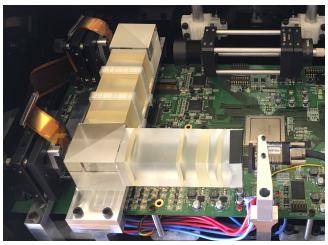
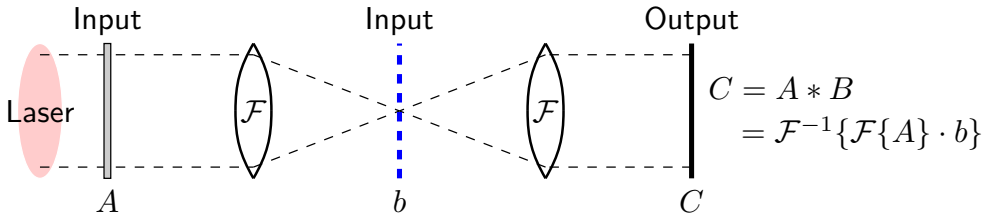
High-performance Optical Processing technology tightly integrated with conventional computing platforms.

Ideally suited to search and pattern recognition tasks, the Optalysys technology exploits the power of the optical Fourier transform to perform 2D correlations. As well as targeted pre-packaged applications, Optalysys are providing an open interface to allow users to exploit this capability in their own applications. **This technology provides a starting-point for future development across diverse application areas.**

Technology

The Optalysys system performs high-performance 2D correlations using a coherent optical system.

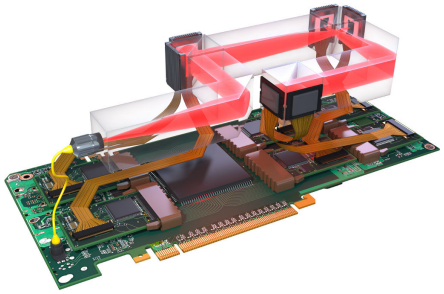




Optalysys exploits recent developments in the displays industry which have led to the production of high-resolution, commercially available microdisplays. Through the modulation of low power laser light, these electronic-to-optical interfaces provide the means to enter large volumes of numerical data into the optical domain, where Fourier-transform based operations may be performed at rates well beyond the capabilities of conventional computing. This is achieved using the Fourier transforming properties of a lens on the complex optical field. By exploiting the convolution theorem high-resolution 2D correlations can be rapidly evaluated. A CMOS sensor acts as the optical-to-electronic interface to convert the result into the digital domain.

Implementation

Our first to-market system is ready for launch at the end of 2017. It will provide a PCI-interface to an optical accelerator. For the first time, this will provide accessible optical processing technology integrated within traditional computing environments.

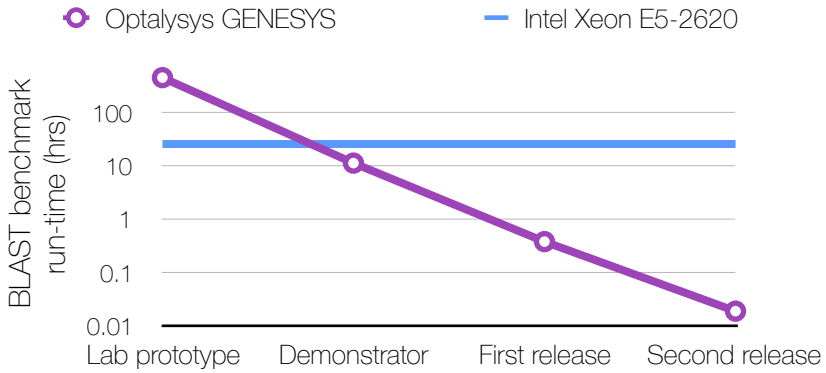


Performance

The effective performance of this first system is **19,200 2048×1536 DFTs per second**. The next system in our roadmap performs **320,000 2560×1600 DFTs per second**. This is far in excess of the performance offered by a CPU or GPU, with significant improvements in efficiency. They key is to develop applications which can exploit this capability.

Application

The application we are initially targeting is **genetic alignment**; specifically implementing a BLAST-like process to sensitively find short genetic sequences in a large database. We project a potential **×2000** improvement relative to an HPC node.



Future development

We are pursuing two strands of development. Firstly, optimising the **hardware** performance, in terms of *throughput*, *resilience*, and *precision*. Secondly, developing **application areas** which can exploit the unique capability of the optical processor to perform Fourier-based calculations at a prodigious speed.