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Novel Digital Camera with the PCIe Interface

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Digital cameras are commonly used for diagnostic purposes in large-scale physics experiments. A typical image diagnostic system consists of an optical setup, digital camera, frame grabber, image processing CPU, and data analysis tool.

The standard architecture of the imaging system has a number of disadvantages. Data transmitted from a camera are buffered multiple times and must be converted between various protocols before they are finally transmitted to the host memory. Such an architecture makes the system quite complicated, limits its performance and, in consequence, increases its price. The limitations are even more critical for control or protection systems operating in real-time.

Modern megapixel cameras generate large data throughput, easily exceeding 10 Gb/s, which often requires some additional processing on the host side.

The optimal system architecture should assure low overhead and high performance of the data transmission and processing. It is particularly important during the processing of data streams from several imaging devices, which can be as high as several terabits per second.

A novel architecture of image acquisition and processing system based on the PCI Express interface was proposed to meet the requirements of real-time imaging systems applied in large-scale physics experiments. The architecture allows to transfer an image stream directly from the camera to the data processing unit and therefore significantly decreases the overhead and improves performance.

Two various architectures will be presented, compared and discussed in the paper.

Minioral

Yes

IEEE Member

Yes

Are you a student?

No

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