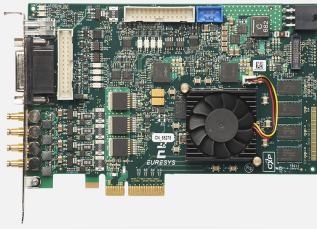


Coaxlink Quad 3D-LLE

Quad CXP-6 Framegrabber mit On-Board Laserlinien-Extraktion für 3D-Profilung



Im Überblick

- Laserlinien-Extraktion ohne CPU-Nutzung des Hosts
- Echtzeitgenerierung von 16-Bit-Höhenprofilen in 3D
- Auswahl an Algorithmen: Maximum, Peak, Center of Gravity (COG)
- Genauigkeit: bis zu 1/256 Pixel (mit den Algorithmen Peak und COG)
- Leistung: 19.000 Profile/s von 1024 x 128 Bildern. 38.000 Profile/s von 1024 x 64 Bildern

Vorteile

Laserlinien-Extraktion ohne CPU-Nutzung des Hosts

Der in der Coaxlink integrierte FPGA misst die Position der Laserlinie während der Bilderfassung, ohne die Host-CPU zu laden.

Echtzeitgenerierung von 16-Bit-Höhenprofilen in 3D

Die Coaxlink überträgt die berechneten 3D-Höhenprofile direkt und ohne Verzögerung in Echtzeit an den Speicher des Host-PC.

Bilderfassung von den schnellsten und höchstauflösenden Kameras

- Höchste Datenerfassungsrate der Branche
- 25 Gbit/s (2.500 MB/s) Bandbreite von Kamera zu Host-PC-Speicher

Unterstützung langer Kabel

- 40 Meter bei CXP-6-Geschwindigkeit (6,25 Gbit/s)
- 100 Meter bei CXP-3-Geschwindigkeit (3 Gbit/s)

Verwendung von Standard-Koaxialkabeln

- Ein einziges, preiswertes Kabel für Datenübertragung, Kamerasteuerung, Auslöser und Stromversorgung
- Hohe Zuverlässigkeit und Flexibilität, einsatzbereit in den härtesten Umgebungen

Robuste Anschlüsse

Coaxlink verwendet DIN 1.0/2.3-Anschlüsse mit Push/Pull-Verriegelungssystem für zuverlässige Verbindungen

Memento Event Logging Tool

- Memento is an advanced development and debugging tool available for Coaxlink cards.
- Memento records an accurate log of all the events related to the camera, the frame grabber and its driver as well as the application.
- It provides the developer with a precise timeline of time-stamped events, along with context information and logic analyzer view.

- Es bietet wertvolle Hilfe bei der Anwendungsentwicklung und beim Debuggen sowie während des Maschinenbetriebs.

Universelle I/O-Leitungen

- Kompatibel mit einer breiten Palette an Sensoren und Bewegungscodern.
- Highspeed-Differenzeingänge: Quadratur-Bewegungscodern unterstützt bis zu 5 MHz.
- Getrennte Strommesseingänge: 5 V, 12 V, 24 V Signalspannungen akzeptiert, bis zu 50 kHz, einzeln galvanisch getrennt bis 500 VAC RMS.
- Galvanisch getrennte Kontaktausgänge.
- 5V-konforme Highspeed-TTL-Eingänge/ LVTTTL-Ausgänge.

High-Performance DMA (Direct Memory Access)

- Direct transfer into user-allocated memory and hardware boards that expose PCI addresses
- Hardware Scatter-Gather-Unterstützung
- 64-Bit-Adressierungsfähigkeit

Trigger-Fähigkeiten für Flächenscans

- Wenn sich das Teil in seiner Position befindet, wird die Erfassung mithilfe eines Triggers ausgelöst. Hardware-Trigger kommen von den Coaxlink I/O-Leitungen. Software-Trigger kommen von der Anwendung.
- Eine optionale Triggervverzögerung ist verfügbar, um die Erfassung entsprechend einer programmierbaren Zeit zu verschieben.
- Eine Funktion zur Dezimierung von Triggern ermöglicht das Überspringen einiger Trigger.
- Mit der Belichtungssteuerung der Kamera kann die Anwendung die Belichtungszeit der Kamera steuern.
- Nach Beginn der Erfassung generiert die Coaxlink-Karte zum entsprechenden Zeitpunkt ein Signal, das ein an die Ausgangsleitung angeschlossenes Beleuchtungsgerät steuert.

Der Coaxlink-Treiber umfasst die folgenden Tools:

- Genicam Browser: An application giving access to the Genicamfeatures exposed by the GenTL Producer(s) in the system.
- GenTL Console: Ein Befehlszeilentool, das Zugriff auf Funktionen und Befehle gibt, die vom Euresys GenTL Producer zur Verfügung gestellt werden.

Compliant with Genicam Including support for

- GenApi
- Die Standard Feature Naming Convention (SFNC)
- GenTL

Windows-, Linux- und Mac OS-Treiber verfügbar

- Including support for Intel 32-bit and 64-bit platforms as well as ARM 64-bit platforms

Entwickelt mit Unterstützung der technologischen Entwicklungsabteilung DG06

Anwendungen

Bildverarbeitungssysteme für die Elektronik-verarbeitende Industrie

- 3D-Bilderfassung für elektronische Inspektionssysteme

Bildverarbeitungssysteme für die allgemeinen Fertigungsindustrien

- 3D-Bilderfassung für Inspektionssysteme

Spezifikationen

Mechanical

Form Factor	PCI Express card
Format	Standard profile, half length, 4-lane PCI Express card
Cooling method	Air cooling, fan-cooled heatsink
Mounting	For insertion in a standard height, 4-lane or higher, PCI Express card slot
Connectors	<ul style="list-style-type: none">• 'A', 'B', 'C', 'D' on bracket:<ul style="list-style-type: none">– 4x DIN 1.0/2.3 female connectors– CoaXpress host interface• EXTERNAL I/O' on bracket:<ul style="list-style-type: none">– 26-pin 3-row high-density female sub-D connector– I/O lines and power output• INTERNAL I/O 1' and 'INTERNAL I/O 2' on PCB:<ul style="list-style-type: none">– 2x 26-pin 2-row 0.1" pitch pin header with shrouding– I/O lines and power output• 'AUXILIARY POWER INPUT' on module:<ul style="list-style-type: none">– 6-pin PEG power socket– 12 VDC power input for PoCXP camera(s) and I/O power• 'C2C-LINK' on module:<ul style="list-style-type: none">– 6-pin 2-row 0.1-in header– Card to card link
Lamp indicators	<ul style="list-style-type: none">• 'A', 'B', 'C', 'D' on bracket:<ul style="list-style-type: none">– 4x bi-color red/green LEDs– CoaXPress Host connector indicator lamps• 'FPGA STATUS LAMP' on PCB:<ul style="list-style-type: none">– Bi-color red/green LED– FPGA status lamp• 'BOARD STATUS LAMP' on PCB:<ul style="list-style-type: none">– Bi-color red/green LED
Switches	'RECOVERY' on card PCB: <ul style="list-style-type: none">• 3-pin 1-row 0.1" header• Firmware emergency recovery
Dimensions	L 167.65 mm x H 111.15 mm L 6.6 in x H 4.38 in
Weight	180 g, 6.35 oz
Host bus	
Standard	PCI Express 2.0
Link width	<ul style="list-style-type: none">• 4 lanes• 1 lane or 2 lanes with reduced performance
Link speed	<ul style="list-style-type: none">• 5.0 GT/s (PCIe 2.0)• 2.5 GT/s (PCIe 1.0) with reduced performance
Maximum payload size	512 bytes
DMA	32- and 64-bit
Peak delivery bandwidth	2,000 MB/s
Effective (sustained) delivery bandwidth	1,700 MB/s (Host PC motherboard dependent)
Power consumption	Typ. 16.8 W (3.8 W @ +3.3V, 13 W @ +12V), excluding camera and I/O power output

Camera / video inputs

Interface standard(s)	CoaXPress 1.0, 1.1 and 1.1.1
Connectors	4x DIN1.0/2.3 75 Ohms CXP-6
Status LEDs	1 CoaXPress Host connection status per connector
Number of cameras	One 1- or 2- or 4-connection camera
Line-scan cameras supported	No
Maximum aggregated camera data transfer rate	25 Gbit/s (2,500 MB/s)
Supported CXP down-connection speeds	1.25 GT/s (CXP-1), 2.5 GT/s (CXP-2), 3.125 GT/s (CXP-3), 5 GT/s (CXP-5), and 6.25 GT/s (CXP-6)
Number of CXP data streams (per camera)	1 data stream per camera
Maximum CXP stream packet size	16,384 bytes
PoCXP (Power over CoaXPress)	<ul style="list-style-type: none">• PoCXP Safe Power:<ul style="list-style-type: none">– 17 W of 24V DC regulated power per CoaXPress connector– PoCXP Device detection and automatic power-on– Overload and short-circuit protections• On-board 12V to 24V DC/DC converter• A +12V power source must be connected to the AUXILIARY POWER INPUT connector using a 6-pin PEG cable
Camera types	<ul style="list-style-type: none">• Gray-scale Area-scan cameras
Camera pixel formats supported	Monochrome 8-bit (Mono8)

Area-scan camera control

Trigger	<ul style="list-style-type: none">• Precise control of asynchronous reset cameras, with exposure control.• Support of camera exposure/readout overlap.• Support of external hardware trigger, with optional delay and trigger decimation.
Strobe	<ul style="list-style-type: none">• Accurate control of the strobe position for strobed light sources.• Support of early and late strobe pulses.

On-board processing

On-board memory	1 GB
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Image data stream processing

Laser Line Extraction (LLE) processing core to compute the vertical position of one detected laser line along a ROI using one of the following algorithms:

- Maximum Detection algorithm
 - Maximum ROI width: 8192 pixels
 - Maximum ROI height: 65536 pixels
 - Depth map format: 16-bit unsigned integer number
 - Accuracy: 1 pixel
- 8-bit Maximum Detection algorithm
 - Maximum ROI width: 8192 pixels
 - Maximum ROI height: 256 pixels
 - Depth map format: 8-bit unsigned integer number
 - Accuracy: 1 pixel
- Peak Detection algorithm
 - Maximum ROI width: 8192 pixels
 - Maximum ROI height: 2048 pixels
 - Depth map format: UQ11.5 fixed-point unsigned number
 - Accuracy: 1/32 pixel
- High accuracy Peak Detection algorithm
 - Maximum ROI width: 8192 pixels
 - Maximum ROI height: 256 pixels
 - Depth map format: UQ8.8 fixed-point unsigned number
 - Accuracy: 1/256 pixel
- Center Of Gravity algorithm
 - Maximum ROI width: 8192 pixels
 - Maximum ROI height: 2048 pixels
 - Depth map format: UQ11.5 fixed-point unsigned number
 - Accuracy: 1/32 pixel
- High accuracy Center Of Gravity algorithm
 - Maximum ROI width: 8192 pixels
 - Maximum ROI height: 256 pixels
 - Depth map format: UQ8.8 fixed-point unsigned number
 - Accuracy: 1/256 pixel

Data stream statistics

- Measurement of:
 - Frame rate (Area-scan only)
 - Line rate
 - Data rate
 - Configurable averaging interval
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Event signaling and counting

- The application software can be notified of the occurrence of various events:
 - Standard event: the EVENT_NEW_BUFFER event notifies the application of newly filled buffers
 - A large set of custom events
- Custom events sources:
 - I/O Toolbox events
 - Camera and Illumination control events
 - CoaXPress data stream events
 - CoaXPress host interface events
- Each custom event is associated with a 32-bit counter that counts the number of occurrences
- The last three 32-bit context data words of the event context data can be configured with event-specific context data:
 - Event-specific data
 - State of all System I/O lines sampled at the event occurrence time
 - Value of any event counter

General Purpose Inputs and Outputs

Number of lines	20 I/O lines: <ul style="list-style-type: none">• 4 differential inputs (DIN)• 4 singled-ended TTL inputs/outputs (TTLIO)• 8 isolated inputs (IIN)• 4 isolated outputs (IOUT)
Usage	<ul style="list-style-type: none">• Any I/O input lines can be used by any LIN tool of the I/O Toolbox• Selected pairs of I/O input lines can be used by any QDC tool of the I/O toolbox to decode A/B signals of a motion encoder• The LIN and QDC tools outputs can be further processed by the other tools (DIV, MDV, DEL) of the I/O toolbox to generate any of the following "trigger" events:<ul style="list-style-type: none">– The "cycle trigger" of the Camera and Illumination controller– The "cycle sequence trigger" of the Camera and Illumination controller– The "start-of-scan trigger" of the Acquisition Controller (line-scan only)– The "end-of-scan trigger" of the Acquisition Controller (line-scan only)
Electrical specifications	<ul style="list-style-type: none">• DIN: High-speed differential inputs compatible with ANSI/EIA/TIA-422/485 differential line drivers and complementary TTL drivers• TTLIO: High-speed 5V-compliant TTL inputs or LVTTTL outputs, compatible with totem-pole LVTTTL, TTL, 5V CMOS drivers or LVTTTL, TTL, 3V CMOS receivers• IIN: Isolated current-sense inputs with wide voltage input range up to 30V, compatible with totem-pole LVTTTL, TTL, 5V CMOS drivers, RS-422 differential line drivers, potential free contacts, solid-state relays and opto-couplers• IOUT: Isolated contact outputs compatible with 30V / 100mA loads
Filter control	<ul style="list-style-type: none">• Glitch removal filter available on all System I/O input lines• Configurable filter time constants:<ul style="list-style-type: none">– for DIN and TTLIO lines: 50 ns, 100 ns, 200 ns, 500 ns, 1 μs– for IIN lines: 500 ns, 1 μs, 2 μs, 5 μs, 10 μs
Polarity control	Yes
Power output	Non-isolated, +12V, 1A, with electronic fuse protection

I/O Toolbox tools

The I/O Toolbox is a configurable interconnection of tools that generates events (usually triggers) from input lines. The composition of the toolset is product- and firmware-dependent.

- Line Input tool (LIN): Edge detector delivering events on rising or falling edges of any selected input line.
- Quadrature Decoder tool (QDC): A composite tool including:
 - A quadrature edge detector delivering events on selected transitions of selected pairs of input lines.
 - An optional backward motion compensator for clean line-scan image acquisition when the motion is unstable.
 - A 32-bit up/down counter for delivering a position value.
- Divider tool (DIV): to generate an event every nth input events from any I/O toolbox event source.
- Multiplier/divider tool (MDV): to generate m events every d input events from any I/O toolbox event source.
- Delay tool (DEL): to delay up to 16 events from one or two I/O toolbox event sources, by a programmable time or number of motion encoder ticks (any QDC events).
- User Actions Scheduler tool (UAS): to delegate the execution of User Actions at a scheduled time or encoder position. Possible user actions include setting low/high/toggle any bit of the User Output Register or generation of any User Events.

I/O Toolbox composition

8 LIN, 1 QDC, 1 DIV, 1 MDV, 2 DEL, 1 UAS

C2C-Link

Description

- Allows to accurately synchronize the trigger and start-of-exposure of multiple grabber-controlled area-scan and line-scan cameras.
- C2C-Link is able to synchronize cameras connected
 - to the same Coaxlink card
 - to different cards in the same PC (requires an accessory cable such as the "3303 C2C-Link Ribbon Cable" or a custom-made C2C-Link cable)
 - to different cards in different PCs (requires one "1636 InterPC C2C-Link Adapter" for each PC and one RJ 45 CAT 5 STP straight LAN cable for each adapter but the last one)

Specification

- Maximum distance
 - 60 cm inside a PC
 - 1200 m cumulated adapter to adapter cable length
- Maximum trigger rate
 - 2.5 MHz for configurations using a single PC, or up to 10 PCs and 100 m total C2C-Link cable length
 - 200 kHz for configurations up to 32 PCs and 1200m total C2C-Link cable length
- Trigger propagation delay from master to slave devices
 - Less than 10 ns for cameras on the same Coaxlink card or on different Coaxlink cards in the same PC
 - Less than 265 ns for cameras on different Coaxlink cards in different PCs (3 PCs and 40m total C2C-Link cable length)

Software

Host PC Operating System

- Microsoft Windows 10, 8.1, 7 for x86 (32-bit) and x86-64 (64-bit) processor architectures
- Linux for x86 (32-bit), x86-64 (64-bit) and aarch64 (64-bit) processor architectures
- macOS for x86-64 (64-bit) processor architecture

Refer to release notes for details

APIs	<p>EGrabber class, with C++ and .NET APIs:</p> <ul style="list-style-type: none"> • .NET assembly designed to be used with development environments compatible with .NET frameworks version 2.0 or higher <p>GenICam GenTL producer libraries compatible with C/C++ compilers:</p> <ul style="list-style-type: none"> • x86 dynamic library designed to be used with ISO-compliant C/C++ compilers for the development of x86 applications • x86_64 dynamic library designed to be used with ISO-compliant C/C++ compilers for the development of x86_64 applications • aarch64 dynamic library designed to be used with ISO-compliant C/C++ compilers for the development of aarch64 applications
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Memento	Compatible with Memento Event Logging tool
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Environmental conditions

Operating ambient air temperature	0 to +55 °C / +32 to +131 °F
Operating ambient air humidity	10 to 90% RH non-condensing
Storage ambient air temperature	-20 to +70 °C / -4 to +158 °F
Storage ambient air humidity	10 to 90% RH non-condensing

Certifications

Electromagnetic - EMC standards	<ul style="list-style-type: none"> • European Council EMC Directive 2004/108/EC • United States FCC rule 47 CFR 15
EMC - Emission	<ul style="list-style-type: none"> • EN 55022:2010 Class B • FCC 47 Part 15 Class B
EMC - Immunity	<ul style="list-style-type: none"> • EN 55024:2010 Class B • EN 61000-4-3 • EN 61000-4-4 • EN 61000-4-6
KC Certification	Korean Radio Waves Act, Article 58-2, Clause 3
Flammability	PCB compliant with UL 94 V-0
RoHS	European Union Directive 2011/65/EU (ROHS2)
REACH	European Union Regulation 1907/2006
WEEE	Must be disposed of separately from normal household waste and must be recycled according to local regulations

Ordering Information

Product code - Description	<ul style="list-style-type: none"> • 1637 - Coaxlink Quad 3D-LLE
Optional accessories	<ul style="list-style-type: none"> • 1625 - DB25F I/O Adapter Cable • 1636 - InterPC C2C-Link Adapter • 3303 - C2C-Link Ribbon Cable • 3304 - HD26F I/O Adapter Cable



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