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High-Speed Imaging in Astronomy

Although stars are not exactly whizzing about in the sky, high-speed cameras provide an important tool for gaining high-res images of astronomical objects.

Most telescopes are based on Earth and the resolution of images taken by these telescopes is influenced by the distortion the light undergoes while passing through several kilometres of turbulent atmosphere. Read below about the technology involved to solve this problem with “Lucky Imaging”.

Lucky Imaging and vision solutions to overcome atmospheric disturbances

What is "Lucky Imaging"

One method to overcome the blurring effects of atmospheric turbulence is “Lucky Imaging”. Images are taken with a high-speed camera using exposure times short enough (100ms or less) to ensure the changes in the Earth’s atmosphere during the exposure are negligible.

If thousands of images are taken, there are likely to be a number of frames where the object in question is in sharp focus due to the probability of having less atmospheric turbulence during the short exposure period of the “lucky” frame.

The very best images, perhaps just 1%, are then taken and combined into a single image by shifting and adding the individual short exposure pictures.

With this approach, “Lucky Imaging” can even reach the diffraction limit – the best resolution possible with a particular instrument – in this case a 2.4m aperture telescope.

The project MOSCAM and the technology involved

MOSCAM is an astronomy project using “Lucky Imaging”. It is a cooperation between the **Astronomy Department at Sheffield University** in the UK, and **NARIT**, the National Astronomical Research Institute of Thailand, with the aim to discover faint companions of stars in our solar neighborhood. For this project a high-speed Camera Link camera is mounted to the telescope in the **Thai National Observatory**, which is situated on Thailand’s highest mountain **Doi Inthanon**.

For optimal image acquisition, Active Silicon’s **FireBird Camera Link 80-bit frame grabber** was chosen along with a 10m passive Camera Link cable also supplied by Active Silicon which was critical to the project.

The system performs perfectly at the maximum 80 bit (Deca) acquisition speed even within the sometimes electrically noisy environment in a telescope.

FireBird is designed for ultimate performance. The RISC based DMA Engine technology,

“ActiveDMA” guaranties zero CPU intervention, high speed and low latency image data transfers.

Features of the FireBird Camera Link 80 bit card

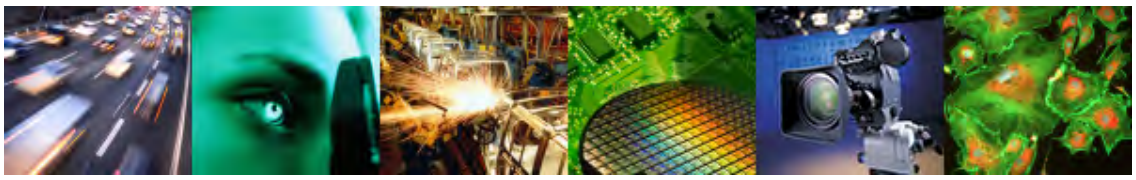
- Fast Camera Link acquisition in Base, dual Base, Medium, Full and 80 bit.
- Full GenICam compatibility.
- Comprehensive I/O supporting standard FireBird I/O adapters.
- Supported by the PHX Software Development Kit (SDK).

Active Silicon - the specialist in Camera Link solutions

We provide acquisition hardware, optimal cabling, and in cooperation with our trusted partner companies, find the right camera for you.

For more information visit our Camera Link frame grabber pages on our website or contact us directly.

Active Silicon is a leading manufacturer of imaging products, embedded systems and custom solutions. If you would like to stay informed of upcoming events, products and news in general, then please follow us on one of our social media channels below.



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