

► Largest UK GigE Vision System Installed

The introduction of the GigE Vision and GenICam standards in 2006 were much heralded in the machine vision industry. The ability to transmit image data at up to 1 Gb/s over distances up to 100 m using industry standard cables and connectors, while offering an independence from any single camera manufacturer, opened up enormous flexibility for the further integration of machine vision into industrial environments.

Now STEMMER IMAGING has utilised the capabilities offered by these standards in a major way, by developing what is believed to be the largest ever GigE Vision camera system. Developed for a major scientific establishment in the UK, the system comprises more than 250 cameras which are used for aligning components

that are critical to the success of the customer's experiments. The whole experiment is controlled by the customer's OPC control system which manages all aspects of the experiment so a dedicated control server compliant with the OPC protocols was included to enable full control of the imaging system.

STEMMER IMAGING and its partner, Perceptive Solutions Ltd, have been working to exacting requirements from the end customer for more than a year to develop the system. STEMMER IMAGING specified and supplied all the hardware and core GigE Vision software technology and contracted Perceptive Solutions to develop the application and control software, undertake the project management and provide documentation aspects of the project.

► Camera configuration

The system primarily uses JAI CM-040GE cameras (Figure 1), with some JAI TM-2040GE and JAI TM-4200GE cameras. Each camera is connected to a bank of 2U industrial PCs via a series of high performance switches. The majority of cameras use CAT6 cables for transmission and control but some are located in a high EMC environment so require fibre transmission via media converters. A large proportion of the cameras need to take an image of an event that is asynchronously triggered by the customer's timing system so STEMMER IMAGING has developed a trigger distribution system which transmits the trigger signal over fibre optic cables to fibre-to-TTL convertors located close to the cameras. The resultant

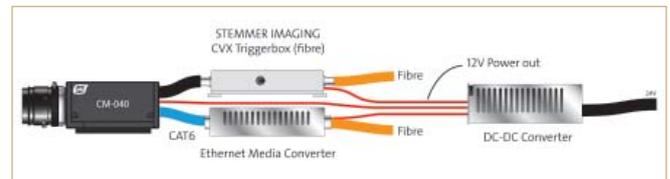
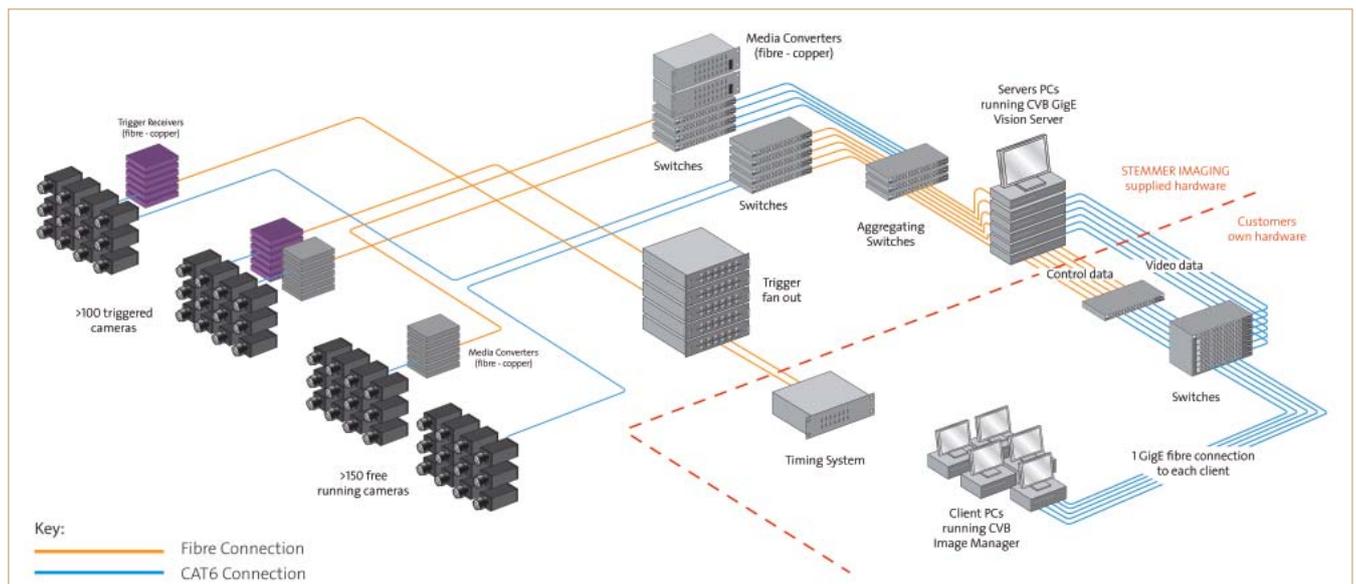


Fig. 1: Detail of triggered camera configuration

triggered images are held in the cameras' memory before being requested by the PCs in order to manage utilisation of the limited available bandwidth.



The system makes full use of the speed and flexibility offered by Gigabit Ethernet, allowing a very large and complex setup to be realised using standard network hardware and topology.



► Data transmission

The bank of 'server' PCs pass their acquired data to a number of 'client' PCs that are used by the operators. This has proven a perfect application for the GigE Vision Server software module from STEMMER IMAGING's Common Vision Blox imaging toolkit. This software makes the output of the server PC appear to the client as though it is a GigE Vision compliant camera and provides a highly efficient method of transmitting the image data. In "live mode" the output of any subset of the 250+ cameras can be selected by the users for simultaneous viewing on any of the client PCs. The servers

manage the acquisition and control of the cameras and transmit the image streams to the clients via the GigE Vision Server link. The GigE Vision server software can multicast the image data if a single camera feed needs to be viewed on multiple clients. The client PCs are running the Image Manager component of CVB, though in theory this could equally be any GigE Vision compliant software as the image stream from the Server is no different from that of a GigE Vision compliant camera.

► System considerations

The end customer has high level requirements for the system to be scalable, adaptable and maintainable over a long period of time. GigE Vision was therefore a logical choice as it has been adopted by so many of the leading camera manufacturers. The use of commercial off the shelf networking and computing components means that the system can easily be modified to take advantage of their ever increasing speeds.

In a project of this complexity, a close working relationship between all parties was essential. Giles Doe, Managing Director of, Perceptive Solutions Ltd, observes: "With proven experience of delivering complex and demanding vision systems to blue chip companies around the world, we took responsibility for implementing the core technology to meet the customer's requirements – understanding the customer's needs and translating that into a fully functional solution. Our remit extended to project management, full system testing and documentation as well as producing the end user software interface, and I am indebted to Steve Cronk, our Technical Director, for his contribution. As a respected value-added partner, STEMMER IMAGING provided all the essential components for a working and tested solution including cameras, cables, power supplies, media convertors, switches, PCs and CVB software along with the network topology definition and the development of a custom trigger distribution system."

Martin Kersting Technical Director at STEMMER IMAGING commented, "This project is a great example of how we can go beyond the supply of components but also develop and customise both hardware and software to deliver a bespoke validated solution for a customers need."

CVB and the CVB GigE Vision Server have recently been evaluated by the Automated Imaging Association (AIA) and have been found to be fully compatible with the GigE Vision standard and therefore work with all GigE Vision and GenICam-compatible camera and software products worldwide. The AIA software validation extends far beyond the previous software certification, which was based only on the unverified assurances of the manufacturer that the product met the standard. In contrast to that procedure used for software products, users can recognise validated GigE Vision hardware from the official GigE Vision® logo. Only products with this logo have been tested by the AIA as to their GigE Vision compatibility.

► COMPONENTS

Imaging components supplied by STEMMER IMAGING:

- | | |
|--|---|
| <input checked="" type="checkbox"/> Illumination | <input checked="" type="checkbox"/> Acquisition |
| <input checked="" type="checkbox"/> Optics | <input checked="" type="checkbox"/> Software |
| <input checked="" type="checkbox"/> Cameras | <input checked="" type="checkbox"/> Systems |
| <input checked="" type="checkbox"/> Cabling | <input checked="" type="checkbox"/> Accessories |

► OUR PARTNER PERCEPTIVE SOLUTIONS

Perceptive Solutions (www.perceptivesolutions.co.uk) are an independent company specialising in the Design and Development of Vision Solutions. Their customers are Computer Vision OEMs, VARs and Corporate Customers, to whom they provide Vision Development Expertise.

Their high level of software and design expertise means that they are ideally placed to help with challenging vision projects. Projects are either undertaken in-house or through a network of experienced Vision/Image Processing Software Engineers that they manage, in order to realise the goals of their clients. Projects are managed to the Client's Quality Procedures.

Perceptive Solutions are product independent and undertake work on any image processing platform, and have experience in SmartCamera's, PC and Embedded software development.