Real-time Lossless Compression

For Bayer, Monochrome, RGB and more

Key Features

- Real-time compression of Color Filter Array (e.g., Bayer), RGB, Monochrome images. For other image formats, contact Gidel.

- Lossless compression

- Compression of camera rates beyond 1 Giga pixel/s

- IP for FPGA based frame grabbers

- Ultra-compact IP (typical< 1000 ALMs)

- Supported by Gidel's reconfigurable acquisition flow enabling adding compression and ISP blocks

- Supported by the Gidel InfiniVision IP for acquisition from multi-cameras/sensors

- Supported by the Gidel Developer's Tools

- Compression optimization based on training using sample data

- Option for on-the-fly optimization using real-time training algorithms

- Option for visually lossless compression fitting for processing quality

- Decompression software with latency of less than one frame period

- Binning option to increase decompression rate by image resize

- Option for software model for compression simulations

Target Applications

- Recording Systems
- Broadcasting and Video
- Smart Cities
- Surveillance
- Autonomous cars
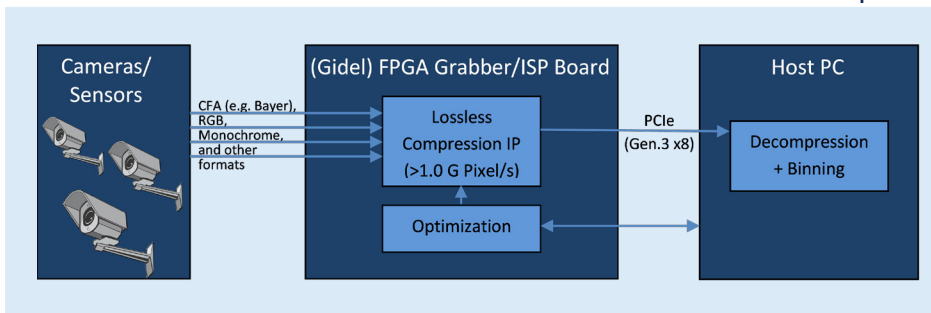
Gidel's lossless compression IP targeting FPGA performs real-time compression for Color Filter Array (CFA - e.g., Bayer), Monochrome, and RGB images and videos. The IP enables compression of multi-cameras/sensors at pixel clock rate exceeding 1 Giga pixel/s while using very small FPGA resources and minimal power consumption. The compression is highly efficient and in real-case video applications has achieved a lossless compression ratio of 1:2.3.

FPGA	Throughput	Line size	Bit/pixel	ALM	M20K	DSP Blocks
Arria 10 (slowest device)	> 1G Pixels/Sec	6K	8	973	9	15

Typical example of required FPGA resources

 The IP is supported by Gidel's comprehensive eco-system allowing tailoring optimized solutions that may include image processing, Vision algorithms and a concurrent recording system. Recording system may also be complemented by Gidel's CamSim playback system.

There are two compression modes: 1. Compression of individual image frames. 2. Compression of video using I and P frames. The compression can be optimized either by pre-training based on sample images data or by on-the-fly training based on real-time data.

The IP is supported by a decompression software enabling:

- Full streaming rate with a latency of less than a single frame period.

- Binning option to reduce image size and processing time. This feature, for example, can be used for displaying videos from multi cameras during a recording session.

Gidel's Supporting Eco-System

The Gidel eco-system includes infrastructure and development tools enabling to quickly develop a high-end custom FPGA frame grabber with real-time compression and image processing capabilities. The eco-system includes:

- ## *FPGA Frame Grabber and Image Processing Systems*

Gidel offers FPGA-based systems with open reconfigurable acquisition flow allowing the user to customize the grabbing and to add user image processing blocks including the compression IP. The frame grabber boards interface with the host computer via PCIe or alternatively may operate as a standalone system.

- ## *Multi-Camera Acquisition System*

The Gidel InfiniVision is a unique image acquisition system designed for grabbing from multi-cameras/sensors. Combined with real-time compression as much as 100 camera video streams can be supported simultaneously.

- ## *Highly Efficient Video Recording & Playback Systems*

Based on real-time compression, Gidel offers a recording system that is exceptionally efficient in both its offloading throughput and compactness of required memory resources. This capability has significant benefits for applications with demanding bandwidth and/or memory resources, e.g., field applications. Based on Gidel's CamSim a playback sub-system, images can then be retrieved at the original throughput for a variety of application tasks.

- ## *Proc Developer's Kit*

The Proc Developer's tools enable to map the FPGA board to the desired data flow and interfaces. The following figure demonstrates one possible implementation using InfiniVision, compression and custom image processing.
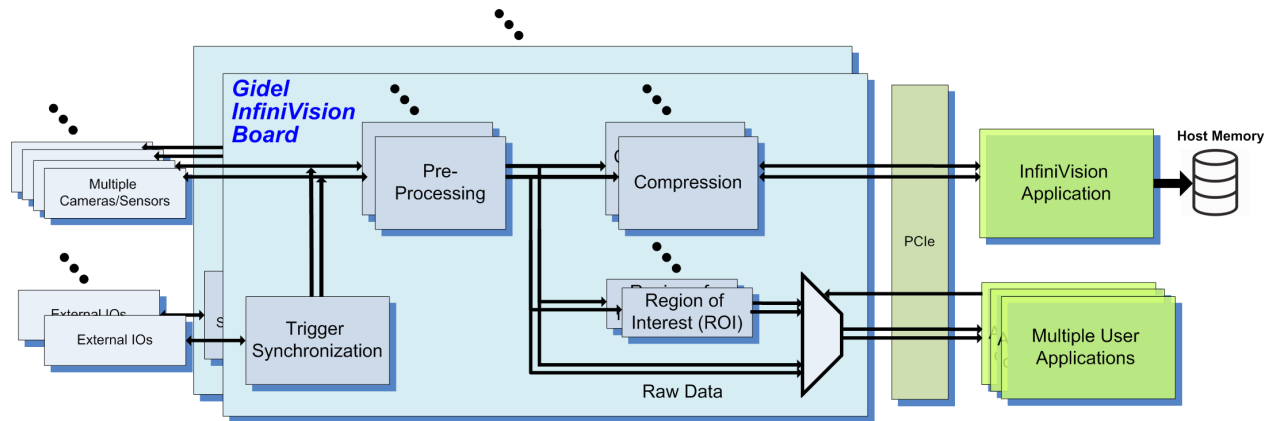
- ## *Gidel Customization Services*

Based on 25 year experience, Gidel offers customization services for developing tailored Vision/Imaging systems according to the customer's specifications. Gidel takes advantage of its uniquely flexible and powerful infrastructure to quickly implement the target application within impressive short time spans.

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