2-CCD camera uses prism technology to produce high dynamic range color images

Last month, JAI rolled out the AD-132GE, a 2-CCD camera that uses prism technology to produce high dynamic range (HDR) color images. Today, the company introduced the monochrome counterpart to that camera, the AD-131GE. Like its predecessor, the new AD-131GE intelligently combines different exposures from the camera's dual ICX447 CCDs in real time to generate high dynamic range (HDR) images with a total resolution of 1.3 megapixels (1296 x 966). Output from the camera is via a standard GigE Vision digital interface.

The HDR capability is made possible by having the two precisely aligned 1/3" CCDs mounted to a high performance beam-splitter prism. This enables the camera to provide an identical field of view to each CCD at a full resolution speed of 31 frames per second. The shutter speed and/or gain for each CCD can be calibrated independently such that one imager captures details in the brighter areas of a scene, and the second CCD captures the same image, but with an emphasis on the details in the darker areas. The two images or video streams can then be processed with in-camera image fusion algorithms to produce a dynamic range nearly double the normal CCD response.

Alternatively, users can choose to send the camera's raw video output to a host computer for post-processing using their own algorithms. Either way, JAI's high performance multi-imager technology enables the AD-131GE to achieve dynamic range levels as high as 20-bits per pixel (~120 dB) in a linear fashion that avoids

the noise, rolling shutter, and compression issues found in comparable CMOS-based logarithmic or LinLog™ HDR cameras.

The AD-131GE is targeted at a range of applications where extreme lighting contrast affects image quality. These include inspection tasks where incident light or bright reflections are present, such as LED inspection, welding, glass inspection, solar panel manufacturing, and monitoring of industrial furnaces or heated metal. The camera is also ideal for microscopy applications, as well as high-end surveillance or traffic applications where sun and shadow or indoor/outdoor scenes make it difficult for conventional cameras to maintain exposure across the entire field of view. The parameters of each CCD can be adjusted by the user to provide maximum dynamic range or maximum contrast/sensitivity within a narrower lighting range, depending on the application.

Several other operating modes are provided to enable users to leverage the unique 2-CCD configuration for uses other than HDR imaging. For example, a high signal-to-noise (S/N) mode automatically averages the video information from the two CCDs to produce a single image with a significantly lower noise component than a typical single-CCD image of the same scene. A double-speed mode offsets the timing of the two CCDs by one-half frame and interleaves captured images into a single 1.3 megapixel output stream at 62 fps. Because this is done without any increase in the clock frequency of the camera, users can achieve high frame rates while keeping clock noise to an absolute minimum.

Also included is an advanced PIV mode, which leverages the camera’s two-channel operation to capture three closely-spaced images on a single trigger instead of only two images captured by conventional PIV trigger modes. This allows 50% more data to be collected to better analyze ultra-fast events such as vortex forming in artificial heart chambers, combustion analysis in engines, and air flow studies in wind chambers, to name a few.

The AD-131GE’s GigE Vision output is provided via two configurable RJ-45 ports, offering users a choice of single-cable or dual-cable operation depending on the mode used. Monochrome output can be either 8, 10, or 12-bit. Other features include partial scanning, blemish and shading compensation, as well as analog video output to support auto-iris lenses.

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