into a personal computer equipped with the rack for 2.5" SATA SSDs. The removable SSD disks enable the most comfortable work with the recorded video sessions, since the copying of up to 2 TB of the video data from the logiRECORDER to the PC through the provided Ethernet connection or off-the-shelf USB 2.0/3.0 to SATA adapter needs hours to complete. As an add-on feature and a separated product, Xylon offers a PC geared up (section "Related Xylon Products") with the integrated SSD Rack and suitable video software for parallel viewing of all recorded and annotated video channels.

Figure 3: Screenshot from the logiRECORDER-BASE Integrated in the Test Vehicle

Upcoming logiRECORDER Kits

Xylon is developing the logiRECORDER kits with significantly improved features set (Figure 4):

- The FPD-Link III from TI® or the GMSL from Maxim Integrated™ camera serial interface
- Six video inputs for video recording and six video outputs for video playback
- Enables non invasive video recordings and transmissions between cameras and the ADAS ECU
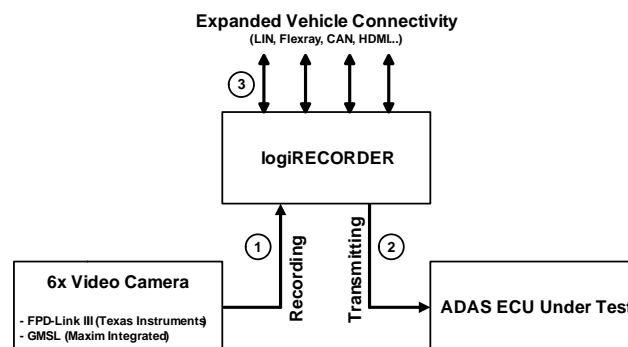- Multiple vehicle interfaces: LIN, CAN, FlexRay, HDMI…

Figure 4: The Upcoming logiRECORDER kits – Concept Illustration

For any inquires regarding the upcoming kits, please contact info@logicbricks.com.

logiRECORDER-BASE Hardware Platform

Figure 5 shows the logiRECORDER system connections. The main system's unit is built around the Xilinx Zynq-7000 AP SoC based ZC706 Evaluation Kit, which is expanded by two add-on FMC boards designed by Xylon. The Xylon LVDS Receiver FMC board assures the serialized video and control data links between Xylon video cameras and the Zynq-7000 AP SoC. The Xylon SATA/CAN/AUX FMC board supports interfacing between the SSD disks and the Zynq-7000 AP SoC, the CAN connections to test vehicle's OBD-II diagnostic bus, UART connection to the GPS module and GPIOs used for communication with the power monitor module.

> ⚠ The flexible and modular logiRECORDER architecture enables changes that meet customer-specific requirements. For inquires regarding logiRECORDER customizations through design services, please contact info@logicbricks.com.

The DC/DC regulator with the microcontroller-based power monitor assures stabile power supply, protects the logiRECORDER from the loss of power during ignition and assures graceful system shutdown to avoid data loss or file system corruption.

The control PC that runs the web user interface connects to the logiRECORDER with an Ethernet cable. Portable SSD Disks can be removed and plugged into a PC for further manipulations with the recorded video sessions. The kit includes an HDMI output for connection to a control monitor.
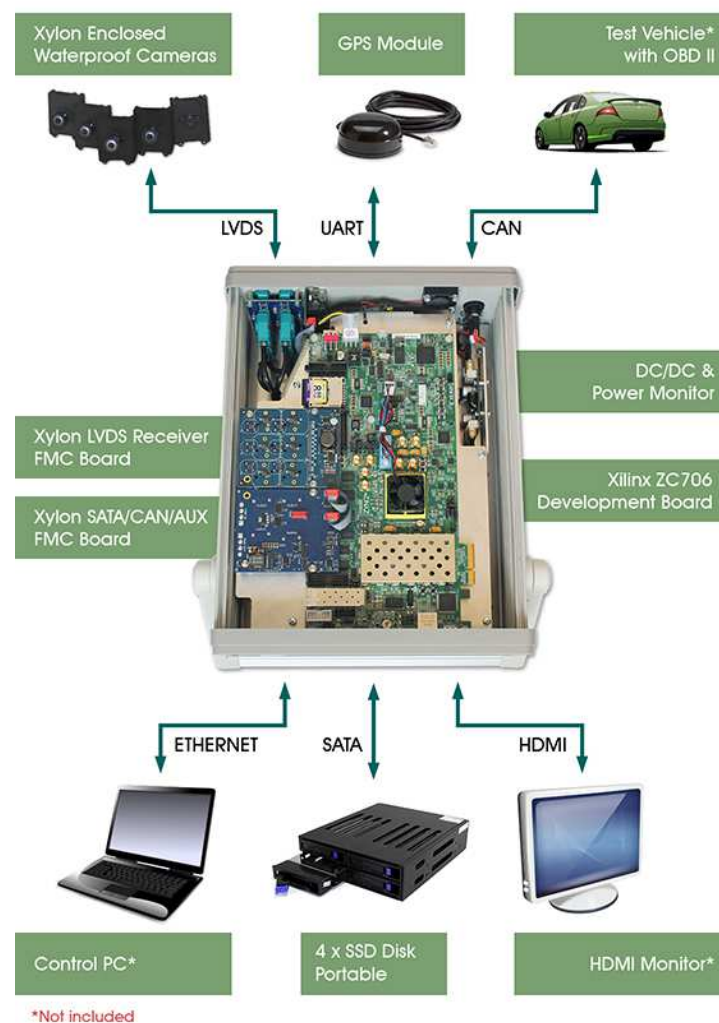

Figure 5: The logiRECORDER-BASE Kit Hardware Platform – System Connections

Xylon Video Camera

For transmissions of the high-definition uncompressed video and camera control data, the logiRECORDER-BASE kit uses hardware and software that is completely developed by Xylon: the LVDS-based serial interface, the Xylon video camera and an add-on LVDS FMC receiver board for up to six camera connections to the video processor implemented in the Xilinx Zynq-7000 AP SoC.

Each Xylon video camera (Figure 1) includes OmniVision OV10635 1-megapixel camera sensor that combines high-definition 1280x800p30 WXGA (HD) video with the color high dynamic range (HDR) functionality, LVDS serializer (transmitter) board, the appropriate lens and a short cable lead with a connector. The 5th camera, which is in Xylon ADAS demos used for the forward-looking collision avoidance and in-cabin driver status monitoring, comes equipped with the Sunex DSL947 Narrow Field of View (FOV) miniature lens. The other four cameras are equipped with the Sunex DSL219 miniature fish-eye Wide FOV lenses.

All camera parts are enclosed in the waterproof aluminum housing. The housing is sealed with rubber gaskets to ensure a weather-proof rating of IP67. Its rugged metal construction provides excellent lens and imager module protection and enables safe and easy test vehicle installations.
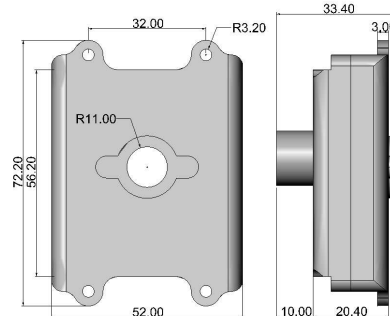

Figure 5: Xylon Video Camera Housing – All Dimensions in Millimeters

Kit Content

- logiRECORDER Main Box:
  - 1x Xilinx Zynq-7000 SoC ZC706 Development Kit[*] with XC7Z045 FFG900 -2 AP SoC
  - 1x Xylon LVDS receiver FMC add-on daughter card for up to 6 camera connections
  - 1x Xylon SATA/CAN/AUX FMC add-on daughter card
  - 4x Samsung 840 Pro SSD (512GB) Disks
  - 1x Xylon Power Supply Monitor
  - 1x DC/DC regulator
  - 1x SD Card with the system software
  - Aux. connectors, adapters and cables
- 5x Xylon Enclosed Camera Systems
  - 4x equipped with the Sunex DSL219 Wide FOC lens
  - 1x equipped with the Sunex DSL947 Narrow FOV lens
- 1x GPS 16xHVS Garmin module
- 5x Rosenberger long cables (7 m) for camera interfacing; suitable for vehicle installations
- 1x PT06A-8-4P(SR) main power connector for making the power cable
- 1x RJ45 to OBD-II vehicle diagnostic cable
- 1x Ethernet cable
- 1x USB serial cable
- 1x HDMI to HDMI video cable
- 1x System power supply for lab use
- User's Manual

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*   *OEM kit version, does not include Xilinx software (seat Vivado Design Suite)*

Related Design Services

Xylon offers customization of the presented hardware and software products through design services. If the logiRECORDER kit needs to be changed to fully fit your specific needs, please contact info@logicbricks.com

Related Xylon Products

Xylon offers a PC[*] geared up for quick archiving and analysis of logiRECORDER video recordings. It comes with the preinstalled 4x 2.5" SATA Disk Rack for hosting logiRECORDER portable SSD disks, the Web interface, 64-bit Microsoft® Windows® 7 operating system and the Sony® Vegas Pro™ video editing software package suitable for parallel and synchronous viewing of all video channels recorded in one video session.

　　Email:　　support@logicbricks.com

　*　*Xylon preserves rights to change content of the described product without prior notice.*

The logiADAK is a great programmable platform for upcoming automotive driver assistance applications that require intensive real-time video processing, parallel execution of multiple advanced algorithms and versatile interfacing with sensors and vehicle's communication backbones. The abundant performance and reprogrammability of the Zynq-7000 device enables ADAS designers to design SoCs that outperform competing solutions and achieve a new level of system differentiation through a combination of hardware-accelerated video inputs from multiple camera inputs and the ability to quickly adapt to ever changing sensor setups and interfacing. To learn more about this product, please contact Xylon or visit our website:

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

Computer vision applications (including ADAS) require quality video input. Xylon's logiISP 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 All Programmable devices. Free logiREF-VIDEO-ISP-EVK pre-verified reference design for the Zynq-7000 AP SoC based MicroZed Embedded Vision Kit from Avnet Electronics Marketing is available from:

　　Email:　　support@logicbricks.com
　　URL:　　　http://www.logicbricks.com/logicBRICKS/Reference-logicBRICKS-Design/ISP-Pipeline-for-Xilinx-
　　　　　　　All-Programmable.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/logiADAK.aspx

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Related Information

Xilinx Programmable Logic

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

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

IntelliProp

For information on the SATA HOST IP core used in the logiRECORDER system, contact:

IntelliProp, Inc.

    105 S. Sunset Street
    Suite N
    Longmont, CO 80501
    URL: www.intelliprop.com

Revision History

Version	Date	Note
1.00	26.01.2016.	Initial public release.