

Annotator CL

CameraLink Annotator



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CameraLink Annotator

- Works with existing hardware and software
- **Annotate CameraLink data streams** with time stamp and 32-bit frame number
- Time stamp is synchronized to modulated IRIG-B input (operates in a free running mode in the absence of an IRIG input)
- Ideal for high speed cameras, spectrometers, radiometers, and other instruments with meta-data and time tagging needs
- **Time stamp is injected directly into the CameraLink data stream**
- Additional ancillary annotation data can be injected into the data stream:
 - Minimum and maximum data values and locations
 - User defined data statistics, digital inputs, and analog inputs
- **Annotation data is collected synchronously with the primary sensor data**
- **No complicated post processing is required to correlate the data**
- Available in a standalone enclosure or as an OEM PC board

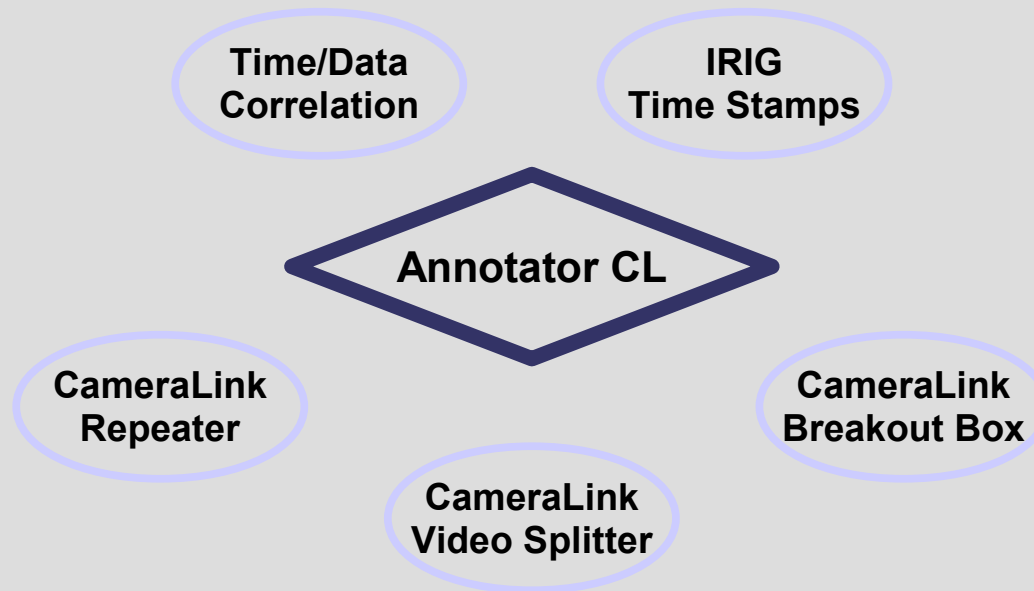
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Dedicated, Custom, High Speed Coprocessor

- Data out (CameraLink Out master and slave) is two clock periods behind the input data (CameraLink In)
 - 80 ns for a 25 MHz pixel clock
 - 50 ns for a 40 MHz pixel clock
- Output byte order can be rearranged to accommodate frame grabber and software requirements
- Built around the Cyclone II FPGA (EP2C20Q240C8N)
 - 18752 Logic Elements
 - 239616 bits (29952 bytes) of high-speed on-chip memory
 - 4 PLLs & 16 Dedicated Clocks
 - Dedicated DDR2 & QDRII external memory interface circuitry
 - 26 embedded 18x18 hardware multipliers (250 MHz performance)
 - High performance DSP capability
- FPGA can be reprogrammed to accommodate other more complex processing operations and custom end user user features
 - Summing pixels in rows or columns in real-time (for use with a digital camera on the exit plane of a spectrometer)
 - Real time sensor control (using built-in CameraLink serial control, or other digital control loop)
 - User defined data statistics and custom processing

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Multiple functions in a single stand-alone product



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Multiple functions in a single stand-alone product

Similar COTS Products

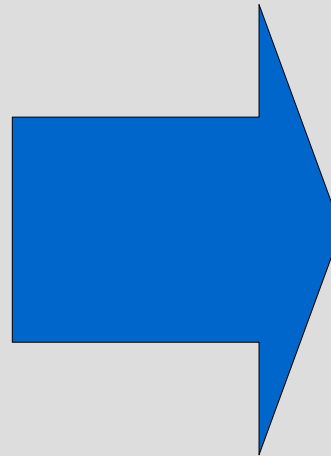
CameraLink Repeater	\$400
CameraLink Video Splitter	\$500
CameraLink Breakout Box	\$450
IRIG Time Code Board	\$1200
Estimated COTS Total	\$2550

Necessary Custom Development

Real-time Sensor Control	\$2000
Correlation Integration	\$2000
Estimated Custom Total	\$4000

Unique Annotator CL Features

CameraLink Annotation	\$\$\$
TTL-to-CamLink Converter	\$\$\$
No Comparable Product	\$\$\$



Ionetrix

Annotator CL (COTS)	\$2450
All-In-One COTS Solution	\$0
Deprecation of Custom Dev.	\$0
Unique Ionetrix Features	\$0
Ionetrix Annotator CL	\$2450

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Annotation Overview

- The annotation occurs directly in hardware with zero software overhead
- The annotation data is guaranteed to be perfectly correlated with the primary data from the instrument (CameraLink or TTL)
- Alphanumeric character generation at speed and resolution matching the CameraLink data input
- Multiple user defined annotation parameters can be accommodated in addition to the IRIG event time stamp and a 32-bit frame or scan number
- Annotation features work with both 16-bit and 24-bit frame grabbers
- Master and slave CameraLink outputs are perfectly synchronized to exactly the same output data stream
- Very flexible IRIG time code latching options:
 - rising or falling edge of frame sync
 - rising or falling edge of a selectable line sync
 - user defined event triggering options

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Annotation Modes

Two Modes of Annotation Use Together or Separately

Digital Annotation

- 32-Word Encoded Block
- Inserted into Data Stream
- User Defined Position
- IRIG Time and Frame Number
- Independently Enabled
- Options for 8-bit or 16-bit annotation data
- 16-bit annotation can be in either high-low or low-high byte order

Text Overlay

- Alphanumeric Bit Pattern
- Overlaid onto Data Stream
- User Defined Position
- User Defined Background Color
- User Defined Foreground Color
- IRIG Time or Frame Number
- Independently Enabled

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Annotation example showing both text overlay
and digital annotation block



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16-bit Mode Digital Annotation Block Details

Word	Definition
1	Year*
2	Day of Year (BCD)
3, 4	Second of Day
5, 6	Microseconds
7, 8	Frame Number
9	AOI1 Maximum
10	AOI1 Maximum X Location
11	AOI1 Maximum Y Location
12	AOI1 Minimum
13	AOI1 Minimum X Location
14	AOI1 Minimum Y Location
15, 16, 17, 18	AOI1 Sum
19	AOI2 Maximum
20	AOI2 Maximum X Location
21	AOI2 Maximum Y Location
22	AOI2 Minimum
23	AOI2 Minimum X Location
24	AOI2 Minimum Y Location
25, 26, 27, 28	AOI2 Sum
29, 30	Text Overlay Background
31, 32	Text Overlay Foreground

*Bit 15 of Year is the CaptureTrigger bit; bit 14 of Year is the IRIG locked bit

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8-bit Mode Digital Annotation Block Details

Byte	Definition
1, 2	Year*
3, 4	Day of Year (BCD)
5, 6, 7, 8	Second of Day
9, 10, 11, 12	Microseconds
13, 14, 15, 16	Frame Number
17, 18, 19, 20	Text Overlay Background
21, 22, 23, 24	Text Overlay Foreground
25, 26, 27, 28, 29, 30	0
31, 32	Checksum

*Bit 15 of Year is the CaptureTrigger bit; bit 14 of Year is the IRIG locked bit

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Flexible Text Overlay Modes

- Text Background and Foreground colors can be independently set to any 24-bit value
- Text Background and Foreground can independently be set to one of four modes
- In “Pixel Replacement” mode, the 24-bit Background or Foreground color replaces the original pixel value
- In “Transparent” mode, the output pixel value is set to the original input pixel value; this can be useful for the Background to reduce the overlay area footprint
- In “XOR” mode, the output pixel value is set to the original input pixel value XORed with the Background or Foreground color; with a color of 0xFFFFFFFF, this is useful to allow recovery of the original pixel values by repeating the XOR operation in processing software
- In “OR” mode, the output pixel value is set to the original input pixel value ORed with the Background or Foreground color; this is useful for 10/12/14 bit cameras with a 16-bit frame grabber to allow recovery of the original pixel values by ANDing with the proper mask; for example, a 14-bit camera could use a color of 0xC000 in OR mode, then the original pixel values could be recovered by ANDing with 0x3FFF

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Breakout Box Functions

External SMA Connectors

- “Sync 1” and “Sync 2”
- Independently Selectable
- Any CameraLink Signal, or an Operation on a CameraLink Signal, Such As:

FVal	CC1	PixelClock	PixelClock/16	PixelClock/256	PixelClock/4096
LVal	CC2	PixelClock/2	PixelClock/32	PixelClock/512	PixelClock/8192
DVal	CC3	PixelClock/4	PixelClock/64	PixelClock/1024	PixelClock/16384
	CC4	PixelClock/8	PixelClock/128	PixelClock/2048	PixelClock/32768

- Any TTL Signal
- Custom User Defined Parameters and Functions

RS232 Connector

- Pixels Per Line
- Line Per Frame
- Frames Per Second
- Lines Per Second
- Pixels Per Second



Easily Determine Image Parameters
For Unknown Cameras
No Frame Grabber Necessary!

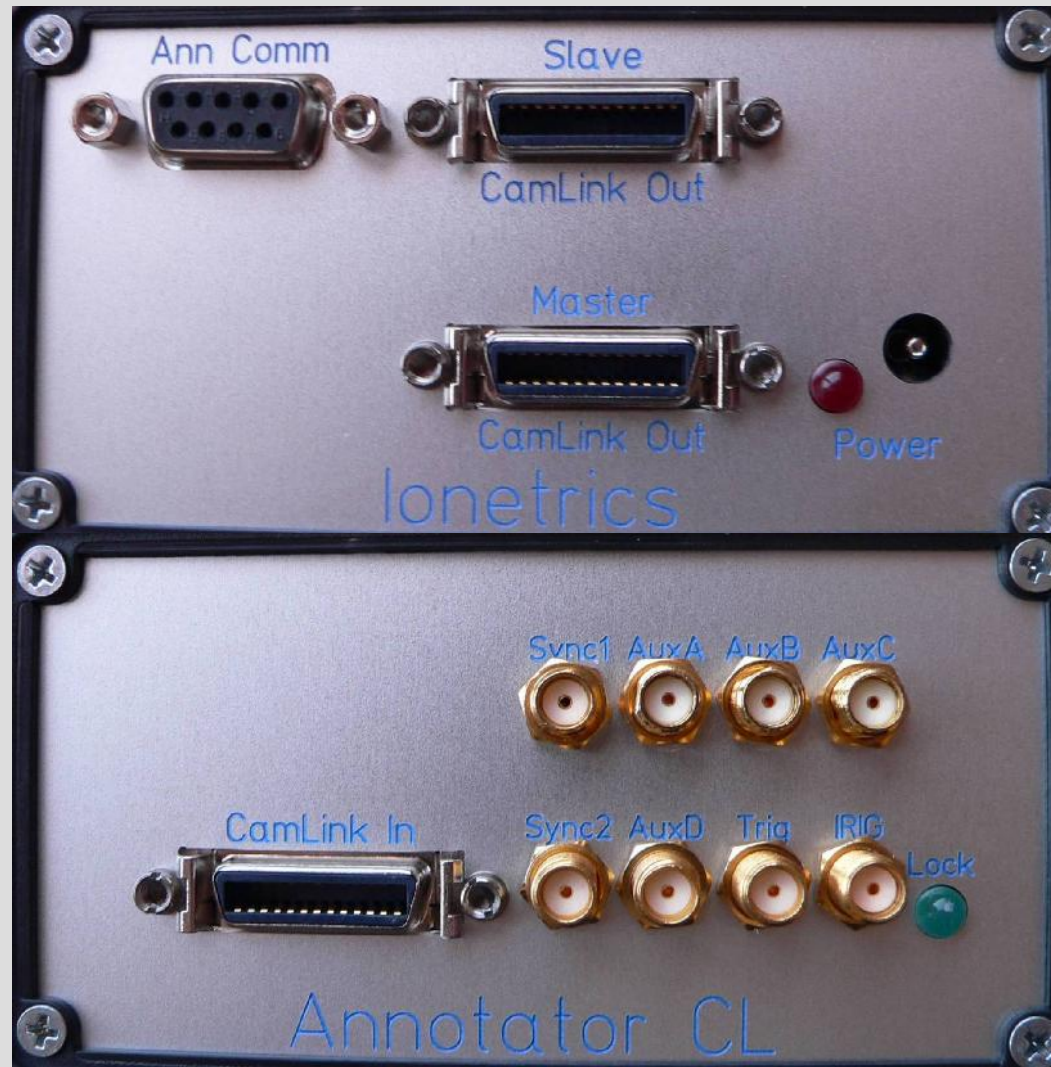
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Flexible “Remote Start” Capture Trigger

- Capture Trigger can be inserted as an annotation bit or used to turn CameraLink outputs on and off
- Capture Trigger is synchronized with CameraLink FVAL signal
- Capture Trigger can be set to trip on a user defined input
 - Rising or falling edge
 - Switch closure or opening
 - Trigger input compatible with LVTTTL, TTL, and CMOS outputs
 - Arbitrary analog trigger inputs can be accommodated as well
- Capture Trigger can be set to trip on a user defined time trip point

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Front and Rear Panel Connections



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AnnCLe Control Software

- Can run alongside end user software as a dedicated Annotator CL control panel
- Comm link documentation provided for easy integration into end-user software

The screenshot shows the AnnCLe 1.2.1 control software interface, which is organized into several sections:

- Image Statistics:** Displays Frame Rate (59.862 Hz), Frame Size (718 x 521), Line Rate (31.486 KHz), and Pixel Clock (25.000 MHz). It includes a Frame Counter Reset button.
- Trigger Control:** Features an IRIG Latch dropdown set to 'FSync Rising Edge', an LSync Number dropdown set to '16', and a Remote Start dropdown set to 'Switch Closure'. There is an 'Enable CameraLink Start/Stop Control' checkbox and a 'Stop' button.
- Digital Annotation:** Includes X Offset (8) and Y Offset (8) spinners, an 'Enable Digital Annotation' checkbox, and Mode options (8-bit, 16-bit HL, 16-bit LH). The Timestamp Year is set to 2008.
- Text Overlay:** Features X Offset (486) and Y Offset (443) spinners. It has Line 1 Mode (Time Stamp) and Line 2 Mode (Frame Number) dropdowns. Foreground settings include Color (0xFFFFFFFF) and Mode (Replacement). Background settings include Color (0x0) and Mode (Transparent).
- Output Port Order:** A grid of radio buttons for selecting the output port order: ABC, ACB, BAC, CAB, BCA, CBA, AAA, BBB, CCC. CBA is selected.
- Breakout Box:** Includes Sync 1 (Frame Sync) and Sync 2 (Line Sync) dropdowns.